

Is the Ozone Depletion Regime a Model for an Emerging Regime on Global Warming?

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I.

INTRODUCTION

In October 1989 I gave a lecture at UCLA entitled "From Vienna to Montreal and Beyond; the Politics of Ozone Layer Protection."¹ During the question and answer period, I was asked whether and to what extent one could draw lessons from the ozone depletion regime for the formation of a regime on global warming or climate change. I shall here give a tentative answer to that query. My response will be based not only on academic research, but also on personal experience, as I have participated in many environmental negotiations, in particular the conferences in Vienna in 1985,² and Montreal in 1987.³ These conferences, which I had the honor to chair, led to the successful adoption of the two legal instruments that constitute the main elements of the ozone depletion regime. That regime may serve as a model for and become a part of a new global warming regime. However, due to complex issues of scientific uncertainty and economic feasibility, it will take much longer to get the new regime working, as progress depends upon meeting the rising energy needs of developing countries by other means than fossil fuel combustion.

II.

REGIME—A NEW NOTION?

"Regime" is a relatively traditional notion in domestic politics and in studies comparing the political systems of various countries;

1. Daily Bruin News, Oct. 10, 1989, at 1; *Id.*, Oct. 12, 1989, at 8.

2. Vienna Convention for the Protection of the Ozone Layer (Mar. 18-22, 1985) reprinted in 26 I.L.M. 1516 (1987).

3. Montreal Convention on Substances That Deplete the Ozone Layer (Sept. 14-16, 1987), reprinted in 26 I.L.M. 1541 (1987).

nations may have democratic or dictatorial regimes, or pluralistic or monolithic regimes. In integration theory, some have held the view that a similarity of political regimes in countries participating in a process of economic or political integration would to some extent further progress toward unification or amalgamation.⁴ Students of international law are also familiar with the term "regime," which covers various sets of rules linked to specific and locally defined situations. The Third United Nations Conference on the Law of the Sea, in its article on the legal status of waters forming straits used for international navigation, refers to the "regime of passage through straits."⁵ Article 35 restricts the scope of the convention in respect of the "legal regime in straits in which passage is regulated by long-standing international conventions."⁶ The term "international regime" also applies in relation to the specific status of international rivers, such as the Danube or the Congo.⁷

International relations theory rediscovered this term in the early 1980's, when a special issue of "International Organization" grew out of the conferences held in Los Angeles and Palm Springs.⁸ A recent definition of "international regimes" sees them as "networks of rules, norms and procedures that regularize behavior and control its effects."⁹ Commentators have also clearly recognized that the "development of an international regime frequently involves intense bargaining, that leads to critical compromises," and that "international regimes generally evolve and change over time in response to various economic and political pressures."¹⁰ The ozone depletion regime testifies to this dynamic nature; it represents "constellations of interest," and works to "shape expectations, facilitate coopera-

4. W. LANG, *DER INTERNATIONALE REGIONALISMUS* 147-51 (1982).

5. United Nations Third Conference on the Law of the Sea, Revised Informational Composite Negotiating Text for the Eighth Session, Apr. 28, 1979, art. 34 UN Doc. A/CONF. 62/wp.10/ rev.1 (ICNT/rev.1), reprinted in 18 I.L.M. 686 (1979).

6. *Id.* at art. 35; see also Reisman, *The Regime of Straits and National Security: An Appraisal of International Lawmaking*, 74 AM. J. INT'L. L. 48 (1980); Moore, *The Regime of Straits and the Third United Nations Conference on the Law of the Sea*, *Id.* at 77.

7. Kunz, *The Danube Régime and the Belgrade Conference*, 43 AM. J. INT'L. L. 104 (1949); Yakemtchouk, *Le régime international des voies d'eau africaines*, REVUE BELGE DE DROIT INTERNATIONAL 480 (1969).

8. See Krasner, *Structural Causes and Regime Consequences: Regimes as Intervening Variables*, 36 INT'L ORG. 185 (1982). The conferences referred to in the text were held in Los Angeles in October 1980 and Palm Springs in February 1981.

