



NATIONAL ROUND TABLE ON THE ENVIRONMENT AND THE ECONOMY  
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**National Round Table on the Environment and the Economy  
Table ronde nationale sur l'environnement et l'économie**

**NRT-1998066**  
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Domestic Emissions Trading

**Description of Different Potential  
Allowance Trading Programs for Canada**

- Option 13: Domestic Cap & Allowance Trading**
- Option 11: Domestic Cap & Allowance Trading  
With Domestic Credit Trading**
- Option 14: Domestic Cap & Allowance Trading  
Including Municipalities with  
Domestic Credit Trading**

Prepared for:

**Multistakeholder Expert Group on Domestic Emissions Trading**

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## DESCRIPTION OF DIFFERENT POTENTIAL GREENHOUSE GAS EMISSION ALLOWANCE TRADING PROGRAMS FOR CANADA

### INTRODUCTION

A July 1998 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; this paper provides an extended description of three of these options, as indicated in the table below.

Option	This Paper	Description of Measure
1		Voluntary credit trading
4		Cap and trade on carbon content of fossil fuels produced and imported
8		Voluntary credit trading with mandatory performance standards
13	✓	Domestic cap and allowance trading
11	✓	Domestic cap and allowance trading with domestic credit trading
14	✓	Domestic cap and allowance trading, including municipalities, with domestic credit trading

This paper covers the following issues:

- Examples of existing relevant programs
- A description of the trading program
- 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
- Special issues raised by the design
- Transitional issues related to a change in the policy setting
- Evaluation of the option against a number of key criteria

NRTEE Option 13, domestic cap and allowance trading for energy-related greenhouse gas emissions by energy users, is presented as the base program.<sup>1</sup> Added features to move from this base option to NRTEE Options 11 (the addition of domestic credit trading) and 14 (NRTEE Option 11 with the addition of municipalities, including the residential and commercial sectors) are then provided, as each option builds on the preceding one. This

<sup>1</sup> The suitability of other greenhouse gases / sources for emissions trading is discussed in NRTEE Issue Paper 1, "Determination of the Type(s) of Emissions Trading System Suitable for Each Greenhouse Gas Source or Sink". It is likely that a number of additional sources of greenhouse gas emissions could be linked to any of NRTEE Options 11, 13 and 14 through the use of allowance or credit trading programs.

format is followed within all the sections, so only incremental attributes of the following options are added to the discussion. This also applies to the assessment of criteria; the basic cap and trade program is assessed, followed by the particular attributes that serve to differentiate the options.

## EXAMPLES OF EXISTING RELEVANT PROGRAMS

Several cap and allowance emissions trading programs have been implemented in the United States to address a range of environmental issues. These programs involve the government setting an overall cap on emissions levels for a specified group of participants, allocating emission allowances among the players, and allowing those with surplus allowances to sell them to those needing them to make up a shortfall. This section will briefly discuss the best known of these trading programs, as well as key municipal greenhouse gas emission reduction programs.<sup>2</sup>

### “Title IV Acid Rain Program”

The legislation to create this sulphur dioxide cap and emission allowance 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<sub>2</sub> 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. 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. Each allowance allows a utility to emit a short ton of SO<sub>2</sub>.

The number of allowances distributed each year drops as the cap declines. Distribution is *gratis* based mainly on historic fuel purchase levels, but adjusted by numerous special provisions. Utilities are given the flexibility to choose how they achieve the reductions necessitated by the program. Monitoring of emissions is extremely strict, using tamper-proof Continuous Emission Monitors (CEMs). Operators with emissions that exceed their allowances must pay automatic administrative penalties and must purchase allowances to make up for the exceedance. The caps for 1995 and 1996 (allowances allocated) were 8.74 million tons in 1995 and 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. To date, the government costs of administering the program and transaction costs have been relatively low. During 1998, allowance prices have increased from about \$100 to \$200 per ton.

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<sup>2</sup> 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.

## **“RECLAIM”**

California’s South Coast Air Quality Management District (SCAQMD) established the Regional Clean Air Incentives Market (RECLAIM) as an alternative to their command and control regulations for large point sources of Nox and SOx. The cap and emission allowance 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 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 use credits created by reductions at other sources (as in NRTEE Options 11 and 14). In 1994, emissions reductions at other sources increased the supply of NOx credits by 4.5% and the supply of SOx credits by 9.7%. While this sounds significant, the reality is that actual emissions had been 16% to 37% below the allocated credits over the first three years. As a result, credits from outside sources do not represent a significant part of the program.<sup>3</sup> 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.

## **“FCM and ICLEI”**

The Federation of Canadian Municipalities (FCM) and the International Council for Local Environmental Initiatives (ICLEI) both have nationwide programs to promote and facilitate greenhouse gas emission reductions by municipalities. These are not trading programs, but are geared towards generating inventories of greenhouse gas emissions and sources, establishing emission reduction goals, and collaborating to undertake emission reduction measures. They help municipalities to reduce emissions through measures such as fuel switching, energy efficiency, urban design, and transportation demand management.

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<sup>3</sup> Southern California Air Quality Management District, RECLAIM Program Three Year Audit and Progress Report, May 8, 1998.

The ICLEI program, Cities for Climate Protection (CCP), is international in scope. There are over 180 members worldwide. Of these, over 35 are in Canada, including major cities like: Toronto, Montreal (East), Vancouver, Edmonton, Calgary, Ottawa and Victoria. Together, these cities account for a significant portion of the Canadian population and urban GHG emissions. CCP members set goals, develop policies, take action to reduce emissions, learn from experiences and share success stories. ICLEI provides a networking framework and supporting functions such as training, development and distribution of research findings, manuals and case studies, and assistance with tools and techniques for inventorying, monitoring, and reducing emissions, conducting urban energy analysis, and to help make policy decisions. CCP programs include the Sustainable Transportation Program, the Green Buildings Program, and the Green Fleets Program.

