Renewable and Alternative Energy as a Source of Electricity in Alberta
Report to the CASA Board

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Clean Air Strategic Alliance

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The CASA board of directors reviewed this report and the recommendations within at its December 01, 2005 meeting.

This report is available as an Adobe Acrobat™PDF on the CASA Web site at **http://www.casahome.org**

About this Report

This report contains the results of the Renewable and Alternative Energy Project Team's discussions and its recommendations to the CASA board. Despite sincere commitment and extensive discussions, the team was unable to reach consensus on matters related to recommendations 2, 3, 4, 11, 18 and 19. Stakeholder positions on the non-consensus recommendations are described in the body of the report in italicized font used to describe various options.

The Renewable and Alternative Energy Project Team presented this report to the CASA board on December 1, 2005. The CASA board approved, by consensus of its industry, government and non-governmental stakeholders, the 17 consensus recommendations (Recommendations 1, 5-10, 12-17, 20-23) with the aim of increasing the supply of renewable and alternative electrical energy in Alberta. Consensus recommendations are indicated in the body of the report in Arial 10 font.

The board did not discuss the six non-consensus recommendations (Recommendation 2, 3, 4, 11, 18, 19), but instead agreed that the CASA Renewable and Alternative Energy Project Team would work with the Government of Alberta on a policy framework to encourage the development of renewable and alternative electrical energy in Alberta.

Acknowledgements

The Renewable and Alternative Energy Project Team gratefully acknowledges the financial contribution of Alberta Environment in support of the team's work. A number of stakeholders also supported the team by hosting meetings and contributing valuable staff resources behind the scenes.

All members of the team were very committed to completing their task and the volunteer time and energy is very much appreciated.

About CASA

The Clean Air Strategic Alliance (CASA) is a multi-stakeholder partnership, composed of representatives selected by industry, government and non-government organizations. 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.

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Acronyms and Abbreviations

AESO	Alberta Electric System Operator
CASA	Clean Air Strategic Alliance
CHP	Combined heat and power
CO_2	Carbon dioxide
EDC	Energy Demand Consulting Associates
ENGO	Environmental Non-Government Organization
EPT	Electricity Project Team
ERG	Energy Recovery Generation
EUB	(Alberta) Energy and Utilities Board
GHG(s)	Greenhouse gas(es)
kWh	Kilowatt-hour
LFE	Large Final Emitter
MWh	Megawatt-hour
NOx	Nitrogen oxides
RAE	Renewable and Alternative Energy
REC	Renewable Energy Certificate
RPPI	Renewable Power Production Incentive
SO_2	Sulphur dioxide
SOx	Sulphur oxides
WREGIS	Western Renewable Energy Generation Information System

Executive Summary

Increasing the amount of power generated from renewable and alternative energy sources was an important issue for CASA's Electricity Project Team (EPT). The EPT made ten recommendations related to renewable and alternative energy in its 2003 report, one of which was to establish a multi-stakeholder process to continue work in this area. The Renewable and Alternative Energy (R&A) Project Team was formed in January 2004 to determine ways in which Alberta's supply of renewable and alternative electrical energy could be increased to meet the target of 3.5% new renewable and alternative electrical energy by 2008.

The R&A Project Team supports Alberta's 3.5% target, as described in *Albertans & Climate Change: Taking Action.*[1] The team proposes that the target be achieved based on the 2008 calendar year, and that the CASA R&A project team be reconvened in 2007 to assess progress toward meeting the target. The team is also proposing a method for calculating progress toward meeting the target. Using data from the EUB and other sources (such as industry disclosure on its contributions to the target), Alberta Environment will calculate and report annually on total incremental production from renewable and alternative energy sources.

The team recommends a definition for Renewable Energy Certificates (RECs) that is consistent with definitions used by other agencies. It also recognized the need for reliable information and tracking system for Alberta to facilitate the exchange of RECs. It proposed that such a system be adopted and implemented as soon as one is available for this purpose. Recognizing the need for greater awareness on the part of electricity consumers, the team recommends that the provincial government initiate a consumer awareness and education campaign to be collaboratively undertaken by government and interested electricity market and industry participants.

Main Areas of Non-Consensus

Despite sincere commitment and extensive discussions, the team was unable to reach consensus in several key areas. Various stakeholder positions are presented in detail in the report, but the areas of non-consensus are summarized below.

Process to Review Barriers, Targets and Contribution of Waste Heat

In addition to the 2007 review of progress toward meeting the 2008 target, the R&A team identified several other tasks that could be considered by a 2007 multi-stakeholder renewable and alternative energy group. These tasks for consideration included establishing targets for R&A energy for 2010 and 2012 and recommending mechanisms to achieve them, and engaging a consultant to complete an economic forecast and review of existing barriers for R&A energy. The R&A team agreed that the 2007 team should also determine waste heat's contribution to, among other things, future targets, any emission trading system established in Alberta, and other elements of renewable and alternative energy management. Although members agreed a CASA team should do the progress review, they did not agree that a CASA consensus process was the best way to complete the other tasks. The rationale was that CASA teams had been unable to achieve consensus in these areas to date, and stakeholder positions were unlikely to change significantly in 12 to 18 months.

[1] Online at http://www3.gov.ab.ca/env/climate/actionplan/index.html.

Approaches for Meeting the 2008 Target
The team is hopeful the commitment expressed to a voluntary approach will result in the 2008 target being met. However, members could not agree on what the appropriate response should be if it appears in the 2007 progress review that the target will be missed. The key area of disagreement pertained to the development of mechanisms for meeting the target. Members discussed several options for meeting the 2008 target, including: the use of emissions trading; renewable portfolio standard requirements; the provision of production incentives; and the use of flow-through tariffs. However, with deregulation of the electricity generation sector, the policy of the Government of Alberta is to not favour one fuel or generating technology over any other. Failure to agree on mechanisms to meet the target was linked to the lack of consensus on including R&A energy in Alberta's baseline and credit emission trading system, which some members regarded as the best way to ensure the 2008 target is met, particularly given the lack of availability of any other mechanisms in the current policy context.

Emission Trading as a Supportive Mechanism
An emission trading system is one tool that could contribute to the increase of renewable and alternative energy in Alberta. The Renewable and Alternative Energy Project Team discussed at length including R&A energy in the 2006 NOx/SO_2 emission trading system as a mechanism to encourage new renewable and alternative energy development, but could not agree on whether it should be included at the present time. The key area of disagreement was how much credit R&A energy should be given for NOx and SO_2. Thus the team has not made a recommendation on whether renewable and alternative energy should be included in the 2006 emission trading system, but describes in the report the baseline options and background rationale proposed by each stakeholder group.

Establishing Future Targets
Setting a renewable and alternative energy target beyond 2008 was one of the key objectives for the project team. The team discussed a wide range of factors that influence the development of R&A energy, acknowledging that many aspects of this sector are in flux, uncertainty remains about issues that are key to R&A development, and it would be prudent to defer the setting of 2010 and 2012 targets for the 2007 team. Minimum future targets were proposed, on the basis that these would encourage R&A expansion in a timely manner, but given the uncertainties and the lack of agreement on mechanisms for achieving the current target, consensus was not achieved on including minimum future targets.

Waste Heat
The team could not agree on either a definition of waste heat for facilities larger than 5 MW, the size limit in the EPT definition for alternative energy sources, or on the contribution of waste heat toward the 2008 target. The team did agree waste heat should be encouraged and therefore, its contribution toward future targets will be addressed again in 2007.

Not all items in the team's terms of reference were entirely completed. The R&A team supports the continued consideration of these other initiatives and mechanisms, particularly the need for additional incentives for renewable and alternative energy, including supplementing federal incentives such as the Wind Power Production Incentive and the Renewable Energy Deployment Initiative, developing a solar infrastructure initiative, and other consumer engagement initiatives.

Recommendations

Rec. #	Recommendation
1	**Reviewing Progress Towards Meeting the 2008 Target of 3.5%** In the first quarter of 2007, the CASA Renewable and Alternative Energy project team be reconvened to assess progress towards meeting the 2008 3.5% target.
2	**Review of Barriers, Targets and Contribution of Waste Heat** *No consensus*
3	**Meeting the 2008 Target** *No consensus*
4	**i. Including Renewable and Alternative Energy in the 2006 Provincial Emissions Trading System** *No consensus*
	ii. NOx and SO_2 Baselines for Renewable and Alternative Energy *No consensus*
5	**Role of Renewable and Alternative Energy in Managing Greenhouse Gas Emissions** The federal and Alberta governments continue to explore and influence the role that renewable and alternative energy plays in a system intended to manage greenhouse gases.
6	**Supportive Policies** The Government of Alberta implement supportive policies to enable the 3.5% target to be achieved.
7	**Transmission Infrastructure Constraints** The AESO, EUB and other stakeholders use best efforts for the timely resolution of any transmission constraints that may exist in areas where renewable and alternative energy generation occurs or is expected to occur in the future.
8	**Calculating Progress Towards Meeting the Target** Alberta Environment use the following formula to calculate progress towards meeting the target: Total electricity produced from new[2] renewable and alternative sources *Divided by* Electric energy distribution sales Where: *Total electricity produced from new renewable and alternative sources* means the electrical output in megawatt-hours of facilities that meet the definition of renewable and alternative energy in EPT Recommendation 57, including behind the fence generation. *Electric energy distribution sales* means the sum of "distribution sales" of electricity to regional distribution companies, as reported to the EUB and which will be adjusted by the EUB and/or AESO to account for new renewable and alternative electricity generated behind the fence. Alberta Environment will make best efforts to ensure this metric is accurate by using additional sources such as industry disclosure on their contributions to the target and/or sources of information that offer higher resolution or better quality and reliability if they are readily available to it. Such sources may include WREGIS (if and when operational) or the AESO or other.

[2] "New" as defined in recommendation 57 of the Electricity Project Team; see Appendix B.

Rec. #	Recommendation
9	**Eligibility of Upgraded Facilities that Produce Incremental Electricity to Meet the 3.5% Target** The calculation of the 3.5% target for new renewable and alternative energy include the net incremental electrical energy output of facilities that have undergone retrofits after December 31, 2001 in order to upgrade the facility to meet the CASA definition of renewable and alternative energy (in Recommendation 57 of the EPT final report).
10	**Effective Implementation Date for 3.5% Target** The 3.5% target for new renewable and alternative energy be achieved for the 2008 calendar year.
11	**Establishing Future Targets** *No consensus*
12	**Reporting Progress Toward Meeting the Target** (a) Starting in 2006, Alberta Environment report the total incremental production from renewable and alternative energy sources that is produced on an annual basis and where it is in relation to achieving the target. (b) Starting in 2006, on a voluntary basis, Retailers and large consumers disclose directly to the public on an annual basis, the share of their retail portfolio that is based on renewable and alternative energy.
13	**Definition of a Retailer** Notwithstanding the definition of a retailer in the *Electric Utilities Act*, a Retailer for the purposes of this report means persons that provide electricity services directly to a customer, to themselves, and/or to eligible customers under a regulated rate tariff.
14	**Retailer as a Singular Corporate Entity** The 3.5% target apply to the Retailer as a singular corporate entity; that is, in the case where Retailers have both regulated and competitive customers, the 3.5% target applies to their entire customer base.
15	**Definition of a Renewable Energy Certificate (REC)** A REC be defined as the instrument that embodies all non-energy environmental and social attributes of electricity generated using renewable and alternative energy sources. A REC is measured in MWh and is created at the time electricity is generated at any facility that meets CASA's recommended definition of renewable and alternative energy,[3] and is measured by a revenue-quality meter, or the power output of which can be derived through mathematical calculations from the readings of other revenue-quality or comparable meters on-site at a rate of one REC per MWh of electrical output. The environmental and social attributes of a particular REC are a function of the characteristics of the generating facility at the time the associated electricity was generated. For the purposes of accounting for Alberta's target for 3.5% new renewable and alternative electricity, all RECs created at any facility that meets the Renewable and Alternative Energy Project Team's definition are deemed equivalent. The property rights to a particular REC belong to the owner of the generation facility and may be transferred by contract or sale or retired permanently together with or separately from the underlying electricity.
16	**Use and Implementation of a Tracking System in Alberta** a) As soon as available, the Government of Alberta adopt WREGIS, or a similar system, as an information and tracking system for purposes of improving the tracking and exchange of RECs.

[3] This definition is contained in the CASA Electricity Project Team's recommendation 57, which was approved by the CASA board in 2003 and adopted by the Government of Alberta in 2004.

Rec. #	Recommendation
	b) As soon as possible, and on an ongoing basis when the system is available to accept the data, AESO submit generation data for facilities registered with WREGIS (or a similar system).
17	**Consistent Terminology** To avoid confusion and potential misunderstanding, CASA documents use the phrase "Renewable Energy Certificates" or "RECs" instead of its conventional synonyms, "Green Tags" and "Green Certificates," which may have other meanings in other documents.
18	**Definition of Waste Heat** *No consensus*
19	**Recognizing Waste Heat** *No consensus*
20	**Waste Heat's Contribution** When the reconvened team comes together again in 2007 they determine waste heat's contribution to: • future targets, • any Alberta emission trading system, • definition of a REC, • upgraded facilities, • any Alberta tracking system or • other future aspect of renewable and alternative energy management. The 2007 team will appropriately adjust the future targets to recognize the contribution of waste heat and other alternative energy sources to Alberta's targets. The 2007 team will not discuss the definition of waste heat or the inclusion of waste heat, as it relates in the 2008 3.5% target, unless Alberta Environment adopts a new definition between now and 2007 for projects over 5 MW.
21	**Interconnected Micro-generation** Alberta Energy complete as soon as possible the review of the technical, legal and financial issues associated with distributed micro-generation, including net metering and net billing, and provide policy direction for the industry.
22	**Areas Requiring Further Work** Key task areas 2b, 2c and 2e from the Renewable and Alternative Energy project team's terms of reference continue to be pursued. In particular, the team recommends that the Government of Alberta and any future CASA Renewable and Alternative Energy project teams explore the need for additional incentives for renewable and alternative energy, including supplementing federal incentives such as the Wind Power Production Incentive and the Renewable Energy Deployment Initiative, developing a solar infrastructure initiative, and other consumer engagement initiatives.
23	**Consumer Awareness and Education** In 2007 at the latest, the provincial government initiate (possibly through Climate Change Central) a consumer awareness and education campaign to be collaboratively undertaken by government and interested electricity market and industry participants with the following objectives: • Raise public awareness about the environmental attributes of renewable and alternative energy and the role renewable and alternative energy plays in Alberta • Educate the public about the options that are available to them with regard to the electricity that they consume

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 2004, coal generated 64.4% of Alberta's electricity; natural gas provided 30.4%; and the remaining 5.2% was generated by hydro, wind, biomass and other sources.[4]

The province's electricity sector has seen substantial change in recent years, including a full shift to deregulation (effective January 1, 2001) and a growing demand for power, which has put pressure on utility companies to expand generation in anticipation of meeting future needs. Although Alberta has a wide range of energy resources available, various challenges are associated with each one. For example, coal-fired generation produces a range of air emissions including sulphur dioxide, oxides of nitrogen, mercury and other toxins, primary particulate matter and greenhouse gases. Gas-fired units are sources of nitrogen oxides and other toxic compounds as well as greenhouse gases. Concerns have been raised about the health and environmental impacts of these emissions.

One way to reduce air emissions from the electricity sector is to increase the amount of power generated from sources that produce few or no emissions. These could include wind, solar, small hydro, biomass, and alternative sources such as small on-site generators that use waste heat or gases. When these types of power displace electricity from traditional fossil fuel sources, overall emissions decrease and the emissions intensity of this sector goes down. Although these sources of electricity produce fewer emissions, not all of these sources are completely emissions free. Plus, they can also face other challenges related to things like the intermittent nature of wind and solar generation.[5]

Canada, like other countries, is showing considerable interest in renewable and alternative energy, particularly in light of international commitments for reducing greenhouse gases. As well, in 2002, the Government of Alberta released *Albertans & Climate Change: Taking Action*[6], part of the Government's plan for reducing greenhouse gas emissions. This plan called for a 3.5% increase in the use of electricity generated from renewable and alternative energy sources by 2008. To indicate its commitment to this goal, the provincial government is currently purchasing over 90% of its own electricity needs from renewable and alternative energy sources.[7]

[4] Source: Alberta Energy and Utilities Board, 2004; *2004 EUB Alberta Electric Industry Annual Statistics.*
[5] There are also economic challenges for the electricity generation sector as a whole, which the team acknowledged and briefly discussed (e.g., volatile gas prices, transmission capacity) but decided it could not address in detail.
[6] This document is online at http://www3.gov.ab.ca/env/climate/docs/takingaction.pdf; see page 34.
[7] See http://www.gov.ab.ca/acn/200303/14035.html.

2 Background on the Renewable and Alternative Energy 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 renewable and alternative energy to contribute to improved air quality in Alberta, the EPT established the Renewable and Alternative Energy subgroup. Its mandate was to look at renewable and alternative energy targets and mechanisms for achieving them, and to report back to the team on its recommendations.[8] With the help of this subgroup, the EPT was able to:

- reach agreement on a definition of renewable and alternative energy and a means of measuring whether the target has been achieved;
- identify a preferred option and five other ways to achieve the target; and
- clarify a number of other issues, challenges, and opportunities in the renewable and alternative energy sector in Alberta.

