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Economic (Market) Measures

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ECONOMIC (MARKET) MEASURES

EXECUTIVE SUMMARY

This paper provides a preliminary assessment of the applicability of economic instruments to limit emissions of greenhouse gases, encourage sinks and facilitate adaptation to climate change. The instruments examined include emissions charges, tradeable emission permits, subsidies, and sanctions.

The paper provides a "top-down" assessment of these measures, which, in conjunction with the more detailed work of the RSWG Subgroups, will comprise a set of ideas helpful to countries in preparing and assessing possible means to address climate change.

These measures have the potential to provide the signals necessary for the more environmentally sensitive operation of markets.

It is considered that economic instruments offer the possibility of achieving environmental improvements at lower cost than regulatory instruments. However, it is unlikely that economic instruments will be applicable to all circumstances. Some combination of economic and regulatory measures will most likely be appropriate. The provision of information and technical assistance are also seen as valuable complementary instruments.

Three factors are considered as potential barriers to the operation of markets and/or the achievement of environmental objectives through market mechanisms. These are: *information problems*, which can often cause markets to produce less effective or unfavorable environmental outcomes; *existing measures and institutions*, which can encourage people to act in environmentally damaging ways; and *balancing competing* social, environmental, and economic *objectives*. Initial response strategies may therefore be to address information problems directly and to review existing measures which may be barriers.

A number of evaluation criteria exist for assessment of instruments that might be adopted at the national and international levels. At the national level, these criteria relate to the need for the measures to: be compatible with sustainable economic development; be cost effective; comprehensively consider all significant sources and sinks; be compatible with international trade rules; be capable of amendment in light of new information; not hinder operation of other measures; be administratively practical overall; and consider distributional and information issues.

Most of these criteria obviously also apply at the international level, where there is also a need for the measures to: be compatible with and support principles of international technology transfer and financial support discussed in other topic papers; take into account the special needs of the developing countries; recognize global climate objectives; and recognize acceptable inter-country arrangements that maintain an overall greenhouse contribution within the sum of their individual obligations.

A general advantage of market based *economic instruments* is that they encourage limitations or reductions in emissions by those who can achieve them at least cost. They also provide an ongoing incentive for industry and individual consumers to apply the most efficient limitation/reduction measures through, for example, more efficient and cleaner technologies. Such incentives may be lacking in the case of regulations.

Regulations, however, are the customary means of controlling pollution in both market and centrally planned economies. A major advantage of

regulations is that they create certainty as to desired outcomes, whereas major disadvantages are that they may fail to encourage innovation, introduce inflexibilities in meeting objectives, and offer few incentives to reduce emissions below specified levels.

Tradeable emission permits are based on the concept that emission entitlements or rights to pollute are provided to emitting sources, subject to an overall limit on total emissions, and allow the permit holders to trade or sell their entitlements to another party on the open market.

While there are potential benefits of national or international tradeable emission permit systems, particularly their economic efficiency and cost effectiveness, many contributors had difficulty with the creation of "rights to pollute" and the administrative and monitoring requirements. A number of issues need further examination, such as: the political problem created by a "right to pollute"; the criteria used to determine the initial allocation of emission entitlements; the special situation of developing countries; the potential scope and size of a trading market; and the feasibility of the administrative structure that would be required to implement such a programme.

Emission charges provide a means of encouraging the limitation or reduction of emissions to a socially desirable level. They also provide an ongoing incentive for efficient means of limiting or reducing emissions and they could provide a funding base for further pollution abatement, research, and administration. However, with such measures, it may be difficult to assess the optimal rate of taxation and detailed (and possibly expensive) knowledge is required about likely market reactions to different tax levels. The basis for the tax and means of collection also need to be considered.

Domestic use of *subsidies* (e.g., direct grants, low interest rate financing, loan guarantees, tax deferrals, tax credits) is another possible economic instrument. While external public benefits can justify the use of such subsidies, difficulties such as their expense, need for careful design, need for review, and international trade aspects, mean that subsidies need to be considered with great care. They may also create disincentives for further innovation and development of appropriate technologies.

Trade or financial *sanctions* established under an international convention would need to be consistent with existing trade agreements and many contributors expressed considerable reservations about applying them in a complex situation such as greenhouse gases where monitoring diverse sources would be difficult.

