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Possible Designs for a Domestic Emissions Trading Program for Greenhouse Gases

Prepared for:

Multistakeholder Expert Group on Domestic Emissions Trading

National Round Table on the Environment and the Economy
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Possible Designs for a Domestic Emissions Trading Program for Greenhouse Gases

PURPOSE

This document is intended to provide information to help the Multistakeholder Expert Group on Domestic Emissions Trading guide the analysis of options for a domestic emissions trading program for greenhouse gases.

Specifically, this document includes:

- A long list of possible designs for a domestic emissions trading program for greenhouse gases;
- A recommended short list of designs for further analysis, with arguments supporting the selection;
- An outline of the proposed content of extended descriptions of the options selected for further analysis;
- A list of issues common to multiple design options; and
- A recommended short list of issues to be analysed together with supporting arguments.

The analysis of possible designs for a domestic emissions trading program for greenhouse gases by the National Round Table on the Environment and the Economy is intended to provide information on this possible option to the national advisory Issues Tables and other processes that will contribute to the development of the Canadian strategy to respond to the Kyoto Protocol.

PROCESS

The analysis is expected to proceed in two stages. The process is outlined below:

Stage 1:

- Further study of a short list of possible designs for a domestic emissions trading program, for example a voluntary credit trading program; and
- Further study of a series of issues common to multiple designs, for example analysis of options for *gratis* distribution of allowances.

This work is expected to be completed in September following a meeting of the Multistakeholder Expert Group at which time detailed designs for a domestic emissions trading program will be developed by fleshing out the framework designs with detailed assumptions relating to common issues.

Stage 2:

- The detailed designs will be used to analyse issues such as the administrative requirements and economic effects of different designs.

The analysis of the detailed designs is expected to be completed in the spring of 1999.

POSSIBLE DESIGNS FOR A DOMESTIC EMISSIONS TRADING PROGRAM

Before listing possible designs it is necessary to define alternative policy settings for a domestic emissions trading program. Three policy settings are distinguished:

- The prospect of a future commitment to limit greenhouse gas emissions exists. Canada has signed the Kyoto Protocol. As a result, the prospect of a future commitment to limit greenhouse gas emissions exists at the present time.

- The prospect of a national commitment to limit greenhouse gas emissions no longer exists. This would be the case if the Kyoto Protocol does not come into force.[1]

- A commitment to limit greenhouse gas emissions exists and policies to meet that commitment are being implemented. This would be the case if Canada ratifies the Kyoto Protocol, the Protocol comes into force, and policies are implemented in Canada to meet that commitment prior to and/or during the commitment period.[2]

[1] This case also includes the possibility that the Kyoto Protocol comes into force but without ratification by Canada, so that Canada does not have a national commitment to limit greenhouse gas emissions. Although the options for a domestic greenhouse gas emissions trading system are the same if the Kyoto Protocol does not come into force or comes into force without Canadian participation, the economic analysis would probably be quite different.

[2] This case also includes the possibility that Canada adopts a national commitment to limit greenhouse gas emissions but the Kyoto Protocol does not come into force. The options for a domestic greenhouse gas emissions trading system to meet the national commitment are basically the same regardless of whether the Kyoto Protocol comes into force, but the economic analysis of the two cases would be quite different.

Summary of Possible Designs and Recommended Short List

A total of 14 possible designs are identified, of which six are recommended for further analysis. These designs are summarized in Table 1.

Table 1: Summary of Possible Designs and Recommended Short List

Design	Short List	Description
Prospect of future commitment to limit GHG emissions		
1	✓	Voluntary credit trading
2		Voluntary cap and trade system
No specific prospect of a commitment to limit GHG emissions		
3		Voluntary credit trading
Commitment to limit GHG emissions exists		
4	✓	Cap on carbon content of fossil fuels produced and imported with trading by producers, importers and exporters
5		Cap on carbon content of fossil fuels crossing provincial and international borders, with trading by owners of the fuels
6		Cap on the carbon content of fossil fuels implemented at the narrowest point in the distribution chain, with trading by owners of the fuels
7		Voluntary credit trading
8	✓	Voluntary credit trading with mandatory performance standards
9		Mandatory credit trading
10		Voluntary cap and trade system
11	✓	Cap on emissions by fossil fuel users, trading by large fuel users and oil companies for transportation fuels
12		Same as previous option, but excluding transportation sector
13	✓	Same as option 11 but with no opportunity to purchase credits or allowances from sequestration or sources outside the program
14	✓	Cap on emissions by fossil fuel users, trading by large fuel users and municipalities for transportation and commercial/residential buildings

The prospect of a future commitment to limit greenhouse gas emissions exists

This is the current situation, Canada and a number of other countries have signed the Kyoto Protocol, which includes commitments to limit greenhouse gas emissions during the

period 2008 through 2012.[3] As a result, the prospect of a future commitment to limit greenhouse gas emissions exists at the present time.

In this situation emissions trading may be motivated by a desire to gain experience with emissions trading or a policy that provides credit for early action.

