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EXTENDED DESCRIPTION OF OPTION 12:

DOWNSTREAM CAP AND ALLOWANCE GREENHOUSE GAS EMISSIONS TRADING (excluding transportation)

Prepared for:

Multistakeholder Expert Group on Domestic Emissions Trading

National Round Table on the Environment and the Economy
Table ronde nationale sur l'environnement et l'economie

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December, 1998

EXTENDED DESCRIPTION OF OPTION 12:
DOWNSTREAM CAP AND ALLOWANCE GREENHOUSE GAS EMISSIONS TRADING

INTRODUCTION

A July 1998 National Round Table on the Environment and the Economy (NRTEE) paper on *Possible Designs for a Domestic Emissions Trading Program for Greenhouse Gases* identified fourteen possible designs for a domestic emissions trading program for greenhouse gases. Six of those designs were selected for further analysis and were subsequently discussed at a meeting of the NRTEE's Multistakeholder Expert Group in September 1998. At that meeting, it was agreed that four of the six options should be elaborated in greater detail and that one of the NRTEE options that had not been considered should be assessed further. Table 1 provides an overview of all of the options that have been considered in the NRTEE process.

TABLE 1 – POTENTIAL DESIGNS CONSIDERED BY THE NRTEE

Option	Extended Description Prepared	Description of Measure
Prospect of a Future Commitment to Limit GHG Emissions		
1	X	Voluntary credit trading
2		Voluntary cap and trade system
No Specific Prospect of a Commitment to limit GHG Emissions		
3		Voluntary Credit Trading
A Commitment to Limit GHG Emissions Exists		
4	X	Cap and trade on carbon content of fossil fuels produced and imported
5		Cap on carbon content of fossil fuels crossing provincial and international borders, with trading by the 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	X	Voluntary credit trading with mandatory performance standards
9		Mandatory credit trading
10		Voluntary cap and trade system
11	X	Domestic cap and allowance trading (including transportation), with domestic credit trading
12	X	Downstream cap and allowance trading (excluding transportation), with domestic credit trading
13		Domestic cap and allowance trading (including trasnportation)
14		Domestic cap and allowance trading – trading by large fuel users and municipalities (transportation and commercial /residential buildings), with domestic credit trading

This paper provides an extended description of Option 12: Downstream Cap and Allowance Greenhouse Gas Emissions Trading (excluding transportation). It draws on an earlier paper prepared for the NRTEE (Description of Different Potential Allowance Trading Programs for Canada)[1] as well as comments on that paper made by members of the NRTEE Multistakeholder Expert Group.

This paper covers the following issues:

- a description of the trading program;
- descriptions of similar existing programs;
- the sources and emissions covered by the trading program;
- the number of participants in the program and the share of total emissions covered by participants;
- how the trading program would be administered;
- how emissions would be measured;
- possible complementary policies;
- transitional issues related to a change in the policy setting; and
- evaluation of the option against a number of key criteria

DESCRIPTION OF THE TRADING PROGRAM

NRTEE Option 12 is a mandatory cap and allowance emissions trading system. It is assumed that it is implemented in response to Canada adopting a national commitment, such as the Kyoto Protocol, and then taking action to implement it.

Under this system, a cap is set on total greenhouse gas emissions from a group of emitters and the regulator issues allowances that provide a right to emit a portion of the cap. All participants in the system are required to hold allowances equivalent to their actual emission levels. Participants that have surplus allowances can sell those allowances to sources whose emissions exceed their allowance holdings.

NRTEE Option 12 is exclusively applied "downstream", at the level where emissions actually occur. It is also possible, however, to apply an emissions trading system "upstream" (e.g., fossil fuel producers) and to regulate the substances that will ultimately produce emissions as opposed to the emissions themselves. At their meeting in September 1998, the NRTEE's multistakeholder expert group had a lengthy debate about the relative strengths and weaknesses of an emissions trading system that focused only on downstream emitters.

It is clear that such a system does have strengths. After all, requiring downstream emitters to hold allowances to cover their emissions provides a clear and tangible incentive to reduce emissions and to sell surplus allowances. If an emissions trading system is implemented upstream, the producer or distributor of the substance that produces

[1] This paper was prepared in September 1998 by Barbara Campbell and Robert Hornung of the Pembina Institute and Erik Haites of Margaree Consultants.

emissions can only influence the behaviour of users by changing the price. It is not clear, however, that these price increases can be transmitted in their entirety or that a downstream emitter will respond to them.

On the other hand, there are millions of sources of greenhouse gas emissions in Canada. It is administratively impossible to include all of these sources in an emission trading system. As a result, an emission trading system focused downstream sacrifices comprehensiveness.

This is clear in NRTEE Option 12. This option requires major point source users of fossil fuels (e.g., electric utilities, key industry sectors) to hold allowances equivalent to their emissions of greenhouse gases. The system also includes a number of non-energy sources of greenhouse gas emissions where there is some degree of comfort that emission levels can be accurately estimated or measured.

A number of key sectors, however, are excluded from the program because they are characterized by a large number of small emitters. These include greenhouse gas emissions from the residential, commercial and road transportation sectors.[2] The administrative burden of enrolling these emission sources in the program is unmanageable.

As a result, NRTEE Option 12 only covers 44% of Canada's greenhouse gas emissions. This partial coverage has implications for the economic efficiency and equity of the system. In essence, both are compromised unless complementary policies (e.g., regulations and taxes) are implemented to address sources not participating in the emissions trading program. It is difficult, however, to design these complementary policies such that the marginal cost of greenhouse gas emission reductions will be the same between participants and non-participants in the emissions trading system.