9. R. KEOHANE & J. NYE, *POWER AND INTERDEPENDENCE* 19 (2d ed., 1989).

10. O. YOUNG, *INTERNATIONAL COOPERATION: BUILDING REGIMES FOR NATURAL RESOURCES AND THE ENVIRONMENT* 22 (1989).

tion and stabilize relations.”¹¹ An impressive list of hypotheses has also been drawn up regarding the factors that condition the success of international regime formation,¹² and the concrete experience made during the formation of the ozone depletion regime confirms most of these hypotheses.

For the purpose of this study, I will consider that an international regime is a complex set of rules which are generated by an intense process of international negotiations and which are subject to periodic changes.¹³ These changes depend on constellations of power as well as on new scientific evidence or technological breakthroughs related to the subject matter controlled by these rules. The main advantage of the notion of “international regime” is that it covers not only a single treaty, but also several interrelated legal instruments; it requires in most instances the intervention of an international organization, which as soon as the regime is established may monitor state parties’ compliance with their duties under the respective treaty. Such organizations and institutions may also serve as the main mechanism to manage the change of these instruments. Aside from formal instruments which have legally binding force, these regimes may also include political declarations which define the future behavior of state parties in non-legal terms; the Noordwijk Declaration on climate change is an instance of such a political text.¹⁴ In view of expectations generated by these political commitments, the regimes cannot entirely be neglected by lawyers, who frequently qualify them as “soft law.”¹⁵ International regimes of the new kind differ from their ancestors insofar as they are not necessarily linked to a specific local situation; like the ozone depletion and nuclear accidents regimes, their scope may be global;¹⁶

11. R. GILPIN, *THE POLITICAL ECONOMY OF INTERNATIONAL RELATIONS* 384 (1987).

12. Young, *Politics of International Regime Formation*, 43 *INT’L ORG.* 366 (1989).

13. For an overview of existing definitions, see Haggard & Simmons, *Theories of International Regimes*, 41 *INT’L ORG.* 491 (1987).

14. The Noordwijk Declaration on Atmospheric Pollution and Climate Change, Nov. 6-7, 1989, reprinted in *THE INTERNATIONAL ENVIRONMENT: A REFERENCE BOOK* (Aug. 1990) (available from External Affairs and International Trade Commission of Canada).

15. For definitions of “soft law,” see in particular Seidl-Hohenveldern, *International Economic “Soft Law,”* 2 *RECUEIL DES COURS, ACADEMIE DE DROIT INTERNATIONAL* 173 (1979); Gold, *Strengthening the Soft International Law of Exchange Arrangements*, 77 *AM. J. INT’L L.* 443 (1983); Lang, *Die Verrechtlichung des internationalen Umweltschutzes vom “soft law” zum “hard law,”* 22 *ARCHIV DES VÖLKERRECHTS* 283, 284-85, 303-05 (1984).

16. See International Atomic Energy Agency: Convention on Early Notification of a Nuclear Accident, Vienna, Sept. 26, 1986, reprinted in 25 *I.L.M.* 1370 (1986).

their scope could, however, be restricted to a regional dimension, as is the long-range transboundary air pollution regime's.¹⁷

III.

ELEMENTS OF THE OZONE DEPLETION REGIME

The ozone depletion regime consists of the following elements: the Vienna Convention for the Protection of the Ozone Layer (1985); and the Montreal Protocol on Substances that Deplete the Ozone Layer (1987). The United Nations Environment Program (UNEP)¹⁸ acts as the main institution facilitating the formation and managing the changes of the regime.

The Vienna Convention on the Protection of the Ozone Layer created a firm institutional basis for interstate cooperation in joint research, joint observation, and possibly the elaboration of protocols relating to certain substances considered as harmful to the ozone layer.¹⁹ A two- or three-tier approach to regime building had already been adopted in the above-mentioned context of long-range transboundary air pollution; however, the umbrella treaty signed in 1979²⁰ contained only a few really stringent obligations, as its main purpose was to put an institutional machinery at the disposal of the contracting states, which formalized their cooperation. Out of this umbrella treaty grew additional protocols on sulphur emissions and nitrogen oxide emissions. Again, in the context of an emerging ozone depletion regime, only an umbrella treaty could be adopted as a first step. Strong opposition from the European Community (EC) and Japan prevented the successful adoption of really stringent measures regarding chlorofluorocarbons (CFC's). The opposition argued that the evidence of damage caused by these substances was insufficient to justify radical reductions of emission levels.