- If emissions trading is a possible policy option to meet the future commitment, sources may wish to gain experience with emissions trading. Sources have an incentive to begin to reduce their emissions to be better able to meet the potential future commitment.[4] But emissions trading also requires a motivation on the part of some entities to purchase emissions reductions implemented by other sources. In this situation the motivation to buy emissions reductions must be voluntary. Voluntary purchases of emissions reductions could be motivated by belief of a need for action, by a desire to enhance the corporate image, to meet a voluntary target such as a commitment under the Voluntary Challenge and Registry, or to attempt to forestall a future commitment or regulation.

- A program of credit for early action should eliminate any risk that early emission reductions might lead to more onerous commitments and may provide positive incentives for such actions. Credit for early action improves the business case for actions to reduce emissions and so should increase the volume of early emission reductions. And if the early reductions can be credited toward future commitments, more sources may be willing to buy credits.[5]

Two options for emissions trading are possible in this setting, voluntary credit trading or a voluntary cap and trade system.

Option 1

[3] The Kyoto Protocol sets out emission limitation commitments for 38 countries, including Canada, and the European Union. Canada's commitment is to limit average emissions for the period 2008-2012 to 94% of 1990 emissions.

[4] Sources that begin to reduce their emissions before their future commitments are defined also run a risk that those commitments will not recognize the early action. The result could be more onerous commitments for sources that have implemented early reductions (and hence benefited the environment) than for sources that have increased their emissions in the interim (and hence damaged the environment). A credit for early action policy should correct such perverse incentives.

[5] The "credit" could take a variety of forms including adjustment of the baseline for determining future commitments, financial incentives such as tax credits, credit toward potential commitments prior to 2008, and credit toward potential commitments during the 2008-2012 period. Obviously different forms of "credit" provide different levels of incentive for emissions reduction and trading prior to actual implementation of an emission limitation commitment.

In a voluntary credit trading program some sources create "credits" by documenting emissions reductions they have implemented and other entities voluntarily purchase some of these credits. Governments encourage such activity by providing appropriate assurances or incentives; for example, that the credits created or purchased can be used to meet existing voluntary or potential future regulatory obligations. Such a trading program would be equivalent to full-scale implementation of the GERT and PERT pilot programs in Canada and the "project-based" stream of the NESCAUM demonstration program in the United States.[6]

Option 2

Under a voluntary "cap and trade" system some sources would voluntarily agree to limits on their aggregate emissions as part of a pilot program. Sources whose emissions were growing more rapidly than anticipated or whose costs of reducing emissions internally were higher than expected could purchase surplus "allowances" from other participants.

A voluntary cap and trade system can be implemented relatively easily by affiliated companies, such as those in the BP Group, because the financial transfers are internal to the group. One of two streams of the NESCAUM demonstration project is attempting to better understand the strategic and decision making implications for companies that have adopted a voluntary cap on their greenhouse gas emissions. Companies that have submitted voluntary emissions limits to the Voluntary Challenge and Registry could use those limits as their allowance allocations for a voluntary cap and trade system.[7]

No specific prospect of a national commitment to limit greenhouse gas emissions

If the Kyoto Protocol does not come into force Canada would not have a national commitment to limit greenhouse gas emissions.

Emissions trading requires a motivation on the part of some entities to purchase emissions reductions implemented by other sources. If there is no specific prospect of a national commitment to limit greenhouse gas emissions, the motivation to buy emissions reductions must be voluntary. Voluntary purchases of emissions reductions could be motivated by belief of a need for action, by a desire to enhance the corporate image, to meet a voluntary target such as a commitment under the VCR, or to meet conditions for exporting to countries that have adopted their own greenhouse gas emissions limitation commitments.

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[6] The GERT, PERT and NESCAUM pilot projects have limited durations and the GERT project has provisions that can be used to limit the volume of trading.

[7] A voluntary cap and trade program involving companies that have submitted voluntary emissions limits to the VCR would require more stringent emissions monitoring, reporting and verification than is required by the VCR.

Option 3

The only trading option possible in this setting is voluntary credit trading program. Some sources create "credits" by documenting emissions reductions they have implemented and other entities voluntarily purchase some of these credits. This option is identical to option 1, except that the policy setting provides a weaker incentive to purchase credits.

A commitment to limit greenhouse gas emissions exists and policies to meet that commitment are being implemented

In this situation sources of greenhouse gas emissions are subject to policies that require them to limit their emissions. It is assumed that policies are implemented that, directly or indirectly, limit emissions from virtually every source of greenhouse gases. Some, but probably not all, sources are required or allowed to participate in domestic emissions trading.[8] Sources outside the trading program are assumed to be subject to other policies, such as efficiency standards, taxes, controls on products, etc. These other policies are not specified as part of the options.

