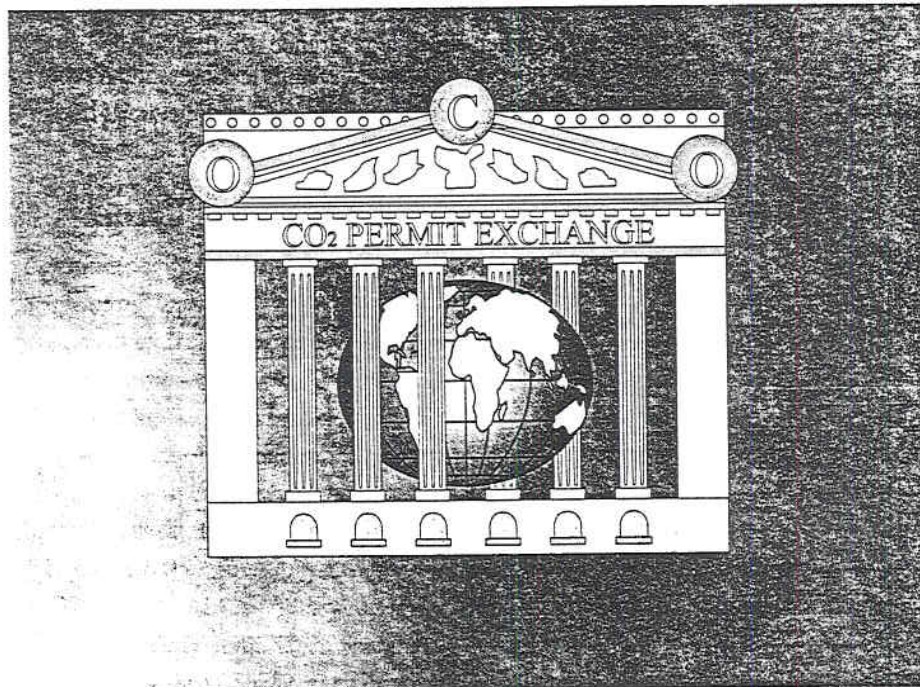


UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

LEGAL ISSUES PRESENTED BY A PILOT INTERNATIONAL GREENHOUSE GAS TRADING SYSTEM

*(AMONG COUNTRIES WITH BINDING
EMISSION TARGETS UNDER THE FCCC)*

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Glossary of terms

Agreement	International agreement among Members, in accordance with the FCCC, establishing an emissions trading system.
AJJ	Activities implemented jointly. Activities, undertaken jointly, in accordance with criteria adopted by the COP at Berlin in 1995, by two or more FCCC Parties, their firms or other NGOs to reduce net GHG emissions.
Allowances	Emissions entitlements issued by IETO authorizing the holder to emit net GHG in the amount of one tonne of CO ₂ or its equivalent, as measured in terms of radiative forcing; allowances may be held, purchased or sold by anyone.
Allowance Trading System	A type of Emissions Trading System in which holders may trade a limited stock of Allowances issued by IETO to Members and allocated by them to sources; sources' net emissions during a specified time period must not exceed their Allowance holdings redeemed for that period.
Annual Allowances	Allowances issued by IETO for a given year, entitling the holder to emit GHG during that year or in any subsequent year.
Board of Directors	The governing authority of the IETO.
CFC	Chlorofluorocarbon.
COP	The Conference of the Parties to the FCCC.
Council	The governing authority of the Agreement, composed of representatives of the Members, established under and responsible for implementing and enforcing the Agreement.
Cumulative Allowances	Allowances that are issued by IETO for a specified period of years authorizing the holder to emit GHG at any time during the specified period.
Cumulative Emissions	Net amount of GHG emitted over a specified period of years.
Emissions Budget	Commitment by a Member to limit its Cumulative Emissions to specified amounts during a budget period.

Emissions Budget System	A type of Emissions Trading System in which Members establish a series of Emissions Budgets and Members which earn Savings in one budget period may hold them for use in future budget periods or sell them.
Emissions Trading System	A performance-based system for achieving quantified emissions reductions under which the overall quantity of allowable emissions is constrained but participants in the system have flexibility in the way they satisfy the emissions constraint, including by redeeming, purchasing, selling or saving allowable emissions.
Emissions Trading Exchanges	Establishments where trade in GHG Allowances/Savings is conducted through brokers.
FCCC	The 1992 United Nations Framework Convention on Climate Change, including any amendments or protocols adopted thereto.
GATS	General Agreement on Trade in Services.
GATT	General Agreement on Tariffs and Trade.
GHG	Greenhouse gases that exert radiative forcing in the atmosphere.
Governing Board	The governing authority of Monitor.
Group	Collectively, the Members of the Agreement.
HCFC	Hydrochlorofluorocarbon.
HFC	Hydrofluorocarbon.
IETO	The International Emissions Trading Organization, an entity created under international law in accordance with the Agreement with responsibility for issuing Allowances or Savings and for supervising trading markets.
JJ	Joint implementation. Cooperative activities by governments, firms or other NGOs in two or more States to reduce net GHG emissions.
Members	The States and international organizations which are parties to the Agreement.
Monitor	An entity created under international law in accordance with the Agreement with responsibility for determining the actual annual net GHG emissions of each Member and certifying the same to IETO.

NAFTA	North American Free Trade Agreement.
NGO	Non-governmental organization.
OECD	Organization for Economic Cooperation and Development.
Parties	The States and international organizations which have ratified the FCCC.
PFC	Perfluorocarbon.
Premium	Extra reward earned by Savings when Savings are held over time.
Savings	Emissions entitlements issued by IETO to a Member when its actual Cumulative Emissions are less than its Emissions Budget for a specified budget period. Savings are issued in the amount of the difference between budgeted and actual Cumulative Emissions. Savings authorize the holder to emit GHG in specified amounts. Savings may be held, bought and sold by anyone.
SF ₆	Sulphur hexafluoride.
State	A legal, political and geographical entity with a defined territory, a permanent population, a government and a capacity to enter into relations with other States.
WTO	World Trade Organization.

Foreword

by the UNCTAD Secretariat

For more than five years the UNCTAD secretariat has been working assiduously to assist governments in their quest for flexible, cost-effective, market-based instruments to control emissions of greenhouse gases. Early studies published by the UNCTAD secretariat included the path-breaking report entitled *Study on a global system of tradeable carbon emission entitlements* (1992),⁴ which provided a comprehensive analysis of key technical and institutional issues in the design and implementation of an international trading system for greenhouse gases. Other studies in this series, published in 1994 and 1995, were primarily concerned with exploring the organizational aspects of a global market-place for trading CO₂ emissions. By mid-1995, developments at the international level had convinced us that the time had come to go forward with the development and implementation of a pilot GHG emissions trading programme. As we saw it, a pilot emissions trading programme would allow participating countries to benefit from the process of 'learning by doing', and facilitate the successful evolution of a global emissions trading system.

This report discusses the principal legal, institutional and organizational issues presented by a pilot GHG international emissions trading system, and options for its implementation. It identifies, for the first time, key elements of international and domestic legal regimes and institutions needed to support an appropriate regulatory framework, monitoring, certification, and enforcement of the pilot emissions trading system. Public interest in these issues was greatly stimulated by the successful conclusion of the second Conference of the Parties to the Framework Convention on Climate Change (COP 2), held in Geneva in July 1996. Negotiations on a protocol or another legal instrument will now focus on agreeing a legally-binding instrument, with ... 'quantified legally-binding objectives for emission limitations and significant overall reductions within specified timeframes' (*Ministerial Declaration, COP 2*).

In that context, it is hoped that this report will make a timely and useful contribution to the negotiations on a protocol or another legal instrument to the Framework Convention on Climate Change, as well as to providing a common basis for action among countries interested in the development of a multilateral greenhouse gas emissions trading system. The UNCTAD Secretariat has been encouraging public/private partnerships in this area and has worked with the Earth Council and Centre Financial Products to promote the development of a pilot emissions market through the establishment of the Global Environmental Trading System (GETS).

This publication is the result of intensive collaboration between the UNCTAD secretariat and the United States Environmental Protection Agency. Research funds were made available by US/EPA, and the report is published under the auspices of UNCTAD's greenhouse gas emissions trading project. However, the views expressed in this report are those of the authors and do not necessarily reflect the views of the UNCTAD secretariat or the US/EPA. This project has benefited over the years from financial support provided by the Governments of Germany, the Netherlands and Norway.

CHAPTER I

INTRODUCTION

This report examines the legal issues arising from the possibility of establishing a pilot international trading system for greenhouse gas (GHG) emissions among a number of States. States have expressed interest in the possibility of establishing such a system for a variety of reasons. Initial experience with emissions trading systems indicates that such systems can be highly effective in meeting environmental targets at much lower cost than traditional types of regulation provided, as with any system of regulation, that monitoring and enforcement are adequate. Emissions trading systems can also increase transparency because they give sources, sequestration projects and governments a strong incentive to use publicly understandable, standardized methodologies for monitoring and reporting. Furthermore, emissions trading systems provide incentives for the transfer of technology and financial and other resources to projects, sectors and locations which offer the opportunity to reduce net GHG at lowest cost, and for the development of new technologies that reduce net GHG emissions.¹ We recognize, however, that trading systems of the type described in this report would be innovative in international agreements and present novel institutional and administrative issues.

The pilot trading system discussed in this report would include trading of energy sector CO₂ emissions, and might also include emissions of HCFCs, HFCs, PFCs and SF₆, all of which are relatively easy to monitor and verify. It would be desirable to include forest-sector CO₂ emissions and sinks, fossil-fuel methane (CH₄) and the tropospheric ozone precursor NO_x, provided that appropriate assurances of monitoring and verification were obtained. Eventually, as monitoring methods improve, the system could be extended to include other GHG emissions, expressed in CO₂ equivalents. The pilot trading system could be designed for an initial 15-20 year period.

The report addresses a pilot trading system among a Group of States which are Members of an international agreement (Agreement).² As a pilot programme, the trading system might begin with a relatively small but diverse group of States. Starting with a relatively small number of participants during the negotiation and early implementation of the Agreement will facilitate a successful learning process.³ Such a system might take one of two basic forms. Under an *Allowance Trading System*, the Agreement would establish an

¹ See UNCTAD, *Combating Global Warming: Study on a Global System of Tradeable Carbon Emissions Entitlements* (1992); Stewart and Wiener (1992). 'The Comprehensive Approach to Global Climate Policy: Issues of Design and Practicality', *Ariz. J. Intl and Comp. L.* 9, 83 (1992).

² International organizations such as the European Union might also become Members.

³ See Robert W. Hahn and Kenneth R. Richards, 'The Internationalization of Environmental Regulation', *Harv. Int. L.J.* 30, 421, 427 (1989).

overall group net emissions cap, an allocation of net emissions allowances among the Members, and institutional arrangements for trading allowances, monitoring net emissions and imposing sanctions for non-compliance. Under an *Emissions Budget System*, Members would commit themselves to limiting cumulative emissions during each of several successive multi-year budget periods. A Member's reductions of emissions below the amount budgeted for a given budget period would generate savings that could be reserved for future use or traded.

By way of introduction, it is important to stress two fundamental working assumptions underlying the report. The first assumption is that any international system for trading emissions between two or more States and their sub-national entities would be governed by international law, rather than by the national laws of any particular State. It is most unlikely that a State could accept that its rights or obligations under such arrangements could be governed by the national laws of another State.

The second assumption is that any pilot international trading system would be established in accordance with and in the context of the 1992 United Nations Framework Convention on Climate Change (FCCC). The idea that separate arrangements might be adopted may theoretically exist, but Parties to the FCCC are not likely to establish an independent and potentially competing system that would risk undermining the FCCC.⁴

Building on these two assumptions, one way of initiating a pilot emissions trading system might be for those FCCC Parties which have committed themselves to quantitative GHG emissions limitations and are interested in participating in such a system to conclude an international Agreement on the system's structure and operation, in accordance with and in the context of the FCCC. In any event, such an Agreement could not, of course, affect existing obligations under the FCCC.

The 'learning by doing' experience under a pilot trading system might provide the basis for enlarging the system through the participation of additional Members, as discussed below, and eventual participation of most or all Parties to the FCCC. The precise path by which such a pilot international trading system might evolve into a more permanent and comprehensive system is a matter beyond the scope of this report. It is also possible that certain industries might agree to an industry-wide emissions limitation and trading system independent of, or linked to, the Group trading system analysed in this report.⁵

⁴ One could envisage separate bilateral arrangements but even in this case it is difficult to see how such arrangements could be linked easily to the FCCC unless they were adopted pursuant to and in the context of the FCCC.

⁵ There are a few industries—such as international aviation and maritime shipping—in which most activities take place outside national jurisdiction or in jurisdictions other than those in which their members are sited. Members of such industries might agree to an industry-wide emissions cap and trading system. They might make such an agreement as an alternative to the imposition of independent regulatory or fiscal measures by States, or as a means of reducing the costs and other burdens associated with differing and potentially conflicting national regulatory measures. It may be very difficult for States to regulate GHG emissions from industries with internationally mobile emissions, many of which occur outside the jurisdiction of any State. For industries such as civil aviation, where emissions-relevant data are already being collected on an industry-wide basis, administrative burdens and transactions costs could be minimized by building on existing industry structures, rather than (continued ...)

This report discusses the principal legal, institutional, and organizational issues presented and options available for implementing a pilot international GHG trading system. It does not seek to reach firm conclusions as to how to proceed, a matter lying beyond the scope of this report.

The remainder of this report is organized as follows. Part II outlines the basic elements of possible pilot trading systems and the organizational structure needed to establish and support them. Part III explains how the trading systems discussed in this report differ from existing approaches to joint implementation (JI) and activities implemented jointly (AIJ). Part IV analyzes in greater detail a number of key design, organizational, and legal issues that must be resolved in order to implement the trading systems successfully.

cobbling together national-based regulatory measures. Coordination through existing organizations, such as the International Maritime Organization, the International Air Transport Association or the International Civil Aviation Organization, could be helpful. Adoption of an effective industry-wide approach to emissions limitations might forestall piecemeal national efforts to regulate the industry in question. Members of such industries would of course seek recognition of emissions reductions achieved through such an arrangement against any current or future GHG limitations obligations. Similar to the Member Agreement described herein, such an industry agreement would specify an allowance cap and allocation, or emissions budgets for the participants; a system for trading allowances or savings; and institutional means for establishing a trading system, monitoring net emissions, and imposing sanctions for non-compliance by participants. The industry in question might contract with the trading and monitoring organs established by the Agreement to provide trading and monitoring services.

An industry trading system could be a closed system, in which allowances or savings would only be freed up or obtained for reductions in net emissions from sources within the industry, or an open system in which allowances or savings could be generated by investments in emissions reductions by non-industry sources or in sequestration projects.

CHAPTER II

BASIC ELEMENTS OF A PILOT GHG ALLOWANCE TRADING OR EMISSIONS BUDGET SYSTEM

This section of the report discusses the basic legal and organizational structure of a pilot international GHG emissions trading system, explains two types of trading systems, the Allowance Trading System and the Emissions Budget System, and summarizes the means by which these systems might be implemented.⁶

The States participating in a GHG trading system would be Members of an Agreement established under international law, either formally part of or appropriately linked to the FCCC. Under an Allowance Trading System, the Agreement would establish a legally binding, quantitative aggregate cap or ceiling on net emissions by the Group Members as a whole, and legally binding quantitative caps on net emissions by each Member consistent with the aggregate cap.⁷ The aggregate Group and individual Member caps could be defined in various ways. For example, they might be:

- numerically-specified annual net emissions caps, expressed in CO₂-equivalent units;
- based on year-to-year increases or reductions in annual net emissions from or towards an historic base year, possibly followed by stabilization at or below the base year level; or
- they might consist of a cumulative limitation on annual emissions over a number of years.

Each Member would receive an allocation of GHG emissions allowances consistent with its cap. Such allowances would be distributed by Members to their sources and could be sold, held or bought by anyone.

In an Emissions Budget System, the Agreement would specify a target level of cumulative emissions for each Member for an initial one of several successive budget periods of, for example, ten years each. A Member might, at its option, adopt national emissions budgets for its sources or use other regulatory techniques to limit emissions. New emissions budgets for Members would be negotiated and adopted in accordance with the Agreement for each successive budget period prior to the close of the current budget period. If a Member's emissions for any budget period were less than the budgeted amount, savings would be generated that could be held for future use or sold to others to use or hold. Members might establish sub-budgets for every one or two years within a budget period; savings could be

⁶ For general discussion of international GHG emissions trading systems, see United Nations Conference on Trade and Development, *Combating Global Warming: Possible rules, regulations and administrative arrangements for a global market in CO₂ emission entitlements* (United Nations, New York, 1994).

⁷ The commitment in the 1996 Ministerial Declaration to agree on legally-binding emissions targets represents an important step in this direction.

generated by keeping net emissions below the sub-budgeted targets. Savings could be held, sold or bought by anyone.

With either of these approaches, the relative burden of net emissions limitations required by the different Members' allowance caps or emissions budgets, whether established by reference to a base year or otherwise, would be negotiated by the Members depending on their historical emissions trends and other considerations. Although allowances or savings could be held, bought or sold by anyone, they probably could be used for redemption or credit only against emissions limitation obligations in Member jurisdictions (see discussion under *C. Other Basic Elements of Trading Systems*, below).

