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<u>Cent 11</u>		Referral Note: <u>A</u>	<u>9/10/105</u>			<u>5 10/10/15</u>
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ACTION CODES:

A - Appropriate Action
C - Comment/Recommendation
D - Draft Response
F - Furnish Fact Sheet
to be used as Enclosure

I - Info Copy Only/No Action Necessary
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Attached is a CO₂
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JHN- 4-78 THU 10:44 DANIEL J. DUDEK, ED

COMMENTS OF THE ENVIRONMENTAL DEFENSE FUND
ON THE IPCC WORKING GROUP III ECONOMIC
MEASURES PAPER

by

James T. B. Tripp, Counsel
and Daniel Dudek, Ph.D.

The IPCC Working Group III (Response Strategies Working Group) has revised its paper entitled "Implementation Measures As A Response To Climate Change" as a result of its October 1989 meeting in Geneva. Among other things, that paper presents criteria to be used in the evaluation of national policy measures designed to control and reduce greenhouse gases and criteria applicable to any international institutional measure incorporated into any convention or protocols.

One of the economic instruments considered as an alternative or supplement to national or international regulations is a system of tradeable emission permits. This paper assesses the benefits and difficulties of a national and international system of tradeable emission permits. A major benefit is that such a system provides manufacturers with an economic incentive to develop and use technology that uses fossil fuel energy more efficiently than national regulations (promulgated to be consistent with an international allocation formula) alone would provide or that relies on renewable sources of energy. It could also provide large industrial or commercial users of energy systems with incentives to make efficiency investments. The reason for this is that such a manufacturer may be able to sell (or large users may be able to earn credits) based on this added efficiency. The ability to sell CO2 emission credits produces economic value for the more efficient technology. Internationally, a potential benefit of a trading program is that, if properly designed, it could promote transfer of energy efficiency technologies from highly industrialized to less developed countries.

A major drawback, according to the paper, is the extremely limited experience with tradeable emission permits at the national level, and lack of experience at the international level other than provisions for economic rationalization allowed under the Montreal Protocol. Since the discussion of tradeable permit or credits systems in the IPCC paper is general and abstract, these comments are intended to provide some illustration of how such a system could work at both the national and international levels. It is important to point out that a tradeable permit system is a supplement to a regulatory program that establishes overall limits on emissions of CO2 or, as a surrogate, limits on combustion of fossil fuel. The trading system is designed to introduce flexibility in economic decisionmaking by allowing regulated sources to increase emissions above regulatory limits through the purchase of emission credits or to acquire income from the

sale of such credits when they emit regulated pollutants below prescribed limits while encouraging investment in pollution reductions beyond minimum requirements.

Before describing a trading program at either a national or international level, we must therefore initially describe the regulatory framework. Initially, as a simplifying assumption, we will look at one greenhouse gas - carbon dioxide.

1. A regulatory framework for allocating CO2 emission loadings

If, through an international convention or even a series of bilateral conventions, nations want to achieve controls on emissions of CO2, one approach, based on the Montreal Protocol experience, would be for those countries to establish goals and then allocate the total loadings authorized by the goals among the cooperating nations. These goals and allocation system must take into account environmental objectives, economic efficiency needs and international equity concerns.

The discrepancy in per capita use of fossil fuels among the world's largest countries varies by more than a factor of 10. According to *Slowing Global Warming: A Worldwide Strategy*, Worldwatch Paper 91, Christopher Flavin, October 1989 (hereafter Worldwatch Paper 91), Table 7 p. 69, North America emitted 1,379 million tons of carbon in 1988, or 5.07 tons per capita. Centrally planned Asia (China) emitted 774 million tons of carbon in 1988, at a rate of 0.66 tons per capita. India's per capita rate was below 0.5 tons. Per capita rates in the USSR and Eastern Europe were 3.55 tons of carbon per person; in Western Europe, 2.03; in Japan, about 2.1; in Latin America, 2.09; in Africa, 0.86. According to Worldwatch Paper 91, world emissions of carbon totalled 7,319 million tons in 1988, at a worldwide per capita average of 1.42 tons.

Current projections are that the developing countries intend to increase their use of fossil fuels significantly in coming decades. In view of the fact that many of these countries today are using these fuels significantly below the worldwide per capita average, it should be clear that the industrialized countries will have to phase down their emissions of CO2 in a major way if the build up of CO2 in the atmosphere is to be slowed. It is also assumed that growth in the demand for energy reviews will outstrip efficiency improvements in the LDCs.

A number of proposals have been made for allocating CO2 loadings among the industrialized and developing countries of the world to meet global CO2 emission goals. These include proposals by a) Florentin Krause, *Energy Policy in the Greenhouse*, Vol. One, *From Warming Fate to Warming Limit: Benchmarks for a Global Climate Convention*, IPSEP (September 1989) (funded by the Dutch Ministry of Housing, Physical Planning and Environment and published in conjunction with the European Environmental Bureau); b) Christopher Flavin, Worldwatch Paper 91; and c)

David Wirth and Daniel Lashof, A Global Greenhouse Gas Convention: Recommendations on Structure and Substance, NRDC (October 2, 1989). These three proposals all call for proportionately higher rates of reduction in CO2 emissions by the industrialized countries and, among the industrialized countries, by the United States, and substantial reductions in the predicted rates of increase in CO2 emissions by most developing countries. Any convention will have to deal with the issue of establishing global and national baselines, i.e., overall levels of global emissions and separate national allocations.

For an international agreement to achieve limits on global CO2 emissions, it must establish overall emission and/or fossil fuel use reduction goals, reduction schedules or formulae, allocation formulae, monitoring, reporting and enforcement provisions and mechanisms for financing and technology transfer. Such an agreement must do all of these things whether or not it provides a mechanism for trading of CO2 emission or energy efficiency credits among sources in different nation states. We will now attempt to describe how a national trading program could work and then how sources in two or more nations could trade emission or energy efficiency credits.

2. A national trading program

To simplify this illustration, let us look at how an international agreement could affect the energy efficiency of, initially, one major appliance, namely, refrigerators, and, then, a broader range of fossil fuel energy systems. Furthermore, by way of illustration, let us assume that the industrialized countries of the world are required by such an international agreement to reduce their emissions of CO2 by prescribed amounts annually or in multi-year phases, that countries with high rates of forest loss would have to reduce their rates of CO2 growth modestly and that many developing countries, such as India and China, with very low but growing per capita rates of CO2 emissions would be authorized to increase those rates modestly for some period of time. The CO2 control/reduction schedule should be pre-announced both in the convention and each national program so that firms and government agencies can plan and make their investments accordingly.

For the U.S., or any other industrialized country, to meet internationally prescribed CO2 reduction goals, it would have to consider a range of strategies, including adoption of progressively more stringent energy efficiency standards for vehicles, building heating, ventilation and conditioning (HVAC) and lighting systems and major appliances (CHVAC), such as refrigerators. Under the National Appliance Energy Conservation Amendments of 1988, the U.S. Department of Energy (DOE) has the authority to promulgate energy efficiency standards for many household appliances, including refrigerators. DOE has in fact recently promulgated new energy efficiency standards for refrigerators and freezers to take effect January 1, 1993, 54 Fed.

JAN- 4-90 THU 18:47 BARTER J. BAKER, JR.
Reg. 47916 (Friday, Nov. 17, 1989). In announcing these new rules, DOE has claimed that they will improve overall refrigerator/freezer energy efficiencies by 25% compared to products on the market today. Each nation could translate CO2 emission controls into percentage improvements in energy efficiency for all industrial sectors.

For the U.S. to meet CO2 reduction goals of the magnitude suggested in the above-described reports, the energy efficiency of new refrigerators and freezers would have to improve substantially before the end of the century. Furthermore, energy efficiency standards for refrigerators and freezers to be sold towards the end of the century would have to take into account energy efficiency requirements for the early years of the 21st century.

To take advantage of a trading program, the DOE standard-setting program for appliances such as refrigerators could be revised along the lines of the Department of Transportation's Corporate Average Fuel Efficiency (CAFE) standard-setting program for automobiles. A car manufacturer complies with the applicable CAFE standard if the average fuel economy of its entire fleet sold in a given year meets the mandated fuel efficiency level. Energy efficiency standards for refrigerators could be similarly set so that the average refrigerator made and sold by a manufacturer complied with the standard in effect in a given year.

Under a trading program, a manufacturer (or importer of a foreign-made refrigerator) that produced and sold in the U.S. refrigerators the average energy efficiency of which was better than the applicable product standard could obtain energy efficiency (surrogates for CO2 emission) credits. These can be statistically translated into CO2 equivalents using average lifetimes of appliances, etc. DOE or some other agency would have to certify the issuance of these credits based on reliable information supplied by the manufacturer. Similarly, a manufacturer whose average refrigerator did not meet the prescribed energy efficiency standard for the applicable year would have to purchase credits. Manufacturers of refrigerators and freezers could therefore buy and sell credits amongst themselves. The end result would be that the average refrigerator/freezer manufactured and/or sold in the U.S. would meet the efficiency standard although the average appliance of any single manufacturer need not.

If well-designed, administered and enforced, this arrangement would give all manufacturers of refrigerators/freezers added flexibility in planning and timing the making of investments to increase the energy efficiency of these appliances. This added flexibility would provide cost savings and therefore afford economic efficiencies to the overall program. In addition, one or more manufacturers might find the economic incentive provided by the potential to earn and sell efficiency credits great enough to invest larger sums in conducting research on and developing

JAN- 4-98 THU 18:48 DANIEL J. DUBER, EDP 7.00

even more efficient technologies than the applicable standards prescribe. So long as at least one manufacturer takes advantage of these incentives, the introduction of improved technologies would occur at a faster pace than otherwise.

Domestically, in the framework of a U.S. program designed to meet CO2 emission goals, this kind of approach could be expanded so that efficiency standards applied to all products that utilize energy. The manufacturers/importers of those products - be they cars, lighting systems or industrial boilers - could then obtain credits if their average products were more efficient (or emitted no CO2 because they used solar energy) than a prescribed baseline and could purchase credits if the contrary were the case. Such credits could be fungible and tradeable among manufacturers of all products subject to the overall program. Further, energy suppliers could directly bundle CO2 credits along with their fuel. In effect, the use of that part of the sector's fuel would be CO2 neutral. That is, permits could be held by energy companies as well as sources. Third parties could also participate in this program. For example, a supplier of energy efficient systems for commercial buildings or industrial plants would have an incentive to retrofit such buildings or plants for a share of the CO2 credits.

For this program to function effectively, manufacturers would have to furnish reliable information about the energy efficiency of their products to the responsible agency that in turn would certify the issuance of credits and report any trades. However, most of this information would have to be gathered and reliably reported, stored and analyzed for a national program designed to meet CO2 emission goals even in the absence of a trading feature.

3. Bi-lateral trading

Other industrialized countries might adopt similar kinds of regulatory and economic incentive programs to comply with their allocated energy efficiency/CO2 emission targets. If such programs included, among other things, a procedure for generating and certifying efficiency credits for refrigerators and freezers, the U.S. and such other industrialized countries could enter into bi-lateral agreements whereby manufacturers of those appliances could buy and sell credits internationally on the same basis as described above.

To give a more concrete example, let us assume that western European countries or the European Community (EC) as a whole would have to reduce CO2 emissions annually by rates or amounts prescribed in an international convention. Those rates may be different from those applicable to the U.S. The EC could establish efficiency standards for refrigerators and freezers. The efficiency standards in force in those countries or throughout the EC in any particular year might be different from those in the U.S., in part reflecting differences in applicable national

goals or, within those countries or groupings, differences in allocating responsibilities for meeting national goals among different sectors of their economies.

With a bi-lateral agreement in place, a manufacturer of refrigerators/freezers selling in both the North American and western European markets might produce and sell appliances which on average were not as efficient as required in one market but more efficient than required in another market. That manufacturer would be eligible for credits in the latter market (i.e., the market where the appliances were sold). It could then use those credits to compensate for its failure to meet the applicable standard in the former market. Or, pursuant to contract, a more energy efficient manufacturer in the latter market could sell or transfer credits to a manufacturer in the former market.

We have limited our discussion to manufacturers of refrigerators and freezers to present a concrete example of how a bi-lateral credit transfer system could operate. As with any national program, such a bi-lateral arrangement could be designed to cover other appliances or all energy-consuming systems. Under such an arrangement, energy efficiency baselines for such systems would be set by the participating countries. Those baselines could be modified in accordance with a prescribed schedule. Energy efficiency or equivalent CO2 emission credits could be traded, bought or sold amongst all manufacturers/importers of such systems. The arrangement would set forth the procedures for monitoring, certification of credits, reporting of transfers and enforcement. It could also authorize participation in the market for credits by third parties. If planting of trees as a sink of CO2 were included in the national program, the energy efficiency credits would have to be denominated in CO2 equivalents as well.

Such bi-lateral agreements expand the universe of manufacturers who could benefit from the investment and flexibility provided by such trading arrangements. CO2 concentrations in the atmosphere are a function of global loadings and are not affected by the geographic distribution of individual sources. The fact, therefore, that one industrial country emits a smaller total load in a given year than an international convention/protocol prescribes while another country emits a concomitantly larger total load as a result of trading among those countries is irrelevant in terms of environmental protection.

4. Industrialized-developing country trading

Bi-lateral or international agreements that authorize trading of energy efficiency/CO2 emission credits between an industrialized country, and a developing country, are also possible. A major objective here would be to design the international allocation system so that firms that decided to take advantage of the trading program would indirectly be contributing to the kinds of technology transfer and financing goals described in the Report

of the Second Session of IPCC Working Group III/Response Strategies Working Group, Geneva, 2-6 October 1989, in particular, "Implementation Measures on Technology Development and Transfer Measures" and "Implementation Measures on Financial Measures." Criterion number 8 applicable to any international measure, as proposed in "Implementation Measures on Economic Measures as a Response to Climate Change," states that "the measures should be compatible with support principles of international technology transfers and financial support discussed in other papers."

To show how this might work, let us hypothesize an example using a highly industrialized country that is a large emitter of CO₂ today (HIC) and a less developed country (LDC) that is a low emitter of CO₂. Let us assume that the LDC intends to increase its coal-fired electrical generating capacity substantially over the next 10 years. Some part of this capacity is to be used to generate electrical power for a rapidly increasing number of refrigerators and freezers in that country. Under an international convention/protocol, the LDC would be allowed, for many years, to increase its total CO₂ emissions but at a set rate, but at a lower rate than otherwise projected.

One way for the LDC to decrease its projected CO₂ emissions growth rate as mandated by an international agreement would be to set efficiency standards for refrigerators and freezers. While those standards may require production and use of more efficient refrigerators and freezers than might be the case absent an international agreement, those standards might not be as stringent as those that the HIC (any hypothetical highly industrialized country) would have to adopt to meet its CO₂ reduction obligations.

Under this example, a firm located in the HIC might find it economically attractive to enter into a joint venture with a firm manufacturing refrigerators/freezers in the LDC. Pursuant to such a joint venture, the HIC firm could provide the know-how and right to use the more energy efficiency technology to the LDC firm. That firm would then be able to manufacture more efficient refrigerators/freezers than the LDC regulations required. In turn, taking advantage of that advanced technology, the LDC firm would obtain credits that it would then transfer to the HIC firm pursuant to the terms of the joint venture. The HIC firm could then use those credits to permit it to manufacture and/or sell in the HIC's market refrigerators/freezers that were less efficient than the HIC's standards otherwise prescribed. Alternatively, depending on the law of the host country, the HIC firm might simply invest in new plant capacity in the LDC to manufacture more efficient refrigerators/freezers than LDC regulations mandate and obtain credits accordingly for its use in the HIC.

The HIC firm (any firm in any industrialized country) might find this arrangement to be economically attractive if it could save significant funds by postponing investments necessary to meet the domestic standards. Because the firm would be obtaining credits under this scheme from a firm in a less developed country, it would be willing to lease or transfer the refrigeration technology at lower cost than it would otherwise. In turn, the LDC firm could make and sell the more efficient refrigerators at less cost than it would otherwise.

Under this example, the potential to obtain credits in a developing country from investments that increased the energy efficiency of appliances made there would create an economic incentive on the part of a firm in an industrialized country to transfer technology and, in effect, to finance the transfer of that technology beyond what otherwise would be the case. The point is that a well-designed protocol that encourages such international trading of energy credits could promote least cost energy efficiency investments (as well as renewable energy investments) on an international basis that would accomplish international equity and technology transfer objectives as well.

As a general proposition, the tougher the CO₂ reduction goals that industrialized countries must meet, the more their manufacturing firms should be inclined to look for such joint venture opportunities in less developed countries as a source of credits. In addition, so long as developing countries face constraints on the rate of growth of their CO₂ emissions, firms there have an incentive to enter into such joint or contractual arrangements as well. By starting with this control program sooner rather than later, we can both avoid the need for reductions at a later date and the potential for ruinous environmental effects.

5. Creation of carbon sinks

The economics measures paper includes as a criterion applicable to any international institutional measure incorporated into any convention or protocol the degree to which that measure encourages utilization or creation of sinks, as well as alternative, less polluting technology. Since tropical forests are a major sink for carbon and their burning or destruction at current rates constitutes some 15% of global CO₂ loadings, the question is how an international agreement can promote the retardation of the destruction or the re-establishment of any forests and whether a trading program can facilitate attainment of those goals.

The destruction and burning of tropical forests in countries such as Brazil and Indonesia contribute a significant fraction of their CO₂ budgets. Thus, if such countries allocated their CO₂ emissions targets proportionately to the forest sector and fossil fuel sectors, Indonesia would have to take steps to pre-

vent any increase in the destruction of its forests; Brazil would have to implement a program to decrease the rate of loss of its forests by 2% per year.

If tropical forest acres can be converted into CO2 and energy efficiency equivalents, countries like Brazil and Indonesia might find it economically attractive, as well as environmentally sound, to retard the destruction of their forests even faster or to implement restoration programs where, in the process, they can earn CO2 credits which their own industry could use or which they could sell to foreign firms or governments. Those countries in turn could use the revenues from the sale of such credits to finance programs to retard forest loss. A trading program authorized under an international convention/protocol could therefore provide such countries with substantial economic incentives to protect their forests over and above the regulatory mandates of such a convention.

While a convention should encourage the creation and protection of carbon sinks, such as forests, defining quantitatively the magnitude, size and rates of loss of those sinks is an enormous undertaking. Satellite monitoring is a critical tool. But this effort must be made whether or not international trading of credits involving sinks is authorized so long as CO2 emissions from destruction or creation of such sinks is incorporated into a convention.

6. International institutional arrangements

For an international convention that imposes limits on emissions of CO2 from burning of fossil fuels and destruction of forests to function effectively, the participating nation states must be willing to and be able to obtain and report reliable information about fuel use and forest loss. The convention must also provide for a credible enforcement mechanism and the establishment or strengthening of an international agency to receive and assimilate data and to assure compliance.

If the convention authorizes bi-lateral or multi-national trading of CO2 emission credits, that international agency or some international body would have an additional role to play. More specifically, at the national level, any country with a domestic trading program would have to have in place an administrative mechanism for certifying that individual firms were entitled to credits or had to acquire credits to comply with standards. If those credits were to be tradeable to a source in another country, some international agency should have the authority to record those credits and to assure that the national credit certification program was viable and accurate. Since a country might have an incentive to inflate its eligibility for credits, this international agency would need additional resources to assure reliable national reporting of information and valid credit issuance programs.

A trading system can also help to assure the integrity of any system of emissions limits. As industrial enterprises -- or even governments -- attempt to comply with CO2 limits, technical or economic factors will inevitably prevent some from complying at some times. Without a trading system, a variance system (formal or simply by non-enforcement) will inevitably develop. A formal system will in turn require technical or economic criteria for evaluating variance requests and bureaucracies to apply those criteria. In a comprehensive, worldwide system for regulating CO2 emissions, the variance bureaucracy may become comparably massive. Inevitably also, those bureaucracies will not close needed economic enterprises for the sake of what may appear "temporary" violations of CO2 limits. The problem could lead to distrust between nations and diminishing willingness to make needed sacrifices.

A trading system should eliminate the need for variances by allowing industries and nations that cannot comply with limits to purchase credits. No criteria would be necessary to evaluate variance requests, and the sole task for bureaucracies would be the registration and verification of the transfer. Enforcement officials would not need to negotiate complex compliance orders, but simply to order the purchase of credits. Enforcement could also be more credible because the purchase of credits should often be less draconian than shutdown of enterprises. In addition, the failure of some enterprises to comply with initially set limits should always be matched by compensating reductions. And because a market mechanism will replace bureaucratic judgment, those enterprises that do not comply with initial limits should do so because of real economic needs not political influence.

{Conclusion}

Since there has been virtually no experience with international pollution credit trading programs, it is difficult to assess their utility in attaining the goals of an international convention designed to limit emissions of CO2 and perhaps other greenhouse gases. It is particularly so at this stage when the international community has not agreed on goals, a reduction schedule or any formula for allocating CO2 emission limits among the nation states of the world. Nevertheless, the potential benefits of trading programs in economic efficiency, technology transfer and financing goals are such that the IPCC should explore these mechanisms in detail.

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file (GCC-IPCC)

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Subject: Follow-up work on our
RSG submissions

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U.S. Department of Justice
Land and Natural Resources Division

103165CU

Office of the Assistant Attorney General

Washington, D.C. 20530

January 5, 1990

MEMORANDUM

TO: Hon. D. Allan Bromley
Assistant to the President
for Science and Technology
Chairman, Domestic Policy Council Working Group
on Global Change

C. Boyden Gray
Counsel to the President

FROM: Richard B. Stewart *RS*
Assistant Attorney General

SUBJECT: Follow-up Work on Our RSWG Submissions

As a follow-up to our recent submissions to the Response Strategies Working Group ("RSWG") of the Intergovernmental Panel on Climate Change ("IPCC"), I believe that we should begin preparing a pamphlet of materials elaborating on the "comprehensive" and "international emissions trading" approaches that we have recommended for IPCC/RSWG consideration, explaining how they might work in the context of policy responses to global climate change and discussing empirical experience with such approaches in other contexts. This pamphlet could be provided to those attending the February, 1990 meetings of the IPCC in Washington, D.C. The pamphlet could be followed by appropriate presentations and workshops.

As part of the educational effort, it would also be useful to draw on the resources and support of other nations who share our views. I am informed that Great Britain, Norway, and New Zealand are likely prospects, as well as the OECD. We might also enlist non-governmental organizations ("NGOs") who share our views, such as the Environmental Defense Fund, an advocate of trading programs like the one for acid deposition in the Administration's proposed Clean Air Act amendments. Attached please find a copy of EDF's recent submission to the IPCC, explaining via a concrete example how a trading program might function. The EDF paper limits itself for the sake of simplicity to carbon dioxide emissions and to one main example of trading,

but the concepts could be expanded to embrace our comprehensive approach and to treat the issues with more consideration of options, advantages and disadvantages.

I believe that the Administration should also promptly begin internal study of the scientific, institutional, monitoring and economic issues that would be presented in implementing the approaches that we have recommended for IPCC/RSWG consideration.

If you agree that these efforts are desirable, an early decision should be made on how to organize and staff them.

ENVIRONMENTAL DEFENSE FUND

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(212) 505-2100

COMMENTS OF THE ENVIRONMENTAL DEFENSE FUND ON THE IPCC WORKING GROUP III ECONOMIC MEASURES PAPER

by

James T. B. Tripp, Counsel
and Daniel Dudek, Ph.D.

The IPCC Working Group III (Response Strategies Working Group) has revised its paper entitled "Implementation Measures As A Response To Climate Change" as a result of its October 1989 meeting in Geneva. Among other things, that paper presents criteria to be used in the evaluation of national policy measures designed to control and reduce greenhouse gases and criteria applicable to any international institutional measure incorporated into any convention or protocols.

One of the economic instruments considered as an alternative or supplement to national or international regulations is a system of tradeable emission permits. This paper assesses the benefits and difficulties of a national and international system of tradeable emission permits. A major benefit is that such a system provides manufacturers with an economic incentive to develop and use technology that uses fossil fuel energy more efficiently than national regulations (promulgated to be consistent with an international allocation formula) alone would provide or that relies on renewable sources of energy. It could also provide large industrial or commercial users of energy systems with incentives to make efficiency investments. The reason for this is that such a manufacturer may be able to sell (or large users may be able to earn credits) based on this added efficiency. The ability to sell CO₂ emission credits produces economic value for the more efficient technology. Internationally, a potential benefit of a trading program is that, if properly designed, it could promote transfer of energy efficiency technologies from highly industrialized to less developed countries.

A major drawback, according to the paper, is the extremely limited experience with tradeable emission permits at the national level, and lack of experience at the international level other than provisions for economic rationalization allowed under the Montreal Protocol. Since the discussion of tradeable permit or credits systems in the IPCC paper is general and abstract, these comments are intended to provide some illustration of how such a system could work at both the national and international levels. It is important to point out that a tradeable permit system is a supplement to a regulatory program that establishes overall limits on emissions of CO₂ or, as a surrogate, limits on combustion of fossil fuel. The trading system is designed to introduce flexibility in economic

decisionmaking by allowing regulated sources to increase emissions above regulatory limits through the purchase of emission credits or to acquire income from the sale of such credits when they emit regulated pollutants below prescribed limits while encouraging investment in pollution reductions beyond minimum requirements.

Before describing a trading program at either a national or international level, we must therefore initially describe the regulatory framework. Initially, as a simplifying assumption, we will look at one greenhouse gas - carbon dioxide.

1. A regulatory framework for allocating CO2 emission loadings

If, through an international convention or even a series of bilateral conventions, nations want to achieve controls on emissions of CO2, one approach, based on the Montreal Protocol experience, would be for those countries to establish goals and then allocate the total loadings authorized by the goals among the cooperating nations. These goals and allocation system must take into account environmental objectives, economic efficiency needs and international equity concerns.

The discrepancy in per capita use of fossil fuels among the world's largest countries varies by more than a factor of 10. According to *Slowing Global Warming: A Worldwide Strategy*, Worldwatch Paper 91, Christopher Flavin, October 1989 (hereafter Worldwatch Paper 91), Table 7 p. 69, North America emitted 1,379 million tons of carbon in 1988, or 5.07 tons per capita. Centrally planned Asia (China) emitted 774 million tons of carbon in 1988, at a rate of 0.66 tons per capita. India's per capita rate was below 0.5 tons. Per capita rates in the USSR and Eastern Europe were 3.55 tons of carbon per person; in Western Europe, 2.03; in Japan, about 2.1; in Latin America, 2.09; in Africa, 0.86. According to Worldwatch Paper 91, world emissions of carbon totalled 7,319 million tons in 1988, at a worldwide per capita average of 1.42 tons.