The above instruments raise a number of complex practical problems, particularly in relation to their implementation, and it is evident that further work is required in all countries, and in ongoing IPCC work, to fully evaluate the practicality of such measures and costs and benefits associated with different mechanisms. It is appreciated that each instrument assessed has a role in meeting greenhouse emission objectives, but the suitability of particular instruments is dependent on the particular circumstances and at this stage no measure is considered universally superior to all other available mechanisms.

ECONOMIC MEASURES AS A RESPONSE TO CLIMATE CHANGE

9.1 INTRODUCTION

Over the last few decades there has been an increased concentration of greenhouse gases in the atmosphere. It is clear that this trend will continue in the years to come unless something is done.

While considerable uncertainty surrounds the effect of greenhouse gas emissions, this uncertainty does not justify a lack of action. It is prudent to take reasonable steps at this stage to avoid the risk of catastrophic consequences as a result of changes to the world climate in the future.

This paper provides a preliminary assessment of the applicability of economic instruments to the problem of climate change. The instruments are examined both in terms of their ability to limit net emissions of greenhouse gases and their usefulness in facilitating adaptation to climate change. The following economic mechanisms are examined (both in national and international variants): emissions charges, tradeable emission permits, subsidies, and sanctions.

The paper provides a "top-down" assessment of these economic measures. It is hoped that this, in addition to the more detailed ("bottom-up") work of the RSWG Subgroups, will comprise a set of ideas helpful to countries in preparing and assessing possible means to meet national goals and international commitments relating to climate change.

The analysis is conducted very much at a preliminary level. The paper aims to do no more than provide the basis for the further, more detailed work that remains to be done. This should be carried forward in the light of further work being undertaken in the context of RSWG and the product from the other Working Groups of IPCC and other organizations and individuals currently examining these issues.

The ideas in this document do not necessarily represent the official views of contributing countries or organizations.

9.2 OVERVIEW

While markets will of themselves adjust to take account of the impacts of climate change (for example, through consumer support of environmentally sound goods) this adjustment will not sufficiently address the problems of climate change and careful intervention by national governments is required. These interventions should aim to overcome existing social, institutional or other barriers to the maintenance of environmental quality and provide the signals necessary for the more environmentally sensitive operation of markets.

Economic instruments, through their encouragement of flexible selection of abatement measures, may offer the possibility of achieving environmental improvements at lower cost than regulatory instruments. They also offer the opportunity for countries to introduce limitation/reduction and adaptation measures while more detailed regulatory or other measures are being formulated and implemented. However, it is unlikely that, in the final

analysis, economic instruments will be applicable to all circumstances. Some combination of economic and regulatory measures will most likely be appropriate. Provision of information and technical assistance are seen as a valuable complementary instrument.

Experience to date, in addressing issues relating to reduction in CFC production and emissions in the context of the Montreal Protocol, suggests that solutions at the national level will need to draw heavily on the widest variety of economic, regulatory, and other response measures. Differing combinations of instruments are likely to be used by individual countries in order to best meet national goals and international commitments.

Most contributors saw market-based instruments (as well as planning mechanisms in centrally planned economies) as having a role in achieving objectives for limiting or reducing emissions of greenhouse gases, rather than in determining what the optimal level of emissions ought to be. Although it was recognized that the purpose of policy measures is to enhance overall welfare, this requires a balancing of the costs of climate change with the costs of policy measures implemented to reach emission reduction targets. Whether or not a strict cost/benefit approach is applied, it seems clear that all costs must be taken into account in setting policy objectives and determining the mix of options for implementation.

Finally, the nature of the greenhouse issue highlights the importance of genuine cooperation by sovereign countries in implementing national programmes of economic and other measures. This will be as important as bilateral, regional, and international activities enforced through conventions and protocols. Clearly, the two approaches would need to complement each other.

9.3 KEY CONSIDERATIONS

Market-based measures could effectively and efficiently help to reduce emissions of greenhouse gases by operating through environmentally adjusted market forces. These should be framed to reflect fully the social costs of environmental resource use in light of available scientific knowledge. This is consistent with the principle of sustainable development.

Three factors were identified as potential barriers to the operation of markets and/or the achievement of environmental objectives through market mechanisms.

1) Information problems.
2) Counterproductive operation of existing measures and institutions.
3) Other competing objectives.

An understanding of these considerations is necessary in assessing the likely success of a response strategy that utilizes market mechanisms.