NRTEE Option 12 does allow greenhouse gas sources and sinks not participating in the system to produce greenhouse gas emission reduction credits through a voluntary credit trading program. These credits are denominated in the same units as emission allowances and are convertible into emission allowances. This provides participants in the cap and allowance emissions trading program with increased flexibility because they can use credits purchased from sources outside the program to cover their emissions. In fact, NRTEE Option 12 also allows participants in the system to make use of credits and allowances generated by the Kyoto Protocol's flexibility mechanisms once they become operational.

Incorporating voluntary credit trading program into NRTEE Option 12 does increase the administrative burden (measurement, verification, enforcement) associated with the program. The extent to which new and incremental emission reductions will be generated is difficult to predict.

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[2] NRTEE Option 11 incorporates transportation-related emissions into NRTEE Option 12 by requiring petroleum refiners to hold allowances for the carbon content (future emissions) of the transportation fuels they sell. An addendum to this paper explains the implications of such a change for NRTEE Option 12.

DESCRIPTIONS OF SIMILAR EXISTING PROGRAMS

Several downstream cap and allowance emissions trading programs have been implemented in the United States to address a range of environmental issues. This section will briefly discuss two of the best known of these trading programs.[3]

"Title IV Acid Rain Program"

The legislation to create this sulphur dioxide cap and allowance emission trading program was passed in 1990 under Title IV of the US *Clean Air Act* of that year. The program is designed to achieve a 7.7 million metric tonne reduction in SO_2 emissions from electric utilities between 1995 and 2010.

In Phase I, which runs from 1995 through 1999, 110 utilities are required to hold emission allowances for 263 high emitting coal-fired boilers. Depending on how these units are operated, utilities may choose or be required to include other units under their control. The actual number of units participating in the program has exceeded 400 each year so far. In Phase II, beginning in 2000, an additional 1,800 boilers are required to enter the program.

The number of allowances distributed each year drops as the emissions cap becomes more stringent. Each allowance allows an emitter to emit a short ton of SO_2. Distribution of allowances to participants in the program is *gratis* and is based mainly on historic fuel purchase levels, but adjusted by numerous special provisions. Non-utility sources can opt-in to the program and receive an allocation of allowances. Only two industrial and one small utility source have opted into the program so far.

In 1995, 8.74 million tons of allowances were allocated and this fell to 8.30 million tons in 1996. Trading volumes were 1.92 million tons in 1995 and 4.41 million tons in 1996. Most trades were among units within the same utility; internal trading was about double the level of inter-company trading. During 1998, allowance prices have increased from about $100 to $200 per ton.

Monitoring of emissions under the program is extremely strict, using tamper-proof Continuous Emission Monitors (CEMs). Operators with emissions that exceed their allowances must pay automatic administrative penalties (currently almost 20 times the current trading price for allowances) and must also purchase allowances to make up for the exceedance. To date, the government costs of administering the program and transaction costs have been relatively low.

"RECLAIM"

[3] The descriptions of the trading programs below are adapted from those appearing in: Chris Rolfe, *Turning Down the Heat - Emissions Trading and Canadian Implementation of the Kyoto Protocol.* Vancouver: West Coast Environmental Law Research Foundation, 1998, pp. 226-228.

California's South Coast Air Quality Management District (SCAQMD) established the Regional Clean Air Incentives Market (RECLAIM) as an alternative to command and control regulations for large point sources of NOx and SOx. The cap and allowance emission trading program applies to all facilities (about 330) that emitted 3.6 tonnes or more of nitrogen oxides and sulphur oxides in 1990 or later. Smaller facilities can elect to join the program; only four have done so to date.

Emission allowances are issued *gratis* to participants on the basis of historic production levels and emission factors applicable to the type of facility. If a facility does not trade allowances, allowable emissions decline by about 7-8% per year. New and significantly modified facilities must obtain allowances to offset their emissions, and are still subject to regulated technology standards.

Sources can also make use of credits created by reductions at other sources not regulated under the program (as in NRTEE Options 11 and 12). In 1994, emissions reductions at other sources produced credits equivalent to 4.5% of NOx allowances and 9.7% of SOx allowances. While this sounds significant, the reality is that actual emissions had been 16% to 37% below the allocated allowances over the first three years of the program. As a result, credits from outside sources do not represent a significant part of the program.[4] The percentage may rise as the RECLAIM caps become more stringent. Credits cannot be banked, so there is no incentive to use credits from external sources unless they are needed during the current year.

A complaint that has been made about the RECLAIM program is that at the outset, allowable emissions were higher than actual baseline year emissions. This was a result of giving firms flexibility in determining historic production and emission levels that were the basis for allowance allocation, and all firms chose high production and emission years. However, actual emissions do not appear to have increased during the initial years. There is disagreement as to whether RECLAIM's emission results represent an improvement over the original air quality plan, but the program is projected to save about $58 million compared to the costs of prescriptive standards.

THE SOURCES AND EMISSIONS COVERED BY THE TRADING PROGRAM

NRTEE Option 12 is a downstream cap and allowance emissions trading system. It will regulate a significant portion of energy-related greenhouse gas emissions from the combustion of fossil fuels by requiring major point source users of fossil fuels as an energy source to participate in the program. The vast majority of energy-related greenhouse gas emissions are carbon dioxide, but methane and nitrous oxide emissions associated with fossil fuel combustion will also be included in the program through the use of internationally accepted global warming potential figures to convert these emissions into carbon dioxide equivalents.

