

Canada in a Post-2012 World

A Qualitative Assessment of Domestic
and International Perspectives

Warren Bell, John Van Ham, Jo-Ellen Parry, John Drexhage and Peter Dickey
of the IISD Climate Change and Energy Team

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List of Abbreviations and Acronyms

AMG	Analysis and Modelling Group
BAU	Business as Usual
CDM	Clean Development Mechanism
CDN	Canadian
CDT	Climate-wise Development Treaty
CEOU	Canada's Emission Outlook Update
CO ₂	Carbon Dioxide
CH ₄	Methane
COP	Conference of the Parties
DET	Domestic Emissions Trading
DC	Developing Country
ETS	Emissions Trading Scheme
EU	European Union
G8	Group of Eight
G20	Group of 20
GDP	Gross Domestic Product
GEM	Group of Emission Markets
GHG	Greenhouse Gas
GI	Graduation Index
GNP	Gross National Product
GSES	Global Sector Emission Standard
GTES	Global Per Capita Total Emission Standard
H ₂	Hydrogen
IET	International Emissions Trading
IISD	International Institute for Sustainable Development
L20	Leaders of the Group of 20
LDC	Least Developed Countries
MERCOSUR	Mercado Común del Sur (the Southern Common Market)
MOP	Meeting of the Parties
N ₂ O	Nitrous Oxide
NGO	Non-governmental Organization
NO _x	Nitrogen Oxide
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
PAMs	Policies and Measures
PM	Particulate Matter
ppm	Parts per million
R&D	Research and Development
SD	Sustainable Development
SO ₂	Sulphur Dioxide
UNFCCC	United Nations Framework Convention on Climate Change
U.S.	United States
VOC	Volatile Organic Compounds
ZETT	Zero-Emission Technology Treaty

Foreword

Canada in a Post-2012 World explores Canadian and international perspectives on establishing a sustainable, global regime for future climate change action. From a Canadian perspective, this publication is the first effort to comprehensively understand whether and how the wide range of future climate change options after the Kyoto Protocol expires in 2012 may or may not work to address Canadian interests and priorities. This certainly has been a very useful exercise from IISD's perspective, particularly in developing a clearer understanding of the range of options being discussed internationally. It has also been extremely helpful in initiating discussions and perspectives from the different regions of Canada, covering the particular circumstances and perspectives of Canada's provinces and territories. One common theme does emerge loud and clear on climate change across all of Canada's regions. While we all may have different sensitivities and socio-economic circumstances which will guide the positions we might wish the federal government to take in post-2012 discussions, we all agree that climate change is a real and future threat and Canada needs to develop a response that takes this threat seriously and recognizes that actions should work to protect and help our economies grow in directions that are sustainable and profitable.

I would like to thank the work of the Climate Change and Energy Team at IISD—in particular, Warren Bell, Peter Dickey, Jo Ellen Parry and John Van Ham—for the quality of their efforts in this regard. I would also like to thank the Pew Center on Global Climate Change, and in particular, Dan Bodansky, for putting together the range of options being discussed internationally in one coherent format. It made our task significantly easier. In addition, I would like to express my gratitude to the many international experts

and negotiators who took the time to be interviewed and complete our surveys—this work could not have been completed without their considerable efforts. Finally, and certainly not least, I would like to thank the members of the Advisory Group who provided timely advice in the development of this analysis and, of course, our sponsors (listed on the next page) who funded this most interesting of exercises.

I believe that this qualitative analysis, with the active inclusion of the federal government, provincial and territorial governments, and other stakeholders in the process, could represent an excellent launch to a national discussion on Canada's role in the post-2012 climate change discussions. I stress, though, that this work, particularly Chapter 7, represents a starting point for discussions and considerably more work still needs to be done. In particular, none of the views expressed in this document necessarily reflect the perspectives of our project sponsors.

We look forward to sharing our results at future conferences and, of course, are keen to continue our research in this area; in particular, refining a limited set of options that may work to more effectively address the unique and dynamic set of circumstances that make up Canada.



John Drexhage
Director, Climate Change and Energy
International Institute for Sustainable Development

Project Sponsors

IISD greatly appreciates the financial support it received for completing the two initial reports (*A Qualitative Assessment of Post-2012 Options: Canada* and *A Qualitative Assessment of Post-2012 Options: International Considerations*) that led to this report: *Canada in a Post-2012 World: A Qualitative Assessment of Domestic and International Perspectives*. We wish to thank the following sponsors for the contributions of time and funding (listed in alphabetical order):

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- Government of Canada (Foreign Affairs Canada)
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Executive Summary

In February 2005, the Kyoto Protocol came into force, completing many years of difficult negotiations. The first commitment period is less than three years away, and many countries, including Canada, are only now putting in place policies to meet their Kyoto targets. At the same time, discussions have started to shift to the post-2012 time-frame, and the nature of the climate change policy regime that might follow the first Kyoto commitment period.

In May 2005, a United Nations Framework Convention on Climate Change (UNFCCC) meeting of government experts took place, representing an initial step towards international discussions on post-2012. In late 2005, Canada hosts the UNFCCC eleventh Conference of the Parties (COP-11) and the first Meeting of the Parties to the Kyoto Protocol, where the post-2012 issue will be an important part of formal and informal discussions.

The way forward on post-2012 climate change policy is unclear but will likely be difficult. The United States remains outside of the Kyoto Protocol process, and there are deep divides among countries on the question of targets for developing countries. Many countries will have great difficulty meeting their Kyoto Protocol targets, yet much deeper reductions are likely to be required in future periods.

The successful negotiation and implementation of post-2012 climate change policy will require creative solutions and a well-managed process to address the many issues and national interests. Already, many different architectures, processes and policy options have been proposed. A recent survey by the Pew Center summarized 44 policy options that have been developed for the post-2012 period.

One of the first steps in moving forward on post-2012 climate change policy is the development of a clear understanding of the interests of the key players, and of how those interests might be affected by the policy options being proposed. In this paper, IISD examines Canada's national interests and priorities, and carries out an initial qualitative assessment of how those interests are affected by post-2012 policy options. The paper provides an international scan and an analysis of interests and priorities of key countries/blocs in the climate change negotiations. This scan includes a survey and interviews with international contacts, to identify support—or lack thereof—for the post-2012 climate change options being discussed and to gauge external perspectives on the main Canadian interests and priorities. The paper also develops a set of possible objectives or criteria, based on Canada's interests and the international context, which could be used to evaluate other post-2012 options.

Post-2012 Policy Options (elements and approaches)

The 44 policy options identified by Pew address a wide variety of objectives. Some emphasize the design of national targets; others emphasize the use of policies and measures (PAMs), or focus on engaging developing countries. Some options are short-term in focus; others address a path towards a long-term stabilization target.

The approach taken in this paper is to simplify the analysis by identifying a few key elements that were included in many of the policy options. IISD also identified several general approaches to the post-2012 period which characterize the many options.

The key elements include:

1. **Soft or qualified targets** – such as intensity targets, or absolute targets with a safety valve (or cap) on the price of CO₂. Soft targets are intended to encourage high participation from large emitters. These targets imply a non-threatening level of action and broad participation, rather than significant near-term emission reductions. Emissions trading is normally included in this type of element, usually with a focus on credit-based trading.
2. **Hard or absolute targets** – include the ones under the Kyoto Protocol, targets based on agreed-to maximum atmospheric greenhouse gas (GHG) concentrations, or country allocations based on per capita emissions or ability to pay. These targets generally strive for mandatory, absolute, emission reductions from developed countries over set timeframes (such as the next five or 10 years). Emissions trading is normally part of this type of element.
3. **Longer-term targets** – include targets such as the United Kingdom's discussion of 60 per cent emission reductions by 2050, or the German proposal to reduce emissions by 40 per cent by 2020, if the EU agrees to a 30 per cent reduction. These longer-term, targets recognize the need for developed countries to achieve significant absolute emissions reductions and for developing countries to grow their economies and their emissions, while limiting the overall atmospheric concentrations of GHGs.

4. **Coordinated/harmonized policies and measures (PAMs)** – include instruments like common sectoral emissions intensity standards (for sectors like electricity, cement and transportation), and common carbon taxes. PAMs can be directed at either developed or developing countries.
5. **National policies and measures** – are aimed at developing policies and infrastructure within countries over the longer term. The focus is on positioning individual countries for future mitigation actions by building capacities and the necessary delivery systems, rather than focusing on larger emissions reductions in the near term.
6. **Low-emission technology incentives** – include funds from developed countries that are used for the development, deployment and diffusion of low emissions technology, and ones that provide other related assistance to developing countries.
7. **CDM incentives** – include funds from developed countries that are used to purchase emission reduction credits from developing countries (the Clean Development Mechanism [CDM] is an example of these incentives).
8. **Vulnerability and adaptation incentives** – include funds from developed countries that are used to pay for adaptation or climate change-related disaster recovery in affected developing countries.
9. **Allowance-based incentives** – are incentives where developing countries receive a generous supply of emissions allowances that can then be traded internationally.

The general approaches include:

- *Extension of Kyoto* – meaning that the existing framework for climate change will be continued, by deepening the absolute reductions required from developed countries, while gradually providing incentives for commitments from large emitting developing countries (linked, in some fashion, to their level of development).
- *Parallel Climate Policy* – proposes that climate change be addressed through either regional or sector-based approaches, coordinated through a parallel or complementary process to the UNFCCC. For example, the United States (U.S.) could develop its own cap-and-trade system which operates parallel to Kyoto's trading regime.
- *Country-/Region-Specific* – involves each country or region developing a plan that suits its circumstances and priorities, followed by participating in trade-like negotiations to achieve agreement on equivalent or equitable efforts.
- *Integrated Policy* – proposes a regime that focuses on integrating climate change considerations into

other “mainstream” priorities, followed by developing climate-specific PAMs to combat climate change. In doing so, climate change would be integrated with other policy priorities in areas related to energy planning, natural resources management and urban planning, in order to achieve a broader desired future vision.

- *Longer-term Targets* – is proposed in 18 of the 44 options identified by Pew, and these include: 60–80 per cent emission reductions by 2050 for developed countries; limiting the global temperature increase to 2°C; limiting atmospheric GHG concentrations to 550 ppm by 2100; and reaching a common per capita GHG emission intensity by 2045. These targets focus on the end point in order to enable short-term decisions in the context of longer-term requirements.

Canadian Interests and Priorities

Effective Canadian participation in advancing the post-2012 policy regime requires a clear understanding of Canada's interests and priorities as they relate to long-term climate policy. Regional interests are critical in Canada, as there are significant differences between provinces and territories in terms of emissions profiles, thermal generation mix, mitigation costs, economic opportunities and vulnerability to the potential impacts of climate change. Despite these differences, IISD's assessment suggests some common priorities across Canada may include:

- effective long-term agreements, regimes or development paths that limit dangerous climate change and any negative impacts;
- mechanisms to help reduce vulnerability through adaptation to climate change;
- opportunities to develop and commercialize new technologies for clean coal, carbon dioxide capture and storage, hydrogen fuel cell vehicles, biomass fuels and other applications;
- opportunities that enable the development, utilization and export of hydrocarbon resources;
- fair treatment of energy exports and imports;
- recognition of the timeframe required for capital stock turnover in resource industries;
- opportunities to take advantage of agricultural soil and forest carbon sink potential;
- economic growth and no negative impacts on the competitiveness of industry in export markets (especially the U.S.); and
- respect for provincial/territorial jurisdiction and flexibility for the provinces/territories to develop and implement their own policies.

Key Country/Bloc Interests and Priorities

The individual countries surveyed face diverse national circumstances and consequently have varying interests and priorities. Despite the differences, a number of common priorities exist.

For nearly all countries, economic growth and the maintenance of economic competitiveness is a main priority. For developed countries, economic growth is the most pressing priority for national governments. Developing countries share this objective but are focused more broadly on achieving economic and social development, and poverty eradication. Economic diversification is the top economic priority for some countries.

Technology development is a priority for a number of countries (developed and developing alike). For many, this implies the development of energy technologies and alternative energy sources. For African nations, least-developed countries (LDCs) and Small Island States, adaptation technologies that help deal with impacts and vulnerability are also important.

The focus on technological innovation ties directly to a third priority—increasing energy security and/or energy sector reform. Energy security is a critical concern for large energy importers like the U.S., EU, Japan, India and China. Energy sector reform is important in Russia, Ukraine and Mexico.

Vulnerability and adaptation to climate change are either already important or becoming important to many countries. Reducing vulnerability and increasing adaptive capacity is particularly important to African countries. Recognition of the impacts of climate change and the potential adverse effects is growing in the U.S., EU, Australia, India, China and Brazil.

International Perspectives (approaches, elements and Canadian sensitivities)

A wide diversity of opinion was expressed by international contacts regarding the general approaches, the key elements and the Canadian sensitivities identified in the research.

Developing country interests could be accommodated under any of the approaches, although a coordinated approach to technology transfer and other assistance is least likely under the Country-/Region-Specific approach. A lot of support exists in developing countries for an Extension of Kyoto approach, which also seems most popular with the EU. However, the Integrated Policy approach also seems attractive from a developing country perspective, because of the possibility of combining climate change priorities with other pressing development priorities.

The U.S. is the least likely to support the Extension of Kyoto approach. U.S. issues are likely best addressed under the Parallel Climate Policy and/or Country-/Region-

Specific approaches, although this also depends on international success in engaging the developing countries.

A number of countries expressed an interest in a technology-based approach. As well, there is a general sense that most countries are interested in taking a flexible approach to post-2012, one that enables the tailoring of country/bloc responses to meet their regional circumstances. For example, while the EU is arguably the strongest supporter of extending Kyoto, it is interested in including new elements to help meet the needs of EU-member countries. Other Annex I Parties see a flexible approach as a way of getting the large emitting developing countries to participate, which many describe as being essential for any post-2012 framework that emerges.

Of the elements presented, the most consensus (and the most support from a wide range of Parties) emerges around:

- the development of PAMs tailored to national circumstances that will support emissions reductions over the long term;
- the inclusion of incentives from developed countries for the development of low emission technologies and deploying these technologies to developing countries; and
- the provision of funds for purchasing emission reductions from developing countries (through a mechanism like the CDM).

The most controversy seems to exist regarding the inclusion of hard targets. The U.S. opposes this approach, which may make the inclusion of this element a non-starter at international negotiations. Disagreement also exists regarding common or harmonized PAMs; however, this depends on the type of PAM being discussed. While there is support for sectoral standards or agreements, common carbon taxes do not receive general support.

Four elements are intended to address developing country concerns. Support for technology and for adaptation appear to be the most favoured of the four elements, followed by support for mitigation efforts. On their own, surplus allowances are not likely to be a sufficient inducement to encourage significantly increased developing country participation.

On the subject of sensitivities, Canada's relationship with the U.S. is recognized as a legitimate concern by only a few respondents and, in fact, most see this as a shared concern. Similarly, Canada's federal structure is not seen as a particularly legitimate consideration, as respondents from the U.S., EU and Australia noted their situations are no different. Canadian sensitivities related to vulnerability and adaptation revealed similar responses, as it seems that most countries/blocs see themselves as being particularly vulnerable to climate change impacts. Canada's desire for a comprehensive approach is shared by a number of countries, notably the U.S., Norway, Australia and Ukraine. As well, a strong common interest exists across a range of

Parties regarding interests in technology development and innovation. While these sensitivities are viewed as legitimate they are not seen as being unique to Canada.

Very little international support exists for allowing credits for clean energy export. This issue was frequently identified as a potential area of conflict, however, allies may be found in Russia, Ukraine and OPEC. Finally, differences may surface regarding the focus of sinks activities and Canada can expect strong Brazilian opposition on issues related to CO₂ sequestration or the maintenance of standing forests.

Evaluation Criteria (objectives for Canada)

For the qualitative assessment of the post-2012 policy options, IISD developed a set of proposed criteria that could be used to assess post-2012 policy options against Canadian objectives. These criteria were meant to be relevant to Canada and to the international analysis provided:

- **Environmental objectives** – including the achievement of significant long-term reductions consistent with the UNFCCC's ultimate objective, comprehensive coverage and promotion of co-benefits. While all options address environmental objectives, they differ in their emphasis and focus.
- **Economic objectives** – including sustainable economic development, competitiveness, minimization of negative economic effects, recognition of Canada's circumstances and cost certainty.
- **Equity objectives** – which, in this assessment, were limited to achieving comparable efforts among industrialized countries.
- **Administrative and institutional objectives** – including minimizing complexity of negotiation and implementation, maximizing policy flexibility and allowing individual countries to determine how to reach agreed objectives.
- **Technology objectives** – including a direct focus on promoting the development, deployment, and diffusion of new and existing technology
- **Developing country participation** – achieved by addressing a wide range of developing country needs in the areas of economic development, technology transfer, vulnerability and adaptation, energy security and capacity building.
- **U.S. participation** – which will be essential for international climate efforts to be successful and for Canada's economic interests to be addressed. Post-2012 policy regimes will need to address U.S. concerns, interests and issues.

These criteria can be used as the basis for a dialogue among Canadian governments and stakeholders on Canada's post-2012 objectives. Potentially, this discussion

will lead to broad agreement on a clear set of objectives for Canada to carry forward and promote in international discussions on post-2012 climate policy. These criteria can be used to evaluate any new proposals for post-2012 policy regimes or to form the basis of a Canadian proposal.

Qualitative Assessment of Post-2012 Options

The proposed criteria developed by IISD were used to evaluate the five general approaches, described above, against Canadian interests.

The main conclusion from IISD's assessment is that while no single approach directly meets all of the criteria and objectives, the approaches each provide sufficiently broad frameworks to address Canadian interests.

The Extension of Kyoto, Parallel Climate Policy or Integrated approaches seem most likely to balance the environmental and economic objectives that reflect Canadian interests. The Long-Term Targets approach generally emphasizes the achievement of long-term reductions, while a Country-/Region-Specific approach emphasizes the economic and other interests of industrialized countries.

Canada's interest in technology development could be addressed by any of the approaches, although a coordinated international effort on technology seems least likely under the Country-/Region-Specific approach.

The proposed criteria were also used in an initial qualitative assessment of the nine key elements identified by IISD:

1. Soft or qualified targets;
2. Hard or absolute targets;
3. Longer-term targets;
4. Coordinated/harmonized policies and measures (PAMs);
5. National policies and measures;
6. Low-emission technology incentives (for developing nations);
7. CDM incentives (for developing nations);
8. Vulnerability and adaptation incentives (for developing nations); and
9. Allowance-based incentives (for developing nations).

The first three of these elements are target-based. While the environmental effectiveness and economic impacts of targets depend primarily on their stringency and timing, the nature of the targets is also important. Canada's economic interests may be addressed best by soft or qualified targets, such as intensity targets designed to encourage economic growth or price caps designed to limit costs and create cost uncertainty. On the other hand, hard and long-

term targets are more likely to achieve significant long-term emission reductions—also a priority for Canada.

National PAMs aimed at developing policies and infrastructure over the longer term are likely to address many Canadian interests, although they are unlikely to achieve significant emission reductions if implemented in isolation of other elements. Also, if the PAMs are defined by individual countries, they may lack the level of international coordination on technology and developing country needs that is required to address these objectives.

The use of coordinated/harmonized PAMs in relatively narrow and specific areas, such as energy efficiency or technology, may address some Canadian interests; however, on their own, they are unlikely to achieve comprehensive and large-scale emission reductions. As well, broad PAMs and common fiscal measures are unlikely to be in Canada's economic interest.

Any post-2012 climate policy regime is likely to include combinations of these elements. A combination that may address many of Canada's interests could include: soft or qualified targets for the near term; hard targets for the longer term; national PAMs, or coordinated PAMs on technology and energy efficiency; and technology transfer to developing countries, and support for both mitigation and adaptation objectives.

IISD assessed 28 of the original 44 policy options against the proposed Canadian criteria. While none of the options support all of the criteria identified, four widely differing comprehensive options appear to address many Canadian objectives:

1. Dual Track – which focuses on increasing participation by offering the choice of targets and PAMs. Most U.S. and developing country issues appear to be addressed.
2. Orchestra of Treaties – is a decentralized approach that is selective rather than comprehensive. The focus on technology may be of interest to Canada.
3. Parallel Climate Policy – is an approach that would involve the U.S. leading the development of an agreement that would operate in parallel to the Kyoto regime, and would include the U.S., Australia and key developing countries. The current Asia-Pacific Partnership may in fact be the starting point for this option.
4. Multi-sector Convergence – is a complex approach that seeks to establish long-term targets and pathways, but is the one that may include the most mechanisms for addressing differing national circumstances.

Several options include a “safety valve” that addresses cost and cost uncertainty—key economic concerns of Canada and the U.S. A safety valve could easily be included in other more comprehensive approaches (e.g., the Dual Track option includes a possible safety valve).

Several options describe separate approaches that focus on energy efficiency and/or technology. While these could be implemented as alternatives to a system of national emission targets, they would likely address more Canadian interests if combined with national targets (perhaps soft or qualified targets) and other measures. These options include:

- International Agreements on Energy Efficiency – is quite narrow in scope; however this option could both enhance technology development and address economic concerns related to competitiveness and capital stock turnover (since most standards would apply to new equipment and plants).
- Technology-Focused Approaches – involve technology standards, coordinated research and development (R&D) and technology transfer to developing countries. Like energy efficiency standards, these address many economic and competitiveness concerns.

Several options focus almost entirely on engaging developing countries. A group of five options propose different approaches to setting national emission targets for developing countries. These are: Dual Intensity Targets; Growth Baselines; Human Development Goals with Low Emissions; Multistage/New Multistage; and Soft Landing in Emissions Growth. A sixth option, Sustainable Development PAMs, avoids targets entirely, focusing instead on voluntary pledges of PAMs that address both economic development and climate change. While it will be difficult to engage many developing countries, an approach that addresses the individual country needs may gain broader support than an approach focused on target-setting.

The assessment carried out by IISD in this report suggests a few key learnings and a way forward:

1. An approach that focuses on the circumstances, interests and priorities of regions and sectors within Canada may be helpful in defining Canada's objectives for post-2012 climate policy.
2. A broader dialogue on Canada's interests and objectives may provide Canadian governments and stakeholders with a better understanding—and perhaps a common view—on the criteria and objectives that Canada could support and promote in international discussions on post-2012 policy.
3. The initial assessment of post-2012 policy options indicates that there are no options proposed to date that fully meet the criteria and objectives proposed by IISD. This result is not surprising, given Canada's unique set of circumstances. However, this “uniqueness” should perhaps not be overestimated, as many respondents to the survey indicated that many of these circumstances are complementary to those of their own countries.

4. The assessment suggests that there are key elements—including soft/qualified targets; hard targets for the longer term; technology and/or energy-efficiency agreements; and support for mitigation, adaptation and technology transfer in developing countries—that could be combined to create options that could address many of Canada’s interests.
5. The assessment also suggests that there are a variety of comprehensive approaches, including Dual Track, Orchestra of Treaties and Parallel approaches, that could provide a framework for these key elements, and thereby address many Canadian interests.
6. A number of developments are taking place outside the UNFCCC process (and COP-11), which may influence the direction of post-2012 policy discussions. These include the recent outcome of the G8 Summit in Scotland, the Climate Change, Clean Energy and Sustainable Development Dialogue in the United Kingdom and the new Asia-Pacific Partnership on Clean Development and Climate. These and other initiatives need monitoring, so that any Canadian efforts on post-2012 policy are carried out with full consideration of the international context.
7. Finally, this is an initial “straw man” assessment, based on IISD’s analysis and the input of the Advisory Group. The approach taken here would benefit from a broader discussion among Canadian governments and stakeholders, and we welcome this discussion.

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1

Introduction

2005 has been a momentous year in the climate change debate, with the coming into force of the Kyoto Protocol on February 16, 2005. Upon ratification, Parties to the Kyoto Protocol became bound to their commitments under this agreement. For Canada, this means reducing emissions by an average of six per cent below 1990 levels over the 2008–2012 timeframe.

In late 2005, Canada will play host to the eleventh session of the Conference of the Parties (COP-11) to the United Nations Framework Convention on Climate Change (UNFCCC) in Montreal, Quebec. This will also be the initial Meeting of the Parties to the Kyoto Protocol. This important event may be the first time that delegates officially discuss, in session, the nature of a climate regime for post-2012—the post-Kyoto period.

Unofficially, discussion of post-2012 scenarios is already underway, with new policy options and approaches being brought forward by a range of research institutes and academics. It is important that Canada, like all other nations committed to the UNFCCC, keeps up-to-date and involved in these discussions because of the domestic impacts any new regime would entail.

It is for this reason that the International Institute for Sustainable Development (IISD) has launched a research agenda on post-2012 policy options for Canada, with funding from the federal government, provincial governments and the private sector. The intent of this research is to prepare Canada as a nation for the post-2012 discussions.

This report provides an initial assessment of the 44 policy options being discussed as of early 2005, each analyzed

from a Canadian perspective that includes key international considerations. The report outlines a set of evaluation criteria and a methodology for assessing post-2012 options in light of the circumstances, interests and priorities of Canadian jurisdictions and of key countries/blocs that will be influential during post-2012 negotiations.

Section 2 of this document, “Post-2012 Policy Options,” provides a description of the general approaches being proposed and the key elements or distinct attributes of these options. Sections 3 and 4 respectively, “Canadian Interests and Priorities” and “Key Country/Bloc Interests and Priorities,” present a detailed account of the circumstances, interests and priorities of Canada’s many regions, and of the key negotiating countries/blocs. “International Perspectives” (Section 5) provides an account of global opinions of the 44 options as well as some identified Canadian sensitivities. Section 6, “Evaluation Criteria,” is an account of the criteria used for conducting the evaluation and assessment of policy options, having taken into account Canadian and international interests and priorities. “A Qualitative Assessment of Post-2012 Options” (Section 7) provides the results of the assessment, in which 28 of the 44 original options were screened for inclusion in an in-depth analysis. The final section, “Conclusions,” is a summary of final results from the research and analysis.

The research for this report was supported by input from an Advisory Group comprised of federal and provincial officials and private sector representatives. The information in this report is a snapshot of today’s reality. The analysis serves as a demonstration of the tool we are developing for studying and evaluating new policy options as they are proposed.

2

Post-2012 Policy Options

A recent report by the Pew Center on Global Climate Change entitled “International Climate Efforts Beyond 2012: A Survey of Approaches” (Bodansky *et al.* 2004) outlines 44 post-2012 policy options currently being discussed within the international climate change community. The evolving number of approaches presents a challenge for those participating in post-2012 negotiations. The 44 options identified by Pew is up from 21 identified by IISD just one year ago (Drexhage *et al.* 2004), and the current number is certain to grow over the coming months and years. Appendix A describes each option in the Pew Center’s report.

Therefore, it seems more appropriate to assess potential post-2012 options on the basis of their key characteristics—their general approaches and key elements—as opposed to the myriad of ways in which they are currently packaged together. Breaking down the options into their constituent parts provides a better basis for moving forward in determining the most appropriate path for Canada to take in post-2012 discussions. One advantage of this method is that it provides a way of assessing existing options as well as any new options as they emerge. In addition, this enables one to provide suggestions for the construction of Canadian options, based on the analysis of elements and approaches, rather than simply assessing the options being developed by others.

2.1 Key Elements

Through analyzing the options identified by Bodansky *et al.* (2004), a list of nine key elements have been identified. A number of options focus on one or a few elements, while others contain many. These elements are:

1. **Soft or qualified targets** – such as intensity targets, or absolute targets with a safety valve (or cap) on the price of CO₂. Soft targets are intended to encourage high participation from large emitters. These targets imply a non-threatening level of action and broad participation, rather than significant near-term emission reductions. Emissions trading is normally included in this type of element, usually with a focus on credit-based trading.
2. **Hard or absolute targets** – include the ones under the Kyoto Protocol, targets based on agreed-to maximum atmospheric greenhouse gas (GHG) concentrations, or country allocations based on per capita emissions or ability to pay. These targets generally strive for mandatory, absolute, emission reductions from developed countries over set time-frames (such as the next five or 10 years). Emissions trading is normally part of this type of element.
3. **Longer-term targets** – include targets such as the United Kingdom’s discussion of 60 per cent emission reductions by 2050, or the German proposal to reduce emissions by 40 per cent by 2020 if the EU agrees to a 30 per cent reduction. These longer-term targets recognize the need for developed countries to achieve significant absolute emission reductions and for developing countries to grow their economies and their emissions, while limiting the overall atmospheric concentrations of GHGs.
4. **Coordinated/harmonized policies and measures (PAMs)** – include instruments like common sectoral emissions intensity standards (for sectors like electricity, cement and transportation), and common carbon taxes. Policies and measures (PAMs) can be directed at either developed or developing countries.
5. **National policies and measures** – are aimed at developing policies and infrastructure within countries over the longer term. The focus is on positioning individual countries for future mitigation actions by building capacities and the necessary delivery systems, rather than focusing on larger emissions reductions in the near term.
6. **Low-emission technology incentives** – include funds from developed countries that are used for the development, deployment and diffusion of low-emission technology, and ones that provide other related assistance to developing countries.
7. **CDM incentives** – include funds from developed countries that are used to purchase emission reduction credits from developing countries (the Clean Development Mechanism [CDM] is an example of these incentives).
8. **Vulnerability and adaptation incentives** – include funds from developed countries that are used to pay for adaptation or climate change-related disaster recovery in affected developing countries.
9. **Allowance-based incentives** – incentives where developing countries receive a generous supply of emission allowances that can then be traded internationally.

Appendix B illustrates which of these key elements each of the 44 policy options include. For example, the *Ability to Pay* option (#1) includes aspects of the first three elements (soft or qualified targets, hard or absolute targets and longer-term targets).

2.2 General Approaches

Five general approaches are used to characterize the nature of the 44 policy options examined. The general approaches are essentially whole concepts or sets of commonly grouped elements that emerge from the policy options. The approaches are:

- **Extension of Kyoto** – meaning that the existing framework for climate change will be continued, by deepening the absolute reductions required from developed countries while gradually providing incentives for commitments from large emitting developing countries (linked in some fashion to their level of development).
- **Parallel Climate Policy** – proposes that climate change be addressed through either regional or sector-based approaches, coordinated through a parallel or complementary process to the UNFCCC. For example, the U.S. could develop its own cap-and-trade system which operates parallel to Kyoto's trading regime.
- **Country-/Region-Specific** – involves each country or region developing a plan that suits its

circumstances and priorities, followed by participating in trade-like negotiations to achieve agreement on equivalent or equitable efforts.

- **Integrated Policy** – proposes a regime that focuses on integrating climate change considerations into other “mainstream” priorities, followed by developing climate-specific policies and measures to combat climate change. In doing so, climate change would be integrated with other policy priorities in areas related to energy planning, natural resources management and urban planning, in order to achieve a broader desired future vision.
- **Long-Term Targets** – is proposed in 18 of the 44 options identified by Pew, in which long-term targets include: 60–80 per cent emission reductions by 2050 for developed countries; limiting the global temperature increase to 2°C; limiting atmospheric GHG concentrations to 550 ppm by 2100; and reaching a common per capita GHG emission intensity by 2045. These targets focus on the end point in order to enable short-term decisions in the context of longer-term requirements.

Appendix C illustrates which of the 44 policy options embody the general approaches noted here. Again using the *Ability to Pay* option as an example, one can see how an option could entail more than one approach, as this option includes aspects of an Extension of Kyoto approach and a Long-Term Targets approach.

3

Canadian Interests and Priorities

All countries experience a variety of national circumstances (some unique; some common to many countries) which, in part, drive their interests and priorities in terms of climate change policy. Therefore, this section provides a summary of the interests and priorities identified at the national and regional levels across Canada. Similar summaries of other countries' and blocs' interests and priorities are provided in Section 4 of this report.

3.1 National Level

3.1.1 National Circumstances

3.1.1.1 Policy Context

Canadian federal political power rests with the Parliament. Within the Cabinet, the Ministries of Environment and Natural Resources are the primary actors in Canada's federal climate change process, with Foreign Affairs sharing the lead on international negotiations and agreements.

The Canadian system of government distributes much of the political and legislative authority to its provinces. Further, the Canadian constitution does not assign the ultimate responsibility for environmental protection to any single jurisdiction, which greatly complicates the domestic climate change process. Natural resources are the province's responsibility, while the federal government negotiates and ratifies international conventions and treaties, such as the UNFCCC and the Kyoto Protocol. Climate change policy and action, which span federal and provincial authorities, are a source of potential conflict and require a high degree of cooperation.

A core guiding principle on climate change policy in Canada is that no one region should be asked to assume an unreasonable share of the burden of GHG emission reductions. Although this principle sounds reasonable, it has proven difficult to implement because some jurisdictions produce more GHGs than others.

Recently, as part of the Prime Minister's Office's (PMO) announcement that COP-11 will be held in Montreal, the federal government released its priority policy objectives for post-2012 (PMO 2005):

- achieve broad participation with fair goals;
- promote inclusion of all industrialized and key emerging economies;
- generate outcomes that will result in real progress over the longer term;
- provide incentives to invest in developing and sharing transformative environmental technologies to reduce emissions at home and abroad;
- maximize the deployment of existing clean technologies;
- support a streamlined and efficient global carbon market; and
- address adaptation as well as mitigation.

3.1.1.2 Economic and Energy Profile

Canada's economy is growing at an annual rate of 2.6 per cent, which is lower than the 2003 rate of 3.3 per cent (Industry Canada 2004). However, the Canadian economy still outperformed other Group of Eight (G8) nations (except for the U.S.) and GHG emissions are rising as the GDP grows.

The Canadian economy is dependent on natural resource sectors and export markets. In 2002, 13.6 per cent of Canada's GDP came from agriculture, forestry and fishing industries, which is a high rate for a G8 country (OECD 2004). Canada accounts for 40 per cent of the world's softwood lumber exports, and is a significant supplier of wheat, fish, mineral products and energy (OECD 2004).

Energy exports (oil and gas, and electricity) will continue to have a significant effect on Canada's emissions profile, unless technology is developed to either reduce emissions in the first place or to capture and store the emissions permanently (e.g., geological storage). Oil and gas production in Canada is now focusing on developing the oil sands—which requires a lot of energy to extract and upgrade. Therefore, emissions from this sector are expected to increase as the oil sands are developed to help meet rising demand for crude oil in the U.S., China and other growing energy markets. Canada itself is an energy-intensive country to start with and domestic demand is increasing too.

3.1.1.3 Greenhouse Gas Emissions Profile

The unique combination of Canada's physical characteristics, its size, geography, population distribution and climate extremes, necessitate an energy-intensive way of life. While increasingly urbanized, it must be appreciated that Canadian cities (and particularly urban infrastructure developed since 1945) have been designed in a way that leads to high per capita GHG emissions. As a result, Canada faces the twin challenges of large distances between cities and within them.

The Canadian resource industries are energy-intensive as are the associated secondary processes of refining, producing and manufacturing and this all contributes to GHG emissions. By exporting these products, domestic emission intensities may increase over time as the emissions related to the energy intensive processes of extraction and processing are accounted for in Canada while the more refined manufacturing and distribution of end products are done elsewhere.

Recently, the federal and provincial governments have been promoting the transformation of the Canadian economy to an advanced and more value-added one—meaning that Canada would like to export more manufactured or finished end-products instead of simply shipping natural resources. This may have the effect of further increasing absolute domestic emissions, as these manufactured products still need to be sold around the world because of Canada's relatively small market size. However, governments also want to grow the service sectors, which should have the effect of reducing GHG emissions per unit of GDP.

Absolute GHG emissions were at approximately 699 Mt CO₂e in 1999 and were forecast to rise to 810 by 2010 under BAU conditions (IISD 2002). Note that this projection is higher than the 770 Mt noted in Canada's third National Communication (Government of Canada 2002). Per capita GHG emissions were at 16.72 t in 2000 (IEA 2003). This indicator increased at a rate of 10.1 per cent between 1990 and 2000, which is the highest rate of increase among Group of Seven (G7) countries and more than double the average of OECD countries (OECD 2004).

3.1.1.4 Vulnerability Profile

Canada is characterized by demographic and physical extremes and differences. Although, the country is sparsely populated, with approximately 31 million inhabitants in almost 10 million km², two very dense regions exist in the Toronto to Montreal corridor and the greater-Vancouver area. These regions are the fastest growing large-urban centres in Canada, along with the rapidly emerging Calgary to Edmonton corridor.

Canada is the second largest country in the world by area. It houses unique ecosystems and habitat that exist because of its size, geographic diversity and climate. The country has the largest coastline worldwide (along three ocean boundaries), and houses 15 terrestrial ecozones. These zones range from extremely cold and dry cordilleran, to continuous permafrost, to mild and moist mixed wood and plains. Canada and Russia are home to the majority of the world's intact boreal forest, an enormous opportunity for sequestering GHG emissions.

Because of Canada's relative size (in land mass), its northerly geographic location, and its sparse and relatively dispersed population, it is expected to be quite vulnerable to the potential impacts of climate change. The shorter winter seasons already being experienced in the North are

negatively impacting permafrost and traditional lifestyles (including hunting and fishing practices). In Canada's heartland mix of boreal forest and prairie, local weather patterns may cause deforestation and drought. Along coastlines and at low elevations (where many Canadians live), sea level and local climate variations could affect human settlement and critical infrastructure such as ports and terminals. Therefore, vulnerability and adaptation to climate change resonate with individuals across the country, especially with those considered most vulnerable—northern and remote populations.

3.1.2 National Interests and Priorities

A core national priority for climate change initiatives in Canada is global economic competitiveness, mostly in relation to the United States. The U.S. is Canada's primary export market, and it accounts for more of Canada's exports today than prior to signing the North American Free Trade Agreement (NAFTA) over a decade ago. The current balance of payment between Canada and the U.S. is in Canada's favour by just over CDN\$102 billion, which is up from less than \$60 billion in 1999 (StatsCan 2005). Canadian business is concerned that a carbon dioxide-constrained Canada alongside an unconstrained U.S. will result in a competitive disadvantage, most acutely felt by the large emitting industry sectors. A clear national interest for Canada is working closely with the U.S. to take on international commitments to GHG emission reductions post-2012.

Innovation is seen as a vehicle to “maintain strong economic growth, create additional export opportunities and reduce greenhouse gas emissions” (Government of Canada 2002). Innovation, technology and capacity development are key principles championed by all of the national political parties in their bid to transform Canada's economy. Innovation and new technology will continue to be strongly promoted through continued funding of earlier efforts like the Program of Energy Research and Development; the Technology and Innovation Initiative; and the Sustainable Development Technology Fund. The February 2005 Budget Speech introduced other new resources for a Clean Fund; Wind Power and Renewable Power Production Incentives; and a Sustainable Energy Science and Technology Strategy (Government of Canada 2005).

Energy security is a significant policy driver in the U.S. and because of Canada's endowment of energy resources, it is an important piece of North America's energy security puzzle. All regulatory jurisdictions are demonstrating a clear and strong interest in developing the oil sands and other resources, which will result in more energy exports from Canada in the future.

In the past, Canada has made the point that the export of clean energy (e.g., hydroelectricity and natural gas) to the U.S. in effect results in the replacement of more emission-intensive energy sources than would otherwise be used. From Canada's perspective, this consideration should be

taken into account as a unique Canadian circumstance. Although the Canadian delegation removed its request for clean energy export credits under Kyoto at COP-10, it did state that Canada may revisit the issue during future negotiations.

Carbon dioxide sinks and sequestration have been priority items for Canada in the past, and negotiators were successful in getting support for sinks and sequestration at previous COPs. The further negotiation of these opportunities is likely a Canadian interest, as is the case with any other large country. Permanent geological storage is a priority that will help reduce emissions from the fossil fuel energy sectors and other energy intensive industries. The development of carbon dioxide capture and storage technology for use in Canada's sedimentary basins may offer the opportunity to significantly eliminate GHG emissions from coal-fired power generation and oil sands upgrading, while developing Canadian technology and expertise that could be transferred abroad.

On the issue of climate change impacts, Canada and other high-latitude countries face the risk of extreme vulnerability. Most climate scenarios suggest a concentration of the warming effect in polar-regions, which would adversely affect northern communities that rely on the current climate balance. The federal government is concerned that the economy will be adversely affected by global warming, most notably in the agriculture, forestry, fisheries, tourism, municipal water supply and water transportation sectors.

Through its international dealings, Canada repeatedly demonstrates a strong commitment to multilateralism and international collaboration on global issues. The federal government has already indicated its commitment to a multilateral approach that includes broadening and deepening participation.

Drawing from the variety of interests noted previously, the top Canadian priorities related to climate change policy are likely to include:

- strong economic growth and competitiveness and, in particular, staying competitive with primary trading partners such as the U.S.;
- development, deployment and diffusion of clean coal; carbon dioxide capture and storage; hydrogen and bio-based technology; and other GHG emission reduction technologies—and the subsequent transfer of that technology to other nations;
- innovation and technology, and the use of technology in a knowledge-based, technology-driven and highly-skilled economy;
- multilateral processes for agreement on climate change, with broad and deep participation;
- vulnerability to climate change impacts across all regions of Canada, and future measures to address adaptation to a changing climate; and

- cost-effectiveness in dealing with climate change mitigation and adaptation, with sustainable development principles guiding the cost/benefit analysis.

Considering these priorities and the circumstances noted previously, it is possible that Canadian interests would best be served under a climate regime that is structured on intensity-based targets rather than absolute ones. Population growth, economic growth and an increasing reliance on emissions-intensive fossil fuels all contribute to emissions growth. Meanwhile, a strong economy is needed to foster the technological development and innovation that will lead to longer-term, environmentally-positive results. An intensity-based regime that focuses on the long-term development of clean industry sectors may be in Canada's interest.

3.2 Provincial/Regional Level

The provinces and territories play a significant role in Canadian politics, more so than equivalent jurisdictions in many other countries. Of particular relevance to this discussion, provinces are the primary regulators of natural resources such as oil and gas, energy, mining, forestry and agriculture. Therefore, the provinces are critical agents in carrying out climate change policy in Canada. Authority in the territories rests much more in the hands of the federal government, through departments such as Indian and Northern Affairs. However, the territories are exerting pressure to manage and develop their own natural resources.

This section summarizes the key interests and priorities of provinces and territories (in some cases on a regional basis) in the context of long-term climate change policy. Additional information related to each region's economy, population, land, climate and carbon intensity is provided in Appendix D.

3.2.1 British Columbia

British Columbia's environment and economy are highly sensitive to climate change. The recently released B.C. climate plan cites beetle kill, forest fires, and drought as examples of recent serious climate-related impacts on B.C. that may become more prevalent with future climate change. The plan emphasizes the need to prepare for future climate impacts as well as reduce emissions (Government of British Columbia 2004).