9.3.1 INFORMATION

Problems of information can often be the cause of markets producing less effective or even unfavorable environmental outcomes. These problems should be borne in mind in the development of economic instruments.

There are three types of information problems.

1) The information does not exist.
2) The information is not disseminated.
3) The decision makers (government, industry, or individual consumers) do not have the ability or the means to use the information.

If information problems are the cause of economic activity producing unsatisfactory environmental outcomes, it would be appropriate for the policy response to target directly the information problems. This might be through a public education campaign. This is further referred to in the IPCC topic paper on public education and information measures. Better protection of intellectual property so as to encourage research into pollution abatement technology, or other appropriate policy responses, may also be required. This is discussed in more detail in the IPCC topic paper on technology development and transfer measures.

It should also be noted that the different types of economic instruments have different information requirements. The choice of instrument should have regard to the type of information available.

9.3.2 Existing Measures and Institutions

Environmental problems can often be attributed to existing measures and institutions that encourage people to act in a way that is not consistent with the preservation of environmental quality. Some of these measures and institutions were adopted without consideration of their contribution to increased emissions of greenhouse gases. Countries should be encouraged to reassess these measures (with, of course, due consideration to other economic and social objectives).

Where counterproductive measures (including subsidies, sanctions, regulations, and technical standards) are the problem, it will be appropriate for the policy response to be directed at re-examining them so that they will be conducive to the production of environmentally acceptable outcomes. Removal of these distortions could also provide immediate direct benefits through improved economic efficiency in addition to reducing the risk of climate change.

Governments also have the potential to contribute to the control of greenhouse gas emissions by attending to their public sectors. Options include: improving the practices of state-owned enterprises, and the environmentally and economically sound management of public lands.

9.3.3 Other Competing Objectives

There will always be competition among different social, environmental, and economic objectives. Inevitably, this will affect the use of economic measures to limit or reduce greenhouse gas emissions. In a world of limited resources, resources must be allocated between competing objectives and social welfare will not be maximized by pursuing any objective to the exclusion of others. It is recognized that, in balancing competing objectives, there will be trade-offs and total elimination of all environmental problems is unlikely to be achieved. Of course, decision makers and the public have a need to know the extent of environmental damage and what trade-offs would be involved in achieving environmental objectives at the expense of other objectives, such as economic growth. This should form the basis for any effective and responsible action to protect the environment. However, this is not to say that action on major environmental issues should always be delayed because insufficient information is available.

9.4 EVALUATION CRITERIA

The economic instruments addressed in this document may be considered as options for any national programme established to respond to the problem of climate change or as options for an international institutional structure. Since the form of the instrument may vary according to different circumstances, it is useful to distinguish criteria for the assessment of instruments or policy measures adopted at the national level from those relevant to an assessment of international instruments or policy measures.

The following criteria can be used in the evaluation of a *national* policy measure applicable to industry as well as individuals:

1) The measure should be compatible with principles of sustainable economic development.

2) The measure should be cost effective in limiting specified emissions in accordance with national goals or any international agreements and balanced so as to optimize the net social benefits from the use of resources in pursuit of competing social, environmental, and economic goals.

3) The measure should be comprehensive in terms of taking into account all significant sources and sinks of the specified emissions.

4) The measure should seek to distribute costs toward sources of the specified emissions and to ensure there are no unnecessary cost burdens on the encouragement of sinks.

5) The measure must be compatible with international trade rules and principles and should seek to avoid distortions or restrictions to trade.

6) The measure should be able to be amended or adjusted efficiently and in a predictable manner in response to new information in the fields of science, impacts, technology, and economics, and any international obligations that might emerge.

7) The measure should not hinder the operation of other measures (particularly technology development and information exchange) that facilitate the achievement of objectives in relation to specified emissions.

8) Accurate and reliable information must be available at a national level about sources and sinks of specified emissions.

9) The measure must be administratively practical and effective in terms of application, monitoring and enforcement.

The following criteria should be applicable to any *international* institutional measure incorporated into any convention or protocols:

1) The international policy regime should be compatible with principles of sustainable economic development.

2) The international measure should be cost effective (i.e., designed to achieve the pollution control goals of any agreement at the lowest economic and social cost).

3) The measure should be comprehensive in terms of taking into account all significant sources and sinks of the specified emissions.