The trading program design options specified below are described for energy-related CO_2 emissions. It is assumed that other sources and sinks of greenhouse gases would be incorporated into these options where feasible and appropriate. Accordingly, if any non-energy related CO_2 emission sources or sinks can be readily incorporated into any of these allowance or credit trading designs, it should be assumed that they are included. This has not been done here because more work is required to determine which sources and sinks lend themselves to emissions trading and which form of trading is most appropriate in each case (see Issue 1).

It is assumed, as well, that international cooperative implementation mechanisms are available under all of the options and that the frameworks agreed internationally will allow participants in Canada's domestic trading program to use any of these options. The Kyoto Protocol establishes three cooperative implementation mechanisms -- emissions trading among Annex I Parties (developed countries), joint implementation among Annex I Parties, and emission reductions in developing countries certified through the Clean Development Mechanism.[9] Canada could participate in all three mechanisms. Each can be

[8] The intent is to incorporate as many gases and sources into each design, except option 12, but some sources, such as methane emissions from livestock, probably will not lend themselves to inclusion in a trading system.

[9] Details as to how these mechanisms will work remain to be agreed. The rules for international emissions trading can be agreed before the Kyoto Protocol comes into force. The rules for the other mechanisms can only be adopted formally after the Protocol has come into force, although discussion of what those rules should be is already underway. Knowledge of the detailed rules for the three mechanisms is not needed to analyse options for domestic emissions trading, only the assumption that an international market for greenhouse gas allowances and credits will exist in which Canadian sources will be able to participate.

used to increase the emissions allowed in Canada while still meeting the commitment under the Protocol.

Option 4

Fossil fuel producers, importers and exporters are included in a carbon content trading program. Each producer and importer must hold allowances equal to the carbon content of the crude oil, natural gas, coal, and imported petroleum products sold. Exporters receive allowances equal to the carbon content of the crude oil, natural gas, coal and petroleum products exported.

This design is implemented as far "upstream" as possible. Participants in the trading program are companies that produce, import or export oil, natural gas, coal, or petroleum products. A cap is imposed on the CO_2 equivalent emissions by these firms from the carbon content of the products they sell in Canada.[10] Sources of other greenhouse gas emissions amenable to allowance trading also participate in the trading program. Participants may also purchase credits from other specified sources, such as landfills and sequestration, to augment the cap.[11] Increasing the emissions allowed in Canada through one or more of the international cooperative implementation mechanisms can also raise the cap.

This option is assumed to be implemented cooperatively by the federal and provincial governments since the former has jurisdiction over foreign trade while the provinces have jurisdiction over production of fossil fuels. Implementation details, whether implemented at the well head or at gas processing plants and oil refineries for example, remain to be defined. Treatment of the fuel used as feedstock also needs further analysis.

Option 5

A trading program is established for the carbon content of fossil fuel transported across provincial or national boundaries. The owner of crude oil, natural gas, coal and petroleum products shipped across provincial or national boundaries must hold allowances equal to the carbon content of the fuel. Exporters receive allowances equal to the carbon content of the crude oil, natural gas, coal or petroleum products exported.

A cap is imposed on the carbon content of the fossil fuel shipped by participants. Again it is assumed that sources of other greenhouse gas emissions amenable to allowance trading also participate in the trading program. And it is assumed that purchasing credits from

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[10] Canada's commitment under the Kyoto Protocol covers the five years from 2008 through 2012. The caps for participants in a domestic emissions trading program could be for five years or for a shorter period, such as one year. This is one of the design features to be discussed in issue paper 8.

[11] If credits for emissions reductions prior to 2008 can be used to meet commitments after 2008 owners of such credits could also use them to help achieve compliance.

other specified sources or through one or more of the international cooperative implementation mechanisms could augment the cap. Treatment of the fuel used as feedstock in this option needs further analysis.

This is similar to option 4 except that it excludes fossil fuel produced and consumed within a province. This consists mainly of coal used by electric utilities but also includes some oil and gas in producing provinces. The amount of coal, oil and gas consumed in producing provinces could be substantial, since it includes most coal used to generate electricity, fuel use and losses in gas processing plants, fuel use and losses in several oil refineries, and fuel used as feedstock for a number of petrochemical plants. Thus, the share of total energy-related CO_2 emissions covered by the trading program is lower than for option 4. But, the assumption that all sources bear a fair share of the burden means that these emissions would be covered by other policies.

It is assumed that this trading program could be implemented and administered by the federal government alone, while option 4 is assumed to involve cooperative implementation by the federal and provincial governments. However, provincial governments would need to implement policies to regulate the emissions associated with energy produced and consumed within the province under this option.

Option 6

The carbon content of fossil fuel is regulated at the narrowest point in the distribution chain to minimize the number of participants in the trading program. This is likely to be the mines or preparation plants for coal, refineries for oil, and processing plants or pipelines for natural gas. The design must ensure that imports of crude oil, natural gas, coal and petroleum products are covered while exports of those products are excluded. Again, the participants in the program would be required to hold allowances equal to the carbon content of the fuel purchased or sold.