Initially the trading system would include energy sector CO₂ emissions, and might also include emissions of HCFCs, HFCs, PFCs and SF₆. It would be desirable also to include forest-sector CO₂ emissions and sinks, and emissions of fossil-fuel methane and NO_x, expressed in CO₂ equivalents, subject to appropriate assurances of monitoring and verification. Eventually the trading system might include other GHGs, sources and sinks as monitoring techniques improve and suitable CO₂-equivalent indexing methods are developed. In principle, it would be desirable to make the coverage of the trading system comprehensive, including all GHG emissions and sinks, in order to promote cost effectiveness, broaden incentives for reducing net GHG emissions, and prevent 'leakage' of investment and activity into GHG emissions activities not included in the system.⁸ On the other hand, we recognize the scientific, technical and administrative difficulties of monitoring and verifying non-fossil CO₂ emissions, fossil-fuel methane emissions, forest-sector CO₂ sequestration, and other GHGs, emission sources and sinks. Members will have to balance these competing considerations when deciding on the coverage of the trading system. In theory some Members might agree to limit their participation to certain sectors, gases or types of sequestration projects while others might choose a broader coverage. Such a mixed system, however, would limit the advantages of the trading system and introduce administrative and other complexities.

A. Allowance Trading System

Under an allowance trading system the Members would agree to establish a limited stock of allowances, consistent with the agreed Group emissions cap, and an allocation of allowances to each Member, as specified in the Agreement. Allowances would be allocated to Members who would distribute them to these sources. One allowance would entitle the holder (in a system of annual allowances) to emit one tonne of CO₂ or the equivalent within a given or subsequent year, or (in a system of cumulative allowances) at any point over a period of years.⁹

⁸ See Stewart and Wiener (1992), footnote 1.

⁹ The basic features of an annual allowance trading system for GHG would be similar to the US allowance trading system for SO₂, which is described in Carlos A. Gavilondo, 'Trading Clean Air—The 1996 Acid Rain Rules: How They Will Work and Initial Responses to the Market System', *Tul. L. Rev.* 67, 749 (1993), and the RECLAIM trading programme for hydrocarbons and oxides of nitrogen in the Los Angeles region, which is described in Matthew Polesetsky, 'Will A Market in Air Pollution Clean the Nation's Dirtiest Air? A Study of the (continued ...)

The Group Members would agree to form an institution—the International Emissions Trading Organization (IETO)—established or authorized as a subsidiary organ in accordance with the Agreement (and in any event consistent with the FCCC), to issue allowances or savings, record trades and holdings, and supervise trading markets. IETO would be an international organization established under international law.

BASIC ELEMENTS OF AN ALLOWANCE TRADING SYSTEM

The Agreement fixes an overall net GHG emissions cap for the Group of Members and an allocation of permitted emissions for each Member for each year or cumulatively for a period of years.

IETO issues allowances to each Member equal to its allocation of permitted emissions for the relevant period. Members in turn allocate allowances to their sources.

Allowances entitle the holder to emit one tonne of CO₂ or equivalent during the period for which they are issued or any subsequent period. Sources may not emit GHG in excess of the allowances that they hold.

Allowances may be held, sold or bought by anyone, and may be used to cover emissions by any source in any Member. Allowances are standardized, homogeneous commodities.

Members are responsible for ensuring that emissions by their sources do not exceed the allowances that they hold. If a Member's net GHG emissions, as determined by Monitor, exceed the allowances held by it and its sources during a given time period, the non-complying Member is subject to sanctions, including a reduction in the number of allowances issued to it for the next period and fines.

1. Annual allowance caps and allocations

If a system of annual allowance caps were established, every year IETO would issue allowances, in standard, serialized form (each allowance would bear an individual, sequential identification number) to the Members in accordance with the cap or allocation established for each Member for that year under the Agreement. Each Member, in the exercise of its sovereign authority, would in turn distribute or sell allowances to sub-national governmental and non-governmental sources and other entities, as it saw fit, subject to any relevant provisions of the Agreement. Each allowance would entitle the holder to emit one tonne of CO₂ or equivalent GHG emissions in the year of issue or in subsequent years (thus enabling an allowance holder to save unused allowances for future use or trading). Allowance holders wishing to emit one tonne of CO₂ or the equivalent in a given year would redeem an allowance with their national government, which would in turn redeem all of its allowances with IETO during the annual accounting period in order to cover its emissions during the year. Members might, if they wished, contract with IETO or with other entities to serve as their agent in arranging for redemption of individual source allowances. in accordance with

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specified regulations and procedures. Members with emissions exceeding their allowances for any given year would incur a deficit. They or their sources would have to buy allowances from others in order to make up the deficit or face sanctions authorized in the Agreement (see below). Members with emissions less than their allowance allocation would enjoy a surplus; they or their sources could sell the surplus to others or hold them for future use or sale. This system provides a relatively high degree of accountability. It is possible, however, that the operation of trading markets in the context of a year-to-year system of allocations may not provide sufficient flexibility for long-term, capital-intensive investments in GHG-reducing innovation, technology and projects consistent with the rate of capital stock turnover.¹⁰

2. Cumulative allowance caps and allocations

As an alternative to annual allowance caps and allocations, a multi-year emissions allowance system would establish for each Member an agreed cap on cumulative net emissions over a multi-year period. At the outset of this period, IETO would issue each Member its total quota of allowances for the entire period. Each Member could redeem its allowances in whatever years during the period it sought fit. Such a system would offer Members the advantage of temporal flexibility. Assume, for example, an arrangement in which IETO issues to each Member not 100 emissions allowances per year for each of 20 years (each allowance eligible to be used in the year of issue or in subsequent years) but rather a cumulative total of 2000 allowances to be used by the Member over a 20-year period. A Member could then, for example, adjust its emissions profile over time to use more than 100 allowances per year in early years and fewer in later years. This pattern would require the Member to reduce substantially its emissions towards the end of the period. The Member might plan such a pattern of use in the expectation that new, cost-effective emissions limitation technologies would be available by then. Another Member, by contrast, might make larger reductions in the early years and save its allowances to accommodate its own growth or to sell to others in later years.

This approach would offer each Member flexibility to allocate its emissions limitation efforts over time and take advantage of long-term, capital-intensive innovation and investment opportunities, with potentially significant cost savings.¹¹ Too much flexibility, however, could inhibit trading and undermine the effectiveness of the Agreement. If allowances were issued for the entire 20-year period, and if there were no penalties for exceeding the total until the end of the 20-year period, Members (especially those with

¹⁰ As described in footnote 11. However, an annual allowance trading system can provide significant temporal flexibility.

¹¹ The annual emissions allocation system previously described, however, also affords a degree of temporal flexibility. A Member could seek to purchase excess emissions allowances from other Members—those for whom near-term emissions reductions are less expensive—in order to cover expected annual allowance deficits in the first few years, and it could finance these purchases by offering to sell scrip for its end-of-period allowances if it thought that it could make those allowances available more cheaply than could other Members. Such purchases, however, might be more costly for the Member than an internal reallocation of its own emissions over time, largely because the transactions costs of internal trades would probably be lower. See Vivien Foster and Robert Hahn, *Designing More Efficient Markets: Lessons From Los Angeles Smog Control*, American Enterprise Institute, draft June 1994.

higher-than-expected growth in industrial output, or more-than-expected loss of forest cover) might incur substantial allowance deficits. Imposing significant penalties for large end-of-period deficits might not be politically feasible after the period nor might the threat of such penalties be credible during the period. This lack of credibility might encourage Members to follow policies resulting in cumulative emissions exceeding their cumulative allowances. Meanwhile, with compliance due only at the end of a long period, the incentives for trading among Members countries and their sources would be diminished, inhibiting the development of the trading market. In addition, to the extent that there are sound environmental reasons to seek early reductions of long-lived GHGs, the ability to draw on future allowances for use in earlier years (the opposite of reserving allowances for use in future years) could undermine environmental goals.

One possible intermediate approach, which would combine multi-year cumulative allocations and annual allocations, would be for the Agreement to set multi-year cumulative caps and issue allowances covering that total, and then for each Member to specify the annual allocation of its allowances over the multi-year period. This allocation would then be binding each year, but the allocation over the time period would initially be up to each Member rather than fixed by the Agreement. Yet this approach might generate problems similar to those with a cumulative allowance cap/allocation system.

B. Emissions Budget System

The approaches outlined above imply that the Agreement would specify an allocation of emissions allowances for each Member (by year or over a multi-year period). A different approach would be for the Agreement to operate through an emissions budget system¹² in which the Group would establish emission budgets for multi-year budget periods. The length of the budget period would be established taking into account differences in investment cycles in different economic sectors (including factors such as national and corporate planning cycles, capital stock lifetimes, infrastructure development and rate of change of individual consumption patterns), and the need to balance long-term flexibility and accountability.¹³ For example, if budgets were established for ten-year periods, each Member would agree to limit its net emissions of GHG to a specified amount over each decade. Budgets could be set, for example, in terms of a percentage reduction from an agreed baseline. Each Member would in turn take the necessary steps to ensure that emissions from its sources remain within the Member's emissions budget. Members might choose to establish emissions budgets for their sources or to adopt other policy instruments to limit their sources' emissions. Members (and, if appropriate, their sources) which reduced their emissions below the budgeted amount for any decadal period would accrue savings. These

¹² See Dudek, Daniel J., Emissions Budgets' Creating Rewards, Lowering Costs and Ensuring Results, paper presented to the Climate Change Analysis Workshop, Springfield, Virginia, United States, 6-7 June 1996.

¹³ The budgets would provide both rewards for early reductions and the 'clear signal' to the private sector that will be needed to spur cost-saving technological innovations over time. See Kevin J. Fay, Establishment of Long Term Climate Change Goals: The Need to Provide a Realistic Framework, paper presented to the Climate Change Analysis Workshop, Springfield, Virginia, United States, 6-7 June 1996, at 2 (discussing importance of 'clear signal').

savings could be held by a Member or, if appropriate, its sources for use in future budget periods or traded to other Members and, if appropriate, their sources for use in meeting their emissions budgets. Members with cumulative emissions that exceeded their budgets for a given budget period would be subject to sanction unless they or, if appropriate, their sources purchased savings from other Members or, if appropriate, their sources in order to make up the deficit. Under this system, savings might also earn a Premium—an extra reward for early reductions. This Premium could accrue on Savings that are held and not utilized. Part of the rationale for a Premium is that significant early reductions can avoid later environmental damages, thereby reducing costs. Early reductions are especially environmentally significant in light of the long atmospheric lifetime of CO₂ (of the order of 100 years). Further, Members might be authorized to establish sub-budgets for each year or other period within a budget period. For example, if the budget period were ten years, sub-budgets could be established for each year or two-year period within a given ten-year budget period. Reduction of emissions below sub-budgeted amounts could generate savings, issued or certified by IETO. Such sub-budgets would provide annual or biennial 'check-ins' to assess how well Members were doing in meeting decadal budgets. The results of those 'check-ins' could be used as a basis, mid-way through a budget period, for launching the negotiations on target-setting for the next budget period. This approach could provide both the flexibility of the cumulative allowance approach and the accountability of the annual allowance system.

BASIC ELEMENTS OF AN EMISSIONS BUDGET SYSTEM

The Agreement fixes an emissions budget for each Member that imposes a limitation on its cumulative emissions during a given budget period (for example, ten years). Members may also establish sub-budgets for shorter periods of time within the budget period (for example, sub-budgets for every year- or two-year period within a ten-year budget period).

Each Member agrees to meet its budgeted level of emissions for the budget period.

If Monitor determines that a Member's net emissions are less than its budgeted emissions for the budget period, IETO issues savings to the Member for the difference.

Savings may be held, sold or bought by anyone, and may be used to cover emissions by any source in any Member. Savings may be carried forward to future budget or sub-budget periods, and a premium may be earned on unused savings.

Members are responsible for ensuring that their sources' net emissions do not exceed the budgeted amount, plus savings held, for the relevant budget period. If a Member's net GHG emission, as determined by Monitor, are greater than its budgeted emissions amount for a given budget period, the non-complying Member is subject to sanctions, including a reduction in its budgeted emissions for the following budget period and fines.

Towards the end of the initial budget period, Members negotiate the budget for the next budget period, taking into account scientific, technical and other developments.

One difference between emissions budget and allowance trading systems concerns the number of trades likely to occur.¹⁴ Compared to allowance trading, the emissions budget approach would generate fewer tradeable commodities because savings would be only a fraction of total authorized emissions. This might result in a less dynamic trading market than in the allowance system. However, experience with trading programmes indicates that the number of inter-participant trades is not necessarily an accurate indicator of the robustness of the system in producing emissions reductions.¹⁵ Simply increasing the possibilities for internal allocation of emissions within participating entities can provide significant opportunities for reducing the costs of achieving emissions reductions, provided that individual entities include a variety of sources and opportunities for reducing net emissions.¹⁶

C. Other Basic Elements of Trading Systems

Under an allowance trading system or an emissions budget system, each Member would agree that its net emissions in any given year or other period would not exceed agreed amounts. Under an annual allowance system, net emissions would not be allowed to exceed the number of allowances redeemed with respect to that Member's sources for that year. Under a multi-year allowance system, Members would agree that cumulative net emissions over the multi-year period would not exceed allowances redeemed during that period. Under either form of allowance system, Members would be responsible for ensuring, through monitoring and enforcement measures and purchases of allowances, that its sources of GHG

¹⁴ Another potential difference between emissions budget and allowance trading systems is the context which they might provide for negotiation of the initial allocation of emissions among Members. In an allowance trading system, allowances might be allocated amongst Members through a negotiation in which each Member presumably would try to convince the others that it should receive its desired number of allowances based on its view of its future needs, taking into account its projected development and its emissions reduction opportunities. In an emissions budget system, by contrast, Members might negotiate budgets by agreeing a uniform percentage reduction from a common historical baseline. In this approach, all Members would agree to the same percentage reduction; negotiation would then occur over the selection of the historical base year or average of historical base years. There is, however, no necessary link between these two approaches to establishing emissions limitations and the two basic types of emissions trading systems. An allowance allocation might be based on historic emissions, while emissions budgets might be based on projected future needs. Under either trading system, it might be easier to negotiate emissions limitations based on actual past emissions profiles rather than projected future needs. See for example Dubash, Navroz, *Commoditizing Carbon: Social and Environmental Implications of Trading Carbon Emissions Entitlements*, (University of California at Berkeley, Energy and Resources Group, 1994). For discussion of the considerations involved in negotiating GHG emissions caps or targets, see Michael Grubb, *The Greenhouse Effect: Negotiating Targets* (London, Royal Institute of International Affairs, 1989); Bjorn Larsen and Anwar Shah, 'Global Tradeable Carbon Permits, Participation Incentives, and Transfers', *Oxford Economic Papers* 46, 841-56 (1994); Adam Rose and Brandt Stevens, 'The Efficiency and Equity of Marketable Permits for CO₂ Emissions', *Resource and Energy Economics*, 15, 117-46 (1993).

¹⁵ See for example Dudek, Springfield, footnote 5; in the US SO₂ allowance trading programme, there have been fewer inter-firm transactions than expected but the programme is nevertheless significantly ahead of schedule in reducing emissions of SO₂.

¹⁶ See for example USEPA/OAR, *1995 Compliance Results: Acid Rain Program*, EPA/430-R-96-012 (July 1996) which reports that 1995 SO₂ emissions were 39 percent below the allowable emissions levels required by the US Clean Air Act; and US General Accounting Office, *Air Pollution: Allowance Trading Offers an Opportunity to Reduce Emissions at Less Cost*, GAO/RCED-95-30 (December 1994) which estimates that \$2-3 billion will be saved with the implementation of the Acid Rain allowance trading programme.

emissions (including, if applicable, sink destruction activities) hold allowances at least equal to their actual emissions for any given year or for the multi-year period. Under an emissions budget approach, each Member would agree that its net emissions in any budget or sub-budget period would not exceed its budget for that period plus any savings obtained, and undertake appropriate monitoring and enforcement and purchases of savings to meet this commitment.

Members would be required to prepare an annual report on their gross emissions, sequestration (if applicable) and net emissions for each year. Members' monitoring and reports would be subject to international review as stipulated in the Agreement. Amounts of emissions or sequestration based on sink destruction or enhancement would be determined by reference to a sink baseline for each Member. Using an historic base for sinks would avoid some of the problems which may be incurred under JI/AIJ or other approaches that require establishing a baseline of future emissions that would have occurred in the absence of emissions reductions and sequestration activities.

**BASIC REQUIREMENTS THAT MUST BE MET BY NATIONS PARTICIPATING
IN A PILOT INTERNATIONAL GHG EMISSIONS TRADING SYSTEM**

Commitment to achieve agreed limits on net emissions.

Establishment and enforcement of emission limitations and allocation of allowances or emissions budgets to domestic sources.

Monitoring and annual reporting to international authorities of net emissions, and submission to specified inspection and monitoring activities by such authorities.

Agreement to participate in and honour a system of accounting by an international authority of holdings and trades of emissions allowances or savings.

Agreement to respect free trade in emission allowances or savings established by the system, and to refrain from expropriating same.

Financial contribution (in the case of developed countries) to the international authorities responsible for implementing the trading system.

Submission to sanctions, possibly including fines, for violations of emissions limitation commitments.

Agreement to participate and abide by the outcome of dispute settlement procedures.

Adoption of appropriate domestic legislation to implement the trading system.