The EPT also described a number of important issues that remained outstanding, such as: how costs could flow through in a deregulated system, linkages of renewable and alternative energy to the emission trading system, and the setting of further targets. The EPT could not complete its examination of these items due to time constraints, the need for clarification of federal government policies, and analysis of the market impact of more ambitious targets. Nevertheless, the final report of the EPT contained ten recommendations on renewable and alternative energy (recommendations 55 to 64), one of which was to establish a multi-stakeholder process to continue work in this area. The CASA board accepted all of the recommendations, including that a new project team be established to attempt to address the outstanding issues. The Renewable and Alternative Energy Project Team was formed in January 2004 (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).

This report contains the results of the Renewable and Alternative Energy Project Team's discussions and its recommendations to the CASA board.

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

3 Goal of the Renewable and Alternative Energy Team

The project team's goal was to implement the renewable and alternative energy recommendations in the EPT report, with the aim of increasing Alberta's supply of renewable and alternative electrical energy to meet the target of 3.5% new renewable and alternative electrical energy, as defined in recommendation 57 of the EPT report.

Recommendation 57 has been adopted by the Alberta Government as the definition for renewable and alternative energy for Alberta.[9] It states:

Renewable and Alternative Electricity is defined as that which is:

a) Power generated within the province of Alberta; and
b) EcoLogo™ compatible in that it meets the EcoLogo™ criteria for Renewable Low-Impact Electricity, but from facilities that are not necessarily EcoLogo™ certified;

OR

Alternative electricity supplies whose source meets the following criteria:
a) 5 MW or less; and
b) Greenhouse gas intensity less than or equal to natural gas combined cycle (418 kg per MWh).

Projects eligible for the target would be those that begin producing electric energy after December 31, 2001.

The Renewable and Alternative Energy (also referred to as "R&A") project team used this definition as the foundation for its work. The team confirmed that although all stakeholders maintain support for this Alberta definition of renewable and alternative energy, some stakeholders felt it did not adequately address all sources of alternative energy.

To achieve its goal, the R&A project team took on four objectives:

1. Develop tools and mechanisms to facilitate meeting the target and to implement the renewable and alternative electrical energy recommendations as described in the EPT report.
2. Develop a renewable and alternative electrical energy target beyond 2008, with corresponding tools and mechanisms.
3. Develop cost-effective approaches and programs that enable the development of renewable and alternative electrical energy.
4. Develop interim benchmarks and reporting for the period between the present and January 1, 2008 to determine if the target is achievable and allow for adjustments to ensure the target is reached.

These objectives were to be achieved by a list of tasks, as outlined in the team's Terms of Reference in Appendix B. The team agreed that not all of these tasks have been completed at the time of this report. Therefore, it is expected that the 2007 team (see recommendation 2) will review its Terms of Reference at the beginning of its work.

[9] The EcoLogo™ mentioned in recommendation 57 is Canada's Environmental Choice Program label. The product or service carrying the label has been rigorously assessed and complies with the certification criteria of the Program. See www.environmentalchoice.com for more information.

4 Renewable and Alternative Energy Targets

Targets were a key issue since the R&A team's goal was to increase renewable and alternative energy in Alberta. The team's main tasks were to work out the details around targets for Alberta, including timelines, measurement, monitoring, reporting on targets and, ultimately, how to determine success in achieving targets, and what stakeholders in Alberta should do if the targets are not achieved. The R&A team feels that finalizing these implementation details will lead to increased renewable and alternative energy production in Alberta.

4.1 The 2008 Target

Alberta's target in *Albertans & Climate Change: Taking Action*[10] was to "increase the renewable and alternative energy portion of total provincial electrical energy capacity by 3.5% by 2008." This target was endorsed by the EPT in Recommendation 55 of its 2003 report, and the R&A team has confirmed that stakeholders maintain support for this target and that achieving this target should be a priority for Alberta.

4.1.1 Reviewing Progress Towards the 2008 Target

Stakeholders generally agreed that the province was "on track" in its efforts to reach the 3.5% target by 2008. In 2003, 1.2% of electricity sales in Alberta were generated from new renewable and alternative energy, as defined by the EPT; this definition is restated in Section 3 of this report. For more details on how this figure was calculated, see Appendix C.

Even though progress is being made, the team noted that many factors could influence whether the target is achieved. The R&A team therefore recommends a progress review as the target date draws nearer.

Recommendation 1: Reviewing Progress Towards Meeting the 2008 Target of 3.5%

The Renewable and Alternative Energy Project Team recommends that:

> In the first quarter of 2007, the CASA Renewable and Alternative Energy project team be reconvened to assess progress toward meeting the 2008 3.5% target.

The team did agree that when stakeholders come together in 2007, they will outline dates for future progress reviews.

Achievement of the target will be based on the full 2008 calendar year, but members recognized that, with a review in 2007, the reconvened team would have only 2006 data available. However, the reconvened team will consider all new renewable and alternative energy that has been developed since 2001, and do its best to determine the amount of additional R&A generation that is expected to come on-stream during 2007 and 2008.

Recommendation 2: Review of Barriers, Targets and Contribution of Waste Heat

The R&A team identified additional tasks that could be undertaken through a multi-stakeholder process in the 2007 timeframe. However, team members had differing views on the process by which these tasks should be undertaken.

[10] This document is online at http://www3.gov.ab.ca/env/climate/docs/takingaction.pdf; see page 34.

OPTION A
It is recommended that the reconvened CASA Renewable and Alternative Energy Project Team should also consider undertaking the following:

- *As part of its progress review, and after the 2006 data are available, the team may wish to consider engaging an independent qualified third party with skills in economic forecasting and knowledge of renewable and alternative energy to complete an economic forecast and a review of the existing barriers, including economic barriers, for renewable and alternative energy.*
- *Establishing targets for renewable and alternative energy for 2010 and 2012, and recommending mechanisms required to achieve these targets.*
- *Addressing waste heat as described in recommendation 20.*
- *Reviewing all areas of non-consensus from the 2005 report.*

Option A was supported by government, ENGOs and most industry representatives. It was blocked by some industry representatives who felt the CASA process was not the best way to do this work.

OPTION B
It is recommended that a multi-stakeholder group established by the Government of Alberta should consider the following:

- *After the 2006 data are available, consider engaging an independent qualified third party with skills in economic forecasting and knowledge of renewable and alternative energy to complete an economic forecast and a review of the existing barriers, including economic barriers, for renewable and alternative energy.*
- *Establishing targets for renewable and alternative energy for 2010 and 2012, and recommending mechanisms required to achieve these targets.*
- *Addressing waste heat as described in recommendation 20.*
- *Reviewing all areas of non-consensus from the 2005 report.*

Option B was supported by some industry members, and other industry members said they could live with it. It was blocked by government and ENGOs who were of the view that the work should be done through the CASA process.

4.1.2 Implementation Method for the 2008 Target

The EPT was given the task of determining a way the 3.5% target could be implemented. It concluded that the "retailer-based" method was the best option for reaching the target. With this method, retailers would voluntarily undertake to include in their electricity portfolio 3.5% of new renewable and alternative power by 2008. The EPT noted, however, that Alberta retailers could not fully implement this method until several key issues were resolved. One key issue was whether and how retailers would flow through increased costs of renewable and alternative energy to their regulated customers under current legislation.

The R&A team was charged with resolving some of the issues related to implementing the 2008 target. The team held many discussions on the retailer-based approach and other mechanisms that could be implemented to achieve the target. An important point for the team was the desire to maintain maximum flexibility for Alberta stakeholders.

The team agreed that the current system in Alberta is working to increase the amount of renewable and alternative energy in the province. This system provides opportunities for many entities to purchase or produce renewable and alternative energy, all of which will be included in calculating progress towards the 3.5% target. Therefore, the team is not making specific recommendations on one method of implementation.

Despite the actions recommended in this and previous reports, it is possible that the 3.5% target will not be met. The team had a wide-ranging discussion on what the response should be if it appeared in 2007 that the 2008 target would not be met. To determine how close Alberta is to meeting the target, a progress review has been recommended for 2007, to be undertaken by the reconvened CASA R&A team (recommendation 1).

Recommendation 3: Meeting the 2008 Target

The team could not agree on what the appropriate response should be in case it appears in the 2007 review that the 2008 target will be missed. A key area of disagreement pertained to the development of mechanisms to ensure that the target is met.

- Environmental non-government stakeholders believe that a regulatory approach, in combination with market forces, is the best way to make sure the target is met. Key regulatory mechanisms could include implementation of a Renewable Portfolio Standard (RPS) or provision of production incentives (similar to the federal Wind Power Production Incentive) or flow-through tariffs.
- Industry stakeholders see the establishment of a renewable and alternative energy linkage to emission trading as the best way to encourage meeting the target. Some industry stakeholders do not currently support, nor are likely to support in the future, a policy framework that includes a requirement on retailers or consumers to purchase renewable and alternative energy.
- The Government of Alberta is committed to a deregulated electricity market and does not believe regulation should favour any one fuel or generating technology.

Three options were proposed for responding if it appears that the 2008 target will not be met. These options are presented below, along with the views of the stakeholders. The "2007 team" mentioned in these options is the team to which options A and B in recommendation 2 refer.

OPTION A, proposed by government stakeholders

It is recommended that:
During the 2007 review, if it appears that the 2008 3.5% target will not be met, the 2007 team develop recommendations on a policy framework that will achieve the target. The policy framework could comprise mechanisms required to support achievement of the target, including (but not limited to) amendments to emissions trading to bring in renewable and alternative energy; an electricity market that is open and accessible with no barriers to renewable and alternative energy development; and/or regulatory, supportive and other appropriate mechanisms that develop over time. If the 2007 team does not reach consensus on its mandate within six months of being formed, the Government of Alberta will develop and implement a policy framework to achieve the 2008 target.

Option A was preferred by government stakeholders and blocked by ENGOs because ENGOs felt the regulatory approach described in option C was more likely to ensure the target would be met. Some industry members also blocked option A because they do not support the

reference to a possible regulatory approach. Some industry members could live with option A or B. Other industry members did not block option A, but fully supported option B.

OPTION B, proposed by industry stakeholders
It is recommended that:
During the 2007 review, and after the 2006 data is available, an independent, qualified party with skills in economic forecasting and knowledge of renewable and alternative energy should complete an economic forecast and a review of the existing barriers, including economic barriers, for renewable and alternative energy. If this forecast shows that the 2008 target of 3.5% will be missed by more than 10% (that is, the target reached is less than 3.15%, which accounts for the anticipated error in data collection and measurement), the 2007 team develop recommendations on a policy framework that addresses the barriers, including economic barriers, for renewable and alternative energy so that the 3.5% target can be achieved.

The policy framework should include mechanisms required to support achievement of the target, including (but not limited to) amendments to existing emissions trading for renewable and alternative energy; an electricity market that is open and accessible with no barriers to renewable and alternative energy development; and/or regulatory, supportive and other appropriate mechanisms that develop over time. Industry does not currently support, nor is likely to support in the future, a policy framework that includes a requirement on retailers or consumers to purchase renewable and alternative energy. If the 2007 team does not reach consensus on its mandate within six months of being formed, the Government of Alberta will develop and implement a policy framework to achieve the 3.5% target.

Some industry stakeholders supported option B, but some industry representatives indicated they could not support option B due to the reference to possible regulatory mechanisms. Government could live with option B. ENGOs blocked option B because it too was not seen as strong enough to ensure the 2008 target is met.

OPTION C, proposed by ENGO stakeholders
It is recommended that:
During the 2007 review, if it appears that the 2008 3.5 % target will not be met, the 2007 team develop a regulatory mechanism. If consensus is not reached on a regulatory mechanism within six months, the Government of Alberta develop and implement a regulatory mechanism to ensure that the target is met.

ENGOs supported option C because they believe that regulated initiatives would increase Alberta's percentage of renewables and alternative energy to a greater extent than open and competitive market forces alone, and preferred a Renewable Portfolio Standard (RPS).

Industry and some government stakeholders blocked option C because they do not support the use of any regulatory mechanisms to achieve the 2008 target.

4.1.3 Supporting Mechanisms for the 2008 Target

Recommendations from the 2003 EPT report required that Alberta Environment establish a NO_x/SO_2 baseline and credit emission trading system for the electricity sector by January 1, 2006. The EPT generally agreed that, as a management tool, an emission trading system provided flexibility to industry in how it meets new, more stringent emission standards.

The baseline and credit system was recommended for three types of electricity generation in Alberta: coal, gas and co-generation. These generators will be required to first determine their deemed credit threshold[11] or their emission intensity credit values. If they operate below these values, they can generate credits, which can be banked or sold to units that operate above these values. The EPT did not make consensus recommendations on these values for renewable and alternative energy. The EPT report (page 45) did state that, "The team agreed to recommend the baseline and credit approach, with further discussion to take place on the role of renewable energy and alternative generation in the electricity sector." Recommendation (64i) further directed a new R&A team to examine ways in which the Alberta emission trading system might be used to assist in developing renewable and alternative energy. Further, EPT recommendation 9 states, in part: "Alberta Environment, in consultation with the multi-stakeholder committee, examine opportunities to merge or harmonize the NOx/SO_2 emissions management system for the electricity sector with a cross-sectoral cap and trade or any other form of emissions trading system. *Access by any other types of electricity generators to any provincial SO_2/NOx trading system should also be examined at that time*." (emphasis added)

During the summer and fall of 2005, Alberta Environment was developing the regulations to accompany the implementation of the baseline and credit system in 2006. The Government was bound by the recommendations in the EPT report, which did not include renewable and alternative energy in the proposed emission trading system. This was a crucial area for the R&A team and considerable time and effort went into understanding the various stakeholder perspectives.

The Renewable and Alternative Energy Project Team agreed that:

- Renewable and alternative energy provides many benefits to society as a whole.
- New renewable and alternative energy development should be encouraged to help Alberta achieve the 2008 target.
- Mechanisms are needed to encourage and support the expansion of renewable and alternative energy development. One mechanism is including renewable and alternative energy in a provincial emission trading framework and its regulations.

Emissions Trading as a Supportive Mechanism

An emission trading system is one tool that could contribute to the increase of renewable and alternative energy in Alberta. The Renewable and Alternative Energy Project Team discussed at length including R&A energy in the 2006 NOx/SO_2 emission trading system as a mechanism to encourage new renewable and alternative energy development, but could not agree on whether to recommend including it at the present time.

Recommendation 4i: Including Renewable and Alternative Energy in the 2006 Provincial Emissions Trading System

It is recommended that:
Renewable and alternative energy be included in the 2006 emission trading system in Alberta at a level that represents the benefits of renewable and alternative energy.

[11] The CASA EPT recommended the establishment of a "deemed credit threshold" for the NOx and SO_2 emission limits where emission credits would only be created for operating below the build-in operational variability in approved emission limits. See Appendix E for details.

This recommendation was supported by industry stakeholders because of the symbolic value of linking to the emission trading system. Government stakeholders do want to see R&A energy included in an Alberta emission trading system in the future, but not until reliable baseline numbers are known (see recommendation 4ii, option C for the Government's position).

Although concerned about potential degradation of the environmental integrity of the 2006 NOx/SO_2 emissions trading system, ENGOs were prepared to consider including renewables and alternatives in this system, but blocked recommendation 4i because the team was not able to agree on baseline and credit values to assign to R&A energy.

Further explanation of stakeholder positions on emission trading issues is provided in conjunction with recommendation 4ii below.

As the team began to investigate the details of how renewable and alternative energy could be included in an expanded emissions trading system, a number of challenges became apparent:

- The current policy context in Alberta offers no other incentive mechanisms for renewable and alternative energy that the team could explore.
- Some key factors, which are beyond the control of the Renewable and Alternative Energy Project Team, could affect an expanded system that includes renewable and alternative energy; among these factors are gas prices, any future imports and exports, and population and demand growth or decline.
- The various types of renewable and alternative energy have different emissions and intensities and in its discussions about including R&A in an expanded emission trading system, the team tried to establish one number that would work for all sources.

Recommendation 4ii: NOx and SO_2 Baselines for Renewable and Alternative Energy

The team agreed to explore inclusion of R&A energy in the 2006 Alberta NOx/SO_2 emission trading system. Members, particularly industry and ENGO stakeholders, engaged in lengthy negotiations around what NOx and SO_2 emission intensity credit values should be assigned to R&A energy sources. With an agreed starting point that renewable and alternative energy should be supported, that current economics are marginal for R&A projects, and that expansion of this sector would be good for Alberta, members looked at the emissions intensity credit values that had been previously agreed to for new gas, and considered demand forecasts for electricity in Alberta and how future marginal units might be displaced. The team was also advised that CASA may be involved in efforts to expand the baseline and credit system, and that some of these issues might be further examined through that process.

In the end, agreement could not be reached on how to distribute the environmental benefits of renewable and alternative energy through the allocation of credits under the baseline and credit system, so the baseline options and background rationale proposed by each stakeholder group are described below.