Current projections are that the developing countries intend to increase their use of fossil fuels significantly in coming decades. In view of the fact that many of these countries today are using these fuels significantly below the worldwide per capita average, it should be clear that the industrialized countries will have to phase down their emissions of CO2 in a major way if the build up of CO2 in the atmosphere is to be slowed. It is also assumed that growth in the demand for energy reviews will outstrip efficiency improvements in the LDCs.

A number of proposals have been made for allocating CO2 loadings among the industrialized and developing countries of the world to meet global CO2 emission goals. These include proposals by a) Florentin Krause, *Energy Policy in the Greenhouse*, Vol. One, *From Warming Fate to Warming Limit: Benchmarks for a Global Climate Convention*, IPSEP (September 1989) (funded by the Dutch Ministry of Housing, Physical Planning and Environment and published in conjunction with the European Environmental Bureau); b) Christopher Flavin, Worldwatch Paper 91; and c)

David Wirth and Daniel Lashof, A Global Greenhouse Gas Convention: Recommendations on Structure and Substance, NRDC (October 2, 1989). These three proposals all call for proportionately higher rates of reduction in CO2 emissions by the industrialized countries and, among the industrialized countries, by the United States, and substantial reductions in the predicted rates of increase in CO2 emissions by most developing countries. Any convention will have to deal with the issue of establishing global and national baselines, i.e., overall levels of global emissions and separate national allocations.

For an international agreement to achieve limits on global CO2 emissions, it must establish overall emission and/or fossil fuel use reduction goals, reduction schedules or formulae, allocation formulae, monitoring, reporting and enforcement provisions and mechanisms for financing and technology transfer. Such an agreement must do all of these things whether or not it provides a mechanism for trading of CO2 emission or energy efficiency credits among sources in different nation states. We will now attempt to describe how a national trading program could work and then how sources in two or more nations could trade emission or energy efficiency credits.

2. A national trading program

To simplify this illustration, let us look at how an international agreement could affect the energy efficiency of, initially, one major appliance, namely, refrigerators, and, then, a broader range of fossil fuel energy systems. Furthermore, by way of illustration, let us assume that the industrialized countries of the world are required by such an international agreement to reduce their emissions of CO2 by prescribed amounts annually or in multi-year phases, that countries with high rates of forest loss would have to reduce their rates of CO2 growth modestly and that many developing countries, such as India and China, with very low but growing per capita rates of CO2 emissions would be authorized to increase those rates modestly for some period of time. The CO2 control/reduction schedule should be pre-announced both in the convention and each national program so that firms and government agencies can plan and make their investments accordingly.

For the U.S., or any other industrialized country, to meet internationally prescribed CO2 reduction goals, it would have to consider a range of strategies, including adoption of progressively more stringent energy efficiency standards for vehicles, building heating, ventilation and air conditioning (HVAC) and lighting systems and major appliances (CHVAC), such as refrigerators. Under the National Appliance Energy Conservation Amendments of 1988, the U.S. Department of Energy (DOE) has the authority to promulgate energy efficiency standards for many household appliances, including refrigerators. DOE has in fact recently promulgated new energy efficiency standards for refrigerators and freezers to take effect January 1, 1993, 54 Fed. Reg. 47916 (Friday, Nov. 17,

1989). In announcing these new rules, DOE has claimed that they will improve overall refrigerator/freezer energy efficiencies by 25% compared to products on the market today. Each nation could translate CO2 emission controls in percentage improvements in energy efficiency for all industrial sectors.

For the U.S. to meet CO2 reduction goals of the magnitude suggested in the above-described reports, the energy efficiency of new refrigerators and freezers would have to improve substantially before the end of the century. Furthermore, energy efficiency standards for refrigerators and freezers to be sold towards the end of the century would have to take into account energy efficiency requirements for the early years of the 21st century.

To take advantage of a trading program, the DOE standard-setting program for appliances such as refrigerators could be revised along the lines of the Department of Transportation's Corporate Average Fuel Efficiency (CAFE) standard-setting program for automobiles. A car manufacturer complies with the applicable CAFE standard if the average fuel economy of its entire fleet sold in a given year meets the mandated fuel efficiency level. Energy efficiency standards for refrigerators could be similarly set so that the average refrigerator made and sold by a manufacturer complied with the standard in effect in a given year.

Under a trading program, a manufacturer (or importer of a foreign-made refrigerator) that produced and sold in the U.S. refrigerators the average energy efficiency of which was better than the applicable product standard could obtain energy efficiency (surrogates for CO2 emission) credits. These can be statistically translated into CO2 equivalents using average lifetimes of appliances, etc. DOE or some other agency would have to certify the issuance of these credits based on reliable information supplied by the manufacturer. Similarly, a manufacturer whose average refrigerator did not meet the prescribed energy efficiency standard for the applicable year would have to purchase credits. Manufacturers of refrigerators and freezers could therefore buy and sell credits amongst themselves. The end result would be that the average refrigerator/freezer manufactured and/or sold in the U.S. would meet the efficiency standard although the average appliance of any single manufacturer need not.

If well-designed, administered and enforced, this arrangement would give all manufacturers of refrigerators/freezers added flexibility in planning and timing the making of investments to increase the energy efficiency of these appliances. This added flexibility would provide cost savings and therefore afford economic efficiencies to the overall program. In addition, one or more manufacturers might find the economic incentive provided by the potential to earn and sell efficiency credits great enough to invest larger sums in conducting research on and developing even more efficient technologies than the applicable standards prescribe. So long as at least one manufacturer takes advantage of these incentives, the introduction of improved

technologies would occur at a faster pace than otherwise.

Domestically, in the framework of a U.S. program designed to meet CO2 emission goals, this kind of approach could be expanded such that efficiency standards applied to all products that utilize energy, and the manufacturers/importers of those products - be they cars, lighting systems or industrial boilers - could obtain credits if their average products were more efficient (or emitted no CO2 because they used solar energy) than a prescribed baseline and could purchase credits if the contrary were the case. Such credits could be fungible and could be bought and sold among manufacturers of all products subject to the overall program. Further, energy suppliers could directly bundle CO2 credits along with their fuel. In effect, the use of that part of the sector's fuel would be CO2 neutral. That is, permits could be held by energy companies as well as sources. Third parties could also participate in this program. For example, a supplier of energy efficient systems for commercial buildings or industrial plants would have an incentive to retrofit such buildings or plants for a share of the CO2 credits.

For this program to function effectively, manufacturers would have to furnish reliable information about the energy efficiency of their products to the responsible agency that in turn would certify the issuance of credits and report any trades. However, most of this information would have to be gathered and reliably reported, stored and analyzed for a national program designed to meet CO2 emission goals even in the absence of a trading feature.

3. Bi-lateral trading

Other industrialized countries might adopt similar kinds of regulatory and economic incentive programs to comply with their allocated energy efficiency/CO2 emission targets. If such programs included, among other things, a procedure for generating and certifying efficiency credits for refrigerators and freezers, the U.S. and such other industrialized countries could enter into bi-lateral agreements whereby manufacturers of those appliances could buy and sell credits on the same basis as described above.

To give a more concrete example, let us assume that western European countries or the EC as a whole would have to reduce their CO2 emissions by rates or amounts prescribed in an international convention. Those rates may be different from those applicable to the U.S. annually. The EC as a whole could establish efficiency standards for refrigerators and freezers. The efficiency standards in force in those countries or throughout the EC in any particular year might be different from those in the U.S., in part reflecting differences in applicable national goals or, within those countries or groupings, differences in allocating responsibilities for meeting national goals among different sectors of their economies.

With a bi-lateral agreement in place, a manufacturer of refrigerators/freezers selling in both the North American and

western European markets might produce and sell appliances which on average were not as efficient as required in one market but more efficient than required in another market. That manufacturer would be eligible for credits in the latter market (i.e., the market where the appliances were sold). It could then use those credits to compensate for its failure to meet the applicable standard in the former market. Or, pursuant to contract, a more energy efficient manufacturer in the latter market could sell or transfer credits to a manufacturer in the former market.

We have limited our discussion to manufacturers of refrigerators and freezers to present a concrete example of how a bi-lateral credit transfer system could operate. As with any national program, such a bi-lateral arrangement could be designed to cover other appliances or all energy-consuming systems. Under such an arrangement, energy efficiency baselines for such systems would be set by the participating countries. Those baselines could be modified in accordance with a prescribed schedule. Energy efficiency or equivalent CO2 emission credits could be traded, bought or sold amongst all manufacturers/importers of such systems. The arrangement would set forth the procedures for monitoring, certification of credits, reporting of transfers and enforcement. It could also authorize participation in the market for credits by third parties. If planting of trees as a sink of CO2 were included in the national program, the energy efficiency credits would have to be denominated in CO2 equivalents as well.

Such bi-lateral agreements expand the universe of manufacturers who could benefit from the investment and design flexibility provided by such trading arrangements. CO2 concentrations in the atmosphere are a function of global loadings and are not affected by the geographic distribution of individual sources. The fact, therefore, that one industrial country emits a smaller total load in a given year than an international convention/protocol prescribes while another one emits a concomitantly larger total load due to trading among sources in those countries is irrelevant in terms of environmental protection.

4. Industrialized-developing country trading

Bi-lateral or international agreements that authorize trading of energy efficiency/CO2 emission credits between an industrialized country, and a developing country, could also be considered. A major objective here would be to design the international allocation system so that firms that decided to take advantage of the trading program would indirectly be contributing to the kinds of technology transfer and financing goals described in the Report of the Second Session of IPCC Working Group III/Response Strategies Working Group, Geneva, 2-6 October 1989, in particular, "Implementation Measures on Technology Development and Transfer Measures" and "Implementation Measures on Financial Measures". Criteria number 8 applicable to any international measure, as proposed in "Implementation Measures on Economic Measures as a Response to Climate Change", states

that "the measures should be compatible with support principles of international technology transfers and financial support discussed in other papers."

To show how this might work, let us hypothesize an example using a highly industrialized country that is a large emitter of CO₂ today (HIC) and a less developed country (LDC) that is a low emitter of CO₂. Let us assume that the LDC intends to increase its coal-fired electrical generating capacity substantially over the next 10 years. Some part of this capacity is to be used to generate electrical power for a rapidly increasing number of refrigerators and freezers in that country. Under an international convention/protocol, the LDC would be allowed, for many years, to increase its total CO₂ emissions but at a lower rate than otherwise projected.

One way for the LDC to decrease its projected CO₂ emissions growth rate as mandated by an international agreement would be to set efficiency standards for refrigerators and freezers. While those standards may require production and use of more efficient refrigerators and freezers than might be the case absent an international agreement, those standards might not be as stringent as those which the HIC (any hypothetical highly industrialized country) would have to adopt to meet its CO₂ reduction obligations.

Under this example, a firm located in the HIC might find it economically attractive to enter into a joint venture with a firm manufacturing refrigerators/freezers in the LDC. Pursuant to such a joint venture, the HIC firm could provide the know-how and right to use the more energy efficiency technology to the LDC firm. That firm would then be able to manufacture more efficient refrigerators/freezers than the LDC regulations required. In turn, taking advantage of that advanced technology, the LDC firm would obtain credits which it would then transfer to the HIC firm pursuant to the terms of the joint venture. The HIC firm could then use those credits to permit it to manufacture and/or sell in the HIC's market refrigerators/freezers that were less efficient than the HIC's standards otherwise prescribed. Alternatively, depending on the law of the host country, the HIC firm might simply invest in new plant capacity in LDC to manufacture more efficient refrigerators/freezers than LDC regulations mandate and obtain credits accordingly for its use in the HIC.

The HIC firm (any firm in any industrialized country) might find this arrangement to be economically attractive if it could save significant funds by postponing investments necessary to meet the domestic standards. Because the HIC firm would be obtaining credits under this scheme from a firm in a less developed country, it would be willing to lease or transfer the refrigeration technology at lower cost than it would otherwise. In turn, the LDC firm could make and sell the more efficient refrigerators at less cost than it would otherwise.

Under this example, the potential to obtain credits in a developing country from investments that increased the energy

efficiency of appliances made there would create an economic incentive on the part of a firm in an industrialized country to transfer technology and, in effect, to finance the transfer of that technology beyond what otherwise would be the case. The point is that a well-designed protocol that encourages such international trading of energy credits could promote least cost energy efficiency investments (as well as renewable energy investments) on an international basis that would accomplish international equity and technology transfer objectives as well.

As a general proposition, the tougher the CO2 reduction goals that industrialized countries must meet, the more their manufacturing firms might be inclined to look for such joint venture opportunities in less developed countries as a source of credits. In addition, so long as developing countries face constraints on the rate of growth of their CO2 emissions, firms there have an incentive to enter into such joint or contractual arrangements as well. A major point is that starting with this control program sooner rather than later avoids the need for reductions at a later date and the potential for ruinous environmental effects.

5. Creation of carbon sinks

The economics measures paper includes as a criteria applicable to any international institutional measure incorporated into any convention or protocol the degree to which that measure encourages utilization or creation of sinks, as well as alternative, less polluting technology. Since tropical forests are a major sink for carbon and their burning or destruction at current rates constitutes some 15% of global CO2 loadings, the question is how an international agreement can promote the retardation of the destruction or the re-establishment of any forests and whether a trading program can facilitate attainment of those goals.

The destruction and burning of tropical forests in countries such as Brazil and Indonesia contribute a significant fraction of their CO2 budgets. Thus, if such countries allocated their CO2 emissions targets proportionately to the forest sector and fossil fuel sectors, Indonesia would have to take steps to prevent any increase in the destruction of its forests; Brazil would have to implement a program to decrease the rate of loss of its forests by 2% per year.

If tropical forest acres can be converted into CO2 and energy efficiency equivalents, countries like Brazil and Indonesia might find it economically attractive, as well as environmentally sound, to retard the destruction of their forests even faster or to implement restoration programs where, in the process, they can earn CO2 credits which their own industry could use or which they could sell to foreign firms or governments. Those countries in turn could use the revenues from the sale of such credits to finance programs to retard forest loss. A trading program authorized under an international convention/protocol could therefore provide such countries with substantial economic incentives to protect their

forests over and above the regulatory mandates of such a convention.

While a convention should encourage the creation and protection of carbon sinks, such as forests, defining quantitatively the magnitude, size and rates of loss of those sinks is an enormous undertaking. Satellite monitoring is a critical tool. But this effort must be made whether or not international trading of credits involving sinks is authorized so long as CO2 emissions from destruction or creation of such sinks is incorporated into a convention.

6. International institutional arrangements

For an international convention that imposes limits on emissions of CO2 from burning of fossil fuels and destruction of forests to function effectively, the participating nation states must be willing to and be able to obtain and report reliable information about fuel use and forest loss. The convention must also provide for a credible enforcement mechanism and the establishment or strengthening of an international agency to receive and assimilate data and to assure compliance.

If the convention authorizes bi-lateral or multi-national trading of CO2 emission credits, that international agency or some international body would have an additional role to play. More specifically, at the national level, any country with a domestic trading program would have to have in place an administrative mechanism for certifying that individual firms were entitled to credits or had to acquire credits to comply with standards. If those credits were to be tradeable to a source in another country, some international agency should have the authority to record those credits and to assure that the national credit certification program was viable and accurate. Since a country might have an incentive to inflate its eligibility for credits, this international agency would need additional resources to assure reliable national reporting of information and valid credit issuance programs.

A trading system can also help to assure the integrity of any system of emissions limits. As industrial enterprises -- or even governments -- attempt to comply with CO2 limits, technical or economic factors will inevitably prevent some from complying at some times. Without a trading system, a variance system (formal or simply by non-enforcement) will inevitably develop. A formal system will in turn require technical or economic criteria for evaluating variance requests and bureaucracies to apply those criteria. In a comprehensive, worldwide system for regulating CO2 emissions, the variance bureaucracy may become comparably massive. Inevitably also, those bureaucracies will not close needed economic enterprises for the sake of what may appear "temporary" violations of CO2 limits. The problem could lead to distrust between nations and diminishing willingness to make needed sacrifices.

A trading system should eliminate the need for variances by allowing industries and nations that cannot comply with limits

to purchase credits. No criteria would be necessary to evaluate variance requests, and the sole task for bureaucracies would be the registration and verification of the transfer. Enforcement officials would not need to negotiate complex compliance orders, but simply to order the purchase of credits. Enforcement could also be more credible because the purchase of credits should often be less draconian than shutdown of enterprises. In addition, the failure of some enterprises to comply with initially set limits should always be matched by compensating reductions. And because a market mechanism will replace bureaucratic judgment, those enterprises that do not comply with initial limits should do so because of real economic needs not political influence.

Conclusion

Since there has been virtually no experience with international pollution credit trading programs, it is difficult to assess their utility in attaining the goals of an international convention designed to limit emissions of CO₂ and perhaps other greenhouse gases. It is particularly so at this stage when the international community has not agreed on goals, a reduction schedule or any formula for allocating CO₂ emission limits among the nation states of the world. Nevertheless, the potential benefits of trading programs within nation states are such that they should consider the potential benefits of transboundary trading of CO₂ emission or energy efficiency credits are such in terms of promoting economic efficiency, technology transfer and financing goals that the IPCC should explore these mechanisms in detail.



U.S. Department of Justice
Land and Natural Resources Division

Office of the Assistant Attorney General

Washington, D.C. 20530

January 5, 1990

MEMORANDUM

TO: C. Boyden Gray
Counsel to the President

FROM: Dick Stewart *DS*
Assistant Attorney General

SUBJECT: Update on Everglades Water Quality Litigation

Approximately one year ago, we filed an amended complaint in federal district court in Miami alleging that the Florida State Department of Environmental Regulation and the South Florida Water Management District (SFWMD) were failing to enforce state water quality statutes, creating a public nuisance, and violating two contractual agreements, to the detriment of Everglades National Park and the Loxahatchee National Wildlife Refuge. We alleged that the unique and fragile ecosystems of the Park and the Refuge were being seriously injured by the state agencies' failure to prevent runoff from agricultural districts in south central Florida of water laden with high concentrations of nutrients such as phosphorus and nitrogen. The environmental problems include a sweeping takeover of native vegetation by cattails, and other forms of ecological perturbation. Fish and other wildlife may be threatened.

The matter is politically controversial. Efforts to prevent or remediate the runoff will be costly, quite possibly exceeding \$100 million. The defendant state agencies admit that problems exist, but have not yet committed themselves to a firm solution. The Interior Department (which manages the Park and Refuge) and EPA favor strong environmental protective measures. The Corps of Engineers operates the canals and structures that drain the agricultural areas' runoff into the Refuge and Park and can be expected to sympathize with its agriculture constituents. Governor Martinez has thus far not taken a public stance. I understand that the President may visit the Everglades later in January. His visit could be the occasion for new efforts to resolve the controversy at a high political level.

During the past year, we have enjoyed unbroken success in the litigation. Major agricultural associations, including major sugar producers, sought to intervene in the matter, but were rebuffed because their members refused to be bound by the outcome in the suit. The court also denied two motions, first to have the Corps of Engineers named a party defendant, and then when that failed, a party plaintiff. The motions, filed in an effort to pit the Corps against the Park Service, alleged that the SFWMD was acting as the Corps' agent and therefore the Corps was responsible for everything SFWMD did. The Court also denied defendants' motion for Rule 11 sanctions which accused the United States Attorney and the Assistant Attorney General of bad faith because of the timing of the filing of the amended complaint. Finally, during the first week of December, the court heard oral argument on plaintiffs' omnibus motion to dismiss. The SFWMD has retained Skadden Arps and invested well over \$1 million in litigation during the past year. In addition to various technical grounds, defendants urged the court to abstain on the ground that there was a pending state administrative proceeding to address the runoff problems raised in the complaint. The plaintiffs urged the court to give the state agencies a chance to solve the problems in the first instance. Similar arguments were made in support of primary jurisdiction and exhaustion of administrative remedies grounds. The judge denied the motions from the bench.

At this point, the federal plaintiffs are in a position of maximum strength and should, I believe, try to encourage discussions with the state parties which could lead to a negotiated resolution of at least some of the issues of the lawsuit, including the selection of appropriate environmental standards to protect the Park and initial remedies. To that end, it is essential that the various interested federal agencies develop a common position.

On January 3, I convened a meeting with United States Attorney Dexter Lehtinen; Assistant Secretary for Fish and Wildlife and Parks, Department of Interior, Connie Harriman; Assistant Administrator for the EPA Office of Water, La Juana Wilcher; and Principal Deputy Assistant Secretary of the Army John S. Doyle, Jr. to develop such a common position.¹

The meeting demonstrated a reasonable level of agreement among the agencies on the existence and basic nature of the problem. However, the Corps of Engineers is presently unwilling to agree to the interim water quality standard proposed by EPA and expressed skepticism about its legal authority to operate its

¹ CEQ Chairman Michael Deland was invited but was unable to attend because of a last-minute conflict.

flood control project in a way which would minimize the physical cost of proposed solutions.

I propose to follow up the meeting with a trip to Florida at the end of January to review the local situation and try to reach final agreement with federal agencies on a common position to propose to the State of Florida. I expect that the principals attending our January 3 meeting will be present.

The President's visit to the Everglades could provide an opportunity to dramatize the environmental threat to the Everglades and the areas of the Gulf immediately south of the Everglades (where the President has fished) and to initiate high-level discussions with Governor Martinez to encourage his leadership on the issue.

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INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

REPORT OF THE SECOND SESSION OF IPCC WORKING GROUP III/

RESPONSE STRATEGIES WORKING GROUP (RSWG)

Geneva, 2-6 October 1989

INTRODUCTION TO THE REPORT OF THE SECOND SESSION OF
THE RESPONSE STRATEGIES WORKING GROUP

Introduction

As part of the work of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC), 163 representatives from 43 governments and 25 observers from governmental, intergovernmental and non-governmental organizations met October 2-6 in Geneva, Switzerland, at the second meeting of the Response Strategies Working Group or RSWG (IPCC Working Group III), convened as a multidisciplinary workshop on possible means of implementing response options to deal with potential climate change. The meeting was chaired by Dr. Frederick M. Bernthal, Chairman of RSWG. Participants included a broad spectrum of experts -- from both developed and developing countries, representing both market and centrally planned economies.

The topics considered included: Legal and Institutional Measures, including elements of a framework climate convention; Technology Transfer and Development; Financial Measures (especially assistance to developing countries); Public Education and Information; and Economic and Market Measures.

Views on Workshop topics

Certain views emerged from the group's identification and assessment of potential implementation mechanisms for climate change response strategies:

Legal and Institutional Measures

-- In addition to strengthening existing legal and institutional mechanisms to address climate change issues, a framework convention on climate change is timely and necessary. The 1985 Vienna Convention on the Protection of the Ozone Layer should provide a point of departure for the development of such a convention. At a minimum the convention should set forth principles of cooperation, provide a legal and institutional framework for monitoring and assessing climate change and for developing and implementing responses, and should aim to attract the largest number and widest range of signatory countries. A number of nations suggested that binding commitments and control measures be included in a framework convention. A number suggested that the convention or its protocols deal with the special circumstances of developing countries, and make clear mechanisms for providing financial assistance. Negotiations on a convention should begin as soon as possible after the issuance of the IPCC first assessment report due in September of 1990.

Technology Development and Transfer

-- Sustainable development requires the development of technologies to address climate change, and should be pursued in a wide range of public and private sectors and through active international collaboration. Such development could be promoted by an inventory of priority areas, public-private partnerships, and the creation of

existing technologies must take account of social, environmental and economic variances among countries and regions. Mechanisms for implementing technology transfer include the establishment of incentives for private sector transfer, initiation of pilot programs in developing countries, and creation of an international clearinghouse on relevant technologies and new developments. There should be particular emphasis on the need to identify and enhance the preconditions for technology transfer, such as financial capacity, domestic institutional and technical infrastructure, and resolution of the issues concerning protection of intellectual property.

Financial Measures

-- Industrialized and developing countries share a common responsibility for addressing climate change. The special needs of developing countries, including their vulnerability to climate change impact, and lack of financial resources and technology must be recognized. Some countries suggested that industrialized countries should show leadership by initiating domestic actions to limit and reduce emissions of carbon dioxide and other greenhouse gases and providing financial support to developing countries wishing to take similar actions. Regional and subregional cooperation to limit emissions was encouraged. The need for cooperation at the international, regional and subregional level, as well as the need for assistance in developing adaptation strategies was stressed.

Existing relevant financial institutions should be strengthened and their mandates expanded to address climate change concerns. A number of delegations from both developed and developing countries suggested that parallel action was already justified with respect to creation of new financial mechanisms and facilities. It was agreed that further analysis should be conducted on the nature of projects that might be warranted, the likely magnitude of assistance needs, and the scope and need for new institutions or mechanisms. Proposals for generating resources and mechanisms for administering a new fund should be examined expeditiously to make early decisions possible.

Public Education and Information

-- Public education and information is of paramount importance for dealing with the climate change issue. There is a particular need both for effective international coordination and for national coordination in each country. Mechanisms should be developed to assure efficient compilation and dissemination of up-to-date information to all sectors. In addition, it is desirable to draw upon the expertise of existing international organizations and to assist developing countries in structuring materials and programs appropriate to their particular social, economic, and cultural requirements.

Economic and Market Mechanisms

-- Economic and market mechanisms that might achieve stabilization or reduction in greenhouse gas emissions at minimum cost to society should be reviewed. These mechanisms may be particularly relevant domestically and may also have some international applications. They entail use of adjustment to market forces (or environmentally adjusted market forces) to take account of environmental impacts. Regulations, tradeable emission permits, emission charges, subsidies and sanctions were discussed as possible economic market mechanisms. Some of the proposed mechanisms would require further careful study. Such measures must be sensitive to the needs of developing countries. It may become necessary to use some economic and market mechanisms in tandem with traditional regulatory approaches. Various potential applications of economic and market mechanisms were identified.

Report on LDC participation

A report was submitted by Mr. J. Ripert, Chairman of the IPCC Special Committee on the Participation of the Developing Countries, which held its first meeting in Paris on the 28 and 29 September 1989. The attention of the delegates was drawn to the necessity of quick implementation of short term measures, including crash seminars, establishment of national climate committees, training of experts and establishment of effective means of communication including communication in regard to IPCC activities.

Results of Workshop

The meeting produced a report of its work, which will be further refined and developed within the IPCC process. The workshop report will be used by the four RSWG subgroups in developing recommended response options, and will itself form the basis for a portion of the IPCC first assessment report.

