SHARING THE COSTS OF CLIMATE CHANGE

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Summary

The scientific research reported by the IPCC established that the costs of climate change would not be spread equally. Developing countries are likely to suffer the most, because of their geographical and climatic conditions, and their lack of capacity to adapt. From the earliest attempts to combat climate change, equity concerns have been taken into account. The United Nations Framework Convention on Climate Change states various principles of equity, leadership by the rich countries, and special consideration for developing countries that may be hit hard by the effects of climate change and response measures. The Kyoto Protocol reiterates these principles and adds further possibilities for cost sharing. These include joint commitments, the Kyoto Mechanisms, and financial and technological transfers from Annex I to the developing countries. However, the ultimate objective of the Climate Convention can only be achieved with inclusion of all countries, including developing countries, into an emissions reduction agreement. Academia and negotiators alike have proposed various approaches for legally binding targets for all Parties.

1. Introduction—the Costs of Climate Change

The potential costs of climate change described in other articles of this topic vary greatly across the countries of the world. This article describes strategies for sharing the

burden of adverse climatic changes, as well as sharing options in the mitigation of the emissions that are the cause.

In its Second Assessment Report, Working Group II of the IPCC has reviewed the literature on the impacts of climate change and a range of potential adaptation and mitigation strategies. The review showed that a large impact can be expected as ecosystems respond to climate changes. The impacts include:

- loss of biodiversity;
- altered growing seasons;
- increasing (irreversible) desertification;
- disappearance of (a large share of) existing glaciers;
- more flooding and coastal erosion;
- major changes in marine ecosystems and heat and carbon storage capacity of oceans.

Developing countries are likely to suffer in particular (see *Global Warming, Poverty, and Ethical Issues)*. Changes in the hydrological cycle (see *Effects of Global Warming on Water Resources and Supplies*) could be of particular concern in regions where water availability is already low, such as the Middle East, North and East Africa, and Central Asia. Although global agricultural production was expected to be maintained, the tropical and subtropical regions with most of the world's poor—already vulnerable to changes in agricultural productivity—are most at risk of regional changes in crop yields and failure. Most developing countries do not have the resources to adapt to these changes. The bare survival of some developing countries in particular is threatened by sea-level rise as a consequence of a global rise of temperatures (see *Effects of Sea-Level Rise On Small Island States)*; these countries are the low-lying and island states—some islands' highest points are less than a meter above sea level.

2. Sharing the Burden

The main cause of anthropogenic climate change is the emission of carbon dioxide (CO_2) from burning fossil fuels. Most of the use of these fuels takes place in the industrialized countries, while the impacts of the emissions are felt particularly hard in the developing countries. Figure 1 shows the global distribution of CO_2 emissions in terms of emissions per capita, population, and total emissions (area of block).

Per capita emissions in the industrialized countries are much higher than in developing countries, particularly countries in Africa and the Indian subcontinent. In 1998, the total emissions of the industrialized countries were more than 50% of the global total; in terms of historic emissions, this share is far greater. This is one of the reasons why industrialized countries have accepted the responsibility for leading climate change efforts. However, the large population of the developing countries indicates a huge potential for emissions growth, if their emissions were to climb towards anything like the levels in the industrialized world, as is the case with some of the Asian emerging industrial economies.

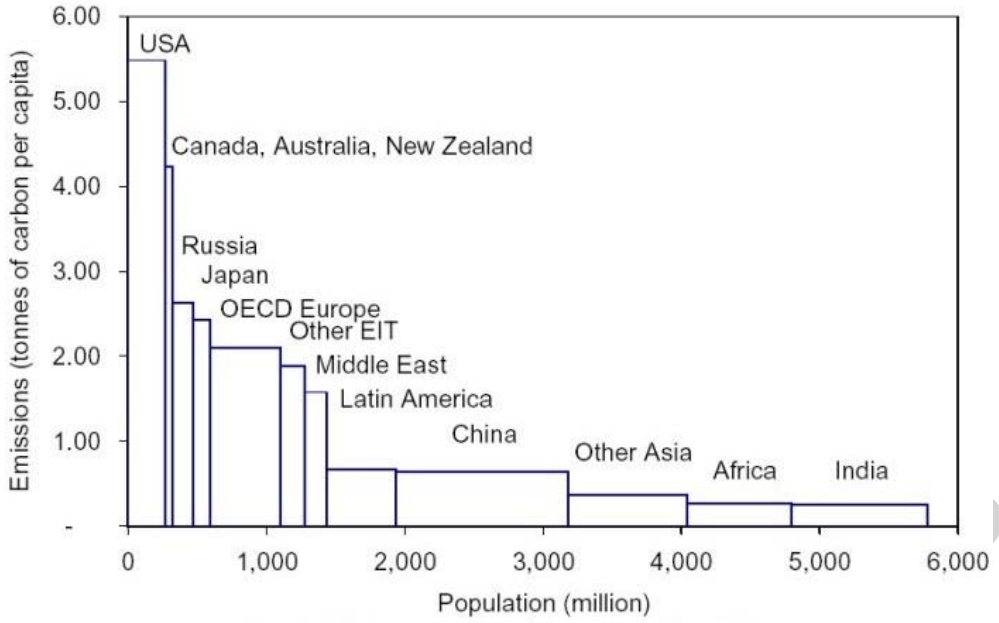

Figure 1. Global per capita CO_2 emissions and population, 1998
(Source: Data from OECD/International Energy Agency, *CO_2 Emissions From Fuel Combustion*, Paris, 2000)