Economic growth in the province will likely remain tied to the utilization and export of natural resources, particularly energy, for the foreseeable future. B.C. has large reserves of natural gas and coal. Most of the province's current production is exported, but increased domestic use of gas and oil may provide economic opportunities. There are potentially large reserves of hydrocarbons offshore near the Queen Charlotte Islands (Haida Gwaii), but a federal moratorium on exploration remains in place. B.C. is a significant coal producer, with most coal exported to Asian-Pacific countries for use in steel production. The develop-

ment of clean coal technologies would be of significant benefit to its coal production and use.

The forest sector is a major economic factor in the province, and while pulp and paper production is highly intensive, the industry is using increasing amounts of renewable energy (biomass and hydro), and is poised to become a net energy producer within two decades. Forest biomass is also a potential feedstock for ethanol and biodiesel and, with advances in technology, could provide substantial quantities of low-GHG vehicle fuels.

The forest sector is also a potential source of significant emission removals through afforestation, reforestation and carbon management. However, the impact of recent forest fires and beetle kill on the forest carbon balance highlight the potential for B.C.'s forests to also become a net source of emissions. This possibility is a major concern in B.C. and may significantly affect the relative advantages of including carbon management in future international regimes.

B.C. is also highly urban and expanding development in the lower mainland and on Vancouver Island is contributing significantly to the growth in GHGs and other air emissions from the transportation sector. Transportation is responsible for more than 40 per cent of GHG emissions in B.C., and achieving long-term reductions will require improvements in both vehicles and fuels, in addition to transit and urban infrastructure.

New technologies for vehicles and fuels would provide economic and environmental benefits to B.C. Much of Canada's fuel cell industry is located in B.C., and there are also companies developing and commercializing technologies for producing liquid fuels from biomass.

New electricity generation is expected to be sourced increasingly from renewable sources. B.C.'s Energy Plan commits to a target of 50 per cent of new power from "clean" sources over the next 10 years (Government of British Columbia 2003). And in October 2004, B.C. Hydro and the provincial government announced new long-term goals for the Crown corporation that include no net incremental impacts on the environment from its operations over the next 20 years.

Key priorities related to long-term climate change policy scenarios for B.C. include:

- effective long-term agreements, regimes, or development paths that limit dangerous climate change and negative impacts on B.C.;
- mechanisms to help reduce vulnerability to climate change;
- opportunities to develop, utilize and export hydrocarbon resources;
- recognition of the timeframe required for capital stock turnover in resource industries;
- no negative impacts on the competitiveness of B.C. industry in export markets (especially the U.S.);

- development and commercialization of new technologies for clean coal, carbon dioxide capture and storage, hydrogen fuel cell vehicles and other applications, and biomass fuels;
- multi-pollutant approaches that recognize the links between GHG emissions and air quality;
- forest sinks; and
- fair treatment for energy exports/imports.

3.2.2 Alberta

The interests and priorities of Alberta are largely shaped by the historic economic dominance of its oil and gas industry which is expected to expand in the future through the development of the province's vast oil sands reserves. Of critical interest to Alberta is integrating GHG emission reductions into an economy that, over the long term, will continue to rely on activity within the oil patch.

This interest is reflected in Alberta's action plan for addressing climate change, released in 2002. The objectives of the province's climate change strategy are to: manage longer-term risks by making a responsible environmental contribution; reduce the vulnerability of Alberta's economy to climate change; ensure that Alberta's objectives and priorities are reflected in national climate change strategies; and increase Alberta's competitiveness, reduce liability and protect jurisdictional authority (Alberta Environment 2005).

From Alberta's perspective, the fossil fuel sectors (e.g., coal-fired electricity, pipelines, oil sands, oil and gas, refining and petrochemicals) cannot only be perceived as part of the problem; they must also be considered as part of the solution to address climate change. As fossil fuels will be used globally for at least the next 50 years to meet energy needs, and this sector remains an essential component of Canada's economy, Alberta argues that this sector must not be overlooked when formulating a future national climate change policy.

Technology and innovation will be essential for achieving Alberta's economic and climate change objectives. Investment in R&D and technology demonstration for carbon capture and storage; efficient energy production; clean coal; carbon management; fuel cells; combined heat and power; and GHG detection/measurement are all priorities. The province considers using Canadian investments to re-tool the Canadian economy for the long term as a priority. Alberta may be able to tap into its extensive resources and the capacity of the fossil fuel industries themselves to develop climate change mitigation technology to be used domestically and to be exported to other jurisdictions to help comply with their future climate change obligations.

As the development, demonstration and commercialization of GHG mitigating technologies generally requires a longer time horizon than the first commitment period of

the Kyoto Protocol, Alberta has a strong interest in looking for a longer-term solution to climate change. Alberta states that focusing on longer-term (out to 2020) intensity targets for large emitters will help Canada and its industries remain competitive by providing the time necessary for appropriate capital stock turn over rates. Doing otherwise would put industry at risk of the financial burden of investments in infrastructure that may become stranded. Given this, Alberta is more likely to support a bottom-up approach to setting a post-2012 goal or target based on what is actually achievable over time. Alberta is also likely to support national policies that support the critical long-term technologies and that fully take into consideration the timeframe for technology development, demonstration, commercialization and roll out.

A sizable portion of Alberta's economy and cultural identity is also dependent on climate-sensitive activities such as ranching, forestry and tourism. Adaptation is, therefore, another of Alberta's key climate change interests. The province is currently completing a climate change impacts vulnerability study that is expected to highlight the impacts of a warming climate on provincial water resources. These impacts have implications for the province's forestry and agricultural sectors, as well as future energy sector development. As Alberta's extensive forestry and grassland areas also may serve as biological sinks, the province has an interest in promoting sequestration and offset activities.

Continuing to work in partnership with the federal government on the measurement and reporting of GHG emissions is a further priority of Alberta government agencies. The province has historically taken the lead nationally in this area, having established the first reporting program in Canada and being the only province to have legislation in effect for managing GHG emissions from large industrial emitters.

From Alberta's perspective, the key priorities to keep in mind during the post-2012 climate change negotiations include:

- current and future economic growth that depends on fossil fuels for economic well-being—fossil fuel industry sectors must be considered part of the solution;
- competitiveness and trade issues with the U.S. and other regions closely tied to the Canadian economy;
- recognition of agricultural and forest sinks as a means of sequestering carbon dioxide;
- advancing technologies like geological clean coal and carbon-dioxide capture and storage technology;
- promoting non-interventionist approaches to stimulating renewable energy development that support de-regulated power sectors;

- the use of existing and new programs and strategies to address adaptation and the province's environmental and economic vulnerability to climate change;
- a broader approach to climate change that emphasizes sustainability by enabling appropriate innovation/technology development geared at addressing energy development needs, climate change and other environmental or development priorities;
- a long-term approach to climate change and a regime with long-term commitments tied to transformative technologies and capital stock turnover (which is 20+ years for most capital intensive industries); and
- the development of novel partnerships for addressing climate change, such as by developing the appropriate international agencies or institutes to actually implement the climate change policy upon which there has been agreement.

3.2.3 Saskatchewan

The impacts of a changing climate on Saskatchewan's economy and environment are top priorities for the province. Because of its geographic location near the centre of the North American landmass and long distance from large bodies of water, Saskatchewan is extremely vulnerable to the impacts of climate change. Higher temperatures may cause drought, heat stress and other impacts during the summer months. Warmer winters would further stress the current delicate balance and especially affect water supply. This vulnerability could, in turn, be disastrous to Saskatchewan's economy, as agriculture and forestry rely heavily on water resources. A decrease in water flow will also negatively impact hydroelectric output. As the impacts of climate change are already being felt, dealing with the impacts of climate change through adaptation is as important as mitigation from Saskatchewan's perspective.

With respect to GHG emissions, Saskatchewan's economy is extremely carbon-intensive. The province relies on domestic low-cost coal reserves for the majority of its power generation and the oil and gas industry is prominent in the province. Land-, rail- or air-based transportation industries are important to Saskatchewan, because of the large distances between cities within the province and even longer distances to external markets. A tricky challenge is that the very industries upon which Saskatchewan's economy is based are those most responsible for generating GHG emissions.

At the same time, some of these critical sectors can also contribute to mitigation. Depending on how it is treated under international law, carbon sinks and biomass-based energy may enable new markets for agriculture and forestry-based products. Saskatchewan is the largest producer of uranium in the world. If nuclear power were to become part of the global solution for climate change, it would be positive news for Saskatchewan's uranium indus-

try. The electricity sector sees opportunities for renewables, but clean coal is of utmost interest to SaskPower (the provincial utility).

This all leads to a critical component of Saskatchewan's climate change plan—R&D and technology development. The province supports energy efficiency and energy conservation programs, and sees the development of alternative energy sources and technologies as a part of the solution. Producing cellulose/ethanol from agricultural crops or other biomass-based fuels from forestry residues would provide new market opportunities for two of the largest industry sectors in the province.

Clean coal technology and carbon-dioxide capture and storage technology would enable the province to continue to use its vast coal reserves for power generation while achieving significant (near total) GHG reductions. The development, demonstration and commercialization of advanced combustion and gasification technology (to be used for the “polygeneration” of electricity, heat, hydrogen and chemical feedstock) and of carbon-dioxide capture and storage technology is a key priority in the province. The by-products of these new technologies will enhance the productivity of petrochemical, oil and gas, and refining industries through CO₂ injection for enhanced oil and gas recovery, or hydrogen (H₂) production and use in refining.

Saskatchewan sees itself as a small, but not insignificant part of the solution to climate change. The province recognizes that this is a global issue that requires a globally coordinated solution, not simply a piecemeal approach undertaken by the various regions of Canada and the world. Public awareness of the issues Saskatchewan faces and the potential solutions the province can provide are important parts of the Saskatchewan plan. In 2005, the province unveiled Saskatchewan's Green Strategy. Many of the critical elements of this strategy reflect the climate change interests and priorities of the province.

Key priorities for Saskatchewan include:

- adaptation through existing and new programs to address the province's extreme environmental and economic vulnerability;
- economic prosperity through change and innovation to old industries plus the development of entirely new ones, to enable a healthy economy and healthy living;
- technology development in existing industry sectors and in new ones as innovation and technology is essential to the future success in new industries and markets;
- opportunities to develop clean energy sources including clean coal and bio-energy;
- recognition of the necessary timeframe for capital stock turnover;

- competitiveness and trade issues related to the U.S. and other regions closely tied to the Canadian economy; and
- inclusion of agricultural soil sinks and GHG storage in future climate policy regimes.

3.2.4 Manitoba

The development and export of renewable electricity is a key economic and environmental priority for Manitoba. About 97 per cent of Manitoba's electrical energy already comes from clean and renewable hydroelectricity. In the long term, continued development of clean energy resources such as hydroelectricity, wind power, geothermal energy and ethanol will generate sustainable economic opportunities, greater self-reliance and could potentially lead Manitoba to be the world's first “net carbon-positive” region.

Manitoba Hydro has potential to increase its current hydroelectric generating capacity by 5,000 megawatts (MW). There is also tremendous potential to diversify energy sources by expanding the use of wind and geo-thermal power (Government of Manitoba 2001). Wind energy complements Manitoba's hydroelectric resources as the hydraulic systems can store energy in reservoirs when the wind is blowing and release water to generate electricity when it is calm. Manitoba has the largest geothermal capacity in the country with total installations representing 30 per cent of total new Canadian installations in 2003 (Government of Manitoba Budget 2004).

Manitoba's major priority and opportunity exists to expand transmission capacity to enable the export of clean power to Ontario, where it will help phase out coal-fired thermal generation. Creating an expanded east-west power grid can provide energy security and reliability for Canada; create reductions in CO₂ and improve air quality; and stimulate development of additional clean energy sources such as wind to link to the national grid.

Freight and personal transportation are major contributors to GHG emissions in Manitoba, and the development and commercialization of new vehicle and fuel technologies—such as biofuels and hydrogen—will be key to limiting future growth in emissions. Manitoba is working with the agricultural and transportation sectors to expand the production of renewable transportation fuels such as biodiesel and ethanol. The development of hydrogen vehicles and fuelling technology is also a priority for Manitoba, and a long-term plan for hydrogen development has been developed.

Due to its dependence on weather and climate, agriculture will be among the sectors in Manitoba most affected by climate change. Similar to the other Prairie Provinces, Manitoba will be vulnerable to more frequent droughts and will need to adjust water management and irrigation practices. Greater heat stress on animals and crops over the summer is also likely to be a problem. Many pests and dis-

eases could survive over milder winters or spread into Manitoba from warmer regions. In response, farmers will need to adapt through measures such as switching to more drought-resistant crops, implementing or improving irrigation systems and altering cropland rotation cycles. While drought risk is expected to increase, increased frequency of extreme wet conditions is also possible. With climate change, a greater risk of extreme events and increased variability is expected. Adapting to wet conditions and increased variability will be challenging, especially for the crop sector of agriculture.

Potential benefits of climate change for Manitoba's agricultural sector include reduced heating requirements and cold stress of livestock in the winter. A longer growing season could enable the cultivation of a wider variety of crops and may also support the expansion of agricultural cultivation northward.

The agriculture sector in Manitoba is also a key potential contributor to future emission reductions/removals. There is considerable opportunity to increase storage of carbon in prairie soils through changed agricultural practices, including conversion from conventional to zero tillage, reduced frequency of summer fallow, the conversion of cropland to permanent cover crops and improved grazing land management. Through technological innovation, there is also significant potential to reduce emissions from agriculture, especially in livestock operations. There are similar opportunities in the forestry sector to increase GHG removals through afforestation, reforestation and forest carbon management.

Manitoba's transportation and infrastructure sectors are vulnerable to climate changes. For example, northern and remote areas are expected to see shorter, milder winters that will limit service by temporary winter roads. Northern infrastructure will be vulnerable to greater land instability from melting permafrost. And in the south, the possible increase in extreme events, such as flooding, will affect roads and infrastructure—such as well water supply—and other services.

Strategic priorities related to long-term climate change policy scenarios for Manitoba include:

- opportunities to expand and develop new hydroelectric resources for export and provide more tangible incentives for their development. This includes partnering with First Nations and northern communities in new hydroelectric projects to create economic development in Manitoba and displace coal in other jurisdictions;
- work with Canada and other jurisdictions to construct a national, secure and reliable clean energy grid;
- develop up to 1,000 MW of new wind energy to provide new power generation and economic opportunities for rural areas;

- broad commercialization of new technologies for biomass fuels (especially biodiesel and ethanol) and hydrogen;
- maintain leadership in ground-source heat pumps technology and installations;
- opportunities to take advantage of agricultural soil and forest carbon sink potential for offset projects and emissions trading;
- effective long-term agreements, regimes or development paths that limit dangerous climate change and negative impacts on Manitoba, especially in the agriculture and forestry sectors; and
- mechanisms to help reduce vulnerability and adapt to climate change. This includes conducting risk assessments of the province's environmental and economic vulnerability to climate change.

3.2.5 Ontario

For many Ontarians, air quality is a more immediate concern than GHGs and future climate change. Local air emissions that contribute to smog or acid rain have immediate impacts on the health of Ontarians. Air pollutants from local industry, transportation, and residential and commercial buildings, including nitrogen oxide (NO_x), sulphur dioxide (SO₂), volatile organic compounds (VOCs) and particulate matter (PM), are blamed for poor visibility and many of the health issues in large urban centres. As a result, a large part of Ontario's focus on air emissions regulation and enforcement is related to local air quality.

Ontario recognizes that GHG emissions are a global issue that must be dealt with to a certain degree through coordinated international treaties or agreements. However, the province is taking measures to deal with GHG emissions through its multi-pollutant approach to emissions. The Ontario government is planning the phase-out of all coal-fired power generation in the province by 2009. This policy direction is intended to reduce all of the aforementioned emissions, not just GHGs.

Southern Ontario is the largest industrial centre in Canada with point sources for emissions coming from a variety of energy and manufacturing industries (e.g., electricity, petrochemicals and automobiles). In addition, Ontario is a transportation hub, with air-, land- and water-based infrastructure all contributing to emissions. These industry sectors rely on the existing infrastructure, low-cost energy and the population base of southern Ontario, which is growing at the fastest rate (in absolute terms) in Canada. These components are a significant part of Ontario's competitive advantage in North America. Industrial nodes such as southern Ontario provide opportunities for new technology deployment through industrial facility applications and at energy generation facilities.

Ontario has traditionally been a net importer of energy. It imports oil and natural gas from Western Canada and coal for electricity generation from the U.S. As well, it imports

electricity from neighbouring provinces. A significant priority for Ontario is energy efficiency through the development of cogeneration and demand-side management opportunities, thereby decreasing Ontario's exposure to energy imports to meet their consumer and industrial needs.

Like most parts of Canada, Ontario also has agriculture and forestry industries that rely on the current environmental balance for their livelihoods. Northern and other rural communities also depend on a reliable climate. Therefore, adaptation is a focus for Ontario's rural regions. These regions are also interested in becoming supply centres of bio-based or renewable energy to help offset the amount of energy that must be imported to Ontario.

Finally, southern Ontario is one of the most densely inhabited areas of North America, and current population growth and infrastructure development is occurring at a very fast rate. Thus, urban and regional planning, and the design of the built environment, can have a lasting impact on GHG emissions in the region (which extends into Quebec). As a result, urban and regional planning are a priority, including plans for public transit, transportation networks, office and commercial space, industrial locations and urban/suburban community development.

Key priorities for Ontario include:

- a multi-pollutant approach to addressing emissions such as NO_x, SO₂, VOCs, PM and GHGs;
- a long-term approach to climate change that addresses the dangerous anticipated impacts;
- industrial competitiveness through the preservation of its competitive advantage generated by highly developed infrastructure and facilities and a large and skilled labour force;
- economic growth and opportunities to grow old businesses and develop new ones;
- the phase-out of coal-fired electrical generation and replacement with cleaner sources of energy;
- energy security and reduced reliance on external energy suppliers through the development of local energy resources and through energy efficiency and demand-side management;
- urban and regional planning primarily in southern Ontario, as growth is imminent in this industrial centre of Canada, and significant GHG reductions can come through changes to the built environment; and
- reducing vulnerability and enhancing adaptation to climate change, and the use of forestry and agricultural sinks.

3.2.6 Quebec

In 2002, the province of Quebec accounted for 12.6 per cent (91.5 Mt) of Canada's total GHG emissions.

Emissions per capita were 12.3 tonnes per person, well below the national average, due primarily to Quebec's heavy reliance on hydroelectric generation to meet end-use energy requirements. Between 1990 and 2002, Quebec's GHG emissions increased by five per cent.

The energy supply/demand profile of Quebec largely defines Quebec's interests related to long-term climate change policy, as it does for most other provinces. Quebec currently ranks fifth worldwide for available hydroelectric production, after China, Brazil, the U.S. and Russia. Although Quebec has been an electricity exporter for much of the last two decades, recent demand growth and low precipitation has meant that Quebec has become a net electricity importer. This situation is expected to persist for some time, with Quebec continuing to rely on Western Canada for natural gas and offshore markets for oil. Energy supply diversity is also an issue—electricity and oil each account for close to 40 per cent of end-use requirements.

The future expansion of large and small hydroelectric capacity may provide significant economic and emission benefits for Quebec. Major undeveloped hydroelectric capacity is estimated at 45,000 MW, of which almost 20,000 MW has economic potential (Ministry of Natural Resources Quebec 2004). Diversifying electricity supply—especially with low-carbon resources—is also a priority for Quebec. By 2012, Quebec will have a wind power capacity of at least 2,000 MW and electricity production capacity from biomass is expected to continue to increase in the coming years.

A major source of industrial sector emissions is the aluminum industry. Quebec is by far Canada's primary producer of aluminum and magnesium. In 2002, Quebec accounted for 76 per cent of Canada's GHG emissions associated with primary aluminum production. Advances in smelting technology will be key to reducing emissions in this sector. The forestry sector and the pulp and paper industry are also major economic players. As in British Columbia, Ontario, New Brunswick and other provinces, the forestry sector is at significant risk from future climate change. The sector also has significant opportunities from increased biomass utilization and carbon sequestration through afforestation, reforestation and forest management. Forest biomass may also become a major feedstock for ethanol and bio-diesel.

Like Ontario and British Columbia, Quebec is also highly urban. Transportation accounted for 39 per cent of total provincial GHG emissions in 2002, and 55 per cent of energy-related GHG emissions. Major investments in urban and inter-city transportation, innovative urban planning, and advances in vehicle and fuel technologies will be needed.

The Canada Country Study identified a range of possible climate change impacts in Quebec. Climate warming in northern Quebec will result in the melting of permafrost, reduce load-bearing capacity and increase instability. These changes will impact road, marine and hydroelectric

infrastructure. Low water levels on the St. Lawrence River may impact shipping and the marine environment. Variations in water supply in hydro reservoirs and the largest watersheds in northern Quebec may result in fluctuations to heating and air conditioning requirements.

Key priorities related to long-term climate change policy scenarios for Quebec include:

- effective long-term agreements, regimes, or development paths that limit dangerous climate change and negative impacts on Quebec;
- mechanisms to help reduce vulnerability and adapt to climate change;
- opportunities to develop hydroelectric and wind power capacity, and export renewable power. Fair treatment for energy exports/ imports. Recognition of existing investments in low-carbon energy;
- no negative impacts on the competitiveness of Quebec industry in export markets (especially the U.S.);
- broad commercialization of new technologies for biomass fuels (especially ethanol) and hydrogen;
- multi-pollutant approaches that recognize the links between GHG emissions and air quality; and
- opportunities to take advantage of agricultural soil and forest carbon sink potential.

3.2.7 Atlantic Provinces

Prince Edward Island (PEI) is responsible for only 0.3 per cent of Canada's GHG emissions (2.1 million tonnes in 2000). The biggest contributors to emissions are transportation (43 per cent), agro-ecosystems (19 per cent) and residential (16 per cent).

Prince Edward Island is the only province in Canada without substantial resources of hydroelectric power, fossil fuels or nuclear energy. This has required the province to import virtually all its sources of energy. Imported petroleum fuels account for almost 80 per cent of the Island's energy needs. The transportation sector is totally dependent on petroleum products and a large component of the Island's heating demands is being met by fossil fuels. Biomass, including cordwood, sawmill residue and municipal garbage, is responsible for 6.5 per cent of PEI's energy mix.

Electricity accounts for 13 per cent of the energy mix. Since the early 1980s, virtually all of the province's electricity needs have been met with off-Island generation that is transmitted via two submarine cables connecting with New Brunswick. In 2004, approximately 94 per cent of PEI's electricity was obtained from generating facilities in New Brunswick and Nova Scotia. Most of this electricity was generated using fossil fuels. Electricity generation on the Island has been primarily from petroleum, until the recent installation of wind capacity at North Cape.

PEI's Energy Framework and Renewable Energy Strategy (released in 2004) emphasizes the role of renewable energy in providing its citizens with "dependable and affordable energy which does not compromise environmental quality." The province has excellent wind resource potential that could generate at least 200 MW of electricity, and the agricultural sector may be a source of producing the necessary feed stocks for a biofuel industry to meet some of the thermal and transportation requirements. The strategy also emphasizes the importance of energy efficiency and the potential contribution of hydrogen technology. The main priority, though, is renewable energy sources developed locally, because of the economic development opportunities, improved security of supply, and improved price stability and protection against fluctuating petroleum product prices.

PEI is particularly sensitive and vulnerable to climate change, and particularly to sea level rise. This is due to the soft sandstone bedrock; a sandy and dynamic shore zone; an indented shoreline with many estuaries and marshes; shore erosion; and ongoing submergence of PEI's coast.

Newfoundland and Labrador account for less than two per cent of Canada's total emissions. In 2000, provincial per capita emissions were 16.4 tonnes, well below the national average. The largest source of GHG emissions in the province is the transportation sector, which accounted for 34 per cent of total energy-related GHG emissions in 2002 (Environment Canada 2003). Limiting future growth in transportation emissions will require the development and commercialization of new vehicle and fuel technologies, including biofuels and hydrogen.

The province has seen a 535 per cent increase in energy production (primary) between 1990 and 2002, due to the strong expansion of offshore oil production (Environment Canada 2003). This has corresponded to a 108 per cent increase in GHG emissions from fossil fuel industries. The continued development of offshore hydrocarbon resources remains a top economic priority for Newfoundland and Labrador. Oil exports now account for 46 per cent of the total value of exports (Newfoundland and Labrador, Department of Finance 2004).

Newfoundland and Labrador generates approximately 60 per cent of the total electricity produced in Atlantic Canada. The power generation sector is predominantly hydroelectric, with about 75 per cent of total provincial generation capacity located in Labrador, mainly at Churchill Falls (5,428 MW). The island has over 1,800 MW of capacity, which is composed of 64 per cent hydro and 36 per cent thermal plants using fuel oil (NEB 2001).

In the 2003 Speech from the Throne, the government said the development of hydroelectricity in Labrador has the potential to make a significant contribution to reducing national GHG emissions levels. The undeveloped Lower Churchill hydro resource in Labrador includes two potential projects: a 2,000 MW plant at Gull Island; and an 824 MW plant at Muskrat Falls. The development of these

projects would also result in significant economic and job creation benefits for the province.

Newfoundland and Labrador are vulnerable to a variety of coastal impacts associated with climate change, including:

- *Changes to sea ice:* Sea ice is expected to become thinner and less extensive. While this could have positive impacts on marine transportation and the oil and gas industry, the loss of protection provided by ice in other areas, such as the Gulf of St. Lawrence, may make the coastal areas more vulnerable to erosion from wave action and storm surges.
- *Storm surges and coastal flooding:* The increase in frequency and intensity of storms increases the risk of flooding of coastal areas with major impacts on coastal infrastructures, including saltwater intrusion into coastal drinking water aquifers.
- *Fishing sector:* Changes to ocean temperature and currents could influence distribution and migration patterns of important fish species.
- *Forestry and agriculture industries:* These areas could be impacted by changes to air and soil temperatures that may positively influence growth rates of plants and trees, but may also lead to more severe insect outbreaks. Also, increased severity of storms may damage crops and forests through erosion, ice, blowdowns or fires.

Nova Scotia generated 20.4 Mt, or 2.8 per cent of Canada's total GHGs in 2002. Nova Scotia has historically relied on oil and coal to meet a large part of its energy requirements. In recent years, activity resulting from Sable Island natural gas development has contributed to strong provincial economic growth (NEB 2001). However, one of the gas fields is in decline, and the long-term outlook for gas development is uncertain.

The power generation sector is the main source of GHG emissions in Nova Scotia. Nova Scotia Power accounts for 80 per cent of emissions from the province's Large Final Emitters. Nova Scotia's generation capacity is predominantly coal-fired (70 per cent of capacity), with some hydro, natural gas, oil and biomass. The Lingan generating station on Cape Breton Island, with a capacity of 620 MW, is the largest coal-fired facility in the province. While there are substantial reserves of coal in Nova Scotia, coal production has declined significantly in recent years, and coal is currently imported to meet thermal requirements.

The development and commercialization of new energy technologies, particularly in the power sector, will be critical to long-term emission reductions in Nova Scotia. While clean coal is a priority for Nova Scotia due to the dominant role of coal in the electricity sector, other clean energy technologies are also likely to be important. There is significant onshore and near-shore wind power potential, along with tidal energy. Bioenergy also offers potential:

currently nine million litres of biodiesel are produced annually from fish processing waste.

The development of an Atlantic regional approach to renewable electricity and regional transmission infrastructure would offer significant economic and environmental benefits to Nova Scotia, by providing access to markets in Atlantic Canada and the New England states, as well as potential access to hydropower from Quebec.

Like the other Atlantic Provinces, Nova Scotia is vulnerable to coastal impacts from climate change, including storm surges and coastal flooding, and impacts on the fishing sector.

In 2002, New Brunswick contributed 21.6 Mt or 3.0 per cent of Canada's total GHG emissions. Over 90 per cent of the emissions are energy related, and electricity generation and transportation account for three-quarters of energy related emissions. Provincial emissions increased by 35.8 per cent between 1990 and 2002, and are projected to increase a further 23 per cent over current emissions by 2020, with no further efforts to reduce emissions. (Government of New Brunswick 2003).

New Brunswick has the most diversified generating base in Atlantic Canada, with thermal accounting for about 50 per cent of the provincial capacity, and hydro, nuclear and biomass accounting for the other half.

The forest products sector has historically been the main economic driver in New Brunswick, and is likely to continue in that role. The forest industry accounts for 30–40 per cent of New Brunswick exports. While energy-intensive, the pulp and paper sector relies heavily on biomass and is a relatively small emitter. Future improvements in technology and processes offer the potential for the industry to be a new energy producer.

The forest sector is also particularly susceptible to the impacts of climate change, including the potential elimination of important species and migration of others into the region. A changing mix of species in the forest will likely require the forest-products industry to modify silviculture practices and its production and manufacturing technologies. While it is quite possible that future forests will grow faster and produce more biomass, the forest-products industry will have to adapt throughout a long period of change. A warmer climate could also result in an increased incidence of forest fires and new insect infestations. Large-scale occurrence of such events could reduce the sustainable annual harvest of wood resulting in economic losses in the forest industry, reduce the opportunities for outdoor recreation, and have critical impacts on wildlife.

With a coastline over 2,000 km long, New Brunswick is also vulnerable to sea level rise, which could carry serious consequences for natural coastal features and habitats, biodiversity, forests and marine fish populations as well as on coastal infrastructure, agricultural systems, tourism and man-made structures.

Key priorities related to long-term climate change policy scenarios for the Atlantic Provinces include:

- development and commercialization of new technologies for clean coal, carbon sequestration and capture, hydrogen fuel cell vehicles, biomass fuels and other applications;
- effective long-term agreements, regimes or development paths that limit dangerous climate change and negative impacts on the region;
- mechanisms to help reduce vulnerability and adapt to climate change;
- opportunities to develop hydroelectric, wind, tidal and other renewable power capacity;
- opportunities to develop, utilize and export hydrocarbon resources; fair treatment for energy exports and imports;
- no negative impacts on the competitiveness of industry in export markets (especially the U.S.); and
- recognition of the timeframe required for capital stock turnover in resource industries.

3.2.8 Northern Territories

The northern regions of Canada face climate change issues that make for a somewhat unique set of priorities and interests compared to other regions. Because of the tiny population of the North, it is not a significant anthropogenic GHG emitter. However, the extreme northern regions of the globe are expected to feel the greatest impacts from climate change. The relative amount of land-mass and the variety of geographies, flora and fauna that will be impacted is unequalled anywhere else in Canada. The northern territories are as diverse from east to west as the southern provinces, from boreal and bog forest, to North America's highest mountains, to the furthest reach into the globe's high Arctic.

In addition, large groups of northerners rely on traditional livelihoods and many aspects of this lifestyle (such as, hunting, fishing and transportation) are directly dependent on a reliable climate. In addition, non-traditional activities, such as the development of oil, gas and mineral resources, also depend on the current climatic balance. Pipelines, roadways and other infrastructure across the North are specifically designed to meet current local conditions. If permafrost is lost, the infrastructure designed to meet this challenge may no longer be appropriate. Therefore, the design criteria for new construction will need to change as the impacts of climate change continue to be felt.

It remains unknown what the impact of a warming North will have on global carbon sinks. There is too much uncertainty around whether existing sinks will be lost or if new sinks will result from climate change; however, it is very possible that northern sinks will play an important role in the global carbon cycle.

Northern economic development is occurring today in a way not unlike past development in other regions of Canada. Consequently, the region's emissions intensity is increasing rapidly and will continue to do so in the coming decades. This development is simply bringing local communities to the same standard of living as other regions of Canada, and the governments of all northern territories welcome this development and do not wish to hinder it.

One of the key issues to developing the North is access to affordable and secure energy. Most northerners rely on hydro-based or, in some cases (as in the NWT), gas-fired power generation. Many of the smallest and most remote communities do not have all-season roads and depend on annual deliveries of diesel fuel, by either ice road or ocean-going barges, for their power needs. This is a very expensive way of generating electricity, but it is the only option available to many communities. As a result, many communities are looking for local energy sources or for ways to reduce their primary energy use through renewable energy development, the use of combined heat and power, and energy efficiency.

Because of potential for major climatic impacts in the North, and the reliance on climate of both traditional living and new economic development, it cannot be stated enough how important adaptation is to the North. The Northwest Territories' GHG strategy (NWT 2001) highlights some of the greatest impacts that NWT and Nunavut face, which include a lack of sea ice, loss of permafrost and loss of biodiversity. More recently, the Arctic Climate Impact Assessment (ACIA 2004) describes the very serious challenges that the northern territories and the rest of the circumpolar North will face as climate change impacts accelerate. This includes the potential for complete destruction of traditional lifestyles in the high Arctic. It is entirely possible that the opening up of the Northwest Passage from Europe to Asia may become a reality, which would have far reaching implications for what are now remote and relatively inaccessible northern communities. The Yukon has also done work to better understand the impacts of climate change on glacial regions, biodiversity and ecosystems, and on the melting of permafrost and resulting land instability.

The key priorities for the northern territories of Canada are:

- vulnerability and adaptation which are critical to all the territories, each of which desires to better understand their vulnerability in order to develop appropriate adaptation strategies;
- traditional livelihoods, which directly engage a large portion of northerners, and the need to reconcile these activities with modern economic development (next priority);
- economic development is occurring in many northern regions for the first time, and all northern governments have a general policy of being open for business;

- technology deployment through the adaptation of technology that is developed elsewhere to northern conditions—especially energy and infrastructure technology; and
- an effective and long-term agreement that limits the dangerous impacts of climate change projected for the North, but one that also responds rapidly enough to the changes already taking place.

respect to future climate change policy. Although regional interests vary significantly due to varying natural resource endowments, electricity generation mixes, vulnerabilities to climate change and other factors, the analysis in this section indicates that there are a number of common interests and priorities.

A methodology of evaluating post-2012 climate change policy options that seeks to focus on areas of common interests may have a stronger likelihood of gaining broader support across Canada, and so the information in this summary is used in the assessment in Section 7.

3.3 Common Interests and Priorities

Table 1 summarizes the common interests and priorities across national as well as provincial/territorial levels, with

Table 1. Summary of commonly shared priorities

Interest/Priority	National	Province/Territory
Effective long-term agreements, regimes or development paths that limit dangerous climate change and negative impacts on the region	Yes	Yes: All
Mechanisms to help reduce vulnerability and adapt to climate change	Yes	Yes: All
Multi-pollutant approaches that recognize the links between greenhouse gas emissions and air quality		Yes: BC, AB, ON, QB
Opportunities to develop clean power	Yes	Yes: All
Opportunities to develop biofuels	Yes	Yes: All
Opportunities to develop, utilize and export hydrocarbon resources	Yes	Yes: BC, AB, SK, Maritimes, Territories
Fair treatment for energy exports/imports	Yes	Yes: All
Economic growth	Yes	Yes: All
No negative impacts on the competitiveness of industry in export markets (especially the U.S.)	Yes	Yes: All
Recognition of timeframe required for capital stock turnover in resource industries	Yes	Yes: All
Development and commercialization of new technologies for clean coal, carbon sequestration and capture, hydrogen fuel cell vehicles, biomass fuels and other applications	Yes	Yes: All
Opportunities to take advantage of agricultural soil and forest carbon sink potential	Yes	Yes: All
Respect for provincial/territory jurisdiction	Yes	Yes: All
Flexibility for provinces/territories to develop and implement own policies	Yes	Yes: All

4

Key Country/Bloc Interests and Priorities

Understanding the national circumstances, interests and priorities of key countries/blocs provides a greater knowledge of the approaches and elements that are most likely to be accepted internationally, and enables the identification of common concerns and potential areas for disagreement. It also reveals areas in which shared or conflicting policy drivers may exist among the countries. This section provides an overview of the national interests and priorities of seven Annex I countries/groups (the U.S., the European Union, Norway, Japan, Australia, Russia and Ukraine) and eight non-Annex I countries/groups (India, China, Mexico, Brazil, South Africa, Chile, OPEC and African countries). Appendix E provides the detail behind this analysis and the national or bloc circumstances that lead to the interests and priorities identified here.

4.1 United States

U.S. climate change policy results from an effort to balance a number of competing political and economic interests and priorities, and out of this comes an overall approach towards climate change that will ensure the continued economic growth and competitiveness of the country. The concern raised in the 1997 Byrd-Hagel Resolution, that the administration not sign any treaty that would “result in serious harm to the economy of the United States,” remains the dominant determinant of U.S. policy on climate change.

Energy security, linked to national security, is also an important influencing factor. As the world’s largest energy producer and consumer, energy resource endowments and consumption patterns are critical determinants of U.S. climate change policy. Two aspects of particular importance include: the abundance of low-cost coal, which has largely dictated the choice of electricity supply in the U.S.; and growing U.S. dependence on imported oil to meet transportation needs.

Beyond these concerns lie more fundamental priorities and interests, which include national security and the maintenance of U.S. sovereignty. It would seem that the most relevant factor for climate change policy in the U.S. is that it is a major energy importer in an apparently unstable world. However, some observers suggested that while these clear linkages are often made, energy security does not have significant political traction in Washington.

Technology to reduce GHG emissions is an important part of the U.S. approach to climate change, but technology development in this area is also driven (perhaps primarily) by energy and national security concerns. The U.S. is seeking technological improvements to allow the country to continue to rely on its abundant domestic coal reserves,

and reduce its dependence on imported oil. As a result, the U.S. government has emphasized the importance of investments in clean coal technology, hydrogen, new vehicle technologies and carbon sequestration. For example, in 2003, President Bush announced FutureGen—a \$1 billion cost-shared project to create the first coal-based, zero-emissions electricity and hydrogen production plant. The main objective cited for this project was protection of national and economic security (U.S. Department of Energy 2004). More recently, the U.S. jointly announced the *Asia-Pacific Partnership on Clean Development and Climate* (see Appendix E for details).

An emerging issue for the U.S. is the adverse impacts of climate change. Changes in weather, migration patterns and the natural environment are already being experienced in Alaska. For example, increased coastal erosion near the village of Shishmaref, Alaska, has already resulted in three homes falling into the sea and could result in the town’s relocation (Los Angeles Times 2002). As observed impacts of a changing climate affect a growing number of Americans, it may become an issue of greater concern for the federal government.

Top U.S. climate change-related priorities include:

- economic growth and competitiveness;
 - minimization of the cost of climate policy;
 - minimization of risks to sovereignty;
 - developing country commitments;
 - national security and energy security considerations; and
 - energy technology development that enhance energy security.
-

4.2 European Union

European Union (EU) member states have varying interests and priorities, depending on their individual economic status, energy profile and opportunities for reducing GHG emissions. In general, however, communal priorities include economic prosperity, sustainable development and environmental effectiveness, energy security, trade liberalization, competitiveness and eco-efficiency.

Economic prosperity, and ensuring the competitiveness of European industry, employment and innovation, are top priorities, particularly for slower-growth countries. The EU envisions a future where it operates as a globally

competitive trading block, thus the opening of borders to product, service and labour markets, and an emissions reduction market. The EU sees itself as having a core competency in trade, and global trade liberalization is a key interest.

Energy security is becoming of greater importance. Europe has few natural gas supply routes and oil is increasingly coming from elsewhere. Coal is very politically volatile and its use is on the decline in many regions, while nuclear is being phased out in others. For many member countries, renewables are limited in resource potential and options are constrained by high market entry costs. Market liberalization has occurred for both electricity and gas, through two separate EU Directives. Electricity prices have come down as a result, but the exact effect on gas is less certain.

The EU has already introduced a variety of PAMs to reduce member states' GHG emissions, and will likely continue to do so. A diversity of measures enables the EU to address the many interests of its membership in a cost effective manner.

Environmental integrity remains an important consideration for the EU as it shapes its approach to climate change. This is perhaps best demonstrated by the EU's commitment to a long-term target for global surface temperatures to increase by no more than 2°C from pre-industrial levels.

Vulnerability, impacts and adaptation are very topical in the EU, especially after the heat waves experienced in France in 2003 and the recent release of the Arctic Climate Impact Assessment. Concerns have also been raised regarding the impact on infrastructure and anticipated impacts on the Gulf Stream. Vulnerability concerns may be highest in the United Kingdom and the Netherlands.

Security is a growing concern in the EU especially with the July 2005 tragedies suffered in London, England. Solidarity is also high on the list in terms of promoting internal EU cohesion to undertake humanitarian aid, emergency relief and development cooperation as a group.

Top EU climate change-related priorities are:

- economic prosperity and competitiveness;
 - energy security;
 - cost effective policies and measures;
 - environmental integrity;
 - vulnerability and adaptation; and
 - security and solidarity.
-

4.3 Norway

As a middle-power country with a strong commitment to meeting the environmental objectives of the UNFCCC, Norway is supportive of the multilateral process. Norway is interested in promoting domestic emissions reductions within the context of a more ambitious global regime with

differentiated commitments and cost-effective mechanisms for implementation.

Norway's profile as a net energy exporter differentiates it from many other European countries. Because revenue from offshore energy development provides a large share of domestic wealth, international action on climate change may significantly alter the Norwegian economy.

In light of its growing carbon dioxide emissions and a commitment to environmental protection, Norway has a strong interest in opportunities such as forest sinks and carbon dioxide capture and storage. Access to sinks opportunities will be an important consideration for Norway in the post-2012 negotiations.

As a northern country that is already experiencing the initial impacts of climate change, Norway also sees adaptation to current and future impacts as key considerations. Norway is particularly concerned about impacts on water, ecology and its Arctic regions.

Top Norwegian climate change-related priorities are:

- multilateral process in support of environmental protection;
 - economic prosperity;
 - energy security;
 - sinks and sequestration; and
 - vulnerability and adaptation.
-

4.4 Japan

An immediate Japanese priority is to ensure continued access to energy resources. Its lack of domestic sources and consequent reliance on imported energy leaves Japan exposed to international energy market volatility. This situation is made more challenging by the fact that Japan has already made a considerable effort to improve energy efficiency in the past and is now among the world's most energy efficient countries. In short, few opportunities currently exist for further reductions. Because of this, Japan is likely to rely heavily on international emissions markets.

Japan views technological development as a means to increase access to new energy resources and reduce GHG emissions. Under existing climate change programs, Japan is investing in new energy sources and in innovative energy and environmental technologies. Japan's historic leadership in technological innovation provides justification for pursuing this objective.

At the same time, Japan needs to address its continuing economic difficulties. Future economic growth in Japan will require reforms to address local dependencies on government handouts, its aging population and unproductive service sectors. Concerns exist regarding the limited openness to foreign trade, which as a percentage of GDP was

valued at just over 18 per cent in 2003, compared to 54 per cent in Germany and nearly 60 per cent in China (The Economist 2005).