Finally, and perhaps most importantly, the RSWG expects that this report will serve as the basis for much more detailed and intensive study of the many issues here outlined, in a wide variety of national and international, public and private fora. The IPCC (and RSWG) in its work must make use of all relevant work of other organizations and individual countries.

All countries have been invited to make additional comments on the draft texts through the end of this year. The RSWG Chairman, Vice-chairmen, Sub-group Co-chairmen and Topic Coordinators will meet for further consultations just prior to the third session of IPCC in February 1990 in the United States. This session will bring together the members of the IPCC. The first RSWG report to IPCC, after its review and approval in a meeting to be held next spring, will be submitted to the IPCC Drafting Committee by mid-June 1990.

REPORT OF THE SECOND SESSION OF IPCC WORKING GROUP III/
RESPONSE STRATEGIES WORKING GROUP (RSWG)

1. OPENING OF THE SESSION

Dr F.M. Bernthal, Chairman of IPCC Working Group III (also known as the Response Strategies Working Group or RSWG) called the session to order at 14.10 hours on Monday, 2 October 1989, in Salle XVI of the Palais des Nations, Geneva.

The list of participants and the approved agenda are attached as Annexes I and II to this report.

2. CHAIRMAN'S OPENING REMARKS

2.1 The Chairman's remarks are reproduced in their entirety below.

"Only eight and a half months ago we had our first RSWG Meeting in Washington, D.C. We have made considerable progress since that time.

I believe we have set an example for the international community with broad participation in both RSWG and the IPCC.

IPCC is now recognized as the primary international focus for efforts to address climate change. Since our last Meeting, the G-7 in its Summit declaration has underscored the IPCC's mandate. Also, the Ottawa and The Hague Meetings have endorsed IPCC's role.

The representatives of each participating country have put considerable effort into preparing papers for consideration at this meeting.

You will be pleased to know that for this Meeting, nearly 30 countries and a goodly number of NGO's sent thoughtful and comprehensive papers on the various implementation measures. About one third of these contributions were from developing countries.

Since it was only last May that we agreed to develop these papers, I can say that we all should be proud of this achievement. By our efficiency in accomplishing this task, we have clearly demonstrated that each country is committing significant human resources to this effort.

Nearly all respondents have submitted papers on Legal and Institutional Measures, which will considerably advance our discussions and preparations for ultimate negotiations on a framework convention.

And although we scheduled more time than for the other topics in this Workshop for discussion of Legal Measures, the degree of consensus emerging from the submittals hold out some hope we may not need all that time.

Interestingly, the next largest response was on Education and Information Measures. It is clear that this is a very broad field with important roles not only for governments, but also for non-governmental, educational and media organizations.

A significant number of papers were likewise prepared in the areas of technology development and transfer, economic (market) measures, and financial measures.

While the purpose of this Workshop is to seek consensus on each topic area, we may not achieve consensus. Differing views should then be reflected in the final report of this Meeting. Needless to say, this Workshop is going to be both an intellectually and physically demanding event.

I am confident, however, that the considered thought and experience that went into the various submissions for this Workshop can be used to move the work of RSWG a big step forward.

Instead of each RSWG Sub-Group grappling independently with the feasibility of possible implementation measures, the idea is for this Workshop to assist the Sub-Groups in that task. The product of this Workshop should provide Sub-Groups with a reference menu of implementation measures -- important agreed principles that should be addressed in the work being done by the four Sub-Groups of RSWG.

If we in this Workshop have done our job properly, the Sub-Groups should be able to concentrate on recommended response strategies, and then simply cite appropriate implementation measures from an agreed list that we will begin, if not complete, here.

Again, I encourage the Topic Coordinators, who will lead the discussion on each topic, to strive to achieve consensus during the "Committee of the Whole" deliberations. Climate change is an issue spanning generations and it behooves us to be pragmatic and seek common principles for responding to this challenge.

If in some areas consensus proves not to be achievable, this Workshop will nonetheless have performed a useful function by providing for the open exchange of views and identification of differences in views. Such problems may then be addressed by further comprehensive study, or by the individual Sub-Groups as they prepare their reports over the next seven months.

Our workplan is ambitious. To cover all five topics adequately, we will have to move the discussion to the next topic as soon as substantial agreement has been reached on the preceding topic.

Realizing that we must be flexible, the times allotted on the draft agenda are only suggestions, and may be modified if necessary as the discussions proceed.

We also expect that the task forces on each paper will need to form drafting groups and work beyond the scheduled times to prepare their consensus reports. It may be that not all the time allocated will be necessary for Committee of the Whole Meeting -- that will allow more time for the important work of drafting consensus documents at more reasonable hours.

I hope that at the conclusion of this Workshop we will have sufficient consensus on the implementation measures so that hereafter the primary focus will be on the Sub-Groups.

It also would be valuable if the Report of this Meeting is written in such a fashion that it could form the basis for a major element of the final RSWG Report.

Looking ahead, the RSWG will have a challenging task in preparing its final Report by early next summer.

Although it will be difficult, we hope to have at least outlines of the Sub-Group Reports and substantive recommendations by mid-April at the latest.

Again I stress the importance of the Sub-Groups making use of the product of this Workshop -- of reviewing implementation measures which should be included in their section of the overall RSWG Report.

These consensus papers will be living documents subject to further development and refinement, but it is also important to give timely guidance to the Sub-Groups. Therefore, we want to use the momentum generated by the effort that has already gone into consideration of these topics to carry the work forward. To continue the effort, we should expand the Topic Working Groups to 5 or 6 countries, with appropriate balance between developed and developing countries.

I plan to meet informally with the RSWG Vice-Chairs, the Sub-Group leaders, and the Topic Coordinators during the Third Session of IPCC in February 1990 scheduled to be held in Washington. At that time we will review the status of the Sub-Group Reports and agree on a final schedule for the draft RSWG Report, so that all delegations will receive it well before a final RSWG Meeting next May.

I would propose to place two additional items before this Group for consideration:

- 4 -
- 1) Each participating country in RSWG/IPCC should consider conducting a national analysis of its individual greenhouse gas emissions. Such data will provide those countries, and the international community, invaluable baseline data to plan national, and of course, international, response strategies should such response measures need to be undertaken.
 - 2) The RSWG delegates may wish to consider, prior to the winter IPCC plenary, in consultation with Working Group I, whether some international body (WMO? ICSU? UNESCO? IMO?) or ad-hoc group should be identified, perhaps through a convening of representatives of responsible international scientific organizations, to monitor and review the progress of international research on climate change.

The U.S. has found it immensely useful to have such a body (Committee on Earth Sciences) to do "cross-cutting" analysis of our domestic programmes. We believe an international effort along these lines, using existing organizations, might also be helpful to avoid duplication of effort and suggest areas in need of further study.

I would like to return to these ideas at the concluding session of this Workshop.

Structure of the Workshop -- Summary

The Chair proposes that the topic coordinators for each of the five implementation categories will chair a meeting of the "Committee of the Whole" -- a task force to discuss their respective subject areas. The proposed schedule for these task force meetings was provided in the draft agenda.

The objective of the topic coordinators during these task force meetings will be to review the synopsis papers, and issue instructions to a drafting group to prepare a final draft for RSWG consideration in each of the five implementation categories.

At the end of each topic discussion by the Committee of the Whole, the Committee should name a small working group, led by the topic coordinators, to draft the section of the workshop based on their synopsis paper and the preceding discussion of the Committee of the Whole.

The draft agenda proposed that these topic meetings take place consecutively in half-day segments. However, the meeting schedule will be flexible and the times listed on the draft agenda may be modified as needed during the course of the meeting.

In closing, although I recognize that we are under a difficult time schedule, I am confident of the ability and desire of the RSWG participants to complete this important task. Moreover, I am delighted that we can finally now discuss substantive, rather than organizational matters. I look forward to a week of productive and fruitful discussions here in Geneva."

(CAS4 - RSWG Rep.) (End of Chairman's remarks)

- 2.2 The Brazilian delegation commented that, since the documentation was circulated late, it would be unrealistic to expect "consensus" on the substance of the topic papers to emerge from this session. Only preliminary, non-binding comments could be made at the session.
- 2.3 Agreeing with the Chairman's remarks about the "living nature" of the documents, and the small number of contributions received so far, the delegation suggested that the papers emerging from this session be immediately sent to all countries for comments. Then at another meeting of the Working Group further elaboration could be accomplished.

3. REPORTS OF THE CO-CHAIRMEN OF RSWG SUB-GROUPS

3.1 Energy and Industry Sub-Group (EIS)

The report of the Co-Chairman, Mr Yokobori, on behalf of both the Co-Chairmen (China and Japan), is reproduced in its entirety below.

"Since the Meeting of the RSWG in May, the Sub-Group of Energy and Industry held one Expert Meeting and one Plenary Meeting.

The Expert Group Meeting was held under my Chairmanship in Tokyo in July. It was intended further to elaborate on methodologies for country-specific as well as global or integrated scenarios on energy demand and supply and greenhouse gas implications. The Expert Group received and examined country-specific studies presented by seven countries, i.e., Australia, Canada, France, Federal Republic of Germany, Japan, the Netherlands, the United Kingdom, and the United States. The IIASA presented the study on the Soviet Union and Eastern Europe.

The Expert Meeting also discussed the issue of the integration of country-specific studies and filling the gap to provide a global assessment. The U.S. and Japan were asked to make a joint proposal to the EIS. Further issues discussed were the common reporting conventions recommending the use of tons of oil equivalent as a common denominator, and the Japanese proposal on how to assess the emissions of methane and nitrous oxide.

The Energy and Industry Meeting was held on the 28th and 29th September at the end of last week in the same premises where we are gathering today. Mr Xie and Mr Yokobori co-chaired the Meeting.

The Sub-Group took note of the Tokyo Expert Meeting's Report and then examined the reference case presentation made from Australia, Canada, Japan, the Netherlands, the United Kingdom and the United States. The majority of the presentations indicated the growth of energy consumption and consequential increases of carbon dioxide despite enhanced energy efficiency in two to three decades ahead.

The Sub-Group received the presentation on the option case analysis from Canada and the Netherlands and brief reports from Sweden, the United Kingdom and the United States. The Canadian delegate described that a recent task force report was submitted to the Federal and Provisional Energy Ministers on the 20% reduction in CO2 emission (from 1988 levels) as recommended at the Toronto Conference on the Changing Atmosphere. It concluded that it might be possible to achieve a reduction in CO2 emissions of 60 to 80% of the amount recommended by the Toronto Conference with the implementation of all the energy efficiency and fuel switching options that might be technologically feasible by 2005. The reduction in CO2 emissions of 40 to 60% of the recommended amount might be possible with those options that are economically feasible.

The Dutch delegate described their National Environmental Programme, which seeks to improve energy efficiency by 20% by 2000 and by 37% by 2010 (instead of 11% and 20%, respectively, in the reference case). The Dutch delegate also reported that additional policy package could reduce CO2 emissions by an additional 15% (without promotion of nuclear power) or 20% (with promotion of nuclear power) by 2010.

The Swedish delegate reported that they were developing two scenarios covering the period to 2015; the one postulate to keep CO2 emissions constant while the other would aim at reducing CO2 emissions by 20%. This option should be examined in the light of the Swedish decision to decommission its nuclear power stations.

The Sub-Group further discussed the methodologies for cost-benefit analysis of measure for integrating global warming put forward by Professor Yoichi Kaya of the University of Tokyo. This issue will be further pursued.

The Sub-Group examined the method of integration of the country-specific analyses and assessments of impact on future CO2 emissions. The Sub-Group decided to review the work of the US-Japan team, which might be joined by interested experts from other countries and international organizations and NGO's in future. In this connection, the Sub-Group also received a report from the IEA on its studies on developing countries, which could also be used in the course of the integration. The US-Japan team aims at producing their first assessment by mid-December, using the information available to them by mid-November (see Table 1). All interested parties are requested to provide their policy option case scenarios together with reference cases, where appropriate to the Co-Chairmen by 15 November 1989. The US-Japan team should contact several key countries and organizations for further information.

On certain methodological issues, the Sub-Group noted that international marine bunkers should be appropriately considered in CO2 emission assessments, although they are not included in the national energy accounting of energy requirements. The Sub-Group also discussed the issues of assessment of methane and nitrous oxide emissions proposed by Dr Sato of the Japanese Environment Agency. His proposal to collect information was endorsed. At the same time, it was proposed that his proposal should be forwarded to the AFOS for its consideration concerning methane and nitrous oxide produced by the agriculture and forestry sector. Dr Sato's proposed format is also available.

The Sub-Group received the reports from the International Energy Agency, the organization for Economic Cooperation and Development and the International Atomic Energy Agency for their extensive activities relevant to the issue of energy and environment. The Sub-Group welcomed the materials as a useful contribution to the EIS activities.

Finally, the Sub-Group discussed the future work, especially the preparation of the final report. The Sub-Group reviewed the outline of the draft final EIS Report which was developed at the May Meeting. Annotated or expanded outlines for substantive chapters will be prepared in the coming two to three months. The United States will draft an annotated outline for the reference case scenarios (i.e., Chapter 2), Mr Yokobori will produce an annotated draft of technology options (i.e., Chapter 3) with a contribution received from IEA and other competent parties. The United Kingdom and the Netherlands will produce an expanded outline for the bulk of Chapter 4, i.e., analysis of policy options, (CAS4 - RSWG Rep.)

while the US will develop an annotated outline for the economic assessment and the identification of constraints of options. The United Kingdom and the Netherlands will also prepare a checklist for a summary and conclusions (Chapter 5). In this connection, Japan circulated an expanded list of illustrative technology options to facilitate the development of policy option case scenarios. It is also available to you.

This is the Summary Report on the EIS activities. The more detailed, written, Report will be circulated at a later date."

Before closing, Mr Yokobori again underscored his concern on the small participation of developing and CPE countries. However, some positive progress could be seen. A Brazilian Embassy staff member participated in the Tokyo Expert Group Meeting. At the EIS held last week, Ugandan and Saudi Arabian delegates were present. It was noted that UNIDO expressed its interests in EIS activities. Mr Yokobori wished to remain optimistic on this score.

(Table 1 on next page)

TABLE 1

DATA REQUIREMENTS FROM EACH COUNTRY SCENARIO*

1. Energy end-use by sector and energy type

Sectors include Residential, Services, Industrial, and Transportation
Energy types include liquids**, gases***, coal, biomass, and electricity
 2. Energy conversion in the refining sector

Energy input (liquids, gases)
Energy output (liquids, gases)
 3. Energy input by energy type (liquids, gases, coal, biomass, nuclear, solar, and hydro)
Electricity output
 4. Synthetic fuel production

Coal input and liquids and gaseous energy output
Biomass input and liquids and gaseous energy output
 5. Energy production

By energy type: oil, gas, coal, biomass, nuclear, hydro, and solar
 6. GNP Growth Rates
 7. Energy prices

Prices of delivered energy by sector and fuel type (see *)
Prices of imported energy by fuel type (oil, gas, coal, electricity)
Prices of domestic energy production (oil, gas, coal, hydro-electricity, nuclear, solar electricity)
-
- * Units of energy production and use could be million tons of oil equivalent but should be consistent within and between countries. Units for energy prices should be consistent within and between countries and could be specified as 1988 U.S. dollars per million tons of oil equivalent.
- ** Liquids include all petroleum products, natural gas liquids, and liquid synthetic fuels such as methanol.
- *** Gases include natural gas and synthetic gases.

3.2 Agriculture, Forestry and Other Human Activities Sub-Group (AFOS)

The Statement of the Co-Chairman, Mr D. Kupfer, on behalf of both the Co-Chairmen (FRG and Zimbabwe), is reproduced in its entirety below.

The subgroup on agriculture, forestry and other activities (AFOS) decided in their meeting on 8-9 May 1989 to establish three workshops:

- a) the workshop on problems of temperate forests will be organized by the Federal Republic of Germany and held in Bonn on 30-31 October 1989.

A preparatory Rapporteur meeting took place in Bonn on 11 and 12 September. The Rapporteurs (Zimbabwe, UK, USA, World Resource Institute and FRG,) reviewed a draft report, which had been prepared by the Federal Republic of Germany. This draft report will also be sent to working group II and to the subgroup "Resource Views and Management" for information.

32 States and 7 international organizations have been invited to the workshop; so far 30 of them have accepted the invitation.

- b) The workshop dealing with boreal forests will be held in Joensuu in Finland on October 9-11. During the workshop the data and the preliminary reports will be presented and the strategy for the final report is to be accepted.

Finland puts emphasis on calculations of CO₂ balance of boreal forests on the basis of forest management plans. Especially difficult is the situation dealing with forestry data from Soviet Union.

- c) The workshop on tropical forests will be organized by the US Forest Service. A preliminary outline was prepared after contacts with Brazil. The workshop will probably take place in January 1990.

In the meeting of the Steering Committee on 10-12 May 1989 it was agreed that an additional workshop should be organized by the USA on agricultural problems:

- d) The intent of the workshop is to bring agricultural experts from round the world together in order to discuss and reach consensus on

- characterization of emissions of carbon dioxide, methane and nitrous oxide from agricultural systems;
- likely future scenarios for these emissions
- technical options for limiting or mitigating these emissions
- economic, institutional, cultural and policy options for reducing emissions and
- needs for further research, education and information dissemination.

In addition to the workshops the FRG prepares a report on problems concerning the emission of methane from waste disposal and waste water treatment.

The next meeting of the subgroup is scheduled for 2-3 November 1989 in Geneva. In this meeting progress will be reviewed in the various fields of activities of AFOS. An outline for a consolidated report will be discussed and a drafting group for the preparation of the consolidated report is to be installed.

3.3 Coastal Zone Management Sub-group

The summary of the Sub-group efforts, as presented by its Co-Chairman, Dr P. Vellinga, on behalf of both Co-Chairmen (The Netherlands and New Zealand), is given below.

The goal of the Coastal Zone Management Group is to provide information and recommendations to national and international policy centres, enabling decision making on:

- (1) coastal zone management strategies for the next ten years, and;
- (2) long term policies dealing with limitation strategies and adaptations with respect to climate change and sea level rise.

The group has agreed to use the following definition of coastal zones:

The area of sea-land interface extending seaward as far as land based human activity directly affects the sea, and extending landward as far as the marine environment affects the land in a physical, environmental, social, cultural and economic sense.

The group is preparing six papers on the following topics: extent and timing of sea level rise and associated climate change effects; impact of sea level rise and climate change; problem identification; available adaptive options and costs for coastal areas at risk; social, economic, legislative, institutional, environmental implications of adaptive options; and possible funding mechanisms for adaptive options. It is also preparing two inventories:

1. providing information on technologies and practices for adapting to sea level rise, and;
2. a regional inventory of existing laws and policies concerning management of development in coastal areas.

In addition to the studies noted above, several workshops have been held or are planned, dealing with coastal problems: an East-West Center (Hawaii) workshop on climate change; one in Marjunro, the Marshall Islands dealing with coastal zone issues in the South Pacific Islands, and another to be held this December in Cairo. In addition, two major workshops are scheduled to review the papers listed above, and the papers which will result from this week's meeting. One of these workshops will be held in Miami, Florida (27 November - 1 December) and will concern coastal zone issues in North and South America, Western Africa, Europe, the Baltic States, and the Nordic countries. The second will be in Perth, Australia on 19-23 February. This meeting will focus on island and tropical countries. The organizers of both sessions highlighted their interest in securing greater participation from developing countries. Several delegates expressed interest in these efforts and recommended that developing country officials be informed well in advance of the agenda for the meeting and of the kinds of information they should be expected to present.

3.4 Report of the Resource Use and Management Subgroup

Canada, on behalf of co-chairs France and India, presented the report.

The member countries of RUMS have been drafting papers which address the management of water resources, salinization, desertification, forestry, agriculture, fisheries, animal husbandry, unmanaged ecosystems, and land use in general. "Theme" papers on biodiversity, food security and water resources have also been prepared by UNEP, FAO and the Chairman of the American Association for the Advancement of Science Panel on Climate Change and Water Resources, respectively.

A workshop to discuss these papers and solicit additional ideas about the management of these resources is scheduled to take place October 30 to November 1, 1989 at the Palais des Nations, Geneva, Switzerland. It will run concurrently with a WG II meeting on Socio-Economic Impacts from October 31 to November 2 and be followed by an AFOS meeting on November 2-3. Thus, there is ample opportunity for cross-fertilization. The workshop will have sessions organized around the three major themes; water resources, food security, and biodiversity. Speakers will be asked to review and comment on the RUMS papers and present their original views on the topics mentioned above. The workshop will meet in plenary session to give people full opportunity to participate in the discussion of all issue areas. (Note that the working language of the workshop will be English).

RUMS hopes to engage all participants in active discussion of adaptive responses and would appreciate hearing specific suggestions from participants on the most effective response strategies. It is most interested in adaptive responses that improve the resiliency of resources . . . future shifts in climatic regimes while ensuring socio-economic stability and growth while acting in concert with strategies that may be needed to limit emissions of greenhouse gases.

The workshop will focus on strategies that are do-able as opposed to those that would be nice to do, noting those that may be particularly liked to succeed given various social, economic, and environmental contexts. Moreover, in recognition of the uncertainties surrounding climate change and its effects, and of scarce resources available to deal with societal problems, the workshop should help identify strategies that are worth undertaking even if climate change were not to occur. It would distinguish between strategies that could be implemented in the short- versus the long-term, and note the social and economic consequences of various strategies especially as they relate to different nations and regions.

The members of RUMS will draw upon papers and results of the workshop to draft the RUMS report which is scheduled to be completed by May, 1990.

4. REPORTS FROM THE TOPIC COORDINATORS

It may be recalled that the RSWG Steering Committee had agreed upon five topics for consideration at this session under its Task B, namely the broad area of implementation mechanisms and associated arrangements (see reference 1). The topics are:

- a. Legal measures and processes (with Canada, Malta and UK as topic coordinators);
- b. Public education and information (with China and the USA as topic coordinators);
- c. Technology transfer and development measures (with India and Japan as topic coordinators);
- d. Financial measures (with France and the Netherlands as topic coordinators with consultation with Egypt);

and

- e. Economic (Market) measures (with Australia and New Zealand as topic coordinators).

At the invitation of the chairman, the topic coordinators reported on the synopsis papers developed by them from the invited submissions from governments and organizations.

4.1 Report of the topic coordinators on legal measures and processes

The report by Mr. R. Beetham (U.K.) is reproduced in its entirety below.

1. I have very little to add to the synopsis produced by the Canadians, Maltese and ourselves on Legal Measures. We are very grateful to all those countries who contributed.
2. We asked contributors four questions:
 - which existing international legal instruments have a bearing on climate and how could these instruments be strengthened to deal with climate change?

- what elements should be included in a framework Convention on climate?

- what other legal instruments (eg Protocols) might be considered?

- what institutional implications might such a Convention have?

3. There was a general view that, although existing international instruments should be fully utilised and further strengthened they are insufficient alone to meet the challenge of climate change. The majority of contributions therefore concentrated on proposals for elements to be included in a framework Convention and Protocols. Our synopsis inevitably reflected this main thrust.

4. As a result, we are conscious that we have not been able to do full justice to two contributions in particular, namely those from France and the United States. Both these papers, whilst not conflicting with the majority of views expressed by other contributors, set out a more general, almost philosophical approach which it was difficult to align with the rather more concentrated and specific approach of the large majority.

5. This broad statement does however need to be qualified by the recognition that only some two dozen countries sent contributions, and the majority of those came from developed countries. We should very much welcome further indications of view at this meeting - indeed that seems to us one of its principal purposes.

6. Equally, as we state in the paper, we could not always be sure where some ideas have been put forward by a limited number of countries, what degree of support or indeed opposition they might encounter: this week's meeting is an opportunity to gauge that more clearly.

7. We deliberated at length as to whether we should include in the synopsis attributions of ideas to particular countries. We concluded that we should not: partly because we felt it might be invidious, partly because we, inevitably in a summary, might not have accurately represented those views, and partly because we did not think it right to make assumptions on the degree of support which particular suggestions might enjoy.

8. Nevertheless, as our synopsis paper makes clear, there is a broad mainstream of opinion which characterises the majority of the contributions, from which one can see a consensus of approach emerging on the principal elements which should be included in a framework Convention, the need for which is widely seen.

9. We have been encouraged by the emergence of the clear mainstream of opinion I have mentioned. We hope this week to hear further views with regard to what the principal elements in a convention should be so that we can enlarge on and deepen this mainstream. We also look forward to discussing how we might best take this work forward. We hope that our synopsis will contribute to such forward movement.

4.2 Report of the topic coordinators on public education and information

The summary of the report by Mr. G. Evans (US) is given below.

SUMMARY

The Public Education and Information discussion was led by Gary Evans (US) and Luo Jibin (China). It was generally agreed that the draft synopsis of country papers required an introduction as well as introductory paragraphs to each section. It was also agreed that it was important to better define the terms used, as a number of them can be used to mean different things.

It was agreed that the following points should be included.

AIMS

- o Emphasize the difference between short-term and long-term measures
- o Importance of education about measures on grounds other than climate change
- o Confusion between aims, problem and objectives; set forth the aims and define aims and objectives
- o Possible grouping of aims
- o Highlight key aims:
 - insure public education program in developed and developing countries
 - insure flow of information
- o Importance of getting information quickly to those who can make a difference -- leaders, policy-makers, boasting importance of educating media
- o Importance of getting information quickly to public and to those of difference cultural backgrounds using traditional means of communication

New Aims Raised:

- o Integration with sustainable development concept
- o Increase participation of developing countries in IPCC
- o Train trainers -- boost training of educators; in developing countries in particular, improve media systems and education of media and media systems
- o "Relevant" education of the public - i.e. educating people about what they can do to make difference and how individual actions are incrementally important
- o Increase awareness of importance of early action: taking actions that make sense for reasons other than climate change and the cost of delay

AUDIENCES

- o Identify key audiences
- o Attempt to organize target audiences into different sectors or types by: interests; impacts (winners and losers); developing versus developed countries; and region --top-down and bottom-up
- o Distinguish between national and international audiences
- o Potential linking of time-frame with audiences
 - short-term: top-down (i.e. policymakers)
 - long-term: bottom-up (i.e. public & public interest groups)
- o Importance of educating industry and the commercial sector

MEASURES

- o Possibility of splitting section into two parts:
 - measures
 - means/methods of educating
- o Use of existing international organizations
- o Need to emphasize importance of measures in their own right
- o Individual measures that can be pursued

ACTIONS

National:

- o Establish focal point in each nation to receive and distribute information and materials
- o Develop effective extension Service
- o Organize Workshops
- o Train the trainers
- o Use local language
- o Pursue outreach to local leaders
- o Use non-governmental interest groups (e.g., women's organizations) and private sector

International

- o Establish a center or institution to develop and coordinate informational materials to be tailored by nations
- o Provide regional seminars for developing countries
- o Identify activities of existing international organizations
- o Use and cooperate with international organizations in efforts
- o Access to national and international data banks
- o Identify financial needs and financing options
- o Develop strategies to address isolation, cultural diversity and absence of effective media in certain regions and countries

4.3 Report of the topic coordinators on technology transfer and development

The report presented by Mr. Haraguchi (Japan) is reproduced in its entirety below.