OPTION 4ii-A: Background and Recommended NOx and SO_2 Baselines, proposed by industry stakeholders

The key concern for the R&A industry is the symbolic message that R&A generation is a better alternative than all types of coal and gas generation in terms of emissions. The emission trading link is the only incentive industry participants have unanimously asked for, as there did

not seem to be any other incentive mechanisms for renewable and alternative energy in Alberta that the team could explore.

The issue from an industry perspective is to provide a clear linkage between the purchase of R&A generation and the NOx/SO_2 emission trading system that adheres to the three principles of environmental integrity, efficient operation and public transparency. An emission trading system without R&A energy is sending a signal to Alberta industrial consumers that R&A should not be a consideration in their environmental compliance efforts. Conversations with industry and large consumers indicate that without a clearly understood linkage between R&A generation and NOx/SO_2 emissions they will not be pursuing the R&A option. Delaying the integration of R&A generation into the expanded version of the NOx/SO_2 emission trading system furthers the uncertainty that R&A will have a role and will act as a negative stimulus. While the absolute value of a NOx/SO_2 emission reduction may appear to be minimal, increases in capital costs and rising requirements and costs for Alberta Electricity System integration can be somewhat offset by the value attributed to emission reductions. This value for emissions reductions should not be considered as an incentive, but rather as providing for a fair and transparent system for all fuel types, and as a way to level the playing field between all generation sources.

With 80% of the provincial generation associated with large industrial customers, such an omission will jeopardize both the CASA recommendations and the Provincial Climate Change Action Plan for 3.5% growth in R&A generation. Simply put, many organizations would defer their plans to develop R&A solutions until a clear linkage between this cleaner, more expensive power and their environmental compliance requirements is understood. This is counter productive to all stakeholders' desire to reduce emissions by building more R&A generation, to the purpose of the CASA R&A team of increasing Alberta's supply of R&A energy, and to the aim of finding ways to promote R&A investment today.

One challenge the team faced was how to include R&A in the trading system at a level that sent a positive message to investors while ensuring that there are real emissions reductions captured in the system. Industry believes that including R&A generation at their baseline numbers of 0.5 kg/MWh for NOx and 0.5 kg/MWh for SO_2 balances these two issues and maintains the system's integrity, while providing flexibility to all types of generators. Industry feels that emission trading does not allow operators to purchase the right to pollute – it allows them to transfer reductions made elsewhere to their plant and reduces total emissions.

The industry proposal is to include R&A generation in the Alberta NOx/SO_2 emission trading system by giving all R&A generators a credit of 0.5 kg/MWh for NOx and 0.5 kg/MWh for SO_2. These numbers were determined by using what is referred to as the marginal unit calculation, and discounting it to allow for potential environmental impacts, while still sending a message that R&A is better than gas-fired generation in terms of emissions. See Appendix D for a detailed description of the marginal unit calculation process.
Industry cannot accept the values proposed by ENGO stakeholders of 0.2 kg/MWh for NOx and 0.0 kg/MWh for SO_2 because of the symbolic message it sends, which is that R&A generation is not as valuable as gas-fired generation. This situation occurs because new gas

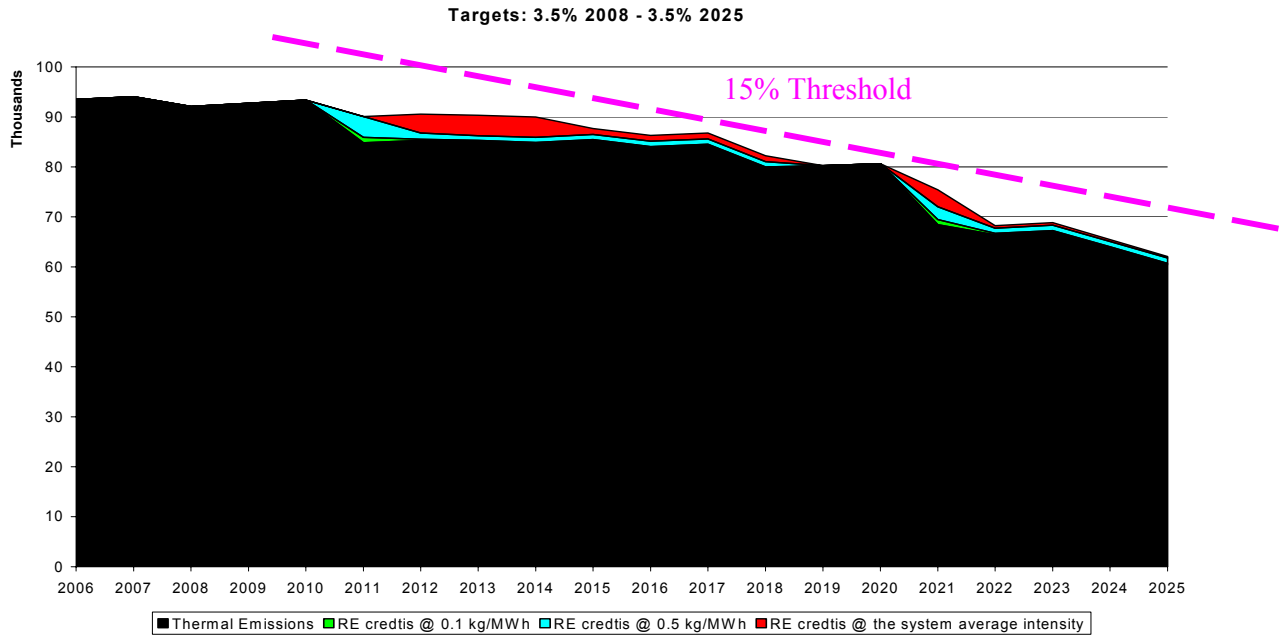
receives a credit threshold[12] of 0.5 kg/MWh for generation under 20MW. In the attempt to reach consensus, industry did offer to go to 0.2 and 0.2 but could not go any further from their preferred position because it is important to industry that the initial message sent by the government is that renewable and alternative energy is more highly valued than gas.

Industry would prefer that the actual marginal unit number be used (1.5 kg/MWh for NOx and 2.0 kg/MWh for SO_2), as industry believes that this reflects the actual amount of emissions displaced when one MWh of R&A generation comes on the electricity grid. Industry does recognize that there could be a very small increase in overall Alberta emissions in the long term with these numbers, and therefore proposed to discount the marginal unit value. However, all industry stakeholders agree that the impact in the short term would be an overall reduction in emissions.

Industry wants to clarify also that from a scale perspective, the impact of including renewable and alternative credits in the Alberta system would only increase NOx and SO_2 emissions by less than 1% of the total tonnes of reduction being desired, as forecasted by the EPT.

The figure below shows the effect of including R&A in the emission trading system at three different credit values: 0.1, 0.5 and the marginal unit value of 2.0 kg/MWh. The results show that the emission levels still fall within the trigger threshold of 15% as recommended by the EPT (2003) and would be captured as part of the expected background deviation. More notably, at a 0.5 kg/MWh credit level for NOx, as single coal plant would need to purchase 500 MW of emissions reductions for 10 years in order to extend its life for one year. Even crediting both NOx and SO_2 at 0.5 kg/MWh will result in a net emissions reduction of more than 1 kg/MWh for each emission. Industry provided significant analysis demonstrating the displacement of fossil fuels sources of power with incremental renewable and alterative energy. The make up and bidding behaviour of zero stack bidders was also reviewed at length. For more information on the effect on emissions see Appendix D.

[12] The CASA EPT recommended the establishment of a "deemed credit threshold" for the NOx and SO_2 emission limits where emission credits would only be created for operating below the build-in operational variability in approved emission limits. See Appendix E for details.



With industry's proposal, all R&A generation (about 430 MW) in Alberta would be eligible. Co-generation is not eligible for credit in this R&A system (other than waste heat or other alternatives of 5 MW limit). The proposed system would be open to R&A generation that chooses to participate, but historic credits from any renewable and alternative generation facility would be discounted at 10%. Industry proposes that at a future date, the actual emissions intensity be calculated for each different type of R&A generation and they be given a value that adequately reflects the value of each type. In the interest of time, the simplified values of 0.5 and 0.5 are proposed for all types of generation.

In summary, there is a desire in Alberta to encourage both renewable and alternative generation. Industry recommends that the use of R&A generation be incorporated within the NOx/SO_2 emission trading system. Industry agrees that slight differences in the calculation methodology of the credit will not have a major impact on the real reductions in emissions, as the inclusion of R&A is more symbolic. Two factors would be used to mitigate these "calculation leakages": the 10% discount, and setting the level slightly below the system average. The marginal unit/baseline calculation represents the true value of R&A in helping clean up the environment and is the preferred option for industry stakeholders.

OPTION 4ii-A: Recommendation, proposed by industry stakeholders:
Alberta Environment use the following baseline numbers for including renewable and alternative energy in the 2006 NOx/SO_2 baseline and credit emissions trading system for the electricity sector in Alberta:

- *0.5 kg/MWh for NOx*
- *0.5 kg/MWh for SO_2*

OPTION 4ii-B: Background and Recommended NOx and SO_2 Baselines, proposed by ENGO stakeholders

ENGOs recognize that renewable and, to a lesser extent alternative, energy provides significant environmental benefits through the displacement of coal and older gas-fired electricity generation. They understand that R&A producers face unique financial hurdles and that there is potential for some financial "uplift" if they could participate in an emission trading system. However, any "uplift" from such a system would come from being able to monetize the environmental benefit (via a credit) created by the R&A sector through selling such credits to those facing environmental liabilities (e.g., old coal and gas generators). ENGOs' understanding is that selling a credit to offset a liability essentially zeroes out any environmental benefit by allowing for continued elevated emissions on the liability side.

Thus, a key policy question facing the R&A team on this issue was how much of the R&A environmental benefit should go to the environment (as a public good) versus how much should be monetized and go to the benefit of the R&A generator.

On this matter, ENGOs are of the view that for the existing CASA EPT-designed system that is a baseline and credit system (i.e., it has no cap), and for which the only "buyers" of NOx and SO_2 credits are older coal plants approaching their end-of-life, the portion of the benefit from R&A that can go to the producer (the monetized portion) should be less than the environmental liability associated with the cleanest form of fossil-fuel generation ("new gas").

The EPT recommended a deemed credit threshold[13] for new gas larger than 60MW in size of 0.2 kg/MWh for NOx. Gas-fired generation is not eligible for SO_2 credits

The ENGOs' initial proposal was that renewable and alternative energy should get a credit of 0.1 kg/MWh of NOx and 0.0 kg/MWh for SO_2; this baseline of one-half the deemed credit threshold for new gas-fired generation would reflect an equal sharing of the environmental benefit between the public and the R&A generator. In the interests of seeking consensus, the ENGOs were prepared to move to a "new gas" equivalency of 0.2 kg/MWh, but could not go any higher. ENGOs believe that to move to a baseline value higher than 0.2 kg/MWh would position renewable and alternative energy as "dirtier" than gas. Such a situation would be detrimental to the environment, would open up the future request by gas to have access to credits in a SO_2 market, contribute to delay in retirements or upgrading of older coal plants in the province, and potentially harm the high public credibility of renewable and alternative energy.

The maximum intensity of 0.2kg/MWh also reflects the environmental benefit expected from the addition of new renewable energy. When the emission reductions from new units are examined from the perspective of marginal unit displacement and the perspective of displacement of new units, the emission reductions that occur from the construction of renewable energy are equal to the emissions from co-generation.

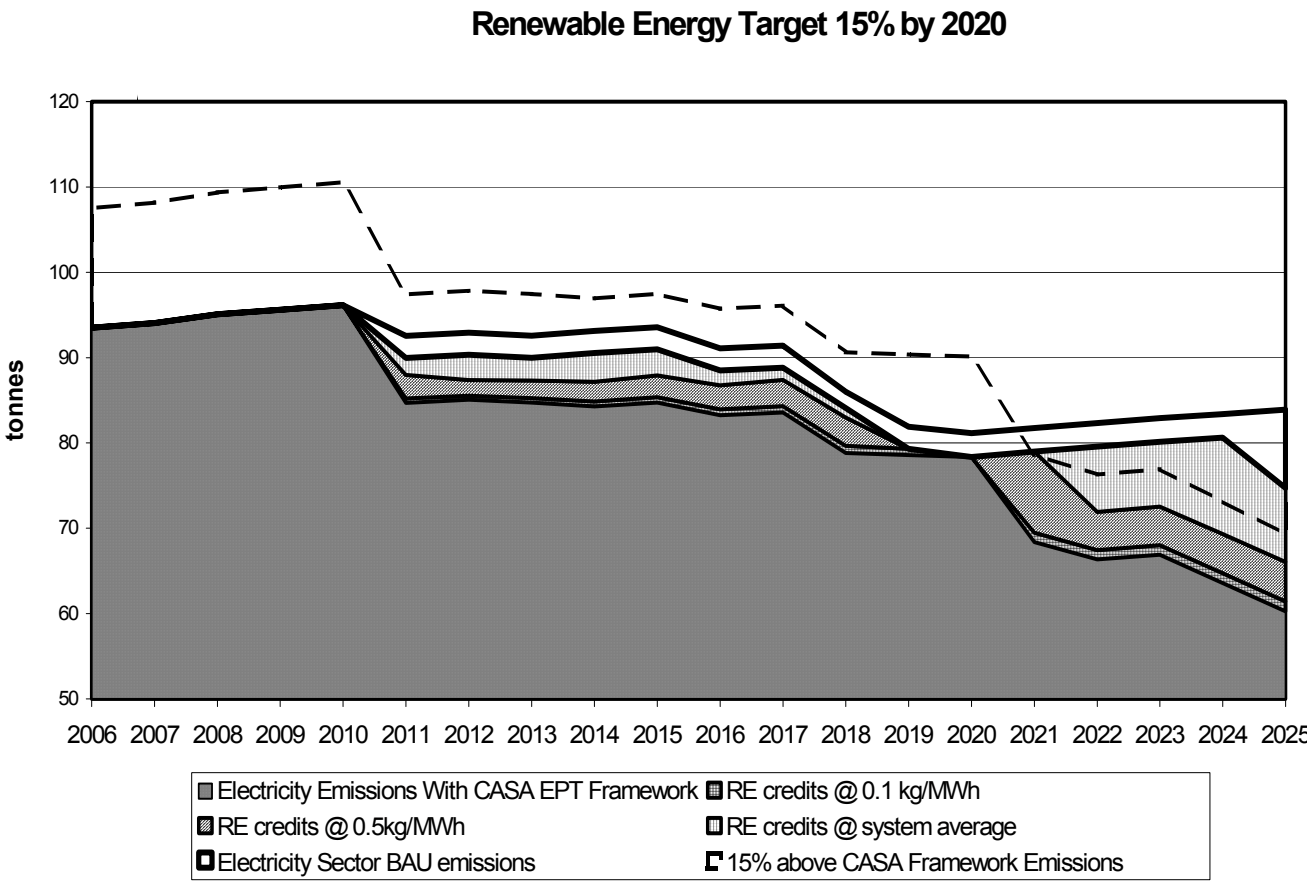
From the perspective of new units, the emission reduction that occurs as a result of increased renewables will be equal to the emission reduction that occurs when renewable energy

[13] The CASA EPT recommended the establishment of a "deemed credit threshold" for the NOx and SO_2 emission limits where emission credits would only be created for operating below the build-in operational variability in approved emission limits. See Appendix E for details.

displaces fossil fuel-fired energy that would have otherwise been built. In Alberta, co-generation is expected to make up the majority of new units. Between 1995 and 2000, all of the new power on the system was gas-fired and 90% was co-generation. Forecasts done by Energy Demand Consulting Associates expect the new generation built between 2006 and 2015 to be gas fired and, for the most part, co-generation.[14]

From a marginal unit perspective if wind is constructed there will be a corresponding emission reduction that will result from reduced generation of units on the margin. This occurs because wind generation bids in a cost of zero, and displaces higher bidding units like combined cycle gas units or coal units. If the wind power had not been constructed, then as indicated above, co-generation would be constructed. The co-generation would also bid into the power pool at a cost of zero, and reduce the same amount of emissions as the wind by reducing the generation of combined cycle and coal units operating on the margin. Hence, from the perspective of the marginal unit, whether wind energy is constructed or not, the environment will see the exact same amount of emissions, and thus the emission reduction caused by new wind from a marginal unit perspective is zero.

It is because a "cleaner than co-generation" credit rate reflects the environmental benefits of the construction of renewable energy both from a marginal and a new unit perspective that



ENGOs would not like to see the credit rate for renewables rise above this level. If other credit

[14] These forecasts were done for the CASA EPT; see the EPT's 2003 report *An Emissions Management Framework for the Alberta Electricity Sector – Report to Stakeholders* for more information.

rates are employed, there is a risk the emission reductions envisioned under the EPT framework will be substantially less than expected. The graph in 4ii-A above shows the potential impacts of R&A credits on the expected emissions reductions from BAU in the case where the 3.5% R&A target is held constant out to 2025. The figure above shows potential impacts where there is 15% R&A, and suggests that higher credit rates could significantly weaken the emissions reduction impact of the EPT framework. The figure also demonstrates the difference between the business-as-usual projection for the electricity sector and the 15% limit in the EPT framework, demonstrating that this limit was not expected to be achieved.