Climate change is predicted to have a major effect on Japan's agriculture industry, forests, fisheries, water resources, coastlines, natural ecosystems and human health. Therefore, vulnerability is a priority.

Japan's top climate change-related priorities are:

- energy security;
 - technology development;
 - economic competitiveness;
 - access to international emissions markets; and
 - vulnerability and adaptation.
-

4.5 Australia

While Australia has taken advantage of sequestration opportunities to stay on track to meet its Kyoto target, its ability to rely upon sequestration in the future will be limited. Future reductions will require more effective GHG control measures that affect energy sectors, transportation and industry (Hunt 2004). Making these reductions while remaining economically competitive with its neighbours will be a priority for Australia.

The country is vulnerable due to its current high level of dependence on coal for internal use and export. With restricted opportunities for hydroelectric development, Australia is investing in opportunities like clean coal technology and the development of solar energy systems.

Australia recognizes its vulnerability to the impacts of climate change, noting that it could be more adversely affected than other developed countries. It, therefore, is interested in the development of adaptive strategies and measures.

Australia's top climate change-related priorities are:

- economic competitiveness and growth;
 - technology development in energy sectors;
 - carbon sequestration and biological sinks; and
 - vulnerability and adaptation.
-

4.6 Russia

The top Russian priority is continued economic reform to fuel growth. In pursuing its stated objective of doubling the economy over a 10-year period, GDP has become the main indicator of success in Russia and, therefore, anything that inhibits economic growth is undesirable.

At the same time, Russia has recognized the need to link economic growth with efforts to improve energy efficiency,

both to enhance economic security and to reduce GHG intensities. Through the "Energy Strategy for Russia for the Period to 2020" and "Energy Efficient Economy" program, the government is attempting to increase energy efficiency through economic restructuring and the use of new efficient technology. There is a great opportunity for efficiency gains in the current Russian system. Even with the efficiency gains, however, it is important to note Russia's dependence on fossil fuel sectors. As natural gas exports to the EU continue to increase, the domestic economy may become even more dependent on coal for power generation.

Carbon sinks and sequestration were priority items for Russia during Kyoto negotiations, and could be an item of interest in future negotiations. However, observers suggest that carbon sequestration and the protection of boreal forest is more of a political issue than an economic concern. It has been suggested that Russia may be interested in separate treatment of managed and unmanaged forests in future discussions.

When looking at Russia's future, it is important to recall its past and keep in mind that, as recently as the early 1990s, Russia was considered the "other" world superpower. To regain its past prestige, Russia has adopted a multilateral approach in the past decade, and is interested in joining any club of the most powerful. However, Russia's continued engagement in multilateral processes remains somewhat uncertain and it continues to extol certain remnant powers from Soviet years.

Lately, Russia seems to be seeking equal treatment in obligations with the large developing countries, particularly China. Russia wishes to be treated as a large and rapidly developing country, which may be appropriate in some respects, given the parallels between Russia's and China's economic and energy profiles.

Russia's top climate change-related priorities are:

- economic reform and growth;
 - energy sector reform;
 - international prestige within multilateral processes;
 - equity of treatment with large emitting developing countries; and
 - carbon sinks and sequestration.
-

4.7 Ukraine

The primary priority of Ukraine is economic growth. While the economy is turning around, considerable work needs to be done to reform economic systems and structures. Key to achieving the Ukraine's development objectives will be reforming its energy and industry sectors to become more efficient and to increase overall energy security by reducing imports.

Ukraine's location and large land base places the country in a good position related to future emission reductions opportunities, through carbon sinks and sequestration. As its economy grows and emissions increase, access to these opportunities will be important.

Ukraine appears committed to participation in a multilateral process. In particular, Ukraine will likely look to receive equal treatment to countries such as China and India, to establish a fair playing field for economic growth.

Ukraine's top climate change-related priorities include:

- economic growth and reform;
 - energy security and energy sector reform;
 - carbon sinks and sequestration; and
 - sovereignty along with participation in multilateral processes.
-

4.8 India

Economic and social development are India's top priorities, as the country is developing at a fast pace in both its traditional and high tech sectors. To support this growth, India needs electrical, communication, transportation, water and sewage infrastructure. Unless new and affordable technology becomes available, India will build infrastructure that results in increased GHG emissions. India is a strong advocate of CDM reform to better enable technology transfer.

To support economic growth, India also needs to increase its energy security by reducing reliance on imports. Continued expansion of its renewable energy sector and improvements to energy efficiency are required to meet this objective, which would in turn make a positive contribution to reducing overall GHG emissions. However, coal is expected to be the mainstay of India's energy system due to an abundant and low-cost domestic supply (Indian Ministry of Environment and Forests 2004).

Environmentally, many regions of India are stretched beyond carrying capacity. The majority of India's population is impacted by air, land and water pollution on a daily basis. The additional impacts of climate change on the carrying capacity of India and neighbouring countries could be greater than in any other region worldwide. Extreme weather events and disasters are already the norm. Countries in this region are overpopulated and ill-equipped for the projected impacts of climate change. As a result, vulnerability and adaptation are prime issues that India wishes to address in climate change negotiations.

India's top climate change-related priorities are:

- economic and social development;
- energy security;
- vulnerability and adaptation;

- population control; and
 - environmental improvement.
-

4.9 China

Economic development and poverty eradication are China's leading national priorities. China is expected to experience high economic growth in the decades to come, and has the potential to become the world's largest economy. Although the government wishes to ensure that the benefits from this growth are equitably distributed, the gap between rich and poor continues to grow.

Supporting China's growing economy will require nearly a four-fold increase in energy demand by 2050. While the country has made strides to improve energy intensity and develop new sources of energy, it still imports energy. Supply security will be a concern for China in the decades to come. A key to successfully managing this energy demand growth is technological development. China has been able to reduce its energy intensity by an average annual rate of 5.32 per cent between 1980 and 2000. China sees efficiency as a competitive factor that they value greatly.

Loss of agricultural and forested land to desertification is a big concern, as China is the world's second largest agricultural producer and has the greatest population to feed. In addition, water resources are already stretched to their limits in certain basins where large cities vie for agricultural water resources. These issues may increase and one day significantly change the viability of China's agricultural heartland. China is densely populated along coastal regions with many large ports and terminals and, therefore, the country is vulnerable to sea level changes and severe weather events.

While vulnerability and adaptation are concerns, regional environmental issues like air, land and water pollution are more pressing. Efforts made on these fronts may end up producing more GHG reduction benefits than actual targeted actions on climate change.

Population is less of a driver for emissions growth in China than other developing nations, as the country continues to practice very stringent population controls. However, a change in population policy could significantly alter the emissions curve.

China's top climate change-related priorities are:

- economic development and poverty eradication;
 - energy supply security;
 - technology development;
 - environmental and ecological degradation concerns; and
 - vulnerability and adaptation.
-

4.10 Mexico

Although Mexico's economy is growing substantially, the benefits have not reached all segments of society. Poverty alleviation, therefore, remains the primary objective. Continued economic diversification and growth, such as stronger integration into NAFTA, is seen as the main avenue to achieve this objective.

For economic and environmental reasons, Mexico has a strong interest in reforming its energy sector. Reform of markets could allow for the entry of independent power producers, greater efficiency and the development of cleaner energy sources, including natural gas. While there have been a number of attempts to introduce these reforms, the consensus required to amend the constitution has been difficult to reach (Chandler *et al.* 2002).

Mexico has significant potential for mitigation in the forestry sector. However, lack of investment and ill-defined property rights may prevent full realization of this potential. Eighty-six per cent of the current potential in this area stems from activities such as forest management, which are outside the scope of the CDM.

The ecological diversity of Mexico and its continued reliance on natural resources for a significant portion of economic activity makes vulnerability and adaptation another priority.

Mexico's top climate change-related priorities are:

- development and poverty alleviation;
 - economic diversification and integration within NAFTA;
 - energy sector reform; and
 - vulnerability and adaptation.
-

4.11 Brazil

The greatest priority for Brazil is economic development. The Southern Common Market (MERCOSUR), which is meant to bring economic stability and growth to the whole of South America, is a priority to Brazil. MERCOSUR is meant to promote an open economy to create a competitive South America in the global context. It also supports modernization of economies through deregulation and privatization to enhance investment and development opportunities.

Although Brazil has a growing economy with large energy needs, reducing emissions from land-use changes and increasing sequestration and sinks are a greater priority than emissions from fossil fuels, mainly because of Brazil's energy situation. Brazil's economy has followed a different path from other countries due to its emphasis on hydro-electricity and other renewable energy sources. However, Brazil is extremely sensitive/resistant to any international

arrangements that appear to compromise its sovereignty in the Amazon or other watersheds.

Technology transfer is a climate change priority, and Brazil highlights that the UNFCCC already contains articles that provide scope for technology transfer. Brazil may be interested in a separate protocol that specifically addresses technology transfer.

Adaptation is a concern for Brazil, but not necessarily a high priority. The government has not made it a priority to undertake detailed studies of the potential risks of climate change. In part, this stems from the uncertainty associated with the science of climate change, for example it is unknown whether rainfall will increase or decrease in the Amazon.

Brazil has experienced a high level of urbanization in past decades and, as a result, local air, land and water pollution has increased. As a result these environmental issues are a higher priority than climate change impacts.

Brazil's top climate change-related priorities are:

- economic development and regional market liberalization;
 - technology transfer;
 - sovereignty over natural resources;
 - emission reductions from land use change; and
 - other environmental concerns.
-

4.12 South Africa

As with all developing nations, and especially African nations, poverty eradication and economic development are high priorities. Although the country is already very developed by African standards, disparity within the nation is enormous. The legacy of Apartheid, which is in part to blame for this disparity, is felt today and will be for some time.

South African energy and electricity consumption is high largely due to industrial demand. One-third of households do not have access to electricity (Chandler *et al.* 2002). Therefore, a major development priority is increasing this access. The energy sector is also restructuring, which will create opportunities for lower-carbon energy resources. The production of synthetic fuels from coal is being phased out. The transfer of new energy is very important to South Africa, especially of clean coal, biofuel and solar thermal technology.

The HIV/AIDS epidemic that is affecting all of Sub-Saharan Africa is a challenging priority that undermines the prospect of long-term economic and social development in South Africa. With an estimated 21.5 per cent of adults between 15 and 49 in South Africa having HIV/AIDS (UNAIDS 2005) this is a public health issue with serious implications for South Africa's long-term

development. If the country is ever able to fight climate change or other serious health or environmental threats, it first needs to deal with AIDS which is taking away any human and institutional capacity to deal with these other problems.

Vulnerability and adaptation are also priority areas and South Africa has indicated support for practical approaches in this area focused on the sectors where the impacts of climate change will be felt. Critical areas of concern under vulnerability and adaptation include: water quantity and quality, impacts on agriculture, increased risk of disease, loss of habitat and species, and loss of coastline and perhaps even critical infrastructure due to sea level rise.

South Africa's top climate change-related priorities are:

- poverty eradication and economic development;
- energy security;
- technology transfer;
- HIV/AIDS; and
- vulnerability and adaptation.

4.13 Chile

Chile's primary objective remains the development and diversification of its economy. The country has undertaken a number of bilateral agreements to support achievement of this objective. OECD membership is a goal for Chile.

Dependence on fossil fuel imports is a continual concern for Chile, particularly given its historically rocky relationship with Argentina. The development of domestic energy sources is of particular interest and in this context Chile sees the value of technology development.

Vulnerability and adaptation are also key priorities for Chile, particularly given the importance of agriculture and forestry to its economy.

Chile's top climate change-related priorities are:

- economic diversification and OECD membership;
- energy supply security;
- vulnerability and adaptation; and
- technology transfer.

4.14 Organization of the Petroleum Exporting Countries

Top priorities for OPEC members include economic development and poverty eradication, and any global efforts to reduce GHG emissions are usually viewed as a direct challenge to their own economic and social advancement goals. OPEC members regularly indicate the

potential loss of revenues from falling sales of fossil fuels needs to be addressed as part of any overall adaptation package in the UNFCCC negotiating process. OPEC maintains that "common but differentiated" must be respected, and recently reiterated its concern about calls for post-Kyoto commitments from large emitting developing countries, stating that this would affect many countries' ability to "sustain economic growth, develop social infrastructure, and eradicate poverty" (OPEC 2004).

OPEC sees economic diversification and technology development as key to their continued development. Given the availability of proven reserves, and the expectation that the global community will remain dependent on fossil fuels for some time to come, OPEC is committed to promoting a policy of clean fossil fuel technology.

Top climate change-related priorities of OPEC include:

- economic diversification;
- innovation and technology development; and
- security of energy demand.

4.15 African Countries and LDCs

Agriculture remains the main economic engine in Africa, involving at least 70 per cent of the population. Yet, sadly, food security remains a critical problem across the continent. Poverty reduction and food security are the number one priorities for African nations as indicated by the Millennium Development Goals (MDGs). However, little progress has been made in achieving these goals and, in fact, the situation is worsening for Africa's poorest and most disadvantaged. While the first MDG target is to halve the proportion of people surviving on less than US\$1 per day between 1990 and 2015, more Sub-Saharan Africans survived on this amount in 2001 than in 1990 (United Nations 2005). The second MDG target is to halve (again between 1990 and 2015) the proportion of people who suffer from hunger in the world. While this proportion has dropped in Africa, it only moved from 36 to 33 per cent and progress on this indicator has slowed in recent years (United Nations 2005).

In Sub-Saharan Africa, seven per cent of the population lives with HIV, and in some southern countries populations are over 25 per cent HIV-positive. While prevalence rates are subsiding in many regions, the annual number of AIDS deaths is still increasing and moved past 2.25 million in Sub-Saharan Africa alone in 2004 (United Nations 2005). In addition, 91 per cent of the one million malaria deaths per year occur in Sub-Saharan Africa. Health is a high priority in African countries.

Africa and LDCs in general are highly vulnerable to the impacts of climate change. Arid and semi-arid regions in Africa face desertification, drought, and, in other cases, extreme flooding. Regions that already experience extreme

weather events are expected to encounter more. Small Island Developing States are particularly vulnerable to rising sea levels or other oceanic changes because of their natural dependence on the sea. Several fragile natural and urban ecosystems in developing countries face the threat of disease, degradation and destruction under most climate change scenarios. Weak infrastructure, limited human capacity, and poor governance regimes exacerbate the situation. Reducing this vulnerability and increasing resilience to climate change is an increasingly important issue.

Technology transfer is fundamental to climate change activities in African and other LDC countries. This includes innovation and technology that supports human and institutional capacity building for preparedness, prevention, planning, and management, as well as technology that helps with information networks, health systems, infrastructure development and resource development. This also includes climate friendly technology for energy infrastructure, transportation and new industrial processes.

Top climate change-related priorities for African countries and LDCs include:

- poverty eradication;
 - food security;
 - health;
 - vulnerability and adaptation;
 - technology transfer; and
 - capacity building.
-

4.16 Common Interests and Priorities

As is made clear in the above profiles, the individual countries surveyed face diverse national circumstances and consequently have varying interests and priorities. Despite the differences, a number of common priorities are shared by most countries.

For nearly all countries, economic growth and the maintenance of economic competitiveness is a main priority. For developed countries, economic growth is the most pressing priority for national governments. Developing countries share this objective but are focused more broadly on achieving economic and social development, and poverty eradication. Economic diversification is one of the top economic priorities for many countries, and it seems essential to some (e.g., OPEC members and Chile).

Technology development was also identified as a priority by a number of countries (both developed and developing). For many, this implies the development of energy technologies and alternative energy sources. For African nations, LDCs and Small Island Developing States, adaptation technologies that help deal with impacts and vulnerability are also important.

The focus for technological innovation ties directly to a third priority for many countries—increasing energy security and/or energy sector reform. Energy security is a critical concern for large energy importers like the U.S., EU, Japan, India and China. Energy sector reform is an important issue in Russia, Ukraine and Mexico.

Vulnerability and adaptation to climate change is either already important or becoming important to many countries. Reducing vulnerability and increasing adaptive capacity are particularly important for African countries. Recognition of the impacts of climate change and the potential adverse effects is growing in the U.S., EU, Australia, India, China and Brazil.

5

International Perspectives

The objective of this section is to gain insight into the perspectives of selected countries related to: the general approaches identified for post-2012 climate change options (Section 2); the elements embodied in the post-2012 climate change options (also Section 2); and the key Canadian sensitivities, which are drawn from the interests and priorities of Canada and its regions (Section 3).

IISD interviewed key contacts, who were asked to provide their personal perspectives regarding the likelihood of their country supporting the approaches and elements identified, and the odds that their country would be sympathetic to Canadian sensitivities (a copy of the interview questionnaire is provided in Appendix F). The responses provide insight into the international receptiveness of any potential Canadian policy for post-2012.

5.1 General Approaches

As noted earlier, IISD identified five general approaches and nine elements that characterize the many policy options being discussed. Only four of the general approaches are discussed here, because the fifth one was not identified in time for the interviews. The following two sections highlight the perspectives of selected countries/blocs on the four general approaches:

- **Extension of Kyoto** – meaning that the existing framework for climate change will be continued, by deepening the absolute reductions required from developed countries while gradually providing incentives for commitments from large emitting developing countries (linked in some fashion to their level of development).
- **Parallel Climate Policy** – proposes that climate change be addressed through either regional or sector-based approaches, coordinated through a parallel or complementary process to the UNFCCC. For example, the United States (U.S.) could develop its own cap-and-trade system which operates parallel to Kyoto’s trading regime.
- **Country-/Region-Specific** – involves each country or region developing a plan that suits its circumstances and priorities, followed by participating in trade-like negotiations to achieve agreement on equivalent or equitable efforts.
- **Integrated Policy** – proposes a regime that focuses on integrating climate change considerations into other “mainstream” priorities, followed by developing climate-specific policies and measures to

combat climate change. In doing so, climate change would be integrated with other policy priorities in areas related to energy planning, natural resources management and urban planning, in order to achieve a broader desired future vision.

5.1.1 Annex I Country/Bloc Responses

For all Annex I Parties interviewed, the engagement of major emitting developing countries is essential. For **Australia**, participation by all major emitters is the main requirement. It was felt that any of the four approaches presented could suit Australian interests because each has the potential to meet this one requirement.

United States (U.S.) respondents felt the Country-/Region-Specific approach to be most consistent with current national interests. It was recognized, though, that a purely bottom-up approach is likely inappropriate. A Parallel Climate Policy approach was viewed as being appropriate as a transitional vehicle but a fully independent system was not seen as realistic. Instead, the general feeling was that the U.S. will eventually move back into the UNFCCC system. The U.S. is against absolute targets, so a Kyoto-like approach would not be supported. Aspects of the Kyoto Protocol (such as the cap-and-trade system), however, continue to be of interest.

There may be interest in developing a new agreement within the UNFCCC process—one that could borrow from the Kyoto Protocol, but would incorporate fundamentally different approaches. Through such a mechanism it may be possible to re-engage the U.S. directly in the UNFCCC process. It was also noted, however, that very little progress on post-2012 discussion is expected to occur during the remainder of the Bush Administration.

European Union (EU) representatives consistently stated that an Extension of Kyoto approach is their priority. The EU has considerable political capital invested in Kyoto, and is unlikely to move away from this in the next few years. A representative also clearly stated that, while the EU will continue to support an approach that builds upon the current Kyoto regime, it is not interested in taking action independently. The EU wants to work in a broader, global context in a system that includes other key actors.

At the same time, though, the EU is open to the inclusion of new elements into the current structure so as to build consensus for an effective post-2012 climate policy. One respondent stated that none of the “pure” approaches alone “will describe adequately what the EU stands for. Instead an intelligent approach seeking environmental

effectiveness, cost efficiency and broad political acceptability will have to combine different useful policy elements.” Another respondent suggested that a menu of different approaches from which countries can select those most suited to their needs and circumstances might be appropriate.

In comments on the other approaches proposed, the European Climate Change Program was cited as a prime example of a Country-/Region-Specific approach as it is based on a thorough sectoral analysis with stakeholder involvement that identified emission reduction potentials and then built consensus around the most appropriate policy instruments to be used. Linking of domestic trading schemes, like the EU’s Emissions Trading Scheme (ETS) with a system developed by the U.S. to create a truly global carbon market was viewed as useful. However, it was seen as unrealistic to expect the U.S. to establish a parallel trading system at this time. An integrated approach was also viewed as being unrealistic.

Other approaches were also suggested: the Technology-Centred approach that would emphasize joint funding and research support; and a Multi-Treaty approach that would enable countries to participate in those treaties most consistent with their circumstances.

Norway is also most likely to support an Extension of Kyoto approach, however, there was a recognition that in the short term a Parallel Climate Policy approach will likely be needed to help bring the U.S. back into the circle. Norway may also be interested in multilateral or bilateral agreements on carbon sequestration. It could also be interested in a multi-commitment global regime that will have the flexibility to incorporate staged development.

While a current supporter of the Kyoto Protocol, Japan is likely to seek a different approach for post-2012—possibly a Parallel Climate Policy approach or a Country-/Region-Specific approach. In its recent interim report, *Sustainable Future Framework for Climate Change* (Japan, Industrial Structure Council 2004), the Japanese government has stated its interest in pursuing an approach that includes a wide range of major emitters (including developing countries) taking action to achieve significant and long-term global emission reductions. Japan may support the use of a flexible approach to enable countries to select which commitments they wish to emphasize. Japan particularly favours: support for sustainable development in developing countries; the development and diffusion of innovative technologies; and cross-border and sectoral intensity improvements. Japan also envisions a revised Clean Development Mechanism that plays an important role in technology transfer.

Russian and Ukrainian representatives both favoured moving away from the current Kyoto regime. Russia does not have strong ties to Kyoto, nor a clear preference between the options presented. Russia has noted that under any future regime the country should be treated in the same light as fast developing nations like China.

Should Russia, other former Soviet Union countries and the large emitting developing countries be willing to make post-2012 commitments, Ukraine will likely make commitments, too.

5.1.2 Non-Annex I Country/Bloc Responses

Non-Annex I countries shared a greater commonality of interest around one single approach—the Integrated Policy approach. Representatives from China expressed interest in this and a number of alternative approaches, including the possibility of combining elements from all four approaches to better enable the incorporation of technology, renewable energy and adaptation commitments. Another suggestion was to take an approach that emphasizes meeting basic demands for human development through low-emission pathways along with incentives for avoiding luxury emissions. It was also suggested that an Extension of Kyoto approach could be undertaken by Annex I countries, with a different approach being undertaken by non-Annex I countries.

Brazil seems likely to favour an Extension of Kyoto approach, provided the U.S. is a participant. One respondent noted Brazil’s interest in pursuing a multilateral approach as opposed to a regional one. Brazil will likely support any approach that is consistent with the *Brazilian Proposal* (see Appendix A), which emphasizes burden-sharing based on historical responsibility for temperature change. A sectoral approach may be of interest to the government, and the Brazilian Energy Initiative at the World Summit on Sustainable Development, was cited as an example of previous leadership in this area.

The Integrated Policy approach was supported by the Chilean representative, as it would perhaps help in reframing things to facilitate the integration of vulnerability and adaptation concerns into the regime.

Representatives of African countries were more supportive of taking an Extension of Kyoto approach, provided that it would not require enlisting the participation of developing countries. An Integrated Policy approach was also seen as being appropriate. Interest was also expressed in some alternative approaches, including the Brazilian Proposal or the use of a non-binding partnership approach.

A representative from OPEC indicated that its member states are most likely to support an Integrated Policy approach. Interest was also expressed in a technology agreement that would facilitate international cooperation on the development of GHG mitigation technologies.

This assessment does not include the perspectives of three key countries—Mexico, India and South Africa. Although efforts were made to contact representatives in Mexico and India, suitable questionnaire responses and interviews were not completed. South Africa was added to the list later on in the research process and so no interviews were conducted for the country. However, recent statements by

all three countries provide some insight into their perspectives on the various post-2012 approaches being discussed.

Informally, Mexico recognizes that it likely will be expected to take on commitments post-2012, and may be open to this idea provided it is joined by other transitional developing countries like South Korea. Mexico has expressed interest in a no-lose approach that would see the adoption of voluntary targets through a pledge and review process; if the target is exceeded, Mexico could then sell its credits. It is likely that Mexico will seek a short-term intensity-based target; it has also expressed interest in pursuing a sector-based approach. Its government has consistently pressed for expansion of the CDM post-2012 to include sector-wide and policy-based approaches that would enable them to trade in international markets.

India remains committed to supporting the adoption of intensity targets based on per capita emissions and the idea of contraction and convergence. It also favours the setting of long-term targets. In this regard, India appears to be increasingly out of step with other developing countries. India has, however, taken a leadership role in the future design of the CDM; it calls for expanding the CDM to include sector-based or policy-based approaches.

Like Mexico, South Africa has acknowledged that it likely will need to take on GHG reduction commitments in the future. At the recent Seminar on Government Experts (SOGE) in May 2005, the government indicated support for strengthening the Kyoto Protocol and expanding participation in emission reductions while respecting the principle of common but differentiated responsibilities. South Africa also expressed a desire for agreement on the post-2012 climate regime so as to foster development of the CDM market, of which it is a supporter. Strong interest is expected in a climate regime that provides incentives for clean coal technology and CO₂ capture and storage given South Africa's heavy reliance on coal.

5.2 Key Elements

IISD asked international contacts to comment on the nine key elements identified in the post-2012 options being discussed, in particular to indicate their country's/bloc's likelihood of supporting these elements (using a scale from highly unlikely to highly likely). The responses are summarized in Table 2. As noted in the table and described in section 5.2.1, some contacts from like countries gave differing responses to the same proposed elements.

5.2.1 Responses (Annex I and Non-Annex I)

In examining the responses in Table 2 it is important to know that opinions were expressed based on a broad characterization of the nine key elements. As such, opinions vary depending on the assumptions made regarding each element. It is also useful to recall that these elements should not be considered mutually exclusive as it is likely that some will be combined in whatever post-2012 policy regime emerges.

Soft or Qualified Targets

The situation is still open as to whether Parties support the inclusion of soft targets for post-2012. While many view soft targets as a means of addressing competitiveness concerns, it is also acknowledged as a less effective means of fulfilling the ultimate objective of the UNFCCC. Opinions generally indicate that soft targets are more likely to be supported by Australia, Russia, Chile and African countries. The EU might be interested in qualified targets, depending upon their specific design.

Russian and Ukrainian representatives both indicated interest in taking an intensity-based approach to addressing climate change. The U.S. may also support intensity targets or a safety valve approach. The U.S. may also be willing to support soft targets, if it is preceded by the adoption of a cap-and-trade system.

China, Brazil and OPEC expressed the greatest opposition to this type of element.

Hard or Absolute Targets

Compared to soft targets, there was less support for hard targets. The U.S., in particular, is highly unlikely to accept targets based on a quantitative formula, particularly a per capita approach. It was suggested, though, that the U.S. may accept targets based loosely on ability to pay and historic responsibility. Japan, Australia, Russia, China, and OPEC also are unlikely to support hard targets.

While the EU is more open to the idea of hard targets, it is also unlikely to support a single formula approach for establishing targets in post-2012, and is unwilling to accept certain types of hard targets (such as a per capita emissions target). Norway's acceptance of this element is also conditional.

Brazil is likely to support these targets because they are consistent with the Brazilian Proposal. The clearest support for this element was heard from Chile and the African countries.

Longer-Term Targets

Representatives from the U.S. expressed the strongest opposition to establishing longer-term targets. The country is highly unlikely to participate in negotiating quantified long-term targets. The U.S. may agree to articulate an aspiration target, provided it does not become the basis for making short- or medium-term commitments.

Brazil, Australia and Russia are highly unlikely to support the inclusion of long-term targets. The position of China and African countries is less clear, with respondents from each country giving opposing answers to this question.

Table 2. Summary of responses to nine key elements

(Table Key: HU = Highly Unlikely - to support element; U = Unlikely; L = Likely; HL = Highly Likely)

	Soft or Qualified Targets				Hard or Absolute Targets				Longer-Term Targets			
	HU	U	L	HL	HU	U	L	HL	HU	U	L	HL
United States		X	X		X				X			
European Union		X	X	X		X	X	X			X	X
Norway		X	X			X	X				X	
Japan		X	X		X	X					X	
Australia			X		X					X		
Russia			X		X					X		
Ukraine		X		X	X		X				X	
China	X	X			X	X				X	X	
Brazil	X						X		X			
Chile				X			X				X	
African countries			X				X	X		X	X	
OPEC	X					X						X

	Common/Harmonized PAMs				National PAMs				Low-Emission Technology Incentives			
	HU	U	L	HL	HU	U	L	HL	HU	U	L	HL
United States	X	X	X				X		X		X	X
European Union		X	X	X		X		X			X	X
Norway		X	X				X				X	X
Japan		X	X				X				X	
Australia		X					X				X	
Russia	X						X			X		
Ukraine		X					X					X
China	X	X					X	X			X	X
Brazil	X			X		X						X
Chile		X					X					X
African countries	X					X	X					X
OPEC			X					X			X	

	CDM Incentives				Vulnerability or Adaptation Incentives				Allowance-Based Incentives			
	HU	U	L	HL	HU	U	L	HL	HU	U	L	HL
United States			X	X	X		X		X	X		
European Union			X	X		X		X		X	X	
Norway			X	X			X			X	X	
Japan			X			X	X		X	X		
Australia			X			X					X	
Russia			X				X				X	
Ukraine				X		X	X					X
China			X	X			X	X		X		
Brazil		X					X			X		
Chile	X							X		X		
African countries			X					X		X		X
OPEC			X				X					X

The EU is more supportive of including longer-term targets, in order to help in the establishment of interim milestones or targets along the way to achieving the long-term goal. Like the U.S., it was suggested that a longer-term target be aspirational in nature so that it can be modified as scientific evidence becomes clearer. Support for longer-term targets was expressed by Norway, Japan, Ukraine and Chile.

It was cautioned that reaching agreement between all Parties on a long-term target would be very difficult to negotiate.

Coordinated/Harmonized PAMs

Establishing a common set of international PAMs was opposed by U.S. representatives, and in particular the notion of a common carbon tax. The U.S. would be more amendable to common sectoral standards, for sectors such as automobile manufacturers. Australia, Russia, Ukraine, China, Chile and African countries are also unlikely to support these PAMs.

Brazil is highly unlikely to support carbon taxes, but more open to the idea of sectoral standards, particularly in the areas of electricity and transportation.

In Norway and Japan, it is likely that common standards or taxes could be supported. Norway already has a well-established carbon tax system, while Japan has called for the development of international sectoral standards. The EU appears likely to support international standards, but not necessarily emission intensity standards or a common carbon tax. OPEC may be supportive of this type of element, again depending on the nature of the PAM.

National PAMs

Many respondents gave strong support for the establishment of tailored national PAMs, the only exceptions being individuals from the EU, Brazil and African countries. An EU representative noted that the aggregate of such a nationally-led approach might not result in the GHG reductions needed to sufficiently address climate change (particularly if it were to be the sole element of a future regime). The Brazilian representative suggested that the palatability of this element would depend on the commitments made by each country, particularly the U.S.

Low-Emission Technology Incentives

Strong support was also expressed for incentives for technology transfer from developed to developing countries. EU representatives supported this element with the addendum that it depends on the scale of transfers involved. Ukraine also expressed support for this element if the incentives were also available to the Ukraine.

The U.S. position depends on the circumstances under which the incentives are applied. It is highly likely to support these incentives on a unilateral or bilateral basis; it is much less likely to support these funds as a negotiated matter or as part of a multilateral process. Russia indicated a reluctance to develop technology incentives like these,

possibly because it fears being ineligible for receiving these funds while its competitors like China would qualify.

CDM Incentives

With only two exceptions, there was strong support for incentives to fund the purchase of emission reductions from developing countries. The U.S. may be willing to support this element in conjunction with market-based incentives such as a cap-and-trade system or an international trading system. EU support for this element might depend on the scale of the funding required. Ukrainian support could be dependent on it being eligible for these funds.

Brazil seems unlikely to support these incentives if it in any way requires non-Annex I countries joining Annex I countries in taking on targets. Brazil would likely want a separate scheme for developing countries. The Chilean representative felt that the carbon market should operate through private transactions rather than as a result of government funds.

Vulnerability and Adaptation Incentives

A broad array of opinions exists regarding funding from developed countries to support adaptation or vulnerability reduction in developing countries. In general, developed countries seem less likely to support this approach than other countries.

The U.S. may be willing to provide technical assistance in support of disaster recovery, but it is unlikely that these efforts would explicitly be linked to climate change. It was stated as highly unlikely that the U.S. would support the provision of incentives through a negotiated fund. Caution was also expressed regarding the amount of funding to be provided and the possibility of linking provision of these incentives to mitigation commitments.

EU representatives' concern with these incentives included the possible perception of developing countries being provided with a blank cheque to finance disaster recovery efforts and implications for potential liability for the impacts caused by climate change. On the other hand, it was suggested that the EU would provide funding to support integrating adaptation concerns into development policies.

The Ukrainian respondent indicated their country is unlikely to support adaptation incentives because adaptation is not an urgent concern today as the country has more pressing priorities.

Norway and (possibly) Japan were the only Annex I Parties to indicate support for this element. Other supporters included Russia, China, Brazil, Chile and OPEC. The greatest support for this element was expressed by representatives of African countries.

Allowance-Based Incentives

Little support was expressed for the allocation of emissions allowances to developing countries. EU representatives suggested that they would be unlikely to support these incentives due to the challenge of setting up such a system

(e.g., how would one allocate allowances among the developing countries?). The U.S. is also unlikely to support this approach, but may be open to a “no-lose” approach. Brazilian representatives expressed no interest in joining International Emissions Trading and therefore had no interest in this element. Japan, China and Chile are unlikely to support an allowance-based incentive.

Australia, Russia, Ukraine and OPEC are more likely to support this incentive. The Ukrainian representative stated they would also look for generous time allocations to undertake the emission reductions.

5.3 Canadian Sensitivities

To better assess the international acceptability of Canada’s post-2012 priorities, there is a need to understand other’s perspectives on key Canadian sensitivities. On which issues may Canada be able to find a sympathetic ear? Which issues are likely to cause friction, and with which Parties?

To address these questions, key contacts were presented with eight Canadian characteristics that distinguish it in terms of circumstances, and interests and priorities (eight “sensitivities”) and were asked which of the eight are seen as shared (or complementary) concerns with the responding country; legitimate Canadian concerns; or issues that may result in future disagreements. The outcomes are provided in Table 3 with a deeper discussion of individual country perspectives in the Sections 5.3.1 and 5.3.2.

The eight sensitivities are in part an direct outcome of the research that went into Section 3, but do not necessarily mimic the final outcomes of that section because these sensitivities were developed prior to completing the domestic research. Nevertheless, the sensitivities do reflect some common concerns and issues of many individuals across Canada.

Table 3. Perspectives on eight Canadian sensitivities

Sensitivity #1		
Unlike all other OECD countries (with the exception of Norway and Australia), Canada has an economy based on the export of natural resources, including energy.		
Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • Norway • Australia • Russia • Ukraine • Brazil • Chile • OPEC • African countries 	<ul style="list-style-type: none"> • European Union • Norway • Russia • China • Brazil • OPEC 	<ul style="list-style-type: none"> • Japan • China
Sensitivity #2		
As Canada has a federal system of government with substantial responsibilities shared on issues such as energy and forestry policy (therefore, for example, only provinces can implement Renewable Portfolio Standards), targets have to be acceptable to a wide range of policy actors for reduction objectives to be reached.		
Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • United States • European Union • Australia 		<ul style="list-style-type: none"> • Japan • China
Sensitivity #3		
Canada has a strong interest in technology and innovation—in vehicles, fuels, power generation and geological storage. Innovation is key for significant long-term reductions.		
Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • United States • European Union • Norway • Japan • Australia • Ukraine • China • Brazil • OPEC • African countries 	<ul style="list-style-type: none"> • United States • Ukraine • Brazil 	<ul style="list-style-type: none"> • OPEC

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Sensitivity #4

Canada has an interest in a comprehensive approach to GHG emission reductions that includes all gases and includes sinks as well as sources. Canada is particularly interested in ensuring that the role of agricultural soils sinks not be excluded.

Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • United States • European Union • Norway • Australia • Ukraine • Chile • OPEC • African countries 	<ul style="list-style-type: none"> • United States • European Union • Japan 	<ul style="list-style-type: none"> • Russia • China • Brazil

Sensitivity #5

Canada has a unique relationship with the United States, to which Canada sends approximately 80 per cent of its exports. Canada might, therefore, require greater flexibility in its response should the U.S. not become more engaged in a multilateral climate regime.

Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • European Union • Japan • OPEC 	<ul style="list-style-type: none"> • United States • European Union • Norway • Japan • China • African countries 	<ul style="list-style-type: none"> • Australia • Russia • Ukraine • Brazil • African countries

Sensitivity #6

Canada is a key supplier of energy (oil, natural gas and electricity) to the United States, and will likely be interested in treatment of energy trade that will account for upstream emissions within the climate regime.

Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • Russia • Ukraine • OPEC 	<ul style="list-style-type: none"> • Norway • Russia • China 	<ul style="list-style-type: none"> • European Union • Norway • Japan • Australia • Ukraine • China • African countries

Sensitivity #7

Based on current climate models, Canada is expected to experience some of the most dramatic changes in its climate. Adaptation is therefore a concern, particularly given the natural resource dependency of many regions.

Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • United States • European Union • Australia • Ukraine • China • Brazil • Chile • OPEC • African countries 	<ul style="list-style-type: none"> • European Union • Japan • Russia • China 	<ul style="list-style-type: none"> • Ukraine

Sensitivity #8

Climate change impacts raise equity concerns for Canada as, like everywhere else, those least responsible for rising levels of GHG emissions are expected to be (and are being) the most immediately and dramatically affected by this process.

Complementary	Legitimate Concern	Likely Area for Disagreement
<ul style="list-style-type: none"> • European Union • Norway • Australia • Russia • Brazil • Chile • OPEC • African countries 	<ul style="list-style-type: none"> • Japan 	<ul style="list-style-type: none"> • Russia • Ukraine • China

5.3.1 Annex I Country/Bloc Responses

While all the sensitivities presented were seen as legitimate, the **United States** representatives saw Canada's interest in technology and innovation as most complementary. The desire for a comprehensive approach that includes sinks and sources, the desire for a broadly acceptable approach, and the inclusion of adaptation concerns also complement U.S. interests.

Canada's desire for recognition as a clean energy exporter was identified as the most likely area of disagreement with the U.S. The U.S. was said to be indifferent to the unique challenges presented by U.S.-Canada energy trade, and individuals suggested that it may be best to deal with the issue more generically rather than seeking special consideration for Canada alone.

It was also cautioned that the U.S. federal government is not that aware of Canada's concerns and sensitivities, and that given the current state of U.S.-Canada relations, the Canadian government should expect an indifferent response from the U.S.

Drawing from **European Union** perspectives, many of Canada's concerns seem complementary to its own. The desire for pursuing technological solutions was seen as strongly complementary. Canada's federal system of government is similar to that of EU member states, such as Spain. The EU may be willing to take this factor into account provided it is not used as an excuse for taking on a less stringent target. Furthermore, as it relates to competitiveness with the U.S., Canada's trade relationship with the U.S. is not seen as unique but rather as complementary. Canada's interest in a comprehensive approach, and concerns regarding adaptation and equity issues, are also shared by EU respondents.

Only one area for disagreement was consistently identified—there is little sympathy for Canada's desire for special recognition of its clean energy exports.

Norway, in many ways, mirrored the perspectives of the EU. Canada's role as a natural resource exporter and its desire for a comprehensive approach that includes sinks were seen as complementary. Technology and innovation and the inclusion of equity concerns in terms of climate change impacts, were also seen as complementing Norway's own interests.

Canada's unique relationship with the U.S., and its role in supplying energy to the U.S. were viewed as the most legitimate concerns. At the same time, Norway is not likely to agree with a Canadian effort for special treatment of its upstream emissions as Norway itself has moved away from this issue in the international climate negotiations. It was suggested that perhaps Canada has a relatively strict Kyoto target, and that it may be able to seek a somewhat more lenient target for post-2012 as a result.

Japanese representatives see a strong parallel with Canada's desire to promote technology and innovation. It

was also stated that because 80 per cent of Japan's trade is with countries that do not have a Kyoto commitment, it is in a similar position to Canada regarding the concern over its relationship with the U.S. Canada's desire for a comprehensive approach, and to address equity issues associated with climate change policy were also seen as legitimate.

A number of areas for potential disagreement were identified by Japanese contacts, including any special consideration of the treatment of energy trade, and concerns regarding Canada's role as a natural resource exporter. As Japan is a net energy importer, it would be difficult to support any action that uses export status as an excuse for more lenient commitments. Regarding Canada's federal system of government it was noted that decision-making is difficult in all democratic countries and that this is not a unique circumstance.

Australia viewed all eight Canadian sensitivities as complementary, with the exception of ones related to Canada's proximity with the U.S. It also viewed all eight issues as being legitimate Canadian concerns. Disagreement with Australia may stem from efforts that emphasize Canada's "special status" because of its relationship with the U.S.

Common concerns between **Russia** and Canada include their countries' status as resource exporters and the interest in the accounting of upstream emissions related to energy trade. These issues were also seen as legitimate Canadian concerns, but not necessarily unique. Potential areas for disagreement between Russia and Canada may arise from Canada's desire for a comprehensive approach that includes agricultural sinks, and its desire for flexibility which stems from its unique relationship with the U.S.

For **Ukraine**, complementary areas include status as a natural resource exporter and the desire to support technological development and innovation. Ukraine may also share Canada's interest in a comprehensive approach that includes carbon sinks. Potential disagreement may arise from Canada's desire for special status should the U.S. remain outside the multilateral process. It is uncertain how the Ukraine would react to issues related to the treatment of energy trade, adaptation concerns, and equity issues associated with the impacts of climate change.

5.3.2 Non-Annex I Country/Bloc Responses

The interest in innovation and technology is the most complementary Canadian sensitivity to **China's** own interests. Canada's concerns regarding climate change impacts and the need for adaptation strategies were also shared. Four Canadian sensitivities were viewed as legitimate including the issues it faces as a natural resource based economy, its unique relationship with the U.S. and the potential need for flexibility, its role as a clean energy supplier to the U.S., and Canada's vulnerability to climate change based on the current climate models.

A number of areas for disagreement between China and Canada were also identified by participants. China is

importing more energy and it may be difficult to side with the concerns related to energy exports. The need to find policies and measures that are acceptable across a wide range of policy actors was also noted as differing from China's circumstances. Other potential areas for disagreement were stated to be Canada's desire for a comprehensive approach and its interest in special treatment for its upstream energy emissions. Equity issues raised by the impacts of climate change may also be a potential area for disagreement.