17. Rosencranz, *The ECE Convention of 1979 on Long-Range Transboundary Air Pollution*, 75 AM. J. INT'L L. 975 (1981); The Protocol on Sulphur Emissions, Mar. 21, 1984, reprinted in 23 I.L.M. 662 (1984).

18. For the activities of UNEP in the field of international environmental law, see M. KILIAN, *UMWELTSCHUTZ DURCH INTERNATIONALE ORGANISATIONEN* 234 (1987); Sand, *Environmental Law in the United Nations Environment Programme*, in *THE FUTURE OF THE INTERNATIONAL LAW OF THE ENVIRONMENT: WORKSHOP IN THE HAGUE*, Nov. 12-14, 1984, at 51 (R. Depuy ed. 1984).

19. *Supra* note 2. For analysis, see in particular Lang, *Luft und Ozon - Schutzobjekte des Völkerrechts*, 46 ZEITSCHRIFT FÜR AUSLÄNDISCHES ÖFFENTLICHES RECHT UND VÖLKERRECHT 261 (1986); Sand, *Protecting the Ozone Layer - The Vienna Convention is Adopted*, 27 ENV'T 19 (1985); Szell, *The Vienna Convention for the Protection of the Ozone Layer*, 36 INT'L DIG. HEALTH LEGIS. 839 (1985).

20. The Convention on Long Range Transboundary Air Pollution, Geneva, Nov. 16, 1979, UN Doc. ECE/GE 79-4960 (1979), reprinted in 18 I.L.M. 1442 (1979).

Thus, the main purpose of this framework convention was to fill the gap and to produce hard evidence of the dangerous nature of these substances. Strangely enough, before that evidence could be fully presented, political pressure, even in countries initially reluctant to envisage restrictions and reductions, grew strong enough to trigger negotiations on just these stringent control measures.

In 1987, after a negotiating process of less than ten months, the Montreal Protocol on Substances that Deplete the Ozone Layer was signed.²¹ It contains a relatively strict regime of measures related not only to CFC's, but also to halons. The emissions of the former must be reduced by fifty percent over a ten-year period; the emission levels of the latter are subject to freeze. This differentiation was due in part to the function of halons as fire-extinguishing substances, for which substitutes had not yet been found. The most striking, and also most controversial feature of this treaty is its comprehensive list of exceptions regarding compliance with treaty obligations. In order to limit the number of non-participating states—the so called “hold-outs”—the treaty grants special treatment to numerous groups of states: developing countries can delay their compliance by ten years; EC member-states may fulfill their duties jointly, allowing for an exchange of production quotas and adding some additional flexibility; and the Soviet Union obtained a special regime in order to take into account the rigidities of its economic system. Needless to say, these exceptions caused considerable dissatisfaction among “green” lobbyists afraid that these broad exceptions would discourage states from complying very strictly with their obligations.

Aside from this potential flaw of the Montreal Protocol, one should not lose sight of three positive elements. First, the conventions envisaged an elaborate verification machinery to be established by the state parties. Second, it tried to prevent any violation of the Protocol through production transfers from member states to non-member states by installing a relatively strict trade regime, imposing restrictions on imports and exports of prohibited substances. Finally, it contained a complex mechanism to expand its scope and bring deeper cuts and inclusion of hitherto uncontrolled substances.

21. *Supra* note 3. For an analysis, see in particular Benedick, *Ozone Diplomacy*, *ISSUES IN SCI. & TECH.* 43 (Fall 1989); Buxton, *The Montreal Protocol*, 2 *EUR. ENV'T REV.* 46 (July 1988); Lang, *Diplomatie zwischen Ökonomie und Ökologie, das Beispiel des Ozonvertrages von Montreal*, 43 *EUROPA-ARCHIV* 105 (Feb. 25, 1988); Szell, *The Montreal Protocol on Substances that Deplete the Ozone Layer*, 39 *INT'L DIG. HEALTH LEGIS.* 278 (1988).