4) The international measure should take appropriate advantage of economic measures as well as regulatory measures to encourage utilization of alternative, less polluting technologies and sinks.

5) It should be able to be amended or adjusted, in a predictable manner, in response to new information and any assessments of science, impacts, technology, and economics.

6) The international measure should be equitable in terms of distribution of costs and obligations across national, intergenerational, and income class categories and in terms of access to decision-making processes. The implementation of such measures should take into account the circumstances that most emissions affecting the atmosphere at present originate in industrialized countries where the scope for change is greatest and that under present conditions emissions from developing countries are growing and may need to grow in order to meet their development requirements and thus, over time, are likely to represent an increasingly significant percentage of global emissions.

7) It should respect established international trade rules, with the aim of not distorting or restricting world trade.

8) The international policy measure should be administratively practical and effective in terms of application, monitoring, and enforcement.

9) The measure should be compatible with support principles of international technology transfer and financial support discussed in other topic papers.

10) The measure should take into account the special needs of the developing countries.

11) The international policy regime should recognize that the interests of the international community relate to global climate objectives, not the means by which they are achieved.

12) The international measure should recognize any arrangements between individual countries that maintain an overall greenhouse contribution within the sum of their individual obligations as an acceptable compliance strategy.

Some contributors thought that further investigation dealing with economic responses to climate change could build on the above. This would present a strategy to deal with conflicting or controversial criteria and guide resolution of most potential conflicts.

9.5 INSTRUMENTS EXAMINED

9.5.1 PREAMBLE

Economic instruments offer the possibility of minimizing the total social costs of achieving national goals and international commitments relating to climate change. They seek to meet limitation/reduction or adaptation objectives by adjusting or harnessing market forces so that they take account of environmental costs.

However, the use of economic instruments raises moral concerns in the minds of some contributors relating to the fact that some of the economic instruments imply "paying for the right to pollute" and that economic instruments introduce a profit motive element into the achievement of public goals of environmental protection. Others have responded that regulations allow for the same rights to pollute, the only difference being in the transferability of the right, and that regulation does not banish the profit motive, since profit opportunities in regulatory systems are often directly dependent on securing favorable regulatory treatment. Indeed, the misuse of resources in lobbying for favorable regulatory treatment represents a considerable drawback of the regulatory approach.

Section 9.5.2, below, looks at measures that might be used in centrally planned economies to reduce emissions and then examines the role of regulations in market economies.

Sections 9.5.3–9.5.6 examine the following economic instruments that might be considered as alternatives or supplements to the regulations. The instruments examined are:

9.5.3 Tradeable emission permits
9.5.4 Emissions charges
9.5.5 Subsidies
9.5.6 Sanctions

It will be up to each country to select the mix of measures most appropriate to their particular circumstances in light of the suggested criteria for evaluating measures outlined in Section 9.4 and any steps (such as international consultation) necessary to avoid negative impacts on world trade. More work is required to identify the circumstances under which each measure is most appropriate.

9.5.2 REGULATIONS

9.5.2.1 *Regulations in Centrally Planned Economies*

Because of the differences between the social and economic structures in different countries, different combinations of instruments or at least different emphases in their use will be required. In the particular case of centrally planned economies, the central plan encompasses a comprehensive set of regulations and is the major instrument for achieving sustainable limitations or reductions in emissions.

Central planning provides possibilities for the government to coordinate and direct all efforts to limit or reduce emissions. Possibilities include: planning emissions reductions/limitations by those enterprises that can achieve them best at least cost so as to minimize the financial burden to society as a whole; provision of loans on favorable terms for environmentally sound investments; and alterations in price regulations to enhance the introduction of new environmentally acceptable technologies and activities.

9.5.2.2 *Regulations in Market Economies*

Governments in market economies also have the option to impose direct controls to limit or reduce greenhouse gas emissions. Regulatory controls typically seek to prescribe acceptable standards or to restrict or limit certain activities. They normally do not seek to influence market behavior through price signals. Such controls have been the customary means of controlling pollution. Examples include emission controls for motor vehicles or the installation of scrubbers on power plants.

Direct controls have the advantage of creating certainty as to the desired actions and outcomes. They may also be useful where it may not be possible to frame appropriate market measures. Their implementation, however, may:

- fail to encourage innovation, as there may be no incentive to further limit or reduce emissions;
- introduce inflexibilities in meeting emission ob-

jectives, thereby imposing unnecessary economic costs; and
- require significant monitoring and/or administration to ensure that the desired outcomes are achieved (although the same may be true for market measures).