THE GIST OF THE REPORT BY A COORDINATOR ON TECHNOLOGY TRANSFER AND DEVELOPMENT MEASURES

1. Eight countries (Australia, India, Japan, the Netherlands, New Zealand, Norway, the United Kingdom, and the United States), one international organization (IAEA) and two NGOs (the Stockholm Environment Institute of Sweden and the Natural Resources Defense Council of the U.S.) have contributed their papers.
2. The synopsis paper is composed of two large sections; Technological Development and Technology Transfer.
3. There was a consensus that technological development is urgently needed for limitation as well as adaptation strategy. There was also a consensus on the importance of monitoring and research. In the Technological Development Section, we first dealt with measures which would facilitate technological development such as appropriate use of price mechanism, information dissemination and collaboration in development, and then tried to identify the priority areas where technological development is needed. Where should we go from here with the lists of priority areas for technological development in front of us? This might be the question to which we will have to address ourselves tomorrow.
4. There was a consensus that rapid transfer of technology to the developing countries is an urgent requirement. In the Technology Transfer Section, the barriers to the technology transfer are first identified and then response measures to overcome those barriers are dealt with.

Incidentally, how to look at the protection of intellectual property rights in this context of barriers and response measures is the problem upon which there was a sharp difference of views.

The use of existing organizations and activities is also discussed as one form of the response measures.

5. At the end of the synopsis paper, we added a list of options for technology development and transfer plans upon which the United States proposes the RSWG to give formal consideration. Tomorrow, we would like to listen to the explanation from the U.S. delegation on this.

4.4 Report of the topic coordinators on financial measures.

The summary report by Dr P. Vellinga (the Netherlands) is given below.

Financial Measures:

The delegate from the Netherlands (co-coordinator) said that the issue of financial measures was particularly complex, as demonstrated by recent discussions, on arriving at financial measures to support implementation of the Montreal Protocol. The Netherlands has prepared a synthesis paper based on submissions from 11 countries and two NGO's. Unfortunately, few developing countries participated. The synthesis paper represents an inventory, not an attempt at a consensus draft.

The paper is organized along main categories, as suggested by Mr. Tolba at the Tokyo conference on the environment. The main categories are use of funds; beneficiaries; sources of funds; institutional arrangements; and process and procedures.

The section on use of funds identifies the key sections which need to be addressed to limit GHG emissions. There is consensus that those areas are energy efficiency, renewable energy, forestry, and CFC phase-out, as well as research and monitoring programmes for each of the above. There is some question as to whether adaptation measures should be funded.

The treatment of beneficiaries indicates that industrialized countries should set an example by undertaking substantial limitation measures based on their own resources. The highest returns on initial spending would come from domestic progress in industrialized countries. There is consensus that developing countries will need financial assistance. There is also the question as to whether some industrialized countries, based on their level of emissions and limited financial resources, should also receive assistance.

The paper does not mention the size of assistance that may be required, but does indicate that it will be important to use numerous types of assistance, including loans, grants, and cooperation with private industry.

The main issue under institutional arrangements is whether emphasis should be placed on strengthening existing institutions or the need for new mechanisms. All want to strengthen new institutions; many want to investigate new ones. The delegate said that the summary document may not have correctly represented various country views. This is a living document, and clarifications and amendments are welcome.

The final question discusses how we should go about strengthening existing institutions. All countries are invited to submit comments.

The delegate from France commented on the logistical problems in preparing the paper, and regretted the delay in its circulation. The French national paper and Dutch synthesis have now been merged with one synthesis paper.

Senegal explained the importance of this issue for developing countries and the need for assistance to allow participation in the IPCC process and in preparing studies and papers. He expressed appreciation for US\$1 million in assistance from UNEP and said Senegal's paper had been presented to France.

The Chairman said we would have a report late in the week on the meeting in Paris concerning support for developing country participation in the IPCC.

India clarified that it believes the central question is not existing versus new institutions, but of general US dedicated funds. India supports the need for a dedicated fund, either within existing or new institutions.

The Chairman thanked India for this clarification.

The US expressed appreciation for the Netherlands' summary paper and the clarity and organization of the French paper. He proposed that the groups work should have the organization of the French paper. He asked the Group to consider how best to coordinate among multilateral, bilateral, and UN programmes to get a better sense of available resources and assure effective use. He also suggested it may be appropriate to proceed in phases, first with assisting countries in assessments, then proceeding to identify how to come up with and use assistance resources, which will always be limited.

Netherlands agreed with India delegate's description that this was not an either/or choice, and that we should consider a two-phase approach, as the US delegate suggested.

The Chairman asked that comments be limited to clarifying the paper's presentation rather than debating its substance at this point.

Austria asked that the paper deal with technology transfer in the first phase, and that it put aside questions relating to the CFC phase-out, which was the competence of the Montreal Protocol implementing mechanism.

The Chairman agreed with the need to avoid overlap. Where necessary, the Group should reference the work the Montreal Protocol.

The FRG delegate asked which of several dated papers would be the basis for discussion.

The Netherlands replied that there was some misunderstanding. The only change has been to translate into English those sections of the Netherlands synopsis which had been in French. There is no merger of the French national paper and the synopsis paper.

4.5 Report of the topic Coordinators on economic (market) measures

The summary report by Mr. John Gilbert (New Zealand) is given below.

- An international focus for the application of economic instruments is breaking new ground. Such has not really been attempted before.
- This meeting presents the opportunity to comment on the progress in forwarding this subject area.
- Synthesis paper reflects the views of the countries that responded to the invitation of Dr. Bernthal to express their views about market measures. These were mainly the developed countries.
- The synthesis does not contain any real detail. It is a preliminary analysis. There is a considerable amount of work that remains to be done.

The paper contains five main sections:

- * an overview;
- * criteria for the evaluation of the instruments;
- * issues arising in the development of the economic instruments;
- * a preliminary look at four different types of instruments;
- * conclusions.

The overview:

Countries responded positively to the idea of using economic instruments to climate change.

They offer the opportunity to meet pollution reduction objectives in the most effective and equitable fashion and at least social cost. Many issues, however, remain unresolved and there is value in investigating them further at both the national and international levels.

At this stage no one instrument offers ideal solutions and in the end a range of the instruments will probably be appropriate involving a balance of market and non-market measures.

Evaluation criteria

Many countries gave some attention to criteria for the evaluation of instruments. These will be particularly relevant in the further work. The criteria emerged:

Issues arising in the development of the economic instruments

There are two issues in particular that need to be borne in mind when developing the instruments.

- (i) Information: The development of economic instruments will need to evolve as more greenhouse data becomes available. Likewise it will be important for economic instruments to encourage information relevant to the greenhouse problem to be produced and disseminated to those that have the ability to transform it into environmental improvements.
- (ii) Incentives: Economic instruments will need to ensure that the incentives and sanctions they create encourage people to act in a way that is in accordance with the resolution of the greenhouse problem.

Instruments examined

Four broad groupings of economic instruments were examined.

- 1) Tradeable emission permits
- 2) A system of taxes (or levies)
- 3) Subsidies
- 4) Sanctions

The conclusions section of the paper notes:

- a considerable degree of consensus amongst contributors;
- if applicable (all 4) economic instruments offer the potential of achieving pollution reduction at minimum social cost;
- the type of instrument to be chosen will depend on the context to which it is to be applied. Therefore it is inappropriate to focus on only one instrument or on economic instruments to the exclusion of other policy responses such as education and regulation.
- notwithstanding the above point, a system of tradeable emission permits looks to be a particularly promising policy option;
- all of the instruments need to be investigated further in the light of the product of the other working groups.

5. REPORT OF THE IPCC SPECIAL COMMITTEE ON THE PARTICIPATION OF THE DEVELOPING COUNTRIES

1. The Chairman of the IPCC Special Committee on the Participation of the Developing Countries, Mr. J. Ripert, reported on the first session of the Committee held in Paris at the invitation of the Government of France on 28 and 29 September 1989.

2. Mr. Ripert expressed his appreciation for the presence of Dr. Al-Gain, the Chairman of the Ad-hoc Sub-group (see reference 2), at the session.

3. He called attention to sections 4 and 5 of the report of the Committee. He stressed the following basic points.

- a) Inadequate funding contributions to the IPCC Trust Fund to support the travel of participants from the developing countries. He made an urgent appeal to those countries present at the session that are able to do so, to increase or initiate their contributions. Further, the funds should be despatched promptly to avoid cash-flow problems.
- b) "Crash" seminars for opinion-leaders. The Committee strongly urged the immediate implementation of such seminars. In this context Mr. Ripert pointed out that the availability of the IPCC Working Group reports in languages other than English would help much in accomplishing information transfer with regard to climate change.
- c. The importance of establishing good communication and coordination within countries and between countries and the IPCC Secretariat.
- d. In respect of long-term measures the targeting of manpower development and facilitation of acquisition of tools of analysis as measures to implement.
- e. Strengthening of the IPCC Secretariat. Mr. Ripert expressed the concern of the Committee about the lack of resources, including human resources, within the Secretariat to carry out the measures proposed. He appealed to the Executive Heads of WMO and UNEP to give urgent consideration to the strengthening of the IPCC Secretariat.

4. The Working Group expressed its appreciation for the work of the Special Committee and endorsed its recommendations.

5. As recommended by the Working Group, the report of the Special Committee is attached as Annex III.

6. TOPIC PAPERS

The topic papers that resulted from the discussions of the Working Group appear below.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WORKING GROUP III

(RESPONSE STRATEGIES WORKING GROUP)

IMPLEMENTATION MEASURES ON LEGAL MEASURES

IPCC, RESPONSE STRATEGIES WORKING GROUP

Legal Measures

I. SUMMARY REPORT

1. The Workshop considered, on the basis of a synopsis of numerous written contributions and views expressed at the meeting, what elements should be included in a framework convention on climate change, what other instruments (e.g., protocols) might be employed, and the institutional implications of a framework convention.
2. There is a general view that existing legal instruments and institutions with a bearing on climate should be fully utilised and further strengthened (a list of relevant instruments and institutions is annexed), but that they are insufficient alone to meet the challenge of climate change. The discussion therefore concentrated on proposals for elements to be included in a framework convention, annexes and protocols, together with the institutional implications.
3. There is a very broad consensus among the participants on the need for a framework convention on climate change and that the framework Convention should generally follow the format of the Vienna Convention for the Protection of the Ozone Layer, and consensus that the framework convention would lay down, at a minimum, general principles and obligations, and provide for a continuing assessment of the scientific aspects of climate change and its impacts, and for response strategies.
4. There is also broad agreement that the framework convention should contain provision for separate annexes and protocols to be negotiated to deal with specific obligations, e.g., research and systematic observations, different greenhouse gases.
5. The participants recognise the political imperative of striking the correct balance between the call for a far-reaching action-oriented framework convention and the need urgently to adopt such a convention so as to begin tackling the problem of climate change. They also attach particular importance to the convention being framed and drafted in a way to gain the adherence of the largest possible number and most suitably balanced spread of countries.
6. Several participants advocate more far-reaching provisions, particularly on institutional aspects and control measures. There are differing views on the timing of negotiations both on a framework convention and on related annexes and protocols.
7. The following sections comprise a compilation of possible elements for a framework convention on climate change proposed by various participants. The inclusion of any particular element does not imply consensus with respect to that element, or the agreement of any particular government to include that element in a framework convention. Some of the proposed elements are controversial, some were in fact objected to, but all have been included to stimulate discussion at the national and international levels.
(WCP-662)

II. POSSIBLE ELEMENTS FOR INCLUSION IN A FRAMEWORK CONVENTION ON CLIMATE CHANGE

1. PREAMBLE

- Description of problem and reasons for action (need for speedy and effective response without waiting for absolute scientific certainty)
- Reference to relevant instruments (such as UNGA Resolution 43/53, Principle 21 of the Stockholm Declaration, ENMOD Treaty)
- Relationship to Vienna Convention and Montreal Protocol
- Common concern of mankind
- Respect for fundamental rights, such as a right to an environment of a quality that permits a life of dignity and well-being, or a right not to be subjected, directly or indirectly, to the adverse effects of climate change
- Need to balance sovereign right of states to exploit natural resources with duty to protect and conserve climate for benefit of mankind
- Endorsement of concept of sustainable development as key test in promoting long-term economic growth, and conservation of environment
- Importance of development and transfer of technology and recognition of circumstances and needs, particularly financial, of developing countries
- Need to increase research to improve scientific knowledge and study social and economic impacts
- Importance of systematic observation to develop further scientific knowledge of climate and the possible adverse effects resulting from changes to it
- Recognition of fact that most emissions affecting the atmosphere at present originate in industrialised countries where the room for change is greatest
- Recognition of fact that emissions from developing countries are growing rapidly and will represent over time an increasingly significant percentage of global emissions
- Development of strategies to absorb greenhouse gases, i.e. protect and increase greenhouse gas sinks
- Development of strategies to limit or reduce anthropogenic greenhouse gas emissions
- Development of strategies to adapt human activities to the impacts of climate change
- Need for regulatory, supportive and adjustment measures that take into account different levels of development of countries. (WCP-662)

2. DEFINITIONS

Definitions will need to be elaborated on the basis of consensus as to the purpose of the framework convention (e.g., protection from the adverse effects of climate change), and according to the terms in which the framework convention is drafted.

The following definitions of certain terms for the purposes of the framework convention have so far been suggested:

(a) Climate

Adopt accepted WMO definition

(b) Climate change

"Change induced by human activities, directly or indirectly causing, or likely to cause, significant adverse environmental, economic or social effects provided that the human activities and their effects are not both wholly located within the area under the national jurisdiction of one state"

"Global climate change resulting from the growing accumulation of atmospheric greenhouse gases generated by human activities"

(c) Adverse effects

"Changes in global climate caused by human activities having significant deleterious effects on natural or managed eco-systems, sea levels, etc."

There will be a need to define other terms.

3. GENERAL OBLIGATIONS

As stated earlier, the following sections comprise a compilation of possible elements for a framework convention on climate change proposed by various participants. The inclusion of any particular element does not imply consensus with respect to that element, or the agreement of any particular government to include that element in a framework convention. Some of the proposed elements are controversial, some were in fact objected to, but all have been included to stimulate discussion at the national and international levels. The degree of support for, or opposition to, individual ideas contained in this section is not reflected in this document.

- Responsibility to adopt appropriate measures to protect against the adverse effects of climate change, to limit and adapt to climate change and not transform adverse effects on the climate into any other adverse environmental or health effects

- Responsibility to protect and improve the composition of the atmosphere in order to protect and conserve climate for the benefit of present and future generations

- Encouragement to take steps having the effect of limiting climate change (e.g., reforestation, energy efficiency) but which are already justified on other grounds

- Specific objectives and time-targeted emission limitations/reductions of greenhouse gases by industrialized countries

- Specific objectives and time-targeted emission reductions/limitations of greenhouse gases, for example an obligation to stabilise total global emissions of greenhouse gases from anthropogenic sources by the year 2000 and, as soon as possible thereafter reduce these emissions down to levels which according to the best scientific knowledge will secure human health and the Earth's capacity to sustain life processes

- Deferral of specific emission limitation/reduction obligations to subsequent protocols

- Use and exploitation of climate for peaceful purposes, encouragement of regional and global peace, and good neighbourliness

- Duty to carry out and co-operate in research and information exchange, systematic collection and transmission of data from observation, research and assessment

- Development and transfer of relevant technologies and the provision of technical assistance, particularly bearing in mind the needs of developing countries, including the prevention of climate change and adaptation to adverse impacts resulting from climate change

- Transfer to relevant technologies on a non-commercial and preferential basis to the developing countries irrespective of the stands of the various countries on the protection of intellectual property rights and free access to relevant scientific information

- Transfer of relevant technologies on a non-commercial and preferential basis to the developing countries and free access to relevant scientific information

- Encouragement of the transfer of technology related to climate change through adequate and effective protection of intellectual property rights in developing countries and removal by developing countries of other impediments to such transfers

- Open and nondiscriminatory access to meteorological data developed by all countries

- Financial assistance by the industrialised countries to the developing countries to enable the developing countries to meet the incremental costs of measures to minimize greenhouse gas emissions and to take adaptive measures. The specific mechanisms of such assistance including the share of various industrialised countries, and arrangements for making the funds available annually, should be included either in a convention or finalized within one year of coming into effect of the convention

- Fair and equitable assistance to countries which have to bear an abnormal or special burden, including provision of funds, over and above official development assistance, by the industrialised countries to the developing countries, to enable them to fulfil their obligations under the framework convention

- Co-operation in formulation and harmonisation of policies and strategies directed at limiting and adapting to climate change

- Co-operation in adoption of appropriate legal, administrative or economic measures to address the adverse effects of climate change

- Co-operation at national and international levels in adoption of appropriate legal, administrative and economic measures, including fair and equitable assistance, to address the adverse effects of climate change to the end that no island nation's very existence be allowed to be threatened by sea level rise

- Avoidance of other environmental problems in taking measures to address climate change

- Prior notice and provision of relevant information such as environmental impact assessment of large-scale planned activities that are likely to cause significant climate change

- Prior notice and provision of relevant information such as environmental impact assessment of large-scale planned activities that are likely to cause significant climate change. Each country has the right to withhold any information sensitive to its security or commercial right

- Recognition of the need for developing countries to increase their present levels of per capita emissions of greenhouse gases in order to meet their development needs

- Clear recognition of responsibility by all member countries to make efforts to limit or reduce greenhouse gas emissions

- Recognition that implementation may take place in different time frames for different categories of countries and/or may be qualified by means at the disposal of parties, and their scientific and technical capabilities

- Provision allowing for bilateral, multilateral and regional agreements or arrangements not incompatible with the framework convention, including opportunities for groups of countries to fulfil the requirements of the convention and associated protocols on a regional or sub-regional basis

- Co-operation with competent international bodies to implement effectively the objectives of the framework convention

- Public education and information

- Liability and compensation

- Commitment to formulate appropriate annexes and protocols, on a sound scientific basis
(WCP-662)

- Agreement on measures to be implemented by amending existing legal instruments

- Strengthening existing legal and institutional instruments and arrangements

- Making full use of existing funding mechanisms

- Creating new funding mechanisms

- Permissibility of more stringent national or regional emission targets than provided for in the framework convention and its protocols

4. INSTITUTIONS

- A Secretariat

- A Conference of the Parties

- A Bureau

- An Executive Committee composed of a limited number of parties, based on equitable geographical representation, possibly with binding decision-making powers and including functions in respect of surveillance, verification and compliance

- An Executive Committee with functions analogous to those assigned to the Executive Body under the ECE Long Range Transboundary Air Pollution Convention

- Working Groups, e.g., on scientific matters as well as on socio-economic impacts and response strategies

- Institution for the administration of a climate fund

5. RESEARCH AND SYSTEMATIC OBSERVATIONS

Co-ordinated research and systematic observations (which could be amplified in annexes), including for example the establishment of expert panels or of an independent scientific board responsible for the co-ordination of data collection from:

- scientific research
- the monitoring of climate change
- human activities affecting climate

6. INFORMATION EXCHANGE AND REPORTING

- Co-operation in exchange of scientific, technological and other information on climate change, with possibly the elaboration of a comprehensive international research programme

- Transmission of information on measures adopted by the parties for the implementation of the framework convention, possibly including regular reporting on emissions of greenhouse gases

- Development of national emission inventories and strategies for addressing climate change, exchange of information on such inventories and strategies.

7. TECHNOLOGY TRANSFER

- Promotion of the development and transfer of technology, taking into account particularly the needs of developing countries

- Preferential and non-commercial transfer of technology to developing countries to enable them to limit or adapt to climate change

8. CONSULTATION

Consultations between, on the one hand, parties whose planned activities are likely to cause climate change and, on the other hand, the Secretariat, relevant international organisations and other parties concerned.

9. SETTLEMENT OF DISPUTES

- Provisions similar to those in the Vienna Convention for the Protection of the Ozone Layer

- A system with compulsory recourse to the ICJ or another appropriate tribunal issuing binding decisions.

10. OTHER PROVISIONS

- (a) Status, adoption and amendment of annexes

- (b) Rules for amendment of the framework convention

- (c) Provisions for the adoption and entry into force of, and amendments to, protocols

- (d) Periodic review of specific obligations based on assessments similar to those required by the Montreal Protocol

(e) Final clauses, including:

- Signature
- Ratification
- Accession
- Right to vote
- Relationship between the framework convention and its protocols
- Entry into force
- Reservations
- Withdrawal
- Depositary
- Authentic texts

11. ANNEXES AND PROTOCOLS

The following subjects among others have been suggested for consideration as possible annexes or protocols to the framework convention:

- Fossil fuels
- Carbon dioxide
- Agricultural practices
- Methane
- Nitrous oxide
- Tropospheric ozone
- Forestation
- Funding mechanisms, particularly for developing countries
- Research and systematic observations
- Energy conservation and alternative sources of energy
- Protection of greenhouse gas sinks
- Liability and compensation
- Emission control technologies

- Adaptation technologies and practices
- Development and transfer of technology.

Individual annexes or protocols might cover more than one of the above subjects.

- Priority should be given to those areas in respect of which the state of scientific understanding is the most developed and international concern the greatest

- Polluting gases should be dealt with according to their importance in increasing the greenhouse effect.

International Agreements Potentially Relevant to
Climate Change

Climate

Contribution of the United States

World Meteorological Organization, Convention, Oct. 11, 1947

Provides framework for cooperation on research and weather observation. Could assist in monitoring climate change. Open to U.N. members.

Various Bilaterals -- e.g., U.S.-U.S.S.R. Agreement on Cooperation in the Field of Environmental Protection, May 23, 1972

Specifies "influence of environmental changes on climate" as one of the areas for cooperation in solving problems. Contemplates exchange of experts, information and joint development of scientific programs.

Energy

International Energy Agency -- Agreement on an International Energy Program, Feb. 5, 1975

Provides framework to promote energy diversification, energy efficiency and conservation, and alternative energy sources. The IEA promotes R&D by sponsoring state-of-the-art reviews of promising energy technologies and by promoting collaborative projects between two or more member countries. The IEA has established an energy technology data exchange and a number of information centers dealing with specialized technology areas, including coal technology, heat pumps, air infiltration, biomass, and end-use technologies. Numerous implementing agreements cover wind, wave, biomass, solar, hydrogen, coal, and other energy sources, as well as conservation in specific industries. Twenty-one OECD countries are members; method for participation by other states not specified.

Solar Heating and Cooling Systems in Buildings -- Memorandum of Understanding, Oct. 4, 1974

Provides for research and information exchange to develop practical applications of solar power, a potential source of nonpolluting energy. Membership consists of mostly western countries.

International Atomic Energy Agency -- U.N. Statute, Oct. 26, 1956

Agency under the aegis of the U.N. to develop peaceful applications of atomic energy and to establish safeguards. Atomic energy does not produce greenhouse gases. Open to U.N. members and to states which are not U.N. members upon approval of IAEA General Conference.

Various Bilateral Energy Agreements

For example, the agreement between U.S. Department of Energy and its PRC counterpart has as its purpose "to explore the relationship of climate changes and atmospheric levels of CO₂".

Bilateral Atomic Energy Agreements -- e.g., U.S.-U.S.S.R. Agreement on Peaceful Uses of Atomic Energy, June 21, 1973

Agreement to develop energy sources from thermonuclear fusion and fast breeder reactors and to establish scientific workgroups and exchanges.

Pollution Control

Convention on Long-Range Transboundary Air Pollution (LRTAP Convention), Nov. 13, 1979

Establishes research and monitoring programs. Broad definition of "air pollution" could include greenhouse gases. Open to members of the U.N. Economic Commission for Europe.

Protocol to LRTAP Convention on Long-Term Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-Range Transmission of Air Pollutants in Europe (EMEP), September 28, 1984. Open to members of the U.N. Economic Commission for Europe.

Protocol to LRTAP Convention Concerning the Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes ("Sofia Protocol"), Oct. 31, 1988

Freezes emissions/transboundary fluxes of, and requires parties to utilize best available technologies economically feasible to reducing emissions of nitrogen oxides, which are greenhouse gases. Also requires parties to facilitate exchange of technology to reduce emissions of nitrogen oxides. Open to members of the ECE Economic Commission for Europe.

U.N. Convention on the Law of the Sea, Dec. 10, 1982. (not in force, but largely reflects customary international law)

Agreement to control pollution of the marine environment, includes measures to minimize "release of ... harmful or noxious substances through the atmosphere." (Art. 194) Potentially applicable to the extent that greenhouse gases and climate change are "harmful" to oceans.

Vienna Convention on the Protection of the Ozone Layer, March 22, 1985, and Montreal Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987

The chemicals (e.g., chlorofluorocarbons) that are regulated to protect the ozone layer are also greenhouse gases. Montreal Protocol, which provides for 50% reduction in production and consumption by 1999, is under review to accelerate reductions. Open to all states.

Convention on the Protection of the Environment between Denmark, Finland, Norway and Sweden, Feb. 19, 1974

Agreement is intended to protect and improve the environment through cooperation to ensure that activities under the jurisdiction of one State do not cause damage to the environment of other States.

Various Bilaterals -- e.g., United States-Mexico, Feb. 16, 1984

U.S.-Mexico agreement provides framework for Annexes on specific pollution reductions.

Natural Resources

Convention on Nature Protection and Wild Life Preservation in the Western Hemisphere, Oct. 12, 1940

Could be made applicable to protecting forests. Open to "American Governments".

Treaty for Amazonian Cooperation, July 3, 1978

Applies to Amazonian Basin and any other "closely connected" territory. Declares that right to use natural resources is inherent in each state's sovereignty. Promotes development consistent with "preservation of the environment". Parties are Bolivia, Brazil, Columbia, Ecuador, Guyana, Peru, Suriname and Venezuela.

Southeast Asia Agreement on the Conservation of Nature and Natural Resources, 1985

Adopts goals of sustainable development and maintaining ecological processes. Parties undertake, e.g., to manage forest resources and to control air pollution.