From a negotiator's perspective the Montreal Protocol was certainly the maximum to be achieved at that point in time. Hard evidence on the link between the chloride content of the stratospheric ozone layer and the depletion of the same layer has since been produced—a fact that heightened this awareness of public opinion and led toward a broad consensus, at least among industrialized states, that chlorofluorocarbons should be phased out by the year 2000.

In June 1990 state parties to the Montreal Protocol met in London for their second formal conference. The outcome of this meeting amounted to a partial rewriting of the Protocol.²² As regards substances already covered by the Protocol, such as chlorofluorocarbons and halons, state parties agreed on a full phase-out by the year 2000, giving some leeway for exceptional cases. The negotiations also extended the coverage of the Protocol by including in the reduction schedule substances such as carbontetrachloride and methylchloroform, which for some time had been considered as substitutes for some of the already prohibited substances. Developing countries achieved a major breakthrough at the London conference when the parties established the principle that these countries' fulfillment of obligations was to some extent dependent on the amount of assistance, i.e., transfer of technology, received from developed states. This assistance is to be facilitated by a financial mechanism which will be supported by a multilateral fund. As regards the relationship between parties and non-parties, the London negotiators tightened the already existing trade restrictions by including down-stream products. Finally, the delegates approved a highly elaborate mechanism of compliance control which goes well beyond anything already known in the field of environmental protection. This impressive record of the London conference is mainly due to new scientific evidence, strong public support which reduced the earlier resistance of chemical industries in Europe, and a new understanding of the needs of developing countries.

The third element of the ozone depletion regime is the United Nations Environment Programme (UNEP),²³ which has been active since the mid 1970's in contributing to the progressive development of international environmental law. From the early 1980's onward,

22. Report of the Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, United Nations Environment Program/OzL. Pro. 2/3 (June 23, 1990). For a detailed account, see Lang & Kempel, *Ozone Layer*, Y.B. INT'L ENV'T'L. L. (1990). As regards the scientific issues to be settled at the London meeting, see Bickel, Makhijani, & Makhijani, *Beyond the Montreal Protocol, Still Working on the Ozone Hole*, 93 TECH. REV. 53 (May/June 1990).

23. See *supra* note 20.

this agency has worked toward the establishment of an ozone depletion regime by gathering scientific evidence and preparing legal instruments. As one of the midwives of the aforementioned treaties, UNEP was also entrusted with the tasks of facilitating their operation and monitoring their implementation. Legal instruments which form an international regime require a supporting agency; its services cover not only simple secretarial functions but also legal advice and the coordination of scientific research.

IV.

FACTORS FACILITATING THE FORMATION OF THE OZONE DEPLETION REGIME

The formation of the ozone depletion regime was facilitated by various factors:

Leadership is required for any sort of international negotiation; a group of states including the United States, Canada, and the Scandinavian countries displayed relatively strong leadership, a role quite legitimate in view of domestic measures already adopted by some of these nations in the late 1970's such as prohibiting the use of CFC's for non-vital purposes.

Opposition to this international regime was strong at the outset, understandably so, in view of the long-standing reluctance of most EC countries to accept substantial restrictions. This opposition could have been even stronger if the EC had succeeded in forming a united front against the regime formation by establishing a firm coalition of the EC, Soviet Union, Japan, and developing countries. Such a coalition, however, never came about. Furthermore, the resistance of the EC itself was weakened as more and more of its member-states gave in to the pressure of public opinion and green lobbies.

The formation of the regime itself also benefitted from this pressure of public opinion, "green lobbies," and concerned scientists.²⁴ Public opinion was deeply affected by the discovery of the so called "ozone hole," a phenomenon perceived by many people as a threat to their very survival.

In view of the limited economic importance of CFC's, many governments thought that the chemical industry could, in the long run,

24. These scientists, forming a specific community of experts sharing beliefs in a common set of cause-and-effect relationships and common value policies governing these relationships, were qualified as an "epistemic community." See Haas, *Do Regimes Matter? Epistemic Communities and Mediterranean Pollution Control*, 43 INT'L ORG. 377, in particular 384 n.20 (1989).

swallow whatever restrictions were imposed, especially because the availability of substitute substances was assured to some extent.