Complementary sensitivities between **Brazil** and Canada include their economic status as natural resource exporters, and a shared interest in technology and innovation. Equity implications of the impacts of climate change are also likely areas of shared interest.

Brazil is expected to be less sympathetic to Canadian concerns regarding its federal system of government as Brazilian states do not have the same degree of autonomy as Canadian provinces. As well, these concerns were thought to be an internal matter that should not be used to weaken Canada's commitment. Canada's trade relationship with the U.S. was not viewed as unique, as many other countries, such as Mexico, face a similar challenge. Canada's wish for the treatment of energy trade is not supported, partly because of an assertion that the life-cycle analysis required for this type of calculation is impossible to do at the international level. Finally, Brazil disagrees with Canada's desire for the inclusion of sinks in a post-2012 regime.

Given the structure of **Chile's** economy, common ground may be found in terms of both countries depending on natural resource exploitation and export, and an interest in a comprehensive approach that includes sinks. Canada's concerns related to adaptation and the equity implications of the impacts of climate change were also noted as complementary. Canada's bilateral relationship with the U.S. was noted as an element that should be taken into consideration during post-2012 negotiations.

It was noted that Chile's status as an energy importer puts it in a potentially conflicting position with respect to Canada. Chile is interested in new technology to reduce reliance on conventional energy sources (a common priority with Canada), but it is unlikely to sympathize with issues deriving from Canada's status as an energy exporter.

OPEC members, it was suggested, could find common ground on all eight Canadian sensitivities with the exception of the implications of a federal structure of governance. Canada's profile as a resource and export-dependent country was viewed as the country's most legitimate sensitivity. Investment in technology development was cited as being a potential area for disagreement, as it would depend on the type of technology being supported—would it be carbon dioxide capture and storage or renewable energy technology like wind?

Representatives of the **African countries** stated that their concerns regarding adaptation complement Canada's concerns—both see a need to respond to the impacts of climate change and to address the equity issues associated with these impacts. African countries are also interested in technology and innovation, and potentially in a comprehensive approach that includes sinks. One respondent agreed with Canada's unique relationship with the U.S. as being a legitimate concern, but another identified this as a potential area for disagreement. The issue of the treatment of upstream emissions from energy export is an issue upon which the opinions of African countries and Canada will likely differ.

5.4 Assessment of Approaches, Elements and Canadian Sensitivities

A wide diversity of opinion was expressed regarding the general approaches, the key elements and the Canadian sensitivities identified.

In general, there appears to be a greater interest in pursuing an Extension of Kyoto approach, with some notable exceptions (namely the U.S.). Of the other three approaches, interest was also expressed in the Integrated Climate Policy approach. A number of respondents noted a desire for a Technology-centred approach, an option that was not explicitly part of the interview protocol.

Overall, however, there is a general sense that countries are most interested in a more flexible approach to post-2012, one that can be tailored to national circumstances and priorities. For example, while the EU is arguably the strongest supporter of extending Kyoto it is interested in including new elements to help meet the needs of EU-member countries. Annex I Parties see a flexible approach as a way of getting the large emitting developing countries to participate, which many describe as essential for post-2012.

Of the elements presented, the most consensus (and support from a wide range of Parties) emerges around:

- the development of PAMs tailored to national circumstances that will support emissions reductions over the long term;
- the inclusion of incentives from developed countries for the development of low-emission technologies and the deployment of this technology to developing countries; and
- the provision of funds for purchasing emissions reductions from developing countries (through a mechanism like the CDM).

More controversial is the inclusion of hard targets. The U.S. opposes this approach, which may make this type of element a non-starter at international negotiations.

Disagreement also exists regarding common or harmonized PAMs, however, the general reaction to this element may stem from the examples presented. There is strong

opposition to the inclusion of common taxes in post-2012 in many countries. Sectoral standards are more acceptable and some countries (notably Japan) see them as a key component of post-2012.

On the subject of sensitivities, Canada's relationship with the U.S. is recognized as a legitimate concern by only a few respondents and, in fact, most see this as a shared concern. Similarly, Canada's federal structure is not seen as a particularly legitimate consideration, as respondents from the U.S., EU and Australia noted their situation is no different. Canadian sensitivities related to vulnerability and adaptation revealed similar responses, as it seems that most countries/blocs see themselves as being particularly vulnerable to climate change impacts. Canada's desire for a comprehensive approach is shared by a number of countries, notably the U.S., Norway, Australia and Ukraine. As well, a strong common interest exists across a range of Parties regarding technology development and innovation. While these sensitivities are viewed as legitimate they are not seen as being unique to Canada.

Very little international support exists for credits for clean energy export. This issue was frequently identified as a potential area of conflict, however, allies may be found in Russia, Ukraine and OPEC. Finally, differences may surface regarding the focus of sinks activities and Canada can expect strong Brazilian opposition on issues related to CO₂ sequestration or the maintenance of standing forests.

In reviewing the responses to the various approaches, elements and sensitivities, it is important to keep in mind the different stages at which the countries/groups are in terms of developing their post-2012 policies. While the EU and Japan have public documents outlining their key issues and concerns, others are only beginning to consider this matter. As well, it was difficult at times to assess the rationale for the responses provided by respondents. Although the information gathered through the questionnaire provides a good indication of some potential reactions to general approaches, key elements, and Canadian sensitivities, these reactions only represent the views of a few during a particular moment in time.

6

Evaluation Criteria

Having identified the key elements and approaches contained in the 44 policy options for post-2012, the key priorities and interests of Canada and its jurisdictions, key country interests and priorities and international perspectives on the elements, approaches and Canadian sensitivities, a qualitative assessment of the options from a Canadian perspective is needed. The methodology used for this assessment draws upon evaluation criteria used in other policy discussions and forums which have examined post-2012 options from an international perspective, and therefore include some basic global principles, such as environmental effectiveness, economic efficiency, equity and administrative feasibility.

The general principles or criteria developed here are used as a starting point to assess potential options for post-2012 from a Canadian perspective. While the analysis here focuses on Canadian interests and priorities, successful implementation of a post-2012 climate change policy will require an agreement that reflects—as much as possible—the reality of the national interests of all the participating countries, as countries will not implement international treaties that run counter to their interests. Thus, the criteria must also reflect this “international reality.”

The criteria are used to assess the general approaches and elements in Section 7. The results of this assessment are used to identify policy options that may be most attractive to Canada. A similar methodology could be used to construct new policy options, drawing from the most attractive of the general approaches and elements to develop such policy.

6.1 Specific Evaluation Criteria Relevant to Canadian Interests

A number of organizations have proposed general assessment criteria to evaluate the post-2012 options. These criteria and their definitions are provided in Appendix G. From this list IISD extracted the most relevant to today’s circumstances, to the type of policies that are generally being proposed, and to the political reality of the times.

Table 4 shows Canada-specific criteria that were developed using these international criteria as a starting point, but they were also based on the national and regional interests and priorities reviewed in Section 3 and the international considerations from Sections 4 and 5.

Table 4. Proposed assessment criteria

General Criteria Categories	Specific Criteria
Environmental	<ul style="list-style-type: none"> • Extent to which the option addresses UNFCCC ultimate objective and results in significant long-term reductions in GHG emissions • Inclusion of most important gases • Inclusion of sinks (removals) as well as sources • Promotion of co-benefits • Integration of adaptation
Economic	<ul style="list-style-type: none"> • Minimize negative economic effects (e.g., promote technology development and consider appropriate rates of capital stock turnover) • Promote sustainable economic development with long-term objectives • Address unique economic structures of Canada and other countries (e.g., energy-intensive, export-oriented, resource-based economy) • Minimize negative effects on industry and national competitiveness • Provide cost certainty
Equity	<ul style="list-style-type: none"> • Comparable efforts by jurisdictions and sectors
Administrative or Institutional	<ul style="list-style-type: none"> • Policy flexibility (international/temporal) • Minimize complexity of negotiation requirements • Promote effective partnerships among relevant jurisdictions • Minimize complexity of administration in Canada • Allows countries to achieve goals/targets using own policies and measures (given federal structure) • A broad-approach inclusive of other policy priorities related to sustainable development
Technology Focus	<ul style="list-style-type: none"> • Promote the development, deployment and diffusion of new and existing technology
Developing Country Issues	<ul style="list-style-type: none"> • Directly address a wide range of developing country needs in the areas of economic development, technology transfer, vulnerability and adaptation, energy security and capacity building
U.S. Issues	<ul style="list-style-type: none"> • Key U.S. issues must be addressed, including economic growth and industrial competitiveness, costs and cost uncertainty, technology development, energy security, developing country commitments and policy sovereignty

6.2 Using the Assessment Criteria

The list of criteria in Table 4 were used to conduct a qualitative assessment of general approaches and the key elements from Section 2. This assessment is not intended to define or determine Canada's eventual priorities or positions in international negotiations; rather it is intended to help frame the issues as Canada seeks to take a leading role in directing future negotiations of post-2012.

The assessment was carried out by testing each of the general approaches and key elements against the evaluation criteria noted above. As part of the overall assessment, a simple evaluation system was used to assess each key element and general approach and the results were summarized. The outcomes of this assessment are provided in Section 7, where the top priority elements and approaches are discussed. When conducting the overall assessment, these results were used to identify the preferred elements and approaches embodied by the 44 policy options. Some options contain many of the key elements, whereas some contain a few, a fact that is considered in the overall assessment of each option.

Canadian interests and priorities came into the assessment both through the criteria used and through the following line of questioning used when assessing each individual option. These questions were used to further scrutinize the results of the criteria assessment and to draw conclusions about each of the 44 policy options from a Canadian perspective:

- What is the option's balance in terms of its ability to address each of the seven criteria categories?

For example, is the option aggressive in achieving environmental objectives, but at the expense of economic efficiency? Or, is the option equitable in its approach to burden-sharing and, because of this, administratively burdensome?

- Is the option in and of itself comprehensive, or does it simply provide a solution for one piece (or aspect) of the post-2012 climate change framework?
- How does the option relate to any others presented? Is the option similar to others in whole or in part? Is it covered off or taken care of by other options?
- Does the option contain elements that are considered "non-starters" from the perspectives of key countries/blocs in the negotiations?
- From Canada's perspective, does the option contain attractive elements? Are these elements a realistic expectation in a post-2012 regime, considering the international context?
- From Canada's perspective, does the option contain un-attractive elements? Are these elements a realistic expectation in a post-2012 regime, considering the international context?

Together, identification of preferred elements and approaches, by using both the assessment criteria and the above questions, constitute a basis for identifying preferred post-2012 policy options from a Canadian perspective.

7

A Qualitative Assessment of Post-2012 Options

This section provides a qualitative assessment of post-2012 policy options, based on: using the evaluation criteria for assessing the common approaches and key elements from the post-2012 policy options, and the line of questioning in Section 6. As noted earlier, the intent was to assess options based primarily on Canadian interests, but also on the current international reality. It needs to be emphasized that the following is only intended as an indicative screening tool, and our assessments of the options are most certainly preliminary. We include them simply to illustrate how evaluating the many post-2012 options available could be made more manageable for further, more sophis-

ticated analysis. The approach used first focuses on the results of the elements and approaches assessments, which provide a basis for analyzing the 44 options. This is followed by an assessment of a selected subset of options.

7.1 Assessment of Elements

Table 5 shows IISD's assessment of the nine elements against the criteria identified in Section 6. The table is intended to indicate whether each of the elements supports or conflicts with the criteria.

Table 5. Assessment of elements against criteria

Criteria	Soft or Qualified Targets	Hard or absolute Targets	Longer-Term Targets	Coordinated/Harmonized PAMs	National PAMs	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
	★★★★ indicates the objective/criteria is strongly supported ★★ indicates a conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria
Environmental	★★★	★★★★	★★★★	★★★	★★★			★★★★	
• Extent to which the element addresses UNFCCC ultimate objective – significant long-term reductions	★★	★★★★	★★★★	★★★	★★				
• Inclusion of most important gases	★★★★	★★★★	★★★★						
• Inclusion of sinks (removals) as well as sources	★★★★	★★★★	★★★★		★★★				
• Promotion of co-benefits					★★★★				
• Integration of adaptation								★★★★	
Economic	★★★★	★	★★★	★★★	★★★★				
• Minimize negative economic effects (e.g., through long-term approaches that respect capital stock turnover)	★★★★	★	★★★		★★★★				
• Promote economic development	★★★★	★★			★★★★				

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Criteria	Soft or Qualified Targets	Hard or absolute Targets	Longer-Term Targets	Coordinated/ Harmonized PAMs	National PAMs	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
<ul style="list-style-type: none"> Address unique economic structures of Canada and other countries 	★★★★★	★★★	★★★		★★★★★				
<ul style="list-style-type: none"> Minimize negative effects on industry and national competitiveness 	★★★★★	★★		★★★	★★★★★				
<ul style="list-style-type: none"> Provide cost certainty 	★★★★★	★	★★						
Equity – comparable efforts by industrialized jurisdictions and sectors	★★★★★	★★★	★★★	★★★	★★★★★				
Administrative and institutional	★★★★★	★★	★★	★★★	★★★★★				
<ul style="list-style-type: none"> Policy flexibility (international/temporal) 			★★★		★★★★★				
<ul style="list-style-type: none"> Minimize complexity of negotiation requirements 			★	★★★★★	★★				
<ul style="list-style-type: none"> Minimize complexity of administration in Canada 		★★		★★★	★★★★★				
<ul style="list-style-type: none"> Allows countries to achieve goals/targets using own policies and measures (given federal structure) 	★★★★★	★★★★★		★	★★★★★				
<ul style="list-style-type: none"> A broad approach inclusive of other policy priorities related to sustainable development 					★★★★★				
Technology focus				★★★	★★★★★	★★★★★			
Address developing country concerns/issues		★			★★	★★★★★	★★★★★	★★★★★	★★★
Address U.S. concerns/issues	★★★★★	★★	★★		★★★★★	★★★★★			

★★★★★ indicates the objective/criteria is strongly supported
 ★★ indicates a conflict with the objective/criteria

★★★★ indicates the objective/criteria is supported
 ★ indicates a strong conflict with the objective/criteria

★★★ indicates the objective/criteria could be either supported or opposed depending on the design of the policy regime

7.1.1 Discussion

While all of the elements are intended to address the environmental objectives of the UNFCCC, elements vary in their emphasis. **Environmental objectives**, and in particular the achievement of significant long-term emission reductions, are likely to be most directly and transparently addressed through hard and long-term targets. The environmental effectiveness of soft targets and PAMs (whether coordinated or national) will depend on their design and the degree to which they can be strengthened through technology advances and increased public awareness. Developing country funds that address technology, mitigation and adaptation have the potential to address the environmental issues of those countries.

Economic criteria are addressed best by soft or qualified targets, which are intended to promote growth and control costs and cost uncertainty, and by national PAMs which could be tailored to meet Canada's needs. Hard targets are least likely to address Canada's economic concerns, since there is only a single mechanism—the absolute target—for addressing differing national circumstances. While some designs could address unique Canadian circumstances, feedback from international experts suggests that few countries would be sympathetic to explicit target adjustments for Canada. Other elements and options may be more successful in addressing Canada's economic interests through less direct mechanisms, such as technology- or energy efficiency-based approaches. Longer-term targets and coordinated PAMs could be consistent with Canadian economic interests, depending on their design.

Equity objectives are interpreted in the Canadian context as comparability of effort among industrialized countries. This is, of course, very difficult to measure and assess, and could be associated with any of the first five elements, depending on the structure of negotiations and design of targets and policies. One interpretation is that elements that enable adapting to national circumstances are more likely to result in comparable efforts. This suggests that common PAMs and hard targets may be less likely to result in comparable efforts.

Administrative and institutional objectives associate primarily with the complexity of the international regime. While none of the elements are likely to be simple to negotiate or implement, national PAMs and soft/qualified targets may imply less stringency and rigour at the international level—and, therefore, reduced administration requirements. Options that lean towards easier national implementation may also be desirable.

Technology objectives are only addressed explicitly by the option of a technology fund for developing country incentives, but could be built into either of the PAM elements or into the CDM. While emission targets clearly provide an indirect incentive to develop and deploy new emission-reducing technologies, technology development is not the main focus. Feedback from a variety of international

experts suggests there may be significant support for technology objectives as an element to whatever option comes into being. The recent G8 Summit Communiqué and the Asia-Pacific Partnership both emphasize a technology focus.

Developing country objectives are addressed most directly by the last four elements. Support for technology and adaptation appear to be the most important, followed by support for mitigation efforts. Surplus allowances are not likely to be a sufficient inducement (on their own) to encourage significantly increased developing country participation.

Addressing **U.S. interests and concerns** will be key to engaging the U.S. and achieving an inclusive regime. U.S. interests are likely best served by approaches that emphasize national PAMs and a technology focus. While targets are not generally supported, U.S. concerns are most likely to be addressed best by soft or qualified targets.

7.2 Assessment of Approaches

Table 6 shows IISD's assessment of the five approaches against the criteria in Section 6, by indicating whether or not each of the approaches supports or conflicts with the criteria.

7.2.1 Discussion

Environmental objectives, in terms of significant long-term emission reductions, are addressed most directly by the Long-Term Targets approach, or by the Extension of Kyoto approach depending on the stringency of future targets. The Parallel Climate Policy, Country-/Region-Specific, and Integrated Climate Policy approaches appear less likely to drive significant reductions.

Negative **economic impacts** are likely to be minimized under a Country-/Region-Specific approach that addresses the economic circumstances of countries and blocs. In principal, the Extension of Kyoto approach could address economic costs and the differing circumstances of countries, although the large number of countries involved makes this exercise difficult and complex. Also, other countries appear generally unsympathetic to requests for the consideration of Canada's unique circumstances (at least insofar as they would translate into a lesser target). Cost certainty might best be provided by the Country-/Region-Specific approach, although both the Extension of Kyoto and Parallel Climate Policy approaches could be designed to provide increased cost certainty (through the use of price caps).

Equity objectives are difficult to assess, but a Country-/Region-Specific approach would certainly allow countries to define their own pathways, and successful international negotiations could lead to comparable efforts by jurisdictions.

Table 6. Assessment of approaches against criteria

Criteria	Extension of Kyoto Approach	Parallel Climate Policy Approach	Country-/Region-Specific Approach	Integrated Policy Approach	Long-Term Targets Approach
★★★★★ indicates the objective/criteria is strongly supported ★★ indicates a conflict with the objective/criteria		★★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria		★★★ indicates the objective/criteria could be either supported or opposed depending on the design of the policy regime	
Environmental	★★★★	★★★★	★★★	★★★	★★★★
• Extent to which the approach addresses UNFCCC ultimate objective	★★★★	★★★	★	★★★	★★★★★
• Inclusion of most important gases	★★★★★	★★★★	★★★★		★★★★★
• Inclusion of sinks (removals) as well as sources	★★★★	★★★★	★★★★		★★★★
• Promotion of co-benefits				★★★★★	
• Integration of adaptation				★★★★	
Economic	★★★	★★★★	★★★★★	★★★★	★★
• Minimize negative economic effects (e.g., through long-term approaches that respect capital stock turnover)	★★★	★★★★	★★★★★	★★★★	★★
• Promote economic development	★★★	★★★★	★★★★★	★★★★	★★
• Address unique economic structures of Canada and other countries	★★★	★★★★	★★★★★		★★
• Minimize negative effects on industry and national competitiveness	★★★	★★★★	★★★★★		★★
• Promote development, deployment and diffusion of new and existing technology				★★★★	
• Provide cost certainty			★★★★		★★
Equity – comparable efforts by industrialized jurisdictions and sectors	★★★	★★★	★★★★★	★★★★	★★★
Administrative and institutional	★★★	★★★★	★★★	★★★	★★★
• Policy flexibility (international/temporal)	★★★	★★★★	★★★★★	★★★★	★★
• Minimize complexity of negotiation requirements	★★	★★★★	★★	★	★
• Minimize complexity of administration in Canada					
• Allows countries to achieve goals/targets using own policies and measures (given federal structure)	★★★★	★★★★	★★★★★	★★★★	★★★★
• A broad approach inclusive of other policy priorities related to sustainable development				★★★★★	
Technology focus	★★★	★★★	★★★	★★★★	★★★
Address developing country issues	★★★★	★★★	★★★	★★★★	★★★★
Address U.S. issues	★	★★★★	★★★★	★★★	★★

Administrative or institutional objectives may best be addressed by the Country-/Region-Specific approach, which may be flexible and allow countries to achieve goals and targets using their own PAMs. A Long-Term Targets approach may place countries on specific paths that limit flexibility, relative to the other four approaches. Agreement on a Long-Term Targets approach could be very difficult, and an Integrated approach could become complicated due to the inclusion of a much broader range of issues and interests. Negotiation requirements may be reduced in the smaller forums that may result from a Parallel Climate Policy approach. All approaches allow countries to define their own PAMs, especially the Country-/Region-Specific approach. For this reason there is no real difference between approaches in terms of the complexity of administration in Canada.

Technology development/diffusion could be addressed by each of the approaches, although it is not an explicit focus in any. The Integrated approach, which addresses a broad range of objectives beyond emission reductions, may be well-suited to incorporating an explicit focus on technology. A coordinated international approach on technology is least likely under the Country-/Region-Specific approach.

Developing country issues are most likely to be addressed under the Extension of Kyoto, Integrated Climate Policy and Long-Term Targets approaches. The other approaches are more focused on addressing the economic interests of industrialized countries and regions.

U.S. issues are most likely to be addressed by a Parallel or Country-/Region-Specific approach.

The main differences between the five approaches are reflected in the different balance struck between the economic interests of individual countries and the need for large-scale global reductions. At one extreme, specific Long-

Term Targets would directly address environmental goals. At the other extreme, a Country-/Region-Specific approach would emphasize the economic and other interests of individual industrialized countries. In between these two, the Extension of Kyoto, Parallel Climate Policy, and Integrated Climate Policy approaches address environmental as well as economic objectives, with the Parallel approach perhaps most likely to address economic concerns.

7.3 Selected Options

The 44 policy options were reviewed against the preferred elements and approaches in the previous subsections and the line of questioning in Section 6, and 28 were selected for a more detailed assessment against the key criteria and questions identified as important to Canada. These options include the ones that contained the greatest number of elements of interest to Canada, and are divided into the following four categories:

1. Comprehensive Options (Table 7, pages 40–46) – set out an overall architecture for climate policy, often long-term, and focused on engaging developing countries and/or the U.S.
2. Safety Valve Options (Table 8, page 46) – include four similar options that focus primarily on containing costs and cost uncertainty for developed countries (a key concern for Canada).
3. Complementary Options (Table 9, page 47) – are ones that either call for replacing or co-existing with a system of Kyoto-like national targets.
4. Developing Country Options (Table 10, page 48) – focus primarily on the engagement of developing countries.

Table 7. Comprehensive options

		★★★★★ indicates the objective/criteria is strongly supported ★★ indicates a conflict with the objective/criteria	★★★★ indicates the objective/criteria is supported ★ indicates a strong conflict with the objective/criteria	★★★ indicates the objective/criteria could be either supported or opposed depending on the design of the policy regime
2 Agreed Domestic Carbon Tax , Richard Cooper				
20 Harmonized Carbon Taxes , William Nordhaus				
Description:				
Apply a common carbon tax rather than national emission targets				
<ul style="list-style-type: none"> Adjusted periodically based on new information Pros include efficiency and effectiveness, cost certainty, transparency Available to all countries, however, developing countries would be given time to phase in Incentives may be required to attract developing countries until per capita income reaches a set level States could vote on tax rate then select the average rate Compliance through trade duties 				
Type of approach: Would operate as a completely new approach				
Elements included: PAMs and most notably a carbon tax; funds from tax could be used for incentives to DCs				
Canadian Objectives/Criteria:				
Environmental	★★★	Taxes may be effective way of achieving environmental objective, however, this assertion is somewhat uncertain and the tax may need to be adjusted periodically to actually achieve the objective		
Economic	★	Economically efficient. However, significant negative impact on Canadian industry costs and competitiveness		
Equity	★★	Does not address question of comparable efforts among developed or developing country groups		
Administrative/institutional	★★★★	Simple to administer and institutionally robust, however, very difficult to negotiate categories of tax rates		
Direct technology focus	★	No focus on technology development, nor on technology transfer to DCs		
Addresses developing country issues	★★	Would not be supported by energy exporters; does not address many of the DC issues like adaptation or technology transfer		
Addresses U.S. issues	★	Not favourable to carbon intensive countries		
Comments: Focus is on an alternative type of mitigation commitment based on a carbon tax rather than on emission reductions. Uncertain as to the environmental effectiveness and economic efficiency of this option. Would likely entail significant costs for Canada and any other energy intensive or energy exporting country.				
3 Bottom-Up , Robert A Reinstein				
Description:				
Each country would determine what is acceptable in light of its own national circumstances				
<ul style="list-style-type: none"> Proposals would be negotiated such that they were comparable based on differing national circumstances Negotiations would be comparable to trade negotiations 				
Type of approach: Country-/Region-Specific				
Elements included: In principle, could incorporate almost all elements. Coordinated PAMs and coordinated funding for DCs unlikely				
Canadian Objectives/Criteria:				
Environmental	★	No mechanism to drive significant reductions		
Economic	★★★★★	Directly addresses Canadian circumstances; limits costs and uncertainty		
Equity	★★★★	Negotiations would seek to balance comparable commitments		
Administrative/institutional	★★★★	Could be difficult to negotiate; domestic implementation straightforward; likely to be stable		
Direct technology focus	★★★★	Could include a domestic focus on technology; but no mechanism for coordinated efforts		
Addresses developing country issues	★★	No coordinated support for DC issues		
Addresses U.S. issues	★★★★	Allows U.S. to define own approach		
Comments: This option focuses on addressing the individual circumstances of countries. While the approach will address Canadian economic and equity concerns, and encourage U.S. participation, its environmental effectiveness is likely to be weak, and there is no mechanism for a coordinated approach to DC issues.				

4 Brazilian Proposal, Meira Gonzalez and Pinguelli-Rosa

Description:

Burden-sharing based on historical responsibility for temperature change

- Absolute targets
- Annex I countries to reduce emissions by 30 per cent below 1990 levels by 2020
- Includes fund for missed targets at \$10.00 per tonne for clean development projects and adaptation

Type of approach: Extension of Kyoto, and Long-Term Targets

Elements included: Soft targets for developing countries, hard targets for developed countries, long-term targets, CDM incentives and vulnerability and adaptation incentives

Canadian Objectives/Criteria:

Environmental	★★★★★	Absolute targets for developed countries, based on historical responsibility
Economic	★★	Costly for developed countries; however, if US\$10 safety valve were not increased would help mitigate cost
Equity	★★★	Arguably allocates historic emissions fairly among developed countries, however, does not bring large emitting DCs into reductions circle
Administrative/institutional	★★★	Could be difficult to negotiate; domestic implementation would be straightforward
Direct technology focus	★★	Could include a domestic focus on technology; no mechanism for coordinated efforts
Addresses developing country issues	★★★★★	Very supportive of DC issues through burden-sharing approach and through Clean Development Fund
Addresses U.S. issues	★	Would mean significant and absolute emissions reductions for the U.S. and other developed countries

Comments: This option focuses on a burden-sharing approach that is based on historic responsibility for temperature change. While the approach will likely be environmentally effective and is arguably an equitable means of allocating responsibility for past emissions, this approach could be economically costly for Canada and other developed countries. This approach would likely not encourage U.S. participation as the commitments from large emitting DCs would likely not suffice and there is very little focus on technology.

6 Climate Marshall Plan, Thomas Schelling

Description:

Focus on inputs of climate policy (policies, incentives, regulations, R&D) rather than outputs (emissions). Coordination of national policies and burden-sharing

- No targets since impact of PAMs on emissions is unknown
- Commitments to policies rather than emissions reduction results
- Developed countries contribute to fund for projects in developing world
- Much increased R&D needed

Type of approach: Parallel Climate Policy; Integrated Climate Policy

Elements included: Many types of PAMs and incentives for low-emissions technology

Canadian Objectives/Criteria:

Environmental	★★	No certainty over environmental effectiveness because of lack of focus on targets
Economic	★★★★★	Pledge-based approach that differentiates between rich and other countries, would likely reduce economic burden
Equity	★★	Burden-sharing based on "multilateral reciprocal scrutiny" could be equitable if parties are forthcoming; does not address DC interests
Administrative/institutional	★★★	Difficult to negotiate because of qualitative nature; domestic implementation would be straightforward
Direct technology focus	★★★★★	Would include focus on technology and global R&D
Addresses developing country issues	★	Does not address adaptation or vulnerability of DCs
Addresses U.S. issues	★★★★★	Allows U.S. to define coordinated approach based on technology; does not put U.S. at economic risk

Comments: This option focuses on a coordinated burden-sharing agreement based on "multilateral reciprocal scrutiny" rather than relying on quantitative measures like energy use, or GDP or population growth rates. While the approach will probably address Canadian economic and North American equity concerns, and it would likely encourage U.S. participation (because of the technology focus), its environmental effectiveness may be weak. DC issues like sustainable development and adaptation are not addressed under this option, which generates a concern around equity.

Canada in a Post-2012 World: A Qualitative Assessment of Domestic and International Perspectives

7 Contraction and Convergence, Aubrey Meyer

Description:

A long-term pathway, along which national emissions of CO₂ converge to a common per capita level

- Contraction – global emissions limits per year that result in long-term concentrations of CO₂ in the atmosphere below 450 ppm
- Convergence – sharing of yearly global emissions limited among countries so that by 2045, per capita emissions are the same for all countries
- Applies to all countries with absolute emission targets
- Emissions trading with tax on trades

New institutions required

Type of approach: Extension of Kyoto; Long-Term Targets

Elements included: Hard targets, longer-term targets, coordinated PAMs and vulnerability and adaptation incentives

Canadian Objectives/Criteria:

Environmental	★★★★★	Strong emphasis on hard targets tied to strict long-term per capita goal
Economic	★★	Costly to GHG intensive countries, and to energy exporters
Equity	★★	Convergence of per capita emissions does not address national circumstances like resource endowments; negotiations would not seek to balance comparable commitments, rather environmentally effective ones
Administrative/institutional	★★★	Difficult to negotiate; challenging to implement domestically; would likely be stable
Direct technology focus	★	No focus on technology
Addresses developing country issues	★★★★★	Allow DC countries to emit equal GHGs per capita as developed countries; however, loses sight of adaptation issues
Addresses U.S. issues	★	Heavy penalty for U.S. under this option

Comments: This option focuses on converging towards a common global per capita emissions cap over the long term. While the approach would likely be environmentally effective and address some DC issues it may be economically costly; it does not have a strong technology focus and it would likely not be supported by the U.S. The option would likely be difficult to negotiate, however, once in place may provide for a stable institutional framework.

11 Dual Track, Yasuko Kameyama

Description:

Countries participate either through Track A (a pledge of domestic PAMs with a non-binding target) or Track B (a binding emission target with full access to international emissions trading)

- Track A allows countries to reflect their national interests. If they are below their target, they could sell allowances
- Track B allows countries to purchase additional allowances under a safety valve price with proceeds going to a fund for developing countries

Type of approach: Extension/modification of Kyoto, with Country-Specific approaches

Elements included: Soft targets, PAMs, funds for DCs

Canadian Objectives/Criteria:

Environmental	★★★	Comprehensive approach; partly retains hard targets; unlikely to yield significant reductions; no link to long term
Economic	★★★★★	Allows countries to reflect national interests through domestic PAMs; has safety valve
Equity	★★★★★	Could yield comparable efforts
Administrative/institutional	★★★	Fairly complex; may be difficult to negotiate and implement
Direct technology focus		No explicit focus on technology
Addresses developing country issues	★★★★★	Funds for DCs; emission mitigation; adaptation
Addresses U.S. issues	★★★★★	Allows U.S. to define own approach and avoid hard targets

Comments: Focus is on increasing international participation in the short run. Addresses both U.S. and developing country issues and could address Canadian needs as well. Concern may be that there is not enough incentive for Track B, and all countries choose Track A—in which case this option is effectively the same as the “bottom-up” approach. May not sufficiently address need for significant long-term reductions.

15 Global Framework: Kyoto, Decarbonization, and Adaptation

Description:

Three tracks for countries

- Developed countries have legally binding absolute emission targets (similar to Kyoto track)
- Large developing countries on a decarbonization track financed by developed countries to put them on low-carbon development path
- Other developing countries on an adaptation track financed by developed countries
- Countries can graduate as their economy improves
- Three levels of targets:
 - Legally binding stabilization targets for developing countries entering the Kyoto track
 - Legally binding absolute reduction targets for Annex I countries and developing countries who have been on Kyoto track for agreed amount of time
 - Carbon intensity targets for developing countries on decarbonization track

Longer-term aim is convergence of per capita emissions

Type of approach: Extension of Kyoto; Long-Term Targets

Elements included: Hard or absolute targets, long-term target; PAMs for DCs; funds for DC technology, adaptation

Canadian Objectives/Criteria:

Environmental	★★★★	Comprehensive; long-term focus
Economic	★★	No mechanisms to limit costs or cost uncertainty; targets based on per capita convergence
Equity	★★	Unlikely to result in comparable efforts from developed countries
Administrative/institutional	★★	Complex
Direct technology focus	★★★★	Funds for clean technology in DCs
Addresses developing country issues	★★★★	Intensity targets for only a few countries; funds for decarbonization and adaptation
Addresses U.S. issues	★★	Issues not addressed

Comments: Focus is primarily on addressing DC issues (development, technology, adaptation) and on achieving significant long-term reductions (60 per cent by 2050). U.S. issues (costs, economic development) not addressed. No mechanism to address most Canadian economic concerns. Targets set mainly on the basis of need for per capita convergence—which would be a significant concern for Canada—although the option would allow specific domestic circumstances to be considered.

17 Global Triptych/Extended Global Triptych, Global Triptych, Groenberg, Blok and van dar Sluijs, Extended Global Triptych, Ecofys

Description:

A sector-based and technologically-oriented methodology for establishing emission targets for different nations

- First developed for use in developing targets for EU member nations
- Addresses sectors of the economy which aggregate to national targets
- First version included CO₂, extended version added CH₄, N₂O and CO₂ from forestry
- Absolute targets for 13 world regions ranging from -30 per cent to +200 per cent from 1995 levels by 2020
- Applies to developed and developing countries

Type of approach: Extension of Kyoto; Long-Term Targets

Elements included: Hard or absolute targets, long-term target

Canadian Objectives/Criteria:

Environmental	★★★★	Short to medium-term targets and long-term targets (2050). Comprehensive, includes all countries
Economic	★★	No mechanisms to limit costs or cost uncertainty
Equity	★★★	Detailed sectoral and technology approach could result in more balanced efforts
Administrative/institutional	★★	Complex
Direct technology focus	★★★	Technologies considered in setting national targets; but no mechanism for technology development, diffusion
Addresses developing country issues	★★	Issues not addressed; hard targets for DCs
Addresses U.S. issues	★★	Issues not addressed; hard targets, no limits on costs

Comments: Focus is on how to differentiate national targets. The detailed approach to analysis of targets could allow Canadian economic structure to be addressed. However, U.S. issues (such as costs and economic development) and developing country concerns are not addressed.

18 Graduation and Deepening, Michaelowa, Butzengeiger and Jung

Description:

Extend emission reduction in the second Kyoto period to DCs whose combined per capita emissions and per capita income exceeds an agreed-to level

- Absolute targets with international emissions trading
- Annex B countries separated into groups with targets of minus 12, 6 or 3 per cent
- Large emitting DCs could select an emissions target with international trading or country-wide pledge to use PAMs with CDM
- A graduation index (GI) used for DCs; per capita emissions (where the polluter pays) combined with per capita GDP (based on ability to pay)
- DC targets depend on their GI
- Longer term, this approach could lead to contraction and convergence
- Intensity targets would be established for international transport

Countries refusing targets would lose any UNFCCC funding

Type of approach: Extension of Kyoto

Elements included: Soft targets for developing countries, hard targets for developed countries, PAMs and vulnerability or adaptation incentives

Canadian Objectives/Criteria:

Environmental	★★★★★	Short-term targets tied to long-term convergence model; comprehensive – includes all countries
Economic	★★	No mechanism to control costs or cost uncertainty
Equity	★★★	Arbitrary Annex B targets may provide little scope to recognize differing circumstances, no differentiation among developed countries
Administrative/institutional	★★	Country and GI differentiation criteria are complex and may be difficult to negotiate and implement
Direct technology focus	★	Mention of transportation approach; may be based on technology
Addresses developing country issues	★★	Focus on DC targets; addresses some DC country issues such as adaptation, but other financial and technological assistance not addressed
Addresses U.S. issues	★	Includes hard targets for developed countries; no limits on cost

Comments: This is an ambitious option focused on the extension of Kyoto with a longer-term timeframe. May be environmentally effective and address many DC issues, however, may not be supported by the U.S. because of the strict hard targets and the option's general lack of a technology focus.

28 Multi-Sector Convergence, ECN and CICERO

Description:

Bottom-up, seven sector based, for national targets based on long-term convergence of national per capita emissions

- Absolute emission targets
- Two groups of countries; those above the global per capita total emission standard (GTES) and those below
- Those above the GTES have emission mitigation commitments those below do not
- Each of the seven sectors (power, households, transportation, industry, services, agriculture and waste) has an annual reduction rate specified
- The global sector emission standard (GSES) aims at convergence in the future for each sector. This establishes the pathway for each sector in each country
- Lower emitting countries will be included when their emissions are above the global average
- Some adjustments for national circumstances can be included

Type of approach: Extension of Kyoto; Long-Term Targets

Elements included: Hard or absolute targets, long-term target

Canadian Objectives/Criteria:

Environmental	★★★★★	Focus on pathway to long-term target
Economic	★★★	Recognition of "special circumstances in target setting," but no mechanisms to limit costs or cost uncertainty
Equity	★★★	Detailed sectoral and technology approaches could result in more balanced efforts
Administrative/institutional	★★	Complex
Direct technology focus	★★★	Technologies considered in setting national targets; but no mechanism for technology development, diffusion
Addresses developing country issues	★★	Graduated targets. DC issues not addressed
Addresses U.S. issues	★★	Issues not addressed; hard targets, no limits on costs

Comments: Very similar to Global Triptych. Focus is on how to differentiate national targets. The detailed approach to analysis of targets could allow Canadian economic structure to be addressed. However, U.S. issues (costs, economic development) and developing country concerns are not addressed.

30 Orchestra of Treaties, Sugiyama, Sinton, Kimura and Ueno

Description:

Four building blocks; emissions market group (GEM countries with DETs), zero-emission technology treaty (ZETT foster long-term technology change), climate wise development treaty, (CDT promote development, technology transfer and adaptation) and the UNFCCC (for issues on which all countries can cooperate)

- For the first three blocks, negotiations could involve the G8, the G20 and the official development assistance (ODA)
- Targets with ultimate goal of zero energy-related CO₂ emissions
- PAMs and financial commitments could form part of the ZETT

Type of approach: Parallel Climate Policy; Long-Term Targets

Elements included: Soft targets; hard targets; long-term target; PAMs; assistance for developing countries (technology transfer, development, adaptation)

Canadian Objectives/Criteria:

Environmental	★★★	Aggressive long-term target for energy-related CO ₂ ; significant short-term reductions unlikely; approach is selective rather than comprehensive; only caps are through domestic emissions trading systems
Economic	★★★★	Focus is on technology and development; should be able to address Canada's economic objectives
Equity	★★★★	Could result in comparable efforts from developed countries, although decentralized approach may make comparisons difficult
Administrative/institutional	★★★	More treaties—but more focused and involving fewer countries
Direct technology focus	★★★★★	Strong technology focus
Addresses developing country issues	★★★★	Separate development to address developing countries needs (technology transfer, development, adaptation)
Addresses U.S. issues	★★★★	No top-down hard targets; technology focus

Comments: A decentralized approach that is selective rather than comprehensive. The components together may effectively address Canada's economic interests, as well as engage the U.S. and developing countries. The focus on technology may be of particular interest to Canada. Although the long-term target is aggressive, it is difficult to gauge environmental effectiveness without short and medium-term national targets.

31 Parallel Climate Policy, Stewart and Wiener

Description:

Led by the U.S., adopting a domestic cap-and-trade system and engaging other large emitting countries not participating in the Kyoto Protocol

- National emission targets with international emissions trading
- Developing countries would cap selected sectors initially (with some head room) and the target would be tightened over time
- Revenue from the sale of excess allocations would flow to the participating developing country

Type of approach: Parallel Climate Policy

Elements included: Hard or absolute targets, funds for developing countries

Canadian Objectives/Criteria:

Environmental	★★★	Comprehensive approach – would capture key emitters. No long-term target specified, and basis for short-term targets unclear
Economic	★★★	U.S. participation would significantly address Canadian competitiveness concerns; no mechanism specified to limit costs or uncertainty; emissions trading allowed
Equity		Unclear
Administrative/institutional		Similar to current regime
Direct technology focus		Not addressed
Addresses developing country issues	★★★	Incentive for participation is the generation of excess allowances and a capacity-building fund; other issues not addressed
Addresses U.S. issues	★★★★	"Not Kyoto" and U.S.-led; may address key cost and development concerns

Comments: This is primarily a complementary, rather than comprehensive option, as it does not address how commitments evolve for Kyoto countries. The main element—and main advantage—is that it is designed to re-engage the U.S. in multilateral climate change commitments. Major developing countries are assumed to participate to acquire excess allowances, but other DC issues—technology transfer, adaptation—are not addressed. Significant questions remain on Canada's role and on any linkages between a parallel and Kyoto system.

38 – South-North Dialogue, Ott *et al.*

Description:

This global approach aims at keeping the global temperature rise to 2°C. All countries are included. There would be six groupings; each with a different set of mitigation, adaptation and financial obligations.