South Pacific Convention for Protection of the Natural Resources and Environment, Nov. 25, 1986

Contains agreement to reduce and control pollution from discharges into the atmosphere. Potentially applicable to measures to prevent climate change which harms oceans.

Africa Convention on Conservation of Nature and Natural Resources, Sept. 15, 1968

Parties agree to consider ecology and natural resources in development plans.

Water Resources Management

Convention Establishing a Permanent Inter-State Drought Control Committee for the Sahel, Sept. 12, 1973

Established committee to promote cooperation to combat consequences of drought. Open to any African country declared to be a disaster area as the result of ecological conditions of the Sudano-Sahelian region.

Various regional and bilateral water basin agreements -- e.g., U.S.-UK Treaty on Boundary Waters, Jan. 11, 1909

Approval of International Joint Commission required for obstructions or diversions from Great Lakes or other boundary waters between U.S. and Canada. Precedence for water uses specified.

Agriculture

U.N. Food and Agriculture Organization -- Constitution, as amended, Nov. 1959

Could assist adaptation to climate change by disseminating technical information and recommending action for agriculture and forestry. Subsidiary groups, like the International Rice Commission, could help with response strategies, for example, reducing methane emissions from rice paddies.

Various Regional Agreements -- e.g., Inter-American Institute for Cooperation on Agriculture, Convention, March 6, 1979

Possible frameworks for development of adaptation strategies or for limiting methane emissions from agriculture.

International Tropical Timber Agreement, Nov. 18, 1983

This agreement provides a framework for cooperation and consultation on, inter alia, improving reforestation and encouraging the development of national policies aimed at sustainable utilization and conservation of tropical forests.

Various Bilateral Agreements -- e.g., U.S.-USSR Agreement on Cooperation in the Field of Agriculture, June 19, 1973

Possible framework to formulate joint plans, exchange information.

Financial Institutions

World Bank--Articles of Agreement, Dec. 27, 1945, Articles of Agreement, Jan 26, 1960

Loans by the International Bank for Reconstruction and Development and concessional loans by the International Development Association fund projects that could be helpful to minimizing climate change (e.g., agroforestry) or harmful (e.g., highway construction leading to deforestation). Environmental policies being implemented by the Bank could be adjusted to support limitation or adaptation response options.

Regional Development Banks

Could give regional support for limitation or adaptation response options. Regional banks include: Inter-American, Indus Basin, African, Andean, Asian, Caribbean, Arab, Central American, European, OPEC, Nordic

Sectorial Funds -- e.g., International Fund for Agricultural Development, Agreement, June 13, 1976

Concessional loans to developing countries. Could adopt policies to assist limitation or adaptation response options.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WORKING GROUP III

(RESPONSE STRATEGIES WORKING GROUP)

IMPLEMENTATION MEASURES ON TECHNOLOGY DEVELOPMENT AND TRANSFER MEASURES

TECHNOLOGY DEVELOPMENT AND TRANSFER MEASURES

SUMMARY

The meeting called for greater cooperation among all nations to improve and transfer existing technologies, develop and transfer new technologies and improve the exchange of technological information to limit or adapt to climate change.

Many countries noted the need to tailor technologies to the domestic technological and human resource capabilities of developing countries and to better develop those capabilities.

Impediments to technology transfer and mechanisms to overcome those impediments were discussed at length. /

I. TECHNOLOGICAL DEVELOPMENT

A. Overview

1. Technological development is urgently needed to:

- (a) limit or reduce anthropogenic greenhouse gas emissions;
- (b) absorb greenhouse gases, i.e., protect and increase greenhouse gas sinks;
- (c) adapt human activities to the impacts of climate change; and,
- (d) detect and predict climate change and its impacts.

2. Technological actions designed to limit or adapt to climate change must be founded on a sound scientific basis, and must be consistent with the concept of sustainable development.

3. Criteria

- (a) Bearing in mind the considerable scientific uncertainties, priority must be given to those technologies which provide significant economic and social benefits in addition to benefits in limiting or adapting to climate change.
- (b) Appropriate criteria for selecting technologies (and for technology transfer measures) include economic efficiency taking into account all the external costs and benefits. Account must also be taken of suitability to local needs and conditions, additional benefits, ease of administration, information needs, legal and institutional constraints, national security (including defense, economy, energy and food), and acceptability to public. The RSWG subgroups may consider these criteria while finalizing their recommendations.

- (c) Technological development will have to be pursued in a wide range of sectors and activities such as energy (including non-commercial sources), industry, agriculture, transport and management of natural resources.
- (d) Adequate and trained human resources in all the countries are a prerequisite for development and transfer of technologies.
- (e) The anthropogenic component of the greenhouse effect is a consequence mainly of the growth of industrial and agricultural activities. Technological advances to limit or adapt to climate change are critically important to provide a sound basis for sustainable development.

B. Measures for promotion of technological development

1. Policies

- (a) An appropriate pricing policy which takes into account external (including environmental) costs and benefits is a key factor in determining the rate and direction of technological development.
- (b) In sectors where price signals do not elicit an adequate response, appropriate policies and incentives may be needed.

2. Information

- (1) There is a need for international information exchange to enable decision makers to continuously monitor development of technologies to limit or adapt to climate change.
- (2) Governments should work co-operatively to conduct periodic assessments of the state of these technologies.
- (3) There is a need to develop methodologies to assess the social, environmental and economic consequences of actions or inactions on climate change.
- (4) There is an urgent need for economic analyses and supporting scientific information to determine external costs and benefits referenced above.

3. Support of technological development by governments

Governments may need to support the development of technologies where such development by the private sector is not feasible.

4. Collaborative efforts

- (a) International collaborative efforts can accelerate development of technologies and offer substantial potential savings for all countries. Such efforts as already exist in several UN and other international organizations need to be strengthened and expanded.
- (b) Such collaborative efforts, as those existing in some countries between the private sector and governments to develop technologies, could be expanded further to include developing countries and international organizations.
- (c) Industrialized countries should take every feasible measure to help developing countries to acquire and apply these technologies effectively. Developing countries should be encouraged and assisted to develop their own technologies to achieve self-reliance.

C. Areas for Technological Development

The attached list (Box 1) provides suggested areas for consideration for technological development.

Another list (Box 2) proffered for consideration by the Stockholm Environment Institute was referred without endorsement to the RSWG Sub-groups for further review in the formulation of response strategies. The Working Group expressed the view that some of the actions are not acceptable and that as to the measures to increase CO₂ sinks, emphasis should be given to rational use of forestry resources.

Box 1. List of suggested actions for technological development

Limitation strategies

1. Limit or reduce CO₂ emissions globally.
2. Absorb emitted CO₂ (by growing biomass, by work on chemical methods).
3. Limit or reduce emissions (use) of ozone depleting substances with greenhouse potential (under the Montreal Protocol to the Vienna Convention).
4. Limit or reduce CH₄ emissions globally.
5. Limit or reduce N₂O emissions globally.
6. Limit or reduce O₃ emissions globally.

Adaptation strategies

1. Manage coastal resources e.g. (erosion or flooding of coastal cities, ports, transport routes, agriculture, estuarine salinization from storm/tidal surges).
2. Manage water resources e.g. water supply, flood control (groundwater, catchments, irrigation, river navigation, etc.).
3. Ensure adequate agricultural response (availability of temperature- and dryness-tolerant varieties of crops, livestock: ensure product storage installations are in right place if crop zones move latitudinally).
4. Ensure adequate forestry response (availability of temperature, dryness and fire tolerant varieties; correct rotation).
5. Revise soil mechanics criteria (permafrost, soil moisture, pore-water pressures).
6. Respond to changes in duration of ice-closure of ports, rivers, coastal seas.

Monitoring and scientific strategies

1. Global monitoring and related modelling of atmospheric and ocean phenomena to try to detect warming signal, improve predictive capacity, assess climate sensitivity and estimate delays in reaching equilibrium conditions.
2. Monitor build-up of GHGs in atmosphere.
3. Monitor sea-level changes.
4. Monitor forests.
5. Systematic integrated monitoring of human induced changes in ecosystems, land-use and ocean resources and to determine their contribution to climatic change.
6. Investigate biogeochemistry of past and ongoing climate-change related phenomena for better understanding of climate change mechanisms and impacts.

* The Working Group recommended that the question of biodiversity and climate change be examined by Working Group II.

II. TECHNOLOGY TRANSFER

A. Overview

- (1) As the greenhouse gas emissions in developing countries are increasing with their population and economic growth, rapid transfer, on a preferential basis, to developing countries, of technologies which help to limit or adapt to climate change, without hindering their economic development, is an urgent requirement.
- (2) It is important to understand the needs, opportunities and constraints of the recipients when undertaking technology transfer.
- (3) Many of the available technologies or those being developed in industrialized countries will have to be adapted to meet the conditions or needs of the developing countries.
- (4) Substantial efforts to transfer technologies to developing countries are now occurring under existing bilateral, and multilateral arrangements. These should be strengthened and expanded.

B. Factors that impede effective transfer of technologies and suggested solutions.

- (1) A consensus has emerged on some of the factors that impede effective transfer of technologies that assist to limit or adapt to climate change and on the steps needed to address them. Such factors include:
 - (a) lack of necessary institutions and trained human resources in developing countries;
 - (b) social factors that inhibit change from established ways;
 - (c) lack of resources for purchase, operation and maintenance of new technologies; and,
 - (d) higher initial capital costs in the case of some technology options.

The suggested solutions to address these factors are : better utilization of existing multilateral and bilateral development institutions to finance transfer of technologies; strengthening or creation of the necessary institutions; training of human resources; and, introduction and operation of new technologies and establishment of new funding mechanisms, as appropriate, to address these issues. The issue of funding mechanisms is discussed in the paper on Financial Measures.. The governments, it is suggested, can provide grants, loans and loan guarantees to overcome obstacles of high initial costs.

- (2) Introduction of new technologies is sometimes delayed by decisions of governments aimed at prevention of closure of existing industries which might cause economic and social disruption. The national governments and the international community should constantly strive to remove the difficulties and to facilitate the introduction of new environmentally benign technologies.
- (3) There are two other factors which impede transfer of technologies that assist to limit or adapt to climate change. These are:
 - (a) Existence of legal barriers and restrictive trade practices which impede transfer technologies; and
 - (b) Constraints arising from property rights involved in the development of technologies.

There is however a divergence of opinion on the solutions needed to address these factors. While some hold that a strict protection of property rights, patents, etc., will promote effective development and transfer of technology, others hold that the level of such protection should conform with overall economic and development policies of the recipient countries. There are differences of opinion on the legal barriers and the methods to remove restrictive trade practices.

It is noticed that these issues are under in-depth discussion in other fora such as GATT and UNCTAD, but no agreement has emerged.

It is extremely important to reach early international agreement on these issues in order to promote effective flow of technologies to limit or adapt to climate change.

III. SUGGESTIONS FOR PROGRAMMES

The following illustrative programmes are suggested to facilitate technology development and transfer:

- Technology Research Centers -- Establish or expand regional or national technology research centers to develop technologies for basic infrastructure, energy efficiency and alternative energy sources, agriculture, forestry, and water resources.
- Energy Efficiency Standards -- Establish standards on the energy efficiency of imported and locally manufactured technologies.
- Energy Services -- Establish a policy to encourage private sector involvement in energy conservation and supply.
- Access to CFC Substitutes -- Initiate a programme to promote CFC substitutes as well as provide assistance to developing countries in the acquisition and manufacture of the substitutes.
- Extension Services -- Organize a network of extension services to provide assistance to government agencies, communities, and the private sector in designing and implementing mitigation and adaptation projects.
- Forestation/Afforestation Programme -- New or expanded reforestation or forestation programmes could be linked to offset programmes for fossil fuel-fired power plants, biomass energy projects, or a timber products industry as a means of obtaining financing and management for the programme. The social and economic incentives needed to encourage long-term planting and maintenance should be identified.
- Technology Advisory Committees -- Establish technology advisory committees comprising representatives from government and business to recommend approaches for increasing export, joint venture, and other business opportunities related to global climate change limitation and adaptation efforts and to advise governments on ways to increase access to and encourage the development of commercial sources of new technologies.
- Technology Research and Development -- Promote research and development on technologies to: (1) monitor and detect climate change; and, (2) to limit or adapt to climate change.
- Technology Conferences -- Conduct conferences to transfer existing technologies: (1) to monitor and detect climate change; and, (2) to limit or adapt to climate change.
- Pilot Transfer Programs -- Conduct pilot programmes to transfer technologies in selected countries and sectors.

Box 2. List of Main Techniques for Limiting GHG Emissions

1. Reduce CO₂ globally

A. Improve energy efficiency

- use fuel efficient engines in vehicles, especially private cars and small trucks
- encourage car pools and other forms of journey sharing
- plan integrated residential/workplace arrangements to reduce journeys to work
- improve traffic flows to reduce engine idling times
- introduce maximum speed limits to improve fuel efficiency
- encourage better tuned engines in official car and bus fleets
- use more mass transit systems (buses, trams, rail, underground)
- cut out Saturday morning office hours in official administrations
- create import licensing systems for imported engines to meet efficiency standards
- phase out oil and gasoline subsidies on production and use
- encourage technical energy audits of industrial processes to identify inefficient steps
- use modern, efficient and advanced processing technologies, particularly in energy intensive (heavy) industries
- use recycled glass, metal, paper etc. to save the energy used in raw material extraction and manufacture of wholly new finished products
- use co-production of electricity and steam (for district and other heating - co-generation)
- encourage clean coal technologies for electricity generation, especially pressurized Fluidized Bed Combustion and Integrated Gasification/Combined Cycle technologies
- use modern, efficient electric motors and electronic control gear
- create licensing to import only the most energy efficient technology
- persuade banks, aid-agencies, developers to finance modern, efficient equipment
- install improved fluorescent or high-intensity-discharge lighting, modern reflectors, spacing controls, daylight enhancement technology
- set energy efficiency goals, targets and pay-back times
- use less energy intensive materials and components or import them
- site energy intensive plants near local energy sources: gas, geothermal, hydropower, solar
- use modern building design and insulation to conserve heat or avoid using cooling equipment in hot countries
- use basement water or rock-bodies for storing heat or "cold" to be released as needed
- retrofit wall, roof, window insulation for thermal efficiency
- use "heat mirror" and vacuum double or triple glazed windows
- plant trees in built-up areas to reduce local heating in hot countries
- use advanced modern boilers and heat pumps, refrigerators, stoves and water heating
- use advanced electronic energy management control systems for large buildings
- encourage efficient wood and charcoal stoves in developing countries

1. Switching to low - or non-carbon energy sources
 - encourage use of natural gas as a fuel instead of oil products
 - encourage use of diesel fuel instead of coal
 - encourage use of fuels based on cultivated biomass: direct combustion of woody biomass, gasification (producer-gas) where appropriate, ethanol and methanol from sugar cane
 - install alternative energy sources where an appropriate supply niche presents itself; after careful feasibility analyses - wind, solar (especially solar water heating and certain photovoltaic applications), hydropower, biogas, geothermal, ocean and wave energy, nuclear applications (with acceptable safety, waste disposal and proliferation safeguards)
 - develop non-fossil fuel-generated hydrogen and fuel-cells to power vehicles
 - encourage electric powered vehicles (non-fossil fuel electricity)
2. Absorb emitted CO₂
 - phase out clear felling of natural high tropical forest for hardwood production or burning off for temporary agriculture
 - formulate massive forest and woody biomass planting programmes
 - scrub CO₂ from flue gases of major energy installations (power stations etc.)
3. Reduce halocarbon emissions globally
 - strengthen the 1987 Montreal Protocol and include chlorocarbons
 - replace halocarbon propellants by CO₂
 - replace other uses with substitutes contributing minimally to the greenhouse effect
4. Reduce CH₄ emissions globally
 - recover methane from landfill sites for use as a fuel
 - cultivate rice aerobically by drawing down water in later growth stages
 - flare all waste methane from oil production
5. Reduce N₂O globally
 - avoid nitrogenous fertilization of the colder, wetter soils
 - switch away from liquid ammonia and urea as a fertilizer
 - use low NO_x burners for fossil fuel
6. Reduce O₃ globally
 - encourage low temperature combustion processes where possible

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WORKING GROUP III

(RESPONSE STRATEGIES WORKING GROUP)

IMPLEMENTATION MEASURES ON FINANCIAL MEASURES

FINANCIAL MEASURES

Introduction

1. The financial approach presented in this document is based on discussions within the IPCC RSWG. It is intended to reflect a wide variety of ideas and opinions. During the coming months, these views should be widely considered by governments and others, with the aim of ensuring effective action to tackle the problem of global climate change.
2. Scientific analysis on the issue is not yet finalized. The nature and scale of the economic and technical measures which are needed will determine the scope and conception of finance. Response measures will, in part, be determined as a result of ongoing deliberations within the IPCC. The financial options listed here are discussed with a view to defining a sufficiently broad, flexible and cooperative framework for action.
3. The paper pays special attention to the mechanisms which should help countries where the protection of the atmosphere would entail a special or abnormal burden, in particular due to their level of development or their effective responsibility in the deterioration of the atmosphere.
4. The objective is to encourage adoption by industrialized and developing countries alike, of strategies to adapt their economy to control, limit or reduce greenhouse gas emissions and at the same time increase the capacity of the natural environment to absorb these gases.

General Considerations

5. The following considerations require special attention. The first tangible results in limiting climate change by these actions will not appear for some time. We are thus engaged in a long term process.
6. Environmental problems caused by global warming can often not be disassociated from other environmental problems or from other development factors. This interdependence of environment and development must be recognized and taken into account in the actions of the international community.
7. The programmes to be undertaken will require actions in both developed and developing countries, under the following broad categories: limitation/reduction measures, adaptation measures, research and development, transfer of technologies, public awareness and education.

8. The special needs of developing countries including their vulnerability to problems posed by climate change and their lack of financial resources must be recognized and assistance tailored to meet their individual needs. Financing requirements might be considerable. Substantial economic gains, however, could be achieved, for example, through measures which result in energy conservation and efficiency. Economic and technological measures are described in more detail in a separate paper.

9. The presence of a positive international economic environment, including further reduction of trade barriers, will also be important to support economic growth of developing countries, and to generate resources which can be applied toward pressing needs.

10. The scale and diversity of the environmental requirements in developing countries, together with their development problems, favour an approach which ensures mobilizing a wide variety of international organizations possibly including new ones. It will also be important to ensure the full participation of existing regional organizations.

11. Priority should be given to those financial measures and policies which can have an early impact in limiting/reducing emissions of greenhouse gases and which make economic sense in their own right.

Guiding principles for cooperation

12. The following principles should guide the financial approach. They do not, of course, predetermine legal issues arising from a future climate convention. These issues are discussed in a separate paper.

(i) Industrialized and developing countries have a common responsibility and need to limit and/or adapt to climate change. The interdependence of the causes of global warming and the interweaving of the necessary economic solutions require a collaborative approach with due respect to national sovereignty. This concept is based upon the recognition that:

- the atmosphere and climate are vital to all human beings;
- it is important for every person and country to contribute to limiting climate change caused by human activities; and
- in pursuing economic growth as a legitimate means of improving standards of living, countries need to integrate environmental considerations with development policies in order to ensure sustainable development.

The elements outlined above apply to industrialized countries as well as to developing countries. All countries are likely to face increased costs associated with preventive and adaptive measures necessary to address climate change.

(ii) Industrialized countries have specific responsibilities on two levels:

- They should adopt domestic measures to limit climate change. And thus, they should show leadership and set an example by adapting their own economies in accord with future agreements to limit/reduce emissions. The fields of action are multiple - faster suppression of the production and consumption of chlorofluorocarbons, energy savings or recourse to non-fossil energy sources, a rational use of forestry resources to commence active reforestation, limiting or reducing CO₂ emissions, etc.
- They should help developing countries participate in international action without compromising their development, by contributing additional financial resources, appropriate transfer of technology, by engaging in close cooperation concerning scientific observation, analysis and research, and finally by means of technical assistance geared to forestalling and managing ecological problems. Additional resources should over time be mobilized to help developing countries take the necessary measures that are compatible with their development requirements, and thus compensate for the specific effort they would be ready to make.

(iii) Developing countries should take measures to adapt their economies. They should undertake, according to their individual circumstances, to set out on a course to make a rational use of forestry resources to commence active reforestation and to promote energy savings or recourse to non-fossil energy sources. International cooperation and urgency plead in favour of the adoption of such programmes, which are likewise applicable in industrialized countries. The immediate development needs of developing countries would certainly require an increase in their present level of CO₂ emissions. The developing countries should attempt to minimize such increases in emissions.

(iv) Multilateral development banks, bilateral assistance programmes, and United Nations development and scientific and technological organizations should be used in their respective fields of competence. In addition, regional cooperation bodies should adopt the required initiatives and implement the appropriate solidarity action at their level.

Uses of financial resources

13. The Working Group reached a general consensus on priority use for financial resources channelled to developing countries. It was accepted that some activities contributed both to limiting/reducing greenhouse gas emissions and promoting economic development, and that early priority should be attached to these.

14. It was noted that some activities would require a much greater scale of resources than others, and that considerations of cost effectiveness should apply in deciding particular priorities. It was further noted that there already a significant amount of activity being funded by existing assistance organizations in some of the priority areas.

15. Among the highest priority areas for assistance are:

- Efficient use of energy including by appropriate use of technologies, increasing the use of non-fossil fuels and switching to fossil fuels with lower GHG emission rates.
- Forestry - to promote the rational management of forest resources and reforestation.
- Agriculture - to limit or reduce greenhouse gas emissions from agricultural activities.
- Help for developing countries in the development and introduction of alternatives to CFCs and halons controlled by the Montreal Protocol.
- Assistance to developing countries for their participation in the meetings of the IPCC.
- Assistance to help developing countries plan how to tackle problems posed by climate change, including assistance in the design of policies and programmes. This holds for adaptation as well as limitation/reduction oriented policy planning. It was noted that small investments on policy or programme design could yield large returns.
- Research and development programmes - including monitoring climate change and research on technologies which might be used to reduce/limit emissions of greenhouse gases and develop adaptive strategies.
- Technology transfer arrangements, including the training of experts.
- Public awareness and education.

16. Some delegations also suggested that financial resources might be used for the following purposes:

- Assistance for developing countries which in future abstain from activities which produce greenhouse gases.
- Assistance to developing countries in adjusting to the problems presented by climate change. It was noted that there might be a parallel with support for current economic or structural adjustment programmes.

- Funding to support the developing countries in fulfilling their obligations under a climate convention, and subsequent related protocols, thereby assuring widespread implementation of the required measures to limit, reduce and as far as possible prevent climate change.

17. The Working Group thought that further consideration might be given to the ordering of existing and future funding priorities.

Sources of financial resources

18. The Working Group noted that the question of ways by which financial resources could be generated to assist developing countries was separate from the issue of how to channel those resources. It was agreed that all avenues should be considered. Among the options for generating official resources were:

- General taxation or other revenues not necessarily related to climate change or the natural environment which might be allocated for specific budgetary purposes.
- Specific taxes or levies related to the emission of greenhouse gases, including taxes or levies on the use of fossil fuels.

19. Other creative proposals for generating resources have included:

- Undisbursed official resources which might result from savings on government energy bills and lower levels of military expenditures.
- Levying a fixed percentage tax on travel tickets issued worldwide.
- A world climate lottery.
- Once any future agreement or protocol on limiting/reducing greenhouse gas emissions is in place, it may be that one source of resources would be levies or payments from countries unable to meet their treaty or other obligations.

20. Some delegations stressed the importance of assuring the additionality of resources. It would not always be possible to identify precisely all the resources thus allocated. However, whenever such identification is possible, separate statistics should be kept. The statistics relating to official development assistance of industrialized countries should be adapted so as to record the special effort which these countries would be prepared to make.

21. Some delegations expressed serious difficulties with proposals for prior dedication of resources -- such as all or part of any revenues from taxes, levies or fees on greenhouse gas emissions -- but agreed that these should be studied among future options.

Institutional mechanisms

22. The Working Group agreed that a progressive approach should be adopted to the need for financial assistance and the mechanisms to be utilized or developed. This approach would parallel that being pursued in the implementation of the Montreal Protocol on the phasing out of CFCs and halons.

23. There was agreement that assistance should flow in a timely, coordinated, and cost effective manner throughout the response tracks described below.

I. One track builds on work underway or planned in existing institutions. In this regard, the World Bank, a number of the regional development banks, other multilateral organizations, including the U.N. specialized agencies such as UNDP, and the bilateral assistance agencies have initiated efforts to incorporate global climate change issues into their programmes. The September 25th Communiqué of the Development Committee and the work plans of the new OECD Development Assistance Committee Group on Development Assistance and the Environment are particularly noteworthy. Each organization is expected to define coherent guidelines for action, and to review the need for additional resources and expanded programmes. Bilateral donors should further integrate and reinforce the environmental component in their assistance programmes, and develop co-financing arrangements with multilateral institutions. In this regard, the Working Group welcomed recent initiatives to increase allocations of bilateral funds to support environmental programs.

II. A number of delegations from both developed and developing countries strongly urged that the parallel creation of new mechanisms or facilities, like a new international Fund, is already justified. They stressed that such new instruments should be directly related to a future climate convention or subsequent protocols. It was added that such new instruments could be located within the World Bank system (with new rules), or elsewhere; with respect to this WMO and UNEP were mentioned. Moreover, some suggested that these instruments should receive guidance from an executive body to be created under a climate convention. Other delegations suggested and it was agreed that proposals for new instruments should be clarified.

24. It was pointed out that a distinction should be made between new mechanisms to generate financial resources and those which should allocate assistance. For example, additional resources could be generated by a new mechanism from among the options described above (see section on sources of funds) but allocated to existing institutions to administer programmes.

25. The issue of additionality was discussed in some detail. A number of delegations felt strongly that funds raised should be clearly additional and distinct from those provided for development assistance, and that they should be provided through separate windows or facilities, to make clear that they would be provided under different terms than normal official development assistance. A number of industrialized countries indicated that they could not, at present, offer significant additional resources. This approach does not preclude the creation of a body for consultations among the main multilateral partners, similar to the consultative group on international agricultural research.

26. Some delegations expressed the strong view that supportive economic measures would be important in the context of assistance provided. Others expressed reservations about the appropriateness of certain types of economic policy dialogue in this respect.

