TRADEABLE PERMITS WORKING GROUP

SUMMARY REPORT

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Note: The Summary Report may be subject to further revision when the Full Report is finalized.

Summary Report

Preface – Table Mandate

Within the National Climate Change Process, the mandate of the Tradeable Permits Working Group (TPWG) has been:

- **to explore the potential contribution of mandatory domestic emissions trading systems towards achieving a substantial reduction in greenhouse gas (GHG) emissions in Canada.**

Emissions trading could be limited to a single industrial sector, in which firms were subject to an emissions constraint. The focus of our report, however, is on potential trading systems that would cover a substantial fraction of total Canadian GHG emissions and apply across several industrial sectors. As well, the focus of our report is on potential trading systems that apply to a period in which a binding target for GHGs had been accepted, though there is some discussion of issues relevant to the application of emissions trading in advance of a commitment period.

We use the label "tradeable emissions permit" (TEP) systems to refer to domestic emissions trading options that require permits to be submitted for a substantial portion of national emissions.

The TEP options presented in this report are described for a scenario in which a targeted emission level, such as Canada's target under the Kyoto Protocol,[1] is assumed to have been accepted. This scenario also assumes that other "Annex B"[2] countries have accepted their targets, and that international trading in emissions rights is available as provided for under the "Kyoto Mechanisms." The purpose of this report is to clarify concepts and issues concerning the use of emissions pricing via a TEP system to achieve a GHG emissions target. Thus, the TEP options presented in this report are not put forward for early final decision, but for consideration for further analysis and design. The major report on domestic emissions trading prepared by the National Round Table on the Environment and the Economy (NRTEE), *Canada's Options for a Domestic Greenhouse Gas Emissions Trading Program*, released in March 1999, has been a highly valuable resource on which the TPWG has built.

If TEP approaches are retained for further consideration in subsequent stages of development of a National Implementation Strategy on climate change, substantial additional work to refine and assess specific TEP options will be required.

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[1] Canada's Kyoto target would be to keep GHG emissions in 2008-2012 to an average level equal to 94% of the 1990 level, subject to adjustment through international trading in emissions rights.

[2] The countries listed in Annex B of the Kyoto Protocol as having quantitative GHG emissions targets – essentially the developed, market-oriented economies (members of the OECD) plus most of the former Soviet Union and East European "economies in transition."

A. Introduction

Achieving reductions in GHG emissions on the scale called for in the Kyoto Protocol is likely to require many decisions made by hundreds of thousands of firms and millions of consumers, to change actions that affect these emissions.

TEP systems are examples of "cross-cutting measures" or "major economic instruments." They work by "putting a price on emissions," which creates an incentive for firms and consumers to reduce GHG emissions through a wide range of actions.

The core of a TEP system is the requirement that emitters of GHGs (or producers of products with which GHG emissions are closely linked) must acquire emissions rights in the form of "permits." Permits equal to their emissions must be submitted to an authority ("retired") on a regular basis (probably annually or semi-annually). These permits are negotiable or tradeable certificates denominated in tonnes of CO_2 equivalent. The government [3] issues permits either by auction or in accordance with some *gratis* allocation. The limit on the total number of permits issued creates a cap on the total of emissions for the parts of the economy covered by the TEP system.

The requirement to submit permits equal to GHG emissions creates a demand for permits. As would be the case under the Kyoto target, we assume that the target for total emissions (and thus, the supply of permits) would be substantially below the "business as usual" level of emissions in the sectors covered by the permits requirement. The price of permits should then, in principle, be bid up to a level high enough to induce reductions in GHG emissions, and corresponding reductions in the need for permits, sufficient to bring emissions and the associated demand for TEPs into line with the limited total supply.

A pricing approach, which directly or indirectly affects the costs of a wide range of GHG emissions, can be effective in inducing many of the actions that firms and consumers would have to take to change production technologies and consumption patterns, in order to achieve major reductions in GHG emissions. It should also be effective in encouraging research and development activities, and, more generally, innovation oriented to the reduction of GHG emissions. Under a TEP approach, firms and consumers make the individual decisions as to how to respond, given the emissions price. This contrasts with approaches under which the specific responses are largely determined by government as, for example, under regulatory approaches in which governments may set detailed standards for allowable emissions levels, or for technologies to be used in different industrial sectors.

Facing as many emitters as possible with the *same* price signal helps to achieve a cost-effective pattern in the emissions reductions undertaken to meet any overall target. It provides an incentive to select those reductions whose cost is no greater than the common price per unit of emissions. It thus helps to avoid unnecessarily costly outcomes, such as the implementation of relatively high-cost emissions reductions in some sectors while much lower cost reductions are available in other sectors but are not exploited.

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[3] Our use of the general term "government" is intended to leave the issue of which level(s) of government might implement a TEP system for later consideration by the intergovernmental process.

As well, a TEP approach, and emissions trading more generally, "enables a distinction to be made between who pays[4] for (i.e. who bears the ultimate burden of) emission reductions and who actually implements emissions reductions actions."[5] The allocation of permits is an important factor in determining who bears the ultimate burden of emissions reductions.

Finally, a TEP system would likely mesh well with international emissions trading. It would provide a straightforward way by which Canada could take advantage of opportunities to reduce the cost of achieving its emissions target that the Kyoto Mechanisms are intended to allow.

A.1 TEP System Design Issues

Potential TEP systems can differ in terms of *coverage***:** how many of the various types of GHG sources in the economy would be subject to the emissions permits requirement. Another important and related issue is the *point of imposition* for permit requirements**,** which can vary from the final emitter (such as where fossil fuel is burned) to points that are upstream of the final emitter (such as fossil fuel distributors, or even further upstream to fuel producers).