In practice this option could be very similar to option 4 or 5 because those options might choose some of the same control points for administrative reasons.[12] As with the other options, sources of other greenhouse gas emissions amenable to allowance trading also participate in the trading program and the cap established for participants could be augmented through international trade or purchases of credits from other domestic sources. How to deal with fuel used as feedstock also needs further analysis.

Option 7

[12] Another possibility is to use strategic points in the distribution chain to administer the trading program, but to leave responsibility for compliance further upstream as in option 4 or 5. Thus, gas pipelines might be obligated to help administer the program by collecting allowances for the carbon content of the gas transported from the shipper. If responsibility for the carbon content was imposed at the well head as in option 4, allowances would need to be transferred with any change in ownership between the wellhead and the pipeline shipment.

To have a voluntary credit trading program in the context of a national emissions reduction commitment, governments would need to accept industry assurances that they will achieve emissions reductions equal to their fair share of the national commitment and allow industry to establish a voluntary credit trading program to achieve the reductions at least cost. To ensure that Canada met its national commitment, governments would presumably insist that if the voluntary program did not meet its commitments participants would be subject to mandatory emission reduction measures and possibly penalties. Otherwise failure of the voluntary to achieve the agreed reductions imposes an unfair burden on other sources.

Industry sources participating in the voluntary credit trading program would presumably have targets reflecting their contribution to the national commitment.[13] Sources that reduced their emissions below their target could create credits. Sources that found it costly to meet their target internally could purchase credits. Credits or allowances could also be purchased from domestic programs for non-energy emissions, or through international cooperative mechanisms.

The voluntary credit trading program would cover energy-related CO_2 emissions. Other greenhouse gas emissions could be controlled by emissions (allowance or credit) trading programs. Thus, credits or allowances from other domestic sources and gases or from the international cooperative mechanisms could be used by program participants as well. The treatment of feedstocks is not affected by the trading system in this option.

Option 8

Governments could implement a series of mandatory performance standards, such as energy efficiency standards, to limit emissions and allow voluntary credit trading to reduce the cost of complying with the standards. The performance standards are assumed to be defined per unit of output (or input); for example CO_2 equivalent emissions per tonne of steel, per automobile, or per kWh produced. Sources able to reduce their emissions below the level specified by the standard are able to create credits. Sources that found direct compliance with the standard costly could comply by purchasing credits instead.

The performance standards are not emissions caps for because they are defined on the basis of a unit of output or input. Total allowable emissions would change as actual output (or input) changed. Governments would need to adjust the performance standards to ensure that actual emissions are less than the national commitment. The performance standards facilitate credit trading by helping to define baselines for credit creation. To provide an incentive to purchase credits, the regulations would need to be written to allow sources to use credits to comply with the performance standards.

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[13] The "targets" could be defined in terms of a "trajectory" with declining annual emissions over the 2008-2012 period. To ensure that industry achieves its "target" and the national commitment is met, industry assurances could be supplemented by penalties for failure to achieve the target.

The voluntary credit trading program with mandatory performance standards would cover energy-related CO_2 emissions. Other greenhouse gas emissions could be controlled by emissions (allowance or credit) trading programs. Thus, credits or allowances from other domestic sources and gases or from the international cooperative mechanisms could be used by program participants as well.

Option 9

With mandatory credit trading each participant would have a government established annual limit on its greenhouse gas emissions. It would be required to monitor and report its actual emissions. Actual emissions would need to be below the established limit to achieve compliance. Sources whose actual emissions are below their allowed levels could create credits by documenting their achievements. The credits could be sold to help other sources meet their assigned limits.

This option is similar to option 7 except that the targets for individual participants are mandatory. This option is also similar to a cap and trade system, except that participants do not receive allowances. Instead they must document their reductions to create credits and obtain regulatory approval for the credits before they can be traded. Mandatory credit trading could be applied to fossil fuel producers, importers and exporters in lieu of the cap and trade system proposed in options 4, 5 or 6, or to fossil fuel users in lieu of the cap and trade system proposed in options 11, 12, 13 or 14.

The caps established for participants could be augmented through international trade or purchases of credits from specified domestic sources outside the mandatory trading program, such as landfills and sequestration.

Option 10

A voluntary "cap and trade" system is also possible given a national commitment to limit greenhouse gas emissions. Governments could accept industry assurances that they will achieve emissions reductions equal to their fair share of the national emissions reduction commitment and allow industry to establish a voluntary cap and trade program to achieve the reductions at least cost.

Industry sources, individual firms and possibly industry associations, that provided such assurances would presumably have voluntarily established an aggregate target reflecting their contribution to the national commitment.[14] Participants would need to agree on individual allocations, monitoring, reporting and verification requirements, and penalties for non-compliance. The provisions for monitoring, reporting and verification would need

[14] Again the "target" could take the form of a "trajectory" of annual emissions limits. To ensure that industry achieves its "target" and the national commitment is met, industry assurances could be supplemented by penalties for failure to achieve the target.

to meet government-established minimum standards. Participants could then trade in the same manner as in a government operated trading system.