Sequestration projects, if included in the system, might be dealt with in accounting terms in one of two ways. First, IETO could issue additional allowances to a Member (over and above those mutually agreed) or recognize savings for sequestration projects based on the tonnes of CO₂ or equivalent sequestered in a given year in excess of the Member's sink baseline. The Member could then allocate these allowances or savings to each such project

based on the amount sequestered. This approach would bring sequestration services within the Group trading system. Alternatively, a Member's compliance with its allowance allocation or emissions budget could be determined based on net emissions, deducting from its gross emissions the amount of CO₂ or equivalent stored by sequestration projects. Under this approach, sequestration projects would make some of the existing allowances of the relevant Member surplus or generate savings by reducing net emissions below budgeted amounts; the Member could channel these surplus allowances or savings into the trading system. The choice between these two approaches for dealing with sequestration projects is discussed in more detail below.

Allowances or savings could be bought and sold to cover emissions by sources throughout the Group. Thus, each Member's sources could in the aggregate control their emissions to a level equal to that Member's allocation of allowances or its emissions budget; or buy additional allowances or savings from others; or reduce emissions below that permitted by that Member's allocation of allowances or its budget and sell excess allowances or savings; or some combination of the above. Although allowances or savings could be held, bought or sold by anyone, the Group would probably want to prohibit or limit use of allowances or savings for redemption or credit against emission limitation or reduction obligations in non-Member jurisdictions. Such use could drive up the demand for and the price of allowances or savings, burdening Members and their sources which, for the reasons explained below, would lack the reciprocal opportunity to generate allowances or savings by investing in net GHG reduction projects in the corresponding non-Member States.

With the trading systems analysed in this report, allowances or savings would be a homogeneous commodity; the value of an allowance or saving would not depend on which Member initially received the allowance as part of its allocation from the Group or which Member created the saving.¹⁷ Enforcement of emissions limitations or reductions will depend not on project-by-project certification of the reductions achieved in individual abatement or sequestration projects compared to a projected and often ill-defined baseline but on an annual accounting of, on the one hand, each Member's actual aggregate net emissions and, on the other, of its redeemed allowances or its budgeted emissions minus savings (both of which legally limit the Member's net emissions, subject to limited deficit flexibility; see Chapter 4, K. Sanctions against members).

In the systems described in this report, no recognition would be granted to reductions of net emissions in States which were not Members and had therefore not agreed to caps on net emissions, monitoring and accounting procedures, and the other requirements established in the Group Agreement. This approach is in contrast to that described in Tietenberg and Victor (UNCTAD 1994), in which both allocated allowances (from States with emissions limits) and certified credits (from other States) could be traded in the same trading system.¹⁸

¹⁷ This approach contrasts with a system in which the value of allowances or savings would depend upon and vary according to the emissions performance of each Member. Such an approach would create additional transaction and risk-bearing costs by treating allowances or savings issued to different Members as different commodities and imposing the risk of emissions deficits on holders of allowances or savings.

The approach discussed here places the highest priority on the integrity and homogeneity of the traded commodity (whether allowances or savings), and the credibility and effectiveness of the overall constraint on Group emissions. On the other hand, it restricts to some degree the scope of the market and does not provide incentives through trading markets for abatement and sequestration activities in non-Members, and associated technology transfers to non-Members. But, in the systems described herein, firms and investors in non-Member States might be allowed to invest in abatement and sequestration projects in Member States and receive allowances or savings which could be sold to other Members or their sources. By this mechanism, the capital, technology and experience of non-Member agencies and firms could be mobilized by the trading system to reduce net emissions in the territory of Members, but without implying emissions limitation or other obligations for non-Member States.

As discussed below, the allowances actually issued to a Member in a given year could be reduced below the allocation initially agreed upon for that Member as a penalty for allowance deficits in the previous year, or might vary depending on changes, made in accordance with the Agreement, in the Group cap and/or allocation of allowances among the Members. Budgeted emissions might be adjusted for similar reasons.

In order to provide a futures market, each Member could be authorized to issue 'scrip' for future year allowances that it expected to receive under the Agreement, although the value of such scrip would depend on the amount of allowances actually issued to it by IETO in each future year.¹⁹ Members could also be authorized to issue scrip for expected future savings.

In addition to issuing allowances or certifying savings, IETO would establish basic rules for the trading of allowances and savings (and possibly scrip as well), including rules for exchanges wishing to offer emissions trading services, and take other steps to promote the development of broad emissions trading markets. For reasons previously stated, the rules established by IETO would be governed by international law. IETO would not itself conduct

¹⁸ Under the approach described by Tietenberg and Victor, marketing of emissions entitlements from non-Member States could be accomplished through project-by-project recognition of net emissions reductions achieved by individual projects in non-Members. This approach places higher priority on providing incentives for technology transfer and abatement activities in non-Members, and could reduce 'leakage' (see below) that could otherwise occur as a result of investments by Member firms in GHG-emitting projects in non-Member states. This approach, however, raises the problem of establishing consistent, workable, insured project baselines and reductions, which creates significant administrative difficulties and increases transaction costs. Furthermore, there is no assurance that the reductions achieved by such projects would not be wiped out by uncontrolled increases in emissions elsewhere in the non-Member. A further problem with this approach is that it could undermine the incentives of States to become Members of the Agreement. A somewhat different option, aimed at mitigating some of the concerns raised by the project-by-project approach, would be to allow marketing of certified credits from non-Member States, with not only project-by-project assurances of additionality, etc., but also with some other assurances of the credibility of the reductions obtained, including adoption by the non-Member of emissions budgets or caps and appropriate monitoring and reporting measures.

¹⁹ For discussion of the analogous futures market under the US SO₂ allowance trading system, see Henry E. Mazurek, Jr., 'The Future of Clean Air: The Application of Futures Markets to Title IV of the 1990 Amendments to the Clean Air Act', *Temp. Envtl. L. and Tech. J.* 13, 1 (1994); Adams J. Rosenberg, 'Emissions Credit Futures Contracts on the Chicago Board of Trade: Regional and Rational Challenges to the Right to Pollute', *Va. Envtl. L. J.* 13, 501 (1994).

trading but would seek to establish the widest possible and most open trading markets, through organized emissions trading exchanges, by individual brokers, and informally by individual buyers and sellers. It would seek to ensure speedy, broad dissemination of accurate information regarding the amount and price of traded allowances or savings. IETO would also carry out bookkeeping functions; it would register trades and net holdings of allowances or savings, and possibly scrip as well, by firms or agencies and by Members. Funding for IETO could be furnished by Member contributions and/or fees charged by IETO for its services to the Members, to holders, to buyers and sellers of allowances or savings, and to authorized exchanges, subject to the approval of the Members.

In accordance with the Agreement, the Members would also establish or designate and provide funding for a separate monitoring institution (Monitor) to review and certify net emissions by Members. That institution would also be established under international law, and consistent with the FCCC. The Members would submit their annual reports on emissions and, if applicable, sequestration projects to Monitor for review. Monitor would issue monitoring protocols and methods that the Members would be obliged to follow in collecting data and issuing reports. Monitor might also be authorized by the Agreement to undertake specified on-site or remote monitoring activities or otherwise review and check Members' monitoring efforts. Alternatively, Monitor might delegate certain verification functions to Group-approved national monitoring entities meeting Group-established standards for training, transparency and reporting. Monitor would certify, on the basis of real-time accounting, each Member's actual net emissions for each year.

If Members chose, their emissions sources could be required in an allowance trading or emissions budget system to redeem directly to IETO sufficient allowances to cover their actual emissions for a given year or to redeem savings directly to IETO. IETO would help organize end-of-year spot markets to facilitate appropriate adjustments. A provisional actual-to-allowances or actual-to-budget-minus-savings comparison would be followed by a 'true up' period, and then a final actual-to-allowances or actual-to-budget-minus-savings comparison.²⁰

Under an allowance trading system, if a Member were found by IETO to have net emissions (as certified by Monitor) in excess of its allowances (as redeemed to IETO) for a given year or cumulative period, *inter alia* one or both of the following sanctions could be imposed in accordance with the Agreement:

- IETO could reduce the allowances otherwise allocable to such a Member for the following year or period.²¹ The amount of redemption could be equal to the

²⁰ Problems are posed by the fact that Monitor's certification of net emissions for a given year would not be completed until some time after the close of the calendar or other accounting year for which allowances are issued. Possible options for dealing with this problem are discussed below.

²¹ This sanction is similar to that found in international commodity agreements, which commonly provide that a Member that has exceeded its export quota for a given year will have its quota for the following year reduced by a similar amount. See B. S. Chimni, *International Commodity Agreements: A Legal Study* (Croom Helm 1987).

amount of excess emission, or could be in a ratio greater than 1:1.²² Such a Member would have to reduce its net emissions for the following year accordingly, or it and/or its sources would have to purchase additional allowances. This reduction would work a proportionate devaluation of any scrip issued by a non-complying Member for the following year or period.

- The non-complying Member would pay a fine to IETO in accordance with an agreed formula or in accordance with sanctioning criteria and procedures specified in the Agreement. The obligation of Parties to pay such fines could be secured in advance by their financial contributions to IETO, contingent bonds or irrevocable letters of credit, or other financial mechanisms. The proceeds of such fines could be used to increase the resources of IETO, distributed to the other Members, or otherwise be disposed of in accordance with the Group Agreement. Parties that paid fines would be required to replenish their financial commitments to IETO.

Under an emissions budget system, a Member whose net emissions for a budget period exceeded its budgeted amount plus any purchased or accumulated savings would have its budgeted amount for the following budget period reduced by the amount of the deficit and/or be required to pay a fine.

The Members might agree in the Agreement to impose trade sanctions or other additional sanctions, including suspension of voting privileges and expulsion from the Group, for persistent failure by a non-complying Member to pay fines or implement a plan to correct its deficits. Trade sanctions might include a prohibition on trades in allowances or savings between Members and the non-complying Member.²³

Under an annual allowance system, if a Member were certified by Monitor as having, for a given year, actual net emissions that were less than its allowances for that year, that Member or its sources would be entitled to sell the unused allowances in the 'true-up' market and/or save the unused allowances for use or sale in a future year. The unused allowances would be accounted for in an account established by IETO for the Member and the appropriate sources or sequestration projects, as determined in accordance with that Member's laws. Under an emissions budget system, if a Member's net emissions in a given budget period were certified by IETO as less than its budgeted amount for that period, it or its sources could either sell the resulting savings or retain them in a savings account for future use or sale.

²² A greater than 1:1 ratio could be adjusted in consideration of environmental equivalency if, for example, earlier GHG reductions are environmentally beneficial. Or such a ratio could be adopted for deterrent purposes. For example, emission deficits less than a specified percentage of a Member's net emissions could be offset 1:1, and greater deficits at increasingly higher ratios.

²³ The NAFTA Supplemental Agreement on Environmental Cooperation provides for fines and trade sanctions for failure by parties to enforce domestic environmental regulations and requirements.

Under a multi-year cumulative allowance system, sanctions for allowance or budget deficits or banking of surplus allowances or savings would not occur until the end of the multi-year period.

Subject to international review, Members would be responsible in an allowance system for policing and ensuring internal (domestic) compliance and would sanction sources within their jurisdiction if their emissions exceeded their allowances, as well as sequestration projects producing less sequestration services than their sequestration credits or allowances. Under an emissions budget approach, each Member could establish and enforce a national emissions budget for controlling emissions from its sources, or use other regulatory techniques to limit its sources' emissions.

This section has explained the essential features of two types of international GHG emissions trading systems and the organizational structure to establish and implement such systems. Implementing either system will require analysis and resolution of a number of more specific structural, organizational and legal issues, which are discussed in Chapter IV of this report.

CHAPTER III

INTERNATIONAL GHG TRADING SYSTEMS AND JOINT
IMPLEMENTATION/ ACTIVITIES IMPLEMENTED JOINTLY

This section of the report explains how the proposed trading system differs from joint implementation (JI) and activities implemented jointly (AIJ), as those terms are currently used in the context of the FCCC.

Article 4.2(a) of the FCCC provides that Annex I Parties adopting policies and measures to limit net GHG emissions 'may implement such policies and measures jointly with other Parties ... ,' subject to criteria adopted by the COP under Article 4(2)(d). In principle, these provisions invite FCCC Parties to engage in cooperative ventures in which each party contributes some part of the investment and activity necessary to reduce or sequester emissions. Cooperative measures between different governments, firms or other NGOs to reduce net GHG emissions could also take place independently of the FCCC.

At its first meeting in Berlin in 1995, the COP decided to launch a 'pilot phase' of Activities Implemented Jointly (AIJ), the pilot phase to end not later than the end of 1999.²⁴ In its Berlin AIJ Decision, the COP further decided that 'no credits shall accrue to any Party as a result of GHG emissions reduced or sequestered during the pilot phase from activities implemented jointly'.²⁵ Cooperative measures to reduce or sequester emissions undertaken in accordance with Article 4.2(a) and this Decision are referred to as activities implemented jointly (AIJ). Other such cooperative measures are referred to as joint implementation (JI).

The future status and direction of JI/AIJ and similar projects are unclear. To date, relatively few individually negotiated project-finance agreements have been concluded between entities in Annex I and non-Annex I Parties. A number of national framework agreements have also been concluded. The slow rate of project development is due to the absence of clear targets and timetables in the FCCC; to the lack of recognition for net emissions reductions achieved; and to relatively high transactions costs, including the costs and delays in obtaining regulatory approval.²⁶ The current 'soft target' in the FCCC would not provide a strong impetus to investment in GHG abatement activities and hence in JI/AIJ projects even if recognition were accorded and transaction costs lowered. The commitment of more than 100 Parties in the July 1996 Ministerial Declaration to 'legally-binding' targets for significant overall emissions reductions indicates that Parties have recognized the importance

²⁴ Conference of the Parties, Framework Convention on Climate Changes, First Session, Berlin, 28 March-7 April 1995, Agenda Item 6(c), *Conclusion of Outstanding Issues and Adoption of Decisions: Activities implemented jointly under the pilot phase*, Document FCCC/CP/1995/L.13, issued 6 April 1995; *Berlin Decision CP/5* ['Berlin AIJ Decision'].

²⁵ *Berlin AIJ Decision*, para. 1(f).

²⁶ The transaction costs associated with regulatory approval of particular projects are aggravated by the difficulties in specifying the appropriate baseline against which reductions are to be measured. See Daniel J. Dudek and Jonathan B. Wiener, *Joint Implementation and Transactions Costs under the FCCC*, paper for OECD Environment Directorate, May 1996.

of obligatory quantitative targets. In light of this commitment to agreed legally-binding targets, private sector interest in JI/AIJ-type approaches and efforts to reduce transaction costs are likely to increase.

The pilot trading system we describe here is quite different from JI/AIJ-type projects already undertaken or currently contemplated, although it is possible that AI/AIJ might evolve in a manner resembling a trading system. A system based on allowance trading or trading of emissions budgets savings would necessarily involve explicit and strictly enforced quantitative limits (caps) on annual emissions backed up by sanctions; formal allowances issued to cover allowed emissions under those caps or certified savings based on limitations of actual net emissions below budget caps; and organized trading exchanges. Because allowances or savings will be homogeneous and fungible, transaction costs should be much lower than for JI/AIJ projects. Investors will be protected against the risk of project failure; such failure would be handled through the obligation of Members to ensure that their net emissions do not exceed their allowance holdings or emissions budgets plus savings, and through sanctions, in accordance with the Agreement, to enforce such obligations. These systems also solve the JI/AIJ baseline problem by issuing a fixed number of allowances or establishing emissions budgets. Such trading systems would offer more predictable rewards from trades and far lower transaction costs.²⁷ At the same time, the trading systems described in this report would initially be open only to Parties to the FCCC which have agreed to the emissions limitation obligations of the FCCC.

Experience with JI/AIJ projects could nonetheless be useful in the design and implementation of an emissions trading system. For example, experience with determining net emissions from such projects could be useful in developing monitoring and accounting protocols for a trading system. Members in which trading system projects are located could draw on experience with JI/AIJ projects in devising steps to ensure that actual net emissions from projects together with allowances or savings transferred to project investors do not exceed targeted levels. Investors could similarly benefit from such experience to the extent that they invested directly in particular trading system projects in return for compensation including allowances or savings rather than purchasing allowances in the trading market.

A trading system of the type described in this report would probably be launched initially by a group of Annex I Parties participating voluntarily. Such a pilot system, however, could be open on a voluntary, optional basis to non-Annex I Parties that wanted to participate under the same terms as the other Members of the Group—that is, the acceptance of emissions limitations, monitoring, verification and enforcement obligations.

²⁷ See Robert N. Stavins, 'Transaction Costs and Tradeable Permits', *Jl Environmental Economics and Management* 29, 133 (1995) which discusses the need to design a trading system to reduce transaction costs in order to foster an efficient trading market.

CHAPTER IV

SPECIFIC ISSUES TO BE ADDRESSED
IN THE DESIGN AND IMPLEMENTATION
OF A PILOT INTERNATIONAL TRADING SYSTEM

This section of the report analyses a number of specific issues that must be addressed in designing and implementing the trading systems considered herein: the nature of the Agreement establishing the system, its governance structure and the role of domestic implementing legislation; the constitution and governance of IETO and the law governing its operation; the constitution and functions of Monitor; the trading systems' treatment of sequestration projects; the compatibility of the trading systems with international and national trade laws; measures to deal with the potential environmental and social effects of projects established through trading; IETO's supervision of trading markets; expropriation of allowances or savings or repudiation of the Agreement by Members; sanctions against non-complying Members; enlargement of the Group; changes in Group emission caps and allocations or budgets; and extension of the trading system to include additional GHG emissions, sinks and activity sectors.