The FCM's program, known as the 20% Club, is a network of municipalities that agree to reduce their emissions, set benchmarks and goals, and work systematically toward greenhouse gas emissions management and reduction over the years in accordance with a plan. The initial phases involve establishing a baseline inventory, then setting goals (such as reducing greenhouse gas emissions by 20% from 1990 levels by 2005), and then working toward the goals. There are some 30 member municipalities in Canada. The FCM provides a focal point and structure, encouragement, and technical assistance. Municipalities gain from each others' experience, learning what measures are good for both the environment (including greenhouse gas emissions reductions and other benefits) and the local economy.

A number of municipalities that have created emissions reductions as part of the ICLEI and FCM initiatives are showing a growing interest in trading as a means to finance the emission reductions required to meet commitments established through these programs.

## **A DESCRIPTION OF THE POTENTIAL DOMESTIC CAP AND ALLOWANCE TRADING PROGRAMS**

The three potential domestic emissions trading programs examined in this paper have at their base a mandatory "cap & trade" program, whereby an overall emissions cap is set for the participant group as a whole. These caps are for energy-related greenhouse gas emissions produced by energy users. Emission allowances are distributed to each participant by auction or 'gratis' according to a specified allocation rule.<sup>4</sup> Each participant must hold sufficient allowances to cover their actual emissions in a given year. Those who hold more allowances than needed may sell them to other participants whose emissions would otherwise exceed the allowances they hold. They could also be banked, if the rules allow.

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<sup>4</sup> There are numerous issues and considerations around the allowance distribution rules, particularly regarding industrial equity. Refer to NRTEE Issue Papers 6 (Analysis of options for gratis allocation of allowances to participants in a domestic emissions trading program) and 7 (Analysis of options for distributing allowances by auction) for a full discussion of the advantages and disadvantages of these two approaches.

The description of the options below assumes that Canada has adopted a national commitment, such as the Kyoto Protocol, and is implementing it. It is also assumed that participants in all three options have access to the Kyoto Protocol's flexibility mechanisms: emissions trading, joint implementation, and the Clean Development Mechanism. The implications of other policy scenarios for these potential emission trading systems are discussed later under transitional issues.

## **THE EMISSIONS COVERED BY THE TRADING PROGRAMS**

These programs cover energy-related greenhouse gas emissions by fossil fuel users. Most emissions will be carbon dioxide; other greenhouse gas emissions related to energy use are also included and will be converted to CO<sub>2</sub> equivalents using agreed-upon factors for global warming potential.

It may well be possible that some non-energy sources of greenhouse gas emissions could be included in these programs. NRTEE Issue Paper 1 examines the applicability of different greenhouse gas emission trading programs to different sources and sinks of greenhouse gas emissions.<sup>5</sup> These programs could be designed to include any non-energy GHG sources and sinks that are viable participants in cap and allowance emission trading systems, or credit trading systems in NRTEE Options 11 and 14.

## **SOURCES REQUIRED TO PARTICIPATE IN THE PROGRAMS**

**NRTEE Option 13:** This program would include the following sources:

- electric utilities using thermal generation;
- large industrial users of fossil fuels (petroleum producers and processors, pulp and paper, iron and steel, smelting and refining, chemicals, cement, petroleum refining, and large-scale manufacturing);
- airlines; and
- petroleum refiners as producers of gasoline and diesel fuels (to cover mobile sources: railways, trucking, automobiles).

A single emissions cap is established for all participants in the program. Portions of this cap are then allocated to individual participants in the program in the form of allowances. Stationary sources, including utilities and industry, will need allowances to cover their emissions as measured or calculated.<sup>6</sup> The same holds true for airlines. Petroleum refineries, however, will also need allowances to cover the carbon content of their gasoline and diesel fuel sales in Canada, to cover emissions from the use of these fuels in the transportation sector.<sup>7</sup>

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<sup>5</sup> NRTEE Issue Paper 1 is entitled "Determination of the type(s) of emissions trading system suitable for each greenhouse gas source or sink.

<sup>6</sup> Approaches to emission measurement are described in a sub-section below.

<sup>7</sup> Note that sales by refineries would also include sales by fuel importers, and that fuel exports would need to be deducted to arrive at mobile fuel sales in Canada.

Within this system, most sources have a strong incentive to take actions to reduce their own emissions. Petroleum refineries, however, have been given responsibility for emissions from the entire transportation sector. This is problematic because these refineries have few policy options to reduce the use of transportation fuels by end users. In fact, their only real option is to increase prices in a manner that reflects the carbon content of the fuels they sell. As a result, this option is much like imposing a carbon tax on the transportation sector.

**NRTEE Option 11:** This option would not change the participants in the cap and allowance trading program, but a broad range of additional sources would have the opportunity to participate as a result of the addition of a domestic credit trading program.

Sources eligible to create credits would be carefully defined to avoid the possibility of double counting. Accordingly, sources that are covered by the cap and allowance trading program would not be eligible to create credits. This means that credits would only be created through reductions in fossil fuel use in the residential, commercial and small industrial sectors.