[4] Southern California Air Quality Management District, RECLAIM Program Three Year Audit and Progress Report, May 8, 1998.

The following sources of energy-related greenhouse gas emissions would be required to hold allowances equivalent to their emission levels under the program:

- electric utilities using thermal generation;
- large industrial users of fossil fuels (petroleum producers and processors, pipeline companies, pulp and paper, iron and steel, smelting and refining, chemicals, cement, petroleum refining, and large-scale manufacturing); and
- airlines[5].

As noted earlier, the large number of small emitters of energy-related greenhouse gas emissions in the residential, commercial and transportation sectors are excluded from the program because of the administrative complexity their inclusion would engender.

The program will, however, extend beyond energy-related greenhouse gas emissions. Indeed, the following sources of non-energy-related greenhouse gas emissions would also be required to hold allowances equivalent to their emission levels under the program (once again, global warming potential figures would be used to calculate carbon dioxide equivalents):

- upstream oil and gas producers (fugitive CO2 emissions)[6],
- large landfills (CH4, CO2)[7],
- adipic acid producers (N20),
- aluminum smelters (CO2, PFCs),
- lime and cement producers (CO2),
- ammonia producers (CO2),
- coal mining companies (CH4), and
- nitric acid producers (N20).

To provide increased flexibility to participants in the program, it will be possible for many sources of greenhouse gas emissions that are not participating in the program to produce greenhouse gas emission reduction credits.[8] These credits should be in the same units as allowances and should be convertible. This would allow sources that create

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[5] Airlines are included because they are small in number and an important contributor to overall emissions. Other sources of transportation-related emissions (e.g., cars, freight trucks) are not included because the number of entities (companies or individuals) owning these vehicles are too large to be incorporated into this system. It should be noted that airlines will only be responsible for emissions generated by flights within Canada as there is as yet no agreement internationally on the assignment of responsibility for fuels associated with international transportation (bunker fuels).

[6] NRTEE Issue Paper # 1 (Potential of Including Non-Combustion Sources of GHG Emissions in a Domestic Emissions Trading Program) concludes that it would be difficult to establish emissions rights trading or credit trading programs for fugitive methane emissions from oil production and natural gas production, transmission and distribution. It is too difficult to make accurate estimates of these emissions.

[7] NRTEE Issue Paper # 1 estimates that 65% of methane emissions from landfills come from only 120 of Canada's approximately 10,000 landfills.

[8] The extended description of NRTEE Option # 1 (Voluntary Credit Trading) examines issues related to the creation of such credits and the administration of a credit trading system. These issues will not be explored in detail in this paper.

emission reduction credits to sell those credits to participants in the program who require additional allowances to meet their actual emission levels. Some of the activities that would be eligible to create credits under the program include:

- actions to reduce emissions from fossil fuel use in residential and commercial buildings as well as the small industrial and transportation sectors,
- actions to reduce non-energy related emissions from sources like enteric fermentation and livestock manure, and
- actions to sequester carbon.

It will be important to carefully define the greenhouse gas emission sources eligible to create credits to avoid the possibility of double counting. Clearly, sources that are covered by the downstream cap and allowance emissions trading program will not be eligible to create credits.

Finally, it will also be possible for participants in the program to apply allowances or emission reduction credits obtained through the Kyoto Protocol's "flexibility" mechanisms (i.e., international emissions trading, joint implementation, and the Clean Development Mechanism) against their emissions. At this time, the rules and operating procedures of these mechanisms are under negotiation. As a result, it is not yet clear what types of emission sources and emission reductions will be covered by these programs.

THE NUMBER OF PARTICIPANTS IN THE PROGRAM AND THE SHARE OF TOTAL EMISSIONS COVERED BY PARTICIPANTS

The number of participants in the program is determined by the "point of regulation".[9] In essence, the point of regulation defines what entities will be required to hold allowances equivalent to their emission levels. There are three potential points of regulation:

- individual emission sources within a facility or plant,
- individual facilities or plants within a company, or
- individual companies.

The number of individual emission sources covered by this trading program is too large to be administratively manageable. While it is certainly necessary to measure and monitor greenhouse gas emissions at the individual source and facility level, it is not necessary to make this the point of regulation. In fact, this paper assumes that the point of regulation will be at the corporate level. Making this assumption limits the number of participants in the program and provides corporations with the flexibility to seek find least cost emission reduction options across all of their facilities before having to enter the trading market.

Simply identifying the point of regulation as the corporation is not enough. It is also necessary to determine which corporations will participate in the program. Many of the

[9] This concept is discussed in more detail in US Carbon Emissions Trading: Some Options That Include Downstream Sources (Center for Clean Air Policy, 1998)

sectors to be covered by this downstream cap and allowance emissions trading system include both small and large companies.

There are tens of thousands of companies that produce greenhouse gas emissions in Canada. It will not be possible to include all of them in this emissions trading system. Fortunately, most of Canada's industrial energy use and energy-related greenhouse gas emissions from industry occurs within seven industrial sectors, and most of the energy use within these sectors is concentrated within a small number of companies. Nonetheless, avoiding administrative impracticality will still probably require the establishment of a minimum annual emissions level (e.g., 100 kt of GHG emissions per year) beyond which it will be mandatory for a company to participate in the program.[10]

In this situation, there is a danger that firms regulated under the system will simply break into smaller units or that smaller companies will obtain an unfair competitive advantage because they fall outside the system. As a result, it is necessary to ensure that complementary policies are implemented that impose similar costs on all firms within a sector whether or not they are participating in the emissions trading system.