A. The Agreement and Governance Structure: domestic implementing legislation

The Agreement, as an agreement among sovereign States, would be an instrument of international law established in the context of the FCCC.²⁸ The Members would establish an allowance trading or emissions budget system as described above, a governing body (for example a Council composed of representatives of the Members) including voting rules, a Secretariat, and procedures for making amendments to the Agreement and the admission of new Members.

The Secretariat, in addition to providing logistical, administrative, and professional support for the Council, would, at the discretion of the Members, represent the Council and the Members in operational relations with IETO and Monitor, prepare reports, provide support for technical advisory committees, and administer procedures for input from third persons including NGOs.

The Members would be obliged to adopt appropriate domestic legislation to implement the Agreement. Such legislation would establish legal and administrative measures for allocating allowances among sources, or for ensuring compliance by sources with national emissions budgets, for dealing with sequestration projects, and for monitoring and enforcement, in accordance with requirements specified in the Agreement or established by the Council, directly or through IETO or Monitor. In order, to ensure the success of the trading system, key elements in the design and implementation of the trading system would

²⁸ For general discussion of the legal and organizational issues presented by governance arrangements under international agreements, see Henry G. Schermers *International Institutional Law* (S. J. Huff and Noordhoff, Alphen van den Rijn, 1980). One model for the Agreement's governance structure might be that used for international commodity agreements. See B. S. Chimni, *International Commodity Agreements: A Legal Study* (Croom Helm, 1987). Other models would also need to be considered.

have to be substantially uniform across the Members. These elements would include, at a minimum, monitoring, data-gathering and reporting protocols; public access to information and procedures; and rules for establishing, transferring and recording ownership rights in allowances or savings. Such protocols, procedures, rules and other uniformly-required measures would be specified in or in accordance with the Agreement.²⁹ Because these and other implementing measures would be central to the success of the trading system, a Member's implementing legislation might be required to be certified by the Council, on the recommendation of the Secretariat, before that Member would be allowed to participate in the trading system.

In theory, a Member's government might be the exclusive international allowance trading agent on behalf of all sources, sequestration projects and investors within the country. In practice, however, such an arrangement would seriously hamper the full effectiveness of the trading system. Moreover, States willing to join an international trading system are highly likely to be committed to an internal trading system as well. Accordingly, the international allowance trading system described in this Report assumes that Members' domestic legislation implementing the Agreement would include the establishment of a domestic trading system, including a system for distributing among sources and, if applicable, sequestration projects, a Member's quota of allowances and any annual allowance deficits or surpluses, consistent with the international trading system established by the Agreement.

With an emissions budget system, however, there is not as strong a need for Members to establish a national system of emissions budgets for sources in order to ensure a successful savings trading market. Hence, the Report assumes that Members would be free in an emissions budget approach to control their sources' emissions through use of emissions budgets or through other regulatory techniques. Even in a Group allowance internal trading system, not all sources or sequestration projects within a Member would necessarily be covered by a national allowance trading system. For example, a Member establishing such a system might decide that, for administrative or other reasons, certain sources, such as very small sources or certain industries, might not be included in the allowance/trading system; their emissions might be addressed through command and control regulation, emissions fees or other means, provided that compliance with the Member's emissions cap was assured. And those sources included within the national allowance trading system might also be subject, in accordance with domestic law, to emissions fees, command and control regulation, or other additional emissions-reducing measures.

B. IETO: constitution, governance and applicable law

IETO would be established under international law in the context of the FCCC.³⁰ The Members would probably be unwilling to have IETO incorporated under the domestic laws

²⁹ Analogous arrangements may be found in federal systems in which provinces or states implement federal environmental legislation and in the implementation by the member states of European Union legislation.

³⁰ For an overview of the legal issues relating to international economic organizations, see Sergei A. Voitovich, *International Economic Organizations in the International Legal Process* (Martinus Nijhoff, Dordrecht, 1995). See also M. A. G. van Meerhaeghe, *International Economic Institutions* (4th ed., Martinus Nijhoff, Dordrecht, 1985); (continued ...)

of one of their number, since this might be difficult to reconcile with the principle of sovereign equality of States and might also introduce a degree of uncertainty or strategic behaviour and controversy resulting from the prospect of unilateral changes in the national law of the State of incorporation.

The choice of organizational form and structure for IETO must balance a number of competing considerations. The Members have a vital stake in the successful operation of IETO, which is integral to the success of the trading system. The Members will also need to contribute financially, either directly or through payment of fees by their sources, sequestration projects, or holders of allowances or savings, in order to enable IETO to operate. IETO's principal role would be to create and maintain the conditions for efficient allowance or savings trading markets. To accomplish this goal, IETO and its management would need to earn and maintain the confidence of the Members, investors and traders.

There are a number of different models by which IETO might be established. One model, for example, is to make IETO's role primarily entrepreneurial; Members would establish a structure that provides IETO with financial or other incentives to make the trading markets work. Another 'technical' model is to make IETO's role primarily professional and technical, and the entrepreneurial function of making the markets work would be undertaken primarily by private sector entities (such as exchanges, brokers and traders) that have historically undertaken similar activities. In either case, IETO should have incentives to reduce transaction costs for traders in order to promote the efficient operation of the system. It should also have clear requirements to eliminate potential conflicts of interest.

IETO would be governed by a Board of Directors, chosen by Members in accordance with the governance structure that Members select for IETO. The Board would select and supervise the IETO management. In developing the governance structure, Members would need to consider such issues as the possible role of NGOs and mechanisms for eliminating conflicts of interest on the part of the Board and management of IETO.

The Members, acting through the Agreement, Council and Secretariat, could arrange for IETO to provide a number of important services related to trading. In particular, IETO should be responsible for issuing allowances and savings; quickly and efficiently recording trades and allowance and savings holdings reported to it; and maintaining a double-entry bookkeeping system to track trades and Members' and holders' account balances. In the technical model, IETO's role would be largely limited to fulfilling these responsibilities; exchanges would be responsible for more entrepreneurial activities such as market promotion; and the exchanges would cooperate with IETO on market supervision. Allowances or savings could be traded on any existing or new exchange, whether or not

G. O. Zacharias Sondström, *Public International Utility Corporations* (A. W. Sijthoff, Leiden, 1972); Angelo Piero Sereni, 'International Economic Institutions and the Municipal Law of States' in *Recueil des Cours* 96, 9 (Academie de Droit International, A. W. Sijthoff, Leyde, 1960). On international institutions generally, see H. G. Schermers and N. M. Blokker, *International Institutional Law: unity within diversity* (3rd rev., ed. M. Nijoff, The Hague, Boston 1995).

located in a Member's jurisdiction that meets certain basic requirements established in accordance with the Agreement.³¹

IETO would be headquartered in a Member country. Following precedent with other international organizations, a Headquarters agreement, negotiated with the approval of the Members, would provide for IETO basic rules on legal personality in the domestic law of the country concerned, the extent to which IETO could sue or be sued, and rights of contracting, as well as privileges and immunities recognized by the Headquarter jurisdiction.³²

The Agreement could also provide procedures for resolution of disputes concerning IETO's internal governance, relations between IETO and its own officers and employees, and relations between IETO and any NGO or other non-Member participants in IETO's governance structure. It would not be usual for such disputes to be heard before national courts. Rules regarding matters of governance, including such matters as the nature and extent of the fiduciary duties of directors, officers and employees, and questions of corporate control are not as well developed in international law as in many national legal systems but would nevertheless have to be adopted and refined to provide a basis for operations. Disputes between IETO and third parties would presumably be resolved through the principles and procedures of public and private international law, including contractual provision for arbitration or choice of forum and law.³³

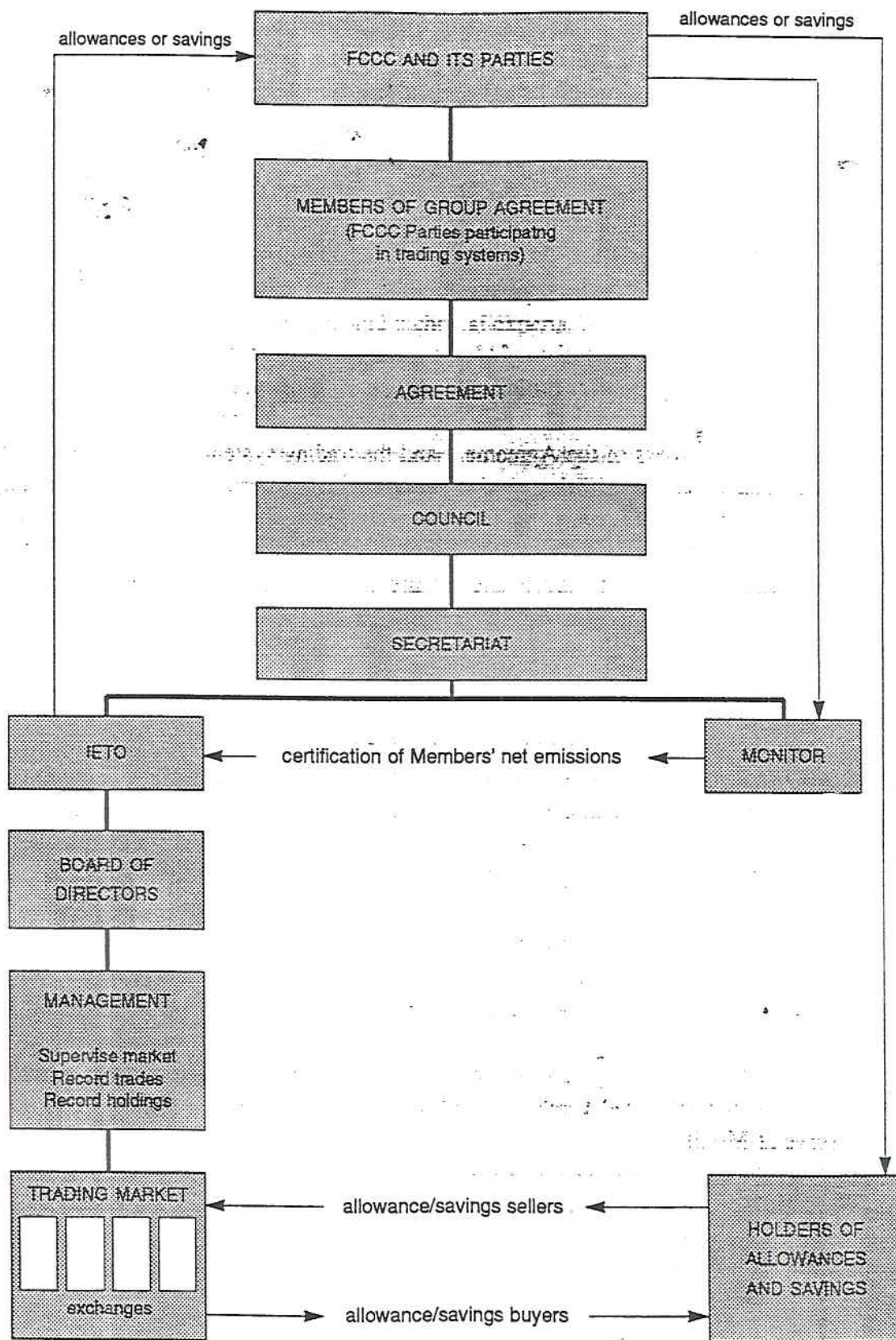
Any disputes between sources or sequestration projects and Member governments regarding domestic aspects of the Agreement's implementation, including a Member's allocation or reallocation of allowances or savings and its monitoring and enforcement activities, would be resolved solely through national law, and would not involve IETO, Monitor or the Council or Secretariat. IETO would recognize the results of domestic dispute resolution in recording trades and holdings of allowances or savings, in accordance with rules and procedures established by the Agreement or the Council.

³¹ In the United States Acid Rain Trading Program, the United States Environmental Protection Agency fulfills the technical model role, issuing allowances, and conducting recording and tracking functions. It processes 99 percent of allowance trades within 5 days, and 81 percent within 24 hours. EPA makes data on allowance transactions and holdings available to the public on the Internet and updates the information weekly. USEPA/OAR, *1995 Compliance Results: Acid Rain Program*, EPA/430-R-96-012 (July 1996), p. 10. EPA's role has been limited to the technical model in order both to avoid potential conflicts and also to spur private sector competition in the market promotion functions.

³² See Voitovich, footnote 30, for discussion of Headquarter agreements between international economic organizations and a host State which provide for recognition by the host of the organization's international legal personality and its legal obligations, privileges and immunities *vis-a-vis* the host. See also Schermers and Blokker, footnote 30, para 1690.

³³ For discussion of dispute resolution procedures involving international economic organizations, see Voitovich, footnote 30, pp. 127-143. If IETO were headquartered in a given jurisdiction, and the third party were also a citizen of, or a resident in such jurisdiction, the dispute would presumably be resolved under that jurisdiction's laws insofar as it related to an ordinary commercial dispute, in accordance with arrangements for other international economic organizations.

TRADING SYSTEM ORGANIZATION CHART



NGOs might be represented in IETO's governance structure. In addition or instead, they might have a role through advisory committees and/or the ability to petition IETO regarding its policies and decisions in designing and implementing the trading system. IETO would make an annual public report to the Council, and its account books would be open for public inspection. NGOs could be afforded opportunities to comment on the report and otherwise air relevant concerns with the Council through procedures developed and implemented by the Secretariat to promote transparency and NGO participation in the Council's review of such reports.³⁴ Such measures would help promote transparency and accountability. Some form of advisory committee that would include NGOs may also be appropriate. NGOs would also be free to participate in the trading market itself—they would be able to purchase, sell, hold and retire allowances or savings, or to design and finance projects to reduce net emissions and thereby to earn surplus allowances or savings to hold, sell or retire.

C. Constitution of Monitor and Implementation of the Net Emissions Verification Function

It is essential to the success of the Agreement and the trading system that there be effective institutional means for monitoring emissions and sequestration credits which enjoy widespread confidence.

One option would be to locate the monitoring function in the same organization (IETO) that establishes and oversees the trading function. This option could minimize organizational costs and facilitate coordination. Over the long term, IETO has a strong institutional interest in the integrity of the monitoring function.

A second option is to locate the monitoring function within the Secretariat or a related but separate organizational structure (Monitor) established by the Members in accordance with the Agreement. Members also have a long-term stake in the integrity of the monitoring function. Moreover, the functions and skills required to discharge the monitoring function are very different from those involved in developing and supervising a commodity market. This option would enhance the independence of Monitor. Use of a separate, specialized monitoring institution might facilitate cooperation between the international monitoring authority established in accordance with the Agreement and comparable national monitoring agencies within each Member's government.

A third option is to establish or contract with a separate, independent international organization, distinct from the Agreement and its organs on the one hand and IETO on the other, to serve as Monitor.

Further, Monitor might delegate some of its verification functions to Group-approved national monitoring entities that meet Group-established standards for training, transparency and reporting.

³⁴ As explained below, complaints that a Party's net emissions were in fact greater than reported by that Party would be directed to Monitor in the first instance, subject to review by the Council.

Whichever approach is chosen, Monitor's constitution should provide for a strong role for qualified independent scientists and technical experts. It should also provide for representation of the Members. Establishing and implementing procedures and criteria for verifying net emissions is not a purely technical task. Many considerations of administrative practicality, equity and political acceptability will enter into the process. It will therefore be important for the Members to be represented in Monitor's governance in order to assist its work and promote acceptance of its decisions.

If established or authorized as an organization separate from the Secretariat and IETO, Monitor's governance authority might consist of a Governing Board composed of representatives of the Members and of international scientific organizations such as the World Meteorological Organization (WMO). Monitor's constitution could also provide for an advisory body of qualified scientists and technical experts. Arrangements should be made to ensure adequate funding for its operations.

Monitor would have four essential functions. First, it would adopt protocols and procedures to be followed by the Members in monitoring domestic net emissions including, if applicable, the contribution of sequestration projects. These measures would include requirements for record keeping and reporting by sources and sequestration projects, and for data collection, emissions estimation and reporting by the Members. The Members would file annual reports on net emissions with Monitor in accordance with these requirements. The function of specifying common monitoring, record-keeping, and reporting protocols would be similar to that of international or national authorities, such as the European Commission or the US Environmental Protection Agency, that have adopted methods and guidance for emissions monitoring and preparation of emissions inventories by member States or states or provinces in federal systems. The reporting frameworks developed under the FCCC would be useful in this respect. An alternative is to have Monitor communicate directly with sources and sequestration projects and undertake all data collection and other monitoring functions rather than have these functions undertaken under the supervision of the Members' governments in the first instance.

Second, Monitor could itself conduct emissions monitoring and, if applicable, sequestration monitoring, as an independent check on the Members' national monitoring and reporting programmes, and inspect Members' and sources' monitoring activities, records and reports for compliance with the protocols and procedures adopted by Monitor. It might carry out these activities through its own personnel or contract with qualified non-profit or for-profit NGOs to do so. Because on-site monitoring by Monitor could present sensitive issues of sovereignty, any on-site monitoring powers granted by the Members to Monitor and the procedures for their exercise should be carefully spelled out in the Agreement.³⁵ Alternatively, as already noted, Monitor might delegate some of its verification functions to Group-approved national monitoring entities that meet Group-approved standards for training, transparency and reporting.