**NRTEE Option 14:** This option would include all the participants in the cap and allowance trading programs described in NRTEE Options 13 and 11, although petroleum refineries would now only have greenhouse gas emissions produced directly as a result of their own operations capped. In addition, the following sources would be added to the cap and allowance trading program:

- large commercial and institutional buildings;
- federal and provincial governments (who would be responsible for emissions from their building stock); and
- large municipal governments (who would be responsible for emissions from residential and commercial buildings within municipal boundaries as well as transportation related emissions that occur within municipal boundaries).

As stationary emission sources, emissions from buildings are capped in terms of their emissions as measured or calculated. Mobile emissions from road transportation would be capped at the municipal level (based on fuel sales of gasoline and diesel within municipal boundaries, as a proxy for urban transportation), rather than on the basis of the carbon content of gasoline and diesel sales in Canada by petroleum refiners (as in NRTEE Options 13 and 11).

This option requires governments to hold allowances for emissions produced in the buildings sector and it requires municipal governments to hold allowances for emissions from the transportation sector. Unlike the petroleum refineries in Options 11 and 13, these governments do have a range of policies they can implement to influence end use demand for fossil fuels in the buildings and transportation sectors (including taxation).

**All Options:**



The programs could be designed so that participation is either at an individual point source level, such as a utility generation unit or a large industrial plant, or at a company level. Either way, emissions by every source (e.g. smokestack) would need to be monitored. Companies could do intra-corporate trading between individual sources if need be, or if participating at a company level they could simply aggregate across corporate operations to meet their allowance level. These program descriptions assume that trading program participants are at the company level. This approach helps to keep the number of participants manageable and the program administratively simpler.

To have good coverage of emissions, yet not make the program too administratively cumbersome, a minimum annual emissions level (for example, 100 kt per year) would be specified for participating sources (above which participation would be mandatory). This limit would be applied to all sources in NRTEE Options 11 and 13.

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 NRTEE Options 11, 13 and 14, 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.

The 100 kt minimum threshold would also be applied to commercial facilities in NRTEE Option 14. As the total number of federal and provincial governments is small, all would be expected to participate in the program. Finally, minimum thresholds would also have to be established to determine which municipalities would participate in NRTEE Option 14. This could be done on the basis of population and it will be assumed that all municipalities with a population of more than 100,000 people would be included.<sup>8</sup>

## **NUMBER OF SOURCES INVOLVED**

Table 1 provides an overview of the sources and emissions covered by NRTEE Options 11, 13, and 14. As this Table illustrates, the total number of participants in the program would be approximately 400 for NRTEE Options 11 and 13, and approximately 500 for NRTEE Option 14. Clearly, there are many more actual sources of emissions (i.e. smokestacks or tailpipes), but defining program participants at the company or government level (federal, provincial, and municipal governments) keeps the number of participants manageable.

## **SHARE OF TOTAL EMISSIONS COVERED BY PARTICIPANTS**

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<sup>8</sup> The Federation of Canadian Municipalities estimates that among their members, there are about 90 municipalities with populations exceeding 50,000 and about 50 with population exceeding 100,000. The FCM's membership contains most large municipalities in Canada. The 50 largest municipalities are estimated to account for about 60 percent of the Canadian population.

Total emissions covered by the emissions cap in these programs would be approximately 320-350 MT CO<sub>2</sub>E for all three options, more than half of the 1995 national total of 619 MT. Since NRTEE Options 11, 13 and 14 only cover energy-related greenhouse gas emissions, a better comparison is with Canada's total energy-related greenhouse gas emissions. These emissions were 477 Mt in 1995, and NRTEE Options 11, 13 and 14 cover more than 70% of these emissions. There is no discernible difference between programs due to the many rough estimates involved.

This may seem surprising because NRTEE Option 14 adds a number of sources to the cap that were not included under the cap in NRTEE Options 11 and 13. The reason for this lack of variation is that the additional emissions covered through the inclusion of residential, commercial and institutional buildings in NRTEE Option 14 are offset by the fact that NRTEE Option 14 only addresses a portion of transportation emissions (emissions produced in major cities), while NRTEE Options 11 and 13 cover all transportation related emissions. It would be possible to design a program that offered greater coverage by leaving responsibility for transportation-related emissions with petroleum refiners and requiring municipal governments to only be responsible for emissions from the residential and commercial sectors in their jurisdictions.

**TABLE 1: Coverage by an Emissions Cap in NRTEE Options 11, 13 and 14**

Participant Category	Total Sectoral Emissions <sup>9</sup>	# of Prog. Part. <sup>10</sup>	% of Sectoral Emissions Covered <sup>11</sup>	Est. Emissions Covered <sup>12</sup>	% of National Emissions <sup>13</sup>
<b>Options 13 &amp; 11:</b>					
Power Generation <sup>14</sup>	103,000	11	100	103,000	17
Upstream Petroleum Producers <sup>15</sup>	44,100	100	80	35,300	6
Pulp & Paper	10,200	14	80	8,000	1
Iron & Steel	15,000	12	100	15,000	2
Smelting & Refining	2,800	10	80	2,200	
Chemicals	7,600	30	80	6,000	1
Petroleum Refineries (as users of fuels)	2,100	9	100	2,100	
Cement (energy-use)	3,700	5	80	3,000	
Petroleum Refineries (as producers of fuels)	136,300	<sup>16</sup>	100	136,300	22
<b>Not in Option 14</b>					
Other Industry	35,600	200	55	20,000	3
Airlines	10,800	2	100	10,800	2
<b>Subtotal Option 13,11</b>	<b>371,200</b>	<b>393</b>		<b>346,700</b>	<b>55</b>
<b>Option 14 (new source)</b>					
Commercial	27,100	75	50	14,000	2
Public Administration	2,800	13	100	2,800	
Municipalities <sup>17</sup>	158,200	50	60	94,920	15
<b>Subtotal Option 14</b>	<b>423,000</b>	<b>516</b>		<b>322,100</b>	<b>52</b>

#### HOW THESE CAP AND ALLOWANCE TRADING PROGRAMS WOULD BE ADMINISTERED

<sup>9</sup> 1995 GHG emissions in kilotonnes of CO<sub>2</sub> equivalent, from Environment Canada's *Trends in Canada's Greenhouse Gas Emissions 1990-95* (detailed tables in Appendix A-2), unless otherwise noted.