ENGOs recognize that this position constrains the potential economic value of credits for the R&A sector. ENGOs note, however, that this potential value has previously been recognized by some stakeholders as largely "symbolic." Using EPT analysis of the forecast values for NOx allowances[15] (which were based on the projected cost of retrofitting existing coal and gas facilities), the maximum potential value for NOx emission credits would range from $0.16 to $0.56 per MWh (at the 0.2 kg/MWh rate). The value of such credits is a small fraction (1.6% to 5.6%) of the current federal WPPI and RPPI programs at $10.00 per MWh. Such a financial contribution, ENGOs believe, would be inconsequential in significantly influencing decisions to proceed with new R&A projects. Also, the only possible purchasers of these credits under the EPT trading system will be old coal (and some gas), and they won't need the credits until the next decade. The broader question of opening up wider participation of other industries (such as to the oil and gas industry) for R&A credits was beyond the scope of the R&A team's mandate. Furthermore, ENGOs emphasize that a range of other tools is available to advance renewable and alternative energy in Alberta that would be simpler to implement, provide more economic uplift, and not require a trade-off of environmental benefits; these include portfolio standards, economic incentives, and others.

This ENGO position applies only to the existing NOx/SO_2 trading system as designed for the Alberta electric power generation sector. Any position on a potential greenhouse gas trading system will be assessed separately. ENGOs also note that their position on this matter could evolve if other changes were to occur to the NOx/SO_2 system in Alberta; for example, if it develops into a capped system and a broader range of "buyers" is established who meet criteria comparable to the electric power generation sector for meaningful new source performance standards or best available technology economically achievable standards and end-of-life provisions.

OPTION 4ii-B: Recommendation, proposed by ENGO stakeholders:
For the above reasons it is recommended that:
Renewable and alternative energy that meets the definition recommended by the EPT and adopted by the Provincial Government receive a credit baseline in the NOx emissions trading system equal to 0.1 kg/MWh. This baseline reflects one-half of the deemed credit threshold for new gas-fired generation. Eligibility to create credits would begin upon the start-up of the emissions trading system – January 1, 2006. At each five-year review, this standard should be reviewed and revised to reflect any changes to the gas-fired standard on which it is based.

[15] See table 9 on page 104 of the EPT report *An Emissions Management Framework for the Alberta Electricity Sector – Report to Stakeholders*.

Option A was supported by industry stakeholders and blocked by ENGOs. Industry was of the view that they had already lowered the baseline they were requesting, based on marginal unit calculations, and did not want to go below 0.5 kg/MWh. They believe that, in future systems, R&A energy should be positioned as better then gas and therefore get more credit than natural gas because it has no or low emissions compared with fossil fuel.

ENGO stakeholders supported Option B, which was blocked by industry. ENGOs were of the view that renewable and alternative energy should not receive a baseline that was equal to or higher than new gas-fired generation (that is, 0.2 kg/MWh), and did not think renewable and alternative energy should receive any SO_2 credit because new gas generation does not emit SO_2 and thus does not receive SO_2 credits in the existing trading system

Government members did not support either option A or B because they believe more analysis is needed to ensure that appropriate baseline numbers are identified.

OPTION 4ii-C: The Government Sector Position
For now, Alberta Environment has prepared the emission trading regulation so that renewable and alternative energy baselines could be added at any time. Governments made it clear that they want to see renewable and alternative energy included in an Alberta emission trading system. They also believe that renewable and alternative energy should be credited for both NOx and SO_2. Giving renewables and alternatives credit on both NOx and SO_2 is something the Alberta Government will consider as a mechanism to help achieve future targets, and the Alberta Government wants the option to put renewables and alternatives in a future trading system. However, the eventual baseline numbers must be defensible and reflect what is actually being displaced by R&A energy.

The Government sector proposed that the team hire an independent consultant to provide information to the team to outline what is most likely to happen if renewable and alternative energy gets into the system at various baselines. The consultant would consider what generation is online and what renewables would displace, how many credits would be generated, and what the impact and benefits would be on costs and emissions. The report would present all the assumptions used and the confidence intervals.

Industry stakeholders supported more research now because they believe it will add credibility to their position. ENGOs do not support the research described in option C because they don't think the research being proposed is asking the right question. The key question to ENGOs is not what is being displaced *per se*, but rather what is the next cleanest source of power that would, in the alternative to renewable and alternative energy, also cause such a displacement to occur.

Recommendation 5: Role of Renewable and Alternative Energy in Managing Greenhouse Gas Emissions

Earlier reports and recommendations by the Electricity Project Team and its Greenhouse Gas Allocation Subgroup considered a number of issues related to renewable and alternative energy and potential mechanisms for addressing their role in managing greenhouse gas emissions. The R&A team reviewed and considered this earlier work in its deliberations. The team notes that including renewable and alternative energy sources in emission trading programs could assist in decreasing the economic gap between such forms of power and the cost of conventional

sources of power. Where possible, such programs should provide clear incentives for investors to direct capital toward lower emissions intensity generation sources.

The Renewable and Alternative Energy Project Team recommends that:

> The federal and Alberta governments continue to explore and influence the role that renewable and alternative energy plays in a system intended to manage greenhouse gases.

Recommendation 6: Supportive Policies

The team also wanted to make recommendations to encourage the Government of Alberta to develop supportive polices to ensure the target is met. The Renewable and Alternative Energy Project Team recommends that:

> The Government of Alberta implement supportive policies to enable the 3.5% target to be achieved.

4.1.4 Removing Barriers to Achieving the Target

The project team discussed the state of renewable and alternative energy in Alberta and the expected increase in this type of generation. To form an opinion with regard to the expected growth, the team looked at the renewable and alternative energy projects that are underway or have been announced. Members concluded that the projected growth in generation from renewable and alternative energy sources is expected to meet the demand that may arise from efforts to achieve the 3.5% new renewable and alternative energy target.

In 2004, Alberta adopted a new transmission development policy (AR 174/2004)[16] intended to provide support for future resource development and improve efficiency. The regulation "Supports the development of Alberta's diverse natural resources to generate power, such as coal, natural gas, wind and biomass located across the province and supports efficient cogeneration from oil sands projects."[17]

The team acknowledges that transmission constraints in Alberta, unless alleviated, may particularly constrain the amount of renewable and alternative energy that can be made available to the market. To facilitate achieving the 3.5% target, the project team is of the view that provincial transmission capacity in Alberta should be increased where renewable and alternative generation is constrained by current transmission infrastructure.

Recommendation 7: Transmission Infrastructure Constraints

The Renewable and Alternative Energy Project Team recommends that:

> The AESO, EUB and other stakeholders use best efforts for the timely resolution of any transmission constraints that may exist in areas where renewable and alternative energy generation occurs or is expected to occur in the future.

4.1.5 Calculation Method for the 2008 Target

Two of the EPT's original recommendations (56 and 58) address aspects of how progress toward meeting the target should be calculated. Recommendation 56 concerned the basis for

[16] Source: http://www.eub.gov.ab.ca/bbs/requirements/actsregs/eu_reg_174_2004_transmission.pdf
[17] Source: Alberta Energy, 2005. *Alberta's Transmission Regulation Fact Sheet,* online at http://www.energy.gov.ab.ca/docs/electricity/pdfs/FactSheet_Transmission.pdf

the target for renewable and alternative energy, noting that irrespective of the mechanism adopted for its implementation, the Alberta government should calculate the 3.5% target for new renewable and alternative energy based on 100% of electric energy sold through the Alberta power pool, from Alberta sources. The Renewable and Alternative Energy Project Team confirmed that this recommendation still applies.

EPT recommendation 58 proposed that the Alberta government should use an energy-based method for calculating new renewable and alternative power, specifically:

(Total new renewable and alternative electricity in MWh, as defined in recommendation 57)
Divided by
(Total power sold through the Alberta Power Pool in MWh)

The R&A team confirmed that it still agrees with the intent of Recommendation 58, whereby the progress towards the target is calculated using the energy-based method in megawatt-hours, as recommended by the EPT. However, the team wanted to expand the calculation of the target to include electricity generated "behind the fence." Therefore, the team proposed an updated calculation formula in Recommendation 8 below.

"Behind the fence" power was defined by the EPT as, "power that is generated by an industrial facility and used to meet its own electricity needs (e.g., the generation of electricity by co-generation units that also provide process steam/heat)." The R&A team acknowledged that if any of this power meets the definition for renewable or alternative energy, it should be included in the calculation of the target. The team felt that the amount of such power should be added to both the production and sales figures used to calculate the target. Appendices C and F provide examples to explain the team's rationale.

Recommendation 8: Calculating Progress Towards Meeting the Target

The Renewable and Alternative Energy Project Team recommends that:

Alberta Environment uses the following formula to calculate progress towards meeting the target:

Total electricity produced from new[18] renewable and alternative sources
Divided by
Electric energy distribution sales

Where: *Total electricity produced from new renewable and alternative sources* means the electrical output in megawatt-hours of facilities that meet the definition of renewable and alternative energy in EPT Recommendation 57, including behind the fence generation.

Electric energy distribution sales means the sum of "distribution sales" of electricity to regional distribution companies, as reported to the EUB and which will be adjusted by the EUB and/or AESO to account for new renewable and alternative electricity generated behind the fence.

Alberta Environment will make best efforts to ensure this metric is accurate by using additional sources such as industry disclosure on their contributions to the target and/or sources of information that offer higher resolution or better quality and reliability if they are

[18] "New" as defined in recommendation 57 of the Electricity Project Team; see Appendix B.

readily available to it. Such sources may include WREGIS (if and when operational) or the AESO or other.

The Renewable and Alternative Energy Project Team was also asked to clarify the eligibility of upgraded facilities that produce incremental electrical energy to meet the 3.5% target. The team agreed that incremental power resulting from upgrades to existing energy facilities should count toward meeting the target even if the site itself predates December 31, 2001, the date on which the 3.5% target is based.

Facilities that are decommissioned and then subsequently re-commissioned do not by virtue of that action alone produce incremental power. Rather, a re-commissioned facility must have power incremental to an historical baseline production level for the increment to be counted toward the target. The EUB has standard language on decommissioning, and the team did not want to duplicate the EUB's efforts in this area.

Recommendation 9: Eligibility of Upgraded Facilities that Produce Incremental Electricity to Meet the 3.5% Target

The Renewable and Alternative Energy Project Team recommends that:

> The calculation of the 3.5% target for new renewable and alternative energy include the net incremental electrical energy output of facilities that have undergone retrofits after December 31, 2001 in order to upgrade the facility to meet the CASA definition of renewable and alternative energy (in Recommendation 57 of the EPT final report).

4.1.6 Determining Success in Achieving the Target

The R&A team were also presented with the challenge of clarifying the effective implementation date for the target of a 3.5% increase by 2008. This issue arose because the government's plan did not name a precise date by which the 3.5% target must be achieved, and two recommendations of the Electricity Project Team were inconsistent. Recommendation 59 said, "By January 1, 2008" while the preamble to recommendation 58 said, "By the end of 2008." Further, the goal in the Renewable and Alternative Energy project team's terms of reference said, "By January 1, 2008." Thus, the team found it necessary to clarify the date as to when the 3.5% target becomes effective.

Recommendation 10: Effective Implementation Date for 3.5% Target

The Renewable and Alternative Energy Project Team recommends that:

> The 3.5% target for new renewable and alternative energy be achieved for the 2008 calendar year.

Alberta Environment has agreed to undertake the calculations to determine achievement of the target, using the method of calculation explained above. To determine whether renewable and alternative energy in Alberta has increased by 3.5% from 2001 numbers, Alberta Environment will do the calculation for both the 2001 and the 2008 timeframes, and compare them. The team recognized that EUB data for the 2008 year would not be available until June 2009.

4.2 Future Targets

Setting a renewable and alternative energy target beyond 2008 was one of the key objectives for the project team. In discussing future targets, the team discussed the state of renewable and

alternative energy in Alberta and the uncertainties around factors that are key to its development. The team considered transmission capacity development; regulation and targets for NOx, SO_2 and greenhouse gas emissions; the availability of renewable energy certificates and other instruments; and the expected supply and demand response given current targets.

Because many aspects of the renewable and alternative energy sector are presently in flux, it is expected that, in a few years, there will be a much clearer vision of participants, the market, the implementation method for the existing target, and the link between renewable and alternative energy and greenhouse gas offsets and the associated costs.

Recommendation 11: Establishing Future Targets

The team discussed whether future targets should be set now and whether they should be voluntary. Not all industry stakeholders were comfortable including targets at all. Two options were proposed.

OPTION A Recommendation, proposed by ENGO stakeholders

It is recommended that:
The 2007 team be tasked with establishing the 2010 and 2012 targets. This group should also make recommendations on any mechanisms required to support achievement of such targets, including (but not limited to) amendments to emissions trading mechanisms; an electricity market that is open and accessible with no barriers to renewable and alternative energy development; and/or regulatory mechanisms and other appropriate mechanisms that develop over time.

These targets will be a minimum of 5-7% new renewable and alternative energy (that is, developed after December 31, 2001 and not additional to the 3.5% target) by January 1, 2010 and 7-10% by January 1, 2012. If the current definition of renewable and alternative energy is broadened when the group meets in 2007, future targets could be increased to recognize the fuller potential of renewable and alternative energy sources.

ENGOs supported option A because they feel that future targets provide a way of expanding renewable and alternative energy in a timely manner. Some industry members blocked option A because they believe that setting future targets at this time is premature given the uncertainty and evolving nature of both the renewables and offsets markets.

OPTION B Recommendation, proposed by industry stakeholders

It is recommended that:
The 2007 team be tasked with establishing the 2010 and 2012 targets. This group should also make recommendations on any mechanisms required to support achievement of such targets, including (but not limited to) amendments to emissions trading mechanisms; an electricity market that is open and accessible with no barriers to renewable and alternative energy development; and/or regulatory mechanisms and other appropriate mechanisms that develop over time.

If the current definition of renewable and alternative energy is broadened when the group meets in 2007, future targets could be increased to recognize the fuller potential of renewable and alternative energy sources.

Industry stakeholders supported option B because there are no supporting mechanisms such as emission trading available to R&A at this time.

ENGOs blocked option B because it does not include reference to specific values for future targets.

With respect to both options A and B, Government of Alberta stakeholders were prepared to support minimum values for future targets but felt it was premature to recommend future targets at this time.

5 Reporting on Renewable And Alternative Energy

The R&A team agreed that mechanisms for reporting renewable and alternative energy production in the province were very important. These mechanisms will ensure credibility and provide public certainty that action is being taken.

The team also felt that reporting could be a way to give credit to government, industry, NGOs and the public for actions they take to increase renewable and alternative energy production and use in Alberta.

At the same time, reporting can encourage stakeholders to take action to increase the production and use of renewable and alternative energy in Alberta. The team recognized that consumers have a role to play in increasing renewable and alternative power in Alberta and better reporting will increase understanding and act as an incentive for all stakeholders.

The Renewable and Alternative Energy Project Team agreed that a process to report on the contribution of renewable and alternative energy to Alberta's electricity generation should be established that involves both government and industry. The team understands the challenges and sensitivities of a deregulated industry with disclosing fuel mixes, electricity retailer sales, and other information that could be considered competitive and private.

Recommendation 12: Reporting Progress Toward Meeting the Target

The Renewable and Alternative Energy Project Team recommends that:

a) Starting in 2006, Alberta Environment report the total incremental production from renewable and alternative energy sources that is produced on an annual basis and where it is in relation to achieving the target.

b) Starting in 2006, on a voluntary basis, Retailers and large consumers disclose directly to the public on an annual basis, the share of their retail portfolio that is based on renewable and alternative energy.

When Retailers make these disclosures, they are not making a claim against any mandatory targets; they are simply communicating their contribution to meeting the target. These reports are an opportunity to provide qualitative as well as quantitative information about electricity production. For example, companies could generally describe their efforts to increase the percentage of renewable and alternative energy in their portfolio without revealing information that compromises their competitive position.

5.1 Definition of a Retailer

The notion of a retailer-based option for meeting Alberta's 3.5% target was proposed by the original Renewable and Alternative Energy subgroup to the Electricity Project Team. Key to this option was clarifying whether the definition of retailer found in the *Electric Utilities Act* is sufficient for the purposes of implementing a retailer-based target for new renewable and alternative electrical energy.

Recommendation 13: Definition of a Retailer

The Renewable and Alternative Energy Project Team concluded that the definition in the *Electric Utilities Act* is not sufficient, and recommends that:

Notwithstanding the definition of a retailer in the *Electric Utilities Act*, a Retailer for the purposes of this report means persons that provide electricity services directly to a customer, to themselves, and/or to eligible customers under a regulated rate tariff.

5.2 Ability of Regulated Supply to Flow Through Costs

The team reviewed the issue of enabling providers of the Regulated Default Supply and Regulated Rate Tariff Options to flow through the costs associated with meeting the 3.5% target while continuing to support a competitive marketplace. Since the system being proposed is a voluntary one, it was agreed that there is no need for mandatory provisions to flow through renewable and alternative energy costs to regulated rate customers at this time. This avoids the need for amendment of the *Electric Utilities Act* and its regulations. Retailers with regulated or default customers have options available to them in achieving their 3.5% target, and the team supports maximum flexibility in achieving the target. It should be noted that many regulated rate tariff providers have competitive affiliates.