Potential TEP systems can also differ in their approach to *the initial distribution or allocation* of permits:

- permits may be sold by governments, probably through some form of auction; or
- permits may be provided free of charge or *gratis* to system participants.

The approaches governing *gratis* distribution of permits and disposition of revenues from auctioning of permits should be based on equity and efficiency principles. There are transitional and international competitiveness issues that may justify a *gratis* allocation for some sectors. The revenue from the auctioning of the remaining permits could be used for purposes ranging from reducing general taxes to providing compensation and/or adjustment assistance to those adversely affected by the requirement to reduce GHG emissions. We assume that a mix of allocation methods would likely be used: auctioning plus one or more *gratis* allocation methods.

[4] The issue of how burden of emissions reduction is eventually shared is complex – see further discussion in "Equity and Incidence Issues" subsection below.
[5] National Round Table on the Environment and the Economy (1999) p. 10.

A.2 Assessing TEP Approaches

The expected economic costs[6] and adjustments involved in reducing emissions may be significant. It is important to note however, that these impacts are primarily the result of achieving the reduction target rather than the method chosen to achieve the reduction. Compared to other methods of achieving emissions reductions, TEP systems offer the prospect of lowering the overall economic cost of achieving the target. As with any policy instrument, it is important to consider regional and sectoral impacts when designing a TEP system so that the economic burdens of achieving emission reductions can be shared equitably.

This Options Report is intended to assist decision makers in choosing whether or not to retain TEP options for further development and consideration. A comparative assessment of the role for a TEP approach in an overall GHG reduction strategy requires an assessment of its benefits, costs and impacts relative to those of alternative means of achieving the Kyoto objectives. Such a comparative assessment is beyond the scope of this report.

A.3 Equity and Incidence Issues

In addition to cost-effectiveness, there are the important issues of the "incidence" of different approaches to achieving GHG reductions. Incidence refers to how the economic burden of achieving emission reductions is likely to be shared. Equity is a closely related concept that may guide decisions as to how the burden *should* be shared

The burden of achieving GHG reductions will generally be shared among:

- people with ownership interests in firms whose production processes involve GHG emissions (or that use inputs whose production involves GHG emissions);

[6] This Options Paper is full of references to the costs and burdens of achieving reductions in GHG emissions. There is no intent to imply that, for the Annex B countries taken as a whole, or for Canada, achieving the Kyoto targets would necessarily constitute a burden, all things considered, relative to "doing nothing about climate change." Over the longer run, the benefits of reducing the extent of climate change and its associated costs could prove to be larger than the costs of reducing emissions. As well, immediate health and environmental impacts are likely to be associated with reductions in regional pollutants that might occur concurrently with reduction in GHGs. These benefits – whether the longer-terms benefits of reducing the extent of climate change (which fundamentally depend on emissions reductions at the global, rather than Canadian, level), or the more immediate health and other environmental benefits that depend more directly on Canadian action – would likely be similar whether a TEP approach, or some other policy approach, were used to achieve a given emissions reduction in Canada.

- consumers of the goods and services produced by such firms, and consumers whose activities directly produce emissions (driving motor vehicles, heating homes);

- those who supply labour and other inputs for which total demand by consumers and businesses is likely to decrease as part of the process of reducing overall emissions;

- the general public whose taxes may be affected by different policies to reduce GHGs. (General tax rates might have to be increased if governments attempted to achieve an emissions target by encouraging emissions reductions through subsidy programs or tax incentives; general tax rates might be lowered if revenues were obtained through auctioning of permits.)

The ultimate incidence of a particular approach is generally not a straightforward matter. The relative burden on an emitting firm does not just depend on the extent of the reduction in emissions that it ends up making, nor does it just depend on the costs it incurs to reduce its own emissions and to purchase any permits required to cover remaining emissions. In general, relative burdens are influenced:

- by the ease with which emitters can reduce GHGs or consumption of related products. (This will affect the direct costs associated with reducing emissions and purchasing permits.)

- in the case of firms, by the extent to which costs incurred to achieve GHG reductions may be "shifted forward" in higher prices for products once markets have fully adjusted to the impacts of the GHG reduction. (As a result of impacts on product markets, the revenue side may provide some offset to higher costs experienced.)

- by the extent to which costs may end up being "shifted backwards" in lower prices for certain inputs. (Impacts on markets for inputs may provide some offset on the cost side.) and

- by the approach used in the initial allocation of TEPs, and/or by the approach to recycling of revenues from auctioned permits.

These factors that affect incidence may be of different relative importance in different regions and different industrial sectors.

When governments impose a requirement that certain emissions be matched by permits, and then make available a limited supply of permits, the result is the creation of a new, valuable asset — the permit. The total value of permits represents a transfer from consumers (who pay higher prices including the costs of permits) and/or producers (who may receive lower prices net of any permit costs). The transfer is initially to the government if the permits are auctioned — and subsequently to whomever benefits from any consequent tax reductions. If the permits are provided *gratis*, the transfer is initially

to whomever receives them (though those people/firms are also likely to be subject to costs associated with the imposition of a permits requirement).

Estimates of the actual incidence of any policy to reduce GHG are likely to be subject to uncertainty and controversy. The issue of how the burden *should* be shared can be expected to be subject to an even wider range of views.

There are two polar views of equity in sharing the burden of reducing emissions:

- Existing emitters have no "right" to continue emitting if emissions are determined to have deleterious effects. This view, which is associated with the "polluter pay" principle, points toward the distribution of permits by auction.

- Existing emitters have a "right" to continue emitting, and compensation should be provided if constraints are imposed on emissions.