- Annex II countries – targets more stringent than Kyoto, provide financial and technical assistance to last four groups
- Annex I countries – Kyoto-like targets, some financial assistance to last four groups
- Newly industrialized countries – limitation or reduction targets, adopt sustainable development (SD) PAMs and sectoral CDM
- Recently industrialized countries – limitation targets conditional on receiving financial and technological support from Annex II countries, adopt SD PAMs and sectoral CDM with financial/technological support from Annex II countries
- Other developing countries – no targets, adopt SD PAMs and sectoral CDM, financial and technological support from Annex II countries
- Least developed countries – no targets, adopt SD PAMs and sectoral CDM, financial and technological support from Annex II countries
- Targets based on three factors; historical responsibility (emissions from 1990 to 2000), capability (per capita GDP), potential to mitigate (per capita emissions)
- Countries graduate to higher categories based on agreed-to formula
- Adaptation fund based on polluter pay

Type of approach: Extension of Kyoto; Long-Term Targets

Elements included: Hard or absolute targets, long-term target; funds for DCs

Canadian Objectives/Criteria:

Environmental	★★★★☆	Long-term, global and comprehensive approach
Economic	★★	Stringent, hard targets for developed countries; no mechanism for limiting costs or cost uncertainty
Equity	★★	Does not address question of comparable efforts among developed countries.
Administrative/institutional	★★	Complex
Direct technology focus	★★★	Technology development not addressed, although DCs receive technological assistance
Addresses developing country issues	★★★★☆	Financial and technological assistance; limited targets
Addresses U.S. issues	★★	Issues not addressed; hard targets, no limits on costs

Comments: Focus is on achieving significant long-term reductions and on engaging developing countries through a highly differentiated set of commitments. Stringent targets for Annex I countries are a concern for Canada and the U.S.

Table 8. Safety valve options

9 Domestic Hybrid Trading Schemes, McGibbin and Wilcoxon

22 Hybrid International Emission Trading, Aldy *et al.*

35 Safety Valve, William Pizer

36 Safety Valve with Buyer Liability, David Victor

Description:

These four options share one main element—national targets with a common international safety valve price—and are otherwise quite similar

(9) includes excess allowances for DCs

(22) allows safety valve revenues to be used for R&D or assistance to DCs

(36) includes pledged PAMs and a technology strategy

Type of approach: Extension of Kyoto

Elements included: Soft targets, funds for developing countries

Canadian Objectives/Criteria:

Environmental	★★	No long-term targets; modest short-term targets; no emphasis on participation by DCs; focus is on managing costs for industrialized countries
Economic	★★★★☆	Specifically designed to address cost and uncertainty concerns; not clear whether target-setting mechanism would address Canadian circumstances
Equity	★★★★☆	Focus on managing costs may result in comparable efforts among developed countries
Administrative/institutional	★★	Similar to current regime, but safety valve would need to be negotiated, administered
Direct technology focus		Not addressed
Addresses developing country issues	★★	Issues not fully addressed, although safety valve revenues could flow to DCs
Addresses U.S. issues	★★★★☆	Addresses key U.S. concerns—costs and cost uncertainty

Comments: These four approaches are relatively narrow, and focus on addressing concerns about costs and cost uncertainty in industrialized countries. Other considerations—long-term targets, DC issues, adaptation and technology—are not fully addressed.

Table 9. Complementary options

24 International Agreements on Energy Efficiency		
Description:		
The international negotiations would include energy efficiency agreements as a complement to the Kyoto Protocol. Agreements would cover:		
<ul style="list-style-type: none"> • Production processes in major emitting industries • Energy efficiency standards for appliances and the transportation sector 		
Establishment of a global R&D fund could be considered		
All major emitting countries would have to be involved to maximize effectiveness		
Type of approach: Parallel Climate Policy or Complementary		
Elements included: PAMs		
Canadian Objectives/Criteria:		
Environmental	★★	Narrow focus, no long-term targets specified
Economic	★★★★	Could address capital stock turnover issues; focus on energy efficiency rather than aggregate emissions may help address many economic concerns; depending on how common standards are set – could address Canadian circumstances
Equity	★★★★	Should result in comparable efforts among developed countries
Administrative/institutional	★★★★	Relatively straightforward
Direct technology focus	★★★★	Strong focus, includes global R&D fund
Addresses developing country issues	★★	Issues not addressed
Addresses U.S. issues	★★★★	Focus on efficiency addresses many key U.S. concerns
Comments: This option is a possible complement to a more comprehensive approach. The focus on energy efficiency (especially with new equipment and processes) could both enhance technology development and address economic concerns related to competitiveness and capital stock turnover.		
<hr/>		
41 Technology-Centred Approach , Scott Barrett		
33 Portfolio Approach , Richard Benedick		
40 Technology Backstop , Edmonds & Wise		
<hr/>		
Description:		
Three broad approaches aimed at promoting a technology transition in electricity generation and transportation		
<ul style="list-style-type: none"> • R&D protocol for development of new technology • Technology standards protocol to help commercialize new low-emissions technology • A multilateral fund to transfer new technologies to developing countries • Short-term pledge and review • A protocol for adaptation assistance (under approach #41 only) • Funds required from developed countries 		
Type of approach: Parallel Climate Policy, Country-/Region-Specific		
Elements included: PAMs, funds for DCs		
Canadian Objectives/Criteria:		
Environmental	★★	No national emission targets; narrow focus on a few sectors (such as automobiles and electricity)
Economic	★★★★	Focus on technologies in key sectors addresses Canadian concerns about overall costs; could address capital stock turnover issues
Equity	★★★★	Negotiations would seek to balance comparable commitments among a few countries
Administrative/institutional	★★★★	Fewer players, simpler agreements
Direct technology focus	★★★★	Directed at technology development
Addresses developing country issues	★★★	No hard targets; financial and technology transfer; lack of strong Annex I actions may be an issue
Addresses U.S. issues	★★★★	No hard targets; technology focus
Comments: These options could operate either as an alternative to an approach based on national emission targets, or as a complementary approach. The focus is on advances in energy technology, a major objective for Canada. There are no national emission targets—hard or soft—and the focus is narrow, so long-term environmental effectiveness is a concern if this approach is not complemented by emission targets.		

Table 10. Developing country options

10	Dual Intensity Targets , Kim and Baumert
19	Growth Baseline , Center for Clean Air Policy
21	Human Development Goals with Low Emissions , Jiahua Pan
29	Multistage/New Multistage , RIVM and Ecofys
37	Soft landing in Emission Growth , Blanchard <i>et al.</i>

Description:
Five approaches to setting national emission targets

- On an intensity (GDP) basis
- Graduated targets based on per capita income
- Country-specific targets developed on a bottom-up basis

Type of approach: Extension of Kyoto; Country-/Region-Specific

Elements included: Soft/qualified targets, hard targets

Canadian Objectives/Criteria:

Environmental	★★★★	Intended to result in meaningful participation by developing countries
Economic		Level of commitments by industrialized countries not addressed; economic implications for Canada are unclear
Equity		Level of commitments by industrialized countries not addressed
Administrative/institutional	★★	Negotiating DC targets will be difficult
Direct technology focus		No technology focus
Addresses developing country issues	★★	Only deals with targets – options do not address other key DC issues (e.g., development, technology transfer and vulnerability)
Addresses U.S. issues	★★★★	DC participation important for U.S. – although perhaps not within a Kyoto framework

Comments: These options focus on setting national or sectoral emission targets for developing countries. While the target-setting mechanisms have some merit, particularly in allowing DC growth, the options do not address the full range of developing country issues (e.g., development, technology transfer and vulnerability) and would likely need to be expanded to be successful.

39 Sustainable Development PAMs, Winkler *et al.*

Description:
Bottom-up, pledge-based approach to engage developing countries

- The focus is on implementing nationally-developed policies rather than setting emission reduction targets through multilateral negotiations
- Funding for developing countries could come through the presently established routes
- Start with voluntary SD PAMs and quantify the outcomes in GHG reduction terms
- Longer term, the most effective SD PAMs might become mandatory for middle income countries

Type of approach: Extension of Kyoto; Long-Term Targets

Elements included: PAMs, DC funding

Canadian Objectives/Criteria:

Environmental	★★★	Intended to result in meaningful participation by developing countries; however, reductions likely to be very modest in short to medium term
Economic		Level of commitments by industrialized countries not addressed – economic implications for Canada are unclear
Equity		Level of commitments by industrialized countries not addressed
Administrative/institutional	★★★★	Pledge-based, voluntary
Direct technology focus	★★	No technology focus
Addresses developing country issues	★★★★★	Bottom-up, pledge-based, voluntary process intended to address priorities of individual countries; funding from developed countries through CDM or GEF
Addresses U.S. issues	★★★	DC participation important for U.S. – although perhaps not within a Kyoto framework; lack of DC targets unlikely to be acceptable to U.S.

Comments: This option is intended as an interim step towards deeper developing country participation.

7.4 Summary of Selected Options

Table 11 summarizes the detailed assessments carried out above, thus allowing for more direct comparison of the evaluated policy options.

Table 11. Summary of policy options assessed

Policy Option Assessed	Environmental Effectiveness	Economic	Equity	Administrative/ Institutional	Technology Focus	Developing Country Issues	U.S. Issues
2 Agreed Domestic Carbon Tax	★★★	★★★	★★	★★★	★	★★★	★
3 Bottom-Up	★	★★★★☆	★★★★☆	★★★	★★★	★★	★★★★☆
4 Brazilian Proposal	★★★★☆	★★	★★★	★★★	★★	★★★★☆	★
6 Climate Marshall Plan	★★	★★★★☆	★★	★★★	★★★★☆	★	★★★★☆
7 Contraction and Convergence	★★★★☆	★★	★★★	★★★	★	★★★★☆	★
9 Domestic Hybrid Trading Schemes	★★	★★★★☆	★★★★☆	★★		★★	★★★★☆
10 Dual Intensity Targets	★★★★☆	★★	★★	★★		★★	★★★★☆
11 Dual Track	★★★	★★★★☆	★★★★☆	★★★		★★★★☆	★★★★☆
15 Global Framework: Kyoto, Decarbonization, and Adaptation	★★★★☆	★★	★★	★★	★★★★☆	★★★★☆	★★
17 Global Triptych/Extended Global Triptych	★★★★☆	★★	★★★	★★	★★★	★★	★★
18 Graduation and Deepening	★★★★☆	★★★	★★★	★★	★	★★★★☆	★★
19 Growth Baseline	★★★★☆	★★	★★	★★		★★	★★★★☆
20 Harmonized Carbon Taxes	★★★	★★★	★★	★★★	★	★★★	★
21 Human Development Goals with Low Emissions	★★★★☆	★★	★★	★★		★★	★★★★☆
22 Hybrid International Emission Trading	★★	★★★★☆	★★★★☆	★★		★★	★★★★☆
24 International Agreements on Energy Efficiency	★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★	★★★★☆
28 Multi-Sector Convergence	★★★★☆	★★★	★★★	★★	★★★	★★	★★
29 Multistage/New Multistage	★★★★☆	★★	★★	★★		★★	★★★★☆
30 Orchestra of Treaties	★★★	★★★★☆	★★★★☆	★★★	★★★★☆	★★★★☆	★★★★☆
31 Parallel Climate Policy	★★★	★★★	★★	★★		★★★	★★★★☆
33 Portfolio Approach	★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★	★★★★☆
35 Safety Valve	★★	★★★★☆	★★★★☆	★★		★★	★★★★☆
36 Safety Valve with Buyer Liability	★★	★★★★☆	★★★★☆	★★		★★	★★★★☆
37 Soft Landing in Emission Growth	★★★★☆	★★	★★	★★		★★	★★★★☆
38 South-North Dialogue	★★★★☆	★★	★★	★★	★★★	★★★★☆	★★
39 Sustainable Development PAMs	★★★	★★	★★	★★★★☆		★★★★☆	★★★
40 Technology Backstop Protocol	★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★	★★★★☆
41 Technology-Centred Approach	★★	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★	★★★★☆

Based on the previous assessments, none of the policy options in the Pew report support all of the criteria and key questions identified as being important to Canada.

A number of options take a comprehensive approach and focus on achieving significant long-term reductions in GHG emissions, including (2 and 20) Agreed Domestic Carbon Taxes and Harmonized Common Taxes, (4) Brazilian Proposal, (7) Contraction and Convergence (15) Global Framework, (17) Global Triptych, (18) Graduation and Deepening (28) Multi-Sector Convergence and (38) South-North Dialogue. In general, however, these options do not include mechanisms that will contain short-run costs and provide cost certainty for developed countries.

Other options focused primarily on addressing the national circumstances of individual industrialized countries and/or containing costs and uncertainty. These included (3) Bottom-Up (6) Climate Marshall Plan, and the various safety-valve options (9), (22), (35) and (36). With these options it was generally less clear how they might lead to significant long-term reductions.

Four comprehensive options stand out as possibilities to address many of Canada's key objectives proposed. These four include a wide variety of approaches with substantial challenges associated with each of them.

- *Dual Track (11)* – which focuses on increasing participation by offering the choice of targets and PAMs. Most U.S. and developing country issues appear to be addressed by this option. There is, however, a question as to how effectively the environmental criteria can be met if a significant subset of Parties are unwilling to commit to “Track B,” the legally binding national emission targets.
- *Orchestra of Treaties (30)* – represents a decentralized approach that is selective rather than comprehensive. The aggressive long-term target and the focus on technology are attractive. The smaller number of countries involved in separate processes suggests that it may be more manageable than a comprehensive UNFCCC process. The components together may effectively address Canada's economic interests, as well as engage the U.S. and developing countries. How this could be used to effectively meet long-term environmental objectives needs to be more explicitly addressed.
- *Parallel Climate Policy (31)* – is an approach that would involve the U.S. leading the development of an agreement that would operate in parallel to Kyoto, and would include the U.S., Australia and key developing countries. While Canada's role in such an arrangement would need to be defined carefully, and additional incentives for developing country participation provided, this approach could provide an interim but comprehensive step forward. It would be important to demonstrate more explicitly how this option might work to

meet the ultimate objective of the UNFCCC. The recent Asia-Pacific Partnership may represent the beginnings of such a parallel approach.

- *Multi-sector Convergence (28)* – is a complex approach that seeks to establish long-term targets and pathways. Of all the long-term target approaches, this one includes the most mechanisms for addressing differing national circumstances, while also most explicitly addressing the environmental objective of the UNFCCC process.

The four safety valve options also address key economic concerns of Canada and the U.S., and a safety valve could be included in other more comprehensive approaches. For example, the Dual Track option includes a possible safety valve option.

Several options take a completely different approach and focus on energy efficiency and/or technology. These could be implemented as alternatives to a system of national emission targets, or as complementary approaches:

- *International Agreements on Energy Efficiency (24)* – while quite narrow in scope, this option could both enhance technology development and address economic concerns related to competitiveness and capital stock turnover (since most standards would apply to new equipment and plants). In order to address other objectives, this option would need to be combined with a system of national targets or other measures.
- *Technology-focused approaches (30, 40, 41)* – these approaches involve technology standards, coordinated R&D, and technology transfer to developing countries. Like energy efficiency standards, these address many economic and competitiveness concerns, but would likely need to be combined with national targets (perhaps soft or qualified targets) and other measures. Again, the Asia-Pacific Partnership may in fact be the initiation of just such a policy option.

The options selected for review were those that have been extensively discussed to date and also those that included elements that may be of interest to Canada. It would be straightforward to extend the analysis to include the other options as they emerge.

One final type of option discussed with the project Advisory Group was the prospect of a mitigation/adaptation approach whereby the cost-curves for each side of the equation are modelled and decisions on the exact mix of mitigation effort versus adaptation effort is determined by the intersection of the two cost curves. IISD was unable to identify an option that takes such an approach (likely because of the challenge of creating the cost curves); however, we have identified some literature that could be used as base information for constructing such an option (Parry 2004; Kates and Wilbanks 2003; Wilbanks *et al.* 2003; in References Section).

8

Conclusions

8.1 Possible Criteria and Objectives for Canada

This qualitative assessment of post-2012 policy options started with the identification of Canadian interests and priorities as they relate to the long-term climate change policy options being discussed. The identification of international interests and priorities, and an understanding of international perspectives on the policy options and on key Canadian sensitivities, was a second step. Subsequent to this analysis a set of criteria were developed to assess post-2012 policy options against Canadian interests (having taken the appropriate international context into account). While this study was designed to analyze policy options from the Canadian context, international interests and priorities and external perspective on the appropriateness of Canadian sensitivities is important. The criteria used are not necessarily a comprehensive or complete set, but do represent a good first step in framing the discussion on post-2012 policy options. These criteria relate to the achievement of:

- **Environmental objectives** – including the achievement of significant long-term reductions consistent with the UNFCCC's ultimate objective, comprehensive coverage and promotion of co-benefits. While all options address environmental objectives, they differ in their emphasis and focus.
- **Economic objectives** – including sustainable economic development, competitiveness, minimization of negative economic effects, recognition of Canada's circumstances and cost certainty.
- **Equity objectives** – which in this assessment were limited to achieving comparable efforts among industrialized countries.
- **Administrative and institutional objectives** – including minimizing complexity of negotiation and implementation, maximizing policy flexibility and allowing individual countries to determine how to reach agreed objectives.
- **Technology objectives** – including a direct focus on promoting the development, deployment, and diffusion of new and existing technology.
- **Developing country participation** – achieved by addressing a wide range of developing country needs in the areas of economic development, technology transfer, vulnerability and adaptation, energy security and capacity building.

- **U.S. participation** – which will be essential for international climate efforts to be successful and for Canada's economic interests to be addressed. Post-2012 policy regimes will need to address U.S. concerns, interests and issues.

These criteria can be used as the basis for a dialogue among Canadian governments and stakeholders on Canada's post-2012 objectives. Potentially, this discussion will lead to broad agreement on a clear set of objectives for Canada to carry forward and promote in international discussions on post-2012 climate policy. These criteria can be used to evaluate any new proposals for post-2012 policy regimes or to form the basis of a Canadian proposal for post-2012.

8.2 Assessment of Post-2012 Approaches and Elements

A wide range of policy options have been proposed as a basis for a future international climate policy regime. In Section 2 of this paper, IISD grouped these options into five basic approaches, and also identified nine key elements that were common to many of the policy options. In Section 7, a set of assessment criteria was used to evaluate these approaches and elements.

The five basic approaches were:

1. Extension of Kyoto
2. Parallel Climate Policy
3. Country-/Region-Specific
4. Integrated Climate Policy
5. Long-Term Targets

The main conclusion from IISD's assessment is that while no single approach directly meets all of the criteria and objectives, the approaches provide broad enough frameworks that it should be possible to address Canadian interests under any approach.

The Extension of Kyoto, Parallel Climate Policy or Integrated approaches seem most likely to balance the environmental and economic objectives that reflect Canadian interests. The Long-Term Targets approach generally emphasizes achievement of long-term reductions, while a Country-/Region-Specific approach emphasizes economic and other interests of industrialized countries.

Canada's interest in technology development could be addressed by any of the approaches, although a coordinated international effort on technology seems least likely under the Country-/Region-specific approach.

Developing country interests could be accommodated under any of the approaches, although a coordinated approach to technology transfer and other assistance is least likely under the Country-/Region-Specific approach. A lot of support exists in developing countries for an Extension of Kyoto approach, which also seems most popular with the EU). However, the Integrated Climate Policy approach also seems attractive from a developing country perspective, because of the possibility of combining climate change priorities with other pressing development priorities.

The U.S. is the least likely to support the Extension of Kyoto approach. U.S. issues are likely best addressed under the Parallel and/or Country-/Region-Specific approaches, although this also depends on international success in engaging the developing countries.

A number of countries expressed an interest in a Technology-Based approach. As well, there is a general sense that most countries are interested in taking a flexible approach to post-2012, one that enables the tailoring of country/bloc responses to meet their regional circumstances.

The nine key elements identified by IISD as being common to many of the options were:

1. Soft or qualified targets
2. Hard or absolute targets
3. Longer-term targets
4. Coordinated/harmonized policies and measures
5. National policies and measures
6. Low-emission technology incentives (for developing nations)
7. CDM incentives (for developing nations)
8. Adaptation and vulnerability incentives (for developing nations)
9. Allowance-based incentives (for developing nations)

The first three of these elements are target-based. While the environmental effectiveness and economic impacts of targets depend primarily on their stringency and timing, the nature of the targets is also important. Canada's economic interests may be addressed best by soft or qualified targets, such as intensity targets that are designed to encourage economic growth, or price caps that are designed to limit costs and create cost uncertainty. On the other hand, hard or absolute, and long-term targets are more likely to achieve significant long-term emission reductions—also a priority for Canada.

National PAMs aimed at developing policies and infrastructure over the longer term are likely to address many Canadian interests, although they are unlikely to achieve significant emission reductions if implemented in isolation of other elements. Also, if the PAMs are defined by individual countries they may lack the level of international

coordination on technology and developing country needs that is required to address these objectives.

Coordinated or harmonized PAMs in relatively narrow and specific areas, such as energy efficiency or technology, may address some Canadian interests; however, on their own they are unlikely to achieve comprehensive and large-scale emission reductions. As well, broad PAMs and common fiscal measures are unlikely to be in Canada's economic interest.

Four elements are intended to address developing country concerns. Support for technology and adaptation appear to be the most favoured elements, followed by support for mitigation efforts. Surplus allowances are not likely to be a sufficient inducement on their own to encourage significantly increased developing country participation.

Most controversy seems to exist regarding the inclusion of hard targets. The U.S. opposes this approach, which may make the inclusion of this element a non-starter at international negotiations. Disagreement also exists regarding common or harmonized PAMs; however, this depends on the type of PAM being discussed. While there is support for sectoral standards or agreements, common carbon taxes do not receive general support.

Any post-2012 climate policy regime is likely to include combinations of these elements. A combination that may address many of Canada's interests could include:

- Soft or qualified targets for the near term
- Hard targets for the longer term
- National PAMs, or coordinated PAMs on technology and energy efficiency
- Technology transfer to developing countries, and support for both mitigation and adaptation objectives

8.3 Assessment of Post-2012 Policy Options

IISD assessed 28 different policy options against the proposed Canadian objectives and criteria. While none of the options support all of the objectives and criteria identified as being important to Canada, four different comprehensive options appear to address many of them:

- Dual Track (11) – which focuses on increasing participation by offering the choice of targets and PAMs. Most U.S. and developing country issues appear to be addressed.
- Orchestra of Treaties (30) – is a decentralized approach that is selective rather than comprehensive. The focus on technology may be of interest to Canada.
- Parallel Climate Policy (31) – is an approach that would involve the U.S. leading the development of

an agreement that would operate in parallel to the Kyoto regime, and would include the U.S., Australia and key developing countries. The current Asia-Pacific Partnership may in fact be the starting point for this option.

- Multi-sector Convergence (28) – is a complex approach that seeks to establish long-term targets and pathways, but one that includes the most mechanisms for addressing differing national circumstances.

Several options include a “safety valve” that addresses cost and cost uncertainty - key economic concerns of Canada and the U.S. A safety valve could easily be included in other more comprehensive approaches (the Dual Track option includes a possible safety valve).

Several options describe separate approaches that focus on energy efficiency and/or technology. While these could be implemented as alternatives to a system of national emission targets, they would likely address more Canadian interests if combined with national targets (perhaps soft or qualified targets) and other measures. These options include:

- International Agreements on Energy Efficiency (24) – is quite narrow in scope; however this option could both enhance technology development and address economic concerns related to competitiveness and capital stock turnover (since most standards would apply to new equipment and plants).
- Technology-Focused Approaches (30, 40, 41) – involve technology standards, coordinated R&D, and technology transfer to developing countries. Like energy efficiency standards, these address many economic and competitiveness concerns.

Several options focus almost entirely on engaging developing countries. A group of five options propose different approaches to setting national emission targets for developing countries, these include Dual Intensity Targets (10), Growth Baselines (19), Human Development Goals with Low Emissions (21), Multistage/New Multistage (29), and Soft Landing in Emissions Growth (37). A sixth option, Sustainable Development PAMs (39), avoids targets entirely, focusing instead on voluntary pledges of PAMs that address both economic development and climate change. While it will be difficult to engage many developing countries, an approach that addresses the individual country needs may gain broader support than an approach focused on target-setting.

8.4 Key Learnings and Path Forward

The assessment carried out by IISD in this report suggests a few key learnings and a way forward:

1. An approach that focuses on the circumstances, interests and priorities of regions and sectors within Canada may be helpful in defining Canada’s objectives for post-2012 climate policy.
2. A broader dialogue on Canada’s interests and objectives may provide Canadian governments and stakeholders with a better understanding—and perhaps a common view—on the criteria and objectives that Canada could support and promote in international discussions on post-2012 policy.
3. The initial assessment of post-2012 policy options indicates that there are no options proposed to date that fully meet the criteria and objectives proposed by IISD. This result is not surprising, given Canada’s unique set of circumstances. However, this “uniqueness” should perhaps not be overestimated, as many respondents to the survey indicated that many of these circumstances are complementary to those of their own countries.
4. The assessment suggests that there are key elements—including soft/qualified targets; hard targets for the longer term; technology and/or energy-efficiency agreements; and support for mitigation, adaptation and technology transfer in developing countries—that could be combined to create options that could address many of Canada’s interests.
5. The assessment also suggests that there are a variety of comprehensive approaches, including Dual Track, Orchestra of Treaties and Parallel approaches, that could provide a framework for these key elements, and thereby address many Canadian interests.
6. A number of developments are taking place outside the UNFCCC process (and COP-11), which may influence the direction of post-2012 policy discussions. These include the recent outcome of the G8 Summit in Scotland, the Climate Change, Clean Energy and Sustainable Development Dialogue in the United Kingdom and the new Asia-Pacific Partnership on Clean Development and Climate. These and other initiatives need monitoring, so that any Canadian efforts on post-2012 policy are carried out with full consideration of the international context.
7. Finally, this is an initial “straw man” assessment, based on IISD’s analysis and the input of the Advisory Group. The approach taken here would benefit from a broader discussion among Canadian governments and stakeholders, and we welcome this discussion.

Appendix A

Policy Options Being Discussed Internationally

Number, Title and Description:	Summary Comments:
<p>1 Ability to Pay, Jacoby <i>et al.</i></p> <p>Modify Kyoto approach to address burden-sharing over time.</p> <ul style="list-style-type: none"> • Long-term emission constraints connected to near-term emission reductions • Ability to pay, GDP per capita, as graduated criteria for developing country targets and burden-sharing formula for allocating national targets • Rolling baselines for emission targets • Absolute national emission targets with international emissions trading • Developing countries, initial targets to reduce rate of increase of emissions • Technology development R&D by wealthy states 	<p><i>Who has commitments:</i> Both developed and developing countries</p> <p><i>What commitments:</i> Absolute for developed countries, reduce rate of emission growth for developing countries</p> <p><i>Timeframe:</i> Mid- and long-term</p> <p><i>Negotiations:</i> This approach could be conducted under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Modify Kyoto</p> <p><i>Emissions trading:</i> Yes</p> <p><i>Focus:</i> Engaging developing countries</p>
<p>2 Agreed Domestic Carbon Tax, Richard Cooper</p> <p>Common carbon tax rather than national emission targets</p> <ul style="list-style-type: none"> • Adjusted periodically based on new information • Developing countries given time to phase in • Needs planning to deal with potential for more serious climate change 	<p><i>Who has commitments:</i> All countries</p> <p><i>What commitments:</i> Common tax with phase-in for developing countries</p> <p><i>Timeframe:</i> Mid- and long-term</p> <p><i>Negotiations:</i> Could use UNFCCC or a different forum</p> <p><i>Relationship to Kyoto:</i> Change or replace Kyoto</p> <p><i>Emissions trading:</i> No</p> <p><i>Focus:</i> Tax rather than targets</p>
<p>3 Bottom-Up, Robert A Reinstein</p> <p>Each country would determine what is acceptable in light of its own national circumstances</p> <ul style="list-style-type: none"> • Proposals would be negotiated such that they were comparable based on differing national circumstances • Negotiations would be comparable to trade negotiations 	<p><i>Who has commitments:</i> All countries</p> <p><i>What commitments:</i> Proposed by each participating country</p> <p><i>Timeframe:</i> Mid- and long-term</p> <p><i>Negotiations:</i> The UNFCCC could provide the framework for the negotiations</p> <p><i>Relationship to Kyoto:</i> Change or replace Kyoto</p> <p><i>Emissions trading:</i> Possible</p> <p><i>Focus:</i> Engaging the U.S. and developing countries</p>
<p>4 Brazilian Proposal, Meira, Gonzalez, Pinguelli-Rosa</p> <p>Burden-sharing based on historical responsibility for temperature change</p> <ul style="list-style-type: none"> • Absolute targets • Annex I countries to reduce emission by 30 per cent below 1990 levels by 2020 • Includes fund for missed targets at \$10 per tonne for clean development projects and adaptation 	<p><i>Who has commitments:</i> Developed countries</p> <p><i>What commitments:</i> 30 per cent reduction by 2020</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Could be negotiated under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Could continue Kyoto process</p> <p><i>Emissions trading:</i> Compatible</p> <p><i>Focus:</i> Significant emission reductions from developed countries</p>
<p>5 Broad but Shallow, Richard Schmalensee</p> <p>Aimed at including a large number of countries</p> <ul style="list-style-type: none"> • Policies that are inexpensive and politically saleable in many countries • Put robust flexible institutional structures in place • Non-burdensome national targets with international trading • Same regime for all countries • Countries develop implementation plan to meet targets 	<p><i>Who has commitments:</i> All participating countries</p> <p><i>What commitments:</i> Non-burdensome national targets plus</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Could be negotiated under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Change Kyoto</p> <p><i>Emissions trading:</i> Yes, international</p> <p><i>Focus:</i> Get policies and institutions in place in more countries</p>
<p>6 Climate Marshall Plan, Thomas Schelling</p> <p>Focus on inputs of climate policy (policies, incentives, regulations, R&D) rather than outputs (emissions). Coordination of national policies and burden-sharing</p> <ul style="list-style-type: none"> • No targets since impacts of PAMs on emissions is unknown • Commitments to policies rather than emission reduction results • Developed countries contribute to fund for projects in developing world • Much increased R&D needed 	<p><i>Who has commitments:</i> All participating countries</p> <p><i>What commitments:</i> Policies, incentives, regulations, R&D</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Could be negotiated under the UNFCCC framework or new institution</p> <p><i>Relationship to Kyoto:</i> Modify, parallel or replace Kyoto</p> <p><i>Emissions trading:</i> No</p> <p><i>Focus:</i> Get policies and institutions in place in more countries</p>

Number, Title and Description:	Summary Comments:
<p>7 Contraction and Convergence, Aubrey Meyer</p> <p>A long-term pathway, national emissions of CO₂ should converge at a common per capita level</p> <ul style="list-style-type: none"> • Contraction, global emissions limits per year that result in long-term concentrations of CO₂ in the atmosphere below 450 ppm • Convergence, sharing of yearly global emissions limited among countries so that by 2045, per capita emissions are the same for all countries • Applies to all countries with absolute emission targets • Emissions trading with tax on trades • New institutions required 	<p><i>Who has commitments:</i> All countries <i>What commitments:</i> Lower absolute emissions with a common per capita emission level long term <i>Timeframe:</i> Long-term <i>Negotiations:</i> Could fall under UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Could be part of continuing Kyoto <i>Focus:</i> Safe level of atmospheric concentrations of GHGs and equal per capita emissions</p>
<p>8 Converging Markets, Tangen and Hasselkippe</p> <p>Emergence of a liquid international carbon market through integration of national emissions trading systems</p> <ul style="list-style-type: none"> • New states could join on incremental trial basis • Mandatory targets, national or sector and absolute or dynamic, required to join • Targets appropriate for state, higher targets bring higher voting rights • Financial assistance could help new countries assume targets 	<p><i>Who has commitments:</i> All participating countries <i>What commitments:</i> Mandatory targets, flexibility of types <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Bilateral negotiations between countries with domestic carbon markets outside UNFCCC process. Could be reintegrated in time <i>Relationship to Kyoto:</i> Could modify or replace Kyoto <i>Emissions trading:</i> Yes <i>Focus:</i> Emissions trading and the market</p>
<p>9 Domestic Hybrid Trading Schemes, McGibbin and Wilcoxon</p> <p>Harmonized domestic trading systems with safety valve of an internationally negotiated price for a tonne of CO₂ for price certainty</p> <ul style="list-style-type: none"> • Countries pay the same maximum price for emitting carbon • Annex I countries given once only emission endowments equal to their Kyoto targets. Developing countries given once only endowments which exceed their current emissions • Emission endowments generate annual emission permits • Additional emission permits can be purchased at the agreed price which is renegotiated periodically • Lowering global emissions would involve buying back and retiring emission endowments 	<p><i>Who has commitments:</i> All countries <i>What commitments:</i> All countries get emission endowment. Developing country endowment equals Kyoto target <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be included in the UNFCCC framework <i>Relationship to Kyoto:</i> Compatible but modify with allocation method and safety valve <i>Emissions trading:</i> Yes, international <i>Focus:</i> Engaging developing countries</p>
<p>10 Dual Intensity Targets, Kim and Baumert</p> <p>This option is for developing countries where each country would have two targets; a relatively weak compliance target and a more stringent selling target</p> <ul style="list-style-type: none"> • The compliance intensity target would have to be met to be in compliance • The selling intensity target, linked to GDP, would provide the incentive to further reduce emissions such that excess permits could be sold • Compliance targets could be set by the country but some form of negotiations would be needed for setting the selling target 	<p><i>Who has commitments:</i> Developing countries, assumes developed countries have targets and trading <i>What commitments:</i> Light compliance target and more stringent selling target <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be negotiated under UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Compatible <i>Focus:</i> Engaging developing countries</p>
<p>11 Dual Track, Yasuko Kameyama</p> <p>Countries agree to participate either through Track A, a pledge of domestic PAMs with a non-binding target, or Track B, a binding emission target with full access to international emissions trading</p> <ul style="list-style-type: none"> • Track A allows countries to reflect their national interests. If they are below their target, they could sell allowances • Track B allows countries to purchase additional allowances under a safety valve price with proceeds going to a fund for developing countries 	<p><i>Who has commitments:</i> Developing countries <i>What commitments:</i> Either binding targets or PAMs <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be negotiated under UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Yes, international <i>Focus:</i> Engaging developing countries</p>
<p>12 Equal Mitigation Costs, Babiker and Eckaus</p> <p>Allocation of emission reductions are tied to the same percentage reduction in GDP for all countries</p> <ul style="list-style-type: none"> • All countries agree on the same economic model to calculate cost 	<p><i>Who has commitments:</i> All participating countries <i>What commitments:</i> All agree to share the pain <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be negotiated under the UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Compatible <i>Focus:</i> This is a different proposal for establishing targets</p>
<p>13 Expanded "Common but Differentiated," Gupta and Bhandari</p> <p>Allocation of national emission targets on a per capita basis, transitional regime for Annex I countries until 2025</p> <ul style="list-style-type: none"> • Global allocations on the basis of maximum atmospheric concentrations of CO₂, say 550 ppm • Developed countries would have aggressive reduction obligations to 2025 • Most developing countries would have excess allocations to sell in international trading system • Annex I countries would have specific reduction targets to 2025 adjusted for carbon intensity 	<p><i>Who has commitments:</i> All countries <i>What commitments:</i> Aggressive mitigation targets for developed countries <i>Timeframe:</i> Mid- to long-term <i>Negotiations:</i> Could be negotiated under the UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Yes, international <i>Focus:</i> Engaging developing countries</p>

Number, Title and Description:	Summary Comments:
<p>14 Further Differentiation, Swedish Environmental Protection Agency</p> <p>Comprehensive survey of mitigation options, suggesting pathway for evolution of Kyoto commitments into a global regime</p> <ul style="list-style-type: none"> • Focus on short and medium-term options rather than on long-term concentration targets • Differentiated targets: <ul style="list-style-type: none"> – binding absolute targets for developed countries – binding indexed targets for wealthy developing countries – non-binding targets for least developed countries • Longer-term, per capita emissions will likely be an important indicator of fairness and effectiveness. 	<p><i>Who has commitments:</i> All countries except least developed</p> <p><i>What commitments:</i> Binding absolute and indexed targets</p> <p><i>Timeframe:</i> Short- and mid-term</p> <p><i>Negotiations:</i> Could be negotiated under UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Compatible</p> <p><i>Emissions trading:</i> Compatible</p> <p><i>Focus:</i> Engaging developing countries</p>
<p>15 Global Framework: Kyoto, Decarbonization, and Adaptation, Climate Action Network International</p> <p>Three tracks for countries:</p> <ul style="list-style-type: none"> • Developed countries: legally-binding absolute emission targets, Kyoto track • Large developing countries: decarbonization track financed by developed countries to put them on low-carbon development path • Other developing countries: adaptation track financed by developed countries • Countries can graduate as their economy improves • Three levels of targets: <ul style="list-style-type: none"> – carbon intensity targets for developing countries on decarbonization track – legally-binding stabilization targets for developing countries entering the Kyoto track – legally-binding absolute reduction targets for Annex I countries and developing countries who have been on Kyoto track for agreed amount of time • Longer-term aim is convergence of per capita emissions 	<p><i>Who has commitments:</i> All countries</p> <p><i>What commitments:</i> Absolute targets for developed countries, intensity or stabilization targets for developing countries</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Could be negotiated under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Compatible</p> <p><i>Emissions trading:</i> Yes</p> <p><i>Focus:</i> Engaging developing countries and adaptation</p>
<p>16 Global Preference Score, Benito Muller</p> <p>A procedural-based approach to burden-sharing. It describes a procedure for fairly establishing emission reduction targets</p> <ul style="list-style-type: none"> • Countries would rank competing proposals for allocating emission targets • Country preferences would be weighed by population • The result would reflect each countries preference 	<p><i>Who has commitments:</i> All countries</p> <p><i>What commitments:</i> Fair emission reduction targets</p> <p><i>Timeframe:</i> Mid- and long-term</p> <p><i>Negotiations:</i> Could be negotiated under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Modify the negotiation method for target setting</p> <p><i>Emissions trading:</i> Compatible</p> <p><i>Focus:</i> Developing a fair allocation process</p>
<p>17 Global Triptych/Extended Global Triptych, Global Triptych, Groenenberg, Blok and van dar Sluijs, Extended Global Triptych, Ecofys</p> <p>A sectorally and technologically oriented methodology for establishing emission targets for different nations</p> <ul style="list-style-type: none"> • First developed for use in developing targets for EU member nations • Addresses sectors of the economy which aggregate to the national targets • First version included CO₂, extended version added CH₄, N₂O and CO₂ from forestry • Absolute targets for 13 world regions ranging from -30 per cent to +200 per cent from 1995 levels by 2020 • Applies to developed and developing countries 	<p><i>Who has commitments:</i> All countries</p> <p><i>What commitments:</i> Targets based on calculation methodology</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Could be used in a UNFCCC negotiating framework</p> <p><i>Relationship to Kyoto:</i> Modify the negotiation method for target setting</p> <p><i>Emissions trading:</i> Compatible</p> <p><i>Focus:</i> Target-setting based on the methods used in the EU rather than negotiations</p>
<p>18 Graduation and Deepening, Michaelowa, Butzengeiger and Jung</p> <p>Extend emission reduction in the second Kyoto period to developing countries whose combined per capita emissions and per capita income exceeds an agreed level</p> <ul style="list-style-type: none"> • Absolute targets with international emissions trading • Annex B countries separated into three groups with targets of -12 per cent, -6 per cent and -3 per cent • Large emitting developing countries could select an emission target with international trading or country-wide pledge to use PAMs with CDM • A graduation index (GI) used for developing countries; per capita emissions (polluter pay) combined with per capita GDP (ability to pay) • Developing country targets depend on their GI with respect to the GI of Annex B countries • Longer-term, this approach could lead to contraction and convergence • Intensity targets would be established for international transport • Countries refusing targets would lose any UNFCCC funding 	<p><i>Who has commitments:</i> All countries</p> <p><i>What commitments:</i> Absolute reduction targets for developed countries with a graduation index used to establish targets for developing countries</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Continues present framework</p> <p><i>Relationship to Kyoto:</i> Continues Kyoto</p> <p><i>Emissions trading:</i> Yes, international</p> <p><i>Focus:</i> Engaging developing countries</p>

Number, Title and Description:	Summary Comments:
<p>19 Growth Baseline, Center for Clean Air Policy</p> <ul style="list-style-type: none"> • An intensity target for developing countries requiring them to reduce GHG emissions per unit of GDP • Alternate to binding absolute targets • Targets set below BAU projections but readily achievable • Start with industry and utilities; good data and government policy can influence decisions • Ability to sell excess allowances • Relies on resources and technical support from developed countries • Grouping of countries contemplated based on reduction potential 	<p><i>Who has commitments:</i> Developing countries <i>What commitments:</i> Reducing intensity targets <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Compatible with UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Yes, international <i>Focus:</i> Target-setting for developing countries</p>
<p>20 Harmonized Carbon Taxes, William Nordhaus</p> <p>Apply a carbon tax rather than a target and emissions trading</p> <ul style="list-style-type: none"> • Pros: efficiency and effectiveness, cost certainty, transparency • Available to all countries, incentives may be required to attract developing countries until per capita income reaches a set level • States could vote on tax rate then select the average rate • Compliance through trade duties 	<p><i>Who has commitments:</i> All countries <i>What commitments:</i> Implement a carbon tax <i>Timeframe:</i> <i>Negotiations:</i> Could be inside or outside of the UNFCCC process <i>Relationship to Kyoto:</i> Replace the Kyoto target-based approach <i>Emissions trading:</i> No <i>Focus:</i> Common carbon tax as the driver of action</p>
<p>21 Human Development Goals with Low Emissions, Jiahua Pan</p> <p>Developing countries set bottom-up climate change targets that are linked with human development goals. Emission targets would satisfy basic human needs limiting luxury or excessive emissions</p> <ul style="list-style-type: none"> • Three types of targets: voluntary reflecting no regrets reductions; conditional commitments linked to technical and/or financial assistance from developed countries; obligatory commitments to restrict excessive or luxury emissions • Targets set through bottom-up process • Could have progressive tax of excessive emissions with recycling of funds for low-carbon development 	<p><i>Who has commitments:</i> Developing countries <i>What commitments:</i> Three types; voluntary, conditional and obligatory <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be negotiated under the UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> No international trading and CDM <i>Focus:</i> Target-setting for developing countries</p>
<p>22 Hybrid International Emission Trading, Aldy <i>et al.</i></p> <p>Both national emission targets and the safety valve price would be negotiated multilaterally</p> <ul style="list-style-type: none"> • Targets set and allowances based on GDP • Safety valve would provide price certainty • Proceeds from use of safety valve could be used for R&D or as assistance from developing countries • National targets with international emissions trading • Could apply to a variety of ways of setting targets – absolute, intensity • Developing countries could use indexed or volunteer targets 	<p><i>Who has commitments:</i> All countries <i>What commitments:</i> Absolute, indexed and voluntary <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be negotiated under the UNFCCC framework <i>Relationship to Kyoto:</i> Modifies Kyoto with safety valve <i>Emissions trading:</i> Yes, international <i>Focus:</i> Engaging the U.S. as well as developing countries</p>
<p>23 Insurance for Adaptation Funded by Emission Trading, Carlo Jaeger</p> <p>A mechanism for emitting countries to pay developing countries that are adversely affected by climate change</p> <ul style="list-style-type: none"> • Emission permits would be issued to vulnerable states • These countries can sell their permits to emitting states with the proceeds financing an insurance pool to cover adaptation and damage costs • Requires insurance industry engagement 	<p><i>Who has commitments:</i> Developed countries <i>What commitments:</i> To buy emission permits from at-risk developing countries <i>Timeframe:</i> Mid- and long-term <i>Negotiations:</i> Could be negotiated under the UNFCCC framework <i>Relationship to Kyoto:</i> Could be compatible with Kyoto <i>Emissions trading:</i> Yes, trading is the source of the funds for adaptation damage insurance <i>Focus:</i> Adaptation insurance for vulnerable countries</p>
<p>24 International Agreements on Energy Efficiency, Yasushi Ninomiya</p> <p>The international negotiations would include an agreement on production processes in major emitting industries</p> <ul style="list-style-type: none"> • It could also include energy efficiency standards for appliances and the transportation sector • Establishment of a global R&D fund could be considered • All major emitting countries would have to be involved to maximize effectiveness 	<p><i>Who has commitments:</i> All major emitting countries <i>What commitments:</i> International efficiency standards for all major emitting sectors <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be negotiated under the UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Not part of this proposal <i>Focus:</i> Engaging the U.S. and major emitting developing countries</p>
<p>25 Keep It Simple, Stupid (KISS), Joyeeta Gupta</p> <p>A methodology for differentiating commitments. Twelve categories from developed countries to the poorest with differentiated obligations, targets and finances, to suit the category circumstances.</p> <ul style="list-style-type: none"> • The twelve categories are based on three criteria: GNP per capita (ability to pay); CO₂ emissions per capita (responsibility); and, the human development index (vulnerability) • Three types of targets: stabilization, reduction and growth limitation • All countries use PAMs for non-CO₂ gases. Countries with higher income must spend a certain per cent of government expenditure on these PAMs • Financial obligation based on per cent of GDP to assist lower income countries • Technology transfer from rich to poor based on per cent of national income 	<p><i>Who has commitments:</i> All countries <i>What commitments:</i> Varies from reduction to stabilization to growth limitation to fit circumstances PAMs for non GHG emissions <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could be negotiated under the UNFCCC framework <i>Relationship to Kyoto:</i> Compatible <i>Emissions trading:</i> Compatible <i>Focus:</i> Target-setting for developing countries</p>