Some contributors thought that regulations were one area where there is extensive experience with controlling pollution. Further work on determining the potential for increased use of environmental regulations and analysis of their advantages and disadvantages, including areas where regulation might be more effective than economic measures, could be of use.

9.5.3 A SYSTEM OF TRADEABLE EMISSION PERMITS

9.5.3.1 *Method of Operation*

An emission permit system is based on the concept that emission entitlements (like coupons) or rights to pollute are provided to emitting sources (which can be as large as countries), subject to an overall limit on total emissions. The sum of entitlements is equal to an emissions budget set at the national level through regulation or at the international level through international agreements. A "tradeable" emission permit system extends the emission permit system by allowing the permit holders to trade or sell their entitlements to another party on the open market. It is supplementary to a regulatory programme in that it operates within overall limits on emissions of the greenhouse gas.

There has been to date only limited experience with tradeable emission permits at the national level, and no experience at the international level. One example that has been implemented in the United States is its programme to phase down the use of lead in gasoline. Under this programme, the United States government set a target for the usage of lead in gasoline through a regulatory process and used a trading system that allowed gasoline refiners to allocate the lead budget in an economically efficient manner. Although this can be viewed as recognizing a "right to pollute," it is only a right to pollute up to a level determined to be environmentally acceptable by the U.S. government.

Many options exist for determining the *initial* allocation of entitlements under a tradeable emission permit system. For example, at the national level, entitlements could be allocated to existing producers in proportion to their existing emission level or they could be auctioned to the highest bidder or sold by tender.

At the international level, a tradeable emission permit system could be based on the same concepts as those described above. As a first step, an overall emission budget could be set. Global emission budgets and *initial* emission entitlements for each country could be determined in a number of possible ways: the entitlements could be allocated by the level of emissions in a base year, by population size of a country, by a target unit of emissions per unit of GNP, by a target unit of fossil fuel use per unit of population or GNP, etc.

Once the initial entitlements to each country have been determined, countries would of course have to allocate their overall budget to the sources in their country. This allocation procedure could follow whatever lines are deemed most appropriate, given their social and economic needs. However, at the international level, a tradeable permit system might operate like international share, currency, or commodity markets. Governments or individual entitlement holders could be free to buy or sell, brokers could operate, and the spot price of an entitlement would float to a current market valuation of a marginal unit of emissions. Making the market freely accessible and issuing entitlements in small divisible units should go a considerable distance in preventing any nation or firm from cornering the market.

At either the national or international level, a further variation of this system is to allow emission entitlements to be granted for the creation of sinks. An international policy regime that focuses on global climate objectives, rather than the means by which they are achieved, would treat sink creation and emissions reduction as one-for-one substitutes.

9.5.3.2 *Benefits and Difficulties of a National Tradeable Permit Programme*

The following potential benefits have been suggested:

- it reduces the cost of meeting a total emission target set by regulation;

- it provides economic incentives to develop and use cost-effective, energy-efficient industrial processes, consumer products, and emission control technologies;
- it works within a system of agreed emission budgets;
- it provides an efficient mechanism for addressing the trade-offs between sources and sinks for the specified emissions; and
- it provides the opportunity for low-income rights holders to sell rights to others in exchange for compensation of greater value.

The following potential difficulties have been suggested:

- it creates a "right to pollute" that can be purchased by those with the highest level of income;
- it may not be politically acceptable in many countries;
- it requires administrative structures that generally do not exist today; and
- it requires extensive monitoring and record-keeping to track the movement of entitlements and overall compliance with the total emissions budget.

9.5.3.3 *Benefits and Difficulties of an International Tradeable Permit Programme*

Generally an international programme will carry with it the same benefits and difficulties as a national programme. The potential cost savings may be higher but the level of the administrative and enforcement complexity could be even more severe. An international body of some kind would be required to identify whether the allowable limit of pollution was being exceeded. In addition, political concerns about the "right to pollute" and the ability of wealthy nations to procure those rights would be greater. Also, there is a lack of experience of these programmes at the international level.

Issues Needing Further Examination

Major concerns were expressed by contributors over the use of tradeable emission permits, some thinking that an international system of tradeable permits was not advisable. While it was agreed that studies of tradeable permits should continue, these countries asked that their major misgivings should be taken into consideration.