What could be characterized as a middle-ground view of equity accepts some case for providing transitional assistance or compensation to firms and individuals that have made investment, location and job choices in good faith, and whose situation is adversely affected by subsequent policy changes. But this view does not accept a "right" to continue emissions indefinitely.

Whatever equity criterion is adopted, the estimated impacts of any given policy approach on individuals at different income levels is likely be of concern. As well, consideration of regional impacts received special emphasis from the federal and provincial first ministers at their meeting in December 1997, and in the principles subsequently accepted by federal, provincial and territorial ministers of energy and the environment in April 1998. Included in these latter principles was the statement: "All sectors and regions should do their share but no region or sector should be asked to bear an unreasonable share of the burden of mitigative actions such that actions would prevent economic growth."

A.4 International Issues

The context in which Canadian policies to achieve GHG reductions are being considered is one in which all Annex B countries are assumed to have accepted obligations to limit emissions as provided in the Kyoto Protocol. More specifically, they are all assumed to be taking action to achieve GHG targets equal to the assigned amounts specified for each Annex B country in the Protocol (these amounts can be adjusted through international emissions trading).

While the details of the Kyoto Mechanisms are still to be worked out, linking a domestic TEP system to international trading should be a fairly straightforward matter. Under full, unconditional linkage, private-sector entities that acquired units of assigned amount of other Annex B countries, and Clean Development Mechanism (CDM) credits, could exchange these for domestic permits (tonne for tonne). There would be an automatic meshing of the domestic TEP system with international emissions trading, in

the sense that imports of foreign-assigned amounts and CDM credits would result in an equal increase in domestic emissions permits and in Canada's adjusted assigned amount. Canadian governments would not have to take any further action (such as further adjustments in the total amounts of domestic TEPs issued and allocated) in order to ensure that total Canadian emissions did not exceed Canada's adjusted assigned amount.

If unrestricted[7] international trading in emissions rights develops and is subject to low transaction costs, then a common international price would be established for units of assigned amounts across the multi-country trading area. The price of domestic TEPs would be equal to the international price and would, in effect, be established in the international market.

A domestic trading system linked to widespread international emissions trading would cause an important change in the nature of the expected impact on TEP prices of other measures or developments that reduce domestic emissions. Under a TEP system with full international emissions trading, measures and technological changes that lower domestic emissions would not be expected to significantly affect the domestic TEP price but rather would be expected to reduce net imports of international assigned amount.

[7] If there were limits on the fraction of a country's GHG target that could be met with imported emissions permits/credits, and if in a particular situation these limits proved to be binding, the country's TEP market would be separated from the international market and the price of permits prevailing in the country in question would be expected to be above the "international price." Such limits are referred to as "supplementarity" conditions," and have been advocated by the European Union.

B. Central Design Issues

B.1 Coverage and Point of Imposition

The *coverage* and *point of imposition* design issues are closely related, and are discussed together here.

The most practical method of monitoring of GHG emissions varies among the six gases and the sources of emissions. Four general categories may be identified:

1. Emissions that can be accurately estimated on the basis of the use of a substance that gives rise to the GHG emission. The most important example of this type is CO_2 emissions from the combustion of fossil fuels.

2. Emissions that can be accurately estimated, for a given process technology, on the basis of measurement of the volume of substances used or product produced.

3. Emissions for which accurate estimation is only possible through direct monitoring of the emissions. Examples include methane and nitrous oxide emissions from large, stationary combustion sources.

4. Emissions for which there is no practical monitoring method, but that can be estimated in aggregate on the basis of experimental data and the overall level and nature of activities with which the emissions are associated. Examples include N_2O emissions from combustion of fuel in vehicle engines and from fertiliser use, and methane emissions from livestock and from landfills.

Emissions that fall into this last category can be expected to be very difficult to include directly within a TEP system or under other policies requiring the monitoring of individual emissions, but estimates of aggregate emissions of these types of emissions are included in the national GHG inventory.

For the first category, one approach to estimation of eventual emissions is to monitor the volumes of the relevant substances used by final emitters. Where the final emitter purchases the substance (e.g. a particular fossil fuel), an alternative approach is to monitor volumes of substance flows “upstream in the substance distribution chain” of the point of emission. This requires that all of the substance is used in a way that leads to domestic emissions, or that other uses (exports, feedstocks) are relatively easy to identify and monitor as exceptions. The burning of fossil fuels falls into this category, since the amount of CO_2 emitted is determined by the carbon content of the fuel used, and fuel uses other than for domestic combustion can generally be identified and monitored.

Imposing a permit requirement at any point will price emissions for all users downstream of that point, except those for whom specific exemption adjustments are made. Applying a permit requirement to the sale of fuel “upstream” of the point of final emissions would increase the price of the fuel at that upstream point. This would feed

through into the price paid by the final emitter, thus providing an incentive to reduce CO_2 emissions by reducing fuel consumption or switching to a fuel that produces smaller quantities of CO_2 when used.

Although it would be possible to use some sort of ration coupon system to impose permit requirements on the millions of final emitters associated with personal and business use of automobiles and space heating, such a system would be complex and costly to administrate. It would be much simpler and less costly to apply a permit requirement upstream of the final emitter at the level of the fuel producers, refiners or wholesalers.

For emissions that cannot be monitored by substance use, the point of imposition would have to be at the point of emission.

Our preliminary judgments of emissions sources for which it would be technically and administratively feasible to estimate the eventual emissions at the final emitter or upstream points (with the degree of reliability and precision that would be required to impose a permit requirement) are shown in the following table. The first column of numbers shows, for reference, the percentage composition of total GHG emissions in Canada. For each of the types of emissions sources listed, a non-zero percentage entry in the second column titled Large Final Emitter indicates a preliminary view of the fraction of emissions of that type that it is feasible to monitor and include in a trading system at the final emitter level. Large final emitters account for about 40% of total combustion CO_2 plus varying fractions of other emissions for which monitoring is practical.