Number, Title and Description:	Summary Comments:
<p>26 Long-Term Permit Program, S. Peck, T. Tiesberg</p> <p>A long-term approach based on achieving an agreed upon atmospheric concentration of GHGs by, say, 2070. Initially there would be DET systems that in the longer term could be linked for IET. Starting with the large emitting countries, participating countries would be given long-term permit allocations that could be used at any time. Countries would chose the timing of their emission reductions</p> <ul style="list-style-type: none"> • Increasing permit prices would be an incentive for R&D • Cumulative allocated permits would be for the full commitment period, say 2010 to 2070 • Permits could be granted to emitting entities or auctioned • Emission permit would decline or depreciate in value from one tonne with time • There could be financial support for adaptation from participating countries if agreed 	<p><i>Who has commitments:</i> Seven major emitting countries or regions, developed and developing</p> <p><i>What commitments:</i> Long-term cumulative permit allocations linked to atmospheric concentration of GHGs</p> <p><i>Timeframe:</i> Long-term (2010 to 2070)</p> <p><i>Negotiations:</i> Major emitting countries possibly through the expanded G8 or L20</p> <p><i>Relationship to Kyoto:</i> Replace Kyoto</p> <p><i>Emissions trading:</i> Initially DET evolving to IET long-term</p> <p><i>Focus:</i> Agreed upon maximum atmospheric concentrations of GHGs for the global common</p>
<p>27 Multi-Dimensional Structure, Ministry of Trade and Industry, Government of Japan</p> <p>Multi-faceted approach including targets, PAMs, technology strategies</p> <ul style="list-style-type: none"> • Includes global, regional and bilateral agreements • Involves major emitting countries • This interim report proposes a broad variety of approaches involving governments, industry, NGOs and individuals participating and taking action 	<p><i>Who has commitments:</i> Major emitting countries</p> <p><i>What commitments:</i> Targets, PAMs and technology</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i></p> <p><i>Relationship to Kyoto:</i> Replaces Kyoto</p> <p><i>Emissions trading:</i> Compatible</p> <p><i>Focus:</i> A new broad engagement approach for large emitting countries</p>
<p>28 Multi-Sector Convergence, ECN and CICERO</p> <p>Bottom-up, seven sector based, for national targets based on long-term convergence of national per capita emissions</p> <ul style="list-style-type: none"> • Absolute emission targets • Two groups of countries: those above the global per capita total emission standard (GTES) and those below • Those above the GTES have emission mitigation commitments while those below do not • Each of the even sectors—power, households, transportation, industry, services, agriculture and waste—has an annual reduction rate specified • The global sector emission standard aims at convergence in the future for each sector. This establishes the pathway for each sector in each country • Lower-emitting countries will be included when their emissions are above the global average • Some adjustments for national circumstances can be included 	<p><i>Who has commitments:</i> All countries with emissions above the global per capita Total Emission Standard</p> <p><i>What commitments:</i> Country and sectoral target setting based on per capita emissions with long-term convergence</p> <p><i>Timeframe:</i> Mid- and long-term</p> <p><i>Negotiations:</i> Could take place under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Modifies Kyoto negotiation for target setting and developing country involvement</p> <p><i>Emissions trading:</i> Not included</p> <p><i>Focus:</i> Continuous improvement in GTES with expanding engagement of developing countries</p>
<p>29 Multistage/New Multistage, Multistage, RIVM and New Multistage, Ecofys</p> <p>A pathway for developing countries to take on commitments on a staged basis, related to GDP per capita and/or GHG emissions per capita, from no commitments to absolute reductions until a sustainable per capita level is reached</p> <ul style="list-style-type: none"> • All developed countries are in the top category • Per capita emissions and historical responsibility are included as considerations • A global emission ceiling sets the base for allocating emission levels for a time period 	<p><i>Who has commitments:</i> All countries</p> <p><i>What commitments:</i> Ranges from absolute reductions to no commitments depending on circumstances</p> <p><i>Timeframe:</i> Mid- to long-term</p> <p><i>Negotiations:</i> Could take place under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i></p> <p><i>Emissions trading:</i></p> <p><i>Focus:</i> Aimed at engaging developing countries through stages targets</p>
<p>30 Orchestra of Treaties, Sugiyama, Sinton, Kimura and Ueno</p> <p>Four building blocks: emissions market group (GEM countries with DETs); zero-emission technology treaty (ZETT) to foster long-term technology change; climate-wise development treaty (CDT) to promote development, technology transfer and adaptation; and the UNFCCC for issues on which all countries can cooperate.</p> <ul style="list-style-type: none"> • For the first three blocks, negotiations could involve the G8, the G20 and ODA • Targets, ultimate goal zero energy-related CO₂ emissions • PAMs and financial commitments could form part of the ZETT 	<p><i>Who has commitments:</i> Developed countries</p> <p><i>What commitments:</i> Ultimate goal of zero energy related CO₂ emissions</p> <p><i>Timeframe:</i> Short- to mid-term</p> <p><i>Negotiations:</i> The first three blocks negotiations could involve the G8, the G20 and ODA. The fourth block could use the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Modifies Kyoto</p> <p><i>Emissions trading:</i> Yes</p> <p><i>Focus:</i> Technology change</p>
<p>31 Parallel Climate Policy, Stewart and Wiener</p> <p>Led by the U.S. adopting a domestic cap and trade system, engage other large emitting countries not participating in the Kyoto Protocol.</p> <ul style="list-style-type: none"> • There would be national emission targets with international emission trading • Developing countries would cap selected sectors initially with head room within the target tightened over time • Revenue from the sale of excess allocations would flow to the participating developing country 	<p><i>Who has commitments:</i> U.S. and large emitting developing countries</p> <p><i>What commitments:</i> National emission target then selected sector targets for large emitting developing countries</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Would take place outside of the UNFCCC</p> <p><i>Relationship to Kyoto:</i> Parallel Kyoto</p> <p><i>Emissions trading:</i> Yes, international</p> <p><i>Focus:</i> The proposal seeks to engage the U.S. and large emitting countries not now having targets under the Kyoto Protocol in a parallel approach</p>

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<p>32 Per Capita Allocations, Centre for Science and Environment</p> <p>Includes several possible burden-sharing approaches, all based on equal per capita emissions entitlement</p> <ul style="list-style-type: none"> • Absolute targets • Includes both developed and developing countries • Three approaches: sink where the oceanic sink is divided by the world population; a budget approach linked to long-term atmospheric concentrations of GHGs divided into budget period emission levels then allocated on a per capita basis; and, moving entitlement where an emission level is set then reviewed in light of new information and reallocated. • Emissions trading is restricted to zero-carbon energy systems • Revenue is intended to be used to lower the price of renewables such that they are competitive with fossil fuel technologies 	<p><i>Who has commitments:</i> Both developed and developing countries</p> <p><i>What commitments:</i> Absolute emission targets based on equal per capita emissions</p> <p><i>Timeframe:</i> Long-term</p> <p><i>Negotiations:</i> UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Compatible</p> <p><i>Emissions trading:</i> Restricted to zero-carbon energy systems</p> <p><i>Focus:</i> Target setting and significant emission reductions</p>
<p>33 Portfolio Approach, Richard Benedick</p> <p>Multifaceted approach aimed at promoting a technology revolution in energy production and consumption</p> <ul style="list-style-type: none"> • PAMs based on fuel efficiency for vehicle-producing countries, industry sector technology standards • Carbon tax for public sector R&D • Financial assistance for developing countries for mitigation measures • Programs to promote technology transfer to developing countries • Developing country commitments conditional on technology transfer and financial assistance • CDM focus on energy sector 	<p><i>Who has commitments:</i> Like-minded countries</p> <p><i>What commitments:</i> Adoption of technology standards and financial assistance to developing countries</p> <p><i>Timeframe:</i> Short- to mid-term</p> <p><i>Negotiations:</i> Outside of the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Parallel negotiations involving like-minded states</p> <p><i>Emissions trading:</i> Could be used by participating countries</p> <p><i>Focus:</i> Promotion of a technology revolution in energy production and consumption</p>
<p>34 Purchase of a Global Public Good or International Emission Trading without a Cap, David F. Bradford</p> <p>A newly-created international bank would purchase emission reductions by buying and retiring emission allowances</p> <ul style="list-style-type: none"> • Countries would be required to make financial contributions to the new bank to finance the purchases • Each country receives emission allowance based on BAU projections plus headroom • All countries are potential sellers • New bank is financed by contributions from participating countries based, possibly, on per capita income, consumption levels or expected benefits • Participant organization (COP) decides country allowances and number of allowances to buy and retire 	<p><i>Who has commitments:</i> Potentially all countries</p> <p><i>What commitments:</i> To participate through the new international bank financed by developed countries</p> <p><i>Timeframe:</i> Short- and mid-term</p> <p><i>Negotiations:</i> Either inside or outside of the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> This proposal could parallel or replace the present approach</p> <p><i>Emissions trading:</i> Yes, selling emission reductions to the new bank</p> <p><i>Focus:</i> Understanding how treating emission reductions as a public good can contribute to solutions</p>
<p>35 Safety Valve, William Pizer</p> <p>Hybrid combination of fixed emission targets with price certainty through a safety valve</p> <ul style="list-style-type: none"> • Additional allowances can be purchased by countries at a predetermined price • Could work with fixed or indexed targets • Revenue could be used to assist developing countries • Safety valve price could be raised over time to reduce emissions or follow public willingness to pay for climate change • If the trigger price was low and operated by individual countries, international trading would not be required 	<p><i>Who has commitments:</i> Mainly developed countries</p> <p><i>What commitments:</i> Emission target with price certainty</p> <p><i>Timeframe:</i> Short- or mid-term</p> <p><i>Negotiations:</i> Could be considered under the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Could form part of the next negotiations</p> <p><i>Emissions trading:</i> Yes, international if trigger price high enough</p> <p><i>Focus:</i> Engaging the U.S. through price certainty</p>
<p>36 Safety Valve with Buyer Liability, David Victor</p> <p>Target-based with a safety valve for economic certainty and buyer liability to promote compliance</p> <ul style="list-style-type: none"> • Fixed national emission targets • A parallel technology strategy to promote international collaboration on technology development • Could use PAMs initially • In the longer term, targets for developing countries differentiated through graduated levels of income • Buyer liability will give countries the incentive to purchase allowances only from sellers that comply with their emission targets 	<p><i>Who has commitments:</i> Developed and developing countries</p> <p><i>What commitments:</i> Emission reduction targets with safety valve</p> <p><i>Timeframe:</i> Long-term outlook</p> <p><i>Negotiations:</i> Inside and outside of the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Could form part of the next negotiations</p> <p><i>Emissions trading:</i> Yes, international</p> <p><i>Focus:</i> Engaging the U.S. through price certainty and buyer liability to promote compliance</p>
<p>37 Soft Landing in Emission Growth, Blanchard <i>et al.</i></p> <p>Designed to integrate developing countries into the emission reduction process after 2010, stabilize global emissions by 2030, and atmospheric concentrations at 550 ppm</p> <ul style="list-style-type: none"> • All countries have fixed binding targets • Developed countries have reduction targets which must allow room for developing countries to increase their emissions • Developing countries have stabilization targets by different dates, ranging from 2015 and 2045, based on their per capita income and their per capita emissions • There is an international emissions trading system 	<p><i>Who has commitments:</i> Both developed and developing countries</p> <p><i>What commitments:</i> Both reduction and stabilization</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Could continue under UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Compatible with Kyoto</p> <p><i>Emissions trading:</i> Yes, international</p> <p><i>Focus:</i> Stabilize global emissions by 2030 and atmospheric concentrations of GHGs at 550 ppm</p>

Number, Title and Description:	Summary Comments:
<p>38 South-North Dialogue, Ott <i>et al.</i></p> <p>This global approach aims at keeping the global temperature rise to 2°C. All countries are included. There would be six groupings, each with a different set of mitigation, adaptation and financial obligations</p> <ul style="list-style-type: none"> Annex II countries: targets more stringent than Kyoto provide financial and technical assistance to last four groups Annex I countries: Kyoto-like targets, some financial assistance to last four groups NICs: limitation or reduction targets, adopt SD PAMs and sectoral CDM RIDCs: limitation targets conditional on receiving financial and technological support from Annex II countries; adopt SD PAMs and sectoral CDM with additional financial and technological support from Annex II countries DCs: no targets; adopt SD PAMs and sectoral CDM; financial and technological support from Annex II countries LDCs: no targets; adopt SD PAMs and sectoral CDM; financial and technological support from Annex II countries Targets consider three factors: historical responsibility (emissions 1990 to 2000); capability (per capita GDP); and, potential to mitigate (per capita emissions) Countries graduate to higher categories based on agreed formula Adaptation fund-based on polluter pay 	<p><i>Who has commitments:</i> All countries in six categories</p> <p><i>What commitments:</i> Varies with category from more stringent than Kyoto to SD PAMs with financial and technological aid from industrialized countries</p> <p><i>Timeframe:</i> Long-term</p> <p><i>Negotiations:</i> Continue under UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Compatible with Kyoto</p> <p><i>Emissions trading:</i> Compatible with international trading</p> <p><i>Focus:</i> Restricting global temperature rise to 2°C</p>
<p>39 Sustainable Development PAMs, Winkler <i>et al.</i></p> <p>Bottom-up, pledge-based approach to engage developing countries</p> <ul style="list-style-type: none"> The focus is on implementing nationally-developed policies rather than setting emission reduction targets through multilateral negotiations Funding for developing countries could come through the presently established routes Start with voluntary SD PAMs and quantify the outcomes in GHG reduction terms Longer term, the most effective SD PAMs might become mandatory for middle income countries 	<p><i>Who has commitments:</i> Developed countries have targets, no GHG targets for developing countries</p> <p><i>What commitments:</i> Implement national SD PAMs</p> <p><i>Timeframe:</i> Mid-term</p> <p><i>Negotiations:</i> Compatible with the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> This proposal would modify the Kyoto approach</p> <p><i>Emissions trading:</i> Developing country CDM reductions would be available for trading</p> <p><i>Focus:</i> Implement developing country SD objectives</p>
<p>40 Technology Backstop Protocol, J. Edmonds, M. Wise</p> <p>In the event that the selected approach does not perform, this approach could be adopted as the replacement.</p> <ul style="list-style-type: none"> International agreements on technology based targets; Annex I countries would capture and store CO₂ from post-2020 fossil fuel fired power plants and new synthetic fuel capacity If there is an agreement on stabilization of atmospheric concentration of GHGs, Annex I countries capture and store CO₂ from new post-2050 fossil fuel refineries. Countries graduate to Annex obligations; first phase when their per capita income exceeds the Annex I average in 2020 and second phase when their per capita income exceeds the Annex I average in 2050 	<p><i>Who has commitments:</i> Annex I countries</p> <p><i>What commitments:</i> Technology basis for CO₂ capture and storage in two phases: 2020 from fossil fuel fired power plants and new synthetic fuel capacity, and 2050 from new fossil fuel refineries</p> <p><i>Timeframe:</i> Mid- and long-term</p> <p><i>Negotiations:</i> Proposed as part of the UNFCCC negotiations</p> <p><i>Relationship to Kyoto:</i> Backstops the next approach in case of failure</p> <p><i>Emissions trading:</i> Not part of this proposal</p> <p><i>Focus:</i> Technology, CO₂ capture and storage</p>
<p>41 Technology-Centred Approach, Scott Barrett</p> <p>Broad approach aimed at promoting a technology transition in electricity generation and transportation with five components</p> <ul style="list-style-type: none"> R&D protocol for development of new technology Technology standards protocol to help commercialize new low-emitting technologies A multilateral fund to help spread and market penetration of the new technologies in developing countries Short-term pledge and review A protocol for adaptation assistance Funds required from developed countries 	<p><i>Who has commitments:</i> No emission reduction targets</p> <p><i>What commitments:</i> Agreements contained in the protocols for participating countries</p> <p><i>Timeframe:</i> Short-, mid- and long-term</p> <p><i>Negotiations:</i> More likely outside but could be inside the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> Not specifically linked</p> <p><i>Emissions trading:</i> Not part of this proposal</p> <p><i>Focus:</i> Promoting a technology transition in electricity generation and transportation</p>
<p>42 Three-Part Policy Architecture, Robert N. Stavins</p> <p>Modify Kyoto to engage the U.S. including more moderate targets and a pathway to global participation</p> <ul style="list-style-type: none"> Three main elements: global participation, long-term targets and market-based instruments National emission targets which are modest to start with Longer-term targets more ambitious to stimulate technology change Different targets between developed and developing countries with developing countries having participation based on per capita GDP with graduated scale 	<p><i>Who has commitments:</i> Developed and developing countries</p> <p><i>What commitments:</i> Developed countries have moderate targets to start, developing countries targets tied to per capita GDP</p> <p><i>Timeframe:</i> Short- to mid-term</p> <p><i>Negotiations:</i> Could be inside the UNFCCC framework</p> <p><i>Relationship to Kyoto:</i> This proposal would modify Kyoto</p> <p><i>Emissions trading:</i> Yes, international</p> <p><i>Focus:</i> Engaging the U.S. and global participation</p>

Number, Title and Description:	Summary Comments:
<p>43 Two-Part Commitments for Industrialized Countries, Ambassador Dasgupta</p> <p>Modified Kyoto to give developed countries more flexibility in how they achieve their commitments</p> <ul style="list-style-type: none"> • Countries could meet their targets or make financial or technological transfers • Depending on the conditions of technology and financial transfer, emissions trading could be affected 	<p><i>Who has commitments:</i> Only developed countries <i>What commitments:</i> Kyoto targets by emission reductions and/or technology and financial transfer <i>Timeframe:</i> Short- and mid-term <i>Negotiations:</i> Under the UNFCCC framework <i>Relationship to Kyoto:</i> Modify Kyoto <i>Emissions trading:</i> Yes, but not explicit in this proposal <i>Focus:</i> Fulfilling developed country commitments</p>
<p>44 UNFCCC Impact Response Instrument, Benito Muller</p> <p>A new disaster relief fund for international relief efforts for climate change-related disasters</p> <ul style="list-style-type: none"> • Financed by developed countries based on their historical responsibility and their ability to pay; mandatory contributions • Focus is on post-disaster; disaster relief, rehabilitation and reconstruction 	<p><i>Who has commitments:</i> Developed countries <i>What commitments:</i> Mandatory contributions to fund <i>Timeframe:</i> Mid-term <i>Negotiations:</i> Could fall under UNFCCC framework <i>Relationship to Kyoto:</i> This proposal could be included in the next phase of Kyoto <i>Emissions trading:</i> Not part of this proposal <i>Focus:</i> Disaster relief for developing countries</p>

Appendix B

Summary of Common Elements in each Policy Option

Approach	Elements								
	Soft or Qualified Targets	Hard or Absolute Targets	Longer-term Targets	Coordinated/Harmonized PAMs	PAMs: Capacity, Infrastructure	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
1 Ability to Pay	Yes, for developing countries	Yes, for developed countries	Yes, to some degree						
2 Agreed Domestic Carbon Tax				Yes, on fossil fuels, all countries				Possible assistance from carbon tax	
3. Bottom-up	Possible, each country constructs own plan	Possible, each country constructs own plan	Possible, each country constructs own plan	Possible, each country constructs own plan	Possible, each country constructs own plan	Possible, each country constructs own plan	Possible, each country constructs own plan	Possible, each country constructs own plan	Possible, each country constructs own plan
4 Brazilian Proposal	Yes, for developing countries	Yes, tied to historical emissions	Yes, -30 per cent by 2020				Yes, to fund CDM projects	Yes, to some degree	
5 Broad but Shallow	Yes, not burdensome				Yes, policies selected to meet targets				
6 Climate Marshall Plan					Yes, to implement policies and negotiate scope	Yes, for energy efficiency and low emission technology			
7 Contraction and Convergence		Yes, for CO ₂ , emission budget allocated on per capita basis	Yes, 1. GHG atm. conc. 2100 and 2. equal per capita emission by 2045	Yes, phase out fossil fuel subsidies				Yes, included in the proposal	
8 Converging Markets	Yes, smaller groups of countries negotiate appropriate targets								Possibly some form for accepting targets
9 - Domestic Hybrid Trading Schemes	Harmonized DET, emission endowment safety valve	Yes, although it states there are no hard targets, there actually are							Yes, with emission endowments for trade
10 Dual Intensity Targets	Yes, two targets for developing countries: compliance and selling								Yes, to a degree. Emit lower than selling target sell excess

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Approach	Elements								
	Soft or Qualified Targets	Hard or Absolute Targets	Longer-term Targets	Coordinated/Harmonized PAMs	PAMs: Capacity, Infrastructure	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
11 Dual Track	Yes, as an option with a safety valve and international trading	Yes, as an option may pursue a hard target		Yes, as an option to meet non-binding emission target and sell excess allowances			Funds from safety valve sales go to assist developing countries	Yes, developing countries on basis of historical emissions	
12 Equal Mitigation Costs	Possibly, emission targets set using agreed upon economic model	Possibly, emission targets set using agreed upon economic model							
13 Expanded "Common but Differentiated"	Yes, increasing equal per capita emissions for most developing countries	Yes, absolute emission reductions for developed countries	Yes, -25 per cent from 1990 by 2025 with adjustments then equal per capita emissions						
14 Further Differentiation	Yes, vary from binding indexed targets to no targets for developing countries	Yes, binding fixed targets for developed countries							
15 Global Framework: Kyoto, Decarbonization, and Adaptation	Yes, intensity targets for some developing countries and future stabilization target for top countries	Yes, absolute targets for developed countries; developing countries can qualify in future	Yes, aim to limit global temp. increase to 2°C. Developed countries reduce emissions by 60 to 80 per cent by 2050	Yes, developing countries adopt SD PAMs		Yes, for decarbonization of developing countries		Yes, from developed countries for adaptation and damage	
16 Global Preference Score	Yes, countries rank proposals for allocating emission targets compromise result								
17 Global Triptych/Extended Global Triptych	Yes, targets calculated based on EU method levels from -30 to +200 per cent by 2020	Yes, targets calculated based on EU method levels from -30 to +200 per cent by 2020	Yes, stabilize atm. conc. at 550 PPM			Yes, sectoral and technology oriented emissions targets			

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Approach	Elements								
	Soft or Qualified Targets	Hard or Absolute Targets	Longer-term Targets	Coordinated/Harmonized PAMs	PAMs: Capacity, Infra-structure	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
18 Graduation and Deepening	Yes, some developing countries can chose targets based on intensity	Yes, absolute targets for developed countries by 2015 at three levels: -12, -6, -3 per cent. Wealthier developing countries qualify for targets based on per capita emissions and GDP		Yes, some developing countries can chose PAMs and CDM				Yes, to LDCs for CC impacts	
19 Growth Baseline	Yes, for developing countries based on emissions per unit of GDP. Reductions from no regrets, low cost actions				Yes, with help from developed countries	Yes, developed countries provide resources and tech. support			
20 Harmonized Carbon Taxes				Yes, can apply to all countries with income above \$10,000 per capita		Yes, incentives for developing countries may be required			
21 Human Development Goals with Low Emissions	Yes, for developing countries. Voluntary targets based on no regrets actions, conditional based on funding, commitment on excess emissions			Yes, progressive tax on excess emissions for low carbon development		Yes, funding a condition of accepting target			
22 Hybrid International Emission Trading	Yes, national targets with IET and safety valve. Developing countries can have voluntary or indexed targets					Yes, safety valve funds could go to R&D and/or assistance to developing countries			

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Approach	Elements								
	Soft or Qualified Targets	Hard or Absolute Targets	Longer-term Targets	Coordinated/Harmonized PAMs	PAMs: Capacity, Infrastructure	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
23 Insurance for Adaptation Funded by Emission Trading	Not part of this approach but IET assumed	Not part of this approach but IET assumed						Yes, developed countries pay for CC impacts through purchase of permits	Yes, vulnerable states receive permit allocations for sale to fund insurance policies
24 International Agreements on Energy Efficiency				Yes, standards for energy efficiency for major appliances and transport plus emission standards for major emitting sectors		Yes, consider a global R&D fund			
25 Keep It Simple, Stupid (KISS)	Yes, for some groups of developing countries	Yes, for groups of developed countries	Yes, gradually meet a common per capita emission level	Yes, for non-CO ₂ gases and sinks		Yes, for developed countries as per cent of GNP plus for tech transfer	Yes, for LDCs through tax on all flexibility mechanism		
26 Long-term Permit Program		Yes, cumulative emission permits issued to 7 high emitting countries or regions to 2070	Yes, based on atmospheric concentrations of GHGs					Yes, if agreed to by participants	
27 Multi-dimensional Structure, Ministry of Trade and Industry	Potentially all approaches could be used	Potentially all approaches could be used	Potentially all approaches could be used	Potentially all approaches could be used	Potentially all approaches could be used	Potentially all approaches could be used	Potentially all approaches could be used	Potentially all approaches could be used	Potentially all approaches could be used
28 Multi-sector Convergence	No for countries with emissions below average global per capita emission standard	Yes, for countries with emissions above average global per capita emission standard	Yes, based on common per capita emissions in 2100	Emission standards and per cent reduction set on a sector basis					
29 Multistage/ New Multistage	Yes, intensity targets for some developing countries	Yes, absolute targets for more developed countries with IET	Yes, based on per capita emissions and other factors	Yes, SD PAMs for LDCs		Yes, from developed countries to support SD actions by LDCs			

Canada in a Post-2012 World: A Qualitative Assessment of Domestic and International Perspectives

Approach	Elements								
	Soft or Qualified Targets	Hard or Absolute Targets	Longer-term Targets	Coordinated/Harmonized PAMs	PAMs: Capacity, Infrastructure	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
30 Orchestra of Treaties	Possibly, series of agreements	Possibly, series of agreements	Possibly, series of agreements	Possibly, series of agreements		Possibly, series of agreements		Possibly, series of agreements	
31 Parallel Climate Policy	Yes, for participating developing countries	Yes, for developed countries				Yes, by developed countries for capacity building and mitigation			Yes, for developing countries
32 Per Capita Allocations		Progressively lowering targets based on per capita emissions for developed countries. IET kept to zero carbon energy projects	Yes, absolute national emission targets with equal per capita emissions, e.g., 450 PPM by 2100			Funds from emission trading used for development of low cost renewables			
33 Portfolio Approach	Developing country commitments conditional on assistance			Yes, for cars and power generation plus carbon tax for energy R&D		Yes, for tech transfer and incremental mitigation costs in developing countries			
34 Purchase of a Global Public Good or International Emission Trading without a Cap	Yes, all countries are allocated extra emission permits. Bank purchases permits as agreed by participants						Yes, countries fund a bank which purchases and retires emission reductions		Yes, BAU emissions plus 20 per cent for all countries
35 Safety Valve	Yes, national emission targets with safety valve and IET								
36 Safety Valve with Buyer Liability	Yes, national emission targets with safety valve and IET. Developing countries participate on a graduated basis				Aims at building robust long-term infrastructure	Plan for international cooperation on technology development			

Approach	Elements								
	Soft or Qualified Targets	Hard or Absolute Targets	Longer-term Targets	Coordinated/Harmonized PAMs	PAMs: Capacity, Infrastructure	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
37 Soft Landing in Emission Growth	Yes, graduated stabilization targets for developing countries based on per capita income and emissions	Yes, absolute reduction targets for developing countries	Yes, stabilize global emissions by 2030 and atm. conc. at 550 PPM						
38 South-North Dialogue	Yes, for some developing countries	Yes, for developed countries	Yes, aimed at a 2°C max increase in global temperature	Yes, SD PAMs and CDM for groups of developing countries		Yes, by industrialized countries for technology and assistance		Yes, funding based on polluter pay principle	
39 Sustainable Development PAMs		Yes, developed countries would have mandatory emission targets		Yes, developing countries commit to implement individual national SD plans	Yes, focus on nationally developed PAMs	Yes, funding for SD PAMs which reduce GHG emissions eligible for funding through UNFCCC			
40 Technology Backstop Protocol			This approach could include a long-term atmospheric concentration of GHGs target post-2050	Yes, CO ₂ recovery and storage technology for industrialized countries in 2020					
41 Technology-Centred Approach				Yes, standards set by participating countries, transport and power		Yes, by developed countries for collaborative R&D plus deployment developing countries		Yes, by developed countries for adaptation assistance	
42 Three-part Policy Architecture	Yes, moderate targets with IET in short term to keep costs low. Developing countries join on graduated basis		Yes, ambitious longer-term targets to promote technology change						

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Approach	Elements								
	Soft or Qualified Targets	Hard or Absolute Targets	Longer-term Targets	Coordinated/Harmonized PAMs	PAMs: Capacity, Infrastructure	Low-Emission Technology Incentives	CDM Incentives	Vulnerability and Adaptation Incentives	Allowance-based Incentives
43 Two-part Commitments for Industrialized Countries	Yes, developed countries could achieve targets by lowering emissions or by financial and tech. transfer					Yes, financial and tech. transfer in place of emission reductions			
44 UNFCCC Impact Response Instrument								Yes, for disaster relief funded by developed countries based on historic responsibility for emissions	
Number of approaches which include the element	32	22	18	19	6	20	6	14	8

Appendix C

Summary of General Approaches Embodied by Policy Options

Policy Option	Extension of Kyoto Approach	Parallel Climate Policy Approach	Country-/Region-Specific Approach	Integrated Policy Approach	Long-Term Targets Approach
1 Ability to Pay	Yes				Yes
2 Agreed Domestic Carbon Tax					
3 Bottom-Up			Yes		Yes
4 Brazilian Proposal	Yes				Yes
5 Broad but Shallow				Yes	
6 Climate Marshall Plan		Yes		Yes	
7 Contraction and Convergence	Yes				Yes
8 Converging Markets		Yes			
9 Domestic Hybrid Trading Schemes		Yes			
10 Dual Intensity Targets	Yes		Yes		
11 Dual Track	Yes		Yes		
12 Equal Mitigation Costs	Yes				
13 Expanded "Common but Differentiated"	Yes				Yes
14 Further Differentiation	Yes				
15 Global Framework: Kyoto, Decarbonization, and Adaptation	Yes				Yes
16 Global Preference Score	Yes		Yes		
17 Global Triptych/Extended Global Triptych	Yes				Yes
18 Graduation and Deepening	Yes				
19 Growth Baseline	Yes				
20 Harmonized Carbon Taxes		Yes			
21 Human Development Goals with Low Emissions	Yes			Yes	
22 Hybrid International Emission Trading	Yes				
23 Insurance for Adaptation Funded by Emission Trading	Yes				
24 International Agreements on Energy Efficiency	Yes				
25 Keep It Simple, Stupid (KISS)	Yes				Yes
26 Long-Term Permit Program					Yes
27 Multi-Dimensional Structure, Ministry of Trade and Industry		Yes			Yes
28 Multi-Sector Convergence	Yes				Yes
29 Multistage/New Multistage	Yes				Yes
30 Orchestra of Treaties		Yes			Yes
31 Parallel Climate Policy		Yes			
32 Per Capita Allocations	Yes				Yes
33 Portfolio Approach		Yes			

Canada in a Post-2012 World: A Qualitative Assessment of Domestic and International Perspectives

Policy Option	Extension of Kyoto Approach	Parallel Climate Policy Approach	Country-/Region-Specific Approach	Integrated Policy Approach	Long-Term Targets Approach
34 Purchase of a Global Public Good or International Emission Trading without a Cap		Yes			
35 Safety Valve	Yes				
36 Safety Valve with Buyer Liability	Yes				
37 Soft Landing in Emission Growth	Yes				Yes
38 South-North Dialogue	Yes				Yes
39 Sustainable Development PAMs	Yes			Yes	
40 Technology Backstop Protocol					Yes
41 Technology-Centred Approach					
42 Three-Part Policy Architecture	Yes				Yes
43 Two-Part Commitments for Industrialized Countries	Yes				
44 UNFCCC Impact Response Instrument	Yes				
Totals	29	9	4	4	18

Appendix D

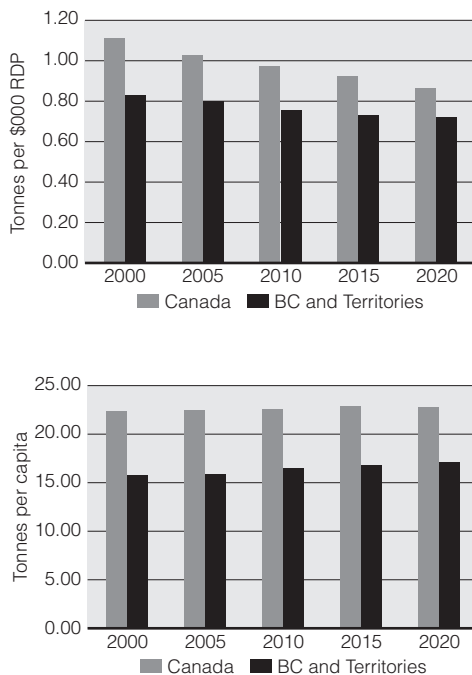
Regional Information on Economy, Population, Land and Carbon Intensity

British Columbia

GDP growth in B.C. is projected to average 2.1 per cent per year over the next 20 years, according to the macroeconomic forecast underlying Canada's Emission Outlook Update (CEOU), the federal government's most recent GHG emissions projection (AMG 1999). This rate of growth is slightly less than the projected national average growth rate of 2.3 per cent (AMG 1999).

B.C.'s population in October 2004 was approximately 4,196,400 (81 per cent urban) (StatsCan 2004). B.C. is a fast growing province, with a population growth rate that has ranged from 0.7–1.1 per cent over the past five years (StatsCan 2004). The population is predicted to grow at an average annual rate of 0.9 per cent from 2000 until 2020 (AMG 1999).

Figures 1 and 2. Emissions intensity – B.C. and the Territories



B.C. is the third largest province in Canada at 947,800 km², and it has 27,000 km of Pacific coastline. The province experiences a diversity of climatic conditions due to its varied geography and differing proximities to the Pacific Ocean. Coastal regions receive a large amount of precipitation

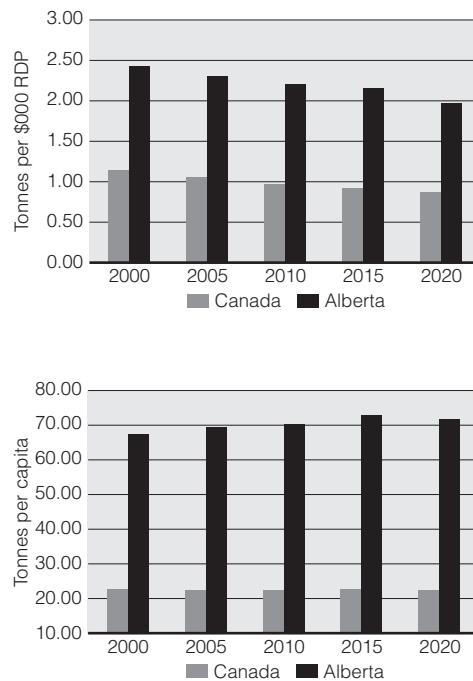
annually, the interior has more of a continental climate, and some regions experience near desert conditions.

B.C. is less carbon-intensive than the national average, both in terms of tonnes per capita and tonnes per thousand dollars of output (see Figures 1 and 2). This profile is primarily due to the low proportion of thermal generation in the province. The projection in the CEOU shows B.C.'s emission intensity per dollar of output declining to 2020, but less rapidly than the national average (AMG 1999) due primarily to growth in oil and gas production and an increase in thermal generation. Increasing vehicle emissions are also a major factor in emissions growth. Emissions (per capita) rise until 2020 at a slightly faster rate than the national average.

Alberta

GDP growth in Alberta is projected to average 2.2 per cent per year over the next 20 years, according to the macroeconomic forecast underlying the CEOU (AMG 1999). This rate is slightly less than the projected national average growth rate of 2.3 per cent (AMG 1999).

Figures 3 and 4. Emissions intensity – Alberta



Alberta's population in 2004 was approximately 3,201,900 (80 per cent urban) (StatsCan 2004). Alberta has been the fastest growing province in Canada for some time, with a growth rate ranging from 1.4 to 1.9 per cent over the past five years (StatsCan 2004). The population is predicted to grow at an average annual rate of one per cent from 2000 until 2020 (AMG 1999).

Alberta is the fourth largest province in Canada at 661,185 km². The majority of the landmass (90 per cent) is interior North American plains, with the remainder being Rocky Mountains and foothills in the southwest and Canadian Shield in the northeast. Over half of Alberta's landmass is forested with both hardwood and softwood species. Alberta has a continental climate, with dramatic seasonal contrasts between long, cold winters and mild to hot summers.

Emission intensity in Alberta is more than twice the national average calculated as tonnes per dollar of output and three times the national average calculated as tonnes per capita (see Figures 3 and 4). This profile is due to the province's large oil and gas sector and the use of coal for electricity generation. According to the federal government's CEOU, emissions intensity per dollar of output is expected to decline considerably to 2020, due primarily to efficiency and emissions reductions in the oil sands and an increased share of natural gas generation (AMG 1999). Emissions per capita follow the national trend and increase slightly to 2020.

Saskatchewan

GDP growth in Saskatchewan is projected to average 2.1 per cent per year over the next 20 years, slightly less than the projected national average growth rate of 2.3 per cent (AMG 1999).

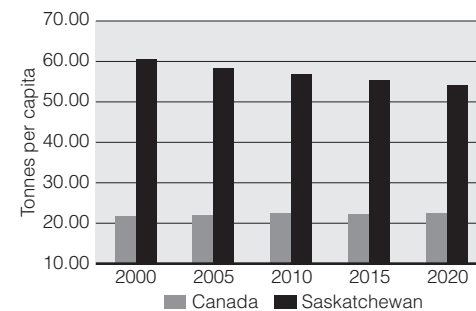
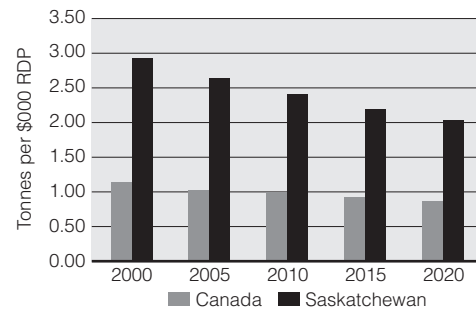
Saskatchewan's population in 2004 was approximately 995,400 (63 per cent urban) (StatsCan 2004). Although Saskatchewan's population increased slightly in 2004, in general it decreased at a rate of between -0.1 and -0.8 per cent from 2000 to 2003 (StatsCan 2004). Much of Saskatchewan's youth is moving to other parts of the country, mainly to the neighbouring province of Alberta. The population is predicted to grow at an average annual rate of 0.9 per cent from 2000 until 2020 (AMG 1999).

Saskatchewan is the fifth largest province in Canada at 651,900 km². The northern third of the province is covered by the Canadian Shield; the southern third is cultivated land. Between these regions is a band of forested land and prairie regions, which also serves as a buffer to human development in the north. Saskatchewan has a moderate climate with four distinct seasons.

Emission intensity in Saskatchewan is the second-highest in Canada, primarily due to the large role of oil and gas, coal-fired power generation, and mining in the provincial economy (see Figures 5 and 6). According to the CEOU, emission intensity per dollar of output is expected to

decline significantly to 2020 (AMG 1999). Emissions per capita are also expected to decline—counter to the national average, which rises slightly.

Figures 5 and 6. Emissions intensity – Saskatchewan



Manitoba

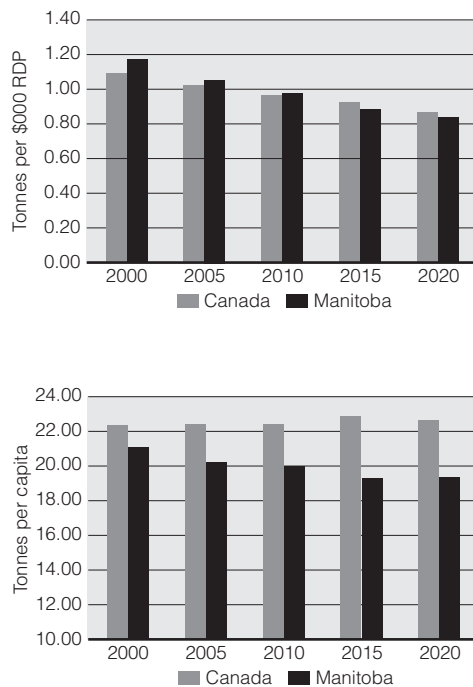
GDP growth in Manitoba is projected to average 2.1 per cent per year over the next 20 years, which is slightly less than the projected national average growth rate of 2.3 per cent (AMG 1999).