There are a number of other issues associated with a tradeable emission permit programme that need further exploration, including: the political problem created by a "right to pollute"; the criteria used to determine the initial allocation of emission entitlements; the special situation of developing countries; the potential scope and size of a trading market; and the feasibility of the administrative structure that would be required to implement such a programme, including the conditions necessary for them to be feasible, such as identifiable emission point sources, standard metering practices, availability of comprehensive and up-to-date information on options, and a market in which to trade permits.

The contribution from the Environmental Defense Fund discussed in some detail the practical arrangements that might be adopted in the implementation of a system of tradeable emission rights, both at a national level and internationally. This and other such work should be consulted in the further development of proposals that might utilize this instrument.

Some contributors thought that an alternative approach to a system of emission charges would be to have the polluter pay by conducting research designed to reduce emissions—e.g., through an appropriate tax credit system.

9.5.4 A System of Emission Charges

Emission charges are levies imposed in relation to the level of emissions. They provide a means of encouraging the limitation or reduction of emissions to a level that is socially desirable. They also provide an ongoing incentive for the parties concerned to implement efficient means of limiting or reducing emissions by, for example, implementing energy efficiency measures. For governments, major attractions of taxes may be the revenue they generate. This revenue could provide a funding base for further pollution abatement, research, and administration. It could also enable other taxes to be lowered, budget deficits to be reduced or government expenditures to be increased in other fields.

A carbon tax on burning fossil fuels is one exam-

ple of an emission charge. Emissions of carbon dioxide are a major contributor to the greenhouse effect and most of the carbon dioxide comes from the burning of fossil fuels.

A tax on fossil fuels, levied in relation to its carbon content although not a direct tax on emissions, could in some circumstances reduce emissions of carbon dioxide into the atmosphere. For the tax to be effective and efficient, its level should not be influenced by the funding requirements of other programmes; its level should be the same across all countries; and it should apply uniformly to all forms of fossil fuels. It would also be necessary to take account of emissions of other greenhouse gases over the full fuel cycle.

The view was expressed that an "energy tax" that does not vary with carbon content could also be employed to encourage overall energy efficiency. Such a tax would not necessarily lead to fuel switching and its revenues could also be used to fund programmes for promoting environmentally favorable energy technologies.

Recent work by the OECD has shown that the use of taxes to fight pollution has been growing in popularity amongst OECD countries, although the experience to date shows that the primary function of pollution taxes (which in the climate change context can be emission taxes) has been to raise the revenue required for pollution management. The taxes have not generally been set high enough to influence the behavior of polluters.

There are some problems associated with the use of emissions charges. These will require careful consideration in the development of response strategies that might make use of this option.

First, it is difficult to assess the optimal rate at which the tax should be applied in order to meet national goals, where these can be defined in terms of technical levels of emissions. Unlike regulations or the system of tradeable emission rights, the level of emissions is not set directly but attained through the market responding to the taxes. In order for national goals to be attained, some quite detailed knowledge is required about how the market is likely to react to different taxation levels. This information could be difficult and expensive to acquire. The cost-effectiveness studies currently being prepared by the RSWG Energy and Industry Subgroup may help with information on this matter.

Second, there is the difficulty of deciding on the basis for the taxes and how they would be collected. (This criticism also applies to a number of other economic and regulatory instruments.)

The implementation of a coherent emission tax regime at the international level poses further practical difficulties. In particular, factors such as varying local price elasticities and tax structures, exchange rate fluctuations, etc., mean that it would be extremely difficult to derive with any confidence a uniform tax that would lead to the required limitation or reduction in emissions, where there is sufficient technical knowledge to enable an emission level to be specified.

A reasonable and practical option would be to give each country flexibility to set its own national charge rates at a level that would achieve its national goals. However, some contributors felt that an international levy system should not be discarded from consideration in this context.

It is evident that the question of emission charges raises many complex and difficult issues. Careful and substantive analysis of the short and long run environmental and economic impacts of such measures is needed.

9.5.5 SUBSIDIES

The use of subsidies to limit or reduce greenhouse gas emissions by developing countries is discussed in the topic paper on financial mechanisms. This section looks at the domestic use of subsidies.