27. With regard to the two tracks outlined above, the group agreed that individual developing countries should initiate studies on their current and projected emissions levels and assistance needs in limiting/reducing them, across the three most important sectors -- energy, forestry and agriculture. Each RSWG Sub-group should take these into consideration in its deliberations. Donors were urged to provide resources for such studies, which should be completed as expeditiously as possible. The Working Group noted that this approach paralleled that currently underway to implement the Montreal Protocol in which an accelerated effort is underway to complete assessments and country studies (supported by external resources) of the increased needs for assistance to make possible a phaseout of production and use of CFCs.

28. While recognizing the complexity of such studies, the Working Group expressed the hope that such assessments and strategy plans would proceed expeditiously to permit early consideration of the magnitude of financing requirements which might be encountered by developing countries. Some delegations strongly expressed the view that such information is indispensable to assess the capabilities of existing institutions, once strengthened and reoriented, to meet the financing needs identified, and to assess the need and scope for new mechanisms.

Future work programme

29. The Working Group agreed that further progress was needed in a number of areas, particularly in assessing the magnitude of the financing needed for developing countries, the need for new mechanisms, and the contribution of the private sector.

30. Individual country studies of current and projected emissions of greenhouse gases and plans for limiting or reducing emissions are needed to permit the assessment of the magnitudes involved. It was noted that the application of efficient technologies can have a major bearing on future capital requirements.

31. Such information is fundamental to determining the future demands on existing institutions and the potential need for new mechanisms. There was consensus on the need to further study the context of a new mechanism, in the concept of a future climate convention or its protocols.

32. The Working Group further noted the important contribution which the private sector might make in assisting developing countries to respond to climate change. In particular, the private sector can facilitate effective technology transfer and, through foreign direct investment, support economic growth and provide additional resources. The potential for co-financing and other forms of public and private sector collaboration should be explored.

Concluding remarks

33. The framework for action which has just been presented, and the financial mechanisms which could accompany it, are of a progressive nature. The first far-reaching measures (for example, research, swifter reduction of the emissions of chlorofluorocarbons, reinforcement of the scientific observations system, technical assistance for developing countries, support for forestry) are already underway and should be strengthened expeditiously.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WORKING GROUP III

(RESPONSE STRATEGIES WORKING GROUP)

IMPLEMENTATION MEASURES ON PUBLIC EDUCATION AND INFORMATION

INTRODUCTION

An environmentally informed global population is essential to addressing and coping with climate change. Throughout the world in whatever the sphere of human activity or exchange, there is now ignorance, apprehension, and confusion about climate change. For some individuals, groups, and organizations, the problem is unknown, irrelevant, or remote. For others, it is of overwhelming proportion or misunderstood. Few bring to the world forum a workable grasp of the issue and the potential adverse consequences of climate change. Despite the fact that there are uncertainties and unknown dimensions about the topic, there is little disagreement among experts about the importance of limiting/reducing greenhouse gas emissions and achieving sustainable human progress.

Given the importance of a well-informed population, the Working Group developed suggestions and approaches for improving international awareness about the causes and potential impacts of climate change. These suggestions and approaches are summarized in this section. While it was recognized that broad-based understanding is essential, it was also appreciated that no single mechanism or template can work for every group or in every culture or country. The social, economic, and cultural diversity of nations will likely require educational approaches and information tailored to the specific requirements and resources of particular locales, countries, or regions. Nonetheless, international collaboration is critical to taking efficient and effective steps. So too is mobilizing and fully integrating the expertise and resources of international organizations. Although education must ultimately be context-specific and reflect what individuals and organizations can best do to make a difference, the commonality of the climate change problem requires cooperative solutions.

Across communities and target audiences, education and information should be geared toward making people more capable of dealing with the problems associated with climate change and better able to make responsible decisions as full global partners. Education is used broadly to encompass formal and informal processes of teaching and learning that occur throughout the life of the individual in the home, the school, the workplace and a range of other settings where instruction, training, and first-hand experience are conveyed. Similarly, information refers to materials and data that are produced and accessible in a variety of formats varying in formality and technical sophistication. Thus, for purposes of IPCC response strategies, both education and information are interactive and dynamic ways of fostering new levels of environmental sensitivity and awareness in public and private lives.

It was recognized that a set of guiding principles must govern the structure for developing and implementing education and public information measures. First, multilevel approaches are important; both education and information measures must be appropriate to international, regional, national and local formats and to wide-ranging audiences from individuals to private and public sector organizations. Second, education and information strategies must be attentive to the cultural and multi-cultural diversity within and between nations or regions, including language diversity and the capacity to communicate fundamental concepts. Third, there must be sensitivity to other national differences, including those between developed and developing nations in education and information resources, in mass media capacity, and in other regional variations. Fourth, education and information mechanisms must strengthen an appreciation of commonality and global interdependence among people facing the complex issues of climate change. Finally, it is important to convey an understanding that early responses are essential to resolving problems of future generations.

This report examines public education and information on climate change in terms of aims, audiences, measures, and actions. Each is addressed in turn. It must be emphasized, however, that these items do not stand on their own merit but are closely interrelated. The aims, audiences, measures, and actions identified in this section in reality fall also into three overlapping categories--those of immediate concern, those of the near term, and those of a long-range nature. In devising public education and information mechanisms, a balance between long-term and short-term actions is recommended. Additionally, there must be a balance between top-down and bottom-up target audiences.

AIMS

The purpose of public education and information is to foster a common understanding about causes and effects of global climate change. There is also a need to change public attitudes and policies to effect responses to climate change.

The core aims may be summarized as follows:

- o Promote awareness and knowledge of climate change issues
- o Encourage positive practices to limit and/or adapt to climate change
- o Encourage wide participation by all countries, both developed and developing, in addressing climate change and developing appropriate responses

Among the aims of education and information is the need to ensure a timely flow of authoritative, frank and dispassionate information about global climate change, exchanging the most up-to-date information as it becomes available. The information must be widespread and must fit into general approaches for information dissemination on world environmental problems.

An aware public is absolutely essential if politicians and other decision makers are to mobilize the necessary means to limit the effects. Most people realize that climate changes exceed the length of human life; yet, unlike the physical earth where deterioration is visible to the naked eye, deterioration of the air is not a tangible element. Therefore, a priority should be placed on education and information because attitudinal and behavioural changes can bring about structural changes in production and consumption processes. Global strategies defined by IPCC and others at all levels can convince leaders of the need for joint or complementary action to achieve common goals--to foster a concept of global common good.

These aims can be met by governments insuring the understanding support, knowledge and expertise of the private sector, including non-governmental organizations, and the general public and by moving normally long-term measures of public education and information into the mainstream much more rapidly. Recognizing that well-planned and well-organized public information and education are separate activities, both must develop on parallel tracks, both must form an inseparable part of response strategies, and both must be open to public action so that people feel directly concerned and mobilized.

AUDIENCES

The audience or target groups include everyone. No person or organization should be excluded. For purposes of discussion, audiences are aggregated into common or related groups that might best be served by particular activities.

These audiences include present and future generations of children and youth as well as individuals at household levels. Public and private sector policy makers and leaders at each level (local, national, and international) are a high priority, special target for immediate and short-term actions. Further, the media, educators and educational institutions, and scientists and other professional groups and their organizations similarly comprise an important group. Finally, but no less important, industrial, business, and agricultural sectors are key target groups. In particular, attention should be given to the bulk of the rural population.

MEASURES FOR DEVELOPING INFORMATION

Informational and educational materials must be developed. Materials should be objective and reflect broadly accepted assessments of the science of climate change suitable for use throughout the world. An explanation of the range of uncertainty is essential for clearly understanding the scope of the issue. Because of the dynamic nature of climate issues and because research is constantly producing new knowledge, information and educational materials must be periodically revised and updated. Informational and educational materials should include: resource and energy conservation; efficient utilization of energy sources with reduced carbon dioxide emissions; control of air pollutant emissions; promotion of sound national conservation strategies which highlight the special role of conservation of forests and reforestation/afforestation in climate change.

Materials should provide consistent, reliable and realistic information on climate change and its consequences in simple and attractive formats. Such materials should also include special attention to the mechanics of the atmosphere and the interaction of human activities with it.

Materials should be appropriate for use by technology-based learning media ranging from basic radio, television, film, and video through very sophisticated levels of computer interactive systems. Information in the form of basic data can be supplied by scientists and other professionals who develop the scientific base from which extension personnel develop the materials provided to the end users. This maintains a continual flow of knowledge and information needed to keep the public well informed.

Mass media, in particular, radio, television, oral and print must play an important role in developing and providing an in depth approach to both education and information ranging from information for schools to detailed publications and radio programming to meet special needs. Attention should be given to developing forms of communication to more remote areas in developing countries.

Information packets, textbooks, and other educational materials for use in schools as well as more detailed materials to meet teacher-preparation and trainer needs must be developed.

Countries with information on the labelling of energy efficient and environmentally-preferred or low emission products should compile such information and make it available to all countries. Such information must be continually updated and provided quickly and effectively to all sectors.

ACTIONS FOR DISSEMINATION

National and local actions

National committees or other organizations on climate change should be encouraged or clearing houses should be established to collect, develop and disseminate materials on climate change. This could help provide focal points for information on issues such as energy efficiency, energy savings, forestry, agriculture, environmentally-sound housing and transportation efficiency. Information exchanges would also provide a means to share technical knowledge and expertise.

Information obtained through greenhouse gas emission audits may be used to identify the size of the problem as it relates to each nation. Practices may then be identified which would provide simple and cost-effective actions. Use of available research about attitudes and behaviour of populations may be used to define local and national programmes, identify primary and secondary target audiences, and enable the setting of realistic goals.

It is important to consider the following items for the development of action programs at this level:

- Organize symposia, seminars, and workshops. (For example, use professional and scientific societies to develop special programs for engineers, architects, land-use planners and other designers and policy-makers making them aware of how they can contribute to energy efficiency and conservation, and anticipate likely impacts of climate change.)
- Develop specialized programs to provide training for educators and communicators (for example, media personnel).
- Devise or work through existing programmes that will take advantage of local language and local culture. (For example, use public meetings and hearings, community organizations, radio programmes to inform the public.)
- Establish or use existing extension-type service organizations to assist in technology transfer and education.
- Establish local outreach through the development of, or use of existing, support groups.
- Call on the skill, structure, and involvement of local and regional special interest groups, for example, women's organizations and environmental interest groups.
- Use media campaigns to raise awareness about climate change concerns affecting the public and about what individuals themselves can do in their daily lives with regard to them.
- Develop and/or strengthen, in the developing countries, the role of NGO's specializing in the field of environment, particularly, in the field of global climate change.

It is important to recognize that, irrespective of global climate change problems, certain actions at the local level are environmentally useful. These include education and information on the utilization of available alternative technology and on utilization of all resources as efficiently as possible, recycling waste where economically practicable, encouraging more efficient use of all forms of energy, increasing tree planting, and minimizing loss of biomass.

International Actions

International organizations (UNESCO, UNEP, WHO, etc.) should utilize IPCC reports in developing and providing countries understandable guidelines for future programmes.

An international institution should be developed or an existing international institution should serve as a clearinghouse for existing and newly developed informational and educational materials. Focal points with existing networks should be established for the development or coordination of materials specific to global climate change issues.

Upon completion of IPCC reports, seminars should be developed that focus on providing informational programs and educational materials to developing countries.

Financial needs and financing options for supporting international activities on public education and information should be identified. These needs and options must be linked to financial and legal recommendations.

Information activities should pay special attention to the issues of geographic isolation, cultural diversity, and the absence of effective mass media within certain regions and countries throughout the world.

Immediate Responses

While a number of actions are immediately feasible at the international, national, and local levels, some specific examples are provided below to illustrate the inter-relationship between components discussed earlier and available steps:

1. Develop strategies at the national, regional and international level for the production, communication and release of the IPCC reports. Participation by invited experts from the developing countries at this stage in particular, and in the IPCC activities in general, is highly desirable; funding for such participation should be ensured.
2. Upon completion of the IPCC reports, or earlier as also proposed by the IPCC Special Committee, a series of short-term seminars should be targeted to inform high priority decision makers, world leaders, scientists and other professionals, educators and media developers, both in the public and private sectors, of the causes and effects of climate change, and the related international efforts already underway. This should include specially formatted publications, news releases and related media events. Existing institutions (international organizations and NGOs) may be approached to determine interest in implementing such a seminar series.
3. Establish multi-disciplinary national committees, or other forms of national coordinating mechanisms, on climate change, to build a partnership for implementing educational and informational strategies nationally and to establish appropriate networks with international and regional organizations. Through such mechanisms or otherwise, establish focal points in each country. This and other measures would help improved distribution channels for dissemination of up-to-date information.

4. Solicit the support of international and regional organizations and NGOs for curriculum development by devising model courses of studies at various levels for primary grades through universities. These could be expected to include educational material (trainer and student texts) tailored at the national or local level, including appropriate specific examples of what individuals, organizations and institutions can themselves do.
5. Solicit the support of the international and regional organizations and NGOs in implementing educational and informational strategies in general.

The immediate responses should take special account of the needs of the developing countries. In this connection, it may be noted that a Special Committee on the Participation of the Developing Countries has been established by IPOC for such purpose.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

WORKING GROUP III

(RESPONSE STRATEGIES WORKING GROUP)

IMPLEMENTATION MEASURES ON ECONOMIC MEASURES AS A RESPONSE TO CLIMATE CHANGE

ECONOMIC MEASURES AS A RESPONSE TO CLIMATE CHANGE

1.0 Introduction

The preliminary ideas set out in this document are intended to assist in investigating the applicability of economic instruments as options in implementing the range of measures available at the national and international level for limitation or reduction of the net emission of greenhouse gases or adaptation to climate change. It is intended that they provide the basis for the further more detailed work that remains to be done by the Working Group.

This work should be carried forward in the light of further responses to this topic paper from countries, and other organizations, the results of the work being undertaken in the context of RSWG and the product from the other Working Groups of IPCC.

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

All countries and organizations participating in IPCC work are encouraged to consider the ideas in this paper and provide the topic coordinator (Mr. J. Gilbert of New Zealand) with further additions, comments, elaboration, or qualifications. Written material should be provided no later than 1 January 1990 so that a further revision can be circulated in time for consideration in early February 1990.

2.0 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 may be insufficient without careful intervention by national governments. These interventions could provide the necessary signals for more effective operation of markets that are otherwise hindered by existing institutional, social or other barriers.

Economic instruments, through their encouragement of flexible selection of abatement measures, offer the possibility of achieving environmental improvements at lower cost than regulatory instruments. Economic instruments 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 economic instruments will be applicable to all circumstances and some combination of economic and regulatory measures will be the most appropriate in the final analysis. 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 participants saw economic instruments (and markets), 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. However, it was acknowledged that assessments of the environmental, social and economic impacts can be useful inputs in reaching these decisions on emission levels.

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, a balance will be required between the two approaches.

This topic paper addresses national and international aspects of the following economic mechanisms: emissions charges, tradeable emission permits, subsidies and sanctions. These ideas may be helpful to some countries in preparing and assessing possible responses to national goals and international commitments. This paper provides a "top-down" assessment of these possible economic measures and it is hoped that through the detailed work of the RSWG Sub-groups that a "bottom-up" assessment of these measures will also be available to countries to draw on in formulating their short and longer term plans.

3.0 Key considerations

Market 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 where appropriate in the light of available scientific knowledge. This is consistent with the principle of sustainable development.

Three important considerations were identified as potential barriers to the achievement of environmental objectives through market mechanisms: (1) information problems, (2) counterproductive operation of existing measures and institutions, and (3) other competing objectives. An understanding of these considerations is necessary in assessing the likely success of a response strategy implemented through market mechanisms.

3.1 Information

As is pointed out in the document on public information and education (IPCC/WG3-II/Doc. 1, see Appendix I) market mechanisms require adequate information used in the most effective way to achieve their maximum benefits. Problems of information can often be the cause of markets producing less effective or even unfavourable 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 consumer) do not have the ability or the means to use the information.

If information is the cause of economic activity producing unsatisfactory environmental outcomes, it may be appropriate for the policy response to target directly the information problems. This might be through a public education campaign, or better protection of intellectual property so as to encourage research into pollution abatement technology, or some other appropriate policy response.

3.2 Existing measures and institutions

It was also recognized that 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 contributions to increased emissions of greenhouse gases. Nations should be encouraged to reassess these measures accordingly with due consideration to other economic and social objectives.

Where counter-productive 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 as well as reducing the risk of climate change.

With regard to intellectual property right arrangements, some countries believed such arrangements could be a barrier to the flow of information necessary to achieve the desired environmental results. Some held that the level of protection should not lend itself to abuse of property rights and restrictions on the use of technology acquired. Others argued, however, that without adequate and effective protection of intellectual property rights, there will be a disincentive for the desired market response of development of needed environmentally beneficial technology.

3.3 Other competing objectives

In addition to examining how existing measures and institutions may operate counter to the objective of limiting or reducing net greenhouse gas emissions, it should be recognized that there will always be competition among differing social, environmental and economic objectives. This will affect the

use of economic measures to limit or reduce greenhouse gas emissions. In a world of limited resources, such resources must be allocated between competing objectives and social welfare will not be maximized by pursuing any objective to the exclusion of others. Thus, in balancing these competing objectives, there will be trade-offs and total elimination of all environmental problems is unlikely to be achieved.

4.0 Evaluation criteria

The kinds of economic instruments addressed in this document may be considered as options for any national programme established to meet national goals and international commitments for limitation or reduction of greenhouse gas emissions and adaptation to climate change or as options for an international institutional structure. Since the form of the instrument may vary between individual national programmes and coordinated action at the international level, it may be useful to distinguish criteria for the assessment of instruments or policy measures adopted at the national level from those applicable to an assessment of possible international instruments or policy measures.

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

1. The effects of 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;
2. The measure should be comprehensive in terms of taking into account all significant sources and sinks of the specified emissions;
3. The measure should seek to direct costs towards sources of the specified emissions and to direct benefits towards sinks;
4. The measure must be compatible with international trade rules and principles and should seek to avoid distortions or restrictions to trade;
5. The measure should be able to be amended or adjusted efficiently, in a predictable manner, in response to new information and any assessments of science, impacts, technology and economics, and any international obligations.
6. The measures should not hinder the operation of other measures (particularly technology development and information exchange) which facilitate the achievement of objectives in relation to specified emissions.

7. Accurate and reliable information must be available at a national level about sources and sinks of specified emissions.
8. 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 assist in achieving the pollution control goals of any agreement at the lowest economic and social cost;
3. The international measures should take appropriate advantage of economic measures as well as regulatory measures to encourage utilization of alternative, less polluting technologies and sinks;
4. 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;
5. The international measures should be equitable in terms of its distribution of costs and obligations across national, intergenerational and income class categories and in terms of access to decision-making processes;
6. It should not distort or restrict world trade;
7. The international policy measures should be administratively practical and effective in terms of application, monitoring and enforcement;
8. The measures should be compatible with support principles of international technology transfer and financial support discussed in other topic papers.
9. The measures should take into account the special needs of the developing countries.

5.0 Instruments examined

This section examines possible economic instruments to achieve national goals and international commitments for limitation or reduction of greenhouse gas emissions and adaptation to climate change.

It will be up to each country to select their own mix of measures that are most appropriate to their particular circumstances and in the light of the criteria for evaluating measures outlined in Section 4. More work is required to identify those characteristics in individual countries under which each measure is most appropriate.

Section 5.1 looks at measures that might be used in centrally planned economies to reduce emissions and then examines the role of regulations in market economies to reduce emissions.

Sections 5.2 - 5.5 examine the following economic instruments that might be considered as alternatives or supplements to the regulations:

- 5.2 Tradeable emission permits
- 5.3 Emissions charges
- 5.4 Subsidies
- 5.5 Sanctions

It was recognized (in Section 3.2) that it was necessary to examine whether current policies provide incentives that tend to result in an adverse effect on climate change or hinder adjustment to it. Agricultural, transport, energy and industrial policies could be relevant here.

In addition to the above, it is clear that governments 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.

These economic instruments could provide a mechanism to adjust market forces to take account of environmental impacts. They would thereby use "environmentally adjusted market forces" to achieve emissions limitations or reductions.

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. Moreover, they provide an ongoing incentive for industry and individual consumers to apply the most efficient limitation/reduction measures through, for example, more efficient cleaner technologies. Such incentives can be lacking in the case of regulations.

Economic instruments offer the possibility of minimizing the total social costs of achieving national goals and international commitments for limitation or reduction of greenhouse gases emissions and adaptation to climate change.

However, some delegates raised moral concerns that some of the economic instruments imply "paying for the right to pollute". Similarly, some delegates also raised moral concerns that economic instruments introduce a profit motive element into the achievement of public goals of environmental protection. In the light of these concerns, individual countries may wish to view the economic instruments as being complementary to regulations. This might involve setting an emissions ceiling beneath which the economic instruments could be used to achieve reductions most efficiently.

For the economic instruments to be effective, it is important that the consumers and polluters are aware of the alternative actions that they can take to reduce emissions. Consequently, it is essential to complement the economic instruments by the provision of information and technical assistance to improve the operation of the environmentally adjusted market forces (see Section 3.1).

5.1 Regulations

5.1.1 Regulations in centrally planned economies

Because of the differences between the social and economic structures in different countries, there will be different combinations of appropriate instruments or at least different emphases in the use of the various instruments. In the particular case of centrally planned economies, their plan encompasses a comprehensive set of regulations and is the major instrument for achieving sustainable development associated with a target limitation or reduction in emissions.

Such central planning provides the possibilities for the government to co-ordinate and direct all efforts to limit or reduce emissions. Such possibilities include: planning emissions reductions/limitations by those enterprises that can achieve them most at least cost so as to minimize the financial burdens for the whole society; provision of loans on favourable terms for environmentally sound investments and alterations in price regulations to enhance the introduction of new environmentally acceptable technologies and activities and to improve consumer behaviour.

5.1.2 Regulations in market economies

Governments in market economies also have the option to impose direct controls to limit or reduce greenhouse gases emissions. Such controls typically seek to prescribe acceptable standards or to restrict or limit certain activities. They normally do not seek to influence market behaviour 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 particular 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 objectives, thereby imposing unnecessary economic costs; and
- require significant monitoring and/or administration (although the same may be true for market measures).

5.2 A system of tradeable emission permits

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 those entitlements is equal to an emissions budget set at the national level through regulation or at the international level based on appropriate assessments. A "tradeable" emission permit system is an extension of an emission permit system which allows the holders of entitlements to trade or sell their entitlements to another party on the open market.

There has been to date only extremely 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 which 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 emitters 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 budget 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 c GNP.

Once the initial entitlements to each country have been set by an international agreement, 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.

Benefits and difficulties of a national tradeable permit programme

The following potential benefits have been suggested:

- reduction of the cost of meeting a total emission target set by regulation;
- provision of economic incentives to develop and use cost-effective, energy efficient industrial processes, consumer products and emission control technologies;
- working within a system of agreed emission budgets;
- provision of an efficient mechanism for addressing the trade-offs between sources and sinks for the specified emissions.

The following potential difficulties have been suggested:

- creation of a "right to pollute" that can be purchased by those with the highest level of income;
- lack of political acceptability in many countries;
- requirement for administrative structure that generally does not exist today;
- requirement for extensive monitoring and record-keeping to track the movement of entitlements and overall compliance with the total emissions budget;
- lack of experience at the international level.

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 and political concerns about the "right to pollute" and the ability of wealthy nations to procure those rights would be greater.

Issues needing further examination

Major concerns were expressed by the majority of countries attending the meeting, 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 about a tradeable emission permit programme that need further exploration. The political problem created by a "right to pollute" programme designed to meet an acceptable global emissions level is one such issue. Another issue is the possible mechanisms that can be used to determine the initial allocation of emission entitlements, taking into account the special situation of developing countries. The potential scope and size of a trading market should also be examined as should the feasibility of the administrative structure that would be required to implement such a programme.

5.3 A system of emission charges

Emission charges or taxes are levied on specified emissions in relation to their level of emissions (or products or activities associated with emissions). Such charges may provide a means of encouraging emitters to limit or reduce emissions to a level that is socially desirable. Moreover, they provide an ongoing incentive for diverse parties concerned to implement efficient means of limiting or reducing emissions by, for example, implementing energy efficiency measures. A major attraction of taxes is the revenue which they generate. They could provide a funding base for further pollution abatement, research and administration. They could also enable other taxes to be lowered.

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 managements. The taxes have not generally been set high enough to influence the behaviour of polluters.

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

Firstly, it is difficult to assess the optimal rate at which the tax should be applied in order to meet national goals. 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 Sub-Group may help with information on this matter.

Secondly, 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.

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. Some countries 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 is therefore needed of the short and long run environmental and economic impacts of any such measures.

5.4 Subsidies

The use of subsidies to limit or reduce greenhouse gas emissions by developing countries is subsumed to the issue of financing mechanisms which is discussed in a separate topic paper (see Appendix I). 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 deferral (e.g., accelerated depreciation), tax credits etc.

Because of the evident external benefits of technology development to the public, subsidies could be used to encourage the development and greater use of technologies and products, which are environmentally sound, particularly, in the absence of agreement of co-ordinated adoption of other measures.

Issues associated with the use of subsidies include information requirements and the selection of specified areas which are similar to those that are relevant to taxes. Other issues raised concerning subsidies include:

- they can be expensive;
- more importantly, 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 CO₂ 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 objectives 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), their removal may have considerable social cost and should not be considered without very careful investigation.

5.5. 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 delegates expressed considerable reservations about applying this measure to other greenhouse gases (other than CFCs and halons), for which the situation would be much more complex. In particular, there are many diverse sources of these other greenhouse gases which could be difficult to monitor. Moreover, some delegates expressed concern that the sanctions could appear arbitrary since it could be difficult to determine accurately whether their emissions exceeded internationally agreed levels. This could create confusion and resentment as to why they were subject to the sanctions. Some delegations objected to the concept of sanctions, which could risk to be used as a pretext to impose new non-tariff barriers on the exports by developing countries.

6.0 Conclusions

The following are the significant conclusions of the country contributions and the subsequent discussions at the meeting:

1. Some economic instruments may 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 that is appropriate will depend to a great extent on the context in which it is to be applied, in particular the economies 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 operation of the new environmentally adjusted market forces;
3. Possible economic instruments that may be relevant include: a system of tradeable emission permits; emission charges; 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 in the first step;
4. A number of countries at the meeting expressed major concerns about the use of tradeable emission permits or of sanctions. While it was agreed that studies should be continued on these instruments, such countries requested that their major misgivings should be taken into consideration;
5. The instruments considered in this topic paper raise a number of complex practical problems, which need further study. In particular they should be investigated in respect of the criteria outlined in section 4 of this paper. These investigations should draw on the output of the IPCC Sub-groups, studies being carried out by international organization and by national governments. It is evident that further work is required regarding the implications of economic instruments for developing countries.