³⁵ Analogies may be found from arms control, NAFTA and other international agreements, including international environmental agreements. See Abram Chayes and Antonia Handler Chayes, *The New Sovereignty: Compliance with International Regulatory Instruments*, Harvard University Press, Cambridge (1995).

Third, Monitor would review the annual reports on net emissions that each Member would be required to submit, and canvass their accuracy based on the extent of compliance with its monitoring protocols and procedures and its own independent monitoring and inspection activities.

Fourth, Monitor would certify, consistent with its protocols and procedures, each Member's net emissions for each year. If the monitoring function were carried out by an organization separate from IETO, in order to maintain an appropriate separation of functions between Monitor and IETO, the Agreement could provide that Monitor's certification would constitute the exclusive basis for IETO's determinations as to whether a Member's net emissions were equal to, less than or greater than the allowances held by that Member's sources or the Member's budgeted net emissions plus savings, and its consequent determinations whether to record unused allowances or savings in the accounts of the Member and its sources, or to record deficits and impose sanctions against a Member because its net emissions exceeded its allowances or budgeted emissions.

Monitor would presumably make its certification determination on an aggregate basis for a Member as an entity, and not for individual sources and sequestration projects. Each Member would be responsible for determining the internal allocation of allowances or budgeted emissions, any surpluses or deficits in the allowances held by sources and the allowances or credits held by sequestration projects, or any budgeted emissions savings or deficits. Each Member would also be responsible for conducting its own emissions monitoring and enforcement activities, using the common protocols and methodologies established in accordance with the Agreement, to ensure that actual net emissions by its sources did not exceed the allowances held by the Member and its sources for that year or their emissions budgets.

Both business and environmental NGOs would have a strong interest in Monitor's activities and decisions. This interest might be served in several ways. Monitor should issue written explanations to accompany its emissions certification determinations and its issuance of monitoring protocols and procedures. In addition, a portion of the seats on the Monitor's scientific and technical advisory committee could be reserved for qualified NGO scientific and technical experts. Alternatively or in addition, a separate NGO advisory council might be established. Further, the Agreement might require that all Members make publicly available all monitoring data and records, whether possessed by sources and sequestration projects or by the Member governments. In addition, Monitor should be required to adopt regulations to govern its certification decisions. Decisions about the exact level of net emissions will necessarily involve some significant elements of uncertainty and judgment. What is important for the acceptability of certification decisions and the success of the trading system is that such decisions be made on a consistent, scientifically and technically sound basis across Members and, insofar as possible, from one year to the next. Regulations, as well as written explanations for certification decisions, would promote such consistency.

Careful attention must be given to dispute resolution procedures regarding Monitor's certification decisions. A Member would have the right to challenge a certification by Monitor of its net emissions as too high, or the certification of another Member's emissions as too low. Certification decisions will have important implications for businesses and

environmental and other interests. Extending rights of challenge to representatives of such interests could, however, unduly proliferate disputes and undercut the responsibility of the Members for the integrity of the trading system and their commitment to its success.

One means of dealing with potential controversy over net emissions certifications would be for Monitor to issue draft emissions certifications to the Members, on the model of a preliminary or draft accounting audit. Members could then informally raise questions and provide explanations or additional data. Considerations of dispute avoidance suggest that such drafts should not be made public. On the other hand, considerations of transparency and accountability may suggest that draft certification decisions should be made public, and that procedures should be provided for NGOs to comment thereon. Monitor's final certification would in any event be made public and be subject to review by the Council through procedures administered by the Secretariat to promote transparency and NGO participation and comment. Disputes among the Members regarding certification decisions could be addressed through mediation and, if necessary, decision by a designated panel constituted by the Agreement, with the possibility of an appeal to the Council. Provision should be made for representation of independent, qualified technical experts on any such panel.

There will be certain difficulties in meshing Monitor's certification determination with the maintenance of a smoothly functioning allowance market. Under a system of annual allowances, allowances will be issued for a given (let us assume calendar) year for use and redemption in that year. But net emissions verification and certification by Monitor will not be completed until, at best, several months after the close of the calendar year. Accordingly, during the course of the calendar year and for some months thereafter, sources, sequestration projects (if applicable), Members, and present or potential holders of allowances or savings will be uncertain as to the precise determination of net emissions by Monitor and whether allowance holdings will be sufficient to cover certified net emissions. Moreover, available allowances for the following year or period will be a function of the certification for the previous year. If a Member's net emissions are determined to be less than its allowances, it will have surplus allowances that can be sold or used in subsequent years. If a Member's net emissions are certified as exceeding its allowances, it will suffer penalties, including an offsetting reduction in allowances for the following year. But this determination will not be made until several months into the following year. Similar problems will arise at the end of a multi-year cumulative allowance period or an emissions budget period.

There are several ways to deal with the uncertainties this creates. A draft or provisional actual-to-allowances or actual-to-budget certification issued by Monitor shortly before the end of the year or period could provide a rough idea of the final certification. Members, sources and others can deal with uncertainty by being conservative in estimating net emissions. The ability to retain unused allowances or savings would encourage such conservatism. In addition, the Agreement might initially provide for a set-aside 'buffer' of banked allowances or budgeted emissions for each Member that could not be used until the second or later year or period under the Agreement, as a cushion to deal with the problems posed by certification uncertainty. Further, the scrip market would perform a hedging function, based on the information available to sources, sequestration projects, holders of allowances or savings, speculators, and Members. The market value of a Member's scrip would reflect its anticipated net emissions and Monitor certification decisions. The scrip futures market would allow sources and countries to insure against possible allowance or

budgeted emissions shortfalls (or windfalls) created by such decisions: Another possibility is to have a different accounting year for each Member so that the reconciliation and certification process would be staggered throughout a calendar year, promoting a more fluid, less chunky market. This approach might, however, create problems in ensuring consistency among certification decisions and resolving disputes regarding them. Finally, the appropriate adjustment in allowances could be made by IETO in the second year following the year for which net emissions are certified by Monitor.

New sources that begin operation in the middle of a year present no real difficulty for the emissions accounting system established in accordance with the Agreement.³⁶ Under an allowance trading system, they will have to acquire allowances to cover their emissions. If, as is likely, allowances are defined in tonnes of emissions, such sources will have to acquire allowances to cover their emissions for the remainder of the year. If allowances are defined in tonnes per year, their emissions and allowances will be accounted (pro rata based on the percentage of the year that they operate) on the same basis as other sources. New sources could purchase allowances in the market or could be given surplus, unallocated allowances by Members. Sources that shut down during the year could sell unused allowances (if defined in tonnes per year, then pro rata for the duration of the year). An budget/savings approach would follow similar procedures.

These various mechanisms should be adequate to harmonize IETO's allowance issuance and accounting functions and Monitor's certification function. Under a system of annual allowances, IETO will, at the beginning of a calendar year, issue allowances to Members in accordance with the schedule provided in the Agreement. Members will be responsible for the allocation of these allowances among sources. The allocation will be recorded in the sources' individual IETO accounts. After the close of the calendar year, Monitor will issue a final certification of net emissions for each Member for the previous year. If a Member has unused allowances, they will be banked to its account and to the accounts of sources that it designates. If its net emissions exceed its allowances, its allowances for the next year will be reduced accordingly. The Member will be responsible for allocating the allowance shortfall among its sources, which will be recorded in the relevant IETO accounts. Procedures for dealing with budgeted emissions savings or deficits will be similar.

D. Scope of the Market

In order to ensure the widest possible trading market, any person or entity, whether or not a citizen of a Member, should be able to hold, buy and sell allowances or savings allocated to Members.³⁷ Consistent with the approach taken in Chapter II C, non-Members could be allowed to purchase allowances or savings from Members or their citizens, through

³⁶ The regulatory terms and conditions on which new sources would be established would, of course, be determined by the domestic law of each Member.

³⁷ There may be domestic opposition to such latitude within certain Member states by those who regard allowances or savings as being akin to entitlements to or a form of national resources that should not be held by non-citizens.

investments in GHG reduction or sequestration activities in Member or non-Member States. New allowances (credits) or savings, however, could not be created by any investments in emissions reductions/ sequestration services in non-Members, and it is also likely that surplus allowances or savings generated by emission reduction activities in Members could not be credited against emission limitation obligations in non-Members. Further, trading should be conducted on any exchange that wishes to provide emission trading services and meets qualifications and requirements established in accordance with the Agreement, regardless of whether or not the exchange is located in the territory of a Member.

In addition, non-Members, or industries, firms or other NGOs undertaking emissions reduction or sequestration projects, such as JI/AJ projects, in non-Members might wish to utilize the services of IETO and/or Monitor in order to reduce transaction costs for such projects, which are likely to be significantly higher than the transaction costs associated with projects undertaken by Members or their NGOs in the context of the emissions trading system. They might also wish to utilize the services of IETO and Monitor in order to obtain internationally-recognized monitoring and verification of the project-specific reductions obtained. In constituting IETO and Monitor, the Group would need to clarify both the extent and the terms under which IETO and Monitor might provide services with respect to projects in non-Members.

E. Treatment of Sequestration Projects

As noted in Chapter 2, there are two basic alternatives for dealing with reductions in CO₂ or other GHGs obtained through sequestration projects.

One alternative is for IETO to issue additional allowances to a Member or record savings equal to the amount of emissions sequestered in a given year by a project located in that Member, as reported by the Member and certified by Monitor. By way of theoretical example assume that in Year 1 and Year 2 Member A has fossil fuel emissions of 100 tonnes of CO₂ and CH₄ (in CO₂-equivalent), and non-fossil fuel CO₂ emissions of 50 tonnes, and that these emissions are covered by an initial allocation of 150 allowances or by budgeted emissions of 150 tonnes for Year 1. A sequestration project in A becomes operational at the beginning of Year 2 and stores 25 tonnes of CO₂ during that year. Based on Monitor's certification, IETO would issue an additional 25 allowances to A or record savings of 25 tonnes, reflecting the amount of CO₂ sequestered. Under this accounting method, the reduction in net emissions achieved by the sequestration project could not be subtracted from A's gross emissions in determining A's net emissions for Year 2, since the reduction would already have been recognized by the issuance of the 25 additional allowances or by the recording of 25 tonnes of savings. Accordingly, in the accounting system for Year 2 in an allowance trading system, A would have emissions of 150 and allowances of 175; the extra 25 allowances would be held by the sequestration project and could be traded by it to sources in A or other Members, for use as credits against their emissions. In an emissions budget approach, A would have emissions of 150 and savings of 25.

The annual allowances or savings initially issued with respect to a sequestration project would be renewed in subsequent years only if Member monitoring data and reporting showed, and Monitor certified, that the project was continuing to sequester the same amount of carbon. Accordingly, the initial allocation in Year 2 of 25 credits or 25 tonnes in savings

for the sequestration project in A would be continued in subsequent years only upon satisfactory assurances that the project was continuing to sequester 25 tonnes of carbon each year. In the case of an allowance trading system, a potential objection to issuing extra allowances to sequestration projects is that it potentially creates confusion by varying the cap on allowances agreed or established by the Members and creates the appearance of 'allowance inflation'. But this is simply a problem of appearances. So long as Monitor verifies that extra allowances are offset by GHG sequestration, the net emissions cap remains effective.

In the second approach, no new allowances would be issued or savings certified by IETO to reflect the operation of the sequestration project in Year 2 or subsequent years. Sequestration services would instead be taken into account in determining Party A's net emissions. Thus, at the end of Year 2, A would have allowances of 150 and net emissions of 125, creating a surplus of 25 allowances or 25 tonnes of savings that could be saved or traded.

In an allowance trading system, a critical difference between the two approaches is that in the first alternative the surplus allowances of 25 tonnes could be directly allocated to, held by and traded by the sequestration project that sequestered the 25 tonnes of CO₂. In the second approach, A and its sources would hold 150 allowances, 25 of which would be surplus. The issue then would be how to allocate the sources' 25 surplus allowances in a fashion that would most effectively release them for inclusion in the trading system. One option is for A's government to reallocate by administrative action the 25 surplus allowances from the sources to the sequestration project. The difficulty with this approach is that a legal/administrative process would have to be established to accomplish this reallocation, which would take time, involve potentially-significant transaction costs, and might provoke conflicts among sources and sequestration projects competing for the surplus allowances. It might, however, be possible to implement a system of automatic pro-rata reallocations. Alternatively, a Member's emission sources could be allowed to net their emissions based on sequestration projects which they undertake or contract for within the same State. Or a Member could establish a separate sequestration credit trading system within the country, and take these credits into account in determining its sources' net emissions. These measures would, however, substantially restrict the scope of the trading market for sequestration services and create significant additional transaction costs.³⁸

Thus in the allowance trading approach, there may be a trade-off between the treatment of sequestration projects as independent holders of allowances (facilitating their participation in the allowance market, and thus providing maximum incentives for

³⁸ These problems would not arise under an emissions budget approach because savings accrue ex post, whether earned by sources through emissions reductions or by sinks through sequestration. A different type of allocation problem, however, could arise under an emissions budget system to the extent that net emissions reductions achieved by two or more sources or sequestration projects are partially offset by increases from other sources. For example, suppose that a Member establishes domestic emissions budgets for its sources in order to meet its emissions budget under the Agreement. Source A achieves emissions reductions of 20 tonnes relative to its emissions budget and sequestration project B sequesters 30 tonnes but other sources emit a total of 25 tonnes more than their emissions budgets. The Member would thus obtain savings of 25. Some means would have to be established for allocating these savings between A and B.

sequestration activities), and the transparent treatment of aggregate net emissions by Members. An ideal accounting method would serve both these goals.

In an allowance trading system (whichever of the two accounting approaches is followed) or in an emissions budget system, there must be accurate monitoring and certification of sequestration services. As in the case of emissions, there will be problems in meshing real-time accounting by Monitor of sequestration services with the annual accounting period for IETO. As discussed above, however, there are various mechanisms to deal with the uncertainties created by the timing of the certification process.

As in the case of new sources, new sequestration projects that come into operation during the course of an accounting year will have their credits certified by Monitor in the usual way, pro-rated if necessary by the portion of the year that they are operating. If the option of issuing additional allowances or savings for the GHG reductions achieved by sequestration project is selected, it may not be appropriate actually to issue such allowances or certify such savings for a new project until after the end of the year in which it is initiated. Retrospective issuance of allowances or certification of savings can, however, be accommodated through the opportunity to bank allowances or savings, and through the allowance or savings futures (scrip) markets.

In the light of these considerations, it might well be advisable for the Members to establish an international expert advisory group to develop detailed recommendations on the treatment of sequestration projects.

F. Potential Problems of Market Power

A frequently voiced concern regarding tradeable pollution permit systems is the threat of anti-competitive market power (for example monopoly, monopsony, cartels or 'hoarding'). If a Member or group of Members or a given firm or group of firms could amass, or hold options on, a sufficient number of allowances or savings, they could exercise market power with respect to purchasers of allowances or savings (charging them higher than market prices) and with respect to sellers of emission reduction or sequestration services (leaving them with fewer allowances or savings than they would obtain in a competitive market).

There are a number of steps that can be taken to deal with the threat of market power. The first and most important is to ensure that allowances or savings are widely held and can be freely traded—that is, to ensure a 'thick' market. In the proposed allowance trading model, allowances would initially be allocated to the Members, and then allocated by Members to sources. Members, however, would probably seek to retain some flexibility to hold currently unallocated allowances and to distribute or otherwise allocate allowances to holders other than sources. As noted above, Members might decide not to include some categories of sources within the allowance system and use other measures to limit their emissions. Furthermore, some individual sources would be so small (such as households with wood-burning stoves) that allowances would have to be distributed to and held on a group basis (for example by the municipality in which the houses are located), if they were included in the allowance system. Similar considerations would apply if a Member chose to establish emissions budgets for and allocate savings to its sources.

To the extent that large numbers of allowances or savings were held by large electric generating systems or petroleum and refining entities, which might be government-owned and/or enjoy a legally-conferred monopoly, there could be cause for concern over market power even if all allowances or savings were distributed to sources. There is also the risk that government regulations and policies on the distribution and use of allowances or savings could be a cloak or prop for cartelization or a barrier to new entrants (such as alternative energy sources). Yet the number and diversity of holders of allowances or savings is likely to be sufficiently great to make monopolization extraordinarily difficult, and cartelization implausible. In a system of annual allowances, the fact that allowances are issued only for a given year also diminishes the threat of market power. While the availability of banking allowances might theoretically enable one or a few holders to build up a substantial holding of allowances, the possibility that this could result in significant problems of market power seems remote because the total number of banked allowances is likely to be small relative to the total number of allowances, because new allowances would be issued every year in a system of annual allowances, and because of the other safeguards discussed in this paper. The availability of a futures market in scrip would further undercut the threat of market power.

The threat of market power would be limited by ensuring the freest possible system of trading. Contrary to some proposals that have been made, it is not recommended that allowances or savings could be bought and sold only by one or a limited number of multilateral development banks or other government or quasi-public entities. On the contrary, it would be desirable that allowances, savings and scrip could be freely held, bought and sold by any person or entity, in accordance with relevant domestic laws of Members or other States. IETO would serve solely as a market maker, registering trades and allowance holdings, authorizing exchanges to conduct organized trading markets, and providing or authorizing information and services to disseminate price and quantity information, and otherwise facilitate trades. Trading could also occur informally through brokers or through individual agreements between purchasers and sellers.