The entries in the third column indicate a preliminary view of the fraction of emissions of that type that it would be feasible to cover through an upstream point of imposition. The entries in the fourth column show the extent to which use of the final emitter point of imposition might be combined with the upstream point of imposition in order to obtain Broad as Practical coverage. The entries in the fifth column show coverage of each type of source that could result from such a combination. This option would cover about 99% of combustion CO_2 emissions plus other emissions that are practical to monitor. The final column converts the percentage coverage of individual source types in the fifth column into percentages of total Canadian emissions, in order to provide an impression of the relative contribution of coverage of different sources to the overall coverage that might be achieved under a Broad as Practical TEP system.

Table: Potential Percent of Emissions Captured under Different Coverage Options

Emissions Category	Percent of Total Emissions in Canada (1996) (667 Mt CO_2 eq)	Potential Coverage Options by Point of Imposition And Emissions Category				
		Large Final Emitter	Broad as Practical			
		% of Source	% of Source			% of Total
			Upstream of Emitter	At Final Emitter	Overall	
Combustion CO_2	67.4	40.8	91	7.7	98.7	**66.5**
Power Generation	15.0	95	100	-	100	**15.0**
Manufacturing/Construction	8.1	70	100	-	100	**8.1**
Mining	1.9	35	88	12	100	**1.9**
Fossil Fuel Industries	6.0	86	5	81	86	**5.1**
Other stationary	12.0	0	100	-	100	**12.0**
Mobile sources	24.4	7.4	100	-	100	**24.4**
Other CO_2	8.1	48	-	48	48	**3.9**
Upstream oil and gas	2.0	40		40	40	**0.8**
Cement/lime production	1.2	80		80	80	**0.9**
Aluminum/Ammonia	1.2	100		100	100	**1.2**
Steel	1.2	80		80	80	**1.0**
Total CO_2	**75.4**	**41.5**	**81.5**	**11.8**	**93.3**	**70.4**
Methane (CH_4)	13.5	10.7	-	10.7	10.7	**1.4**
Upstream oil and gas/coal	5.8	25		25	25	**1.4**
Agriculture	3.5	-		-	-	**-**
Landfills	3.0	-		-	-	**-**
Nitrous Oxide (N_2O)	9.9	18	-	18	18	**1.8**
Agricultural	6.0	-	-	-	-	**-**
soils/fertilizer	1.4	-	-	-	-	**-**
Fuel combustion – mobile	1.8	100	-	100	100	**1.8**
Nitric/Adipic acid						
Other GHGs: (SF_6, HFCs, PFCs)	1.2	76 (PFCs)	18 (SF_6)	76	94	**1.1**
Total GHGs	**100**	**35**	**62**	**13**	**75**	
Number of Firms		400-500	50 (midstream) 425 (upstream)		100-500	

Note: See Table 3.1 in the full report for more detail and notes.

B.2 Coverage Options

Only Large Emitters

A TEP system that covered only large emitters would apply the permit requirement directly to such emitters:

- Emissions from the combustion of petroleum, natural gas and coal would be calculated from the amount of those fuels consumed by the emitters.

- Other emissions would be either calculated from substances used coupled with information on processes employed, or directly monitored, depending on the type of emissions.

Focussing the TEP system only on large emitters could fit with a set of policies in which the large number of smaller sources of emissions were to be covered by other policy instruments. Potential coverage using this approach might be about 35% of total GHG emissions.

Upstream of Emitter Only?

It would in principle be possible to limit coverage of a TEP system to the carbon content of fossil fuels with the permit requirement applied at some point in the distribution chain for such fuels upstream of the final emitter, in other words, to apply a system that only attempted to cover the combustion CO_2 component of total GHG emissions. We have not put this forward as a specific option for consideration, given the importance attached to achieving broad coverage of GHGs.

As Broad as Practical Coverage

Broad as practical coverage would, in general, require the combination of upstream, and large final emitter points of imposition so as to achieve the maximum potential coverage of each type of GHG source. Such an approach could make sense if TEPs were chosen as the major element of the set of policies designed to reach a commitment period target. The broad coverage would transmit the GHG emission price signal throughout most of the economy, and would thus allow a high degree of diversity of choice in the areas and methods of emission reductions. Broad as practical coverage could cover about 75% of total emissions in Canada.

B.3 Initial Allocation of Permits

In a Kyoto scenario of limits on national emissions, Canada's limited GHG emissions rights (equal to 565 megatonnes of CO_2 equivalent emissions per year for the period 2008-2012) would be distributed to Canadians in some manner, implicitly or explicitly, through a set of GHG policies. Under a TEP system, that distribution would be explicit: it would be the method of allocating the permits. When permits were sold, the ownership of the rights would be transferred from government to the buyers in exchange for payments representing the value of the rights. These payments would be divided among the federal, provincial, and territorial governments in accordance with whatever federal-provincial-territorial auction revenue division method were established. When permits were issued *gratis* to various entities, these entities would receive the ownership, and the value, of the rights. We assume that a mix of allocation methods would likely be used: auctioning plus one or more *gratis* allocation methods.

The term "initial allocation" refers to the fact that because these permits are tradeable, the initial allocation may be quite different from where the permits are actually used. Some permits may be allocated to people/firms who are not subject to a permit requirement, but who face higher costs of production due to the application of permit requirements to their suppliers. Many of those who are subject to permit requirements will thus buy permits from others who received them under a *gratis* allocation, as well as from third parties in the secondary market and at initial government auctions.