<sup>10</sup> 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 confirmed and refined in the next stage of this process in which options will be worked out in more detail.

<sup>11</sup> Estimates of portions of sectoral emissions that would be covered by program participants.

<sup>12</sup> Sectoral emissions multiplied by estimated percent that would be covered by these programs.

<sup>13</sup> Estimated emissions covered as a percent of total national GHG emissions.

<sup>14</sup> 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 energy-related GHG emissions that are not from power generation.

<sup>15</sup> This industry makes a larger contribution to Canada's greenhouse gas emissions, but a significant portion of these emissions are not energy-related.

<sup>16</sup> The number of refiners in this table does not include importers (data to be sought).

<sup>17</sup> Includes the other half of commercial (14,000kt), all of residential (42,000kt), and an estimated 80% of transportation emissions (102,200 kt) for ALL municipalities. About 60% of the Canadian population is estimated to be represented by the largest municipalities, that would be participants in this program.

This paper does not address the issue of which government jurisdiction should have responsibility for implementing a domestic cap and allowance trading system for greenhouse gases. The Canadian Constitution provides no clear guidance in this regard. It is clear at this time that 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. In reality though, it seems likely that the administration of any emissions trading system would require cooperation between federal and provincial governments. The issue of legislative authority for an emissions trading program is discussed in more detail in NRTEE Issue Paper 2.<sup>18</sup>

Instead, the paper discusses some key areas related to program administration, for which it will ultimately be necessary to assign roles and responsibilities to specific jurisdictions. For example, government clearly has a role in areas such as assigning emission caps, allocating allowances, and certifying credits for use in such a system.

While this list of administrative issues is far from comprehensive, it does provide a sense of some of the broad range of issues that need to be addressed with respect to the design of an emissions trading system. Other key administrative issues, such as the establishment of a registry and enforcement of compliance are discussed in detail in NRTEE Issue Paper 8.<sup>19</sup> One other key issue, the measurement of greenhouse gas emissions, is however, discussed in a subsequent section of this paper.

#### **Defining who must participate in the cap, and setting and revising the level of the cap:**

The first step that needs to be taken to implement a cap and trade allowance trading is to establish a greenhouse gas emissions cap for the program participants.<sup>20</sup> This would require decisions to be made about who the program participants are, what the level of the cap should be, and procedures for adjusting the cap if necessary.

NRTEE Options 11, 13 and 14 clearly define who the program participants would be. Setting an emissions cap under any of these options, however, would be a challenging task. Although the Kyoto Protocol would establish a cap on Canada's greenhouse gas emissions, none of NRTEE Options 11, 13 or 14 address all of Canada's greenhouse gas emission sources. Accordingly, the cap established for the emissions trading system will be some subset of Canada's total cap. The level of the cap will therefore be highly dependent on the range of actions taken to address greenhouse gas emission sources not included in the program. Making adjustments to the cap over time will also require some sense of what sources outside the program are contributing to Canada's emission reduction objectives.

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<sup>18</sup> This paper is entitled "The Legislative Authority to Implement a Domestic Emissions Trading System".

<sup>19</sup> This paper is entitled "Analysis of Emissions Trading Program Design Features".

<sup>20</sup> Sources outside the program are assumed to have emissions controlled through other means (e.g. regulation).

As a result, if Canada is to meet its obligations under the Kyoto Protocol, it must allocate responsibility for reducing emissions at a sub-national level to emission sources. While a cap and allowance trading system can do the job for sources participating in the program, other measures (e.g., regulations, taxes) will need to be applied to other sources to ensure that no source bears an unfair share of the burden of meeting Canada's climate protection commitments. Policies that can be used to address greenhouse gas emissions from sources not included in an emissions trading program are discussed in more detail in NRTEE Issue Paper 11.<sup>21</sup>

**Distributing allowances and meeting allowance levels:**

Once an emissions cap has been established for program participants, it is necessary to allocate allowances that authorize the emission of a specific portion of the cap. This can be done either by auction, in which participants pay for the allowances, or it can be done through '*gratis*' allocation based on some distribution rule (such as historical levels of emissions). A hybrid approach is also possible, in which the program starts out with *gratis* allocation and an increasing portion of the allowances are auctioned off each year. The distribution of allowances under a *gratis* allocation system and the use of revenues generated by an auction of allowances can have important implications for the equity of the emissions trading system. As a result, decisions regarding these factors are often extremely difficult. NRTEE Issue Papers 6 and 7 describe in more detail some of the key issues that need to be addressed when pursuing '*gratis*' and auction allowance allocation, and NRTEE Issue Paper 6 in particular focuses on the equity implications of allowance distribution.