2.1 The UN Framework Convention on Climate Change

In February 1991, the negotiations for a global agreement on climate change started. Even though the differences between the negotiating countries' positions were enormous, the UN Framework Convention on Climate Change (FCCC) emerged and was signed at the Earth Summit in Rio de Janeiro, Brazil, in June 1992. This Convention was the first coordinated step towards a global response to the threat of climate change. This section briefly describes the main elements of the FCCC. The ultimate objective of the Convention is "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." It was added that this "should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed."

The Convention recognizes various underlying principles:

- Parties should protect the climate on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities;
- the industrialized countries should take the lead in combating climate change;
- the specific needs of developing countries that are particularly vulnerable (low-lying and other small island countries, countries with low-lying coastal, arid and semiarid areas or areas liable to floods, drought and desertification, and developing countries with fragile mountainous ecosystems, and the countries that are particularly dependent on fossil fuel production) or any party that would have to bear disproportionate or abnormal burden should be given consideration;
- lack of full scientific certainty should not be used as a reason for postponing

measures.

There was general agreement that developed countries should take the lead, but there were important disputes about why they should. The developing countries stressed the historic "debt" from the much higher past emissions of industrialized countries, which have caused the problem. Developed countries argued that current generations were not to blame for historic emissions and that they would take the lead because of their present (financial) capacity to do so.

The Convention commits all countries to promote sustainable development and implement measures to mitigate and adapt to climate change. Parties of Annex I (the industrialized countries) have additional commitments to stabilize emissions at 1990 levels and provide financial resources for developing countries for various measures, as well as to transfer environmentally sound technology and know-how.

The Convention was probably as successful as could reasonably be expected. It provides an international legal framework and set of principles which was acceptable to almost all the countries involved. It accepts that climate change is a serious problem and reassures developing countries that addressing it at present is primarily a responsibility of the industrialized countries. It also established the ground for transfers of financial resources and technology to the developing countries to respond to climate change.

The Framework Convention on Climate Change (FCCC) entered into force in 1994. At the first Conference of Parties (COP-1), in 1995 in Berlin, the Parties agreed that the headline commitment (to return greenhouse gas emissions to 1990 levels) was inadequate. The COP-1 adopted the Berlin Mandate to negotiate a strengthening of the commitments for the period beyond 2000, specifically to set "quantified emission limitation and reduction objectives." This negotiating process culminated at the third Conference of Parties (COP-3) in Kyoto, Japan, December 1997.

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Biographical Sketches

Christiaan Vrolijk is research fellow at the Energy and Environment Programme, the Royal Institute of International Affairs, London, where he has been working on climate change and energy-related issues for four years. Most of his research has dealt with the impact of the various dimensions of flexibility in the climate regime. This research included the development of a relatively simple model for analyzing the impact of, for example, emissions trading and the inclusion of the whole basket of greenhouse gases. He has also worked on the energy and emissions issues in Russia, and renewable energy strategies in Europe. He has published and presented his work on these policy areas widely. He was co-author of the first major book published on the Kyoto Protocol, namely *The Kyoto Protocol: A Guide and Assessment.* His current work, *Climate Change and Power: Economic Instrument for European Electricity*, looks at the interaction of electricity liberalization and climate protection in European countries.
Christiaan received his Masters degree from the University of Utrecht, in the Netherlands, on the role of the network and network tariffs in the liberalization of the electricity market, while working at the Dutch Ministry of Economic Affairs during the liberalization process in 1996.

Dr Michael J. Grubb is professor of climate change and energy policy at Imperial College in London. Until September 1998, he was head of the Energy and Environment Programme at the Royal Institute of International Affairs in London, where he remains an associate fellow. Dr. Grubb is a leading

international researcher on the policy implications of climate change, and energy policy issues including renewable energy sources. He was a lead author for the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), convening the chapter on equity and social considerations, and is a convening lead author for the IPCC's Special Report on Technology Transfer. He has advised a number of international studies and organizations and is a member of the UK Government's Green Globe Task Force. He is editor-in-chief of the new journal *Climate Policy* and is on the editorial board of *Energy Policy* journal.

Dr. Grubb's most recent book, *The Kyoto Protocol: A Guide and Assessment*, was published in June 1999 and is already being translated into Japanese and Russian. He is also completing a series on Renewable Energy Strategies for Europe, and is leading an international research project on European policy towards climate change. Previous publications include a 1989 report on the options for international climate change negotiations that helped to launch a global debate on the use of tradable emission quotas for climate control; a two-volume international study entitled *Energy Policies and the Greenhouse Effect*; and a range of journal publications on economic and political aspects of the problem. He has also led an extensive study resulting in a book on emerging energy technologies, and published a book examining the outcome and implications of the Rio "Earth Summit."