The approach for permit allocation will affect the distribution across sectors, regions and income groups of the burden of achieving the overall emissions reduction targeted by the permit system. It may also influence the pattern of actual emissions reductions.

Distribution by Auction

Auctioning permits to the highest bidders is an obvious way to distribute a fixed number of permits. As well, a permits system with auction allocation constitutes a useful initial reference case for consideration of the incidence, and behavioural impacts, of a TEP system.

A TEP system with distribution by auction raises the prices of emissions-intensive activities to induce changes that will lower emissions. An (over-)simplified explanation of the underlying process follows.

- The requirement to submit permits, which are acquired in the market either at government auctions or in the secondary market, raises the costs of emissions-intensive activities. Consumers face higher prices for fossil fuels and for goods whose production is emissions-intensive, as firms pass on the costs of their permit requirements.

- The auction revenue received by government is used to reduce taxes.

- Households thus face higher prices driven by the auctioned permits, and (at least partially) offsetting tax reductions, financed by the auction revenue.

There are important circumstances, however, where product prices are unlikely to adjust sufficiently to provide firms with revenues covering the cost of emissions abatement actions and of permits. Firms would then suffer losses on a continuing basis, and the burden of achieving GHG reductions through a TEP approach with auction allocation would be borne only partially, if at all, by consumers.

Specific Approaches to Gratis Allocation of Permits

We focus on two types of situation in which firms would not be able to pass on the costs of permits in higher prices:

- Where industries compete in international markets dominated by non-Annex B producers, who face no constraint on emissions under the Kyoto Protocol, international and Canadian prices would be unaffected by the pricing of domestic emissions in Annex B countries.

- Where existing capital is significantly more emissions-intensive than competitive alternative technologies, prices will rise less than the permit costs associated with continuing to operate such existing capital. Owners of the capital would suffer capital losses.

We thus put forward two motivations for *gratis* allocation of permits: addressing international competitiveness and dealing with significant capital losses.

While a *gratis* allocation could be used to address each of these potential objectives, it is important to note that there are usually other approaches that could achieve the same result, as discussed below.

Addressing International Competitiveness Issues

A *gratis* allocation approach to the competitiveness would involve an ongoing allocation to firms in eligible industries on the basis of benchmark emission intensity rates multiplied by the firms' current levels of specified types of output.

The allocation to a firm would be independent of that firm's actual emissions, because it would be based on the benchmark intensity. Firms would therefore face a continuing incentive to reduce their emissions intensity of output, but would face no cost disadvantage relative to non-Annex B producers, if they adopted or surpassed the technology and practices upon which the benchmark was based.

Implementation of such an approach would pose significant challenges. Specification of benchmark levels of emissions intensity would inevitably involve considerable complexity, coupled with some difficult judgments and a degree of

arbitrariness. As well, the approach would have to be structured so as to be consistent with international trade rules.

There are alternative means of offsetting these competitiveness issues, including exemption from the permit requirement of the Canadian industries most affected or distributing part of the auction revenue in a manner that would mimic the *gratis* permit allocation. Another possibility could be for Annex B countries to arrange for equal treatment of imports from non-Annex B countries whose production is emissions-intensive, with goods produced by emissions-intensive industries in the Annex B countries. This approach would require border permit adjustments by all Annex B countries on imports from non-Annex B countries of goods whose production was GHG emissions-intensive. In principle, it would likely offer the best solution from the point of view of the Canadian economy. If the application of border permit adjustments were based on the methods by which a good is produced, it would be administratively difficult and of uncertain acceptability under World Trade Organization (WTO) rules. It is still an open question whether an alternative approach based on deemed production-related emissions would be acceptable.

Compensation for Capital Losses

In general, *gratis* allocations motivated by compensation for capital loss would be expected to be both:

- partial, in that the allocation of permits would be equal to only a fraction of expected emissions level; and
- temporary, given that a firm's capital business assets, whose value would be adversely affected by imposition of a permit requirement, would not have been expected to last indefinitely.

Compensation for capital losses could also be addressed, in principle, through a distribution of part of the auction revenue to those affected.

Other Specific Approaches: Grandfathering

In the context of emissions trading, the term "grandfathering" has often been used to refer to a *gratis* allocation of permits to emitters on the basis of their historical emissions — emissions in some year prior to the coming into force of the permits regime. In most discussions, the basis of grandfathering is not tied to any specific principle. Rather, it is loosely tied to the notion that providing existing emitters with free permits equal to a substantial fraction of their likely emissions (relative to a TEP system in which all permits are auctioned) can achieve effects such as:

- giving recognition to past investments;

- easing the adjustment faced by industry; and
- reducing the uncertainties to which business is exposed.

However, as a basis for *gratis* allocation of permits, it is widely recognized that historical grandfathering is subject to difficulties:

- Where a recipient of *gratis* permits on a grandfathered basis is in a position to make very inexpensive major reductions in emissions, the value of the permits it receives may far exceed any net extra costs it has to incur.
- In addition, if the grandfathered allocations extend over many years, there will be increasing pressures to make permits available on some *gratis* basis to new entrants to an industry, and to adjust the basis for the permit allocation to existing firms whose activity levels have grown sharply relative to the reference year used for grandfathering.

If the grandfathering approach is assessed against the criterion of providing approximate compensation for the capital losses that can be expected to result from imposition of a TEP system, further limitations become apparent. The amounts provided under simple historical grandfathering may diverge sharply from the patterns of expected capital losses:

- Different emitters will have different technological opportunities to reduce emissions — one reason why the impact of a TEP system on costs will vary across firms.
- Firms' capital assets will vary in their remaining useful lives.
- Perhaps most importantly, increases in prices for emissions-intensive products — once product markets have adjusted to the imposition of a TEP system — will vary, thus providing different degrees of offset on the revenue side to the cost increase resulting from the requirement to acquire permits to match emissions.