[10] Of the 86 leading submissions made by industry to the Voluntary Challenge and Registry (VCR) in 1997 (as determined in a review by the Pembina Institute), 72 had emissions of more than 100 kt in 1996. This figure is high, however, because most of these sources have included emissions associated with the production and distribution of the electricity they use in their greenhouse gas emission inventories. In this option, those emissions are the responsibility of electric utilities. As a result, the number of these VCR participants meeting the 100kt limit is likely to be somewhat smaller.

Table 2: Number of Participants and Emissions Covered by the Program

Participant Category	Total Sectoral Emissions[11]	# of Prog. Part.[12]	% of Sectoral Emissions Covered[13]	Est. Emissions Covered[14]	% of National Emissions[15]
Energy-Related GHG Emissions					
Power Generation[16]	103,000	11	100	103,000	17
Upstream Petroleum[17]	55,800	600	80	44,640	7
Pulp & Paper	10,200	14	80	8,160	1
Iron & Steel	15,000	12	100	15,000	2
Smelting & Refining	2,800	10	80	2,240	
Chemicals	7,600	30	80	6,100	1
Petroleum Refineries	2,100	13	100	2,100	
Cement Production	3,700	5	80	2,960	
Other Industry	35,600	200	55	19,580	3
Airlines	10,800	2	100	10,800	2
Non-Energy-Related GHG Emissions					
Upstream Petroleum[18]	47,350	n/a	22	10,600	2
Landfills[19]	18,250	120	65	11,860	2
Adipic Acid Production	10,850	1	100	10,850	2
Aluminum Smelting	9,600	11	100	9,600	2
Lime and Cement[20]	7,630	40	80	5,890	1
Ammonia	3,800	10	100	3,800	1
Coal Mining	1,700	28	80	1,360	
Nitric Acid Production	930	9	100	930	
TOTAL	**346,710**	**1,116**	**78**	**269,470**	**44**

[11] 1995 GHG emissions in kilotonnes of CO2 equivalent, from Environment Canada's *Trends in Canada's Greenhouse Gas Emissions 1990-95(* detailed tables in Appendix A-2), unless otherwise noted.

[12] These figures are preliminary estimates of the number of participants that would be expected to participate in the program, given the threshold levels discussed in the text. They have been drawn from a variety of sources, including: industry associations, VCR submissions, and Statistics Canada, and need to be further confirmed and refined.

[13] Estimates of portions of sectoral emissions that would be covered by program participants.

[14] Sectoral emissions multiplied by estimated percent that would be covered by these programs.

[15] Estimated emissions covered as a percent of total national GHG emissions.

[16] Emissions in this row include predominantly power generation by utilities, but also power generation by industrials. The number of companies in this row are utilities only. The number of industrial companies are listed by sector, along with GHG emissions that are not from power generation.

[17] This row addresses oil and gas producers and pipeliners.

[18] It is assumed that fugitive methane emissions are not included in the system. The number of participating companies has already been included under energy-related emissions.

[19] It is assumed that only large landfills (more than 2 million tonnes of waste) participate in the program.

[20] The number of potential participants does not include the major energy-using cement manufacturers identified above.

As Table 2 illustrates, the number of participants is large enough to ensure a competitive market, but small enough to ensure the program is manageable and administratively feasible. Indeed, the United States' SO2 emissions trading program will involve significantly more participants as of the year 2000.

Table 2 also illustrates, however, that coverage of emissions under the system is limited. Less than half of Canada's greenhouse gas emissions (44%) will be covered under this program. This makes consideration of complementary policies for sources not participating in the program a necessity if Canada would hope to meet a binding emission reduction commitment.

It may be that allowing sources not covered under the program to engage in emission reduction credit trading will increase both the number of participants and the percentage of Canada's emissions covered by an emissions trading framework. The extent to which this is the case will depend on a number of factors.

For example, if potential credit creators face no legal requirement to hold emissions to a specific level themselves, there will be much less incentive to create credits. At the same time, the demand for credits will be influenced by the rules established regarding credit use (e.g., can they be banked?). While no definitive answer can be provided at this time, it is unlikely that the addition of voluntary credit trading will significantly increase the coverage provided by this emissions trading program.

HOW THE TRADING PROGRAM WOULD BE ADMINISTERED

This paper does not address the issue of which government jurisdiction should have responsibility for implementing a downstream domestic cap and allowance emissions trading system for greenhouse gases. The Canadian Constitution provides no clear guidance in this regard. It is clear, however, that at this time any level of government seeking to establish a domestic emissions trading system for greenhouse gases would need to pass new legislation to obtain all the authority required. The issue of legislative authority for an emissions trading program is discussed in more detail in NRTEE Issue Paper 2.[21]

Setting out the rules governing this emissions trading system will be a time consuming process that will likely require the participation of all relevant stakeholders, including both federal and provincial governments. A full discussion of the range of administrative issues that must be addressed in either an allowance or credit trading system can be found in NRTEE Issue Paper 8.[22] Some of the rules that will need to be developed concern:

- Allowance use and transfer (who needs allowances, who can hold allowances, how to distribute allowances, what are the units of measurement, banking and borrowing).

[21] This paper is entitled "The Legislative Authority to Implement a Domestic Emissions Trading System".
[22] This paper is entitled "Analysis of Emissions Trading Program Design Features".

- Registration, reporting and monitoring (what are monitoring and reporting requirements, what information is public or confidential).
- Audit and verification (who determines compliance, role of third party audits, power to acquire information, administration of penalties in cases of non-compliance).