The program design and rules will also have to establish how allowances can be used. Clearly, an allowance can be used to meet the basic requirement that allowances must be equivalent to actual emission levels. It is also possible, however, to allow allowances to have value over time. For example, participants can be permitted to bank allowances for future use, providing increased flexibility to system participants. Issues concerning the banking of allowances are examined in more detail in NRTEE Issue Paper 8.<sup>22</sup>

**Creating rules around credit generation, use, verification and transfer:**

In systems that include a domestic credit trading component (NRTEE Options 11 and 14), governments must establish rules to ensure that the emissions reductions credited actually contribute to the environmental objective. Because credits can be produced by emission sources that do not face a cap on their emission levels under the NRTEE Options being examined here, environmental effectiveness is not guaranteed.

To qualify in a credit trading system, emission reductions will be required to meet certain criteria to ensure that they actually contribute to the environmental goal of reducing greenhouse gas emissions. Criteria widely used in many different emissions trading systems require that the emission reduction be real, surplus and measurable. Other criteria

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<sup>21</sup> This paper is entitled "Evaluation of Possible Complementary Policies".

<sup>22</sup> This paper is entitled "Analysis of Emission Trading Program Design Features".

are also possible. For example, an “additionality” criterion can help to address equity concerns, and other criteria may be used to meet non-climate-related objectives of the emissions trading program. A full discussion of potential criteria for credit creation can be found in NRTEE Issue Paper 9.<sup>23</sup>

Credit creation needs to avoid double counting. If transportation emissions are covered in an emissions trading system through limits on the carbon content of fuel sold, and emission reduction credits are awarded for the scrapping of old vehicles, the reduction will be counted twice. Accordingly, credits can only be generated through reductions in emissions from sources not already covered by a cap and allowance trading program.

The design of the domestic credit trading program element within NRTEE Options 11 and 14 also needs to consider which party will be responsible for ensuring the validity of credits. In an Emission Reduction Credit (ERC) program, (in which ERCs represent a stream of future credits in tonnes per year), government pre-approval of credits is required. This means the onus is on the credit generator to prove the validity of the emissions reduction project before it is valued in terms of credits and may be traded. In an Open Market Trading (OMT) format, Discrete Emission Reduction (DER) credits (which represent a specific quantity in tonnes) are verified after-the-fact. This means that the emissions reduction projects are conducted and the trade made, and then the onus is on the buyer to have purchased valid credits (and to have required the seller to provide adequate proof). NRTEE Issue Paper 8 discusses the different possible roles and liabilities of credit generators, sellers and buyers.

## **HOW EMISSIONS WOULD BE MEASURED**

Accuracy of emissions measurement is key to the effectiveness of a cap and allowance emissions trading program. One way to measure emissions is to require participating sources to implement Continuous Emissions Monitoring (CEM) through sophisticated tamper-proof devices. The trading program rules would 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. Such missing data protocols would be designed to bias the estimates upward so that participants have an incentive to keep their monitoring equipment operating properly. The onus would be on participants to conduct their measurements and reporting in accordance with the trading program protocol. Sources would be subject to periodic verification audits by the government authority.

This form of emissions monitoring equipment could be quite expensive, however, for some of the participants in NRTEE Options 11, 13 and 14. For these sources, continuous emissions monitoring equipment could be substituted with accurate, tamper-proof fuel meters, and then to apply a pre-determined conversion factor to change fuel use into greenhouse gas emission estimates.<sup>24</sup> The conversion factors related to energy-related

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<sup>23</sup> This paper is entitled “Specification of Criteria for Credit Creation Where Credit Trading is Accepted”.

<sup>24</sup> For large stationary sources such as industry or large commercial and institutional buildings using electricity, the emissions from that electricity would be captured at the generating source (either utility or

greenhouse gas emissions are reasonably accurate and virtually all of Canada's greenhouse gas emissions inventory is calculated through the use of such factors.

Obviously, sources for which reliable, accurate, and verifiable measurements of either emissions or fossil fuel use are not feasible could not be part of the trading program.

**NRTEE Option 13:** It is assumed that the stationary sources involved in this option would measure greenhouse gas emissions through either the use of continuous emissions monitoring equipment or through detailed monitoring of fuel use and then using emission conversion factors to develop emission estimates. There is some debate as to which system provides the more accurate data and this issue would need to be examined further before a final decision was taken.

Greenhouse gas emissions from mobile sources, however, could only be measured by determining the carbon content of fossil fuels for transportation sold in Canada by petroleum refineries. Accordingly, it would be critical to have accurate information on the sale of fossil fuels for transportation by fuel type. This carbon content would then be converted into greenhouse gas emission estimates through the use of standard conversion factors.

**NRTEE Option 11:** Adding domestic credit trading to the system poses new measurement challenges. Expanding the program to include outside sources requires a high degree of confidence that credits purchased from non-participants have the same value from an environmental perspective and are truly equivalent.

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 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 continuous monitoring of emissions or fuel use. 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 Options 11, 13, and 14 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. These issues are discussed further in NRTEE Issue Paper 9.

**NRTEE Option 14:** The increased complexity of NRTEE Option 14 (including residential, commercial and institutional buildings and municipal responsibility for

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industrial) based on the actual measured emissions. The remaining emissions to be recorded would be from fuel combusted on site, through the use of conversion factors.

transportation-related emissions) adds further complications to emission measurement. Although buildings are stationary sources, the number of individual point sources covered by NRTEE Option 14 is several orders of magnitude higher than is the case in either NRTEE Options 11 or 13. Many of these sources are small and could not afford continuous emissions monitors. At the same time, however, aggregating data from all of the fuel metering devices so that conversion factors can be utilized is also a challenging task. In the end, this aggregation could be undertaken by utilities on behalf of governments.