A further means of addressing the threat of market power could be to authorize IETO to hold a reserve of allowances or savings in the form of unallocated budgeted emissions which it would auction or sell in the open market either at fixed periods or at IETO's discretion. This could help ensure purchasers (especially new sources) of a supply of allowances or budgeted emissions and help to maintain confidence in the trading market.³⁹

Another means of dealing with potential problems of market power is through domestic or international antitrust and competition remedies. We are conscious of the limited international antitrust rules currently in force, and the failure of States to establish an international competition regime in the context of the WTO. Nonetheless, it is possible that a special set of competition rules for an allowance or savings trading system might be established by the Agreement, although this would seem most unlikely in the short term. Sources complaining of monopolization, cartelization or price-fixing agreements with respect to allowances or savings could in any event resort to available remedies under the domestic

³⁹ Under the 1990 United States Clean Air Act Amendments, EPA was given and has exercised the authority to sell periodically a reserve of unallocated SO₂ allowances.

law of the State in which they were located, including, for example, bringing actions for damages or injunctive relief in the courts or obtaining remedies from government authorities charged with ensuring competitive markets. Even if the anti-competitive conduct occurred in other States, under the antitrust/competition law in many nations the nation where the effects of the restraint are felt has authority to impose appropriate remedies and sanctions, provided that the necessary personal jurisdiction can be acquired. Similarly, sellers of emission reduction or sequestration services might pursue antitrust/competition remedies under the laws of the States where they are located. There is also growing coordination among antitrust/competition authorities, including those in the United States and the European Union, in dealing with trade restraints in international markets. The effectiveness of such remedies, particularly with respect to sources, would, however, depend on the identity of the Members to the Agreement and the antitrust/competition laws in those States, some of which might have only rudimentary competition/antitrust laws. Also, the availability of remedies against government agencies that hold allowances, or against government-sanctioned arrangements challenged as fostering cartelization, may be restricted by sovereign immunity principles or act of State or similar doctrines. Further, differences among the domestic antitrust/competition laws of the Members and other relevant countries may create significant friction.⁴⁰

G. Compatibility with International Trade Law

This section considers the relationship between an international GHG allowance/credit trading system and the general international trading system. It is possible that limiting allowances or credits to projects located in Members and other aspects of the arrangements described herein could be challenged as discriminatory or otherwise contrary to international trade rules. If, however, a substantial number of FCCC Annex I Parties were to join the Agreement, the likelihood of such a challenge may be remote. Moreover, as discussed below, there is at present no well-established legal basis for such a challenge. The analysis which follows focuses on the Uruguay Round of multilateral trade agreements adopted under the auspices of the World Trade Organization (WTO),⁴¹ since those agreements are the most comprehensive in coverage and membership.

⁴⁰ See Eleanor Fox, 'Competition Law and the Agenda for the WTO: Forging the Links of Competition and Trade', *U. Wa. Pac. Rim L. and Policy J.* 4, 1 (1995).

⁴¹ Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations, adopted at Marrakesh, 15 April 1994 (referred to as 'the WTO Agreements' in the text that follows). The WTO Agreements include the General Agreement on Tariffs and Trade 1994 ('GATT'), which includes the text of the original General Agreement on Tariffs and Trade of 1947 ('GATT 1947'). The WTO has the ultimate legal authority to interpret the WTO Agreements: 'The Ministerial Conference and the General Council shall have the exclusive authority to adopt interpretations of this Agreement and of the Multilateral Trade Agreements.' Marrakesh Agreement Establishing the World Trade Organization ('Marrakesh Agreement'), at Art. IX.2. This applies also to the results of disputes over interpretations of the WTO Agreements, as provided in the Dispute Settlement Understanding and the Marrakesh Agreement. Understanding on Rules and Procedures Governing the Settlement of Disputes, WTO Agreements at Annex 2 ('DSU').

The obligations contained in the WTO Agreements apply principally to States that are members of the WTO, and to the European Union.⁴² Accordingly, for the purposes of this paper, the principal potential points of interface with the WTO agreements occur with respect to participation in the allowance trading system by States rather than by other entities.

The following discussion focuses on the general case in which States that are already WTO members subsequently enter into a Group Agreement to reduce GHG emissions through agreements on emissions limitations and emissions trading. This general case is explored because more than 120 States, including all FCCC Annex I Parties, are already WTO members. It is likely that all Members to the emissions trading Agreement would already be WTO members. In this case, the Members' WTO rights and responsibilities persist after the adoption of the Agreement unless waived (*vis-a-vis* other Members) by the Agreement.⁴³

The WTO Agreements apply, among other things, to trade in goods (the Goods Agreements)⁴⁴ and trade in services (the General Agreement on Trade in Services or GATS).⁴⁵ Accordingly, in order to determine the legal relations between the WTO Agreements and an international emissions trading system, a preliminary question must be addressed: to what extent does the trading system involve trade in goods and/or trade in services? That is, to what extent do the WTO Agreements apply to: (a) trade in the allowances or savings themselves or investments or services in projects for which allowances or savings are obtained; and (b) trade in the services necessary to support allowance transactions, including the services of issuing allowances, making markets, brokering and conducting allowance sales, recording allowance trades and holdings, etc.

1. Trade in Allowances or Savings and Treatment of Related Investments and Services

Are emissions allowances or savings recognizable items under the WTO? If they are, then WTO disciplines (including requirements of non-discrimination and prohibitions on quantitative restrictions on trade), and WTO exceptions to these disciplines would apply. There is no precedent on this question; the WTO Goods Agreements and the GATS do not

⁴² The Multilateral Trade Agreements are 'binding on all Members.' Marrakesh Agreement at Art. II.2. Some of the obligations in the WTO Agreements apply to non-governmental bodies. See for example WTO Agreements at Annex 1A: Multilateral Agreement on Technical Barriers to Trade ('TBT Agreement').

⁴³ See P. Sands, *Principles of International Environmental Law* 112-3 (1995). If the Agreement waives specific WTO rights or commitments, then the Agreement would take precedence for these States that are bound by both WTO and the Agreement. The Members to the Agreement, however, could not waive the WTO rights and responsibilities of any non-Member. By contrast, if a State that is not a member of the WTO becomes a Member to the Agreement and subsequently joins the WTO, its rights and responsibilities under the Agreement would persist after joining the WTO unless the WTO Agreements specifically override the legal commitments expressed in the Group Agreement.

⁴⁴ See WTO Agreements at Annex 1A: Multilateral Agreements on Trade in Goods. These include Agreements on Agriculture, Sanitary and Phytosanitary Measures, Textiles and Clothing, Technical Barriers to Trade, Trade-Related Investment Measures, Preshipment Inspection, and other Agreements.

⁴⁵ See WTO Agreements at Annex 1B: General Agreement on Trade in Services.

clearly indicate that emissions allowances or savings would fall within the purview of these agreements; and there is no interpretation by the WTO members on this subject. Accordingly, no definitive statement can be made on this point. It is instructive, however, to consider three alternative possibilities.

The first is that emissions allowances and savings simply are not covered by the WTO Agreements. Analogies could be made to other items that are capable of being traded internationally, but whose WTO status is unclear, such as electricity. Analogies could also be made to items capable of being traded internationally, where other international agreements govern the major portion of trade, such as money.⁴⁶ If emissions trading is not covered by the WTO Agreements, then the benefits and obligations created by those agreements simply are not relevant with regard to trade in allowances or savings themselves.

A second possibility is that a WTO Dispute Settlement Panel would find allowances or savings similar to Goods. In that event, relevant disciplines and exceptions of the WTO Agreements on Trade in Goods would apply. On this assumption, an Agreement that limited trading to a group of less than all WTO Members could raise potential concerns under GATT 1947 Articles I (General Most-Favoured-Nation Treatment), III (National Treatment) and XI (Quantitative Restrictions). These concerns would not, however, arise with respect to participation in the trading systems described in this report, because the systems provide for open participation: allowances or savings can be held, sold and purchased by anyone, whether or not a Member or a citizen of a Member. Nor would such concerns relate to the ability of investors to obtain allowances or savings in exchange for investment in GHG abatement services, because investors who are citizens of non-Members as well as those who are citizens of Members can obtain allowances for investment in such services. Concern would arise, however, to the extent that allowances or savings can be obtained only for providing GHG abatement services in Members, and not for investment in similar services in non-Members.

A recent WTO Appellate Body decision on United States regulations for reformulated gasoline (RFG), however, lends support to the view that if membership in the Group Agreement is open to any State on reasonable terms, then the Group Agreement would withstand WTO Panel scrutiny, especially if there are strong, non-arbitrary environmental justifications for any requirements (such as emissions limitation obligations and monitoring, verification and enforcement obligations) for participation.⁴⁷

⁴⁶ Trade in money is regulated principally by the International Monetary Fund (IMF) and the Bank for International Settlements (BIS). See Statutes of the International Monetary Fund (IMF), as amended (Washington, 22 July 1945); and Convention Respecting the Bank for International Settlements (BIS), and Constituent Charter and Statutes of the Bank for International Settlements (BIS) (The Hague, 20 January 1930). Specific provisions of the WTO Agreements regarding currency exchange and balance-of-payments refer to and complement the IMF but do not seek to regulate trade in money per se. See for example GATT 1947 Article XIV.1 and XIV.5.a and Ad Article; GATT 1947 Article XV; Ministerial Decision on the Relationship of the WTO with the IMF (15 December 1993); see generally WTO, *Guide to GATT Law and Practice* 420-41 (1995).

⁴⁷ See "United States—Standards for Reformulated and Conventional Gasoline," AB-1996-1 (complainant—Venezuela). This report, the 'Appellate Body RFG Report', recognizes that differential treatment for environmental purposes may be justifiable under GATT 1947 Article XX(g), including the chapeau to that article, (continued ...)

A third possibility is that a WTO Dispute Settlement Panel would find trade in allowances or savings credits similar to trade in the services of providing emissions reductions opportunities. In that event, the GATS disciplines might apply, although it is still possible that the type of services provided would not be covered by the GATS, for example because they are governmental services.⁴⁸ If the GATS disciplines were applicable, GATS Article XX exceptions would not apply; instead, the slightly different exceptions contained in GATS Article XIV would apply.⁴⁹

2. Trade in the Services Associated with Trading

There is also no precedent in the way the WTO treats trade in trading-associated services. The GATS defines financial services to include '(x) Trading for own account or for account of customers, whether on an exchange, in an over-the-counter market or otherwise, the following: ... derivative products including, but not limited to, futures and options; ... transferable securities; [and] other negotiable instruments[; and] (xi) Participation in issues of all kinds of securities, including underwriting and placement as agent (whether publicly or privately) and provision of services related to such issues.'⁵⁰

The application of these provisions to an emissions trading system is unclear. The trading system would be open to informal trades by anyone, and to trades on any exchanges meeting exchange trading rules in accordance with terms established by Members directly or through IETO. These rules would need to provide for trading on an open and competitive basis. The question then is whether the issuance of allowances or savings to Members by IETO would run foul of 5(a)(xi), requiring open and competitive participation in the issuance of securities, and whether other IETO functions (for example in the entrepreneurial model)

provided that the differential treatment is not arbitrary; the Report also supports negotiation of cooperative agreements for verifying the accuracy of environmental data.

⁴⁸ GATS disciplines would apply unless the Panel were to find that these services were being 'supplied in the exercise of governmental authority'. Such services are not covered by the GATS. See GATS Article I(3)(b). GATS Article I(3)(c) defines 'services supplied in the exercise of governmental authority' to mean 'any service which is supplied neither on a commercial basis nor in competition with one or more service suppliers'. The term 'commercial basis' is not defined in the GATS. If a Panel elected to treat trade in emissions allowances or savings as trade in services for GATS purposes, it is unclear whether the Panel would then treat the trade as exempt under the governmental services exception, since part of the purpose of the trading system is to encourage competitive private-sector opportunities for reducing emissions.

⁴⁹ The RFG Appellate Body Report's interpretation of GATS 1947 Article XX could, however, be regarded as an analogy, since there is no jurisprudence under the GATS Article XIV.

A fourth possibility is that measures related to the allowance trading system would be deemed trade-related investment measures under the WTO Agreement on Trade-Related Investment Measures (TRIMs). This possibility is unlikely, since the TRIMs Agreement covers 'investment measures related to trade in goods only,' and it is unclear that measures establishing an allowance or savings trading system relate to the trade of any particular good or of goods generally. See TRIMs at Article 1.

⁵⁰ GATS Annex on Financial Services at 5(a)(x) and 5(a)(xi). Trade in the services associated with emissions trading would be covered by these articles only if Members listed such services in their financial services coverage offer. See *Understanding on Commitments in Financial Services* (1994).

would be covered by the GATS. It would appear most unlikely that issuance to Members by IETO of allowances or savings, which are created in accordance with sovereign authority, and are issued in accordance with an international Agreement to reduce GHG emissions, would be judged to violate 5(a)(xi), particularly if IETO were careful to maintain the open and competitive character of the trading markets.⁵¹

3. Monitor and the WTO

A further question arises as to whether Monitor's functions are covered by the WTO Agreements. While there is no precedent on the issue, it is possible that a WTO Panel would find that such functions are indeed covered. There are two possibilities.

First, Monitor's functions might fall within the GATS. In that case, as with the market-making/brokerage services, the provision of the monitoring services to a trading programme would need to be done on an open and competitive basis. For reasons already noted, however, the application of this principle to allowances or savings issued for environmental regulatory purposes is at best unclear.⁵²

Second, the monitoring functions could be deemed to fall directly or by analogy within the scope of coverage of the WTO Agreement on Preshipment Inspection.⁵³ If allowances or savings are deemed to be 'Goods' for purposes of the WTO Agreements, then monitoring and verification functions could be deemed to be PSI activities within the meaning of the PSI Agreement.⁵⁴ If covered as 'Preshipment Inspection', the monitoring functions would, under the terms of the PSI Agreement, need to be 'carried out in a non-discriminatory manner,' with 'objective procedures and criteria'.⁵⁵ As discussed above, however, it is highly uncertain whether allowances or savings issued in accordance with an environmental regulatory system would be treated as 'Goods'.⁵⁶

⁵¹ This conclusion would be strengthened to the extent that IETO's operations are specified or controlled by the Agreement or Council. An exclusive market-making or brokerage function for IETO might need to be avoided as this might run foul of the GATS commitments.

⁵² Moreover, an exception would potentially exist if the Members elected to have the monitoring services provided by an intergovernmental entity on a non-commercial basis in the exercise of sovereign authority. See GATS Article I.3.

⁵³ That Agreement applies to 'preshipment inspection activities carried out on the territory of WTO Members,' whether the activities are contracted or mandated by the government. Preshipment inspection activities are in turn defined as 'all activities relating to the verification of the quality, the quantity, the price, including currency exchange rate and financial terms, and/or the customs classification of goods to be exported to the territory of the user Member'. See *WTO Agreement on Preshipment Inspection* (the 'PSI Agreement') at Article I.1 and I.3.

⁵⁴ Monitor's verification functions, however, would generally not occur prior to allowance trades but only thereafter, at the end of the allowance year or period of years.

⁵⁵ PSI Agreement at Article 2.1. While an exclusive contract could probably be let consistent with the PSI Agreement, that contract would periodically have to be opened to competitive bid if the PSI Agreement applies. See generally Patrick Low, *Pre-shipment Inspection Services*, World Bank Paper No. XXX (1995).

The Group Agreement arrangements must also be examined for compatibility with regional free trade regimes, including the European Union and NAFTA. The elements of analysis would be similar to those described above. Complications would arise relative to the WTO analysis to the extent that some of the Members to the Agreement would be members of such a regime, while some of the Members would not, or that some other members of that regional trade regime would not be Members to the Agreement.

H. Environmental or Social Effects of Projects Established Through Trading

Concern might arise that trading in allowances or savings could have untoward, adverse environmental or social side effects within Member States. For example, suppliers of nuclear technology in Member A might sell to a utility company in Member B a nuclear generating plant, in exchange for compensation that could include the surplus allowances or savings resulting in a switch from fossil-fueled electric power to nuclear-fueled power in B. Such a transaction might be challenged by those concerned about the hazards of nuclear power.

Concerns about the adverse environmental and social side effects of particular trading transactions raise the question whether the Agreement should provide for regulatory authority, exercised on a case-by-case basis, to block particular trades on such grounds, or to require clearance of individual trades based on an assessment of their environmental and social impacts. As demonstrated in several practical applications of emissions permit trading systems, however, such measures could create serious uncertainty, cost and potential delay that would undermine the effective working of the trading system.⁵⁷ Since the allowance trading system has as its main goal the encouragement of activities to protect the Earth's climate, dragging down the trading system would undermine important environmental protection efforts. Moreover, because allowances or savings will be homogeneous and fungible, they will not be tied to specific GHG abatement projects. Often there may be no clear way to link individual trades to particular environmental and social side effects. Furthermore, in an open trading system, Members are under no obligation to trade with another; market participants are free to choose when, where and with whom to conduct trades. More fundamentally, such side effects would be of concern for any projects undertaken for GHG abatement, whether undertaken in the context of a trading system or not.