The addition of a voluntary credit trading system will require the development of an additional set of rules. These rules will have to address issues such as: baseline establishment, liability, criteria for credit creation, and the role of life-cycle emissions accounting in the system. This paper will not focus on these issues as they are already discussed in the extended description of NRTEE Option # 1 on Voluntary Credit Trading.

The NRTEE multistakeholder expert group was unable to address many issues related to the administration of this emissions trading system at their meeting in September 1998. As a result, Table 3 proposes potential responses to some of the key design issues raised in NRTEE Issue Paper 8 for the consideration of the expert group.

Table 3 – Key Design Issues and Proposed Responses

Design Issue	Potential Response
Distribution of Allowances	*Gratis* distribution to participants initially. The NRTEE expert group did express an interest in also examining the potential to move toward an auction of allowances over time.
Holders of Allowances	Any entity can hold allowances (e.g., they can be purchased by an environmental group and be retired).
Allowance Unit of Measurement	1 tonne of carbon dioxide equivalent
Banking and Borrowing of Allowances	Banking for future use should be allowed, but borrowing from hypothetical future allowances should not.
Allowance Life	Throughout the period covered by Canada's binding emission reduction commitment(s).
Price Disclosure	Through brokers.
Compliance Period	One year with a grace period at the end of the year (60 days) to allow participants to come into compliance.
Liability	The seller is liable and pays a penalty if he does not have enough allowances to cover emissions.
Penalties for Non-Compliance	Stiff fines and a requirement to purchase allowances to come into compliance.

HOW EMISSIONS WOULD BE MEASURED

It is essential to be able to accurately measure actual emission levels in a downstream cap and allowance emissions trading program. There are several different ways to measure and/or estimate actual emissions and it is likely that a mix of these methods will be required to ensure that all participants are meaningfully engaged in the program. These measurement options include:

- Continuous Emissions Monitoring (CEM) through sophisticated tamper-proof devices. This may well be an effective measurement tool at large point sources of emissions like coal-fired electricity generating stations.
- Tamper-proof fuel meters could be used to monitor fuel use and then standard conversion factors could be used to calculate greenhouse gas emissions.[23] This might be more appropriate for smaller source of energy-related greenhouse gas emissions.[24]
- Modelling might be necessary to develop estimates of emissions for some non-energy-related sources of greenhouse gas emissions such as methane from landfills.

The trading program rules will need to specify the type of monitoring equipment each source is required to install, test procedures to ensure that it is operating accurately, and also specify protocols for emissions estimation in the event of missing data for all sources. Missing data protocols should be designed to bias the estimates upward so that participants have an incentive to keep their monitoring equipment operating properly. Where modelling is required to estimate emissions, the trading program rules will have to clearly specify the protocols to be used and ensure that they are used consistently by all sources. It is likely that sources would be subject to periodic verification audits by the government authority or a third party.

The measurement protocols established can have a major impact on system design. For example, NRTEE Option 12 requires petroleum refineries to be responsible for the greenhouse gas emissions generated through their combustion of fossil fuels on site. If these emissions are measured through fuel use meters instead of continuous emission monitors, some problems could arise. This is because petroleum refineries use fossil fuels as non-energy feedstocks in the production of other goods that sequester the carbon contained in the feedstocks. Under this scenario, petroleum refiners would need to be allowed to create emission reduction credits for the carbon sequestered for 20 years or more in the products produced.[25] This issue doe not arise, however, if measurement occurs through continuous emissions monitoring.

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[23] The conversion factors related to energy-related greenhouse gas emissions are reasonably accurate and virtually all of Canada's greenhouse gas emissions inventory is calculated through the use of such factors.

[24] There is some debate as to whether or not continuous emission monitors or fuel meters provide the more accurate estimates of emissions.

[25] Issues regarding the treatment of fossil fuel feedstocks in an emissions trading system are discussed in more detail in NRTEE Issue Paper 5: Design Options in a Domestic Emissions Trading System for the Treatment of Fossil Fuels Used as Feedstocks.

Adding domestic credit trading to the system poses additional measurement challenges. An emission reduction credit is the difference between actual emissions and baseline emission levels, where baseline emission levels are the level of emissions that would have occurred if a specific emission reduction action had not taken place. To have confidence that credits purchased from non-participants are of equivalent value to emission reductions generated by participants requires that: (a) actual emissions can be measured with a high degree of confidence, and (b) accurate baseline levels can be established for credit generators.

Actual emission levels can be determined through the use of tools like those described above. In a credit trading system where baselines are determined by regulations such as performance standards (NRTEE Option 8), it is also straightforward to determine baseline levels. It is likely, however, that the credits traded under NRTEE Option 12 would be created without the benefit of a regulated baseline (NRTEE Option 1). As a result, estimating baseline levels becomes much more complicated. This is because there is an inherent difficulty in assessing "what would have happened" and this becomes more problematic as time passes and other factors influence events.