An even more complicated situation arises with respect to transportation. Under NRTEE Option 14, greenhouse gas emissions from transportation are the responsibility of municipal governments. It would be very costly to monitor greenhouse gas emissions or fuel use on an individual vehicle basis. Indeed, because vehicles burn transportation fuel both inside and outside municipal boundaries, it will be impossible to estimate greenhouse gas emission levels from transportation within municipal boundaries.

It may, however, be possible to develop a proxy measurement that is greenhouse gas emissions associated with the combustion of transportation fuels sold within municipal boundaries. This information could be collected by aggregating sales data from service stations found in the municipality and then using conversion factors to develop greenhouse gas emission estimates. Measurement protocols would need to be established to ensure that this information was as accurate as possible.

## **POSSIBLE COMPLEMENTARY POLICIES**

An emissions trading program is one of several measures to address greenhouse gas emissions. Complementary policies will 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.

There are many barriers to the implementation of cost-effective actions to reduce greenhouse gas emissions. These 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). While an emissions trading system may help to address some of these barriers, many barriers will still remain. As a result, the implementation of complementary policies that help overcome these barriers can increase the efficiency of an emissions trading system.

Complementary policies that can help to overcome such barriers include: utility demand side management programs, land use planning policies, information and education programs, energy audits, energy efficiency standards, procurement programs, the removal of subsidies and the provision of financial incentives for the purchase of specific energy efficient or climate friendly equipment.



It is also critical to put in place complementary policies that address sources of greenhouse gas emissions not covered by the emissions trading program. This is necessary to ensure that all sources contribute to Canada's climate protection objectives and that no source bears an unfair share of the burden of meeting such a commitment.

Sources of energy-related greenhouse gas emissions outside the emissions trading program can be addressed through regulations or standards, taxes, and subsidies and incentives.<sup>25</sup> With regard to NRTEE Options 11, 13 and 14, for example, it is critical that policies are put in place to address smaller industrial sources of emissions that fall below the 100 kt threshold. Ideally, these policies would ensure that smaller sources face similar compliance requirements and costs as larger sources participating in the trading program. Should the requirements be less onerous, there may be leakage from emission sources within the program to those outside, and this would reduce the effectiveness of the trading program.

For NRTEE Options 13 and 11, it should be possible to implement complementary measures that would reduce emissions from sources outside the program. This is because the number of sources covered by the cap and allowance trading system in both of these options is relatively small. As a result, if specific policies are implemented to reduce greenhouse gas emissions among those representatives in the industrial sector that are not participating in the trading program, it should be possible to exclude participants in the trading program from those measures.

The situation, however, is more complex for NRTEE Option 14. In this option, part of the emissions produced by the transportation, residential and commercial sectors are captured by the emissions cap. Federal and provincial governments could implement additional policies (e.g., fuel economy standards, gasoline taxes) to try and reduce emissions from transportation sources not covered by the cap and allowance trading system. It is impossible, however, to implement these measures such that they only have an effect on sources of transportation emissions outside the trading program.

## **TRANSITIONAL ISSUES RELATED TO A CHANGE IN THE POLICY SETTING**

These three variations on domestic cap and allowance trading programs all assume that a national commitment, such as the Kyoto Protocol, has entered into force, and that Canada has implemented policies to reduce greenhouse gas emissions from all sources. A cap and allowance trading system is the mechanism through which Canada has allocated responsibility for a portion of Canada's climate protection commitment to specific sources.

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<sup>25</sup> It is assumed that non-energy sources of greenhouse gas emissions will be covered by complementary policies. Some of those policies might include emissions trading systems as outlined in NRTEE Issue Paper 1.

It is likely that entry into force of the Kyoto Protocol would be required for any of NRTEE Options 11, 13 and 14 to become a reality. In a situation where the Kyoto Protocol had no prospect of entering into force, it would be unlikely that Canada would establish any mandatory caps on greenhouse gas emissions from specific sources. Currently, 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 any of NRTEE Options 11, 13 or 14 would be put into place.

Under this latter scenario, however, there is an argument for undertaking the preparatory work required to designing a trading program for future implementation. For example, development work to generate the necessary inventory of greenhouse gas emissions at a company level can begin. A number of design issues, relating to allocation, trading rules, monitoring and enforcement can be examined.

Steps can also be taken to move beyond the theoretical. Canada already has in place two pilot credit trading programs (Ontario's Pilot Emission Reduction Trading Program and British Columbia's Greenhouse Gas Emission Reduction Trading Program). A pilot cap and allowance trading program could also be established. Governments could work with major emission sources that have already voluntarily established emission caps (like many companies have already established under the Voluntary Challenge and Registry Program) to design a pilot system. 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.

## **EVALUATION AGAINST A NUMBER OF KEY CRITERIA**

The three emission trading system design options presented in this paper 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.<sup>26</sup> In each case, the criterion will be described and an initial assessment will be made of how NRTEE Option 13 fares against the criterion. Then any additional implications associated with the addition of domestic credit trading in NRTEE Option 11 and with the addition of more sources under an emissions cap in NRTEE Option 14 are addressed. A Table at the end of the discussion summarizes the evaluation and some basic conclusions are drawn.

### **Economic Efficiency**

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

#### Cost-effectiveness

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<sup>26</sup> 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.

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.

**NRTEE Option 13:** One of the main aims of a cap and allowance trading program is to minimize the cost burden of emissions reductions to individual firms and society. To the extent that a smoothly running active trading system enables those parties who can achieve emissions reduction at lower cost to do so and sell allowances or credits to those with higher costs, then this is achieved.