THIS MATERIAL WAS NOT DISCUSSED BY RSWG BUT IS DRAWN TO THE ATTENTION OF RSWG SUBGROUP CHAIRMEN FOR INVESTIGATION IN THE IDENTIFICATION OF SECTORAL RESPONSE MECHANISMS. THE MATERIAL WAS SUBMITTED BY THE ENVIRONMENT DIRECTORATE OF OECD.

APPENDIX I: SECTOR BY SECTOR ANALYSIS OF THE APPLICABILITY OF ECONOMIC INSTRUMENTS

This appendix contains a brief sector by sector analysis of the applicability of the economic instruments explained in the body of the report. It covers both prevention and adaption and is based on information forwarded to New Zealand by the Environment Directorate, OECD.

PART ONE: PREVENTION

AGRICULTURE

Three target areas in the prevention of emission of greenhouse gases are rice production; animal wastes; and, agricultural fertilisers and pesticides.

Rice production is probably one of the most difficult areas to address because of the importance of rice as a staple in many of the less-developed countries. Possibilities include the removal of rice subsidies to reduce rice production and a system of tradeable permits. The matter requires particularly sensitive handling.

Economic instruments have been experimented with in the control of animal wastes in some OECD countries. For example a "surplus manure" charge was introduced in the Netherlands in 1987. It may be appropriate to extend this approach, particularly in the developed countries.

Charges have also been used in the past to control the release of nitrous oxides from fertilizers. Revenue from charges (or the removal of subsidies) could be used to promote better management of chemicals. A permit trading system may also be applicable here.

DEFORESTATION

A charges approach to controlling deforestation would probably be vigorously resisted by less developed countries (where most deforestation takes place). Removal of subsidies (where they exist) may go some way in slowing the rate of deforestation however.

Another option is a system of tradeable "clearcutting rights". Debt-for-nature swaps should also be investigated further.

Economic instruments can also be targeted at reforestation as a means of reducing the impact of deforestation. Issuing emission credits where reforestation is taking place is one option worth considering further.

INDUSTRY

Two major elements of the industrial contribution to the climate change problem are the production and consumption of halocarbons and the management of landfill sites.

The halocarbon production industry is characterised by the existence of many different pollutants. In some cases the environment will not be able to stand the ecological loads imposed by halocarbons at any emission levels and only a total ban would be appropriate. In other cases a system of tradeable emission permits or the imposition of charges may be useful.

Methane emissions could be limited by improving the management of landfill sites and reducing the waste stream. It may be appropriate for governments to support the production and sale of methane gas from landfill sites. A packaging tax could be used to limit the amount of material going into landfill.

ENERGY

There are three key elements to the energy emission problem: transportation, residential and industrial consumption and industrial production.

Transportation is a major contributor to the greenhouse effect. There are many options available to control the emission of greenhouse gases from the transport sector. These include; increased fuel taxes, vehicle charges, or charges placed directly on transportation infrastructure. Note, however, that because of the low price elasticity of demand for transport, taxes and charges will need to be reasonably large if they are to have any significant impact. Any existing subsidies for transportation should be reviewed.

The imposition of extra charges on domestic and/or industrial consumption of products that emit greenhouse gases would help to reduce demand for these products. The removal of demand-enhancing subsidies should also be considered.

Industrial production is largely based on the use of energy derived from processes which produce greenhouse gases. The sheer number of producers and consumers involved coupled with the technical diversity of modern production functions means that any system designed to limit greenhouse gases will be very complex. A charges approach (perhaps based on the carbon content of emissions) and the system of transferrable permits are of some potential.

PART II: ADAPTION

SEA LEVEL RISE

The two traditional responses to rising sea levels are to improve

coastal defences and to induce people to move to higher ground. Historically, governments have responded with subsidies (e.g. for flood compensation or for the construction of dykes). It can be argued that this type of subsidy has led to the over development (in social terms) of flood prone land and that they should be removed. Where this is not possible (because of geographical, political or moral constraints) it may be possible to fund improved coastal defences from taxes levied on emissions.

AGRICULTURAL PRODUCTION

The agriculture sector is characterised by extensive subsidy systems (usually in the form of price supports). Price support of agricultural products can inhibit producer adjustment to climate change by masking the incentives to change to products more appropriate to the different climatic conditions. An obvious policy response is to remove price supports and use the funds saved to promote research into 'climatically resistant' food products. Removal of trade barriers in the agricultural sector would also help to minimise global disruption in food supply caused by climate change.

FORESTRY

As with the agricultural sector, policies that inhibit response to changing climate (such as price support) should be re-examined with a view to removal. While it may be important to encourage forestry (as a sink for greenhouse gases this should be done in a way that does not inhibit the forestry sector to respond to the changing climate. To this extent, rewarding reforestation with emission credits is attractive.

WATER MANAGEMENT

Apart from flooding (discussed under the heading of Sea Level Rise) the main issues here are drought and water quality.

Economic instruments are well suited to encouraging water conservation in order to reduce the impacts of drought. In fact, charges have probably been more often applied to water management than to any other sector. A tradeable permit system (giving holders the right to consume or use specific quantities of water) might also be appropriate.

Water quality problems also lend themselves to emission trading systems. Here the focus is on the assimilative capacity of the receiving water rather than on the emissions into the water.

Finally, as with other sectors, existing subsidies should be reviewed to ensure that they are not creating an incentive to overuse water supply or assimilative capacity.

7. DISCLAIMERS

The disclaimer submitted by New Zealand is given below.

NEW ZEALAND DELEGATION COMMENTS

ON RSWG LEGAL MEASURES AND PROCESSES PAPER

(IPCC/WG3-II/DOC.2)

Mr Chairman,

As foreshadowed earlier in the week, my delegation has circulated an extract from a statement made in New York by the New Zealand Prime Minister on 2 October. It is the latter portion of that extract which speaks of the need for institutional reform that bears on the topic we are now discussing : the nature of the legal instrument or instruments that will be needed to deal with climate change.

You will have seen that what is proposed draws on the landmark Hague Declaration of March 11 of this year. My Prime Minister's statement contemplates the creation of a new institution, an Environmental Protection Council. That institution would not replace existing bodies such as UNEP, but it would have new functions making it the equivalent of a legislature. It would have responsibility for taking coordinated decisions. It would be empowered to take binding decisions.

Behind this proposal is a judgement that the greenhouse effect and the prospect of climate change constitute a problem qualitatively different from issues the international community has so far sought to address through the traditional means of creating new international law. The aggregate of atmospheric emissions has a global impact. It is not an isolated, accidental or deliberate act. Its causes are several and the solution called for will require complex and delicate negotiations.

The question we all need to consider is what is the best means of putting into place universally accepted and binding rules to deal with a complex and evolving situation. Any legal instrument adopted by the international community for this purpose will, of necessity, have a framework character. We don't yet know the full scope of the problem and we haven't had the negotiations needed to provide the solutions.

If that is accepted, as it appears to be, how do you fill in the framework? One method - the traditional and well-known one - is to create the specific rules and obligations through the negotiation and adoption and, subsequently, signature and ratification, by individual States of a series of individual protocols to the framework convention. The model is the Vienna Convention for the Protection of the Ozone Layer, followed by the Montreal Protocol. New Zealand, like many other countries, would like to see the Protocol strengthened and accepted by all and I would not wish to be misunderstood on that point.

On the other hand, it has, I think, to be acknowledged that this traditional incremental process, particularly if applied to a large and multifaceted issue, can be slow and inflexible and it stands to be rendered ineffective if individual countries or groups of countries stand aside from protocols that are negotiated and adopted.

The other method of filling in the framework would be to give an international institution the power to produce the necessary specific rules and obligations and to oversee their application. The international community has in the past been reluctant to give international institutions this sort of authority. The United Nations Security Council, acting under Chapter 7 of the UN Charter, has such authority but only in relation to situations involving international peace and security. But we are dealing here with a situation that in a very real sense threatens the security of all and even, in the worst case, as my colleague from Vanuatu pointed out on Monday, threatens the very existence of small low-lying island States. Ought we not to be prepared to look at an innovative institutional solution of this kind?

In asking that question, we are well aware that the creation of an international institution with legislative powers would itself require the most careful consideration and negotiation. Representation on the institution would be of critical importance. So would its method of taking decisions. So, too, would the definition of the areas within which the institution would have power to take binding decisions. And, as envisaged by the Hague Declaration, judicial controls could well be needed, especially in relation to securing compliance with binding decisions.

Neither path - law-making through traditional means or through institutional innovation - is an easy one. We would like to see this Working Group look hard at the merits of the institutional solution.

REFERENCES

1. Report of the Second Session of the Steering Committee of IPCC Working Group III/Response Strategies Working Group, Geneva, 10-12 May 1989. IPCC Secretariat, WMO.
2. Report of the First Session of the IPCC Bureau, IPCC-2, Geneva, 6-7 February 1989. IPCC Secretariat, WMO.

8. CHAIRMAN'S CONCLUDING REMARKS

"Much has been achieved in one week, although agreement was not reached on those elements that would form a framework climate convention. We have outlined a number of elements of a convention and identified areas where negotiations will be required to reach agreement.

A great deal more consensus has been reached on the issues of financial measures, economic measures, public education, and technology transfer measures. The papers on these topics should greatly assist the efforts of the RSWG subgroups and the other Working Groups.

The documents produced at this meeting are living documents. They will be held open until January 1, 1990 for further comments, and we will try to simplify the routing system. Any comments should be sent to the IPCC Secretariat for distribution to the topic coordinators and the Chairman and vice-chairmen. Please bear in mind that the topic coordinators must receive all comments by January 1st. The topic coordinators should close submittals on that date in order to prepare for the February meeting. I urge all the sub-groups to make full use of these topic papers and include in your deliberations the elements recommended for implementation strategies. The final RSWG report should contain fairly detailed plans for the implementation of the key agreed measures.

I plan to meet with the topic coordinators, vice-chairmen and sub-group chairmen informally at the time of the February IPCC Plenary. The purpose of our meeting will be to review comments received on the five topic papers and determine if there are any significant changes that need to be circulated to all countries.

The target completion date for the draft sub-group reports is April 30, 1990. This is one month before the RSWG Plenary meeting, which is scheduled for late May or early June.* Space has been reserved for this meeting in Geneva, although there are other possible venues. At this meeting, we will review the RSWG report and approve it for transmittal to the IPCC drafting committee.

As I mentioned at the opening of this workshop, I urge all nations participating in RSWG to undertake detailed analyses of their future greenhouse gas emissions and to provide data on their country scenarios to the Energy and Industry Subgroup, including as much information on costs as possible. It is entirely appropriate that the Agriculture, Forestry, and Other Subgroup should also be involved in such country-specific studies. We have not

had time to discuss this matter in detail at this workshop, but I hope we can do so at the February IPCC Plenary meeting.

I would like to conclude with special thanks to Professor Obussi, Dr. Tolba, and Dr. Sundararaman, who have made it possible for us to hold this workshop, and to the able and dedicated members of the IPCC Secretariat staff whose support has enabled us to accomplish so much at this meeting. I also thank the topic coordinators for their hard work both before and throughout this meeting to accurately reflect and summarize the views expressed. Finally, I thank all of you who participated in this meeting for your contributions throughout the week. This meeting is now adjourned."

*The date has since been fixed for June 5-8

RESPONSE STRATEGIES WORKING GROUP (IPCC WG III) MEETING
GENEVA, 2-6 OCTOBER 1989

List of participants

ARGENTINA	V. Berdou	Principal delegate
AUSTRALIA	J. Tilley D.R. Buchler J. Burgess P. Howarth P.T.B. Kohona	Principal delegate
AUSTRIA	W. Kempel H. Hojesky	Principal delegate
BANGLADESH	A. Mahtabuddin	
BRAZIL	E. Cordeiro F. Meyer	Principal delegate
CANADA	E. Dowdeswell (Ms) J. Campbell D.K. Dawson R. Street R. Rochon B. Herman J. Côté	Principal delegate
CHINA, People's Republic of	Luo Jibin Wu Jihong (Ms) Xia Kunbao Li Haiqing Su Wei Xianhong Bai Xie Shaoxiong	Principal delegate
COSTA RICA	M. Campos	Principal delegate
DENMARK	U. Torp P. Pouplier	Principal delegate
EGYPT	A.A. Ibrahim	Principal delegate
FINLAND	S. Nurmi J. Ojala M. Pietarinen	Principal delegate

FRANCE	J. Ripert J.-C. Oppeneau O. Herz D. Borione (Ms) P. Vagogne B. Le Fraper (Ms) P. Maugain (Ms) H. Ladsous P. Pissaloux J. De Peretti	Principal delegate
GERMAN DEMOCRATIC REPUBLIC	R. Fretter	Principal delegate
GERMANY, Federal Republic of	D. Kupfer S. Comes W. Koehler J. Rosenberg J. Wolke	Principal delegate
INDIA	K.M. Sarma	Principal delegate
INDONESIA	A. Sugandhy ... Karjoto T. Sutrisno	Principal delegate
ITALY	M. Conte	Principal delegate
JAPAN	K. Haraguchi Y. Kaya K. Yokobori T. Takahashi J. Okumura M. Ohmura K. Sato T. Hoshino H. Ogata O. Kobayashi S. Tomonari	Principal delegate
MALAYSIA	Y.C. Ho	
MALDIVES	A. Majeed	Principal delegate
MALTA	H. Taylor-East	Principal delegate

MAURITIUS	R. Vaghjee	Principal delegate
MEXICO	D.L. Ponce (Ms)	Principal delegate
NETHERLANDS	P. Vellinga D. Pietermaat H. van der Kooi R. Hermans G.J.R. Wolters	Principal delegate
NEW ZEALAND	C.D. Beeby J. Gilbert D. Wratt B. Forde P. Rider	Principal delegate
NIGER	A. Angoua	Principal delegate
NIGERIA	J.A. Adejokun M.K. Musti	Principal delegate
NORWAY	J. Thompson S. Aass P.M. Bakken J. Leiro G. Mathisen H. Toresen	Principal delegate
POLAND	S. Reichhart	
PORTUGAL	E. Aquiles de Oliveira	Principal delegate
SAUDI ARABIA	A.R. Al Shahri M.A. Al-Deghaither	Principal delegate
SENEGAL	M. Seck	Principal delegate
SPAIN	A. Pou J.A. Lopez L. Balairon	Principal delegate
SWEDEN	S. Bodin T. Palme G. Persson	Principal delegate
SWITZERLAND	P. Morand Francis (Ms) W. Schmid	Principal delegate

USSR

S.S. Khodkin
Y. Vakalyuk
S. Stepanov
B. Smirnov

UNITED KINGDOM

D.J. Fisk
A. Apling
R. Beetham
J.C.D. Fisher
M. Lowcock
P.D. Ward
S. Mann (Ms)
P. Szell

Principal delegate

UNITED REPUBLIC
OF TANZANIA

S.B. Salula

Principal delegate

USA

F.A. Bernthal
W.A. Nitze
J. Easton
T. Davies
J.R. Spradley
N. Maynard (Ms)
A. Dunn
J. Clarke
R. Reinstein
A. Hecht
I. Goklany
J. Cohrssen
F. Li (Ms)
G. Evans
F. Levine
R. Morgenstern
M. Rees
P. Koshel
N. Coar

Principal delegate
Alternate
Alternate
Alternate
Alternate
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor
Advisor

USA

Support delegation

C. Ruebensaal
S. Biniaz (Ms)
C. Dawson (Ms)
L. Butcher
E. Williams
D. Dwyer (Ms)
S. Hajost
S. Kinney (Ms)
D. Tirpak
W. Sugg
J. Schefter
C. Moore
B.R. McBee
J.R. Wells (Ms)
S. Tindel
J.K. Atchley

USA (continued)	N. Styles D. Johnsen A.W. Patterson (Ms)	
VANUATU	E. Bani	
ZIMBABWE	R.P. Karimanzira (Ms)	Principal delegate
MARSHALL ISLANDS	W. Kendall M.G. Coerper	Principal delegate
TONGA	Tukia Taniela	Principal delegate

OBSERVERS

HONG KONG	K.H. Yeung
E.C.E.	B. Cohen L. D'Andrea F. Romig
Commission of the European Communities (EEC)	J. Henningsen B. Delogu
F.A.O.	D. Norse
International Atomic Energy Agency (IAEA)	W.D. Guthrie M.S. Opelz F. Niehaus
International Energy Agency (IEA)	F. Neumann J. Ferriter C. Sayser (Ms)
OECD	P. Stolpmann
United Nations Development Programme (UNDP)	L. Hyttinen
United Nations Environment Programme (UNEP)	W.V. Kennedy C.M. Schlosser T. Tukia I. Rummel-Bulska

R. Weibel	Centre for Applied Studies in International Negotiations (CASIN)
E. Thorndike (Ms)	Center for Environmental Information
T.J. Scott	Center for Policy Negotiation
W. Nolan	Edison Electric Institute
J.T.B. Tripp	Environmental Defense Fund
S. Boyle	European Federation of Energy Management Associations
V.R. Stevens	Global Climate Coalition
P. Hohnen	Greenpeace International
A. Kerr	
R. Stevens	International Chamber of Commerce (ICC)
J. Lemlin	International Petroleum Industry
F. Rijkels	Environmental Conservation Association (IPIECA)
D. Pearlman	Leadership Council for Effective Climate Policies
D. Lashoff	Natural Resources Defense Council
A. Markham	World Wide Fund for Nature (WWF-International)
M. Yung (Ms)	
T. Robertson (Ms)	
A.S. Miller	University of Maryland Center of Global Change
K. Ramakrishna	Woods Hole Research Center
F. Rajotte (Ms)	World Council of Churches
R. Pomeroy	World Resources Institute

IPCC_SECRETARIAT

N. Sundararaman
S. Tewungwa

Agenda for RSWG Workshop, Oct. 2-6
Geneva, Salle 16, Palais des Nations

Monday
October 2

8:30 A.M.	Registration Opens at Palais des Nations, Salle 16, 5th floor Porte Door 6, Use Old Palais Entrance.
10:00 A.M.	Meeting of Topic Coordinators with Chairman Bernthal (Room X, 3rd Floor)
12:00 Noon	LUNCH (Palais has cafeteria with plates from 5-12 SFR and Delegates Dining Room with plates from 21-29 SFR)
2:00 P.M.	RSWG Plenary Opening Remarks Approval of schedule and agenda Brief Reports from Working Group III Subgroups Brief reports from Topic Coordinators
6:00 P.M.	RECEPTION for delegates hosted by the Honorable Morris B. Abrams, Permanent Representative of the United States to the European Office of the United Nations and other International Organizations, Geneva, Reception Hall, United States Mission, 11 Route de Pregny, Geneva. (Delegation invitations are being delivered to appropriate Missions in Geneva.)

Tuesday
October 3

9:00 A.M.	Public Education and Information Measures Topic Coordinators: U.S. and China Committee of the Whole discussion and report
10:10 A.M.	COFFEE BREAK
11:00 A.M.	Discussion Resumes
12:30 P.M.	LUNCH
2:00 P.M.	Technology Transfer and Development Measures Topic Coordinators: Japan and India Committee of the Whole Discussion and Report
3:30 P.M.	COFFEE BREAK
4:00 P.M.	Discussion Resumes
6:00 P.M.	Session Ends

Wednesday
October 4

9:00 A.M. Economic (Market) Measures
Topic Coordinators: Australia
and New Zealand
Committee of the Whole discussion
and report
10:30 A.M. COFFEE BREAK
11:00 A.M. Discussion Resumes
12:30 P.M. LUNCH
2:00 P.M. Financial Measures
Topic Coordinators: France,
Netherlands, Egypt
Committee of the Whole discussion
and report
3:30 P.M. COFFEE BREAK
4:00 P.M. Discussion Resumes
6:00 P.M. Session Ends

Thursday
October 5

9:30 A.M. RSWG Plenary Session: Progress
Review
10:30 A.M. COFFEE BREAK
11:00 A.M. Legal Measures
Topic Coordinators: U.K., Malta
Canada
Committee of the Whole discussion
and report
12:30 P.M. LUNCH
2:00 P.M. Session Continues
3:30 P.M. COFFEE BREAK
4:00 P.M. Discussion resumes
6:00 p.m. Session Ends

Friday
October 6

9:30 A.M. REVIEW and REPORT of SESSION
ADOPTION OF REPORT
11:30 a.m. BREAK FOR COFFEE/LUNCH
2:00 p.m.. SUMMARY
Next Steps/Concluding Remarks

REPORT OF THE FIRST SESSION OF THE IPOC
SPECIAL COMMITTEE ON THE PARTICIPATION OF THE DEVELOPING COUNTRIES

1. OPENING OF THE SESSION (AGENDA ITEM 1)

1.1 Mr Jean Ripert, the Chairman of the IPOC Special Committee on the Participation of the Developing Countries, opened the session at 10.00 hours on Thursday, 28 September 1989, at the French Ministry of Foreign Affairs building at 37 Quai d'Orsay.

1.1.1 The list of participants is to be found in Annex 1.

1.2. Chairman's welcoming remarks

1.2.1 In his opening remarks, Mr Ripert briefly described the IPOC decision to set up the Committee. The establishment and the composition of the Committee reflected the need for dialogue between the developed and the developing worlds.

1.2.2 The basis of the discussions during the session was the report of the Ad-Hoc Sub-Group on Ways and Means to Increase the Participation by the Developing Countries in IPOC Activities. The Sub-Group was established by the IPOC Bureau and submitted its report to the Second Session of IPOC (Nairobi, 28-30 June 1989). The Panel had endorsed the recommendations of the report. (see reference)

1.2.3 Some of the issues could prove sensitive; the Chairman pleaded for a practical, constructive and concrete approach to the matters of concern to the Committee.

1.2.4 The concern shown by the developing countries on the climate change issue is already very significant. Mr Ripert cited the example of the Declaration of the Non-Aligned Movement (Belgrade, 1989) which stressed the need for necessary and timely action to deal with climate change and calls for preparation and adoption of an international convention on protection and conservation of the global climate on an urgent basis.

1.3 Remarks by Dr A. Al-Gain, IPOC Vice-Chairman

1.3.1 Dr A. Al-Gain, the Vice-Chairman of IPOC and the Chairman of the Ad-Hoc Sub-Group said that while the Sub-Group was composed of the developing countries only, the Special Committee had Members from the developed world also; therefore it

1.3.2 While there may be adequate awareness of the issue of climate change among the political leaders of the industrialized countries, there is a case for greater awareness in some developing countries. Part of the problem lies in the perception of, and the consequent priority accorded to, environmental issues in the developing countries; to them, oftentimes, economic development is the preoccupying issue.

1.3.3 Assistance to developing countries can no longer be viewed as a charity but is a responsibility. While the industrialized countries are the main producers of greenhouse gas emissions and have the resources to ameliorate the adverse effects, a grave situation could develop if this attitude is carried too far inasmuch as the developing countries now produce about a quarter of the total greenhouse gas emissions and have the potential to produce more. The problem lends itself to a new search for global solutions.

1.4. Remarks by the representative of WMO

1.4.1 Dr G. Necco, representing the Secretary-General of WMO, stated that the WMO role is to provide the authoritative scientific information and advice on the state of the atmosphere and changes occurring therein. He said that the Organization is emphasizing the importance of short and long-term activities with regard to information transfer on the issue of climate change.

1.5. Remarks by the representative of UNEP

1.5.1 Mr Yusuf Ahmad, representing the Executive Director of UNEP, stated that UNEP would like the Committee to pay particular attention to short and medium-term measures with regard to promoting the participation of the developing countries; no time should be lost. There is also a need to address the financial needs of the developing countries in this respect if national programmes on climate were to be implemented at an early date.

1.6 Approval of the agenda

1.6.1 The Chairman reminded the Committee that the agenda could be amended at any time during the session. The agenda, which was approved, is attached as Annex II.

1.7 Programme of work of the session

1.7.1 The Committee decided to arrive at decisions by consensus.

2. Terms of reference (agenda item 2)

2.1. After discussion, the Committee approved its terms of reference:

TERMS OF REFERENCE OF THE IPOC SPECIAL COMMITTEE
ON THE PARTICIPATION OF THE DEVELOPING COUNTRIES

1. The Committee will recommend to IPOC and its Bureau, specific measures to be undertaken for promoting the full participation of the developing countries in all IPOC activities.
2. It will include in such recommendation institutional arrangement(s) and implementation schedule, if and as needed.
3. It will develop action plans for the implementation of its recommendations.
4. It will identify the resource requirements and the means of meeting them to accomplish the task outlined in (1) above.
5. It will periodically review the progress of the implementation of its recommendations and make modifications thereof, as appropriate.
6. It will work closely with IPOC Working Groups.
7. It will continue its work until its dissolution by IPOC.

3. The report of the Ad-Hoc Sub-Group (agenda item 3)

3.1 The report (see reference) was introduced by Dr Al-Sain.

3.2 The burden of the Sub-Group Report was that actions need to be planned on two time-scales.

- a) In the short-term (18-24 months), a three-fold approach was recommended consisting of:
 - efforts to support the travel of invited experts to the meetings of the IPOC Working Groups and their Sub-Groups;
 - "crash seminars" for opinion leaders in the developing countries on topics related to climate change;
 - establishment of national climate change centres to

- b) In the medium to long-term (2 to 10 years), definition and implementation of programmes that will enable the developing countries to establish and/or improve their national expert capability to integrate the underlying science of, predictions of, impacts of, and response measures to, climate change, were recommended. This would contain the twin components of technology transfer and knowledge transfer.

4. Travel support of experts. Public education and information.
Short-term (1-2 years) measures. (agenda items 4,5 and 6)

4.1 The Committee decided to consider agenda items 4,5 and 6 together as they were all related.

4.2 Dr N. Sundararaman, IPOC Secretary, in his introduction of the relevant documents for the Committee's consideration, identified three areas of concern with respect to travel support:

- a) The status of the 1989 budget of IPOC. The available and pledged contributions are not adequate to meet all the needs. (See Annex III for list of contributions.) The situation may become more acute if more meetings are planned by the Working Groups/Sub-Groups in 1989. Also, there may be a cash shortage in the beginning of 1990 with three meetings scheduled for February (see Annex IV for a list of IPOC meetings);
- b) Identification of experts in various disciplines related to IPOC work;
- c) Establishing effective means of communication with the experts.