The grandfathering approach also has serious limitations as a method of addressing international competitiveness issues:

- If applied generally, it would cover sectors that do not face significant competition from non-Annex B producers.
- By not being tied to continuing production, it does not address growth and new entrants, and continues in the face of reduced production and shut down.

Other Specific Approaches: Performance Standards

Performance standards provide a continuing *gratis* allocation of permits, either explicitly or implicitly, to the sectors to which they apply. In essence, the allocation

method discussed above that aims to address international competitiveness issues is a performance standard approach applied to those sectors competing in markets dominated by non-Annex B producers. As a general method of allocation, performance standards would fail to create the price signal to consumers to shift consumption away from emissions-intensive activities, goods and services, which is desired to help achieve an emissions target in a Kyoto scenario.

B. 4 A General Framework for Allocation

We thus envisage a framework for allocation that is composed of:

- auctioning of the total supply of permits less the allocations under the following two *gratis* components, with revenue recycled in a manner to address equity and efficiency objectives not addressed by the two *gratis* components (for example, through reductions in personal and corporate income taxes);

- a continuing *gratis* allocation of permits to address competitiveness of industries competing primarily with producers in non-annex B countries; and

- a transitional *gratis* allocation to firms in sectors that would be expected to suffer significant capital losses because of the reduction in value of their existing capital stock that results from the imposition of a TEP system with relatively short notice.

Further work is required to determine whether workable approaches could be developed for both the appropriate benchmarks for the continuing allocation and for the method of determining and targeting significant capital losses. If not, alternative approaches would need to be considered.

Relative to an approach that ignored international competitiveness issues and simply addressed capital losses, the above framework would, of course, reduce the permits available to be auctioned. In a scenario of widespread international emissions trading, the “costs” of such a competitiveness-oriented allocation would take the form of less auction revenues for recycling as general tax reductions, a larger share of global production emissions from the industries in question in Canada, and larger imports of permits.

It would still be the case, however, that *gratis* allocations under the allocation framework envisaged would absorb only a fraction of the total supply of permits. Under a broad as practical coverage approach, and depending on the eligibility conditions and parameters of the *gratis* allocations, this fraction might be as much as one-half, or even somewhat more, of the total supply of permits for the first commitment period, but would presumably decline thereafter. The remainder of the permits would be auctioned and the revenues recycled.

Emissions pricing would likely cause a larger relative increase in living costs for low-income people than for high-income people. To offset this incidence pattern, the general tax reductions financed from revenues from permit auction could be structured so as to provide benefits that increase less than proportionately with income.

The very uneven pattern of emissions by province, relative to population or size of economy, means that it would likely be a challenge to avoid unreasonable regional burdens while ensuring that each region does its share. The design of *gratis* permit allocation approaches, the division of auction revenue among provinces and the federal government, and the use of that revenue by governments, provide means of addressing potential inequities in the burdens of achieving GHG reductions.

C. Implementing a TEP System

C.1 Legislation, Regulation and Jurisdiction

New legislation would be required to apply a TEP system to GHGs. The body of this report notes the heads of constitutional power that might provide a basis for legislation by the federal and provincial, governments, but does not explore the arguments in favour of one or other (or both) levels of government having jurisdiction over TEPs.

C.2 Administrative Design Issues

The basic coverage and permit allocation features of a TEP system would determine many of the administrative design issues to be addressed. The measurement, reporting and permit submission provisions could be expected to involve significant costs for both the TEP authority and covered firms. However, more or less comparable costs would presumably be associated with the measurement, reporting and enforcement aspects of other approaches for limiting emissions (e.g. regulatory approaches).

Experience with existing motive fuel excise taxes provides a preliminary indication that administrative costs for an upstream permit approach could be quite minor relative to likely permit prices and relative to the costs of reducing emissions. Administrative costs for GHG emissions that must be directly monitored could be significantly higher. This area requires substantial further work.

C.3 Permit Characteristics/Units of Trade

A permit would represent an authorization for a one-time emission of one unit of greenhouse gas (or for a one-time sale of a unit of substance that would release one unit of GHGs when used). The unit used would presumably be tonnes of CO_2 equivalent. The permit would also have a specified life span that could, in principle, range from one year to indefinite. There does not seem to be any reason to limit the life span of permits issued for use in the commitment period (i.e. no need to limit their “bankability” for use in the future).

C.4 Provisions Governing Trading and Ownership of TEPs

Secondary market trading of permits could well prove to be a dimension of a TEP system that required relatively little official government intervention. Laws governing contracts and financial instruments, together with competition law, might provide most of the required legal framework. Governments would have to specify any constraints on who could own permits. In general, allowing broad ownership, including ownership by entities that are neither subject to permit requirements nor recipients of *gratis* permit

allocations, should enhance the liquidity of the permit market.

C.5 Transaction Costs for Trading in TEPs

It is important that trading transaction costs be kept as low as possible while maintaining the integrity of the trading system. In a TEP system, transaction costs should be relatively low given the fact that the item being transacted is, in effect, a standard government security and that the amounts traded would likely be substantial. In financial markets, costs for transactions of this type are typically less than 1% of the value of the transaction, often substantially under 1%.

D. Other Issues

D.1 Lead Time and Preparation Required to Implement a TEP System

It seems unlikely that any final decision to proceed with a TEP approach will be made in advance of a decision on ratification of the Kyoto Protocol, which is not expected before 2002 at the earliest.