Should the renewable and alternative energy target become mandatory, regulated, or supported by a regulatory backstop, this issue will need to be re-visited to ensure that it is considered in the proposed legislation or supporting mechanism.

Recommendation 14: Retailer as a Singular Corporate Entity

The Renewable and Alternative Energy Project Team recommends that:

> The 3.5% target apply to the Retailer as a singular corporate entity; that is, in the case where Retailers have both regulated and competitive customers, the 3.5% target applies to their entire customer base.

5.3 Other Retailer Provisions

The team's terms of reference identified two other issues that may need to be considered in relation to implementing the retailer-based method described in the EPT's 2003 report:

1. Provisions to ensure retailers that have taken prudent measures to achieve the 3.5% target are not penalized if supply does not materialize in a timely manner, and
2. Transitional provisions that take into account previously signed long-term contracts.

Team members agreed that the first item was not applicable because the team is not recommending penalties at this time, and the second item was not applicable because the team is proposing a voluntary method of implementation.

Should the renewable and alternative energy target become mandatory, regulated, or supported by a regulatory backstop, these issues will need to be re-visited to ensure that they are considered in the proposed legislation or supporting mechanism.

6 A Tracking System for Renewable Energy Certificates Generated in Alberta

Renewable Energy Certificates (RECs) are a market instrument designed to facilitate the purchase and sale of the non-energy environmental and social attributes of alternative and renewable energy, and therefore support the achievement of alternative and renewable energy targets and objectives. The following description of RECs is not intended to be comprehensive, but rather provide sufficient detail to facilitate establishment of RECs on a provincial basis.

6.1 Renewable Energy Certificates

Recommendation 15: Definition of a Renewable Energy Certificate (REC)

The team agreed that it was important to be consistent with other definitions, such as, but not limited to, the one used by Canada's EcoLogo program. Thus the Renewable and Alternative Energy Project Team recommends that:

> A REC be defined as the instrument that embodies all non-energy environmental and social attributes of electricity generated using renewable and alternative energy sources. A REC is measured in MWh and is created at the time electricity is generated at any facility that meets CASA's recommended definition of renewable and alternative energy,[19] and is measured by a revenue-quality meter, or the power output of which can be derived through mathematical calculations from the readings of other revenue-quality or comparable meters on-site at a rate of one REC per MWh of electrical output.
>
> The environmental and social attributes of a particular REC are a function of the characteristics of the generating facility at the time the associated electricity was generated. For the purposes of accounting for Alberta's target for 3.5% new renewable and alternative electricity, all RECs created at any facility that meets the Renewable and Alternative Energy Project Team's definition are deemed equivalent.
>
> The property rights to a particular REC belong to the owner of the generation facility and may be transferred by contract or sale or retired permanently together with or separately from the underlying electricity.

6.2 Potential Use of the Western Renewable Energy Generation Information System (WREGIS)

There is already a market for RECs in the form of voluntary green power sales in Alberta and in other provinces, but these certificates do not yet have a universal third party system in place to verify or track them.

In 2002, the Western Governors' Association, which includes a number of states in the western US as well as Alberta and British Columbia, agreed to support the creation of an independent regional tracking system to provide the data needed to substantiate and support the quantification and tracking of renewable and alternative energy generation. This included bringing western stakeholders together to help define the institutional structure, design operating guidelines, and identify information needed to support tracking of and accounting for renewable and alternative energy generation and registering Renewable Energy Certificates in

[19] This definition is contained in the CASA Electricity Project Team's recommendation 57, which was approved by the CASA board in 2003 and adopted by the Government of Alberta in 2004.

the Western Interconnection.[20] The resulting initiative was the Western Renewable Energy Generation Information System (WREGIS).

The Western Governors' Association, the California Energy Commission (CEC) and the Western Regional Air Partnership are sponsoring WREGIS with funding for the development stage, and system software is being provided by the CEC. Ongoing WREGIS operations will be funded by WREGIS users through registration and account and volumetric fees. This fee structure and the level of charges are only an estimate at this time and can be found in *Phase II Report of the Institutional Committee of the Formation of the Western Renewable Energy Generation Information System (WREGIS), October 29, 2004.*[21]

The team is not recommending a "trading" system *per se* for Alberta, but recognizes that tracking RECs would facilitate the formation of a market for RECs in Alberta and, by extension, facilitate the expansion of the market for renewable and alternative energy. While WREGIS performs as a tracking system, it does not verify or certify RECs.

Recommendation 16: Use and Implementation of a Tracking System in Alberta

Voluntary participation by individual Retailers and generators in a tracking system will be essential for the system to succeed in Alberta. Data submitted to a tracking system will also be a key success factor, and the team notes the valuable role of third party verification of data that the AESO provides in this province. The Renewable and Alternative Energy Project Team recommends that:

> a) As soon as available, the Government of Alberta adopt WREGIS, or a similar system, as an information and tracking system for purposes of improving the tracking and exchange of RECs.
>
> b) As soon as possible, and on an ongoing basis when the system is available to accept the data, AESO submit generation data for facilities registered with WREGIS (or a similar system).

6.3 Clarifying Terminology

The term "green tags" has commonly been used to mean the instrument that embodies the non-energy attributes of renewable and alternative energy related to greenhouse gases; i.e., a subset of those contained in a REC. The wording and definition of Green Tags and Green Certificates are synonymous with RECs in the electrical energy industry worldwide. The industry uses these phrases to refer to all the environmental attributes associated with a megawatt-hour of renewable and alternative power.

However, there has been some confusion with the use of these terms; for example, other CASA reports (EPT Recommendation 28 and the report of the Greenhouse Gas Allocation subgroup, pp 28-29) used the term "green tags" to mean units of tonnes of greenhouse gases, and "green certificates/Renewable Energy Certificates" to describe units of MWh of renewable and alternative power. The Renewable and Alternative Energy Project Team is not recommending the use of both instruments in Alberta and proposes that common terminology be established, based on the definition of a REC (recommendation 14).

[20] Source: http://www.energy.ca.gov/portfolio/wregis/
[21] The report is available at http://www.westgov.org/wieb/wregis/reports/ICPhase2fnl11-3-04.pdf

Recommendation 17: Consistent Terminology

The Renewable and Alternative Energy Project Team recommends that:

> To avoid confusion and potential misunderstanding, CASA documents use the phrase "Renewable Energy Certificates" or "RECs" instead of its conventional synonyms, "Green Tags" and "Green Certificates," which may have other meanings in other documents.

7 Policy Direction for Specific Types of Renewable and Alternative Energy

7.1 Waste Heat

Waste heat[22] is an alternative source of energy that can be recovered from industrial processes and converted to electricity. The definition of renewable and alternative energy developed by the EPT captured waste heat projects but limited their size to less than 5 MW. The R&A team wanted to encourage the use of waste heat, and undertook to develop a definition that would better capture waste heat projects and their potential to contribute to the 3.5% target.

Recommendation 64 (c) in the 2003 report of the CASA EPT, *An Emissions Management Framework for the Alberta Electricity Sector, Report to Stakeholders*, proposed that ways to encourage and incent larger co-generation and waste heat facilities be identified. To address the waste heat component, the Waste Heat Subgroup was formed. With reference to Recommendation 64 (c), and in association with the EPT's recommendation 57 (which defined renewable and alternative energy), the subgroup's purpose was to formulate a recommendation(s) that would enable waste heat projects to effectively contribute to meeting the current 3.5% target for renewable alternative energy as well as any future targets that may be proposed.

Recommendation 18: Definition of Waste Heat

OPTION A: Definition of Waste Heat Recovery Generation, proposed by industry stakeholders

It is recommended that:

The following definition of waste heat recovery generation for alternative electricity be adopted by the Alberta government for the purposes of calculating the 3.5% target for new renewable and alternative energy:

> *Waste Heat Recovery Generation for Alternative Electricity is defined as that which is:*
>
> *a) Power generated within the province of Alberta; and*
> *b) Has a greenhouse gas intensity less than or equal to 210 kg per MWh (50% of natural gas combined cycle); and*
> *c) Is waste energy[23] recovered from a process stream; and*
> *d) Is not co-generation.[24]*
>
> *Projects eligible for contributing to the target are those that began producing electric energy after December 31, 2001.*

Industry stakeholders supported option A because they believe it provides a clear definition of waste heat recovery generation that can be applied in Alberta. They feel the definition contained in option A is consistent with definitions of waste heat recovery used by other jurisdictions (see Appendix G), and is actually more detailed than these definitions, which have

[22] Waste heat is also referred to as Energy Recovery Generation in some forums.

[23] Waste energy is energy that is not producing work AND is being rejected from the primary operating process.

[24] Co-generation is defined as the simultaneous production of useful heat AND electricity in a plant that was specifically designed to produce these co-products.

been accepted and used to develop policies in other jurisdictions. Further, Alberta's Energy and Utilities Board approved an application that distinguished between waste heat and co-generation (June 2005 OPTI/Nexen Application No. 1379963).

Government could support option A because they believe waste heat should be included in the 2008 target.

ENGO stakeholders blocked option A because they are of the view that the proposed definition does not provide a distinction between larger waste heat generation and co-generation that can be reliably applied in practice. The CASA EPT recommended a 5 MW size limit for each individual source of alternative energy (recommendation 57). While smaller waste heat sources are already counted (up to 5 MW), ENGO stakeholders believe that not having a clearly defensible delineation between waste heat and co-generation, coupled with no size restrictions, leads to the possibility of including larger "grey zone" co-generation/waste heat energy sources in the calculation to determine whether the 3.5% target for 2008 has been reached. Including such larger sources in the 3.5% 2008 target would undermine the credibility of Alberta's achievement if this target is actually reached. If a clear and practically applicable definition can be established, then larger sources of waste heat could be included in establishing a revised 2008 target and/or form a new baseline for achieving future (post-2008) targets (see option B proposed by ENGOs below).

OPTION B: Definition of Waste Heat Recovery Generation, proposed by ENGO stakeholders

It is recommended that:
The 2007 team work to develop a definition for waste heat electricity generation that clearly and uniquely identifies it as an environmentally preferable means of generating electricity. If this group fails to reach consensus, it is recommended that government determine an adequate definition of waste heat generation. This definition could then be used for future targets and all aspects of R&A management, but not for the 2008 target.

Industry stakeholders blocked option B because they feel the difference between co-generation and waste heat is identifiable, and waste heat should be included in the calculation toward the 2008 3.5% target.

Recommendation 19: Recognizing Waste Heat, proposed by industry stakeholders

It is recommended that:
Alberta Environment use the definition of waste heat recovery generation provided in Recommendation 18 option A to determine the contribution of waste heat recovery generation in:

- *Emission trading as a supportive mechanism (recommendation 4)*
- *Calculation formula for measuring progress toward the 2008 target (recommendation 8)*
- *Eligibility of upgraded facilities that produce incremental electricity towards meeting the 2008 target (recommendation 9)*
- *Reporting on the 2008 target (recommendation 12)*
- *Definition of a REC (recommendation 15)*
- *Using and implementing a tracking system in Alberta (recommendation 16)*

ENGOs blocked recommendation 19 for the same reasons given for blocking option A in recommendation 18.

Recommendation 20: Waste Heat's Contribution

The Renewable and Alternative Energy Project Team recommends that:

> When the reconvened team comes together again in 2007 they determine waste heat's contribution to:
>
> - future targets,
> - any Alberta emission trading system,
> - definition of a REC,
> - upgraded facilities,
> - any Alberta tracking system, or
> - other future aspect of renewable and alternative energy management.
>
> The 2007 team will appropriately adjust the future targets to recognize the contribution of waste heat and other alternative energy sources to Alberta's targets. The 2007 team will not discuss the definition of waste heat or the inclusion of waste heat, as it relates in the 2008 3.5% target, unless Alberta Environment adopts a new definition between now and 2007 for projects over 5 MW.

7.2 Interconnected Micro-generation

Decentralized energy, including micro-generation, is the production, management and storage of heat and/or power, irrespective of generator size, fuel or technology that is located close to the customer's load. It complements traditional, centralized, large-scale power generation that is located at some distance from end users and connected to customers via a bulk transmission system or grid.

Recent advancements in micro-generation technologies now permit electricity customers the opportunity to use new technology to generate their own electricity. Such technologies include solar photovoltaic systems, micro turbines, micro-wind turbines, micro-hydro turbines, fuel cells, and Stirling engines.

Net metering allows the standard, single register residential meter to measure a reverse flow of power when a customer generates more electricity than is used on site. Measurement Canada is responsible for the certification of electricity meters and has not yet approved standard residential meters to measure reverse power flows. The current practice is to use a bi-directional meter that separately measures consumption and generation. Measurement Canada has a project underway to certify residential electricity meters to measure reverse flows, with an expected completion date in 2006.

Net billing is the practice of subtracting (netting) the generation from the consumption over a specified period and issuing a single billing. Some utility companies (e.g., BC Hydro and Enmax) offer their micro-power customers an equal-rate net billing service that appears to the customer to be identical to net metering.

Alberta Energy is conducting a comprehensive, consultative review of policy and practices respecting small- and micro-scale generation, including net metering.

Recommendation 21: Interconnected Micro-generation

The Renewable and Alternative Energy Project Team recommends that:

> Alberta Energy complete as soon as possible the review of the technical, legal and financial issues associated with distributed micro-generation, including net metering and net billing, and provide policy direction for the industry.

7.3 Supporting Mechanisms for the Target, and Areas Requiring Further Work

In addition to setting a target for renewable energy, the Alberta government should consider providing support to the province's renewable and alternative energy industry in a way that complements similar federal programs.

The R&A team recognized the potential need for incentives by including this item in the key task areas of the team's terms of reference. Three of the sub-components of key task area 2 on enabling mechanisms state that:

> (b) Seeking means by which programs such as the federal government's Wind Power Production Incentive program, the Renewable Energy Deployment Initiative and other production incentives described in the November 2003 report of the Renewable and Alternative Energy Sub-group of the EPT might be augmented by the Alberta government to promote Alberta's renewable and alternative energy sector.
>
> (c) Seeking means by which consumer engagement mechanisms as described in the November 2003 report of the Renewable and Alternative Energy sub-group of the EPT could be funded and implemented.
>
> (e) Seeking means by which a Solar Infrastructure Initiative as described in the November 2003 report of the renewable and alternative energy sub-group of the EPT could be funded and implemented

Recommendation 22: Areas Requiring Further Work

The Renewable and Alternative Energy Project Team supports the continued consideration of the initiatives and mechanisms noted in its terms of reference, and therefore recommend that:

> Key task areas 2b, 2c and 2e from the Renewable and Alternative Energy project team's terms of reference continue to be pursued. In particular, the team recommends that the Government of Alberta and any future CASA Renewable and Alternative Energy project teams explore the need for additional incentives for renewable and alternative energy, including supplementing federal incentives such as the Wind Power Production Incentive and the Renewable Energy Deployment Initiative, developing a solar infrastructure initiative, and other consumer engagement initiatives.

8 Consumer Awareness and Education

The Renewable and Alternative Energy Project Team discussed measures that could further support the development of renewable and alternative power in Alberta and agreed that consumer awareness is important. Electricity consumers are relatively uninformed about how their power is generated and about the environmental impacts of its generation. The team agreed that effort should be made to increase consumer awareness and education about the attributes of various types of electricity generation in Alberta, particularly renewable and alternative energy.

Recommendation 23: Consumer Awareness and Education

The Renewable and Alternative Energy Project Team recommends that:

> In 2007 at the latest, the provincial government initiate (possibly through Climate Change Central) a consumer awareness and education campaign to be collaboratively undertaken by government and interested electricity market and industry participants, with the following objectives:
>
> - Raise public awareness about the environmental attributes of renewable and alternative energy and the role renewable and alternative energy plays in Alberta
> - Educate the public about the options that are available to them with regard to the electricity that they consume.

Appendix A: Project Team Members

Darren Aldous	Alberta Urban Municipalities Association
Dave Axford	Nexen
Denise Chang-Yen	EPCOR
Kerra Chomlak	CASA Secretariat
Julia Ciccaglione	Pristine Power
Rob Falconer	Enmax
Shannon Flint	Alberta Environment
Gordon Howell	Howell-Mayhew Engineering
Theresa Howland	Vision Quest Windelectric
Martha Kostuch	Prairie Acid Rain Coalition
Ken Hogg	NewEra
Paul Hunt	Climate Change Central
Bevan Laing	Alberta Energy
Frank Letchford	Environment Canada
Satwant Lota	Alberta Energy and Utilities Board
Tom Marr-Laing	Pembina Institute
Paula McGarrigle	Shell Canada/CPPI
Alan Morin	CCPA
Steve O'Gorman	Canadian Hydro Developers
Mark Roedel	Suncor
Rob Schnell	Direct Energy

Former Members:

Matthew Bower	TransCanada
James Brown	Shell Canada/CPPI
Geraldine Byrne	Mariah Energy
Matthew Dance	CASA
Keith Denman	CASA
Paris Fronimos	Alberta Environment
Rick Hyndman	CAPP
Markus Kellerhals	Environment Canada
Anouk Kendall	NewEra
Kirk Lamb	Alberta Environment
Glenn McIntyre	Direct Energy
Morgan McRae	NewEra
Brian Mitchell	Mewassin Community Action Council/CO_2RE
Nashina Shariff	Toxics Watch Society
Terry Rendflesh	TransCanada
Karen Taguchi	Direct Energy

Appendix B: Terms of Reference

Background:
The Alberta government's Climate Action Plan, released in the fall of 2002, includes an increase in the use of renewable and alternative electrical energy as one means of reducing Alberta's green house gas emissions. The CASA Electricity Project Team (EPT), which reported to the CASA Board in November 2003, included a number of recommendations on renewable and alternative energy in its report (#s 55 – 64, appended to these terms of reference). Due to tight time frames and a number of policy issues that needed to be resolved, the electricity project team's recommendations include a recommendation that a team be struck and further work done on a number of issues related to renewable and alternative electrical energy. This group is being formed in response to these recommendations.