The voluntary cap and trade program would cover energy-related CO_2 emissions. Other greenhouse gas emissions could be controlled by emissions trading programs. Thus, the cap established for participants could be augmented through international trade or purchases of allowances or credits from other domestic sources. How to deal with feedstocks would need further analysis and could depend on the sources that participate in the trading program.

Option 11

A cap and trade system is established for energy-related CO_2 emissions by fossil fuel users. Participants would include electric utilities and large industrial sources. Large commercial and institutional buildings and medium-sized industrial plants could also be included. Large airlines and railways would participate. Motor vehicle emissions could be covered by including refineries or gasoline retailers. Governments would set a cap on total energy-related CO_2 emissions by participants.[15] Each participant would be required to hold allowances equal to its actual CO_2 emissions.

The total number of participants would probably be much larger under this option than under options 4, 5 and 6. To keep the number of participants small enough for effective administration this option might be reduced to cover only large sources -- electric utilities, large industry, large transportation companies, and producers of gasoline and diesel fuel.

Implementation of this option might involve provincial administration of fixed sources -- industry, electric utilities, and commercial and institutional buildings with federal administration of the transportation sector and federal buildings. As with the other options in this section, sources of other greenhouse gas emissions amenable to allowance trading also participate in the trading program and the cap established for participants could be augmented through international trade or purchases of credits from specified domestic sources.

Option 12

This option is the same as option 11, except that the transportation sector is excluded. Thus, this option is a cap and trade system for electric utilities and large industrial sources, with large commercial and institutional buildings and medium-sized industrial plants included if this does not create administrative difficulties.

[15] Again, the "cap" could take the form of a "trajectory" of annual caps.

The reason for excluding the transportation sector from the trading system is that transportation sector emissions are difficult to accommodate in a cap and trade system. Transportation sector emissions would be regulated by other means.

As with the other options in this section, sources of other greenhouse gas emissions amenable to allowance trading also participate in the trading program and the cap established for participants could be augmented through international trade or purchases of credits from other domestic sources.

Option 13

This option is the same as option 11, except that trading is restricted to the participants. No purchases of credits from other domestic sources are allowed, but purchases through the international cooperative mechanisms are possible. Participants would include electric utilities, large industrial sources, large airlines, railways, and refineries or gasoline retailers. Large commercial and institutional buildings and medium-sized industrial plants would also be included unless the administrative requirements became unwieldy.

The reason for excluding purchases of credits from other domestic sources is to better understand the administrative complexities and economic efficiency added by merging a credit trading option with the basic cap and trade system.

Option 14

This option also establishes a cap and trade system for CO_2 emissions by fossil fuel users, but extends the range of sources covered. As in options 11, 12 and 13 electric utilities, large industrial sources, large airlines and railways would participate directly. The federal and provincial governments would participate directly as managers of government buildings. Municipalities would have caps covering the emissions from residential and commercial buildings and urban transportation.

This option would probably involve more participants than options 11, 12 and 13, but it covers residential and commercial buildings, which are not captured in those options. To keep the number of participants in this option manageable, small municipalities would probably be excluded. Electric and gas utilities , or other groups, could earn credits by implementing energy efficiency and fuel switching options in residential, commercial and small industrial buildings in municipalities that are not part of the trading program.

As with the other options in this section, sources of other greenhouse gas emissions amenable to allowance trading also participate in the trading program and the cap established for participants could be augmented through international trade or purchases of credits from specified domestic sources.

Combinations of Options

Combinations of some of the above options are possible; a voluntary cap and trade system for some sectors and a cap and trade system for other energy-related CO_2 emissions. The reason for defining the designs listed above is to select some of the options for further study. Combining options is desirable only if it leads to a better result that any of the individual designs on its own. Until the strengths and weaknesses of the specific options are better understood, it is not possible to define combinations that achieve this result.

RECOMMENDED SHORT LIST OF DESIGNS FOR FURTHER ANALYSIS

The design options recommended for further analysis are 1, 4, 8 11, 13 and 14.

- Option 1 is a voluntary credit trading program assuming only the prospect of a future commitment to limit greenhouse gas emissions. Such a trading program would be similar to the GERT, PERT and NESCAUM pilot programs and should be analysed in cooperation with participants in those pilots to maximize efficiency and limit duplication of effort.

- Option 4 is a trading program for the carbon content of fossil fuels and petroleum products that involves fossil fuel producers, importers and exporters. It would provide virtually complete coverage of energy-related CO_2 emissions with a relatively small number of participants.

- Option 8 is a voluntary credit trading program with mandatory performance standards to ensure the national emissions commitment is met. The performance standards are assumed to be expressed in terms of emissions per unit of output (or input) and so allow a firm's emissions to vary with output.

- Options 11 and 13 apply to energy-related CO_2 emissions by electric utilities, large industrial sources, large airlines, railways, and refineries or gasoline retailers. Large commercial and institutional buildings and medium-sized industrial plants might also be included. The only difference is that in option 13 trading is restricted to the participants; no purchases of credits or allowances from other domestic sources are allowed.