Subsidies and government financial assistance (hereinafter referred to as "subsidies") are aimed at assisting environmentally sound goods and actions by lowering their costs. Various forms of subsidies have been used, among other things, to encourage the use of energy efficient equipment and to encourage the use of non-fossil energy sources. These include direct grants, low interest rate financing, loan guarantees, tax deferrals (e.g., accelerated depreciation), tax credits, etc.

Because of the external public benefits of developing environmentally sound technologies, subsidies could be used to encourage the development and greater use of such technologies.

A number of difficulties are associated with the use of subsidies.

- In general, subsidizing environmentally sound activities tends to be less efficient than applying charges or fees directed toward the emissions that are to be reduced.
- It is difficult to assess the optimal rate of subsidization.
- They can be expensive.
- More important, unless carefully designed, they could fail to be effective. For example, a subsidy on competing energy sources would not only encourage a move to alternative fuels, but could also encourage a net increase in energy consumption and CO_2 emissions, unless accompanied by economic or regulatory measures.
- Overly generous subsidies or their continual use without review can act as a disincentive for investigation and research into alternative means of meeting the same objective and thus act to lock pollution abatement into outdated or inefficient technology.
- Unqualified use of subsidies could hinder the full direction of costs to sources of the specified emissions, and might cause trade distortions.
- Although some food and agricultural subsidies may lead to some greenhouse gas emissions (e.g., methane) and their removal would result in overall social benefit, this can also produce significant local or regional social costs which need to be considered.

The question of subsidies may prove to be controversial from the point of view of international trade. Environmental subsidies have been the subject of some discussion by members of GATT but there has been no agreement as to what differentiates an environmental subsidy from other subsidies.

9.5.6 Sanctions

A final type of economic instrument is the use of economic sanctions for the enforcement of international agreements. This would require an international convention to establish a system of agreed trade or financial sanctions to be imposed on countries that did not adhere to agreed targets. The aim here would be to discourage non-complying countries from deriving benefits without taking action.

Discussion of trade sanctions has already taken place under the Montreal Protocol in relation to products containing CFCs and halons. Sanctions might range from the imposition of import taxes on the offending products to outright bans until the exporter conforms with agreed international standards. The mechanisms for operating such a system would need to be made consistent with existing trade agreements such as GATT.

However, many contributors expressed considerable reservations about applying this measure to greenhouse gases other than CFCs and halons because of the complexity of the situation. In particular, it would be difficult to monitor the many diverse sources of greenhouse gases. Moreover, it was felt that sanctions could appear arbitrary, since it could be difficult to determine accurately whether particular countries exceeded internationally agreed levels or not. This could create confusion and resentment as to why they were subject to the sanctions. Some contributors objected to the concept of sanctions because of the risk that they could be used as a pretext to impose new non-tariff barriers on the exports by developing countries.

9.6 CONCLUSIONS

The following are the significant conclusions of the country contributions and the subsequent discussions at WGIII meetings.

1) Economic instruments offer the potential to achieve national goals and international commitments for limitation/reduction of greenhouse gases and adaptation to climate change, at minimum social cost.

2) The type of instrument chosen will depend to a great extent on the context in which it is to be applied, the economy of the country concerned, and the type of greenhouse gas to be controlled. It is likely that the instruments chosen would include a combination of regulations, economic signals, and economic instruments, plus the provision of information and technical assistance to improve the opera-

tion of the new environmentally adjusted market forces.

3) Economic instruments that may be relevant include: a system of tradeable emission permits; emission charges; sanctions; subsidies to encourage the implementation of measures to limit/reduce emissions; and reduction of existing government interventions in other areas, such as transport, energy, food, and agriculture, that inadvertently encourage emissions of greenhouse gases. Indeed, an international system of tradeable emission permits or, alternatively, a system of international emission charges could offer the potential of serving as a cost-efficient main instrument for achieving a defined target for the reduction of greenhouse gas emissions.

4) A number of contributors expressed major concerns about the use of tradeable emissions permits or sanctions. While it was agreed that studies should be continued on these instruments, contributors requested that their misgivings should be taken into consideration.

5) The instruments considered in this topic paper raise a number of complex practical problems, relating in particular to the implementation of these measures. These should be investigated in respect of the criteria outlined in Section 4 of this paper, the output of the IPCC Subgroups, and studies being carried out by international organizations, national governments and individuals. It is evident that further work is required regarding implications for economic instruments for developing countries.