Manitoba's population in 2004 was approximately 1,170,300 (72 per cent urban) (StatsCan 2004). Its population is growing slowly, at a rate of 0.4 to 0.8 per cent over the past five years (StatsCan 2004). Provincial population is predicted to grow at an average annual rate of 0.8 per cent from 2000 until 2020 (AMG 1999).

Manitoba is the sixth largest province in Canada at 649,950 km² (World of Education 2005). The province is very low lying and relatively flat, with 16 per cent of its area covered by fresh water. Sixty per cent of the province is pre-Cambrian Canadian Shield, with the north-eastern portion being Hudson Bay Lowlands and the southern region being North American prairie. The southernmost regions of Manitoba are prairie comprised of low-lying floodplain territory. Most of central Manitoba is forested with mixed woods. In the north, the province has Arctic tundra and permafrost regions. Manitoba is characterized by mild sunny summers and cold clear-skied winters. The province experiences a continental climate, with extreme temperature changes between winter and summer.

Emissions intensity in Manitoba in terms of tonnes per dollar of output is very close to the national average, but is declining slightly more rapidly than the national average to 2020 (see Figures 7 and 8). Emissions per capita are below the national average and predicted to decline significantly to 2020—in contrast to the slight increase in the national average (AMG 1999).

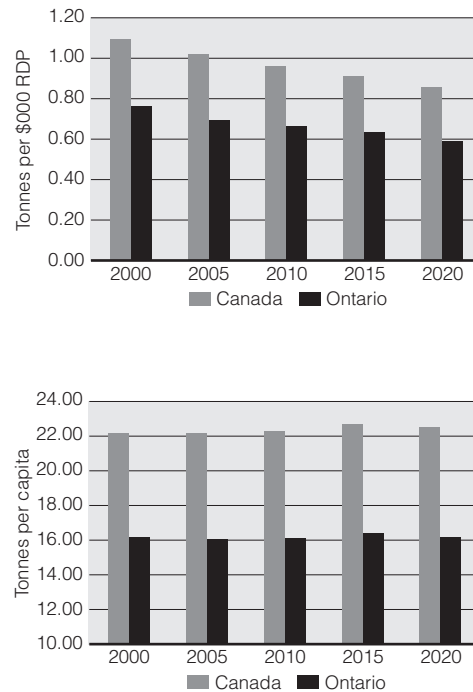
Figures 7 and 8. Emissions intensity – Manitoba



and the province includes the largest freshwater lake in the world (Lake Superior). Ontario's climate ranges from sub-arctic in the far north to humid continental in the south.

Emissions intensity in Ontario is well below the national average, on both a per capita and dollar of output basis (see Figures 9 and 10). Emission intensity tracks the national average to 2020, declining on a dollar of output basis and staying roughly constant on a per capita basis (AMG 1999).

Figures 9 and 10. Emissions intensity – Ontario



Ontario

GDP growth in Ontario is projected to average 2.5 per cent per year over the next 20 years, which is slightly above the projected national average growth rate of 2.3 per cent (AMG 1999).

Ontario's population in 2004 was approximately 12,492,700 (83 per cent urban) (StatsCan 2004), which makes it the most populated province/territory in Canada. In the past five years, Ontario has grown very quickly by Canadian standards, with a growth rate ranging from 1.1 to 1.8 per cent (StatsCan 2004). Many people immigrating to Canada move to Ontario, as do large numbers of Canadians from other regions. The population is predicted to grow at an average annual rate of 1.1 per cent from 2000 until 2020 (AMG 1999).

Ontario is the second largest province in Canada, at 1,068,580 km² of Canada's 10 million plus km² of total land area. Together, the Canadian Shield and the Hudson Bay Lowlands cover 90 per cent of Ontario, with the remainder covered by the Great Lakes and St. Lawrence Seaway Lowlands. Over one-sixth of Ontario is covered by water

Quebec

GDP growth in Quebec is projected to average two per cent per year over the next 20 years, which is quite a bit less than the projected national average growth rate of 2.3 per cent (AMG 1999).

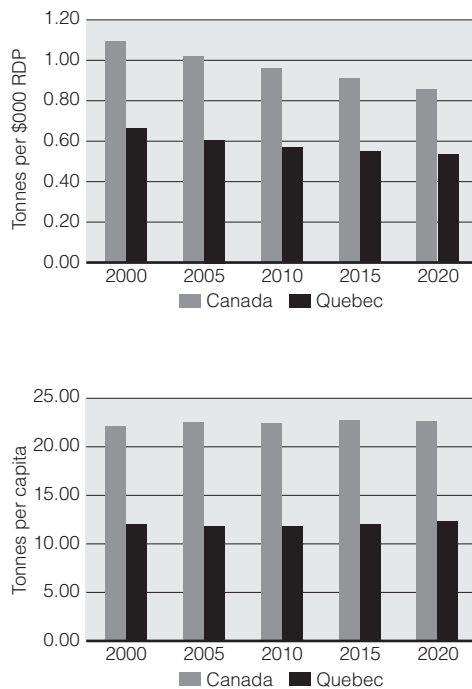
Quebec's population in 1998 was approximately 7,542,800 (78 per cent urban) (StatsCan 2004), which makes it the second most populated province/territory in Canada. Quebec is growing at a relatively moderate rate by Canadian standards, with rates ranging from 0.5 to 0.7 per cent over the past five years (StatsCan 2004). The population is predicted to grow at an average annual rate of 0.7 per cent from 2000 until 2020 (AMG 1999).

Quebec is the largest province in Canada, and is larger than two of the three territories at 1,667,926 km². Freshwater covers 10 per cent of Quebec and the coastline is 9,000 km long. The Canadian Shield covers 60 per cent of Quebec, with the Hudson Bay and St. Lawrence Lowlands making up the remainder.

With such a huge land mass, the province experiences large temperature variations from north to south and east to west. The south is temperate with four distinct seasons. Quebec has four main types of climate, from humid continental in the south, sub-arctic in the central continental regions, to arctic in the north and maritime in the east.

Emission intensity in Quebec is well below the national average, both in terms of tonnes per dollar of output and tonnes per capita (see Figures 11 and 12). This situation is due primarily to the high proportion of hydroelectric generation. The federal government’s forecast shows a decline to 2020 in emissions per dollar of output and a slight increase in tonnes per capita, following the national trend (AMG 1999).

Figure 11 and 12. Emissions intensity – Quebec



Atlantic Provinces

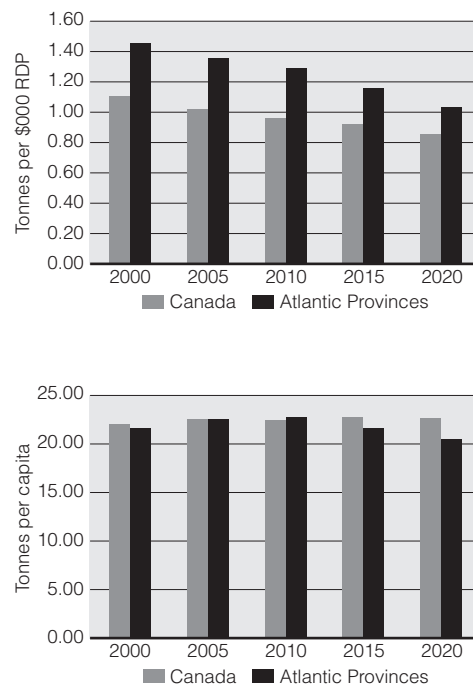
GDP growth in the Atlantic Provinces is projected to average 1.8 per cent per year over the next 20 years, well below the projected national average growth rate of 2.3 per cent (AMG 1999). Growth rates vary among the provinces: in Newfoundland and Labrador it is two per cent, in Nova Scotia it is 1.9 per cent, Prince Edward Island (PEI) is at 1.8 per cent and New Brunswick is at 1.6 per cent.

The four Atlantic Provinces together had a population of 2,343,300 in 2004 (StatsCan 2004). Of this total, roughly 751,400 are in New Brunswick, 517,000 in Newfoundland and Labrador, 937,000 in Nova Scotia, and 137,900 in PEI (StatsCan 2004). In each of the Atlantic Provinces, the urban population hovers near 50 per cent, which is rela-

tively low by Canadian standards. Atlantic population growth rates differ by province, as Newfoundland and Labrador has been in decline for the past five years, at a rate between -1.1 and -0.2 per cent (StatsCan 2004). The population of the other three provinces is somewhat stable with slight growth rates ranging from -0.2 to 0.4 per cent over the past five years (StatsCan 2004). The population in the Atlantic Provinces is predicted to grow at an average annual rate of 0.4 per cent from 2000 until 2020 (AMG 1999).

Together the Atlantic Provinces cover an area of 540,371 km². The Atlantic Provinces make up the first to fourth smallest Provinces in Canada, with PEI being the smallest at 5,660 km² and Newfoundland and Labrador being the largest of the four at 405,720 km².

Figures 13 and 14. Emissions intensity – Atlantic provinces



Newfoundland and Labrador have over 17,000 km of coastline and its regional climates are heavily affected by the Atlantic Ocean. Newfoundland has a moderate maritime climate whereas Labrador experiences a more continental climate as one moves inland.

Nova Scotia has over 10,000 km of coastline dotted with hundreds of small, protected harbours that have since become ports. Although completely surrounded by water, Nova Scotia experiences a continental climate, with a moderation of temperature ranges because of the proximity to ocean.

The northern part of New Brunswick is an extension of the Appalachian mountains. The interior is largely a rolling

plateau. The south is characterized by hills sloping down to tidal marshes. Warm Gulf of Mexico air also reaches all the way up the North American coastline and reaches New Brunswick.

Prince Edward Island is a crescent shaped island that ranges in width from six to 64 km. PEI has a moderate climate with warm summers that have highs of 32°C, and crisp winters that generally drop no lower than -11°C.

The Atlantic Provinces are treated as a group in this analysis although their emission intensities differ significantly. As a region, emissions per dollar of output are above the national average but are forecast in the CEOU to decline significantly by 2010 (see Figures 13 and 14). Emissions per capita track the national average but decline fairly significantly from 2010 to 2020 (AMG 1999).

Northern Territories

GDP growth in the northern territories is projected to average 2.1 per cent per year over the next 20 years, which is slightly less than the projected national average growth rate of 2.3 per cent (AMG 1999). However, it is important to note that the work of the Analysis and Modelling Group (AMG) never did use real data for the Territories. Instead, the Territories were lumped in with B.C. and the AMG was disbanded before they could ever undertake the task of running separate numbers for the Territories. Therefore, the AMG numbers for the Territories are only estimates based on some of the similar economic elements shared between B.C. and the Territories.

In 2004, the northern territories together had a total population of just over 103,600 (StatsCan 2004). Most people in the Northwest Territories and Nunavut live in rural settings, whereas 60 per cent of Yukon's population is in urban centres. In stark contrast to this population (which makes up a fraction of Canada's total population), the territories cover more than a third of Canada's total land mass.

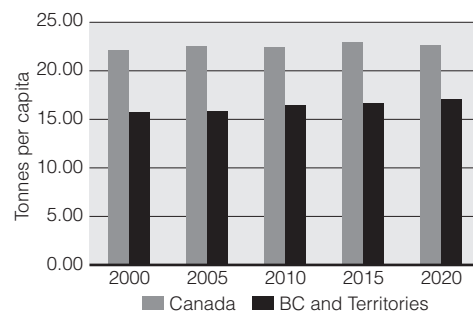
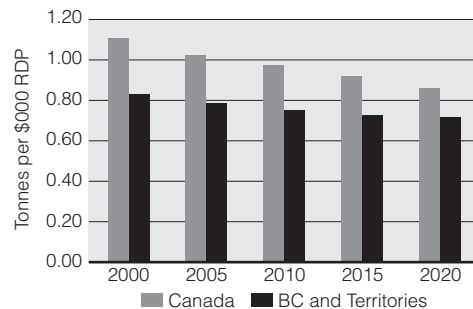
The north is experiencing population growth but the rate fluctuates from year to year depending on the economic conditions of certain resource industry sectors. Many of the people moving to the north are of a transient group that work in the mining and oil and gas sectors, and their permanence in the north is determined by global demand for the natural resources their industries supply. Approximately half of the permanent population in the territories is aboriginal, whether native North American Indian, Metis or Inuit.

Living in this sparsely populated yet enormous landmass, with its diverse social makeup of Aboriginal lifestyles along with intense development by trans-national companies, makes for a distinctive set of interests and priorities in the north.

The extreme climatic conditions of the northern territories add to the context of these circumstances to create a truly extreme situation within Canada. Above the Arctic Circle (66° N latitude) the land falls under complete and continuous darkness/daylight for long periods of the year (the extreme being three months straight).

The territories are less carbon-intensive than the national average, both in terms of tonnes per capita and tonnes per thousand dollars of output (see Emissions intensity figures below). This situation is primarily due to the low proportion of thermal generation in the territories. The projection in CEOU shows emission intensity per dollar of output declining to 2020, but less rapidly than the national average (AMG 1999). Again, it should be noted that the numbers used in the figures below are actually for B.C., and are only a very rough estimate (or a proxy) in terms of what the Territories' profile might actually look like.

Figures 15 and 16. Emissions intensity – B.C. and the Territories



Appendix E

Country/Bloc Information on National Circumstances

United States

Policy Context

Climate change policy in the U.S. requires the consideration of the interests of many parties, including the White House, Senate, Congress, states, and business and non-governmental groups. The decision by the Bush Administration to not ratify the Kyoto Protocol continues to be the dominant factor determining the U.S. government's approach to climate change today. Their withdrawal from Kyoto in 2001 was driven largely by concerns regarding the U.S. economy, the absence of developing country commitments, however are also consistent with a general U.S. reluctance to engage in international treaties.

In its first term, the Bush Administration set an independent approach to addressing climate change, primarily through its Clear Skies Initiative. This initiative focuses on achieving an 18 per cent reduction in emissions intensity through voluntary actions by 2012 (United States General Accounting Office 2003) and increased federal funding for science and technology development. In its second term, the Bush Administration was expected to continue to focus on seeking voluntary and technological solutions to reducing GHG emissions. The Administration remains opposed to domestic binding emission reduction targets and is unsupportive of international obligations beyond those contained in the UNFCCC. At COP-10 the U.S. indicated that any discussion on the future of the international climate regime is "premature."

Congress has introduced a number of climate change related bills since 1997, including the Clean Power Act (2003) and the McCain-Lieberman sponsored Climate Stewardship Act (2003). After initially failing by a vote of 43 to 55 in October 2003, the latter Act was re-introduced in February 2005. Given the current Republican dominance of the U.S. Congress, the relative success of the McCain-Lieberman bill suggests that the introduction of some type of national cap on GHG emissions is inevitable. There is growing recognition within industry and government that it is more a question of when, not if, carbon management requirements will be established, particularly carbon dioxide emissions from the utility sector.

Considerable leadership in addressing climate change has come from western and northeastern coastal States under the leadership of both Republicans and Democrats. A number of states have taken aggressive action—individually and jointly—to limit GHG emissions, through caps on carbon dioxide emissions from the power sector and other

measures. The Regional Greenhouse Gas Initiative led by New York continues to move forward; it seeks to establish a mandatory regional cap-and-trade system for carbon dioxide emissions from the power sector that will involve 10 northeastern states (RGGI 2003). California has established a binding target for emission reductions from vehicles, which is now before the courts. Actions such as these follow a historical trend of state-level action paving the way for federal efforts to address environmental issues.

Recently the federal government (and Bush Administration) has become more directly engaged in future climate change policy. At their most recent meeting, G-8 leaders (including the U.S.) agreed to a *Plan of Action on Climate Change, Clean Energy and Sustainable Development*. Work on implementing the plan is set to begin in early November of 2005. On July 27, 2005, the U.S. jointly announced the *Asia-Pacific Partnership on Clean Development and Climate* along with Australia, China, India, Japan and South Korea. The partnership will promote the development, deployment and diffusion of existing and emerging cleaner, more efficient technologies. Much like the communication from G-8 leaders in the UK, members of the partnership are careful to state that these recent efforts on climate change are meant to contribute to UNFCCC efforts and to complement but not replace the Kyoto Protocol.

Preparations for the 2008 Presidential elections are already beginning, and some Republican Senators seem to be repositioning themselves on the issue of climate change (Little 2005). For example, Senator Chuck Hagel has put together a new climate change package that addresses the "links between energy, the economy and the environment" in three separate bills (Brahic 2005) aiming to find the middle ground between Bush and McCain-Lieberman.

Economic and Energy Profile

The U.S. is by far the world's leading economic power, with 2004 GDP totalling US\$11.66 trillion (OECD 2005). The U.S. has a growing merchandise trade deficit, which reached a record US\$547.6 billion in 2003 when imports rose by over eight per cent but exports went up by only 4.6 per cent (The Economist 2005).

The U.S. economy is largely fuelled by a combination of domestic coal and imported oil. The availability of low-cost coal has made it the preferred fuel for power generation and today it accounts for half of U.S. electricity generation. Coal is the only fossil fuel for which domestic production exceeds consumption. Based on current estimates of domestic recoverable reserves (of nearly 460 billion

tonnes) the U.S. has enough coal to last 460 years at current recovery rates.

In contrast, since the early 1970s the U.S. has become increasingly dependent on foreign oil supplies. Proven domestic reserves have been on a downward trend ever since 1970, while consumption has grown rapidly. In 2000, net imports of petroleum accounted for more than 60 per cent of consumption, a share that expected to increase to 65 per cent by 2020 (U.S. Department of State 2002).

Greenhouse Gas Emissions Profile

The U.S. is the world's largest GHG emitter, accounting for 24 per cent of global energy-related carbon dioxide emissions in 2000 (Marland *et al.* 2003). U.S. emissions are approximately twice those of the world's second largest emitter, the People's Republic of China, although China has 4–5 times the population of the U.S. Per capita emissions in 2002 were 19.66 tCO₂ in the U.S. (IEA 2004).

Between 1980 and 2000, energy-related carbon dioxide emissions increased by 22.5 per cent in the U.S.; during the same period, emissions intensity (emissions per \$GDP) fell by 34.7 per cent. 2003 emission levels were actually below 2000 levels; however, they increased by 0.6 per cent from 2002 (U.S. Environmental Protection Agency 2005). These trends of rising emissions and falling intensities are expected to continue.

Electricity and transportation are particularly large contributors to the level and growth of GHG emissions in the U.S. The power sector is responsible for 40 per cent of total U.S. CO₂ emissions and 31 per cent of total GHG emissions. Between 2000 and 2020, CO₂ emissions from power generation are expected to increase by 35 per cent in absolute terms, with a six per cent decline in emissions intensity. Emissions from the transportation sector represented 27 per cent of total GHG emissions in 2000, and are expected to increase by 46 per cent by 2020.

Vulnerability Profile

In its June 2001 report, the Committee on the Science of Climate Change, which was convened by the National Academy of Sciences, concluded that “human-induced warming and associated sea level rises are expected to continue through the 21st century.” The Committee recognized that there remains considerable uncertainty in the current understanding of how climate varies naturally and how it will respond to projected (but uncertain) changes in the emissions of GHGs and aerosols. It also noted that the “impacts of these changes will be critically dependent on the magnitude of the warming and the rate with which it occurs” (NRC 2001a).

The U.S. feels that because of the momentum in the climate system and natural climate variability, adapting to a changing climate is inevitable. The question is whether to adapt poorly or well. Although successful U.S. adaptation to a changing climate during the 20th century provides some context for evaluating potential U.S. vulnerability to

projected changes, assessments indicate that the challenge of adaptation is likely to be greater during the 21st century.

European Union

Policy Context

The EU expanded in 2004, when 10 accession countries (including Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia) joined 15 previous members (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Italy, Ireland, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom). The EU's objectives are to promote peace, provide freedom and justice under a single and open market system, and work for sustainable development in Europe. Members states also seek to promote these objectives internationally.

Combating climate change aligns with the objectives of the EU. Initial actions to address climate change included the establishment of directives to promote electricity from renewable energy, voluntary commitments by carmakers to reduce carbon dioxide emissions by 25 per cent, and proposals on the taxation of energy products (European Commission 2005).

The European Commission launched the European Climate Change Program in 2000 to stimulate further action. Through this program, the EU established its Emissions Trading Scheme (ETS), which began operating in 2005. Phase I of the scheme covers the pre-Kyoto period of 2005 to 2007, involves selected industrial emitters from five major sectors in the 25 member states, and spells out methods for establishing the emissions trading scheme in each member state. Phase II of the scheme will incorporate lessons from Phase I and include additional sectors for operation during the Kyoto compliance period from 2008 to 2012.

PAMs in the industrial, commercial and residential sectors are aimed at eco-efficiency in buildings, motors, electronics and appliances. Process emissions have not yet been addressed comprehensively, but are becoming a priority for the next round of emissions reductions. Transportation emissions have been addressed somewhat through negotiated agreements with European and Japanese auto manufacturers and the creation of a bio-fuels Directive. Air transport and other sub-sectors will be considered for post-Kyoto inclusion.

Although the EU has argued strongly in the past for continuing with a Kyoto-type of approach for the future climate regime, its tone has changed recently to more of a listening mode. EU leaders at the recent G8 Summit demonstrated support for initiatives outside the UNFCCC (and Kyoto) sphere of influence by signing (along with the U.S., Japan, Russia and Canada) the *Plan of Action on Climate Change, Clean Energy and Sustainable Development*. However, the EU does remain very supportive of the UNFCCC, the Kyoto Protocol and its Mechanisms, and the EU is the strongest developed world

supporter of beginning post-2012 discussions at COP-11. The EU has invested heavily in the Kyoto process to date and would like to see the benefits of this investment carry over to future periods.

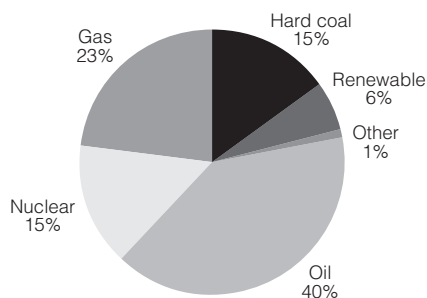
Economic and Energy Profile

EU GDP (in real terms) increased by 20 per cent in the 1990s, from just over 6.2 trillion Euros to over 7.4 trillion Euros (Commission of European Communities 2001). Services and public administration accounted for approximately 68.8 per cent of economic activity in 2000, up from 66.4 per cent in 1990. Industry and construction, which account for 28.5 per cent, have grown in absolute terms but have declined relative to the economy. Agriculture and fishing have remained unchanged at 2.6 per cent.

EU trade patterns shifted somewhat during the 1990s. Back then it was a net importer and today it is a net exporter. The EU is creating more emissions at home in the manufacture of goods and services that are used abroad.

EU energy policy has been based on three pillars through the 1990s: security of energy supply, competitive energy prices and respect for environmental objectives. The region heavily relies on energy from other regions. In 2001, the EU-25's energy dependency rate was 47.7 per cent, an increase of about 2.0 per cent since 1991. The EU-15 has experienced a similar trend, but are constantly two to three units higher. Only two EU countries, Denmark and the United Kingdom, had a net surplus of energy in 2001. Seven member states had an energy dependency ratio of over 75 per cent (European Commission 2004). The EU's energy consumption mix for 2000 is shown in the illustration.

Figure 17. EU – Energy consumption in 2000



Source: Eurostat, 2002

Energy intensity in the EU-25 has fallen by 10 per cent since 1991, declining in all states except Spain, Greece and Portugal. EU-15 countries had an energy intensity of 216 kgoe/1,000 Euro in 1991 compared to 194 kgoe/1,000 Euro in 2001 (European Commission 2004).

Greenhouse Gas Emissions Profile

The EU-15 has committed to reducing their collective emissions by eight per cent below 1990 levels. Accession

states are responsible for meeting their individual targets under the Kyoto Protocol.

The EU-15 reached its own goal of stabilizing carbon dioxide emissions at 1990 levels by 2000, and emissions in 2002 were 2.9 per cent below 1990 levels. Although this is significant progress, the EU-15's GHG emissions are still 1.9 per cent above the Kyoto target pathway, and some member states find it hard to meet their target (e.g., Austria at +16.3 per cent above target in 2002, Denmark at +11.8 per cent, Ireland at +21.1 per cent, Portugal at +24.8 per cent and Spain at +30.4 per cent) (European Commission 2005).

Vulnerability Profile

Vulnerability to climate change varies by member state. While temperatures are predicted to rise by 0.1 to 0.4°C per decade, warming will likely be greater in southern and northeastern Europe. Annual precipitation levels will increase in northern Europe, and decline in southern Europe. Key sources of vulnerability for EU countries include: provision of water resources, rise in sea level, declines in soil quality, increased risk from flood and storm damage in coastal areas, potential loss of glaciers and health impacts.

Global climate change may impact oceanic currents to the point where the Gulf Stream no longer warms the European continent as it does today. Without this warming effect, the climate in northwestern Europe could more closely resemble that of countries found at similar latitudes, such as Russia, the northeastern U.S. and Canada's Maritime provinces.

Norway

Policy Context

Norwegian climate change policy is typically developed through an inter-ministerial process prior to being placed before parliament (Norway, Ministry of the Environment 2002). Norway ratified the UNFCCC in 1993 and the Kyoto Protocol in 2002. Norway was an early mover in taking domestic action on climate change, by introducing a tax on carbon dioxide in 1991. The tax covers 65 per cent of carbon dioxide emissions and is set at differentiated rates of up to NOK 315 per tonne (about \$US49.70) (Norway, Ministry of the Environment 2002). The Norwegian government expects to earn NOK 7.8 billion through carbon taxes in 2005. Of this, an estimated NOK 3.6 billion will come from oil and natural gas industries, the remainder coming from the consumption of oil products, coke and coal (CICERO 2005).

Since early 2005, Norway has operated a domestic ETS that will be in place until 2007; it covers about 10 per cent of Norway's total GHG emissions. The ETS was established to provide experience and learning before the first commitment period, and it is consistent with the EU's ETS. Uncertainty remains regarding continuation of this system

after 2007 (CICERO 2005). Norway's carbon taxation efforts have created a dilemma regarding its approach to the ETS, as the likely higher cost of the carbon tax may in fact encourage Norwegian industry to reduce its emissions even further than if they operated solely under the ETS (CICERO 2005).

At the recent Seminar of Government Experts (SOGÉ) meetings in Bonn, Norway expressed its desire to become a low emitting society, noting that the government is examining how the country could achieve reductions on the order of 50–80 per cent by 2050. Norway has no official position yet on post-2012, but strongly supports the need to begin discussion at COP-11.

Economic and Energy Profile

Norway's small, open economy has grown in recent years, having a GDP of US\$250.7 billion in 2004 (OECD 2005). With its small population, Norway is one of the wealthiest countries in the world on a per capita basis. Exports constitute a relatively high percentage of GDP—the export of goods and services accounted for 41.5 per cent and 27.3 per cent of GDP respectively in 2002. Offshore oil generates more than half of Norway's total export revenue, making the country highly vulnerable to world oil markets (The Economist 2005). Other primary sectors (agriculture, forestry and fishing) and secondary sectors (particularly manufacturing) provide a diminishing portion of GDP in Norway, as the service sector now accounts for half of GDP (The Economist 2005).

Although not an EU member, Norway is part of the EU's internal market through the Agreement on Economic Area (EEA). The main purpose of the agreement is to ensure equal conditions of competition throughout the EEA, which includes the EU member states and the three other countries, Norway, Iceland and Liechtenstein. As such, Norway has the same obligation to implement EU environmental legislation as member states, which influenced the development of Norway's domestic ETS.

Norway is a net exporter of energy, selling 205.07 Mtoe in 2002 (The Economist 2005). About half of all energy used (111.32 tWh net energy consumption in 2002) (IEA 2004) and nearly all electricity produced in Norway is generated using hydro. This energy powers the country's energy-intensive industries (like metal smelting, fertilizers and carbides) which account for a higher percentage of GHG emissions than in other countries despite their renewable energy base (Norway, Ministry of the Environment 2005).

Norway has focused on expanding its offshore oil and natural gas sectors in recent years, one of the main factors behind Norway's strong economic growth in the past decade (Norway, Ministry of the Environment 2002).

Greenhouse Gas Emissions Profile

Norway's Kyoto target is eight per cent below 1990 levels. Meanwhile, its emissions grew by 9.5 per cent between 1990 and 2002 (UNFCCC 2005), and they are expected to

continue to rise by up to 22 per cent by 2010. About three-quarters of Norway's GHG emissions are generated by the energy sector, mainly from oil and gas extraction and the transportation sector (Norway, Ministry of the Environment 2002). Oil and gas production is the largest source of new emissions.

Norway emitted 7.28 tCO₂ per capita in 2002 (IEA 2004), which is fairly close to the European average and lower than the OECD average. Although most electricity today is generated from hydro, future increases in electricity consumption will need to be met through non-hydro sources or from importing energy, which may result in an increased GHG emissions intensity (Norway, Ministry of the Environment 2002).

Vulnerability Profile

Over the next 50 years, Norway is expected to experience a mean temperature increase of 0.9°C in the summer and 1.6°C in the winter, a 10 per cent increase in precipitation, and increases in coastal storms. Northern Norway is predicted to experience the greatest change, as it is already experiencing the impacts of climate change as documented in the recent Arctic Climate Impact Assessment. Due to its wealth and experience with a harsh and variable climate, Norway views itself as relatively robust with respect to climate change (Norway, Ministry of the Environment 2002).

Japan

Policy Context

As host country to the signing of the Kyoto Protocol, Japan has an active interest in ensuring the agreement's success. Japan introduced its first Climate Change Policy Program in 1998, which was revised in March 2002 as it became clear that initial efforts would be insufficient to meet its target. New "Guidelines for Actions to Prevent Global Warming" containing more than 100 domestic PAMs were introduced, including energy conservation measures, the development of new energy sources, conversion of coal-fired plants to natural gas, research and development of advanced and innovative energy and environmental technologies, enhancement of sinks activities and participation in the Kyoto mechanisms. These actions are expected to reduce emissions by 144 MtCO₂ by 2010 (Government of Japan 2002).

The role of emissions trading is still under review in Japan, and there are no plans yet to introduce an ETS. However, the Japanese Ministry of Environment announced its plans in August 2004 to introduce a voluntary trading scheme in 2005. Japan has also considered introducing a carbon tax.

Most recently, Japan is looking for alternative ways to deal with climate change, including avenues outside the UNFCCC process. Japan supports the *G-8 Plan of Action* and the *Asia-Pacific Partnership* noted earlier. At the SOGE meetings in Bonn, Japan noted a need to shift the focus to a more encouraging environment for taking action,

instead of the constraints and punishment oriented approach of the past. Japan sees a long-term focus and the development of technology as part of the solution. The country has also stated a need for mainstreaming climate change considerations into other activities and institutions. CDM reform is high on Japan's list of priorities, for the efficacy of both current and future commitment periods.

Economic and Energy Profile

After rapid economic growth in the 1960s, 70s and 80s, the Japanese economy has been in a slump since 1989. After experiencing negative or less than one per cent growth in most years since 1992 (Government of Japan 2002), the Japanese economy has improved in recent years in response to aggressive actions by the Bank of Japan and cost-cutting by Japanese exporters. Japan's GDP in 2004 was US\$4,665.4 billion (OECD 2004) and is expected to grow by 1.4 per cent in 2005 and 1.8 per cent in 2006 (The Economist 2005).

Manufacturing continues to be the mainstay of Japan's economy, accounting for over 20 per cent of GDP. Manufacturing in Japan consists of two distinct tiers—large, powerful multinational companies and the small, often family-owned, enterprises. Japan is also one of the world's most important iron and steel makers (The Economist 2005).

Japan is highly dependent on foreign energy sources, having limited domestic fossil fuel resources. Japan currently imports 80 per cent of its energy supply (Government of Japan 2002), net energy imports were 425.15 Mtoe in 2002 (IEA 2004). Domestic energy production from nuclear power and hydropower account for 27 per cent and 8.4 per cent of Japan's energy use respectively (IEA 2004). Since the oil crisis in 1973, Japan's final energy consumption has levelled off, with total primary energy supply per capita remaining relatively constant at 4.06 toe in recent years (IEA 2004).

Greenhouse Gas Emissions Profile

Japan is the third-largest emitter of GHGs in the world. Its total emissions in 2002 were 1,338 MtCO_{2e}, nearly 12 per cent above its 1990 level of 1,196 MtCO_{2e} (UNFCCC 2005). Emissions per capita were 9.47 tCO₂ in 2002 (UNFCCC 2005). In its Third National Communication (2002), Japan estimated that its emissions would be 1,320 MtCO₂ in 2010—leaving a gap of 165 Mt (Government of Japan 2002).

Vulnerability Profile

Climate change is predicted to have a major effect on Japan's agriculture industry, forests, fisheries, water resources, coastlines, natural ecosystems and human health. The country is expected to experience a decline in the number of typhoons, but their intensity may increase (Government of Japan 2002). Japan sees climate change as a threat to its natural resources and livelihoods.

Australia

Policy Context

Australia decided to not ratify Kyoto because "it does not provide a comprehensive or environmentally effective long-term response to climate change. There is no clear pathway for action by major developing countries and the U.S. has indicated it will not ratify" (Government of Australia 2004). The government has also expressed concern that implementing Kyoto would make energy more expensive for Australian industry and households, and increase the risk of industries moving offshore (Hunt 2005). However, Australia has indicated its commitment to meeting its Kyoto target (108 per cent of 1990 levels). It has introduced a "no regrets" policy under which \$1 billion has been committed to a variety of PAMs aimed at reducing emissions and developing new technologies (Hunt 2005). The idea of establishing a national ETS was abandoned in 2004.

Australia is one of six countries involved in the *Asia-Pacific Partnership on Clean Development and Climate*. This fits with Australia's positioning over the past years and its involvement in other partnerships, all of which are designed for technology development, deployment and diffusion. Despite having opted out of Kyoto, Australia has indicated a willingness to re-engage in a formal multilateral climate change forum, provided all major GHG emitting countries also make commitments (Government of Australia, Department of Foreign Affairs and Trade 2005).

Economic and Energy Profile

Australia's GDP in 2004 was US\$639.0 billion (OECD 2005). Energy and GHG-intensive industries, such as oil and gas, heavy engineering, aluminium and steel, are significant contributors to the economy. Australia is a significant energy exporter, selling 138.59 Mtoe in 2002 (IEA 2004). It is the world leader in exporting coal having shipped 208 Mt of hard coal in 2003 (IEA 2004).

Most Australian energy is generated using fossil fuels, due in large part to the availability of coal and other low cost sources. In contrast, hydroelectric development is hampered by the limited availability of water. Nuclear power is not used in Australia.

Greenhouse Gas Emissions Profile

Australia's GHG emissions increased from 503.3 MtCO_{2e} in 1990 to 535.3 MtCO_{2e} in 2000, an increase of 6.3 per cent. However, in December 2004, the Australian Ministry for the Environment and Heritage released a report indicating that Australia is on track to meet its Kyoto target. Although energy-related CO₂ emissions are expected to be 43 per cent above 1990 levels, this increase is offset by a 66 per cent (80MT) reduction in emissions from land use change (through reduced land-clearing).

Population growth is a significant long-term emissions reduction concern for Australia. With a population of just over 20 million people in 2004 (The Economist 2005),

Australia is expected to grow by 32.2 per cent between 1990 and 2020 (Australian Greenhouse Office 2002). Australia's emissions per capita were 17.36 tCO₂ in 2002 (IEA 2004).

Vulnerability Profile

The impacts of climate change are of particular concern to Australia, which is predicted to be one of the more adversely affected developed countries during the initial stages of climate change. By 2030, it is estimated that annual average temperatures could be 0.4 to 2.0°C higher over most of Australia. By 2030, most climate models project an annual average rainfall decrease in southwest Australia, southeast Australia and Queensland. An increase in the frequency and intensity of extreme weather events is also predicted. Because more than 80 per cent of Australians live within 50 km of the coast, extreme weather events like tropical cyclones, storm surges and flooding have the potential to impact a large number of people (Australian Greenhouse Office 2002).

Australia's coral reefs, arid and semi-arid habitats in southwest and inland Australia, and its alpine systems, are particularly vulnerable to climate change. Also of concern are Australia's water supply and hydrology systems, which could experience increased dryness. These changes would negatively impact the country's important agriculture industry (Australian Greenhouse Office 2002).

Russia

Policy Context

On November 18, 2004, Russia ratified the Kyoto Protocol, enabling this agreement to enter into force in mid-February 2005. Russia's ratification came after a lengthy and vigorous internal debate. Many speculate that favourable treatment on non-climate change economic issues, such as entry into the World Trade Organization (WTO), contributed to the decision. Ultimately, the decision to ratify was made by President Vladimir Putin. As Putin continues to centralize power in the hands of the Kremlin, his role in setting and implementing Russia's approach to climate change will only continue to grow.

Russia is well positioned to gain from Kyoto. The country has an allocated emission level of 100 per cent of their 1990 emission levels while the GHG emissions are now some 20 per cent lower due to the drop in its economy post-1993. Many opportunities exist in Russia to further reduce its present emission levels, both in energy production and in consumption. Concern has been expressed, however, regarding whether Russia will be able to put in place the institutional requirements needed to fully participate in Joint Implementation (JI) and International Emissions Trading (IET). If Russia is unable to establish the internal reporting, inventories and monitoring capacity, it will need to enter into Track II JI and, therefore, be ineligible to participate in trading. Russia may also lack the capacity to support participation in proposed Green Investment Schemes related to its surplus Assigned Amount Units.

The government has implemented some PAMs targeting these opportunities. They have focused primarily on reducing carbon dioxide emissions from electricity, the dominant source of emissions today. For example, Russia introduced the "Energy Efficient Economy Federal Target Program" (2002–2005) to promote wide-scale energy efficiency and savings. As well, the aim of Russia's strongly promoted "Basic Provisions of the Energy Strategy of Russia for the Period to 2020" is to achieve "the most efficient utilization of natural resources and of the available scientific, technical and economic potential in the fuel-energy complex for improving the quality of life of the population" (Inter-Agency Commission, Russian Federation on Climate Change 2002).

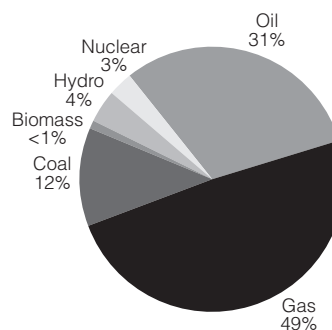
Most recently, Russia is indicating that it may seek equal treatment with countries like China and other large emitting developing countries for post-2012.

Economic and Energy Profile

From 1999 to 2003, GDP grew 6.7 per cent annually (The Economist 2005), compared to the 42 per cent reduction in total GDP between 1990 and 1998 (Inter-Agency Commission, Russian Federation on Climate Change 2002). In 2002, per person GDP was US\$1,198 (The Economist 2005). Recently, Vladimir Putin and the Russian government have been publicly speaking about a doubling of the Russian economy between 2002 and 2012.

The Russian economy remains highly dependent on natural resource industries, but this constitutes a declining portion of its overall GDP. The industrial sector's share of GDP in 2002 was 30.5 per cent, compared to nearly 50 per cent in 1990, but remains dominated by large, heavy industry enterprises. Fuels and energy account for nearly 20 per cent of industrial output. Agriculture contributed to five per cent of GDP (2002) compared to 14 per cent in 1991, but still provided more than 13 per cent of official employment in 2000. Since 1991, though, retail trade and services have increased; this sector accounted for 54 per cent of GDP in 2002, compared to less than 36 per cent in 1990 (The Economist 2005).

Figure 18. Russia – Total primary energy supply in 1999



Source: National Communication to UNFCCC, 2002

In 2002, Russia produced 1,034.52 Mtoe of energy, of which it exported 410.43 Mtoe (IEA 2004). The vast majority of Russia's primary energy is gas, oil and coal (see chart). There are indications that President Putin wants to return the energy sector to central-government control (The Economist 2005).

Greenhouse Gas Emissions Profile

In 1999, GHG emissions were at 1,880 MtCO₂e (Inter-Agency Commission, Russian Federation on Climate Change 2002), a significant decrease from their level in 1990 of 3,050 MtCO₂e. The Russian economy is energy intensive and, therefore, GHG emissions intensive. While the economic decline that lasted until 1998 coincided with a 36 per cent reduction in GHG emissions, today emissions growth is taking off. Russia will likely have a sizeable number of Assigned Amount Units (AAUs) to sell in the Kyoto period, but will likely retain a portion of their excess allocation for future requirements.

Like Canada, Russia is home to vast tracts of the world's intact boreal forest, an enormous sink opportunity for GHG emissions.

Vulnerability Profile

Like other high-latitude countries, Russia is expected to face the most significant temperature increases as a result of global warming. The Russian Ministry of Agriculture has noted the possibility of a Russian advantage in a warmer world, however, the true cost of global warming could outweigh any such advantages, particularly in or near polar-regions.

There is little concern about climate change impacts within the Russian public, which is more bothered with other local environmental issues like nuclear or chemical pollution. Vulnerability is not topical today but this may change as the effects of global warming become more apparent.

Ukraine

Policy Context

The political context of Ukraine has changed dramatically this year, with the swearing in of Viktor Yushchenko as President in January following demonstrations in last November. The new President is expected to bring greater political openness and faster economic reform to Ukraine.

Ukraine submitted its first, and so far only, National Communication to the UNFCCC in February 1998. It ratified the Kyoto Protocol in February 2004, and set in place the structures needed for its participation in Joint Implementation (JI). Ukraine may supply more than 650 MtCO₂ of emissions reductions over the 2008–2012 period through JI projects.

Economic and Energy Profile

Like other former Soviet Union Republics, the Ukraine experienced a significant decline in its economy during the

1990s. Its economy began recovering in 2000, largely through increased exports of metals and chemicals. Ukraine's GDP in 2003 was US\$50 billion, an increase of 8.5 per cent from 2002. Its GDP per person remains low, at US\$5,240 which is half of that in neighbouring Poland. Real GDP is expected to grow by 7.5 per cent in 2005 and six per cent in 2006 (Inter-Agency Commission, Russian Federation on Climate Change 2002).