- Option 14 also establishes a cap and trade system for CO_2 emissions by fossil fuel users, but distributes responsibility for the various users differently than options 11 and 13. They differ in two ways: the approach to motor vehicle emissions (about 20% of total emissions), and inclusion of residential and small commercial sources in option 14.

Option 2 is not recommended for further analysis because credit trading is more likely than a cap and trade program in this policy setting as evidenced by the GERT, PERT and NESCAUM pilot projects. The issues related to a cap and trade system that arise when such a system is voluntary also arise when the trading system is mandatory. Hence, the

issues raised by option 2 will be analysed under options 4, 11, 13 and 14 but in a different policy setting.

Option 3 is not recommended for further analysis because it is essentially the same as option 1 but for a different policy setting. The policy setting for option 1 is currently more relevant and would lead to more trading than the policy setting for option 3. However, part of the analysis of each option on the short list will be issues related to transition to different policy settings. Thus, the analysis of transitional issues for option 1 will address, in part, options 3 and 7.

Options 5 and 6 are not recommended for further study because they are essentially the same as option 4, which is being studied. The share of total emissions covered by option 5 and 6 is likely to be smaller than that covered by option 4. However, if subsequent analysis of jurisdictional issues indicates that option 4 would be difficult to implement, option 5 or 6 could be considered as a substitute.

Option 7 is not recommended for further analysis because it is similar to option 1, which is being recommended. The analysis of transitional issues for option 1 will address, in part, option 7. In addition, option 8, which is being studied, also addresses many of the issues that would arise in option 7.

Option 9 is not recommended for further analysis because the key design issues that highlight the differences between credit trading and allowance trading systems will already be covered by other options in the proposed short list. In addition, this option is very similar to a cap and trade system.

Option 10 is not recommended for further analysis because issues related to a cap and trade system that arise when such a system is voluntary also arise when the trading system is mandatory. Hence, the issues raised by option 10 will be analysed under options 4, 11, 13 and 14 although some of those issues would be resolved by industry participants, rather than governments, under option 10.

Option 12 is not recommended for further analysis because it is the same as option 11, which is being recommended, except for exclusion of the transportation sector. If the analysis of option 11 encounters difficulties in accommodating the transportation sector, this would become the default option.

PROPOSED CONTENT OF EXTENDED DESCRIPTIONS OF THE OPTIONS SELECTED FOR FURTHER ANALYSIS

Once a short list of emissions trading program designs has been agreed upon, each option will be described in more detail. The descriptions are expected to include:

- The emissions covered by the trading program

- The sources required to participate in the program
- The number of sources involved
- Share of total emissions covered by participants
- How the trading program would be administered
- How emissions would be measured
- Possible complementary policies, such as efficiency standards
- Any special issues raised by the design, such as treatment of feedstocks
- Transitional issues related to a change in the policy setting
- Issues related to potential future changes in the national commitment (for options 4,8, 11, 13 and 14 only)
- Evaluation of the option using the criteria listed in Table 2.

Table 2: Criteria for Evaluating Proposed Greenhouse Gas Emissions Trading Systems

Economic efficiency
- Cost-effectiveness
- Transactions costs
- Comprehensiveness

Equity
- International equity
- Domestic equity
- Industrial equity

Technical feasibility
- Technical flexibility
- Timing
- Leakage

Political feasibility
- Domestic political compatibility
- International compatibility
- Sovereignty

Administrative feasibility
- Measurability
- Verifiability
- Enforceability

These criteria are drawn from *Analysis of the Potential for a Greenhouse Gas Trading System for North America*, Commission for Environmental Cooperation, Montreal, May 1997, chapter 3, pp. 32-42, and are described there.

ISSUES COMMON TO MULTIPLE OPTIONS

A number of issues are common to several designs and hence can be analysed separately while the design options are being further developed. These issues identified and those recommended for further analysis are listed in Table 3.

Each of the issues is described briefly below. Further work on an issue is recommended unless a reason to the contrary is given.

Issue 1. Determination of the type(s) of emissions trading system suitable for each source/gas covered by the national commitment. The national commitment in the Kyoto Protocol covers anthropogenic greenhouse gas emissions from energy production and use, landfills, adipic acid, lime production, cement production, nitric acid production, aluminum production, magnesium production, fertilizer use, HFC uses, PFC uses, SF_6 uses, methane emissions from livestock, methane emissions from manure, and methane emissions from wastewater treatment. Net changes in emissions due to direct human-induced land-use change and forestry activities, limited to afforestation, reforestation and deforestation can be used to meet the commitment if rules can be agreed. Parties may also agree on rules for governing activities to sequester carbon in other sinks, such as agricultural soils. The analysis required is to determine which of these sources/gases lend themselves to which form(s) of emissions trading. If more than one type of trading system is possible for a given source/gas, the best option should be determined based on considerations such as number of participants, share of emissions covered, ease of monitoring, potential for leakage, etc.