Thus, in order to maintain the effective functioning of the trading system, environmental and social concerns of this sort should be addressed outside the trading system through national regulation, without regulation or review under the Agreement of particular trades. Members have the sovereign right, as a matter of their national law and subject to

⁵⁶ Whether or not the monitoring functions would be deemed to fall within the PSI Agreement, a number of portions of the PSI Agreement are arguably relevant by analogy to the monitoring functions, and should be carefully examined. These include, in particular, the PSI Agreement provisions pertaining to Conflicts of Interest, Delays, Transparency, and Independent Review Procedures. PSI Agreement at Articles 2 and 4. Accordingly, the possible usefulness of developing national and/or international criteria for accredited monitoring entities should be considered.

⁵⁷ See John P. Dwyer, 'The Use of Market Incentives in Controlling Air Pollution: California's Marketable Permits Program', *Ecology L.Q.* 20, 103 (1993).

their international obligations, to regulate or prohibit certain forms of energy, such as nuclear power, or to restrict displacement of agricultural activities, or the like. Such legislation could indirectly restrict the available opportunities for trading in emission reduction or sequestration services, but would apply uniformly to projects whether financed by trades or not, and would not directly affect the functioning of the trading market itself. Similarly, although trades as such would not be subject to special environmental and social impact assessment requirements in accordance with the Agreement, such assessments could independently be required under domestic law generally applicable to a given type of project, whether or not the project is related to an allowance or emissions trade. One option, for example, would be to require impact assessments for all major GHG abatement or sequestration projects, whether or not they are financed by trades; FCCC Article 4(2)(f) already promotes such an obligation. Projects and activities financed by allowance trades would be fully subject to international environmental standards and requirements otherwise applicable to projects or activities of the type in question.

A quite different form of potential environmental side effect resulting from the Agreement would be the 'leakage' of investment in GHG-emitting activities, such as fossil-energy consumption or deforestation, by firms located in Member states into non-Member States as a result of the emissions cap and the need to buy or hold emission allowances or meet budget limitations if such activities occur in Members. To the extent that such a diversion of investment in emissions-generating activities occurs, it would tend to reduce the overall degree of GHG emissions limitation achieved by the Agreement, reduce the price of allowances and the incentives that they provide, and reduce the level of economic activity in the Members. Thus the Members would have an interest, either through domestic legislation or through the Agreement, in restraining such emissions investment leakages through regulatory, tax or other measures. For example, Members might require that investments by their citizens in projects in non-Members meet minimum environmental standards limiting GHG increases from such projects. There might, however, be practical as well as possible legal problems under WTO/GATT or other free trade agreements in implementing any such scheme. Moreover, such 'leakage' of investment in GHG-emitting activities would occur in any legal regime seeking to constrain GHG emissions but covering less than all the nations of the world, whether such a regime were based on economic incentives or traditional command and control regulatory methods. Accordingly, some leakage may have to be tolerated as a necessary side effect of any approach that involves a limited number of States. By lowering the costs of achieving any given level of emissions limitation, however, the superior cost effectiveness of a trading system would moderate the extent of leakage. Furthermore, simply keeping track of emissions in non-Member countries could provide oversight of leakage and could help stimulate efforts to bring more States into the Agreement.

1. IETO's Legal and Supervisory Authority Over Trading Markets: dispute resolution

IETO would be required to establish basic recording requirements for all trades in allowances or savings, whether conducted on organized exchanges or through informal transactions. IETO would specify standardized forms for recording trades or savings to ensure submission of the necessary information to enable IETO to register trades and make appropriate entries

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in the accounts of holders of allowances or savings.⁵⁸ Allowances or savings could not be redeemed or banked unless these procedures had been complied with.

In addition, IETO would establish basic requirements for exchanges that wished to conduct organized trading in allowances or savings. These requirements might include provisions relating to capitalization, governance, arrangements to ensure delivery of allowances and sale proceeds, systematic disclosure of information regarding trades, and remedies and dispute resolution. These provisions should be designed to encourage broad participation by exchanges in emissions trading. Competition among exchanges to provide accurate timely information and trading services might obviate the need for elaborate regulations. The ultimate sanction for failure of exchanges to adhere to these requirements might be refusal by IETO to record trades conducted on that exchange. IETO might also set minimum requirements for individual brokers, subject to the non-discrimination principles discussed above.

There are substantial questions as to how the market in scrip for future allowances should be organized. One alternative would be for IETO to issue scrip to the Members in accordance with the future year allowances allocations set forth in the Agreement or emissions savings projected by a Member in a submission to IETO. Scrip—unlike allowances or savings themselves—would bear the name of the Member to which it was issued. This feature is necessary because the redemption of scrip depends on the allowance allocation or savings for each Member in the relevant year or period. Members would then distribute their scrip to their sources and other holders, perhaps in a manner similar to the distribution of allowances or, if a Member chose, budgeted emissions. In the year or period to which the scrip pertains, IETO would redeem scrip issued for a given Member for that year or period by issuing allowances or savings good for that and subsequent years or periods to holders of the corresponding scrip. If a Member's projected quota of allowances for a given year or period had been reduced as a sanction for excess emissions in the previous year or because of agreed adjustments in the Group cap or its allocation, the allowances issued by IETO to scrip holders would be discounted on a pro rata basis. Similarly, if a Member's allowances were increased by adjustments in the Group cap or because of sequestration projects, the excess allowances would be allocated to scrip holders pro rata. (Banked allowances or savings reserved from surpluses in prior years or periods would be held by those who banked or bought them, not allocated to scrip holders.) Similar adjustments would be made in issuing savings to reflect changes in budgeted emissions. Under this approach, IETO would organize trading in scrip, creating an effective futures market in allowances or savings. IETO would record and organize trades of scrip on the same basis as allowances or savings.

A less centralized approach might be to authorize the issuance of scrip by any Member that wished to. Each Member would be responsible for deciding how to redeem scrip for a given year in light of the allowances or savings issued to it by IETO in that year. Individual Members themselves, IETO or exchanges could authorize or establish trading markets in scrip.

⁵⁸The United States Environmental Protection Agency has followed such a procedure in implementing the SO₂ trading provisions of the 1990 Clean Air Act Amendments.

There would be no apparent need for the Agreement to establish distinctive legal rules to govern the contractual and other aspects of trades in allowances, savings or scrip. Subject to compliance with the provisions of the Agreement and implementing rules and practices adopted by the Council and IETO, such contracts could be established in accordance with normal practices and procedures of commercial law. Thus issues such as disclosure, fraud, breach of contract and sanctions for non-performance would be addressed by contractual agreements for arbitration or for choice of domestic law and forum, or failing such agreements, by applicable domestic jurisdictions and laws.

IETO, however, might by regulation establish certain standard or minimum remedies and dispute resolution procedures or develop guidance on uniform national rules with respect to trades on authorized exchanges to the extent that these would help protect purchasers and sellers and promote confidence in the integrity and reliability of the trading system. These provisions could apply to disputes between members of an exchange as well as disputes between an exchange and its members and/or their customers. These provisions might include reliance on arbitration or the domestic law of the country where the exchange was located. Resolution of disputes between IETO and exchanges themselves might also be addressed by IETO regulations, contractual agreements between IETO and authorized exchanges, or uniform national procedures.

J. Party Repudiation and Expropriation

It is possible that a Member could, at short notice, withdraw from the Agreement, perhaps because it wanted to increase emissions beyond its allotment of allowances or applicable emissions budgets and felt it could do so at lower cost by abandoning the Agreement rather than by buying additional allowances or savings. Such repudiation would forfeit the Member's financial securities deposited with IETO, and would bar the Member from future participation in the trading system.

Another possible scenario is a Member 'expropriating' allowances, savings or scrip issued to or by it and held by private sources, projects or third persons (in particular non-nationals), or 'nationalizing' private emissions reduction or sequestration projects. In these cases, the Member government might invoke the principle of 'permanent sovereignty over natural resources' in support of its right to use the natural resource of the air to emit GHG.⁵⁹ This principle is reflected in the 1974 Charter of Economic Rights and Duties of States, which provides that 'Each State is entitled to exercise effective control over [its natural resources] and their exploitation with means suitable to its own situation, including the right to nationalization or transfer of ownership to its nationals, this right being an expression of the full permanent sovereignty of the State'. In so acting, Members might rely upon a line of

⁵⁹ See generally F Yamin, *The Climate Change Convention and Joint Implementation: Legal, Institutional and Procedural Issues*, FIELD Working paper, August 1993, pp. 4-7; F. Yamin, 'The Use of Joint Implementation to Increase Compliance with the Climate Change Convention', in J. Cameron et al. (eds), *Improving Compliance with International Environmental Law* (1996). See especially UN General Assembly Resolution 1803 of 12 December 1962 on permanent sovereignty over natural resources, which has been recognized in a number of international arbitration awards, and Principle 21 of the Stockholm Declaration.

international arbitral awards recognizing that States can so act, provided that certain conditions are satisfied (including the payment of appropriate compensation).⁶⁰

The Agreement would need to be drafted so as to provide maximum stability to the trading system, by eliminating or significantly limiting the extent to which expropriative actions could be undertaken or legally justified. Significant security would be provided by establishing the Agreement as a treaty (within the framework of the FCCC) governed by public international law, with express provisions on withdrawal and a clause which expressly prohibited interference by Members with interests in allowances, savings or scrips which are held in accordance with the Agreement by private parties (national or non-national). Further security (from the perspective of potential private holders of allowances, savings or scrip) would be obtained by ensuring that the dispute settlement provisions of the Agreement are accessible to other entities (governmental or non-governmental) which have claims against Members in relation to actions taken, such as the ones indicated in the previous paragraph. In addition, the Agreement could require advance consent by Members to compensate those from whom allowances, savings or scrip are taken, and could even establish a compensation fund with deposits by the Members.⁶¹

K. Sanctions Against Members: enforcement

The success of the Agreement and the trading system requires that Members' net emissions do not exceed the allowances that they and their sources redeem or their budgeted emissions plus holdings of savings. Under the Agreement, each Member would assume the obligation to take appropriate action to ensure that net emissions from sources within its territory do not exceed the allowances held and redeemed or budgeted emissions plus savings. Members would also have to ensure that the emissions credits allocated to sequestration projects in determining a Member's net emissions or the allowances or savings issued to such projects did not exceed the GHG sequestered by such projects. The Agreement or regulations adopted in accordance with it might provide certain minimum requirements for domestic implementation and enforcement by Members. These requirements might include provision for citizen suits against sources for emissions exceeding their allowances, or against sequestration projects for failure to achieve claimed sequestration levels, or against enforcement authorities within the country for failure to take appropriate action. However, any such remedies would need to be consistent with the legal traditions of the Members. Of course, any Member would be free to adopt these or similar measures purely as a matter of domestic law in order to carry out its commitments under the Agreement and avoid the imposition of sanctions.

The Agreement will have to provide for cases where a Member fails to limit its net emissions to the level of its allowance holdings or to the level of its budgeted emissions plus savings and thereby incurs an allowance or emissions budget deficit. In the allowance model,

⁶⁰ See for example 'Libyan American Oil Company (LIAMCO) v. Libya', *I.L.R.* 62, 389, *I.L.M.* 20, 1, 53 (1981).

⁶¹ A distinct issue is the question whether changes adopted by the Group in the emissions caps, and thus in the number and value of allowances, would constitute a compensable, taking of allowance holders' property. See Chapter IV N, Extension of allowance system..

the primary mechanism for dealing with deficits would be for IETO to reduce the allowances to be issued to a Member for a given year or period by the amount, as certified by Monitor, of its excess emissions in the previous year or period. In the emissions budget approach, a Member's emissions budget for the next budget or sub-budget period would be reduced by the amount of its deficit in the prior period.⁶²

This type of remedy is commonly imposed in the case of exporting country members of international commodity agreements that exceed their export quota, and it is a key remedy under the SO₂ allowance trading system in the United States. This procedure can be viewed not as a sanction but simply as a means of affording flexibility in the operation of the allowance system. In practice, it may be difficult for each Member to balance precisely net emissions and allowances or budgeted emissions plus savings in every given year or period. When emissions are less than allowances or budgeted emissions, Members are authorized to reserve the unused allowances or budgeted emissions savings and carry them forward. Similarly, when emissions exceed allowances or budgeted emissions plus savings, the allowance deficit could be carried over and paid for by reductions in the allowances or the budgeted emissions otherwise available for the next year or period. Nonetheless, the flexibility afforded by the trading system greatly diminishes the need or justification for allowing Members to run large or persistent deficits. Real-time emissions accounting should give sources and Members fairly prompt notice of impending deficits, which can be covered through purchases of allowances or savings. Large or persistent deficits by Members would threaten the integrity of the trading system. Accordingly, the size of the deficit that a Member should be allowed to run in any given year without penalty (other than adjustment of its allowances or emissions budget for the following year or period) should be limited to a small percentage of its allowance allocation or emissions budget. If this percentage is exceeded, significant penalties should be imposed, such as financial penalties and greater than 1-for-1 reductions in future allowances or budgeted emissions.

There are additional checks against Members running large and persistent deficits. There will be powerful domestic political and economic interests that will wish to avoid such deficits, including other Parties, environmental groups, holders of scrip (whose holdings will be devalued by the prospect of future deficits), and sequestration projects and sources with surplus allowances or savings (whose opportunity to sell allowances or savings will be diminished as a result of deficits). If continuing deficits were anticipated, a Member's scrip would be devalued over a range of future years, with a corresponding adverse impact on holders of scrip. If the Member in question raised revenues by auctioning off the scrip as well as allowances or savings, devaluation could have a significant negative revenue impact on the government. Such devaluation would also be a negative economic indicator in international financial markets, potentially impairing a Member's credit worthiness in other respects as well. And international political pressure would help encourage compliance.

⁶² An alternative remedy, in the case of an emissions budget system, would be to devalue any outstanding savings issued to a Member by the amount of the deficit. This remedy, however, could undermine the trading system and investor participation therein by eliminating the homogeneity among different Members' savings and placing the risk of a Member's non-compliance with the Agreement on holders of savings.

Additional sanctions, beyond reduction in subsequent allowance allocations or emissions budgets, could be imposed in accordance with the Agreement to deal with persistent or gross allowance deficits by a Member. Monetary fines or sanctions could be imposed against the Member in question, a matter which remains undeveloped in other international legal arrangements, with the notable exception of the European Community and the Montreal Protocol on Substances that Deplete the Ozone Layer and, to a smaller extent, the NAFTA.⁶³ The European Commission is authorized in some instances to impose fines on member States; the Commission, for example, has recently fined a number of member States a total of \$1 billion for violations of the requirements of the Community's common agricultural policy.⁶⁴ In addition, the European Court of Justice is authorized to fine member States for infringements of Community legislation.

To the extent that such approaches were to be followed in the Agreement, fines could be collected by garnishing the Member's investment in IETO or by collection on irrevocable letters of credit or by redemption of conditional bonds issued by each Member on joining the Agreement. As in the case of the authority of the European Court of Justice to impose fines on member States for infringement of Community legislation, the amount of fines that could realistically be authorized and collected might well be less than the short-term economic advantage that a Member or its sources might enjoy from running a deficit. But a substantial fine would have an appreciable deterrent effect in the court of public opinion as well as having an adverse impact on the Member's standing in the international financial community.

Potential further sanctions for persistent excessive allowance deficits could include suspending the Member's voting rights in the Council or halting trade in allowances or savings with that Member. These sanctions are provided in some international commodity and environmental agreements. The ultimate sanction for repeated excessive allowance deficits would be for the Council to expel the Member in question from the Agreement in accordance with its terms.

Decisions about imposition of fines or expulsion would inevitably be political ones, reached in accordance with voting procedures for the Council or the Members as specified in the Agreement. The Agreement, however, might set certain thresholds before such sanctions could be imposed; for example, deficits would have to exceed a certain percentage of a Member's allowances or be maintained above a certain level for a specified period. Resort to an appropriate international judicial or arbitral body or to dispute resolution procedures specified in the Agreement might be provided to resolve any disagreement about whether a Member has violated the Agreement or the appropriateness of the sanctions imposed.

⁶³ The NAFTA Environmental Agreement contains provisions for imposition of a monetary enforcement assessment in the case a persistent pattern of failure to enforce environmental laws effectively. 'North American Agreement on Environmental Cooperation', in *The NAFTA Supplemental Agreements*, US Government Printing Office, Washington, DC 1993, ISBN 0-16-041969-7, at Article 34.5 (1993) (hereinafter NAFTA Agreement). No such sanctions have been imposed to date.

⁶⁴ See N. Buckley, 'CAP Abuses Bring Brussels Fine', *Financial Times*, 29 March 1996.

Environmental and other NGOs could play a useful role in bringing information about non-compliance to the attention of Monitor and the Council, and thereby create pressures on non-compliant Members to improve their performance. Thus a formal mechanism for submitting information and lodging complaints to Monitor and the Council by NGOs may be appropriate. The NAFTA Environmental Agreement provides a potentially useful example.

The Agreement will need to make appropriate provision for enforcing Members' financial commitments under the Agreement, including commitments to help fund IETO and Monitor and to pay fines for non-compliance. The dispute settlement provisions should be broad enough to cover this eventuality, including the waiver of any sovereign immunity claims which might be raised by Members.