Ukraine's economy is based on heavy industry (steel, chemicals, shipbuilding, coal, machine-tools and weaponry). Economic reform has been slow due to embedded vested interests and corruption. Studies by the IMF and the World Bank indicate far higher levels of corruption in Ukraine than in almost any other country in the region (Inter-Agency Commission, Russian Federation on Climate Change 2002).

President Yushchenko has stated that Ukraine will apply for entry into the EU in the second half of 2005. He has forecasted that Ukraine could join the EU before 2016 (Ukraine News 2005).

Ukraine has limited domestic sources of energy and imports half of its requirements mainly from Russia (Government of Ukraine 1998). Net energy imports in 2002 were 59.22 Mtoe (IEA 2004). Domestic energy production comes largely from coal (about 80 per cent), followed by natural gas and oil (Government of Ukraine 1998). Being one of the least energy efficient countries in the world further complicates the country's energy situation.

The government has undertaken a number of initiatives in the energy sector since 1991, adopting the Concept on Fuel and Energy Complex Development up to 2010 in 1994 and the National Energy Program of Ukraine in 1996. These two initiatives address energy conservation, domestic energy resource use, and renewable energy development (Government of Ukraine 1998). An updated version of Ukraine's National Program for Energy Conservation is currently being prepared (Rapsun 2004).

Greenhouse Gas Emissions Profile

Ukraine's emissions declined by a factor of 2.5 as its economy slowed in the 1990s. With the country's economic recovery since 2000, emissions have risen. Estimated total emissions in 2002 were 486 MtCO₂e (compared to 919 MtCO₂e in 1990) (UNFCCC 2005). Three-quarters of Ukraine's GHG emissions come from the energy sector.

Vulnerability Profile

Climate change could have significant impacts on Ukraine's agriculture, forestry, water and coastal resources. The Black Sea is already rising at a rate of 1.5 mm per year. Concerns include potential reductions in power generation from hydropower plants (Government of Ukraine 1998).

India

Policy Context

Geopolitical threats and insecurity drive many political decisions in India. Being near the Middle East and next door to political foes (which are also extremely poor nations) makes regional risks more acute in the Indian subcontinent. While Pakistan and India have been at or near war for the past 50 years, this relationship has entered a period of warming lately.

India is a staunch supporter of the “common but differentiated responsibility” priority under the UNFCCC, and maintains that developed countries are responsible for the issue of climate change and should, therefore, take the lead on mitigation. At the recent SOGE meetings, India was very critical of developed countries for not living up to their commitments under the Kyoto Protocol. India argues for technology transfer playing a larger role, and that adaptation should be a larger focus under the UNFCCC. India is a strong supporter of CDM reform.

Meanwhile, India does support the use of other venues for tackling climate change, and the country is pursuing an agenda of strengthened multilateral and bilateral systems. India was one of the five developing countries that attended the climate change meetings of the 2005 G-8 Summit and is also one of the six countries in the Asia-Pacific Partnership.

Economic and Energy Profile

Home to the second largest population in the world, India is a growing economic and political force. However, while experiencing strong economic growth a vast number of Indians continue to live in poverty. India has some of the lowest human development indicators in the world, particularly in rural areas.

India’s annual average GDP growth rate was 5.8 per cent between 1999 and 2003, making it one of the 10 fastest growing economies of the world (Indian Ministry of Environment and Forests 2004). Its GDP in 2002 was US\$501.8 billion, or US\$480 per person. India has one of the starkest disparity gaps worldwide, with the vast majority of Indians living in poverty while a small wealthy upper class dominates the economy.

The economy remains highly dependent on natural resources, with one-quarter of India’s GDP coming from agriculture, forestry and fishing (The Economist 2005). Industrial development is growing, particularly in sectors now open to foreign investment, e.g., automobiles, electronics and computers. Very rapid growth has taken place in telecommunications and information technology.

The energy sector is experiencing even greater growth than the economy. Energy demand is increasing by seven per cent annually. About 47 per cent of India’s total commercial energy comes from domestic coal reserves estimated to be 221 billion tonnes. About 20 per cent of India’s total

commercial energy use comes from petroleum, and 11 per cent from natural gas (Indian Ministry of Environment and Forests 2004). Small amounts of hydro and nuclear energy are also produced domestically. However, the majority of Indians use non-commercial biomass energy for cooking and heating. This biomass, which includes wood and animal dung, accounts for one-third of total Indian energy use (Chandler *et al.* 2002).

India is a large net importer of energy (95.95 Mtoe in 2002) (IEA 2004), mostly from the Middle East. As a consequence, domestic energy security drives energy policy, which in turn is promoting energy efficiency and alternative energy in India. The country is becoming a developing world leader in renewable energy projects. However, the abundance of low-cost coal means that it will remain the mainstay of the Indian energy system (for energy security reasons) (Indian Ministry of Environment and Forests 2004).

Greenhouse Gas Emissions Profile

In its first national communication, released in 2004, India reported 1994 GHG emissions of 1,229 MtCO₂e, about 1.3 tonnes per capita. The energy sector contributed the largest proportion of emissions (61 per cent), followed by agricultural (28 per cent), industrial processes (eight per cent), waste (two per cent) and land use, land use change and forestry (one per cent) (Indian Ministry of Environment and Forests 2004).

A significant source of future emissions in India will come from population growth. While considerable efforts have been made to slow population growth, India is home to about 1.05 billion people (16.2 per cent of the global population), and has an annual growth rate of 1.5 per cent (Chandler *et al.* 2002). India’s population is expected to surpass China’s by 2040 at 1.5 billion people (Parikh 2004). Combined with anticipated economic growth and rising household incomes, India’s per capita and total GHG emissions could rise substantially. A slight change in the population growth rate could have significant implications for India.

Vulnerability Profile

India is very vulnerable to the potential impacts of climate change due to the huge population and the large proportion of its people and economy that depend on climate-sensitive sectors. Key concerns include changes in water availability resulting from the melting of glaciers, declining precipitation, and potential increases in flooding. Coastal systems are also vulnerable to sea level rises and increased frequency of extreme events. Vast numbers of Indians are settled along the coast, including over 15 million in each of Mumbai and Calcutta. Climate change is expected to negatively impact natural habitats, health and infrastructure (Indian Ministry of Environment and Forests 2004).

China

Policy Context

China has introduced a variety of PAMs since the 1980s to support its rapid economic development while limiting energy consumption and reducing GHGs. Through a combination of economic incentives and administrative regulations, the Chinese government has reduced energy consumption, enabled more efficient use of natural resources and promoted cleaner production. These efforts were captured in China's first National Communication in 2004.

China, like other developing countries, supports the "common but differentiated" principle under the UNFCCC and the notion that developed countries should take the lead on tackling climate change for the Kyoto period and beyond. However, senior officials also state that as long as energy security, economic development and life quality are taken into account, China is willing to cooperate in working towards future international responses to climate change (Liu 2005). At the SOGE in Bonn, China indicated its interest in a successful COP-11 (IISD 2005). China also attended the recent G8 meetings on climate change, and is part of the Asia-Pacific Partnership.

A big concern of China's is energy supply and infrastructure security, and how to develop policy to ensure that the country avoids locking itself into undesirable energy pathways. This concern is especially relevant when the enormous investments China will make in energy infrastructure over the coming years is taken into consideration.

Economic and Energy Profile

China will be an increasingly influential force in the decades to come. The most populous and fourth largest country in the world, China has undergone a series of transformations in the past twenty years to become one of the world's fastest growing economies. China joined the WTO in 2001, and has seen a rapid increase in economic performance since. Its GDP growth has been and remains one of the highest in the world; between 2000 and 2004 it grew 8.5 per cent annually (The Economist 2005). Rapid growth is putting pressure on China's infrastructure. As well, the benefits of this growth are not reaching all people. While GDP in 2002 was US\$1,266 billion, on a per capita basis it was only US\$974 (The Economist 2005). Net income of urban residents is nearly three times that of rural residents (Government of China 2004). The growing disparity between rich and poor is of increasing concern to the Chinese government.

Industrial production continues to dominate economic activity in China, accounting for 51.1 per cent of GDP in 2002. In the same year, agriculture accounted for 15.4 per cent of GDP.

China estimates that some 20 million farmers in remote regions are without power, on top of the growing demand in rapidly urbanizing regions (Liu 2005). The country is

electrifying to meet demand, with the majority of commercial primary energy (about 67 per cent) coming from coal (Government of China 2004).

China's energy demand is skyrocketing and the country is one of the primary factors in global energy prices today. Renewable energy use increased from 10.26 million tonnes of coal equivalent in 1994 to 33.57 million tonnes in 2000. At the same time, oil and natural gas' share of China's primary energy production expanded from 19.5 per cent in 1994 to 25.2 per cent in 2000 (Government of China 2004). At the same time, China has been able to reduce its energy intensity by an average annual rate of 5.32 per cent between 1980 and 2000. Thus, China has been somewhat successful in decoupling its economic growth from its energy consumption.

Greenhouse Gas Emissions Profile

China will become the number one GHG emitter in the world in the not too distant future if current trends continue. China's total GHG emissions in 1994 were 3,650 MtCO_{2e}, of which carbon dioxide, methane and nitrous oxide contributed 73.05 per cent, 19.73 per cent and 7.22 per cent respectively (Government of China 2005). Transportation is currently responsible for nine per cent of Chinese GHG emissions, but this portion is expected to grow rapidly as middle class Chinese earn more, and as Chinese policy-makers continue to support a growing automobile sector to help spur overall economic growth.

China's future GHG emissions profile will be affected by economic growth and the resulting changes in pattern of economic development and consumption. Scenarios predict that China's emissions could grow by anywhere from 1.5 to 2.8 billion tonnes of carbon emissions per year by 2030 (Chandler *et al.* 2002). Population is a key factor influencing this growth; while China's population is only growing at 0.7 per cent per year, China's total population of over 1.2 billion means any increase has important consequences.

Vulnerability Profile

The geographic diversity of China means that it expects to experience a range of impacts as a result of climate change. Extreme weather events such as floods and droughts are expected to rise, along with declines in run-off in northern China and increases in southern China. This pattern will intensify existing water shortages in northern China, which will be exacerbated by the loss of mountain glaciers (which have already shrunk by 21 per cent since 1900).

Climate change is expected to have significant, adverse ramifications on China's agricultural sector. As noted in its initial National Communication, "simulations indicate that potential food production would decrease by 10 per cent due to climate change and extreme climate events during 2030–2050."

Coastal areas, home to the majority of Chinese, will also be affected. Sea level rise has taken place along China's coast

since the 1950s, and is currently rising at a rate of 1.4 to 2.6 mm per year. By 2100, relative sea level rise could range from 31 cm to 65 cm, with consequences for coastal erosion, salt-water intrusion, and adverse impacts on freshwater supplies.

Mexico

Policy Context

Mexico occupies a unique position in the international climate policy community, reflecting its on-going transformation from developing to developed country status. Within the UNFCCC, Mexico is a non-Annex I country and has no emission reduction targets under the Kyoto Protocol. It joined the OECD in 1994 and as such is no longer a member of the G-77. Mexico is only one of three OECD members that are not listed in Annex B of the Kyoto Protocol (the others being Korea and Turkey). Mexico was the first large oil-exporting country to ratify the Kyoto Protocol.

Mexico has taken a very proactive stance on addressing climate change, in part because it fully expects to be one of the first non-Annex I countries to be asked to take on commitments. Mexico has proposed a step-by-step process for developing countries to take on commitments which includes: first, strengthening national capacities; second, introducing PAMs; third, taking action; and finally, monitoring and evaluation (Government of Mexico 2005). The country supports a process for further differentiation of developing countries. Mexico is a strong supporter of CDM reform and has expressed interest in sector-based approaches within the CDM. The country's stance on future commitments might result in it playing a pivotal role in broadening participation for post-2012.

Economic and Energy Profile

The Mexican economy is the eighth largest in the OECD and the largest in Latin America. Despite the downturns in 1994–95 and 2001, Mexico's GDP grew by 41 per cent overall between 1990 and 2001 while its population increased by 22 per cent to a total of 105 million (OECD 2003). GDP in 2004 was US\$676.5 billion, two-thirds from services and one-fifth from manufacturing (The Economist 2005). Mexico's income inequality is among the greatest in the OECD and poverty remains widespread. In 2000, extreme poverty affected up to 54.2 per cent of Mexicans, therefore, poverty eradication remains an overriding goal (OECD 2003).

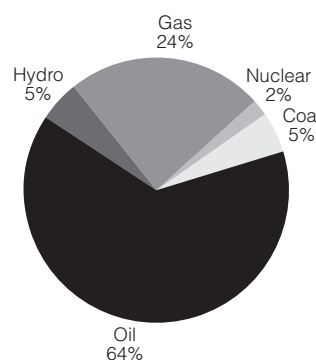
Since signing the North American Free Trade Agreement, Mexico has pursued a policy of opening up its economy and integrating it with world markets. Its economy remains strongly connected to the U.S. Mexico is by far the largest exporting country in Latin America.

The country has extensive oil and gas reserves and other mineral resources, and is one of the world's largest energy exporters. Energy is a state monopoly in Mexico and the

Mexican constitution limits private participation in the sector. The Mexican Petroleum Company (PEMEX), the largest state-owned company in Mexico, is the world's third largest oil producer. While proven reserves are declining, Mexico still ranked ninth in the world in 2001. Mexico exports 1.7 million barrels of crude per day (56 per cent of production), mostly to the U.S.

Oil is critical to Mexican government revenues—in 2000 oil exports provided 37 per cent of total government revenues. To ensure the future viability of Mexico's energy sector, the government is pushing for energy sector reform, the development of cleaner energy sources and improved energy efficiency to help sustain the government's energy revenue streams. However, energy sector reform has proven difficult as it will require an amendment to the constitution.

Figure 19. Mexico – Primary energy use in 1998



Source: BA, 2002

Greenhouse Gas Emissions Profile

Mexico is the 11th largest emitter of carbon dioxide from fossil fuels (Carbon Dioxide Information Analysis Center 2004) and the largest emitter in Latin America. However, per capita emissions from fuel combustion are 3.7 tCO₂—one-third the OECD average and slightly below the world average (World Resources Institute 2003). GHG emissions totalled 515 MtCO₂e in 1990 and increased 31 per cent by 1996 (Chandler *et al.* 2003, Pew Centre 2003).

Energy-related emissions—including transportation, industrial processes and fugitive methane—account for 60 per cent of Mexico's total emissions. Agriculture, livestock, land use change and forestry account for 32 per cent and waste accounts for the remaining nine per cent.

Mexico's carbon dioxide emissions are expected to grow by approximately 70 per cent between 1990 and 2020, mainly due to population growth and economic development, growth in the energy sector, and land-use policies. Emissions from land-use change are particularly important in Mexico (OECD 2003). After decades of deforestation, habitat destruction and land transformation in the mid 1990s, as much as 45 per cent of original forests were

lost and less than one-quarter of original rainforests in the subtropics remained. While there have been considerable conservation and restoration efforts, these have not counteracted deforestation and biodiversity loss.

Vulnerability Profile

Like many developing countries, Mexico is vulnerable to the adverse effects of climate change. Much of the economy is sensitive to climatic conditions. Economic development has tended to concentrate in the arid and semi-arid northern regions, which face severe water resource shortages. Over 75 per cent of the population relies on groundwater (OECD 2003).

Biodiversity is also at considerable risk in a country that is considered one of the world's 12 mega diverse countries. With just under two million square km, or 1.5 per cent of the world's terrestrial surface, Mexico possesses 10–12 per cent of all known animal and plant species. A large proportion of these species is endemic to Mexico (Chandler *et al.* 2003).

Brazil

Policy Context

Brazil was the first country to sign the UNFCCC, which it ratified in 1994. It has since become a Party to the Kyoto Protocol, and released its first National Communication last November. For a combination of reasons, Brazil has initiated a number of activities that support GHG emissions reductions. This includes the development of a National Alcohol Program beginning in the 1970s to reduce Brazil's dependence on imported oil. As well, Brazil promotes the adoption of more energy efficient technologies through its National Electrical Energy Conservation Program. It has also called upon all countries to generate a minimum of 10 per cent of their energy from sources such as solar and wind (Brazil, Ministry of Science and Technology 2004).

Brazil is a strong supporter of the “common but differentiated” principle and the notion of developed countries taking the lead on future climate change action. The *Brazilian Proposal* for dealing with climate change suggests a multilateral burden-sharing agreement based on historic responsibility for temperature change (Bodansky *et al.* 2004).

While Brazil supports beginning the discussions on post-2012, it maintains that the Kyoto period comes first and that any post-2012 discussions should not be used to undermine Kyoto itself. Brazil has the very clear position that all countries must work for the success of the UNFCCC, the Kyoto Protocol and the CDM.

Brazil strongly opposes land use, land use change and forestry (LULUCF) discussions if they in any way threaten sovereignty over domestic natural resources such as the Amazon basin.

Economic and Energy Profile

Brazil has a growing economy that is relatively resource intensive. Agriculture has traditionally been a key area of economic activity, and Brazil remains one of the world's largest agricultural producers. It has also become one of the largest manufacturers in industries like cement, aluminium, chemical products, petrochemical feedstock and oil. Recently, there has been a shift to a modern service oriented economy. In 2000, services accounted for 55 per cent of Brazil's economy, industry for 37 per cent and agriculture eight per cent. Brazil's GDP in 2000 was US\$594 billion (Bodansky *et al.* 2004).

Approximately 170 million people live in Brazil's 8.5 M km². Population growth has slowed in recent years to 1.3 per cent, which sets Brazil apart from many other G-77 nations. Per capita GDP is \$3,580 USD and is growing at 4.4 per cent annually (Chandler *et al.* 2002). Despite these positive indicators, a substantial portion of Brazil's population remains poor.

Energy in Brazil is largely provided by renewable sources. Brazil has the world's second largest installed capacity of hydroelectricity, which provides 90 per cent of its electricity. It is also a global leader in low-emissions transportation fuels. Nearly 15 per cent of total commercial primary energy is from renewable sources. Brazil has negated its dependence on oil through the development of its own oil fields and oil products.

Greenhouse Gas Emissions Profile

Although Brazil is a big energy user, carbon dioxide emissions are low at 225 Mt CO₂ in 1995. In fact, carbon intensity per capita was only 0.5 t in 1998 (Chandler *et al.* 2002). While Brazil has been able to limit energy-related emissions, it faces the unique challenge of having the greatest portion of its GHG emissions generated through LULUCF, which accounted for 75 per cent of emissions (CO₂e) in Brazil in 1995 (Brazil, Ministry of Science and Technology 2004). New forest planting or reforestation provides the largest source of Brazilian emissions removal.

Vulnerability Profile

Brazil spans a number of climatic zones and houses unique habitat and ecosystems. Brazil has some 55,000 plant species (22 per cent of world's) and is one of the richest nations in animal, bird, amphibian, reptile and insect populations. The country has the largest national fresh water resource in the world and is home to much of the Amazon basin and rainforest. Only a limited understanding exists of the potential impacts of climate change in Brazil. Key concerns include: the potential for drought particularly in north-eastern Brazil, flooding in various regions, impacts on coastal zones, and an increase in vector-borne diseases (Brazil, Ministry of Science and Technology 2004).

South Africa

Policy Context

South Africa ratified the UNFCCC in 1997 and the Kyoto Protocol in 2002. South Africa submitted its First National Communication in 2000 and in the fall of 2004 released *A National Climate Change Response Strategy for South Africa*. The government's 2005 *Energy Efficiency Strategy of the Republic of South Africa* established a national 12 per cent energy efficiency improvement target for 2014. South Africa also has a voluntary target of 10,000 GWh of new renewable energy supply.

South Africa acknowledges at some point it will need to take on reduction commitments, and at the SOGE in May 2005 indicated its willingness to talk about future actions. At the meeting, they indicated support for a strengthened Kyoto Protocol that includes all countries, while recognizing the common but differentiated principle. South Africa has been a strong supporter of the CDM. At the SOGE they emphasized that markets need certainty that there will be a second commitment period and they called for a "roadmap" for negotiations to be developed at COP-11 in Montreal.

Economic and Energy Profile

South Africa is the most industrialized country in Africa. In 2001, South Africa ranked 26th among all nations in terms of GDP and was the world's 16th largest energy consumer (Government of South Africa 2005).

Coal is the primary fuel produced and consumed in South Africa. The country has the world's seventh largest recoverable coal reserves (54.6 billion short tons). South Africa is the world's sixth largest coal producer at 245.3 million short tons in 2002 (U.S. Energy Information Administration 2005). In 2002, 74 per cent of total energy consumption came from coal. South Africa consumed 171.6 million short tons of coal in 2002, 90 per cent of which was used for electricity generation and in the synthetic fuel industry. South Africa has a highly developed synthetic fuels industry and Sasol is the world's largest manufacturer of oil from coal.

Greenhouse Gas Emissions Profile

Reliance on coal has resulted in relatively high GHG emissions. In 2002, South Africa emitted 306 MtCO_{2e}, or 91 per cent of total African energy-related CO₂ emissions. South Africa's CO₂ intensity was approximately 0.8 t per US\$1,000 in 1995, which is larger than many countries, including the U.S.

Vulnerability Profile

South African vulnerabilities to climate change are similar to those in other African nations, however, the country may be better equipped to adapt to climate change than many neighbours simply because of the economic situation. Regardless, South Africa is extremely vulnerable to increases in tropical diseases like malaria and schistosomiasis if climate predictions hold true (Government of South

Africa 2000). Most of South Africa is arid and is subject to droughts and floods, and the country faces both water quantity and quality risks due to climate change, both of which further contribute to the risk of infectious disease. The country has a large agricultural industry, which would be vulnerable to water resource and climate changes. Loss of species and habitat may occur in particularly vulnerable regions. As well, the country has a lot of coastline, along which most of the population is located and, therefore, rising sea level may affect these regions.

Chile

Policy Context

To support its climate change efforts, the government has established a National Advisory Committee on Global Change within the Ministry of Foreign Affairs. This committee serves as a forum for debate and advice to the government on climate change. Chile released its first National Communication in 1999.

Economic and Energy Profile

Following steady economic growth in the 1990s, of up to seven per cent per year (Chile, National Environment Commission 1999), Chile's economy plunged into recession in 1999. Currently, it is growing at six per cent per year. Natural resource production remains a key component of Chile's economy, with important economic sectors including mining, commercial fishing, manufacturing, forestry, agriculture and tourism. Total GDP in 2001 was US\$66.5 billion, with a GDP per capita of US\$4,335 (The Economist 2005).

Chile's primary sources of energy are oil and hydroelectricity. Chile imports almost all of its oil, mostly from Argentina. Economic growth has led to an increase in average annual energy consumption of 7.4 per cent between 1990 and 1996 (Chile, National Environment Commission 1999).

Greenhouse Gas Emissions Profile

In its first National Communication, Chile reported that its net emissions in 1994 were seven MtCO₂, from 95 Mt emitted versus 88 Mt captured. Most GHG emissions are produced outside the energy sector, through LULUCF activities which both generate and sequester emissions. Within the energy sector, the main sources of emissions are transportation, followed by manufacturing and construction, residential, commercial and institutional sources (Chile, National Environment Commission 1999). Chile has a growing population of 15 million people (The Economist 2005) which may result in higher future emissions.

Vulnerability Profile

Studies predict that Chile will face significant temperature changes as a result of climate change. It is predicted that temperatures in its northern regions could rise by 2°C

while in the center of the country and in the south the temperature could increase 3°C. Significant variations in annual rainfall could also result, with increases in the altiplano due to increased tropical cyclone activity, and declines in central regions. Rising temperatures and declining precipitation in the center of Chile is expected to influence agriculture. There is uncertainty regarding potential negative changes in the hydrology of the Andes Mountain Range. However, concerns have been raised regarding the impact of retreating glaciers on the provision of water for municipal supply, hydroelectric development, mining activities and agriculture.

Organization of Petroleum Exporting Countries

Members of OPEC face some unique challenges due to international efforts to address climate change. OPEC depends on revenues from fossil fuel export activities. In some cases, petroleum is the primary revenue generator for central governments and industry alike. In addition, a number of OPEC members are developing countries whose future economic prosperity is dependent on petroleum generated income (e.g., Nigeria and Venezuela).

OPEC not only faces the prospect of dwindling petroleum revenues, but also the added cost of GHG reductions if they are one day expected to commit to mitigation efforts. These economies are extremely dependent on fossil fuels for every part of life, including domestic transportation, electricity-generation and industry. In fact, many use fossil fuel-generated electricity to desalinate water for both direct human consumption and for agriculture.

On the other hand, many OPEC nations face serious vulnerability concerns due to climate change and not doing anything about the issue could be very costly.

African Countries

Fifty countries are currently designated by the United Nations as Least Developed Countries (LDCs). Thirty of these are African; the remainder are Asian countries and Small Island States. LDCs are extremely poor countries whose citizens often survive on an income of less than \$1 U.S. per day (in 1985 PPP dollars). The UN uses three criteria to identify LDCs, which also provide a sense of some general afflictions these countries face (Desanker 2004):

1. An income criterion based on GDP per capita, with less than \$750 for inclusion.
2. A human resource weakness criterion which is based on a suite of indicators like nutrition, health, education and adult literacy.
3. An economic vulnerability criterion which is based on the instability of the country's agricultural production and the economic importance of non-traditional activities like manufacturing.

The Millennium Development Goals under the UN also provide insight into the common issues faced by the LDCs (United Nations 2005):

1. Eradication of extreme poverty and hunger
2. Achievement of universal primary education
3. Promotion of gender equality and equality for women
4. Reduction of child mortality
5. Improvement of maternal health
6. Combating HIV/AIDS, malaria and other disease
7. Ensuring environmental sustainability
8. Creation of global partnerships for development

Appendix F

Interview Questionnaire

Interview Protocol – Post-2012 Scenarios Collaborative Project

Interviewee: _____

1. Based on a literature review, we feel that your country’s primary climate change-related priorities are:
 - i.
 - ii.
 - iii.
 - a. Do you feel that this is an accurate characterization of your country’s main priorities at this time?
 - b. Are there other priorities that should be added to this list? If so, for which reasons?
2. IISD has reviewed the various approaches that have been proposed for the content and structure of a post-2012 climate regime and has identified four main alternatives:
 - i. *Build on Kyoto Approach* – proposes that a second commitment period build upon the basic structure of the Kyoto Protocol while adding elements aimed at enlisting participation by the United States and major emitting developing countries.
 - ii. *Parallel Climate Policy Approach* – proposes that climate change be addressed through processes undertaken in parallel with the UNFCCC. For example, the United States could develop its own cap-and-trade system and then invite other large emitting countries without targets to join them. This system would initially operate in parallel with the Kyoto system, and countries would choose to engage in this system or the Kyoto system.
 - iii. *Bottom-Up Approach* – proposes that a new start is required. Countries would develop their own plan that suited their circumstances then engage in negotiations similar to trade negotiations.
 - iv. *An Integrated Approach* – proposes to fully integrate climate change considerations into policy formation and decision-making processes that address national priorities.
 - a. Which, if any, of these options do you feel are most consistent with your country’s interests and priorities?
 - b. Are there other general approaches that you feel should be considered?
3. The table below lists a variety of elements that may be adopted, individually or bundled together, to support implementation of the approaches identified in question 2. Please indicate whether your country is highly unlikely, unlikely, likely or highly likely to support these proposed elements:

		Highly Unlikely	Unlikely	Likely	Highly Likely
1	Targets based on emissions per unit of GDP or absolute targets with a safety valve cap on the price of CO ₂				
2	Targets based on: agreed maximum atmospheric concentration of GHGs; allocation of agreed total allowable emissions; equal per capita emissions; ability to pay; and historic responsibility for past emissions				
3	Longer term targets (e.g., to 2050)				
4	Coordinated/Harmonized Policies and measures shared internationally such as common sector emission intensity standards (e.g., electricity and transportation) or common carbon taxes				
5	National Policies and measures tailored to national circumstances that will support emission reductions over the long term				
6	Incentives – funds from wealthy countries contribute to the development and deployment of low-emission technology in developing countries				
7	Incentives – funds from wealthy countries contribute to the purchase of emission reductions from developing countries				
8	Incentives – funds from wealthy countries pay for adaptation and/or climate change-related disaster recovery in affected developing countries				
9	Incentives – developing countries receive generous allocations of emission allowances that can be traded internationally				

4. In its review of Canada's domestic circumstances and priorities, IISD has determined that Canada has the following key sensitivities:
- i. Unlike all other OECD countries (with the exception of Norway and Australia), Canada has an economy based on the export of natural resources, including energy.
 - ii. As Canada has a federal system of government with substantial responsibilities shared on issues such as energy and forestry policy (therefore, for example, only provinces can implement Renewable Portfolio Standards), targets have to be acceptable to a wide range of policy actors for reduction objectives to be reached.
 - iii. Canada has a strong interest in technology and innovation—in vehicles, fuels, power generation and geological storage. Innovation is key for significant long-term reductions.
 - iv. Canada has an interest in a comprehensive approach to GHG emission reductions that includes all gases and includes sinks as well as sources. Canada is particularly interested in ensuring that the role of agricultural soils sinks not be excluded.
 - v. Canada has a unique relationship with the United States, to which Canada sends approximately 80 per cent of its exports. Canada might, therefore, require greater flexibility in its response should the U.S. not become more engaged in a multilateral climate regime.
 - vi. Canada is a key supplier of energy (oil, natural gas and electricity) to the United States, and will likely be interested in treatment of energy trade that will account for upstream emissions within the climate regime.
 - vii. Based on current climate models, Canada is expected to experience some of the most dramatic changes in its climate. Adaptation is therefore a concern, particularly given the natural resource dependency of many regions.
 - viii. Climate change impacts raise equity concerns for Canada as, like the globe, those least responsible for rising levels of GHG emissions are expected to be (and are being) the most immediately and dramatically affected by this process.
- a. Which of these sensitivities do you feel most strongly complement your own country's potential position on a post-2012 framework?
 - b. What would you consider to be the most legitimate policy concerns of Canada?
 - c. Where do you see the most likely area(s) for disagreement?

Appendix G

Criteria Defined

IISD has tried to capture as much of the discussion on post-2012 climate regimes as possible when formulating the criteria outlined below. Many of the definitions are IISD's representations of criteria developed by others. It is possible that IISD has overlooked some of the content pertaining to specific criterion; however, these definitions are current and fair representations of the criteria being discussed internationally.

Summary of general criteria being discussed

Criteria Being Discussed Internationally	Criterion Cited By					Number of mentions
	Aldy <i>et al.</i> 2003	Jaccard <i>et al.</i> 2004	Aldy <i>et al.</i> 2003a	Clausen & Fri 2003	Drexhage <i>et al.</i> 2004	
Policy Criteria						
Environmental effectiveness	+	+	+	+	+	5
Economic efficiency	+	+	+	+	+	5
Dynamic efficiency			+			1
Equity (or fairness)	+		+	+	+	4
Policy flexibility	+		+		+	3
Complementarity	+				+	2
Comparative advantage					+	1
Technology innovation	+				+	2
Continuity (or transition)	+				+	2
Sustainable development (compatibility)	+					1
Political negotiability	+	+		+	+	4
Political enforceability (and ability to comply)	+	+	+	+	+	5
Participation*			+			1

* The inclusion of the U.S. and other major GHG emitters in the commitments made is essential, whether the case is full or partial participation, as a policy option that doesn't include the current nor projected emissions leaders will fail. Therefore, a strong policy thrust has begun to re-engage the U.S. and to get the large developing-nation emitters on side.

Policy Criteria

The policy criteria selected in this study are intended to be used in determining whether critical aspects to any climate change “policy” are inherent to the post-2012 option being evaluated. The selected criteria are viewed as being essential considerations when assessing the technical aspects of any climate change policy option, as extracted from the work of other policy institutes and the work of IISD during its post-2012 research. As described in Section 4.1, the criteria selected for use in this study were:

- Environmental Effectiveness
- Economic Efficiency
- Dynamic Efficiency
- Equity (or Fairness)
- Policy Flexibility
- Complementarity
- Technology and Innovation

- Competitiveness
- Continuity (or Transition)
- Sustainable Development.

Environmental Effectiveness – Ultimately, the driver behind any climate change policy option is the long-term and permanent reduction of GHGs in the Earth's atmosphere, as identified under Article 2 of the UNFCCC. Key aspects of this criterion may include: the development of new environmental technology, the changing of public attitudes through education and training, and the enforceability of a policy based on environmental objectives (e.g., annual emissions caps or an absolute concentration target). It is critical to understand that the environmental effectiveness of a policy is extremely difficult to measure. For example, in the case of climate change, the ultimate indicator of success is no noticeable change in the global climate, which is very difficult to actually verify that a policy was successful in changing anything.

Some believe that a strict and punitive compliance-based regime is needed to ensure environmental effectiveness,

while others opt for a more facilitative approach. Regardless of the approach, the main questions remain what can the committing Party do under the approach to ensure that the goals or targets are being met, and what recourse does the Party have if they are not reached? For some participants in the climate change debate, the *dynamic efficiency* criterion makes this criterion redundant, in that any policy that satisfies dynamic efficiency will naturally result in appropriate environmental and social outcomes.

Economic Efficiency – Because of resource limitations on what can be committed to climate change, each unit of reduced emissions needs to be done at lowest cost. However, cost-effectiveness analysis alone cannot meet this criterion, as it is entirely likely that the most cost-effective option today may not necessarily produce the desired results over longer timeframes. Therefore, the question of the length of the commitment period becomes critical. Achieving the most attractive, long-term cost-benefit analysis result would be desirable (if one were conducting a quantitative economic assessment).

Many agree that flexible and market-based approaches are most likely to deliver lowest-cost emissions reductions. The term flexible applies not only to the type of market approach, but also to the timeframe for making commitments to emission reductions. Of course, the ancillary consequences (e.g., health consequences and employment outcomes) of the policy option should also be considered in the cost/benefit analysis. The same goes for administrative and transaction costs of the proposed option. To add another dimension of complexity, the predictability of economic variables in such long-term projections is very uncertain. Aspects such as economic and population growth rates are difficult to predict, let alone the expected rate of technological change.

Dynamic Efficiency – Situations become very complex and difficult to manage when a policy is being developed in order to change actions and behaviours so as to produce desired impacts while at the same time also minimizing the costs versus benefits over long timeframes. On top of this, the science around the various aspects of climate change is extremely difficult to understand let alone agree upon. The responses of individuals and of the private sector are hard to predict, as is the rate of technological change. Some propose that economic analysis can assess this dynamic efficiency by accounting for people's preferences across time to predict an efficient situation in which collective gains outweigh the collective losses in a way that maximizes the net benefits.

Equity (or fairness) – Whatever the commitments may be, they should be constructed so that each accountable party is treated fairly as a result. This sense of fair treatment also relates to the political acceptability and administrative feasibility of a commitment. The trick here is to determine to what extent the commitment takes into consideration the relevant circumstances of the committing Parties, and to what extent it results in an equitable distribution of obli-

gations. Although this notion of fairness often results in per capita or per GDP targets and measures, fairness must also take into consideration aspects like the existing energy mix of the region, its type of economy and geographical location, as these all relate to the *competitiveness* issues that a Party might have with other regions or countries (see subsequent criteria). A policy option that places a region in a competitive disadvantage is an undesirable end result. To the extent that a policy option has a mechanism for accounting for the unique circumstances of the party being put in the competitive disadvantage, and to the extent that one can come to a mutual resolution with the party over the issue, the fairness question should be manageable. Many proponents of this argument extend the fairness question not only to jurisdictions but also to industry sectors, stating that no one sector should bear an unfair burden when taking action on climate change.

Policy Flexibility – Because there will likely be a need to revise commitments in light of new economic or scientific information over time, the ideal situation is for commitments that can be adjusted or augmented as is warranted. The use of a sequential decision-making process for the development of climate change policy would be an indicator of the inclusion of this notion of flexibility. Other examples of somewhat flexible policy options include targets and taxes because either can be scaled up or down as needed for future commitment periods.

Complementarity – In a situation where the overarching policy framework allows different countries or groups of countries to adopt different policy options (a hybrid approach), there must be way of assessing and comparing the various options through the complementarities or potential linkages among the different commitment regimes. In other words, when a policy framework allows for a variety of options to exist there must be a way for the options to interact with others, in order to work towards a common goal. Sharing mechanisms would help achieve that goal, by allowing for the relative comparison of achievements along the way.

Technology and Innovation – An important aspect of reducing emissions while encouraging economic growth is a component of technology development and innovation over the long-term. It has become increasingly accepted that technology, both for reducing emissions and for the capture and permanent storage of emissions, is critical to mitigating climate change. This criterion is related to two previous ones: *environmental effectiveness*, in that new environmental technology needs to be developed to achieve the environmental objectives; and, *economic efficiency*, in that innovation and technology can result in entirely new components or can result in incremental innovations to old equipment; either way, economic efficiency from business as usual is created. As energy production, transportation and end-use are generally GHG intensive activities, the energy sector is a specific target for technology and innovation. This implies either the use of new technology for energy production, transportation and end-use, or innovations to existing infrastructure or supply chains.

This type of policy commitment to science and technology is a long-term endeavour because of the time it takes to bring new technology through to commercialization (10–20 years) and because of the rate of capital stock turnover in industry (e.g., 20+ years for most industries, at least 40 years for electricity generating plants).

Comparative Advantage – Of significance to all countries and regions, but particularly so for Canada, is the issue of competitiveness related to trade, productivity, GDP, and other measures. Canada’s signing of the Kyoto Protocol, while its closest trade partner (the U.S.) has opted out, is a significant issue from many perspectives. The issues addressed under this criterion relate to those under *equity* but speak more directly to a specific issue from Canada’s perspective—that of the potential for leakage of GHG emissions reductions if a new climate regime does not gain U.S. or developing country participation. Essentially, this criterion addresses the additional burden put on Canada and the world if other international players do not participate in the new regime.

Continuity (or transition) – Continuity from the Kyoto to post-Kyoto period could be viewed as positive or negative depending on one’s perspective. In so far as there will already be a climate change framework in place for the 2008 to 2012 period, and in so far as there will be some success with the useful aspects of that framework, it is only reasonable that the positive aspects at least be carried over to subsequent commitment periods. By 2012, there may already be some well-established mechanisms and aspects in place and some countries will have already made significant investments in the Kyoto process. The value of these investments should not be lost in subsequent frameworks. For example, there will likely be a large carbon market in place by 2012 and any players involved in that market will expect it to continue as a mechanism in future regimes. At the same time, the U.S. has stated that the Kyoto Protocol is seriously flawed, and the simple recreation of a Kyoto-type of regime for the second commitment period would not be acceptable from their perspective. The right balance will need to be struck.

Sustainable Development (compatibility) – To entice developing countries into taking on commitments there must be a perceived synergy between reducing GHG emissions and achieving their sustainable development goals. Many nations see sustainable development as a guiding force for economic development in the 21st century, rather than simply repeating the industrialization path taken by developed nations during the 19th and 20th centuries. To the extent that climate change commitments can be tied to sustainable development goals, such as energy efficiency, distributed and renewable energy, sustainable land use, and especially to adaptation, developing countries may see incentives to commit to climate change mitigation. Developed countries that embrace sustainable development will find it important for any new climate regime to meet not only environmental and economic objectives but also objectives related to social development. For some participants in the climate change debate, the dynamic *effi-*

ciency criterion makes an examination of sustainable development redundant, in that any policy that satisfies dynamic efficiency criterion will result in appropriate social and environmental outcomes.

Political Criteria

The following criteria are different from the previous ones in that they have a very strong element of the political acceptability of the various policy options. Amid all of the discussions around a post-2012 framework, the reality of actually negotiating an agreement acceptable to all Parties, which each can then take back to their respective jurisdictions, is paramount. Without taking into account this element of political acceptability, the reality of actually achieving climate change objectives comes into serious question. The three political criteria presented are: political negotiability, political enforceability and participation.

Political Negotiability – Many of the options or approaches being discussed have been proposed by international negotiators at one time or another, but have not received consensus support. Many times, an option is simply a non-starter to certain countries or trading blocks that have different priorities from the option’s proponent. Aspects of the other criteria play into this notion of political negotiability. For example, *continuity* in whole or in part with the Kyoto Protocol is a highly contentious point among UNFCCC signatories. The predictability of economic variables (noted under *economic efficiency*), or lack thereof, makes for difficult negotiations because of disagreements over economic predictions and even modeling. For most negotiating groups, the compatibility of the option with other priorities and policies related to economic development, *technology innovation*, *cleaner energy*, and *sustainable development*, is what makes certain options preferable to others in the end. Ultimately, the question for any negotiating group under this criterion must be whether the policy option is saleable back home.

Political Enforceability (and ability to comply) – In order to be effective, the commitment made under a specific policy option must take into account the capacity of the institutions on which compliance depends. This criterion is especially salient at the international level, where institutions making the commitments may not actually have the power within their own jurisdictions to implement the commitment and enforce compliance. In other cases, a country that has made a commitment may not have the physical capacity to implement the commitment. For example, a lack of measuring and monitoring capabilities, or the capacity to report in the expected way, would make compliance difficult. Commitments made at the international level, must be ones that the respective countries can implement domestically, otherwise the country risks non-compliance, which may bring with it both legal and financial penalties as well as international embarrassment. This implies administratively feasible commitments that are relatively simple to monitor and verify using processes that each Party either already has or could replicate.

Participation – Two camps are developing on the participation question. Some believe full participation is essential while others are striving for commitments under a narrower scope of participation. There are pitfalls and difficulties related to either. A truly efficient climate change agreement would have full participation from all countries, and each of these countries would individually pursue mitigation activities that would cumulatively meet the agreed to environmental objectives. In practice, the notion of full participation is politically difficult to achieve because of sovereignty constraints. The alternative may result in undesirable economic impacts. For example, a

policy of reduced fossil fuel dependence among a narrower list of participants may result in market dynamics such as an abundance of fossil fuels, which would result in reduced prices and thereby act as an incentive for non-participants to increase their use of fossil fuels. A critical aspect of participation, whether it be full participation or partial, is the inclusion of the U.S. and other major GHG emitters in the commitments made. With the U.S.' current share of global emissions, and the future projections that are emerging for China, India, Brazil and others, it is essential that these Parties be willing to commit.

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Canada in a Post-2012 World

Canada in a Post-2012 World explores Canadian and international perspectives on establishing a sustainable, global regime for climate change action. It provides a set of analytical tools to help frame Canadian perspectives on the range of international options being considered for a post-Kyoto world, and an initial assessment of how Canadian sensitivities and perspectives might be received by critical Parties in the global community. One common theme that emerges is that the threat of climate change is real—some impacts are already visible—and Canada needs to respond in a meaningful way that works to position the country as a leader in a clean energy future.