Issue 2. Analysis of legislative authority to implement different forms of emissions trading covering various sources and sinks of greenhouse gases. Some provinces have legislation that explicitly authorizes emissions trading, but other provinces and the federal government do not have such legislation in place. The consistency of the legislation, where it exists, and the legislative requirements to implement various design options need to be examined.

Table 3: Issues Common to Multiple Options and Recommendations for Further Study

Issue	Further Study	Deferred	Description
1	✓		Determination of the type(s) of emissions trading system suitable for each greenhouse gas source or sink
2	✓		Analysis of legislative authority to implement different forms of emissions trading for various sources and sinks
3			Methods to link the domestic emissions trading system to the provisions of the Kyoto Protocol
4	✓		Implications of international trade agreements for design of a

			domestic emissions trading program
5	✓		Options for treatment of fossil fuels used as feedstocks
6	✓		Analysis of options for *gratis* allocation of allowances to participants in a domestic emissions trading program
7	✓		Analysis of options for distributing allowances by auction
8	✓		Analysis of emissions trading program design features
9	✓		Specification of criteria for credit creation where credit trading is accepted
10	✓		Analysis of implications of using life-cycle emissions in trading system designs
11	✓		Evaluation of possible complementary policies
12		✓	Assessment of the administrative resources needed to implement emissions trading for greenhouse gases
13		✓	Evaluation of the need to regulate the allowance/credit market
14		✓	Analysis of the economic effects of different emissions trading systems compared with a regulatory regime
15		✓	Analysis of the ancillary environmental benefits of the anticipated greenhouse gas emissions reductions
16		✓	Analysis of potential market power

Issue 3. *Methods to link the domestic emissions trading system to the provisions of the Kyoto Protocol.* (This is relevant only to options that assume the Protocol is ratified and adopted by Canada.) The domestic emissions trading program would need to be consistent with measurement and reporting obligations under the Protocol. The domestic emissions trading program would also need to be linked to the cooperative implementation mechanisms -- international emissions trading, joint implementation, and the clean development mechanism -- established by the Protocol. This issue is not recommended for further work because it will be addressed by the Emissions Trading Issue Table.

Issue 4. *Implications of international trade agreements for design of a domestic emissions trading program.* In general trade agreements require that imports be accorded the same treatment as domestic products. How that principle, or other more specific requirements, are implemented in a domestic emissions trading program could affect the design of the program. The potential for adverse competitiveness impacts, leakage, frivolous unfair trade practices complaints, and retaliatory actions needs to be considered.

Issue 5. *Options for treatment of fossil fuels used as feedstocks.* Petroleum and natural gas products are used as feedstocks in the production of a very wide range of products, including petrochemicals. The cost of the feedstock is generally a significant share of the total cost. Any policy that has the effect of increasing the cost of the feedstock -- carbon tax, emissions trading for the carbon content of fossil fuels, regulations on energy-related CO_2 emissions, etc. -- will have a significant impact on the cost of producing these products. Some of the products, such as asphalt, sequester carbon

for a very long time, while others decay and release the carbon to the atmosphere within a few years. What options are available to reasonably balance the environmental impacts of these products and the economic impact of greenhouse gas policies on the industry?

Issue 6. *Analysis of options for gratis allocation of allowances to participants in a domestic emissions trading program.* Every cap and trade program implemented to-date in the United States has distributed allowances free of charge to participants. But each has used a different allocation rule. While the details of the allocation rule need to be specific to the design option chosen, it is useful to analyse the principles involved and their implications. The work on this issue will clarify the principles involved in *gratis* allocation of allowances and their implications. It will specifically address the treatment of new, expanding and declining sources under *gratis* allocation of allowances. Allowance allocation rules will be compared with the distribution of emission rights implicitly established by credit trading programs.

Emissions trading makes it possible to separate responsibility for limiting emissions from the implementation of emission reduction actions. The possibility of allocating allowances, in whole or in part, to persons or entities not required to hold allowances to cover their actual emissions will also be discussed. Such allocations could be designed to address competitiveness, compensation, or adjustment issues.

Issue 7. *Analysis of options for distributing allowances by auction.* Reasonable arguments can be made for use of an auction or transition from *gratis* allocation to an auction as a means of distributing allowances for greenhouse gases. The design of the auction can affect the outcome and the perceived equity. Thus, an analysis of options for distributing allowances by auction, including the impact of the auction design on prices and options for the use of the revenue raised is needed.

Issue 8. *Analysis of emissions trading program design features.* The design features of an emissions trading program include: emissions monitoring, reporting, audit and verification, permit life, banking, borrowing, price disclosure, trading institutions, operation of the registry, transactions costs, fees, penalties for non-compliance, legal liability for allowance/credit validity, participation of new sources, allocation of allowances to sources that cease to operate, changes to the emissions cap as international commitments change, etc. All of these issues need to be decided before an emissions trading program to meet regulatory requirements can be implemented. In most cases, the principles involved are the same regardless of the specific program design, so it makes sense to analyse them independently.