Renewable and alternative electrical energy, whose definition for the purposes of this team can be found in recommendation #57 in the November 2003 EPT report, includes low or zero emissions sources such as wind power, solar power, run-of-river hydro, biomass, and other small GHG-efficient sources. It does not include larger co-generation projects, although these are efficient means of generating electricity. While the cost of some of these technologies is becoming competitive, it is necessary to ensure that any barriers in the marketplace that are impeding the development of renewable and alternative energy are removed. These barriers include but are not limited to regulatory barriers, transmission and metering issues, the lack of a liquid market for green credits, and the belief that renewable energy is not able to provide reliable capacity to the grid.

Goal:
The goal of the Renewable and Alternative Energy Project Team is to implement the renewable and alternative energy recommendations found within the EPT report, with the aim of increasing the supply of renewable and alternative electrical energy in the province to meet the target of 3.5% new renewable and alternative electrical energy, as defined in recommendation 57 of the EPT report, by January 1, 2008.

Objectives:
In order to achieve its goal, the Renewable and Alternative Energy project team will accomplish the following objectives:

1. Develop tools and mechanisms to facilitate meeting the target and to implement the renewable and alternative electrical energy recommendations as described in the EPT report
2. Develop a renewable and alternative electrical energy target beyond 2008, with corresponding tools and mechanisms.
3. Develop cost effective approaches and programs that enable the development of renewable and alternative electrical energy.
4. Develop interim benchmarks and reporting for the period between the present and January 1, 2008 to determine if the target is achievable and allow for adjustments to ensure the target is reached.

Key Task Areas:

1. Administration
    a. Underpinnings

i. Setting a further target for renewable and alternative electrical energy beyond 2008.
ii. Clarifying the eligibility of upgraded facilities that result in incremental electrical energy for the target.
iii. Clarifying whether the definition of retailer found in the Electric Utilities Act is sufficient for the purposes of implementing a retailer-based target for new renewable and alternative electrical energy.
iv. Recommending options to resolve the issues listed below and identifying any additional issues for resolution related to implementing the retailer-based method described in the November 2003 report of the renewable and alternative energy sub-group of the EPT. The implementation of the retailer-based method is contingent upon the resolution of these issues to the satisfaction of affected stakeholders represented on the implementation team:
    1. Scope of audit process
    2. Timely development of a market for green certificates
    3. Provisions to allow providers of the Regulated Default Supply and Regulated Rate Tariff Options to flow through the costs associated with meeting the 3.5% target while continuing to support a competitive marketplace.
    4. Provisions to ensure retailers that have taken prudent measures to achieve the 3.5% target are not penalized if supply does not materialize in a timely manner
    5. Transitional provisions that take into account previously signed long term contracts.
    6. Examine the need for compliance mechanisms and regulatory backstop

b. Implementation, Operation, and Management
    i. Examining ways in which the Alberta emissions trading system might be used to assist in developing renewable and alternative electrical energy
    ii. Examining ways in which Alberta' sectoral agreements might be used to assist in developing renewable and alternative electrical energy
    iii. Clarify the definition of green tags and green certificates to ensure they are compatible with both the provincial and federal government positions on emissions trading.

2. Enabling mechanisms
    a. Determining ways in which larger co-generation and low-impact electric energy sources can be encouraged.
    b. Seeking means by which programs such as the federal government's Wind Power Production Incentive program, the Renewable Energy Deployment Initiative and other production incentives described in the November 2003 report of the Renewable and Alternative Energy Sub-group of the EPT might be augmented by the Alberta government to promote Alberta's renewable and alternative energy sector.
    c. Seeking means by which consumer engagement mechanisms as described in the November 2003 report of the Renewable and Alternative Energy sub-group of the EPT could be funded and implemented.

d. Examining options that would allow Climate Change Central, with the assistance of other groups such as the Office of Energy Efficiency, ENGOs, and retailers, to take the lead in the educating consumers about the sources of their electrical energy.
e. Seeking means by which a Solar Infrastructure Initiative as described in the November 2003 report of the renewable and alternative energy sub-group of the EPT could be funded and implemented

3. 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 Renewable and Alternative Energy Project Team will report to the CASA board in March 2005. An interim report, on the implementation mechanisms referred to in objective #1 should be made to the CASA Board in September 2004.

Budget:
The financial needs of this team are unknown at this time. There will be some funding available from Alberta Environment to be shared between this project team and the Energy Efficiency and Energy Conservation Project Team, and also the remaining funding from the EPT will be made available to these two groups. It is not anticipated that this group will require a great deal of financial resources beyond the costs relating to the preparation of its final report. Fundraising for this work beyond the available monies, if required, will be one of the tasks for this group.

Membership:
The following groups have been identified as having a stake in the outcome of this team's work:

- Electricity industry, including:
    - "Wires" companies
    - Independent Power Producers Association
    - Renewable and alternative electricity generators
    - Retailers
    - Self-retailers
    - Generators, both Renewable, Alternative, and others
- Alberta Environment
- Alberta Energy
- ENGOs
- Canadian Association of Petroleum Producers
- Alberta Electrical System Operator
- Canadian Chemical Producers Association
- Alberta Forest Products Association
- Canadian Petroleum Products Institute
- NewEra
- Climate Change Central

- Municipalities
- Federal Government
    - Environment Canada
    - Natural Resources Canada

CASA EPT Renewable and Alternative Energy Recommendations

#	Recommendation
55	**The Provincial Target for Renewable and Alternative Energy** The Alberta government implement at the very least the 3.5% target for new renewable and alternative energy referenced in its *Albertans & Climate Change - Taking Action* plan.
56	**The Basis for the Target for New Renewable and Alternative Energy** Irrespective of the mechanism adopted for its implementation, the Alberta government calculate the 3.5% target for new renewable and alternative energy based on 100% of electric energy sold through the Alberta Power Pool, from Alberta sources.
57	**Defining Renewable and Alternative Energy** The following definition of Renewable and Alternative Energy be adopted by the Alberta government for the purposes of calculating the 3.5% target for new renewable and alternative energy: Renewable and Alternative Electricity is defined as that which is: a) Power generated within the province of Alberta; and b) EcoLogo™ compatible in that it meets the EcoLogo™ criteria for Renewable Low-Impact Electricity, but from facilities that are not necessarily EcoLogo™ certified; OR Alternative electricity supplies whose source meets the following criteria: a) 5 MW or less; and b) greenhouse gas intensity less than or equal to combined cycle gas turbine 418 kg per MWh Projects eligible for the target would be those that begin producing electric energy after December 31, 2001.
58	**Calculating the Amount of New Renewable and Alternative Energy Generation** The Alberta government use the following energy-based method to calculate new renewable and alternative power: (Total new renewable and alternative electricity in MWh, as defined in recommendation 57) Divided by (Total power sold through the Alberta Power Pool in MWh)
59	**Mechanisms for Achieving the Renewable and Alternative Energy Target** The Alberta government consider developing a program to implement the mechanisms required to achieve a target of at least 3.5% new renewable and alternative energy by January 1, 2008. These mechanisms may include a "green certificate" program, emissions trading, offset credits, or any other mechanism to incent the use of green power.
60	**The Retailer-Based Method for Achieving the Renewable and Alternative Energy Target** The retailer-based method, described in this report, be the preferred option for achieving the target for additional renewable and alternative energy. The implementation team (see recommendation 64) will be tasked with recommending options to resolve the issues listed below and identifying any additional issues for resolution related to implementing the retailer-based method. The implementation of the retailer-based method is contingent upon the resolution of these issues to the satisfaction of affected stakeholders represented on the implementation team: • scope of audit process; • timely development of a market for green certificates; • provisions to allow providers of the Regulated Default Supply Option to flow through the costs associated with meeting the 3.5% target; • provisions to ensure retailers that have taken prudent measures to achieve the 3.5% target are not penalized if supply does not materialize in a timely manner; and • transitional provisions that take into account previously signed long term contracts.

#	Recommendation
61	**Sectoral Agreements and Green Power** The Alberta government, in any sectoral agreement negotiations, consider encouraging all purchasers of power to buy at least 3.5% new renewable and alternative electricity, as defined in recommendation 57, as a means of reducing their greenhouse gas emissions.
62	**Net Metering and Net Billing** Alberta Energy undertake a study to identify the technical, legal and financial issues associated with net metering and net billing, including a policy direction for the industry.
63	**Infrastructure Needs** Alberta Energy and the Alberta Electric System Operator examine the decision-making process for the renewable and alternative energy sector's infrastructure needs, with a view to: a) ensuring that the process is accessible to the renewable and alternative sector, and b) improving the infrastructure for renewable and alternative energy.
64	**Renewable and Alternative Energy Implementation Team** A CASA multi-stakeholder implementation team be formed to address the following issues, as well as issues that may be referred to it by other stakeholders or other sub-groups of the EPT. In forming this group, it is essential that all interested stakeholders who will be affected by the matters discussed be actively involved. a) Setting a further target for renewable and alternative energy beyond 2008. b) Clarifying the eligibility of upgraded facilities that result in incremental power for the target. c) Determining ways in which larger co-generation and waste heat facilities can be encouraged and incented. d) Clarifying whether the definition of retailer found in the *Electric Utilities Act* is sufficient for the purposes of implementing a retailer-based target for new renewable and alternative electricity. e) Seeking means by which the federal government's Wind Power Production Incentive program, the Renewable Energy Deployment Initiative and other production incentives described in this report, might be augmented and integrated into Alberta's renewable and alternative energy sector. f) Seeking means by which consumer engagement mechanisms as described in this report could be funded and implemented. g) Seeking means by which a Solar Infrastructure Initiative, described in this report, could be funded and implemented. h) Examining options that would allow Climate Change Central, with the assistance of other groups such as the Office of Energy Efficiency, ENGOs, and retailers, to take the lead in the educating consumers about the sources of their electrical power. i) Examining ways in which the Alberta emissions trading system might be used to assist in developing renewable and alternative energy.

Appendix C: Calculating the 3.5% Target

AENV Performance Measure (2005-08 Business Plan)

Performance Measures	Last Actual	Target 2005	Target 2006	Target 2007
Goal 3: Albertans recognize the impact of their activities on the environment and are informed, encouraged and enabled to work together to safeguard it				
New Renewable and Alternative Energy Generation Indicates Alberta's progress towards meeting the goal for increasing the renewable and alternative energy portion of total provincial electricity sales by 3.5 per cent from 2001 levels by 2008.	1.2% (2003)	1.5%	2.5%	3.5%

Note: Calculation of the performance measure for 2003 was based on generation that meets the EcoLogo definition. The accuracy of this number reflects the existing data shown in the tables below and the team felt this data was adequate for this purpose.

Data

The New Renewable and Alternative Energy Generation Indicator tracks the change in renewable and alternative energy's share of Annual Electricity Energy Distributions Sales from the 2001 calendar year to the calendar year ended in the current annual reporting cycle.

Renewable and Alternative Energy includes the net electricity generation from facilities in Alberta that harness wind, hydro and waste (biomass) to produce electric energy.

Data is provided by the EUB in Table 6: ALBERTA ELECTRIC ENERGY GENERATION (GWh) BY RESOURCE AND INTERCHANGE, 1994- 2003 (see below) and in Table 11: ELECTRIC ENERGY DISTRIBUTION SALES AND NUMBER OF CUSTOMERS, 2003 (see below) recorded in the EUB Alberta Electric Industry Annual Statistics.

Table 6: ALBERTA ELECTRIC ENERGY GENERATION (GWh) BY RESOURCE AND INTERCHANGE, 1994- 2003

								Net Interchange		
Year	Coal	Natural Gas	Hydro	Wind	Biomass & waste	*Others	Total	In	Out	Total
1994	42,269.8	8,364.5	1,763.2	35.6	475.3	1.5	52,909.9	-	2,108.6	50,801.3
1995	42,460.8	7,098.1	1,999.8	54.3	591.3	1.3	52,205.6	-	958.9	51,246.7
1996	41,220.3	8,025.3	1,966.7	59.1	692.8	0.4	51,964.6	1,883.8	-	53,848.4
1997	43,054.2	8,585.7	1,824.3	62.0	697.2	0.4	54,223.8	1,039.5	-	55,263.3
1998	41,267.7	11,530.7	2,043.3	49.4	737.1	0.4	55,628.6	768.2	-	56,396.8
1999	40,276.7	11,565.3	2,181.0	64.6	798.0	0.3	54,885.9	999.7	-	55,885.6
2000	40,459.2	14,830.4	1,748.2	71.8	732.3	1.4	57,843.3	360.3	-	58,203.6
2001	41,713.3	16,602.3	1,446.3	151.0	717.4	0.7	60,631.0	-	1322.8	59,308.2
2002	42,541.8	15,799.1	1,668.0	296.1	774.3	0.4	61,079.7	612.3	-	61,692.0
2003	42,345.7	18,412.6	1,733.0	374.2	782.5	0.1	63,648.1	126.5		63,774.6

* *Others* include oil, diesel, geothermal and solar

Excludes Isolated Plants

Table 11: ELECTRIC ENERGY DISTRIBUTION SALES AND NUMBER OF CUSTOMERS, 2003

Utility	Residential		Farm [1]		Commercial [2]		Industrial [3]		Total	
	GWh	No.	GWh	No.	GWh	No.	GWh	No.	GWh	No.
ATCO ELECTRIC - Northern & East Central Alberta	785.2	113,606	483.7	29,702	1,496.4	23,317	6,425.8	10,444	9,191.1	177,069
ENMAX - City of Calgary	2,302.6	338,085	-	-	4,913.1	32,582	712.6	2,090	7,928.3	372,757
EPCOR - City of Edmonton	1,656.8	264,341	-	-	813.8	29,839	3,968.3	2,018	6,438.9	296,198

Utility	Residential		Farm [1]		Commercial [2]		Industrial [3]		Total	
	GWh	No.	GWh	No.	GWh	No.	GWh	No.	GWh	No.
AQUILA * - Southern & Central Alberta	2,208.6	284,705	1,287.8	49,148	3,013.2	44,679	16,029.4	22,669	22,539.0	401,201
City of Lethbridge	178.9	27,921	-	-	236.6	3,230	226.9	49	642.4	31,200
City of Medicine Hat	191.4	22,960	3.2	136	254.4	2,642	285.2	20	734.2	25,758
City of Red Deer	193.9	28,845	0.0	0.0	317.1	3,388	122.8	32	633.8	32,265
Other Towns & Villages [4]	42.5	6,464	0.0	0	54.9	860	13.4	41	110.8	7,365
Total	7,559.9	1,086,927.0	1,774.7	78,986.0	11,099.5	140,537.0	27,784.4	37,363.0	48,218.5	1,343,813.0
Isolated Plants	21.1	n/a	1.4	n/a	18.3	n/a	85.3	n/a	126.1	0
Total Including Isolated	7,581.0		1,776.1		11,117.8		27,869.7		48,344.6	

Note: This data does not include electricity generated on-site and used on-site.