Another factor that facilitated these negotiations was the simple fact that only a few countries were actually engaged in producing and exporting CFC's. Furthermore, in these few countries, only a small number of chemical plants would be affected by control measures. Thus, the implementation of these measures and the surveillance of production lines were not likely to generate high costs.

In reviewing these factors facilitating the formation of the regime, one should not neglect one major uncertainty: namely, the behavior of developing countries. Are they ready to join the Montreal Protocol and abide by their duties under the revised Protocol? Is the financial mechanism established at the London conference likely to meet the expectations of developing countries relating to the transfer of technology? Will the advantages hitherto awarded to developing countries—a ten-year grace period, financial support—suffice to entice them to full participation?

V.

THE EMERGING REGIME ON GLOBAL WARMING

Since the conclusion of the ozone negotiations and of negotiations related to the transport of hazardous wastes,²⁵ global warming, i.e., the greenhouse effect and global climate change, has become the top priority on the agenda of international environmental cooperation. On the basis of tentative scientific findings, approved by the Toronto Conference on "The Changing Atmosphere: Implications for Global Security,"²⁶ we are witnessing the build-up of a broad political consensus that early and progressive action must be undertaken in order to prevent further global warming. Milestones in this process are the Hague Declaration on the Environment,²⁷ and the Noordwijk Declaration on Atmospheric Pollution and Climatic Change, adopted at the ministerial level on November 6 and 7, 1989.²⁸

25. Conference of Plenipotentiaries on the Global Convention on the Control of Transboundary Movements of Hazardous Wastes, Mar. 20-22, 1989, reprinted in 28 I.L.M. at 657 (1989). For a detailed account, see Lang, *The International Waste Regime*, in ENVIRONMENTAL PROTECTION AND INTERNATIONAL LAW (available Summer 1991).

26. Environment Canada, Conference Statement, *The Changing Atmosphere: Implications for Global Security* (Toronto, June 27-30, 1988) (available from the World Meteorological Organization).

27. Reprinted in 28 I.L.M. at 1308 (1989).

28. See *supra* note 14.

The Noordwijk Declaration qualified climate change as a common concern of all mankind, although it assigned specific responsibilities to industrialized countries: these wealthier nations should set an example by initiating domestic action and should financially support developing countries for which such action is an excessive burden. This action should include the following: phasing out CFC's (which are already controlled by the Montreal Protocol); limiting or reducing carbon dioxide (CO₂) emissions (an action mainly assigned to industrialized countries because of their dominant contribution to these emissions in the past); reducing deforestation and preventing soil erosion and desertification (which includes afforestation); and limiting or reducing emissions of all greenhouse gases other than CO₂ (which means methane and nitrogen oxides). In many instances, the Noordwijk Declaration reiterated the need to assist developing countries to identify the causes of anthropogenic climate change and to take appropriate action. This requires that developing countries acquire affordable technologies which allow for better energy conservation and efficiency. Although the Noordwijk conference strived for a political consensus on exact target dates for stabilizing CO₂ emissions, only "many" industrialized nations agreed that this stabilization should be achieved by the year 2000. Even less consensus could be attained regarding twenty percent reduction of CO₂ emission levels by the year 2005, as recommended by the Toronto Conference. This partial failure of the Noordwijk conference was mainly due to the resistance of the United States, the Soviet Union, Japan, and the United Kingdom.

Again, in May 1990 the Environment Ministers of the Economic Commission for Europe (ECE), which includes the United States and Canada, meeting in Bergen, Norway, did not achieve full consensus. The pertinent part of their conclusions read as follows: "In view of most ECE countries such stabilization at the latest by the year 2000 and at present levels must be the first step."²⁹ The U.S. delegation had reiterated its objection to any firm commitment on the CO₂ issue.