**NRTEE Option 11:** By adding the ability to purchase credits within Canada, the range of different abatement costs is broadened. This can increase cost-effectiveness for domestic sources by providing participants in the trading program with a larger number of options from which to select emission reduction opportunities.

**NRTEE Option 14:** Cost-effectiveness would be expected to improve under this option because a larger number of sources would be involved and required to participate, bringing more low-cost opportunities into the system and reducing overall costs.

#### 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 covers the program administrators as well as participants.

**NRTEE Option 13:** In the early stages of a cap and trade 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.

**NRTEE Option 11:** 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.

**NRTEE Option 14:** The addition of residential and commercial buildings through the inclusion of municipalities in the cap and allowance trading system means that transaction costs will be higher than in NRTEE Option 13 (there are more sources and these are more difficult to measure and verify). At the same time, however, transaction costs may be lower than in NRTEE Option 11 because many sources that had previously only been able to interact in the system through credit trading are now captured by the cap and allowance trading program. In allowance trading programs, transaction costs will be lower on a transaction by transaction basis.

### 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. It must be remembered that all of NRTEE Options 11, 13 and 14 focus only on energy-related greenhouse gas emissions. All three options cover approximately 70% of energy-related greenhouse gas emissions under an emissions cap. The balance of energy-related greenhouse gas emissions is assumed to be covered through complementary policies, and, in the case of NRTEE Options 11 and 14, through a credit trading program.

**NRTEE Option 13:** Cap and allowance trading programs might not be expected to be very comprehensive, because they are best suited to large stationary sources of emissions. By addressing transportation related emissions through the inclusion of fossil fuels sold by petroleum refiners, however, this option is expected to address 70% of Canada's energy-related greenhouse gas emissions.

**NRTEE Option 11:** By including the ability to purchase domestic credits from outside the program, the range of possible sources and sinks and economic sectors participating in emissions trading is increased. It may not, however, significantly enhance comprehensiveness, because domestic credits may only be a small part of the program.

**NRTEE Option 14:** By including many residential, commercial and institutional buildings in the program through the addition of federal, provincial, and municipal governments, comprehensiveness is increased in terms of the types and numbers of sources covered by the program. At the same time, however, coverage of the transportation sector is lower here than in NRTEE Options 13 and 11 because NRTEE Option 14 only addresses the portion of transportation related emissions tied to the sale of transportation fuels in major urban centres. As a result, this option does not cover any more of Canada's greenhouse gas emissions than NRTEE Option 11.

### 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 13:** This option allows for the purchase of credits internationally 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.

**NRTEE Option 11:** Adding the ability to purchase credits domestically would not affect international equity.

**NRTEE Option 14:** Including residential, commercial and institutional buildings municipalities in this program has no incremental effects on this criterion.

#### Domestic equity

Domestic equity seeks to minimize the incremental burden on low-income groups. If the price of staple goods increases, for example, this has a greater negative impact on low-income groups relative to others.

**NRTEE Option 13:** 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).

**NRTEE Option 11:** Adding domestic credit trading to the program should serve to further reduce overall compliance costs.

**NRTEE Option 14:** By making municipalities responsible for greenhouse gas emissions from buildings and transportation within their jurisdiction, this system could affect domestic equity if it results in increased differentials in basic living costs between participating and non-participating municipalities. The net effect will depend on the actions taken by participating municipalities to reduce greenhouse gas emissions. Some policies (e.g., increased parking charges) will increase costs for individuals, while other policies (e.g., residential energy efficiency retrofits) might reduce the burden on individuals.

#### 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.

**NRTEE Option 13:** While this option is predicated on the assumption that all industrial sectors take on some responsibility for meeting Canada's greenhouse gas emission reduction obligations, the contribution to be made by participants in a cap and allowance 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 trading system should, however, equalize costs per tonne of greenhouse gases reduced among participants.

A cap and allowance trading system will tend to favour existing sources, particularly 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.

**NRTEE Option 11:** The addition of domestic credit trading can improve industrial equity; it provides more emission reduction options to program participants and can help to equalize marginal costs between program participants and non-program participants.

**NRTEE Option 14:** This option is also unlikely to have any significant incremental impact on industrial equity. Although smaller industrial sources in major urban areas could be brought under the cap and allowance trading system in this option, these sources will not be required to hold allowances. Instead, these will be held by municipal governments. As a result, industrial equity remains unchanged.

### **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.

**NRTEE Option 13:** A cap and allowance trading program with international allowance and credit trading offers a significant amount of technical flexibility. Although domestic credit trading outside the program is not allowed in this option, emission reduction measures can be sought worldwide. This provides much flexibility in terms of the type and location of reduction projects, as well as technologies employed in-house or externally.

**NRTEE Option 11:** Including in a cap and trade program the ability to purchase credits domestically further increases the flexibility described above.

**NRTEE Option 14:** Including greenhouse gas emissions from part of the residential, commercial and institutional sector through the participation of federal, provincial and municipal governments may increase flexibility because more parties are required to address emissions under the cap - therefore, more options are on the table. On the other hand, the total emissions covered by this option is roughly equivalent to the total emissions covered by NRTEE Options 11 and 13 so this increased flexibility may be limited.