1 Includes 33205 Rural Electric Assn. (REA) customers
2 Includes Street Lighting
3 Includes Transportation
4 Includes Cardston, Fort Macleod, Municipality of Crowsnest Pass, Ponoka

Last Actual (2003) Calculation:

	2001	2002	2003
Annual Electric Energy Generation from Renewable and Alternative Sources (GWhr)	2314.7	2738.4	2889.7
Annual Electric Energy Distributions Sales (GWhr)	48289.9	48728.9	48218.5
Renewable and Alternative Energy Share of Sales	4.8%	5.6%	6.0%
Increase from 2001 (Performance Measure)	**-**	**0.9%**	**1.2%**

The Performance Measure for the 2003 Calendar Year:

$$\frac{R\cdot\&\cdot A\cdot Generation_{Current} - R\cdot\&\cdot A\cdot Generation_{2001}}{Electric\cdot Energy\cdot Distribution\cdot Sales_{Current}} = \frac{(2{,}889.7 - 2{,}314.7)}{48{,}218.5}\cdot 100 = \frac{575.0}{48{,}218.5}\cdot 100 = 1.2\%$$

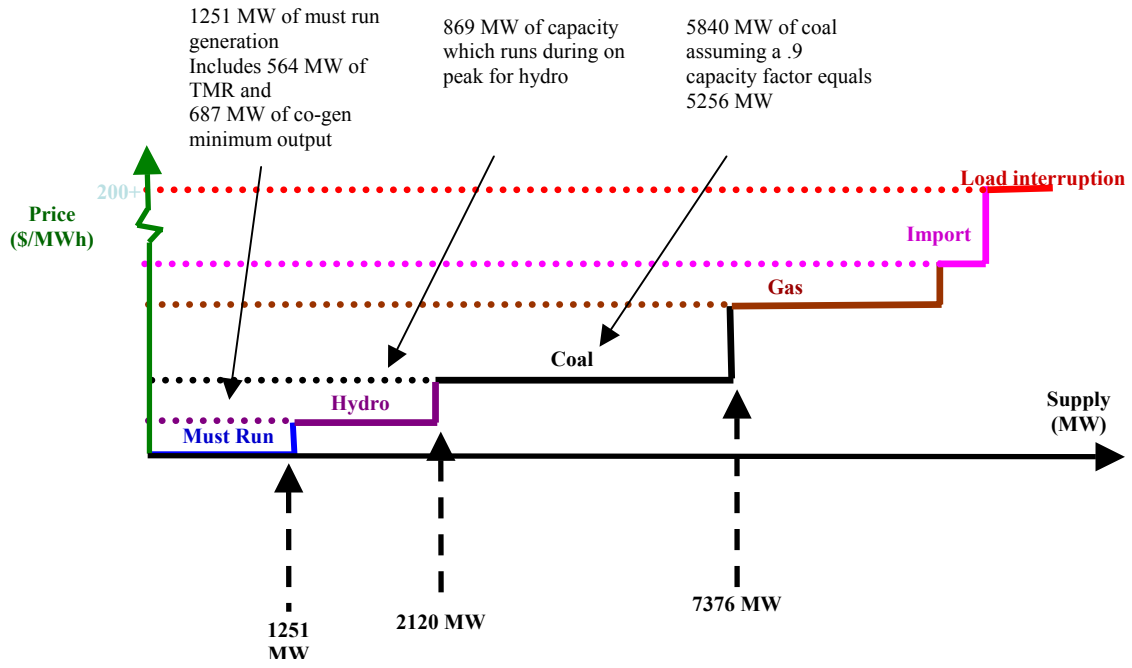
Target

To increase the renewable and alternative energy share of total electricity production as a percentage of sales in AB by 3.5% compared to 2001 levels.

Appendix D: Marginal Unit Calculation*

*This appendix was prepared by industry members of the R&A team. The information contained within has not been agreed to by all stakeholders.

Based on the 2005 generic stacking order provide by the AESO, below is the dispatch order and the MW of capacity needed for dispatch.



The step function for gas dispatch (non must-run) occurs at 7376 MW. This marginal unit calculation can be created with the generic stacking order information from the AESO and two conservative assumptions: on-peak dispatch of the majority of hydro and a counter balancing assumption that must-run co-generation only produces the minimum output. (Note: If we assume that must-run co-generation produces at maximum capacity rating then the value for all must run is 3509 MW and coal is on the margin at all times regardless of the impact of hydro.) Note that in the actual bid stack, wind and a significant portion of coal generation bids at $0, which is the same as the "Must Run" generation. On a typical day, 5,000MW of capacity or more can be observed with a $0 bid. This does not affect the conclusion that coal is the marginal generation fuel when demand is below 7376 MW and natural gas is the marginal generation fuel when demand is above 7376 MW.

For the marginal unit calculation, based on the 2004 hourly data, the coal plants were the marginal unit 73% of the time. This would apply to all dispatchable forms of R&A generation; for non-dispatchable generation such as wind the issue becomes when "the wind blows." Review of the McBride specific production for 2004 found that coal was the marginal unit 70% of the time in a bad wind year. Extended wind data for McBride indicates that here should be more on peak generation in the future years which would decrease the wind specific marginal unit for McBride. Each wind farm's production on an annual basis would be required for further refinement of the marginal unit calculation.

Industry's proposed marginal unit calculation to determine the amount of credit to give R&A generators is based on three steps:

> *Step 1 – Establish a baseline for average intensity of thermal generation in the province. This baseline represents the maximum amount of intensity offset by a MWh of R&A generation. The R&A baseline would be established and reviewed as part of the five-year BATEA review (use the previous year's data to establish this year's R&A offset value).*
>
> *Step 2 – Establish the intensity value for each R&A generation source. Each R&A facility that wants to participate must provide the emission intensity for their production. Such information must be verified by a qualified third-party auditor through review of all the facility testing.*
>
> *Step 3 – Create the credit based on the difference between the agreed system intensity and offsetting generation sources intensity. The credit must be registered with the registry operator and all such information will be considered in the public domain.*

This proposal was originally created in 1997 as part of the GERT process and subsequently endorsed by Industry, Federal Government and Province of Alberta in 1999 as part of the Emissions Quantification Protocol. Representation on the EQWG (emissions quantification working group) included Alberta Department of Energy, thermal generators, renewable generators, Power Pool of Alberta, Natural Resources Canada, Energy Importers/Exporters and Pricewaterhouse Coopers.

The EQWG concluded that in Alberta the average or marginal unit method is most suitable quantifying emissions on the system, as well as emission reductions resulting from the addition of lower emissions electrical resources.

The calculation determines the marginal unit or average unit being displaced and while it is possible to calculate the effect of the marginal unit hour by hour, such a calculation would not be consistent with the principle of efficient operation for the Alberta ETS. The simplified baseline calculation will be more consistent with this principle and the recent 2005 independent analyses by both Coral Energy and Alberta Government confirmed the calculation of the marginal units as accurate for establishing the baseline intensity calculation (see Appendix D for example of marginal unit calculation).

Rather then use the marginal unit calculation, a proxy for the marginal unit can be developed using the average annual production as captured below.

2002 data

Year / Resource type	***Coal***	***Natural gas***	***Hydro***	***Wind***	***Biomass &Waste***	***Others1***	***Total***
Capacity (MW)	*5658.9*	*4538.9*	*861.4*	*102.6*	*0*	*26.4*	*11188.2*
Capacity (%)	*50.58%*	*40.57%*	*7.70%*	*0.92%*	*0.00%*	*0.24%*	*100%*
Generation (GWh)	*42541.8*	*19462.1*	*1675.4*	*323.2*	*281.3*	*44.8*	*64328.6*
Generation (%)	*66.13%*	*30.25%*	*2.60%*	*0.50%*	*0.44%*	*0.07%*	*100%*
Capacity factor (%)	*85.82%*	*48.95%*	*22.20%*	*35.96%*	*#DIV/0!*	*19.37%*	*65.64%*

Sourced from EUB annual statistics for 2002
ISSN 0706-1420, volume XXII, July 2003

For comparison purposes the 2004 raw data is captured below.

2004 raw data	*coal*	*gas*	*hydro*	*other*
Generation (%)	*64.83%*	*30.30%*	*2.91%*	*1.96%*

Establishing the base line for 2006:

Intensity of Coal x % of Coal + intensity of gas x % of Gas = Annual baseline in kg/MWh (intensity for each type was obtained from the CASA/EDC model).

Under the marginal unit calculation the baseline would be

	NOx		*SOx*	
Coal	*1.699*	*x*	*2.705*	*intensity*
	0.724315	*+*	*0.724315*	
Gas	*1.024*	*x*	*0*	*intensity*
	0.275685	*=*	*0.275685*	
	1.512913		*1.959272*	*Marginal*

Under the annual baseline methodology the baseline would be

	NOx		*SOx*	
Coal	*1.699*	*x*	*2.705*	*intensity*
	64.83%	*+*	*64.83%*	
Gas	*1.024*	*x*	*0*	*intensity*
	30.30%	*=*	*30.30%*	
	1.411712731		*1.75369*	*Baseline*

There is very little difference under the two methods.

While coal-fired generation has been shown to have a SO_2 intensity of 2.705 kg/MWh, the fact that gas generation has no SO_2 emissions creates a potential issue when allocating credits to renewables and alternatives. Restricting SO_2 credits to renewable and alternative energy facilities does not solve the problem that some of the time it is natural gas on the margin. To limit this leakage, the intensity for coal-fired generation could be adjusted to reflect the new coal standards. CASA's EPT recommended (#6) an intensity of 0.8 kg/MWh for new coal facilities. Substituting this value into the baseline calculation results in the following intensity:

		SO_2	
Coal		*.8*	*intensity*
	x	*64.83%*	
Gas	*+*	*0*	*intensity*

		x	*30.30%*	
2004	=	*.529*	*Baseline*	

For example, using the intensity above of 0.529 kg/MWh, indicates that consumer would have to purchase 2000 MWh of wind or run of river hydro to reduce SO_2 by one tonne. The use of the 0.529 kg/MWh baseline intensity represents a significant discount for renewable and alternative energy facilities with respect to both the baseline and marginal unit calculations. Using this discounted baseline will more than cover any leakage within the Alberta SO_2 trading system.

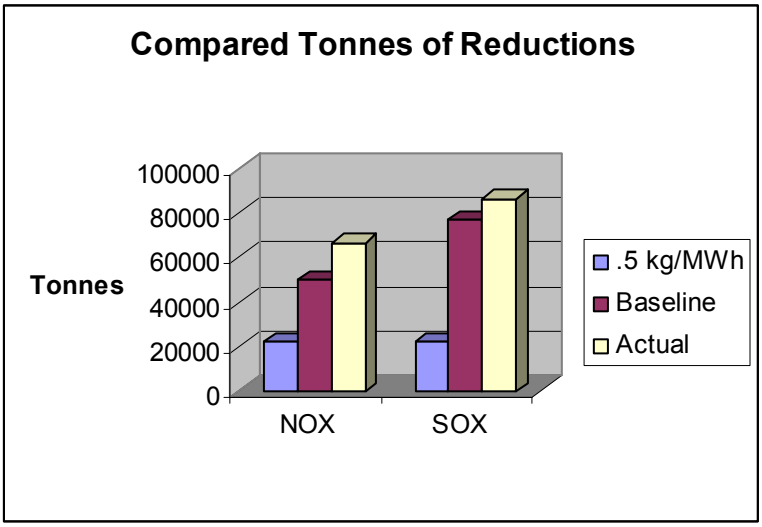
Using the baseline calculation presented in the discussion above would represent the most conservative approach to establishing a SO_2 credit threshold (the marginal unit or average calculations have higher values in the range of 1.7 to1.9 kg/MWh for SO_2).

The proposed system would be open to R&A generation that chooses to participate. The owner of a REC may choose to convert it to a credit by following the QTPA process outlined in the ETS administration document. In choosing to participate, the R&A generator/owner takes on the accountability for tracking and validating the ownership of the REC or Credit. RECs and ETS Credits are mutually exclusive; once a REC has been converted to a credit or credits (unbundled) they can no longer be trading as RECs. However it is unlikely that the entire value of NOx/SO_2 reductions from R&A generation would be converted into the NOx/SO_2 credits simply because the majority of production is already contracted outside of the NOx/SO_2 trading regime.

Emissions Effects of Including R&A in the 2006 Trading System

Using the intensity of 0.5 for both NOx and SO_2 indicates that consumers would have to purchase 2000 MWh of wind or run of river hydro to reduce one tonne of emissions.

The total tonnage of reductions available from R&A participation is reflected by the marginal unit calculation. Assuming that all new R&A generation would be eligible for emission trading results in the absolute reduction of 66,000 tonnes for NOx and 86,000 for SO_2. The graph below captures the impact of using baseline and .5 as the intensity values when compared to the actual reduction.



The second table illustrates the net impact for every MWH of renewable credited.

Credit Type	*Marginal unit*	*Credit intensity*	*Benefit to the Province*
NOX	*1.513*	*.5*	*1.013*
SOX	*1.959*	*.5*	*1.459*

Industry wanted to address the overall effect on emissions, considering the credits are in units of emissions intensity as opposed actual tonnes. Industry believes that if we displace the thermal generation we are not changing their intensity but lowering their total emissions and total generation in the province. Using the discounted average intensity of thermal generation will account for the leakage associated with the intensity based method and the current total contribution on an annual basis from R&A generation would be very small compared to the total tonnes of reductions.

Industry believes that the primary benefit of adopting the R&A generation as part of the Alberta emission trading system is the potential to see real reductions today rather then approximately 15 years from now. Graphically the impact of including the NOx/SO_2 R&A credits can be presented two ways; the value of credits as compared to actual reductions and the net impact under the current form of NOx/SO_2 emission trading.

Appendix E: Deemed Credit Threshold

The text below is excerpted from the 2003 final report of the CASA Electricity Project Team and is referenced in recommendation 4.

Deemed Credit Threshold

Under the current regulatory regime, approved emissions limits for generating units take into consideration the inherent variability in the operation of these units and the performance capability of the emission control technologies. This allows the emission performance of a unit to fluctuate within certain reasonably foreseeable limits without triggering an exceedance of approval limits. The proposed CASA framework anticipates that the BATEA emission limit standard will also incorporate provisions for such operational variability.

Unlike the current regulatory regime, the CASA framework offers a performance incentive for units by allowing them to generate saleable emission credits when operating at better than required performance levels. Since it would be inappropriate to issue credits for a unit operating below its licensed BATEA emission limits but within its normally expected operational variability, it is recommended that a "deemed credit threshold" be established for the NOx and SO_2 emission limits where emission credits would only be created for operating below the built-in operational variability in approved emission limits.

For example, recommendation 8 (below) recommends that the deemed credit threshold for new coal-fired units be set at 90% of the 2006 BATEA limits for SO_2 and NOx. Emission credits would be generated at an amount equal to the difference between the "90% of BATEA levels" and the annual averaged emission levels for years when this level is less than 90% of the BATEA level. Credit threshold generation limits have also been recommended for gas and co-generation units. The procedure for determining a baseline and generating credits from new and existing gas-fired units would be as described in the relevant sections of recommendation 8. The appropriate deemed credit threshold to apply to future BATEA emission levels should be determined during each Five-Year Review beginning in 2008.

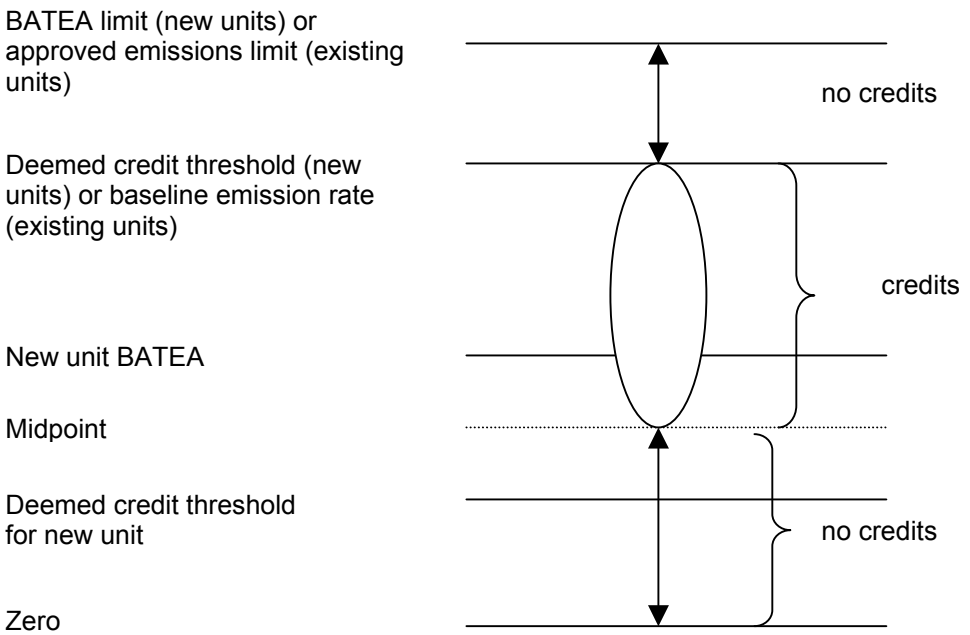
Credit Generation

The team identified several ways in which SO_2 and NOx credits can be created. These are:

i. performance better than a unit's pre-established baseline performance (which applies to existing units);
ii. performance better than the deemed credit threshold applying to that unit (which applies to some existing units and all post-2005 units);
iii. credits for early shutdown; and
iv. three years of transition credits at the end of design life.

The intent of credit generation is to: provide incentives and rewards for better than required or expected performance, encourage early shutdown of older units, and encourage implementation of new emission controls at existing units. Figure 3 demonstrates the concept behind credit generation for performance better than expectations.

Figure 3: Generation of NOx and SO_2 Credits for Early Shutdown



Examples of how credits for early shutdown and "transition" credits are created and granted are presented in Appendix G. All NOx and SO_2 credits created are subject to a 10% discount if not used in the year or period in which they are granted. This 10% discounting of credits is considered the "environmental benefit" component of emission trading. Without this discounting there are no overall environmental benefits from credit generation and emission trading because credits generated at one unit get applied to another unit in lieu of actual emission reductions; that is, there is a "zero sum" result.