If credits are awarded for emission reductions that are not "additional" (i.e., they would have happened anyway), the participant purchasing that credit is allowed to increase emissions even though no real incremental emission reduction has occurred. As a result, that participant is simply passing on the responsibility for generating real emission reductions to other participants in the program – creating real equity concerns. This issue and a number of others related to credit creation are discussed in more detail in NRTEE Issue Paper 9.[26]

POSSIBLE COMPLEMENTARY POLICIES

An emissions trading program is one of several measures to address greenhouse gas emissions. Complementary policies will often be required to: create a demand for allowances and credits, ensure the integrity of the trading system, remove barriers to the implementation of greenhouse gas emission reduction measures, and to ensure that sources outside the program also take steps to reduce greenhouse gas emissions. Some of these types of policies are discussed further below, but all of them are discussed in more detail in NRTEE Issue Paper 11.[27]

With regard to NRTEE Option 12, there is clearly room for the implementation of complementary policies that remove barriers to the implementation of greenhouse gas emission reductions. It is true that this option does provide a strong incentive for participants to find cost-effective ways to reduce emissions that can mitigate the need to purchase additional allowances to cover expanded emission levels.

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[26] This paper is entitled "Possible Criteria for the Creation of Emission Reduction Credits Under a Domestic Emission Reduction Credit Trading Program.

[27] This paper is entitled "Policies that Could Complement a Domestic Emissions Trading Program for Greenhouse Gases".

Even such a price signal, however, may not be enough to overcome a number of well known barriers to action to reduce greenhouse gas emissions. Some examples of such barriers include: institutional barriers (e.g., institutional cultures), information barriers (e.g., a lack of information about greenhouse gas emission reduction opportunities), and financial barriers (e.g., lack of access to capital). If these barriers exist, participants in the trading system may be unable to respond to price signals by implementing the lowest cost emission reduction options. This threatens the economic efficiency of the emissions trading system.

Implementation of complementary policies that help to overcome these barriers will improve the economic efficiency of an emissions trading system. Some examples of such policies include: utiltity demand side management programs, information and education programs, energy audits, procurement programs, the removal of subsidies and the provision of financial incentives for the purchase of specific energy efficient or climate friendly equipment.

As noted earlier, this emissions trading system will only address 44% of Canada's greenhouse gas emissions. Such partial coverage threatens both the environmental and economic benefits of implementing an emissions trading system.

The environmental benefits are threatened because incomplete coverage raises the possibility of "leakage" – emissions simply being transferred from participants in the system to emission sources not covered by the system. For example, if some companies in a sector are participants in the system and others are not, non-participating companies could gain a competitive advantage in the marketplace, increasing its emissions.

The economic benefits are threatened because an emissions trading system is designed to equalize the marginal cost of emission reductions across the system. If emission sources outside the system are not receiving the same price signal, and different sectors are regulated with different stringency, the result could be price distortions across sectors that make it more costly to achieve an environmental objective.

Sources of greenhouse gas emissions outside the emissions trading program can be addressed principally through regulations or standards and taxes. The use of taxes provides the best opportunity to ensure that the marginal cost of emission reductions is equalized between participants in the program and non-participants. At the same time, however, it is important to try to ensure that participants in the emissions trading system do not face a "double burden" in the form of a regulated limit on emissions and a tax. The number of participants in NRTEE Option 12 is relatively small. It should be possible to exempt them from a tax imposed on non-participants in the program.

There is also an important role for the use of regulations (e.g., energy efficiency standards for appliances, equipment, buildings and vehicles) in addressing emissions from sources not included in the emissions trading system. It is difficult, however, to ensure that the price signal generated by these regulatory changes is consistent with that produced by the emissions trading system.

TRANSITIONAL ISSUES RELATED TO A CHANGE IN THE POLICY SETTING

As noted earlier, NRTEE Option 12 is described as being implemented in a policy context where a national commitment, such as the Kyoto Protocol, has entered into force, and that Canada will be required to implement policies to reduce greenhouse gas emissions. The downstream cap and allowance emissions trading system serves as the mechanism through which Canada has allocated responsibility for a portion of its climate protection commitment to specific sources.

If such a binding commitment is subsequently abandoned, it would be unlikely that Canada would continue its mandatory cap and allowance emissions trading program.

In reality, however, Canada has signed the Kyoto Protocol and there is a prospect that it will enter into force - although this is not guaranteed. Once again, with no mandatory commitment in place for Canada under the Kyoto Protocol, it is unlikely that NRTEE Option 12 will be put into place.

On the other hand, implementing NRTEE Option 12 suddenly when a binding commitment is undertaken could impose serious economic costs if steps have not been taken by system participants to reduce their emissions in preceding years to close to the level of allowances that will be available. There are several steps that could be undertaken to ease this transition:

- A voluntary credit trading system with meaningful incentives could be established to encourage learning about emissions trading and to generate some emission reductions.
- Regulators could inform participants that a system will be put in place at a specific future date and could provide participants with the rules that will govern the system at that time.
- A voluntary pilot program could be established among companies that have made voluntary commitments to limit their emissions to a specific level to provide a learning opportunity for potential system participants and regulators. As the allocation issue would not need to be addressed, the pilot could focus on the mechanics of a cap and allowance trading program. This would include issues related to measurement, reporting, and verification.
- A wide range of other policies (e.g., regulations or taxes) could be implemented to provide a strong incentive for potential participants to begin to take actions to reduce their emissions.
- A mandatory cap and allowance emissions trading program with less stringent emission caps could be established prior to the "commitment period" to provide an opportunity for system participants and regulators to familiarize themselves with the system.

EVALUATION OF THE OPTION AGAINST A NUMBER OF KEY CRITERIA

NRTEE Option 12 will now be evaluated against a set of criteria that the NRTEE is using to assess all of the emissions trading systems it is examining.[28]

Economic Efficiency

This section on economic efficiency focuses on emission reduction costs, by looking at cost-effectiveness, transaction costs, and comprehensiveness.