4.3 The Committee, while noting that indications had been given of the intentions of a number of countries to renew and to increase their contributions to the IPOC for 1990, agreed with the assessment of the IPOC Secretariat on 4.2(a) above, expressed its concern and made an urgent appeal to those in a position to contribute the maximum to increase or initiate contributions for 1990 and to provide the funds early in 1990.

4.4 While endorsing the specific steps taken by the IPOC Secretariat on 4.2(b) and 4.2(c) above (see Annex V for a description), the Committee recommended that communication with regard to the selection of, and contact with, the experts be copied to relevant focal or contact points designated by Member States.

4.5 The attention of the Committee was drawn to the intergovernmental nature of IPCC and the need therefore for its Members and the Secretariat to adhere to the customary UN practice of communication in respect of IPCC activities, especially with regard to documentation and convening of meetings. The Committee felt that this was necessary to ensure adequate participation and governmental involvement in IPCC activities.

4.6 The Committee recommended the establishment of a mechanism, at the national level, to coordinate the numerous aspects of the climate change issue. This step would assist the integration and assimilation of available information on climate change and facilitate a concerted action of all parties concerned at the national level. It would further assist the identification of resource requirements to cope with such change. (An example of such a mechanism is an interministerial or inter-agency national climate committee. Several members have already established or are establishing such committees.)

4.7 The Committee agreed with the Chairman's proposal that the two Executive heads, with consultation as appropriate with the Chairman of IPCC, write jointly to governments urging the formation of national coordinating mechanisms on climate change and the designation of focal/contact points for communication purposes.

4.8 The Committee discussed information exchange seminars for opinion-makers in the developing countries. The Committee strongly endorsed the principle. The following points emerged in the course of the discussion:

- a) the seminars should be tailored to the needs of a region or a country (e.g., language needs);
- b) the audience should be carefully targeted; such could include scientists, high-ranking officials, business leaders, the media;
- c) all relevant aspects of the greenhouse warming issue, viz., the scientific basis, the likely impacts and possible actions to mitigate, or adapt to, the warming, should be presented in an integrated manner;
- d) the seminars should be designed and implemented in the short-term, almost on a crash basis, in an IPCC seminar series.

4.9 The representatives of WMO and UNEP jointly submitted a proposal for three such seminars. The proposal is attached as Annex VI. The Committee expressed the wish to see similar initiatives taken by other organizations, including bilateral and agencies.

4.10 In a related measure, the Committee felt that the ready availability of the reports of the IPCC Working Groups to the developing countries in various languages (the 6 UN languages, for example) would go a long way in alleviating the lack of scientific/technical/expert information on climate warming. In this context, the Committee recognized the need for the developing countries to be in a position to make substantive examinations of the preliminary reports produced by IPCC.

4.11 The Committee was concerned with the availability of sufficient staffing in the IPCC Secretariat to deal with the issues mentioned above and with the implementation of its recommendations. It calls on the Bureau of IPCC as well as the heads of UNEP and WMO to give urgent consideration to this recommendation.

5. Medium to long-term (2-10 years) measures (agenda item 7)

5.1 The Committee, basing itself upon the recommendations of the report of the Ad-hoc Sub-group (see Annex III of reference), agreed that the prime requisite in the medium to long-term revolves around informed manpower in the developing countries. Thus, manpower development and the supply of analytical tools should be targeted for special attention. In this regard, the process of transfer of technology, through appropriate funding mechanisms, for complying with the provisions of the Montreal Protocol, should be speeded up considerably. This is important in itself, but may also serve to provide valuable experience for similar transfers of technology, to address climate change.

5.2 The Committee recommended the following priority areas for consideration by IPCC, WMO, UNEP and other relevant international/national organizations.

a. Training of experts. A substantial programme of training scientists and other experts should be undertaken. Examples of areas of emphasis would be construction and use of numerical models (including writing of software), analysis of climate and other (e.g. sea level) data, measurements of greenhouse gases, laboratory techniques etc. The programme should include a long-term component of exchange of visits of experts from the developing countries to centres of training in the developed countries and visits of scientists/professors from the latter to the former. It would be beneficial if such visits can last as long as a year or more as needed. A practical way of achieving this is to target a number of institutions/individuals in both the developed and developing countries who would participate in the process.

b. Involvement of local scientists in the development and use of prediction and impact models. This would be in the area of data collection and assimilation, model construction and interpretation of the results. 5.2 (a) and (b) would require long-term commitment to fellowships and incentives to scientists from the industrialized countries to work in scientific institutions in developing countries.

c. Facilitation of acquisition of hardware including micro and mini-computers, laboratory analytical tools, etc. Existing programmes such as the CLICOM of WMO and other technical cooperation programmes should be strengthened in this regard.

d. Strengthening of existing regional centres such as the WMO Regional Meteorological Training Centres. Such strengthening should include consideration of all climate-change-related issues, in, as needed, cooperation with other relevant organizations.

e. General education. Material should be made available to the appropriate authorities at the national level that would help curriculum development and teacher training in climate-oriented courses.

5.3 The Committee recommended that developing countries be invited to identify their specific needs for assistance in all of the areas mentioned in para. 5.2. Such information would help identify overall resource requirements.

5.4 Another concrete step that is recommended to WMO is the increased use of the Global Telecommunication System (GTS) for exchange of information such as indices of drought.

5.5 Every government is encouraged to incorporate environmental considerations in general, and climate warming considerations in particular, in its plans for sustainable development.

6. Other business, date and place of next session, adoption of the report of the Session, closure of the Session (agenda items, 8, 9, 10 and 11)

6.1 The Committee agreed to meet in its Second Session on Friday, 2 February 1990, in Washington, D.C., USA, at the kind invitation of the Government of the United States of America, with a possible half-day session on 3 February 1990, if needed.

6.2 When adopting the Report of the Session, the Committee authorized the Chairman to approve the final draft before its distribution.

6.3 This First Session of the Committee came to a close at 17.40 hours on Friday, 29 September, 1989.

Reference: IPCC-3 - The Report of the Second Session of IPCC, Nairobi, Kenya, 28-30 June 1989.

LIST OF PARTICIPANTS -

SPECIAL COMMITTEE ON THE PARTICIPATION OF THE DEVELOPING COUNTRIES

Brazil

A. CAMARGO

Chef Adjoint du Service Politique

Ambassade du Brésil

34 Cours Albert Premier

75008 Paris

France

Tel: 4225 9250

E. CORDEIRO

Chef Adjoint de la Division des Affaires

Humanitaires et d'Environnement

Ministère des Relations Extérieures

Brazil

Fax: 005 561

Tel: 211 6873

France

A. RIPERT

Chargé de mission auprès du Ministre d'Etat

Ministère des Affaires Etrangères

37 Quai d'Orsay

75007 Paris

France

Fax: 4753 4476

Tel: 4753 5136

S. ANTOINE

Directeur de la Mission Environnement-

Developpement

Secrétariat d'Etat à l'Environnement

Fax: 4745 0474

Tel: 4753 1212

J.-C. OPPENEAU

Chef du Service de la Recherche, des Etudes

et du Traitement de l'Information

sur l'Environnement

Secrétariat d'Etat à l'Environnement

Fax: 4745 0474

Tel: 4747 6619

M. ROCHAS

Direction de la Meteorologie Nationale

2 Avenue Rapp

75007 Paris

Tel: 4556 7276

* The delegate from Algeria was unable to attend due to illness.

D. BORICNE (Mlle)
Cellule Environnement à la Direction
des Affaires Economiques et Financieres
Ministere des Affaires Etrangeres
37 Quai d'Orsay
75007 Paris
France

TELEX: 4753 4470

TEL: 4753 5130

B. LE FRAPER
Service des Nations Unies et des
Organisations Internationales
Ministere des Affaires Etrangeres
37 Quai d'Orsay
75007 Paris
France

TEL: 4753 4661

M. PALAT
Adjoint au Directeur
Direction de la Cooperation Scientifique,
Technique et du Developpement
Ministere des Affaires Etrangeres
34 Rue La Perouse
75775 Paris Cedex 16
France

INDIA

A. VAISH
Director (IC)
Ministry of Environment and Forests
Government of India
CGO Complex
Lodi Road
New Delhi 110012
India

TEL: 91 11 361 640

INDONESIA

A. SUGANDJY
Assistant Minister for Population
and Environment
Division of Natural Resources Management
Ministry of Population and Environment
Jalar Merdeka Baratis
Jakarta Pusat
INDONESIA

TEL: 374 307

I. MUDJAJADI
Indonesian Embassy in Paris
47-49 rue Contambert
75116 Paris
France

TEL: 4503 0760

JAPAN

Y. KIMURA
First Secretary
Permanent Delegation of Japan to the OSLO
7 Avenue Hoche
75008 Paris
France
Tel: 4624 7890
(Ex. 321)

KENYA

J. Kagia Njihia
Deputy Director
Meteorological Services
Ministry of Transport and Communications
Kenya Meteorological Department
P.O. Box 30259
Nairobi
Kenya
Tel: 867 850
Tlx: 2228

NORWAY

S. AASS
Department North/South
Ministry of Foreign Affairs
7 Juni-Plassen
Oslo - Dep
1 OSLO 1
Norway
Tel: 472 343 800

J. METRO
Ministry of Environment
Oslo - Dep
0030 Oslo 1
Norway
Tel: 472 349 090
Fax: 472 349 561

SAUDI ARABIA

A. ALGAIN
President
Meteorology or Environmental
Protection Administration (MEPA)
P.O. Box 1358
Jeddah 21431
Saudi Arabia
Tel: 966(2)651 2312

USA

S. SMITH KINNEY (Ms)
Office of Global Change
US Department of State
OES/EOC, Room 4325
Washington, D.C. 20520
USA
Tel: (202) 647 3935
Fax: (202) 647 5947

K.P. REES (Ms)
Office of International Research
Development Policy
US Department of Energy, Rm. IE-218
Office of International Affairs IE-12
1000 Independence Avenue, S.W.
Washington, D.C. 20545
USA
Tel: (202) 586 5902
Fax: (202) 586 1180

USSR

S.S. KHODKIN
Department of International Cooperation
USSR State Committee for Hydrometeorology
12 Pavlik Morozov Street
123376 Moscow
USSR
Tel: 3673

UNEP

A. YUSUF
Senior Advisor to the Executive Director
UNEP
P.O. Box 47074
Nairobi
Kenya
Tel: 333 930

WMO

G.V. NECCO
Director
Education and Training Department
World Meteorological Organization
41 Avenue Giuseppe Motta
Case postale No. 2300
CH-1211 Geneva 2
Switzerland
Tel: (022) 730 8398
Fax: 4122 734 2316

IPCC

N. SUNDARARAMAN
IPCC Secretary
World Meteorological Organization
41 Avenue Giuseppe Motta
Case postale No. 2300
CH-1211 Geneva 2
Switzerland
Tel: 441 22 730 8235
Tlx: 23260 OMW CH
Fax: 441 22734 2326

AGENDA

1. OPENING OF THE SESSION
 - 1.1. Chairman's welcoming remarks
 - 1.2. Remarks by Dr Al-Gain, IPCC Vice-Chairman
 - 1.3. Remarks by the Representative of WHO
 - 1.4. Remarks by the Representative of UNEP
 - 1.5. Approval of the Agenda
 - 1.6. Programme of work of the Session
2. TERMS OF REFERENCE OF THE COMMITTEE
3. THE REPORT OF THE AD-HOC SUB-GROUP
4. TRAVEL SUPPORT OF EXPERTS
5. PUBLIC EDUCATION AND INFORMATION
6. SHORT-TERM (1-2 YEARS) MEASURES
7. MEDIUM TO LONG-TERM (2-10 YEARS) MEASURES
8. OTHER BUSINESS
9. DATE AND PLACE OF NEXT SESSION
10. ADOPTION OF THE REPORT OF THE SESSION
11. CLOSURE OF THE SESSION

TRAVEL SUPPORT OF INVITED EXPERTS TO MEETINGS(Submitted by Secretary, IPCC)

In addition to the shortage in funds, there are two major difficulties in providing travel support:

- a) Identification of experts in various disciplines related to IPCC work;
- b) Establishing means of communication so that the expert is aware of the possibility of support and can undertake the travel in time.

With respect to the identification needs, the following steps have been taken by the IPCC Secretariat, in addition to using the information available at the UNEP and WMO Secretariats:

- a) The Permanent Missions and/or the Principal IPCC Delegates of selected countries (selected using the criteria appearing in Annex IV of the reference) in Geneva have been contacted for lists of such experts. In specific instances, such as the Second Session of Working Group III, the need for specific discipline areas have been flagged;
- b) The Co-Chairmen/Lead Authors of the Sub-groups/Sections of the Working Groups have been contacted for nominations of experts in their respective disciplines;
- c) The Secretariat of the International Council of Scientific Unions (ICSU) has developed lists of experts. The IPCC Secretariat is working with the Executive Secretary of ICSU on the matter. The ICSU lists can be interrogated country-wise and discipline-wise. Similar co-operative efforts are being undertaken with the World Wide Fund for Nature (WWF) International;
- d) Lists of invited experts who would be supported for travel are sent periodically to the Co-Chairmen/Lead Authors. The experts are individually notified as early as possible;
- e) Travel support is automatically extended to Bureau Members, Co-Chairmen and Lead Authors from the developing countries.

There are two aspects to the problem of communication:

- a) Lack of precise contact information. Many experts do not have access to such facilities as telex. This necessitates long lead times for notices and responses, something that is difficult in the brisk work schedule of IPOC. This also works against quick consultations, if needed, especially if the expert is a Co-Chairman or Lead Author;
- b) Difficulty, oftentimes, of obtaining visas by the experts.

White House effect vs. greenhouse effect

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As the nation shivered through one of the coldest Decembers in North American history, White House advisers were seeking ways to cool down President Bush's exposure on global warming, without reneging on his rhetorical 1980 campaign flourish:

"Those who charge we are powerless to do anything about the 'greenhouse effect' are forgetting about the 'White House effect.' So far, the main 'White House effect' has been damage control, keeping environmental hotheads from signing the United States up to potentially disastrous international agreements, long before any scientific evidence even remotely supports them.

But that changed Friday. The State Department, under pressure from the White House, quietly filed with the Intergovernmental Panel on Climate Change (IPCC) the ultimate strategic weapon: an unassailable sound, but bold new market-based approach to the international regulation of greenhouse gases that should put the Bush administration back in charge of this debate.

While the purpose of this new approach is to avoid the kind of command-and-control environmentalism that has made the Clean Air Act such a costly and ineffective disaster, it also will slow down the ideological rush to put greenhouse policy way out ahead of real science, and hard evidence.

Most of all, it will drive the international environmental bureaucrats right up the wall, because it hugely undercuts their potential turf and power to meddle in domestic national affairs.

A Dec. 14 confidential memorandum by a brilliant environmental lawyer in the Justice Department, Assistant Attorney General Richard Stewart, supplied Mr. Bush with exactly the intellectual construct he needed to strike a blow for environmental sanity.

Mr. Stewart, one of the nation's leading environmental law theorists, has long been a supporter of the market-based "bubble and offset" approach to controlling pollutants.

Under that strategy, instead of setting discrete emission-reduction targets, pollutant by pollutant, company by company, total "bubble" targets are set for a region, letting all players use the trading process to find the best way to achieve them.

That's in stark contrast to the greenhouse approach promoted in the Netherlands last November (and supported by Environmental Protection Agency Administrator William Reilly and State Department departing greenie William Nitze) of signing up the United States to at least 13



separate, specific targets — on carbon dioxide, methane, agricultural practices, nitrous oxide, tropospheric ozone, forestation, etc., etc.

Instead, Mr. Stewart argued for the development of an overall performance goal or "global warming potential index," allowing nations to decide individually the best ways to meet it.

The major advantage of this approach, aside from efficiency, is that development of such an index will force the kind of comprehensive and detailed science that has so far been missing in the climate-change models with their deliberate preoccupation with carbon dioxide while ignoring all other variables:

Under Mr. Stewart's proposals, all aspects that either contribute to (sources) or reduce (sinks) global warming would be "scored" in setting an index both for the world and for each country — and each nation could then decide for itself which components to emphasize.

For example, some nations might find it easier to cut more carbon dioxide by substitution of non-fossil fuels, but be unable to do as well on methane. Other nations might be in an opposite situation, or have more

The upside of Mr. Stewart's approach is that it will finally force the kind of real science we need, either to make more sensible policy or to dismiss the problem.

"sink potential" from forestation or land-use change.

In addition, Mr. Stewart argues for a system of both intranational and international trading to allow nations to cooperate on mutually advantageous strategies. For example, the United States might be willing to pay Brazil for preserving the Amazon rain forests, and use those "sink credits" to allow more carbon-dioxide emissions from the United States.

The advantage of this approach is that while it introduces the efficiency of market mechanisms to a

world environmental problem, it does not dictate strategy to individual nations. That lessens the greatest danger of all: Anti-democratic central planning by unaccountable, power-hungry, global-greenie bureaucracies.

Those bureaucracies won't take this lying down. State's Mr. Nitze, who has routinely wounded the Bush administration with manipulative leaks, reportedly weighed in with a parting shot, damning the Stewart approach with the faintest possible praise, and with arguments sure to be played back by his IPCC colleagues.

Ironically, another potential threat to this comprehensive approach will come from multinational corporations both in the United States and in Europe, who see specific emissions targets as a way of inflicting competitive harm — Europeans against the United States, and both Europe and the United States against Japan and the Pacific Rim nations.

For example, Dupont and the United Kingdom's Imperial Chemical Industries have a direct stake in immediately phasing out CFCs, now that their Asian and Latin American competitors can make them cheaper,

while they, in turn, have a head start on producing more environmentally benign substitutes.

Such manipulation would become moot under an overall performance and trading strategy. Also moot are the five incredibly crude Global Circulation Models (GCMs), which can't even explain the last five decades let alone predict the next 100 years. They would be unacceptable in setting comprehensive indices called for in the Draft Framework Convention filed to the IPCC Friday.

Thus will the global greenies have to go back to the drawing board, and the climate modelers back to their computers. While this is a major victory for the "White House Effect" over the Reilly hothouse fervor, it still is too large a concession to the whole notion of global warming as a real problem. There has been no significant warming trend since 1890, either in the best land-based records (the United States) or the exhaustive ocean-based records recently published by the Massachusetts Institute of Technology. But the upside of Mr. Stewart's approach is that it will finally force the kind of real science we need, either to make more sensible policy or to dismiss the problem altogether.

Warren T. Brookes is a nationally syndicated economics columnist.

THE WHITE HOUSE
Office of the Press Secretary

For Immediate Release

February 5, 1990

REMARKS BY THE PRESIDENT
AT THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

Georgetown University
Washington, D.C.

10:20 A.M. EST

THE PRESIDENT: Thank you, Dr. Bolin, and thank you for all you're doing in leading this very important effort here. To Professor Obasi and Dr. Tolba, and all the delegates of the World Meteorological Organization, and the UNEP -- the United Nations Environment Program. Let me commend all of you for coming together to examine an issue of such great importance.

I also want to salute Bill Reilly, our able EPA Administrator. He will become the next Cabinet official in the U.S. government. I want to thank Assistant Secretary Bernthao for his leadership from the U.S. side of things. And also salute my able Science Advisor who is with us today, Dr. Bromley, who many of you know.

The recommendations that this distinguished organization makes can have a profound effect on the world's environmental and economic policy.

By being here today, I hope to underscore concern -- my country's and my own personal concern about your work, about environmental stewardship, and to reaffirm our commitment to finding responsible solutions. It's both an honor and a pleasure to be the first American President to speak to this organization, as its work takes shape.

You're called upon to deliver recommendations which strike a difficult and yet critical international bargain: a convergence between global environmental policy and global economic policy. A bargain where both perspectives benefit and neither is compromised.

As experts, you understand that economic growth and environmental integrity need not be contradictory priorities. One reinforces and complements the other. Each, a partner. Both are crucial.

A sound environment is the basis for the continuity and quality of human life and enterprise. Clearly, strong economies allow nations to fulfill the obligations of environmental stewardship. Where there is economic strength, such protection is possible. But where there is poverty, the competition for resources gets much tougher. Stewardship suffers.

For all of these reasons, I sincerely believe we must do everything in our power to promote global cooperation: for environmental protection and economic growth; for intelligent management of our natural resources and efficient use of our industrial capacity. And for sustainable and environmentally sensitive development -- around the world.

The United States is strongly committed to the I.P.C.C. process of international cooperation on global climate change. We consider it vital that the community of nations be drawn together in

MORE

an orderly, disciplined, rational way to review the history of our global environment, to assess the potential for future climate change and to develop effective programs.

The state of the science, the social and economic impacts, and the appropriate strategies all are crucial components to a global resolution. The stakes here are very high; the consequences, very significant.

The United States remains committed to aggressive and thoughtful action on environmental issues. Last week, in my State of the Union address, I spoke of stewardship, because I believe it's something we owe ourselves, our children and their children. So we are renewing the ethic of stewardship in our domestic programs; in our work to forge international agreements; in our assistance to developing and East bloc nations; and here, by chairing the Response Strategies Working Group.

I have just submitted a budget to our Congress for Fiscal 1991. It includes over \$2 billion in new spending to protect the environment. And underscoring our commitment to you efforts, I am pleased to note that funding for the U.S. Global Change Research Program will increase by nearly 60 percent, to over \$1 billion.

That commitment, by far the largest ever made by any nation, reflects our determination to improve our understanding of the science of climate change. We are working with our neighbors around the world to enhance global monitoring and data management, improve analysis, reduce the uncertainty of predictive models, and conduct regular reassessments of the state of science.

Our program allows NASA and her sister agencies and all our international partners to move forward with the "Mission to Planet Earth." That will initiate the U.S. Earth Observing System, in cooperation with Europe and Japan, to advance the state of knowledge about the planet we share.

Furthermore, even as we wait for the benefits of this research, the United States has already taken many steps in our country that bring both economic and environmental benefits. Steps that make sense on their own merits in terms of responsibility and efficiency, which help reduce emissions of CFC's and carbon dioxide and other pollutants now entering the atmosphere. Let me outline them very briefly:

We are pursuing new technology development that will increase the efficiency of our energy use and thus reduce total emissions.

We're crafting a revised Clean Air Act with incentives for our private sector to find creative, market-driven solutions to enhance air quality.

We've launched a major reforestation initiative to plant a billion trees a year on the private land across America.

And we're working out a comprehensive review and revision of our National Energy Strategy, with initiatives to increase energy efficiency and the use of renewable sources. These efforts, already underway, are the heart of a \$336 million Department of Energy program and are expected to produce energy savings through the year 2000 of over \$30 billion -- while achieving significant pollution reduction. Quite a return on investment.

We're also working, through diplomatic channels with our colleagues in other countries and through innovative measures like debt-for-nature swaps, to do more than simply reduce global deforestation. We hope to reverse it, turn it around -- not unilaterally, but by working with our international neighbors.

The economics of our response strategies to climate change are getting intensive study here in our country, in the United

States. We're developing real data on the costs of various strategies, assessing new measures, and encouraging other nations to follow suit. And we look forward to sharing this knowledge and technical support with our international colleagues.

As we work to create policy and agreements on action, we want to encourage the most creative, effective approaches. Wherever possible, we believe that market mechanisms should be applied -- and that our policies must be consistent with economic growth and free market principles in all countries. Our development efforts and our dialogue can help us reach effective and acceptable solutions.

Last December at Malta, in my meeting with President Gorbachev, I proposed that the United States offer a venue for the first negotiating session for a framework convention, once the I.P.C.C. completes its work. I reiterate that invitation here and look forward to your cooperation in that agenda.

We all know that human activities are changing the atmosphere in unexpected and in unprecedented ways. Much remains to be done. Many questions remain to be answered. Together, we have a responsibility to ourselves and the generations to come to fulfill our stewardship obligations. But that responsibility demands that we do it right.

We acknowledge a broad spectrum of views on these issues, but our respect for a diversity of perspective does not diminish our recognition of our obligation -- or soften our will to produce policies that work. Some may be tempted to exploit legitimate concerns for political positioning. Our responsibility is to maintain the quality of our approach, our commitment to sound science, and an open mind to policy options.

So the United States will continue its efforts to improve our understanding of climate change -- to seek hard data, accurate models, and new ways to improve the science -- and determine how best to meet these tremendous challenges. Where politics and opinion have outpaced the science, we are accelerating our support of the technology to bridge that gap. And we are committed to coming together periodically, for international assessments of where we stand.

Therefore, this spring, the United States will host a White House conference on science and economic research on the environment -- convening top officials from a representative group of nations, to bring together the three essential disciplines: science, economics, and ecology. They will share their knowledge, assumptions, and state-of-the-art research models to outline our understanding and help focus our efforts. I look forward personally to participating in this seminar and to learning from its deliberations.

Our goal continues to be matching policy commitments to emerging scientific knowledge -- and a reconciling of environmental protection to the continued benefits of economic development. And as Secretary Baker observed a year ago, whatever global solutions to climate change are considered, they should be as specific and as cost-effective as they can possibly be.

If we hope to promote environmental protection and economic growth around the world, it will be important not to work in conflict, but with our industrial sectors. That will mean moving beyond the practice of command, control, and compliance -- toward a new kind of environmental cooperation -- and toward an emphasis on pollution prevention, rather than mere mitigation and litigation. Many of our industries, in fact, are already providing crucial research and solutions.

One corporation, for example -- and there are others, but I'll single out one of them -- 3M started an in-house program called Pollution Prevention Pays -- one company. And that has saved the company well over a half a billion dollars since 1975 -- prevented

112,000 tons of air pollutants, 15,000 tons of water pollutants, and almost 400,000 tons of sludge and solid waste from being released into the environment. They've done it by rewarding employees for coming up with ideas. And they have clearly demonstrated the benefits of doing it right.

Where developing nations are concerned, I know some argue that we'll have to abandon the free-market principles of prosperous economies. In fact, we think it's all the more crucial in the developing countries to harness incentives of the free enterprise system in the service of the environment.

I believe we should make use of what we know. We know that the future of the Earth must not be compromised. We bear a sacred trust in our tenancy here -- and a covenant with those most precious to us: our children and theirs. We also understand the efficiency of incentives -- and that well-informed free markets yield the most creative solutions. We must now apply the wisdom of that system, the power of those forces, in defense of the environment we cherish.

Working together, with good faith and earnest dialogue, I believe we can reconcile vitality with environmental protection. And so let me commend you on your outstanding work -- and wish you all deliberate speed in your efforts to address a very difficult, but very important, human concern.

Thank you all very much. It is a great pleasure to be the first President to address this distinguished group. Thank you very much. (Applause.)

END

10:36 A.M. EST