Recommendation 8: NOx and SO_2 Emissions Management Approach

The EPT recommends adoption of a baseline and credit emissions trading system at this time for SO_2 and NOx. To manage SO_2 and NOx from Alberta's electricity generation sector, the EPT recommends that

1. Baseline emission rates for both new units and existing units that are at the end of Design Life are the BATEA limits of the day.
2. The emission rate for existing units prior to the end of their Design Life is the currently approved emission rate as specified in the regulatory approval.
3. For the purposes of credit generation, where not otherwise covered by points 4, 5, 6 or 7 below, the following will apply. The baseline emission rate for existing units would be established based on the average emissions per MWh in the 2000-2002 period inclusive. For co-generation units, the baseline emission rate will be based on the combined heat and electricity in MWh. In the event of unusual operating conditions or a prolonged shutdown during that period, the baseline would be based on the three most recent "average" years of operation. A unit that has been recently commissioned would have its baseline set by the first three years of operation. In the case of an existing unit that does not yet have three years of operation; the first year of "normal" operation would be used.

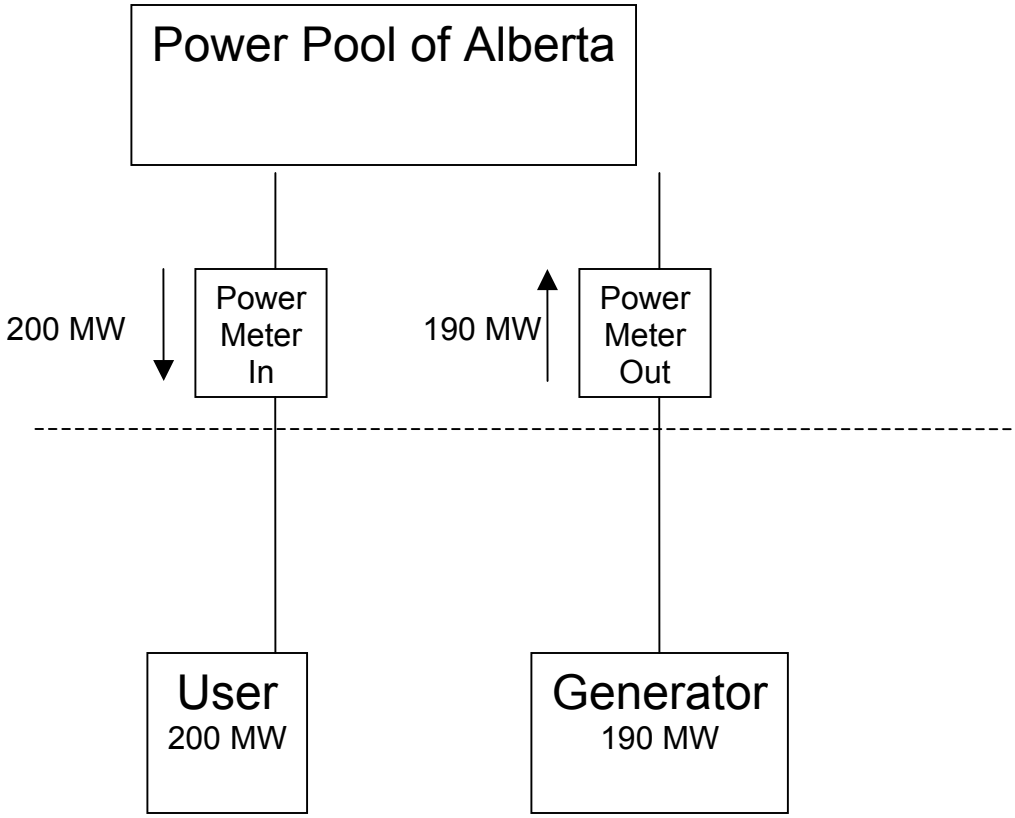
4. The deemed credit threshold for the 2006 BATEA standards, as applied to new coal-fired units, is 90% of the BATEA level.
5. Credits for performance better than the deemed credit threshold are subject to a one-time discount of 10% if they are not used within twelve months of being certified.
6. The deemed NOx credit threshold for new (post 2005) gas units (including peaking units) is as follows:
    i. 0.5 kg/MWh for units less than 20 MW in capacity rating
    ii. 0.3 kg/MWh for units between 20 and 60 MW in capacity rating
    iii. 0.2 kg/MWh for units greater than 60 MW in capacity rating
7. The deemed NOx credit threshold for existing gas units is as follows:
    i. 0.2 kg/MWh for units operating below 0.2kg/MWh. As this threshold already incorporates the concept of deemed credit threshold and an environmental discount, #5 above would not apply to these units.
    ii. baseline emission rates for units operating above 0.2kg/MWh
    iii. 0.2 kg/MWh for all peaking units operating above 0.2 kg/MWh. Peaking units can generate credits to a maximum of the difference between actual NOx emissions and the NOx emission cap applying to that unit.
8. Credits for existing units that shut down before the end of Design Life will be granted based on:
    i. the number of years between shutdown and end of Design Life
    ii. the difference between the unit's baseline emission rate or deemed credit threshold, where applicable (kg/MWh), and the BATEA emission rate of the day and the corresponding deemed credit threshold applicable to new units.
    iii. the unit's generation rate (MWh/year), which will be the average of the three highest years' generation in the last five years before shutdown
9. Unlimited banking of credits
10. Units that reach the end of Design Life and commit to either shutting down on that date or upgrading to BATEA within three years of that date are eligible for transitional allocations based on the following formula: BATEA limit of the day (kg/MWh) x 3 years x the average of the three highest years' generation in the last five years (MWh). Consistent with the 2010 shutdown or upgrade requirements of their EPEA Approval, the Wabamun generating units are not eligible for this provision.

For units that have reached the end of their Design Life, there be a 10-year limitation, to a maximum operating life of 50 years for coal, 40 years for gas, and 60 years for peaking gas units, on the use of credits to meet new BATEA limits, at which time the existing unit must physically upgrade to comply with the BATEA emission limit of the day or shut down. Consistent with the 2010 shutdown or upgrade requirements of their EPEA Approval, the Wabamun generating units are not eligible for this provision. For exceptions, see recommendation 10.

Appendix F: Examples of Calculations to Address Behind the Fence Generation

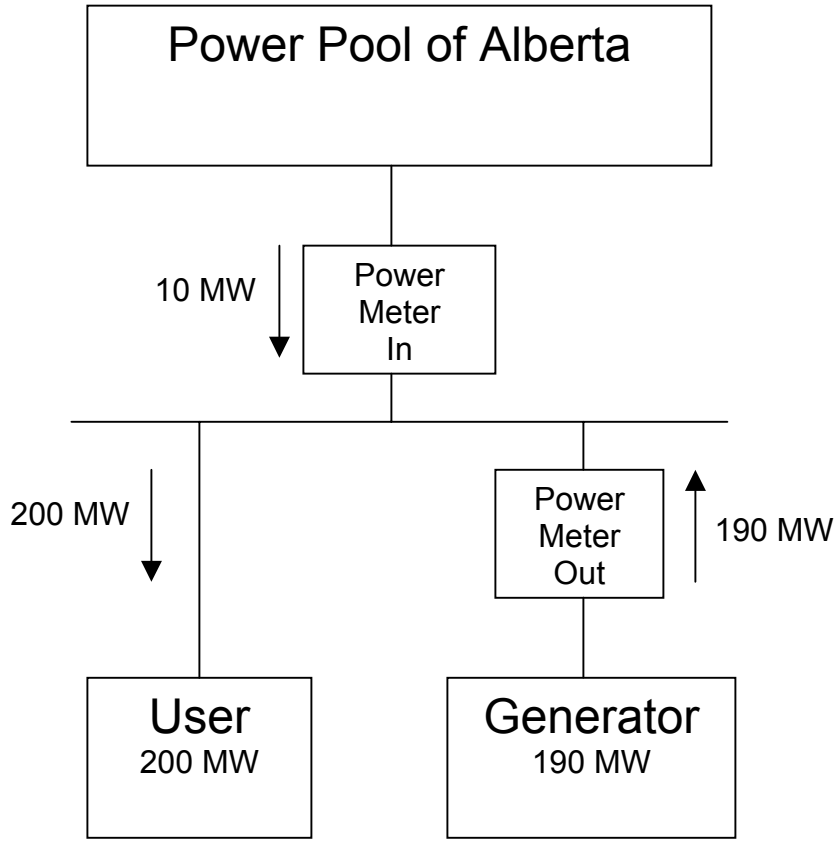
This appendix provides examples of ways in which electricity generated "behind the fence" could be addressed in the calculation described in recommendation 7, section 4 of this report.

BASE CASE



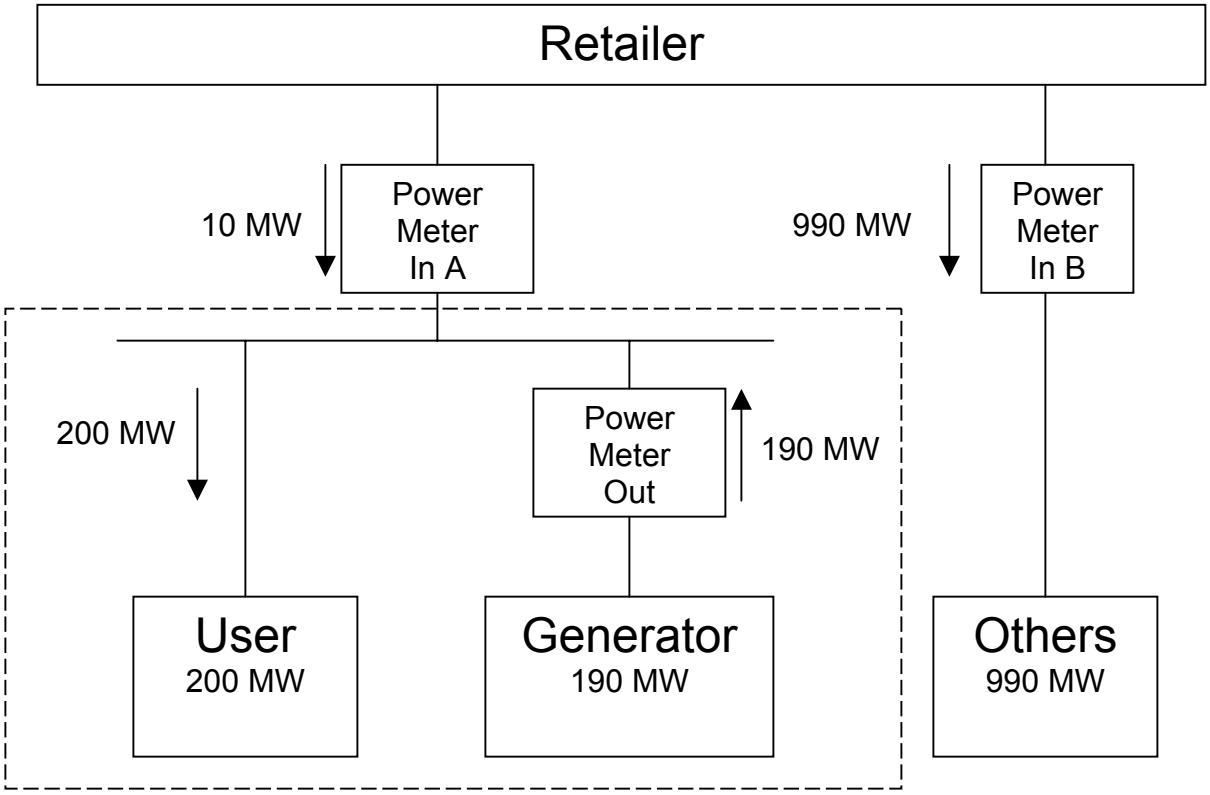
- Generation is connected to Power Grid directly and sells its energy to the Power Pool.
- User is connected directly to the Power Grid and buys its energy from the Power Pool.
- The reading of Power Meter Out is included in the calculation of progress towards target.
- The reading of Power Meter In is included in the calculation of "Total Energy Sold Through the Power Pool".
- The User would purchase Target% X 200 MW of R&A energy to meet its voluntary commitment.

R&A GENERATION INSIDE PLANT – DIRECT CONNECT



- Generation is connected directly to the User and supplies its energy to the User.
- User is supplied in part from the generator and the balance is purchased from the Power Pool.
- The reading of Power Meter Out is included in the calculation of progress towards target.
- The reading of (Power Meter In + Power Meter Out) is included in the calculation of "Total Energy Sold Through the Power Pool".
- The Generator sells his RECS to another party or to the User.The User would purchase Target% X 200 MW of R&A energy to meet its voluntary commitment, which can be purchased from another party and/or the Generator.

R&A GENERATION INSIDE PLANT - RETAILER



- Generation is connected directly to the User and supplies its energy to the User.
- User is supplied in part from the generator and the balance is purchased from a Retailer.
- The reading of Power Meter Out is included in the calculation of progress towards target.
- The reading of (Power Meter In A + Power Meter Out + Power Meter In B) is included in the calculation of "Total Energy Sold Through the Power Pool".
- The Generator sells his RECS to another party, the User or the Retailer.The User purchases energy from the Retailer, which may or may not include a component of R&A energy.
- The Retailer would purchase Target% X 1000 MW of R&A energy to meet its voluntary commitment, which can be purchased from another party and/or the Generator.
- The Retailer may sell R&A energy to User or Others.

Appendix G: Waste Heat Recovery: Definitions and Use in Canadian and US Energy Policies and Regulations

The table below contains descriptions of waste heat, as developed and used by other Canadian and US jurisdictions in qualifying waste heat as a renewable and alternative energy source. This table was provided by industry stakeholders and is referenced in conjunction with non-consensus recommendation 18 in section 7.1, where stakeholder positions on this topic are described.

Province/State	Definition (in italics) and Use
British Columbia	**BC Clean Electricity, September 2005** • *Energy Recovery Generation (ERG) – means electricity produced from the recovery of waste energy from an industrial process, either in the form of heat or steam that would otherwise have been vented or emitted into the atmosphere. Eligible processes use a closed-loop system and do not use fossil fuels as an input source within the ERG technology process. The only product of ERG is electricity.*
Saskatchewan	**Environmentally Preferred Power; SaskPower, February 2005** • *Heat Recovery Systems: minimal environmental site impact; facility is sited in an area which does not have legislated environmental status; little or no fisheries, species at risk, wildlife habitat or heritage site impact; minimal requirements for new electrical infrastructure; new facility would neither require nor necessitate additional resource consumption to maintain or enhance facility; if added to an existing facility, the existing facility would not be substantially altered to allow the new development to operate; low to nil operational risk regarding noxious and hazardous substance release; contingency and containment plans acceptable to regulatory authorities; maintenance of regional air quality. Net reduction desirable; no increase in GHG emissions; GHG reduction desirable; in order to allow for conditions such as start-up, combustion stabilization and low combustion zone temperatures, be generated in a manner such that supplementary, non-renewable fuels are used in no more than 5% of fuel heat input*
Government of Canada	**Offset System for Greenhouse Gases, August 2005** • Indirect Emission Reductions-Electricity: Electricity saving, clean energy production and non-LFE cogeneration projects that result in indirect emission reductions from fossil fuel electricity production are eligible to create offset credits. • Clean energy projects are low GHG emission intensity electricity generation projects that are covered by the Large Final Emitters system

Province/State	Definition (in italics) and Use
Nevada	**Renewable Portfolio Standard, Nevada Office of Energy** • **Assembly Bill No. 429,** *"An Act relating to energy;…revising the provisions governing the portfolio standard to include energy from a qualified energy recovery process;"* • **Sec. 6. Chapter 704**, *"is hereby amended by adding thereto a new section to read as follows: 1. Qualified energy recovery process means a system with a nameplate capacity of not more than 15 MW that converts the otherwise lost energy from: a) The heat from exhaust stacks or pipes used for engines or manufacturing or industrial processes; or b) The reduction of high pressure in water or gas pipelines before the distribution of the water or gas to generate electricity if the system does not use additional fossil fuel or require a combustion process to generate such electricity. 2. "The Term does not include any system that uses energy, lost or otherwise from a process whose primary purpose is the generation of electricity, including without limitation, any process involving engine-driven generation or pumped hydrogeneration.* • 15 MW size limit is arbitrary • [Limit is] in place to satisfy a special interest lobby • However, 15 MW limit captures all waste heat sources found in Nevada.
Oregon	**Oregon Energy Conservation Statute 469 and the Oregon Renewable Energy Action Plan, April 2005** • waste heat recovery recognized as a source of **Renewable Energy in Oregon statute 469 – Energy Conservation** • Action Plan includes biofuels, biogas, biomass, waste heat recovery, CHP, geothermal, Hydro, solar, wave, wind
South Dakota	**South Dakota Department of Tourism and State Development** "The South Dakota State Energy Office has evaluated the waste heat recovery projects proposed by [proponent] and *find these projects to be equivalent to other renewable energy electric generating resources such as those powered by solar, wind, biomass, or geothermal fuel sources."*
North Dakota	**North Dakota Department of Commerce** • "statutorily charged with developing state energy conservation policies…The Division of Community Services has evaluated the waste heat recovery projects proposed by [proponent] *and find these projects to be equivalent to other renewable energy electric generating resources such as those powered by solar, wind, biomass, or geothermal fuel sources."*