Cost-effectiveness

Cost-effectiveness involves implementing the least expensive (to participants and society as a whole) measures to achieve a given level of net greenhouse gas emissions reductions. It requires that each source find the lowest cost options to reduce its greenhouse gas emissions and that the marginal cost of reducing greenhouse gas emissions be equalized across all sources. It also means that the costs of greenhouse gas emissions should be reflected in product prices so that the mix of goods and services consumed adjusts to "economize" greenhouse gas emissions to an appropriate degree.

NRTEE Option 12 only covers 44% of Canada's greenhouse gas emissions. This means that it will be difficult to equalize the marginal cost of reducing greenhouse gas emissions across all sources. The addition of a voluntary credit trading system and access to the Kyoto Protocol's flexibility mechanisms improve cost-effectiveness, but the ultimate cost-effectiveness of the program will be determined by the extent to which actions taken to reduce emissions from sources outside the program produce similar marginal costs of emissions abatement. As noted earlier, this will be difficult to achieve, although regulators are likely to get closer if taxes are used to address non-participating sources instead of regulations.

Transaction costs

Transaction costs include the costs of obtaining needed information, identifying potential traders, effecting trades, and the administrative costs of managing and participating in the program. The criterion of minimizing these costs, all else being equal, covers both the program administrators as well as participants.

In the early stages of a cap and allowance emissions trading program, before a smoothly running system is in place, transaction costs can be relatively high in terms of obtaining needed information, finding trading partners, and effecting the trade. These costs are reduced as a trading service with brokers and a database becomes more streamlined. Over time, it would be expected that the transaction costs for participants will be very low relative to the value of the trades.

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[28] These criteria were drawn from *Analysis of the Potential for a Greenhouse Gas Trading System for North America,* Commission for Environmental Cooperation, 1997, Chapter 3, pp. 32-42.

It should be noted, however, that adding the dimension of domestic credit trading will tend to increase transaction costs. No longer is the issue simply one of measuring actual emissions and monitoring trades in allowances. Under a credit trading system, program participants will face increased transactions costs because credit trading requires participants to invest in identifying, analyzing, and selecting credits. Program administrators will then be required to audit some or all proposed credits against a number of criteria to ensure their environmental effectiveness prior to certification for use. All of this requires significant incremental resources.

Over time, however, these costs will be lessened by the entry of brokers into the marketplace. In addition, the fact that lower cost emission reduction opportunities may be made available through credit trading may help to offset some of the increased transaction costs.

Comprehensiveness

The comprehensiveness of a program involves maximizing the portion of total emissions covered, the range of greenhouse gas emission sources and sinks, and the various sectors of the economy that are included. As noted earlier, this system is not very comprehensive as it only addresses 44% of Canada's total greenhouse gas emissions. Including a domestic credit trading component is unlikely to have a large impact on comprehensiveness because domestic credits are likely to be only a small part of the program. It is assumed that emission sources not covered by the program are addressed through complementary policies.

Equity

Equity can be defined at various levels (e.g. equity among individuals, firms, regions, or nations) and in different ways (e.g. based on relative shares of emissions, ability to pay, or vulnerability to impacts). The equity criteria applied here focus on equity between nations, people of varying income levels, and industrial sectors.

International equity

The objective with respect to international equity is to minimize the cost burden borne by developing countries as a result of the program. NRTEE Option 12 does not affect international equity because it is addressed primarily through the international agreements that establish national commitments.

It should be noted that NRTEE Option 12 does include credits obtained through the flexibility mechanisms of the Kyoto Protocol. The Clean Development Mechanism (CDM) should produce a transfer of funds from industrialized countries to developing countries and is specifically tasked with the promotion of sustainable development.

Domestic equity

Domestic equity seeks to minimize the incremental burden on low-income groups and to ensure an equitable distribution of impacts on income groups and regions. Equity concerns could possibly be addressed through the distribution of allowances under NRTEE Option 12, but further analysis is required to understand equity concerns and solutions.

It should be noted that a cap and trade program is anticipated to reduce overall costs of compliance for firms, such as industry and utilities, and therefore should reduce the costs passed on to consumers relative to other forms of greenhouse gas emissions management (e.g., regulation).

Industrial equity

The criterion of industrial equity constitutes a fair distribution of the cost of emissions containment and reduction across industrial sectors. Another aspect of industrial equity has to do with new versus existing sources.

Once again, the issue of comprehensiveness is a concern. The contribution to be made by participants in a cap and allowance emissions trading program is much clearer than the contribution to be made by sources that are only required to take action as a result of emissions charges or other forms of regulation. It will be hard to devise complementary policies that guarantee equity between participants and non-participants. The cap and allowance emissions trading system should, however, equalize costs per tonne of greenhouse gases reduced among participants.

The addition of domestic credit trading could improve industrial equity as it provides more emission reduction options to program participants and can help (in a small way) to equalize marginal costs between program participants and non-program participants. A cap and allowance trading system will tend to favour existing sources, if there is an initial *gratis* allocation of allowances, over new sources that must purchase allowances or provide offsets for their entire emissions limit. These elements of industrial inequity can be addressed to a degree through the program design and possible adjustment measures (e.g. compensation, transition assistance). These issues are discussed further in NRTEE Issue Papers 6 and 7 on the allocation of allowances.

Technical feasibility

Technical feasibility covers key aspects that contribute to the reliability of achieving greenhouse gas reductions by the agreed amounts. Included in this set of criteria are flexibility of potential reduction options, timing of reduction measures, and leakage of emissions to outside the program.