L. Procedures for Additional States to Join Group

A major purpose of establishing a trading system as described in this report is to demonstrate that it is an efficient means of controlling GHG emissions, and thus persuade other Parties to the FCCC to participate. Broad participation would bring more States' economies under agreed net emissions limits, thus improving the ability of the Group to contribute to global GHG limitations. Enlarging the Group would also simultaneously reduce the problem of leakage as a result of investments by firms in Members in GHG emissions-generating activities in non-Members. Broad membership could also make the Group more diverse, thus enlarging emissions abatement opportunities and potentially reducing the marginal cost of abatement for all Members. As discussed above, openness could also alleviate potential GATT/WTO legal objections to an emissions trading system.

The Rules for admitting new Members to the Group would need to be designed with care. Every new Member would need to meet the Agreement's requirements. The Agreement's pertinent requirements include (but are not limited to) the commitments to set and enforce limits on emissions, to respect free holding and trade in allowances or savings and scrip, to implement requisite domestic legislation, to distribute allowances to entities within the country, to coordinate implementation of trading with IETO, to submit to agreed inspection by Monitor, to refrain from expropriation of allowances or savings and scrip, to place requisite financial instruments or other sovereign guarantees with IETO as insurance against non-compliance, and to participate in and abide by the results of dispute settlement procedures.⁶⁵

When a new Member is added to the Group, it will be subject to a set of binding annual net emissions caps (or perhaps a cumulative cap covering a period of years, as previously described) or to binding emission budgets, consistent with its obligations under the FCCC. Under the allowance model, upon admitting a new Member the Group would need to recalculate the Group's aggregate emissions cap by adding the new Members' limitations caps to the previous Group total, and then allocate to the new Member allowances (annually

⁶⁵ Accordingly, any FCCC Party not within Annex I would have to agree voluntarily to emissions limitations as well as the other listed requirements in order to be admitted to the Group.

or cumulatively) corresponding to the limitations accepted by the new Member. The need for these measures does not arise with the emissions budget approach.

In the allowance model, some Members of the Group might be concerned that the Group should be enlarged in an orderly fashion. Suddenly adding a major new Member to the Group's allowance trading market could destabilize allowance prices if the new Member added a sufficiently large number of emissions and allowances to influence market prices significantly through shifts in supply or demand. These Members might try to ensure that new Members were added in a way that maintained stability or at least predictability in the prices for allowances, either by adding new Members in sets that contributed balanced new supply and demand, or by using the addition of new Members with unbalanced supply and demand to correct for a countervailing imbalance that had arisen within the pre-existing Group. Other Group Members might give greater weight to enlarging the scope and enhancing the competitiveness of the system. While the Group would need to consider the market price effect of the participation of new Members, and of admitting them at different times or in different combinations, concerns about market stability should not be allowed to displace the environmental goal of encouraging greater participation in the allowance trading system.

Similar issues would arise in an emissions budget approach because of the potential impact of the admission of new Members on the savings market, although any such impact would be less direct and immediate than in the case of an allowance system. Since the first step for a new market participant is to take a budget, and since savings do not accrue until they are earned, savings do not enter the market immediately and *en bloc* as supply or demand for allowances might with a new market entrant in the allowance model.

The considerations of openness and market stability suggest that Members might wish to include in the Agreement a mechanism by which the Group could consider petitions by prospective Members for admission. Under such a new-entrant mechanism, prospective Members would need to demonstrate their willingness and ability to meet the terms of the Agreement. In an allowance trading system, the Group would then consider how to develop a new aggregate Group net emissions cap and an allocation of allowances to the prospective Member, as well as a date of admission, consistent with and relevant to its obligations under the FCCC. In the emissions budget model, the Group would have to reach agreement with the new entrant on the amount and period of its emissions budget, again consistent with FCCC obligations.

Voting rules could specify the vote required to admit a new Member to the Group. A rule of unanimity, or even of no substantial opposition, could empower Members with strategic interests to exclude new competitors. A rule of simple majority of Members, or perhaps a modest supermajority (for example 60 percent), might be preferable. Of course, any constraint on new entrants would need to be justified in competitiveness and environmental terms to ensure consistency with GATT/WTO arrangements.

*M. Changes in Agreed Group Cap and Member Allowance Allocations
or in Emissions Budgets*

In an allowance system, the Group might from time to time wish to change its aggregate emissions cap and perhaps the allocation of emissions among Members, consistent with the FCCC, in order to take into account changes in scientific information, technological and economic developments, and international legal and political developments, including changes in or the adoption of protocols to the FCCC.

Any changes in the aggregate Group cap would affect the number and value of allowances held by the Members and their sub-national entities and of scrip. Raising the cap and allocating additional allowances—equivalent to regulating less stringently—would devalue allowances and scrip currently held, to the financial detriment of those who purchased them before the trading market had anticipated the policy change.⁶⁶ Experience with markets in government-issued licences, such as taxicab medallions, indicates that current licence holders can be a powerful lobby against efforts to increase the total number of licences.⁶⁷ This suggests that trading systems may be resistant to relaxation, a feature which may worry those concerned about the cost of emissions controls but may please those concerned about environmental objectives.

Lowering the cap—equivalent to regulating emissions more stringently—would necessitate reducing the number of allowances by some means, such as canceling certain allowances, pro rata revaluation (requiring that allowances with a face value of one tonne of CO₂-equivalent now be deemed to cover less than one tonne), or purchasing allowances with taxpayer revenues and retiring them. Existing holders of allowances or savings might resist the first two of these moves (depending on the ensuing rise in the price of the revalued allowances) but might be indifferent to the third option (taxpayer-financed repurchase) as long as the price paid for repurchase reflected allowance holders' willingness to accept (WTA) parting with allowances (for example, in an auction or voluntary repurchase programme) rather than relinquishment at an imposed price such as a judicially-determined 'fair market value'.⁶⁸ Some existing allowance holders might be advantaged by a rise in prices following a diminution in the supply of allowances, but this price effect would primarily benefit holders whose own holdings were not canceled, revalued or repurchased at a fixed price; such holders would in any event tend to favour taxpayer-financed repurchase at an open auction, which might well be opposed by taxpayers.

⁶⁶ If allowances are issued annually for a one-year period, the effect of any devaluation on allowances would be correspondingly limited. If allowances are issued on a cumulative basis for a number of years, the effects would be greater.

⁶⁷ New York City has decided to add 400 new taxi medallions—the first increase over the 11 787 medallions issued in 1937. See 'New York's Cabs: A Revolution!' *The Economist*, 2 February 1996, p. 21.

⁶⁸ The 'fair market value' of allowances or savings (a 'liability rule' entitlement) would tend to be less than the WTA of many holders otherwise the holders would be selling them on the open market. An auction or voluntary repurchase offer (a 'property rule' entitlement) would invite participation by those holders whose WTA was equal to or less than the offer price.

Under either scenario, existing holders might seek to restrict changes in the stock of allowances. In addition, changing future caps and allocations will affect the value of scrip issued for those future years. Like holders of allowances, scrip holders could be expected to oppose changes that devalued their scrip by adding future allowances, or that revalued their scrip holdings at less than face value.

These inertial factors might work against the Group's overall interest in flexibility to adjust the aggregate cap in the light of new developments. On the other hand it might protect Members—and the environmental goals reflected in the cap—from the use of changes in the cap to manipulate trading prices for strategic competitive or financial reasons. For these and other reasons, the voting rules for changes in the aggregate Group cap would be important.

Changes to the aggregate cap would have to be followed by changes to the allocation for each Member, presumably on the basis of some sort of pro rata approach.

Any independent changes to the existing allocation of allowances among Parties, however, would probably be even more controversial, and even more fraught with opportunities for strategic gaming, than changes to the overall cap. For such changes, it is most likely that a voting rule of unanimity be required. Redistributing allowances within the Group would be tantamount to renegotiating the crux of the Agreement.

Consideration would need to be given as to how to avoid a situation where changes in allowance totals or allocations could give rise to claims by individual holders of allowances that their 'property rights' had been 'taken.' Although allowances have some characteristics of property, they are also regulatory instruments subject to government policy. The Agreement and implementing measures should make clear that holders should expect and accept periodic policy changes affecting the value, number and price of allowances.

In order to minimize financial dislocation, and thereby to defuse blocking coalitions of adversely affected Members and holders of allowances or scrip, the Group could visibly air the possibility of changes in caps in advance of actual votes, and could phase in changes over time. These steps would send signals to the trading markets so that prices would adjust gradually. Indeed, if participants in trading markets could foresee the policy change in the offing, and adjust to it over time, then the markets—particularly futures markets—would incorporate *ex ante* premia for the risk of policy change, and there would be little or no imposed loss at the time of the actual vote.⁶⁹

The foregoing concerns about reallocation and the effect of changes in the aggregate cap would also arise in the emissions budget approach because changes in budgeted emissions could affect the value of savings. However, these concerns would be less acute in a budget system because the impact is less direct and immediate than the impact of changes in allowance caps and allocations on the value of allowances. Furthermore, if budgets were

⁶⁹ See Louis Kaplow, 'An Analysis of Legal Transitions', *Harv. L. Rev.* 99, 509 (1986). For this reason, the Federal Open Market Committee of the Board of Governors of the US Federal Reserve Bank often lets it be known in advance of formal votes that interest rates may change. The US Congress phased in declining total allowances for lead in gasoline over a seven-year period (1981-87).

negotiated on, for example, a decadal basis, negotiations on the next future budget period would commence during the current budget period, and would take into account changes in scientific information, technological developments, and international legal and political developments.⁷⁰ The negotiation for the next budget period would also include consideration of the level of premium to be offered on savings held or accrued during that budget period. The 'rolling' nature of the budget process, plus annual or biennial sub-budgets, would provide system-wide flexibility and would send advance signals to the trading markets so that prices could adjust gradually.⁷¹

N. Extension of Allowance System to Include Additional GHGs and Activity Sectors

The pilot trading programme discussed herein would initially cover CO₂ emissions from energy-sector supply, transmission, and demand (including transportation, residential/commercial, industrial, and utility uses), and might also include emissions of HCFCs, HFCs, PFCs and SF₆. Emissions of these GHG are relatively easy to monitor and verify. It would also be desirable to include forest-sector CO₂ (including sinks) and energy-sector CH₄ (methane), and the tropospheric ozone precursor NO_x, if appropriate assurances of monitoring and verification could be provided. The programme would probably not in the near future cover emissions from other sectors such as agriculture (whether of CO₂, CH₄, N₂O or other gases), nor emissions of other ozone precursors or other greenhouse gases, although these sectors and gases could be included later as monitoring and verification methods improve.

Including forest-sector CO₂ (including sinks) and energy-sector CH₄ in the initial trading system would have a number of significant advantages.

- It would address a significant additional share of the contributions to global warming.
- It would allow Members the flexibility to control their net emissions in the most cost-effective manner. Including forest-sector CO₂ (sequestration) and energy-sector CH₄ could significantly reduce the marginal cost of emissions abatement.⁷²

⁷⁰ A similar approach could, however, also be used for determining allowance caps and allocations. Thus, for example, allowances could be set over ten-year periods, and renegotiated for each successive period prior to the end of the previous period. Alternatively, different portions of the allowance stock could be established for different time periods, such as 5, 10 and 15 years. On the other hand, under a decadal budget process, it might be necessary or appropriate to change the current emissions budget before the end of the decade.

⁷¹ See Dudek, Daniel J., 'Emissions Budgets: Creating Rewards, Lowering Costs and Ensuring Results,' presentation to the UNFCCC Workshop on Quantified Emission Limitation and Reduction Objectives (QUELROs Workshop), Geneva, Switzerland, February 1996. This rolling budget approach, including consideration of premium setting, would be analogous to the US Federal Reserve advance indications of changes in interest rates.

⁷² See Richard B. Stewart and Jonathan B. Wiener, 'The Comprehensive Approach to Global Climate Policy: Issues of Design and Practicality', *Ariz. J. Int'l and Compar. L.* 9, 83, 93-5 and nn. 44-7 (1992) which cites cost savings of 70-90 percent in the United States and India when controls are broadened beyond energy sector CO₂ alone to encompass energy-sector CH₄ and forest-sector CO₂, as estimated in studies by the US Department of Energy and the World Bank.

- It would avoid inadvertent, environmentally-counterproductive shifts from controlled categories to uncontrolled categories. For example, a CO₂-only system could induce shifts from coal to natural gas such that emissions of CH₄ from leaky natural gas pipelines resulted in a net increase in contributions to global warming.⁷³ Such an environmentally-counterproductive result could be avoided by including energy-related CH₄ emissions in the trading programme.
- Demonstrate the success of a trading system applied to a diverse set of gases and sectors. For both environmental and economic reasons, it would be desirable for the trading system ultimately to cover all anthropogenic emissions significantly affecting the Earth's climate. But the administrative and other costs of designing and implementing a fully comprehensive system from the outset would be enormous. In the pilot phase described in this report, the trading system could nevertheless be tested to observe its functioning for more than one gas-sector category.

There are, however, countervailing considerations. Including forest-sector CO₂ and energy-sector CH₄ emissions would add scientific, monitoring and administrative complexities and costs. It is generally more difficult to track and quantify CO₂ emissions and sequestration for different types of forests, or energy-sector methane emissions, than to monitor energy-sector fossil fuel combustion. Still, the solution to such measurement challenges may be to include these emissions and sequestration projects in the emissions limitation/trading regime, using conservative conversion factors, with appropriate incentives for private or public sector investment in improved measurement techniques.⁷⁴

Addressing different gases and sectors while creating a homogeneous commodity (allowances or budgeted emissions and savings denominated in tonnes of CO₂-equivalent) requires employing some conversion factor to compare emissions units in equivalent terms.⁷⁵ The Montreal Protocol uses such a conversion factor, called the 'Ozone Depletion Potential' index, to compare the various gases in the basket of halogenated compounds it regulates. The IPCC's Global Warming Potential (GWP) index⁷⁶, or a variant thereof, could be used in a GHG emissions trading system to compare the climate impacts of different gases.⁷⁷

⁷³ For analysis and supporting references, see Stewart and Wiener (1992), footnote 72; and Jonathan Baert Wiener, 'Protecting the Global Environment', in J. Graham and J. Wiener, eds., *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment* (Harvard University Press 1995).

⁷⁴ See Jonathan B. Wiener, 'Solving the Precautionary Paradox: Policy Approaches to Improve Measurement of Greenhouse Gas Sources and Sinks', in J. Van Ham et al., eds. *Non-CO₂ Greenhouse Gases* (Kluwer Academic Publishers, 1994).

⁷⁵ For discussion of the variables that might be included in a cross-gas index, see Stewart and Wiener (1992), footnote 72., pp. 88-9; and Wiener in Graham and Wiener (1995), footnote 73.

⁷⁶ See Intergovernmental Panel on Climate Change, *Climate Change 1995: The Science of Climate Change—Summary for Policymakers and Technical Summary of the Working Group I Report*, (World Meteorological Organization and United Nations Environment Programme 1995), p. 26.

⁷⁷ Analysts have proposed a variety of indices, including some that include social as well as climate impacts. See James K. Hammitt, Atal K. Jain, John L. Adams, and Donald J. Wuebbles, 'A Welfare-Based Index for Assessing Environmental Effects of Greenhouse-Gas Emissions', *Nature* 381, 301 (23 May 1996).

Activities in different sectors require different monitoring techniques and present different problems: energy-sector emissions depend on fuel types, combustion processes and combustion rates, while forest sequestration depends on vegetation types, growth rates, meteorological and climatological factors, atmospheric composition, soil content and nutrient supplies, and other factors. These variables create uncertainties about the appropriate cross-gas comparison between, for example, reduced energy emissions and increased forest sequestration.⁷⁸

'Default' or benchmark cross-category weighting factors can, however, be adopted, incorporating a conservative approach to the relevant uncertainties.⁷⁹ As scientific understanding and monitoring capabilities improve, Members, sources and sequestration projects could seek to persuade Monitor that new gas- or sector-measurement methods were superior to the assumptions used in setting the default comparison factors and justify changes in these factors. Changing the default cross-gas comparison factors or the default sectoral emissions-sequestration factors will affect many individual project investments; a significant change could be as important in its effects on trading markets (and the investments they induce) as a change in aggregate allowance or emissions caps or Member allocations. Such a decision ought to be considered not only by Monitor but by the Council or the Group subject to appropriate voting rules.

Voting rules should also be specified for any future decision to enlarge the coverage of the trading system to encompass additional gases (such as N₂O) and sectors (such as agriculture). Such extensions might be handled through Council-vote Annex procedures rather than requiring full consensus renegotiation of the Agreement. This is the process that has been employed under the Montreal Protocol with general success. Since the initial listing of various CFCs in 1987, numerous other gases have been added to the Annex of the Montreal Protocol, enlarging the Protocol's scope and improving its environmental effectiveness.

⁷⁸ Some have called for a 'gas-by-gas' approach, in which cross-gas indexing would not be permitted. Instead, separate allowances and budgets would be established for each GHG. As a practical matter, in an emissions trading system the market would probably develop an effective cross-gas indexing as, for example, traders swapped CO₂ allowances/savings for CH₄ allowances/savings.

⁷⁹ See Wiener, *Solving the Precautionary Paradox*, footnote 74..

CHAPTER V

CONCLUSION

A system for international trading of GHG emissions limitations or reductions could provide significant environmental and economic benefits. This report has analysed the legal issues, and related issues of organization, procedure and implementation, presented by two possible pilot GHG trading systems: an allowance trading system and an emissions budget system. The analysis concludes that all these issues can in principle be resolved in a satisfactory manner and do not represent a material impediment to establishing a successful pilot trading system.

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