Legislation and regulations would have to be drafted, and would presumably then be subject to consultation before being passed into law. Administrative structures would have to be designed and established. Ideally, there might be a "dry-run" period for monitoring and reporting processes in advance of the start of the actual system. The time required to design and implement a system would depend on the particular type of system; however, it is probable that the above steps would require a minimum of three years and quite possibly longer.

D.2 Linkage of a TEP system to Pre-Commitment Period Policies

Elements for consideration include:

- Baseline protection
- Early announcement of commitment period policies
- Voluntary emissions trading linked to incentives for early action
- A TEP system that took effect prior to the period to which a fixed-quantity target applied.[8]

D.3 Extension of a TEP Approach to Uncovered Sectors

Two very different means of extending TEP coverage to sectors where accurate estimation of emissions is not practical are, in principle, available:

- Mandatory coverage based on approximate estimates of emissions derived using observable variables that are, on average, linked with emissions. An example might

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8 Consideration might be given to implementing a TEP system in advance of the Kyoto commitment period, with a cap set initially only marginally below business as usual emissions levels, and then phasing down but subject to adjustment if international developments raised doubts as to the widespread implementation of Kyoto targets. This could provide a clear policy signal regarding the intent to use a TEP system, and would allow some experience to be gained under a system with relatively undemanding targets. At the same time, it should avoid major international competitiveness impacts or other economic impacts.

be methane from landfills based on the volume of material in the landfill, possibly supplemented by other information on the landfill.

- Providing the option to uncovered sources to *choose* to reduce emissions in return for earning credits in the form of permits, which could be sold.

While deserving further consideration, both approaches face significant problems of design and implementation, though there may be scope for them to play a useful role in achieving cost-effective emissions reduction in limited sets of circumstances. International progress on the CDM may provide some guidance for the design of approaches under which credits are earned for emissions reductions in uncovered sectors.

D.4 Relationship to Other Emissions Reduction Policies

We would not expect a TEP approach to be used alone.

- Other measures would presumably be developed to reduce emissions not covered by the TEP or its extensions.

- Even for emissions covered by TEPs, certain measures might be judged to provide useful supplementation of the incentives for emission reductions provided by TEPs. In addition to support for research, such supplementary measures could include consumer information and possibly emissions or energy-efficiency standards for consumer appliances, motor vehicles and new housing.

Where other measures are under consideration, the trading price of permits could be used as a reference to help guide their design. For example, it could guide the valuation of emissions reductions, and thus the assessment of benefits that may influence the setting of control parameters for regulatory measures.

D.5 How Important is it to Harmonize with any U.S. System?

There does not appear to be an overwhelming logical case for harmonization of all aspects of a TEP system with any domestic TEP system that the U.S. might use to achieve its emissions reduction target. However, harmonization would help to avoid trade irritants, and would likely make a TEP system more acceptable to industry.

D.6 Comparison with Other Broad Approaches to Achieving a GHG Target

On the basis of a very preliminary summary comparison with other major approaches to GHG reduction, such as a GHG tax, widespread regulation of GHG sources, or a broad subsidy system, a TEP approach appears to fare reasonably well. To some extent, this is because a domestic TEP system would potentially mesh more readily with features of the Kyoto Protocol (the quantitative target for each Annex B country's emissions and international emissions trading) than would the other approaches.

E Conclusions

The members of the Tradeable Permits Working Group are under no illusions that any of the TEP approaches considered would provide means of achieving a major part of Canada's Kyoto emissions reduction requirement that would be easy to implement or free of significant costs and adjustments. It is the case that TEP approaches would not necessarily be more difficult to implement than approaches designed to achieve the same substantial reduction in GHGs, and might well be less costly in overall economic terms. Still, we expect that:

- the analytical work involved in completing the required examination of impacts and development of full specifications for any of TEP options would prove to be challenging and time-consuming;

- when obtained, solid economic impact estimates would likely suggest that any of the TEP options would have significant overall economic costs[9] and substantial adverse impacts on certain sectors — including employment in these sectors;

- explanation to the public of what one or more of the TEP options would involve, and why they might be worth considering, would be difficult given the unfamiliarity of the concepts and the complexity of the economic arguments;

- federal-provincial negotiation of relative responsibilities in implementing TEP approaches would involve many contentious issues;

- political leaders, if convinced that on balance one of the options was an appropriate part of an overall national implementation strategy on climate change, would face a major challenge in obtaining public acceptance of this view.

Nonetheless, on the basis of the analysis in this Options Report, it is our view that TEP options are worth pursuing further.

E.1 Coverage

Our analysis suggests that use of an upstream approach to CO_2 emissions from combustion of fossil fuels, with the requirement for permits imposed at some point in the fuel distribution chain, would be administratively efficient and would make it possible to substantially extend the coverage of GHGs under a TEP system. This expansion of coverage through use of upstream points of imposition where practical, coupled with coverage at the final emitter level for other GHGs where this is more practical (or the only option available), should assist in achieving a least-cost pattern of emissions reduction. Our *broad as practical* coverage option is intended to provide an initial illustration of the coverage that might be achieved under this general approach.

[9] As stressed in Section A, our references to costs relate only to the cost side of achieving reductions in GHGs. No attempt is made to compare these costs with the benefits (or avoided costs) associated with slowing the pace of climate change.

The relative importance of the advantage provided by use of an upstream point of imposition for some sources of GHGs depends on the alternatives available to reduce such emissions. If alternatives are available to reduce CO_2 emissions from transportation and residential/commercial heating at costs similar to the expected permit price, the use of the narrower coverage, large final emitter TEP approach, coupled with such alternative approaches to reducing these "other emissions," might also fare reasonably well under the least-cost criterion.