In November 1990, 137 countries attended the Second World Climate Conference in Geneva. Their deliberations were based upon a report of the Intergovernmental Panel on Climate Change (IPCC), which mainly confirmed the concerns expressed at the aforemen-

29. Bergen Ministerial Declaration on Sustainable Development in the ECE Region, May 16, 1991, 9-10 (available from the United Nations Economic Commission for Europe).

tioned scientific and political meetings. The Ministerial Declaration adopted on November 7, 1990³⁰ restated the views that "developed countries must take the lead,"³¹ and, as far as the needs of developing countries are concerned, "that adequate and additional financial resources be mobilized and the best available environmentally-sound technologies be transferred expeditiously on a fair and most favorable basis."³² The participants agreed that "the lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent such environmental degradation."³³ They also considered measures for which funds channelled to developing countries should be used.³⁴ Furthermore, the ministers agreed "that there is no single quick-fix technological option for limiting greenhouse gas emissions,"³⁵ and noted "that the conservation of the world forests in their role as reservoirs of carbon . . . are of considerable importance for global climatic stability."³⁶ In concluding, the Conference called for negotiations on a framework convention on climate change, to be signed in 1992 at the United Nations Conference on Environment and Development. The first negotiating session was scheduled for February 1991 in Washington D.C.. It should be noted that the Vienna conference, despite its high political level and broad participation, was not able to agree on any concrete measures concerning emission levels of CO₂ or other greenhouse gases.

VI.

WHICH FACTORS FACILITATE OR IMPEDE THE FORMATION OF A GLOBAL WARMING REGIME?

Drawing up a list of facilitating and impeding factors on the formation of a global warming regime produces a highly negative balance. Among the facilitating factors stands mainly the already existing ozone depletion regime, which is about to phase out numerous chlorofluorocarbons expected to cause about seventeen percent of the anthropogenic greenhouse effect. As a second factor, one

30. Ministerial Declaration of the Second World Climate Conference, Geneva, Nov. 7, 1990 (available from World Meteorological Organization or the United Nations Environment Programme).

31. *Id.* at ¶5.

32. *Id.*

33. *Id.* at ¶7.

34. *Id.* at ¶19.

35. *Id.* at ¶22.

36. *Id.* at ¶24.

should add the dedicated leadership of a group of industrialized states, in particular Canada and the Netherlands. As a third factor, one should not discount the growing environmental awareness in public opinion, a factor that played a major role during the formation of the ozone depletion regime.

There are, however, many more factors impeding progress: Scientific uncertainty is still very high, particularly regarding the origins of and control measures related to methane (CH₄), which is supposed to cause some nineteen percent of the greenhouse effect.³⁷ As regards CO₂ emissions, which are deemed responsible for about fifty percent of the greenhouse effect and which come mainly from the combustion of fossil fuels, the main concern is how to maintain economic growth and development while at the same time promoting energy conservation and energy efficiency. Population growth in third world countries will increase energy consumption and thus counteract most endeavors aimed at lower levels of energy production.

Also, most developing countries consider fossil fuels their major capital heritage and advantage. They are therefore reluctant to relinquish their assets. This reluctance grows in the light of past behavior of industrialized states, which acquired their strength mainly on the basis of such fossil fuel combustion as coal burning. Third world countries therefore have two demands: that they be compensated for not basing their increasing energy consumption on fossil fuel combustion, and that they obtain "clean" technologies for energy production at minimal costs. Hence the always recurring proposal for a specific funding machinery, which should help developing countries adopt control measures and join the regime. Alternative means of energy production will have to be used; this may imply a higher reliance on solar, hydro, and nuclear energy.

Another negative factor one must take into account is the fact that in the case of global warming there may well be winners and losers. Certain low-lying coastal areas may be among the losers as a consequence of the rise of ocean levels, whereas other areas, such as

37. As regards scientific evidence in general, see 1-4 ENVIRONMENTAL PROTECTION AGENCY/UNITED NATIONS ENV'T PROGRAMME, EFFECTS OF CHANGES IN STRATOSPHERIC OZONE AND GLOBAL CLIMATE (1986); Flohn, *Possible Climatic Consequences of a Man-Made Global Warming*, RR-80-30 IIASA Res. Rep. (1980); Mintzer, *A Matter of Degrees: The Potential for Controlling the Greenhouse Effect*, WORLD RESOURCES INST. (April 1987). As regards the specific situation of developing countries, see Conference Statement on Global Warming and Climate Change: Perspectives from Developing Countries, New Delhi, Feb. 21-23, 1989 (available from Woods Hole Research Center).

Siberia, will become increasingly hospitable to large scale agriculture.³⁸ Thus, countries potentially benefitting from global warming will have little incentive to join a global warming regime.