Issue 9. *Specification of criteria for credit creation where credit trading is accepted.* Sources not covered by a cap and trade program are assumed to be subject to other policies that limit their emissions. Some of those sources will be able to create credits be reducing their emissions beyond the levels required. In general, such sources should be allowed to create credits for sale to other sources or to purchase credits for compliance with their obligations if that is less costly. That raises questions of criteria for

credit creation and use, which in turn may influence the way regulations are structured. The scope for credit trading also needs to be defined for each design to avoid double counting. In option 14, for example, credits created by a utility that implements energy efficiency measures in buildings within a participating municipality leads to double counting.

Issue 10. Analysis of implications of using life-cycle emissions in trading system designs. Emissions trading systems generally deal with actual emissions by participants. To address "upstream" emissions, firms involved in production, processing and transportation of energy must also participate in the trading program or be subject to other policies governing their emissions. Making participants in the trading system responsible for the life-cycle emissions, rather than their direct emissions, might allow the overall regulatory structure to be simplified. This issue paper will analyse the implications of using life-cycle emissions as the basis for different credit and allowance trading design options.

Issue 11. Evaluation of possible complementary policies. Complementary policies are measures that enhance the efficiency, effectiveness or equity of the selected emissions trading program as a domestic policy to achieve the national commitment. They could include policies to facilitate credit creation and use by sources and sinks outside the trading program; policies such as efficiency standards for buildings, vehicles, appliances and equipment, to reduce barriers to achievement of greater energy efficiency; or policies to assist adjustment in industries and communities affected by the domestic policy to achieve the national greenhouse gas commitment.

Issue 12. Assessment of the administrative resources needed to implement emissions trading for greenhouse gases. To implement an allowance trading system, regulators need to verify that reported emissions are accurate. This involves periodic testing and inspection of monitoring equipment, quality control on reported emissions, and implementation of missing data procedures as required. If a "buyer beware" approach is adopted for credit trading, regulators do not become involved until a participant proposes to use credits for compliance. A registry that tracks ownership of allowances and credits is required. This can be operated by the regulator or by an independent agency.

In an allowance trading system, the regulator determines compliance by comparing verified actual emissions with allowance holdings for each source. In a credit trading system, the regulator verifies that credits used to achieve compliance meet the established criteria. Enforcement action is then taken against sources not in compliance. The federal and provincial governments need information on the administrative resources required to perform these functions under allowance and credit based systems. It is recommended that further work on this issue be deferred until detailed emissions trading options have been developed and are being evaluated.

Issue 13. Evaluation of the need to regulate the allowance/credit market and how best to meet that need. The financial aspects of emissions trading programs in the United States have not been regulated. The allowances are not listed on a stock or commodity

exchange. Brokers help to match buyers and sellers, but the brokers are not regulated. Regulation of the financial aspects of the trading programs has been considered unnecessary since the participants are large companies which should be able to protect their own interests. An emissions trading market for greenhouse gases might be so much larger or involve less sophisticated participants that some regulation of the market is desirable. It is recommended that further work on this issue also be deferred until detailed emissions trading options have been developed and are being evaluated.

Issue 14. *Analysis of the economic effects of different emissions trading systems compared with a regulatory regime to meet the same commitment.* Such an analysis can only be completed after the emissions trading designs have been well specified. The economic effects should include both domestic effects on production and consumption of various goods and services and the international effects on trade and financial flows. This requires specification of the international context, including the adoption of greenhouse gas emissions commitments by Canada's major trading partners. That provides a basis for assessing the impacts of alternative policy options on the competitiveness of different industries. Options for addressing these impacts should then be considered. The options could range from adjusting the policies to reduce the competitive impacts to assisting affected industries and communities to adjust to the impacts. Since the analysis can only be performed after the detailed emissions trading options have been developed, it is recommended that further work on this issue be deferred until that time.

Issue 15. *Analysis of the ancillary environmental benefits of the anticipated greenhouse gas emissions reductions.* Many measures that reduce greenhouse gas emissions also reduce emissions of other pollutants. Lower emissions of these other pollutants may have human health or environmental benefits. Lower emissions of other pollutants may also reduce spending to control the emissions of those pollutants. These ancillary benefits of limiting greenhouse gas emissions vary with the location of the emissions reductions. Thus, it is not possible to analyse the ancillary benefits of a proposed trading system until the option has been modeled. Hence analysis of the ancillary benefits is deferred until detailed emissions trading options have been developed and are being evaluated.

Issue 16. *Analysis of potential market power.* An emissions trading system requires that a competitive market be established if it is to function efficiently. If the number of participants in the market is small, or if a few of the participants control a substantial share of the allowances or credits bought or sold, those participants may be able to wield market power -- to influence prices higher or lower to their advantage. The potential for market power can not be analysed until the proposed trading system is well defined and so is deferred until detailed emissions trading options have been developed and are being evaluated.