### 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.

**NRTEE Options 13, 11 and 14:** A key program features that determines timing flexibility is whether banking is allowed (it increases flexibility). Incentives for early action are affected by whether the distribution is done by auction or allocation (the latter reduces this incentive, if based on a recent historical year). No assumptions have yet been made with respect to these design features, so no assessment can be made at this time for any of the options presented.<sup>27</sup>

### 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.

**NRTEE Option 13:** Generally, trading programs reduce compliance costs relative to regulatory programs, so leakage would tend to be lower under a cap

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<sup>27</sup> The issues cited are introduced in earlier sections and discussed in NRTEE Issue Paper 8; these are to be discussed in the detailed design phase of this study.

and allowance 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.<sup>28</sup>

**NRTEE Option 11:** Incorporating domestic credit trading would not tend to alter the extent of leakage. While it does reduce costs to participants, the amount of credit trading is likely to be so small relative to the international market that the price effect will be negligible. As a result, the impact on leakage would be nil.

**NRTEE Option 14:** Leakage may increase, however, if larger municipalities are required to hold allowances for emissions from buildings and transportation within their jurisdiction. Under this scenario, a participating municipality may take actions that establish energy efficiency requirements that make it more costly to build new facilities. If similar changes do not occur in smaller municipalities found outside the trading program (and it is not clear that they will because municipalities are not sources of emissions), these municipalities may become more attractive for people building houses or companies expanding their businesses. While it is assumed that the residential and commercial sectors in smaller municipalities would have to take on some emission reduction responsibilities, this would be, as noted earlier in the report, a challenging task.

### **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.

#### **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.

**NRTEE Option 13:** An cap and allowance 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.

**NRTEE Option 11:** Adding a domestic credit trading component is also in keeping with the trend of providing industry with flexibility to meet environmental imperatives.

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<sup>28</sup> 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.



**NRTEE Option 14:** Making municipalities take on responsibility for greenhouse gas emissions is in keeping with a trend towards downsizing, privatization, devolution, and treating municipal governments as businesses.

#### 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 13:** The proposed cap and allowance trading program 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.

**NRTEE Option 11:** The basic trading program described in Option 13 is consistent with the FCCC and Kyoto Protocol; adding a domestic trading component maintains this compatibility.

**NRTEE Option 14:** Adding the residential, commercial and institutional sector through the inclusion of governments in the program has no further effects in this regard than those described under the options above.

#### 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 Options 13, 11 and 14:** These domestic cap and allowance trading programs do 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.

**NRTEE Option 13:** 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. Refiners would also be required to measure the carbon content of the transportation fuels they sell in Canada. While this makes measurability more complex, it does not pose a significant problem.

**NRTEE Option 11:** Including a domestic trading component would make it significantly more difficult to ensure 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.

**NRTEE Option 14:** By requiring municipalities to be responsible for greenhouse gas emissions related to residential and commercial buildings and the transportation sector within its boundaries, measurability is made somewhat more difficult because of the vast number of sources represented. This difficulty can be addressed through aggregation of data at the level of utilities and gasoline retailers, but there can be no doubt that this option is somewhat more complex than NRTEE Option 11.<sup>29</sup>

## 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.

**NRTEE Option 13:** 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 13, although transportation related emissions do require the verification of sales of transportation fuels by refiners within Canada.

**NRTEE Option 11:** Adding a domestic credit trading component makes verification more difficult, 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.

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<sup>29</sup> There are some 17,000 gasoline retail outlets in Canada.

**NRTEE Option 14:** Verification should not be considerably more difficult in this option than in NRTEE Option 11, although more sources are involved and will need to be verified. The new sources included in the program can have their emissions verified through verification of the sales of transportation fuels by gasoline retailers and home heating fuels by utilities.

**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.

**NRTEE Option 13:** Under cap and trade allowance 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.

**NRTEE Option 11:** 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.

**NRTEE Option 14:** Enforceability would not be significantly more challenging in this system than in Option 11. Although a much larger number of point sources are now covered by the system, enforcement must only deal with 100 new sources because it is municipal, provincial and federal governments that must hold the allowances.

**TABLE 2 – SUMMARY OF THE PERFORMANCE OF NRTEE OPTIONS 13, 11 AND 14 AGAINST A STANDARD SET OF EVALUATION CRITERIA**

Evaluation Criteria	# 13	# 11	#14
<b>ECONOMIC EFFICIENCY</b>			
Cost-effectiveness	3	2	1
Transaction costs	1	3	2
Comprehensiveness	2	1	1
<b>EQUITY</b>			
International equity	-	-	-
Domestic equity	1	1	2
Industrial equity	2	1	1

<b>TECHNICAL FEASIBILITY</b>			
Technical feasibility	2	1	1
Timing	-	-	-
Leakage	1	1	2
<b>POLITICAL FEASIBILITY</b>			
Domestic political compatibility	-	-	-
International compatibility	-	-	-
Sovereignty	-	-	-
<b>ADMINISTRATIVE FEASIBILITY</b>			
Measurability	1	2	3
Verifiability	1	2	3
Enforceability	1	2	2

NOTE: Numbers are provided when the three options differ in their ability to meet one of the evaluation criteria. A '1' means that this option is best able to meet the criteria – a '3' indicates the option that does the poorest job of meeting the criteria.

What overall conclusions can be drawn from the evaluation results as presented in Table 2? First, NRTEE Options 13, 11, and 14 do not differ very much in terms of their political feasibility or their impacts on equity. Second, NRTEE Option 14 seems to offer the greatest technical flexibility, comprehensiveness and cost-effectiveness, but it comes at the cost of higher transaction costs and less administrative feasibility.

Indeed, Table 2 makes it clear that no single emissions trading system will score the best with regard to all of these criteria. As NRTEE Option 14 demonstrates, the criteria can often be contradictory and tradeoffs will have to be made when trying to determine what domestic emissions trading system for greenhouse gases is best suited for implementation in Canada.