Technical flexibility

Technical flexibility includes flexibility in the amount, location and technology of reduction measures that can be implemented. The greater the flexibility, the more choices participants have with respect to the level of emission reduction they implement in-house versus purchasing credits, the geographic location of reduction projects, and the types of existing or new technologies they apply. Greater flexibility provides more options for emissions reduction, perhaps at lower cost due to the broad range of options.

A cap and allowance emissions trading program with domestic credit trading and access to the Kyoto Protocol's flexibility mechanisms offers a significant amount of technical flexibility. Technical flexibility is somewhat limited, however, by the lack of comprehensiveness in the program.

Timing

The objective with regard to timing is to provide flexibility in the timing of reductions and incentives for early action. The design features of the program determine the extent to which this is achieved. If banking is allowed, as proposed in NRTEE Option 12, sources would have flexibility in the timing of their actions.

Leakage

In terms of leakage, it is desirable that the program minimize the likelihood that greenhouse gas reductions in one place would lead to counterbalancing increases elsewhere.

Generally, trading programs reduce compliance costs relative to regulatory programs, so leakage would tend to be lower under a cap and allowance emissions trading model. This is because the program participants would tend to have lower costs than the non-participants (who are assumed to be regulated), so there would be no incentive to circumvent the trading program.[29] If, however, complementary policies are not implemented to address non-participant sources, leakage could be a serious concern because NRTEE Option 12 covers less than 50% of Canada's greenhouse gas emissions.

Political feasibility

Any trading or other program must be compatible with several dimensions of the present and future political context, including: energy, environmental, fiscal and other policies; international agreements and commitments; and issues of national sovereignty.

[29] For example, if compliance costs within the program were higher than outside, more leakage would be expected in terms of, for example, companies splitting into smaller entities in order to fit below the minimum emissions threshold for mandatory participation in the cap and trading program.

Domestic political compatibility

Domestic political compatibility entails minimizing potential conflicts with existing and future domestic policies. Although future policy is not known, this assessment is based on recent trends in policy-making. A cap and allowance emissions trading program is in keeping with a move toward market-based mechanisms, deregulation, and utilities market restructuring. A mandatory cap is in keeping with emissions limits on other pollutants.

International compatibility

International compatibility involves minimizing potential conflicts with existing and future international regimes, including of course the Framework Convention on Climate Change (FCCC), and trade agreements such as NAFTA, GATT and the possible MAI.

NRTEE Option 12 is consistent with the FCCC and the Kyoto Protocol. Generally, an emissions cap and trading program is in keeping with the direction a number of other countries are taking with respect to the control of air emissions through the use of market mechanisms.

Sovereignty

Sovereignty is the ability of countries and their citizens to act according to national policies and self-interest with a minimum of international interference and pressure. NRTEE Option 12 does not threaten Canada's sovereignty and would not impinge on other countries' sovereignty.

Administrative feasibility

In order to function, any program must be able to be feasibly carried out by the participants and the government agencies. Three key aspects of administrative feasibility are measurement, verification and enforcement of emissions and reductions.

Measurability

The criterion of measurability seeks to minimize the uncertainty and complexity of measuring emissions levels and reductions.

To the extent that emissions are measured via Continuous Emissions Monitoring (CEM) and/or calculating emissions by applying a conversion factor to metered fuel use, as suggested for most sources in this program, there would be a relatively high degree of certainty in the measurement of actual emissions. Several of the non-energy sources of greenhouse gas emissions proposed for inclusion in the program, however, pose much more of a measurement challenge. As a result, their participation may be characterized by modelling more than measurement, and this definitely increases uncertainty.

The inclusion of domestic credit trading significantly increases concerns about measurability. While actual emission levels can be measured using any one of the techniques described above, emission reductions can only be measured through the development of a baseline that represents what emissions "would have been" if no action had been taken. When a baseline has been regulated through performance standards, this is not a major issue. It is likely, however, that credit trading as envisioned in Option 11 would require the development of baselines on a project by project basis. This process is complex and uncertain.

Verifiability

In order for the program to be viable and effective, the measurement of emissions and reductions needs to be verifiable in an objective manner by a third party. This ensures the reliability of information on which the program is based, and increases the confidence of participants and administrators in the actual performance of emission reductions.

Verifiability in a pure cap and allowance trading program is high when actual emission levels can be determined with a high degree of confidence. This is generally the case in NRTEE Option 12, although all that can be done with some non-energy sources of greenhouse gas emissions is verification of the model used to estimate emissions.

Once again, adding a domestic credit trading component makes verification more difficult. This is because emission reduction need to be verified on a project by project basis and verification requires not only a verification of actual emission levels, but also verification of what emission levels 'would have been' if an action had not been taken.

Enforceability

With regard to enforceability of a program, the objective is to maximize the compliance with allocated emission levels and complementary reductions. For participants to take the program seriously, the capacity and threat of enforcement action must be there.

Under cap and allowance emission trading programs, enforcement can take the form of the imposition of automatic administrative penalties for emission exceedances or other infractions. The potential for strong enforcement exists, but the degree of enforcement will depend largely on the exact trading program design and on the level of resources applied to the enforcement effort.

Adding a domestic trading component to the program makes enforcement more challenging because inspections of multiple sites may be necessary to determine whether credit use is valid. For example, it will be necessary to examine both where the credit has been used and where it has been created. This will require more enforcement resources. Moreover, the fact that emissions measurement is less certain in credit trading systems (due to uncertainties around baselines) makes it more difficult to apply automatic penalties. More discretionary penalties may be required.