E.2 Allocation of Permits

We envisage an overall framework for allocation of permits, which would include:

- auctioning of the supply of permits not allocated under the following two *gratis* components, with recycling of revenues to reduce general taxes and address equity issues raised by the imposition of a TEP system and not addressed by the two *gratis* components;
- a continuing *gratis* allocation of permits to address competitiveness of industries competing primarily with producers in non-annex B countries;
- a transitional *gratis* allocation to firms in sectors that would be expected to suffer significant capital losses because of the reduction in value of their existing capital stock that results from the imposition of a tradeable permit system with relatively short notice.

Both of the above *gratis* components require considerable further development and analysis to determine their workability and their effectiveness in meeting the objectives. As well, the consistency of such *gratis* allocation approaches with international trade rules — in particular, the continuing allocation intended to address international competitiveness effects — requires further exploration.

E.3 General Conclusion

Tradeable Emissions Permit options have promise as a potential major component of an overall policy approach designed to meet a commitment period target involving substantial reductions in emissions in a cost-effective way.

- TEP options should receive further consideration in the period leading up to a ratification decision.
- Further development of specific options, and analysis of impacts, are required before a final decision should be made on the inclusion of a TEP component in an overall National Implementation Strategy on climate change. Such work is also required

before final decisions should be made on the coverage, approach to permit allocation, and other features of a TEP system.

- Such further development and analysis of specific TEP options would put those with responsibility for overall climate change strategy in a much better position to decide what role a TEP approach should play in a set of measures designed to achieve a commitment period target.

F. Recommendations for Further Work

Decision making on the role of TEP options in a commitment period phase of the overall National Implementation Strategy on climate change may be viewed as involving the addressing of a range of issues from high level comparisons of broad TEP options with other broad options, to specific questions of TEP option design.

The process of addressing the highest-level issues would presumably draw in part on the TPWG Options Report and on the results of further work on TEP options design and analysis, as sketched below. But it would also presumably draw on analysis of alternative broad approaches and on analysis of non-TEP specific measures that might be used in combination with different TEP options. It would be informed by the work of the Analysis and Modelling Group.

Key examples of the high-level issues that would require weighing of TEP options within a broad framework that takes account of potential alternative and complementary measures are as follows:

- The general approach to coverage by a TEP system, illustrated by our contrast between the broad as practical versus large final emitter coverage options. In addition to taking account of analysis of features specific to each broad coverage approach, the assessment in this area would presumably consider the different sets of complementary measures that could be used in conjunction with each TEP coverage approach.

- The relative roles and division of responsibility between the federal and provincial governments regarding implementation of TEP approaches. This would presumably be heavily influenced by broader negotiations regarding the relative roles of the federal and provincial governments in the overall National Implementation Strategy.

- The highest-level issue of all: whether to make use of a TEP approach as part of the National Implementation Strategy. While informed by the results of the further analysis of TEP options suggested below, answering this question would presumably involve comparison with other broad approaches. This would include a comparative assessment, in terms of equity criteria, of the acceptability of TEP approaches that included *gratis* permit allocation options that are judged to be workable together with recycling of revenues from the auction of a portion of permits.

The next level of topic involves assessment of specific aspects of TEPs:

- The administrative feasibility, and effectiveness in meeting the equity and international competitiveness objectives, of the two new approaches to *gratis* permit allocation suggested in the Options Report: the continuing output-related allocation to address competitiveness of certain sectors particularly vis-à-vis producers in non-Annex B countries, and the temporary allocation intended to provide compensation for expected capital losses resulting from the imposition of a TEP system.

- The precise specification of the limits of coverage under the broad as practical and large final emitter approaches. This involves technical work on measuring and monitoring a range of GHG sources, including work to inform decisions on the size threshold for coverage of individual emitters of various types of GHGs.

- The potential for extension of TEP options beyond GHG sources for which reasonably accurate estimation of emissions at reasonable cost is feasible. Two alternative bases for inclusion were suggested for further consideration: mandatory inclusion on the basis of approximate estimates using observable variables linked to emissions, and inclusion on a voluntary basis under which credits would be earned for reductions below some baseline level of emissions.

- The interrelation between TEP options and potential complementary measures applicable to the GHG sources covered by the TEP option. What types of other measures are complements that it would make sense to use in tandem with a TEP system (as opposed to being made redundant if a TEP system were in effect)?

- Potential measures that might ease the transition to a commitment period TEP system. These include options that would provide incentives for early action linked to permits in the commitment period, the phasing in of some form of TEP system prior to the commitment period, and baseline protection issues in the context of the *gratis* permit allocation approaches suggested for a TEP system.

- Determination of the appropriate time profile of the issue of a given overall supply of permits.

- Exploration of the potential impact on the functioning of a TEP system of use of different points in the distribution chain under the upstream point of imposition approach, and of any potential competition policy concerns that could arise in permit markets or in markets for products subject to a permit requirement.

- International trade aspects of a TEP system, in particular the acceptability of various approaches to g*ratis* permit allocation, and to border permit adjustments, under WTO rules.

- The extent to which harmonization of the specific aspects a Canadian TEP would be desirable with any domestic emissions trading system that may be introduced by the United States as part of its approach to achieving a Kyoto commitment.

If a decision to go ahead with a TEP approach were taken, a major work program would be required to deal with a wide range of design issues relating to specific administrative procedures and to the nature of the required administrative infrastructure. It might not be appropriate to engage in detailed work on these administrative design issues until decisions have been made with regard to broad coverage and allocation options. However, it would be important to devote some effort, at an early stage, to

identifying any potential major administrative design problems that could arise and that might influence basic judgments on the feasibility of broad approaches.