Furthermore, one must recognize that in the cases of ozone depletion and nuclear accidents public opinion was mobilized by exogenous shocks such as the discovery of the ozone hole and the Chernobyl accident. Global warming represents, however, some kind of "creeping crisis," which has a much weaker impact on public opinion.³⁹

Against this background of prevailing negative factors, regime formation must go on. This requires sustained efforts from the aforementioned group of lead countries and a cautious step-by-step approach which links international commitments to their economic feasibility. In clear language this implies a considerable financial burden to be borne by industrialized states, which up to now have built their economic advances on atmospheric pollution. As in the case of ozone depletion, much will depend on the policy adopted by the United States government.

VII.

ELEMENTS OF A GLOBAL WARMING REGIME

The potential state parties to a global warming regime already commonly understand that such a regime should consist of an umbrella treaty or framework convention supplemented by one or more specific protocols and possibly an agreement on a funding mechanism.⁴⁰

The *climate convention* will probably start off with a general statement as to the awareness of the state parties that global warming is a threat to mankind, and that they are determined to take all appropriate measures to limit, reduce, and, as far as possible, prevent global warming. This may be followed by articles on "ex-

38. This important difference in factors contributing to the formation of the ozone depletion and the global warming regimes was recognized by Young, *Politics of International Regime Formation: Managing Natural Resources and the Environment*, 43 INT'L ORG. 367 (1989).

39. *Id.* at 372.

40. See the conclusions of a Commission of the German Bundestag, *Schutz der Erdatmosphäre, eine internationale Herausforderung* 514 (Bonn 1988); *United Nations: General Assembly Resolution on the Protection of Global Climate for Present and Future Generations of Mankind*, 44 U.N. GAOR C.2, U.N. Doc. A/C 2/44/2 (1989) reprinted in 28 I.L.M. 1326 (1989); the Noordwijk Declaration, *supra*, note 14; *Global Climate Change: A Scientific Review* by the World Climate Research Programme, (Jan. 1990) (available from the World Meteorological Organization (WMO)-International Council of Scientific Unions (ICSU)).

change of information," "research and systematic observations," and "development and transfer of technology." Another set of articles would establish duties of cooperation and consultation as well as an obligation of prior notice and environmental impact assessment. The convention should also contain a reference to the other elements of the regime, i.e., the protocols related to specific substances, as well as to the need to establish a fund. It would be a most welcome innovation if a provision for the monitoring of compliance were already included in this framework convention. The treaty will devote a major part to institutional issues, such as the various organs (conference of parties, secretariat, etc.) required to make cooperation between parties fully operational. Because it will form the basis upon which other elements are to be built, this machinery will be the most visible element of the regime.

Among the other elements, the parties to the convention will have to agree upon one or more *protocols* on CO₂ emissions and CH₄ emissions, to mention just the most important ones. In light of the Montreal Protocol experience, where all controlled substances were included in one single text, it may be that only one protocol is to be negotiated, which covers the whole range of greenhouse gases. It may well be that separate protocols will be devoted to the issue of reforestation and afforestation and to the situation of developing countries. Control measures to be adopted, such as quantified reductions of certain emissions by certain target dates, are likely to be the core of future negotiations. Most probably the parties will agree upon these measures only some years after the framework convention enters into force. The economic feasibility of control measures may reveal itself as the major stumbling block to progress. Negotiators will have to give special consideration to developing countries and to their energy requirements in light of population growth. For some time this will mean that industrialized countries must reduce their emission levels whereas developing countries may maintain or even slightly increase their levels. Developing countries will certainly try to link their compliance to financial assistance received from the "Fund." Special attention should also be paid to the revision and amendment procedures; specific devices must be developed to allow for the quick adaptation of treaty provisions to changing circumstances such as new scientific evidence and technological breakthroughs.

A *Fund*, which primarily facilitates the domestic action of developing countries to limit or reduce emission levels and allows for a transfer of technologies at minimal costs, will be the most difficult

issue for the parties to settle. At present, uncertainty prevails as to the size of such a fund, the formula for burden sharing, and the requirements to be fulfilled in order to receive assistance. One must expect strong opposition from the main contributors to existing financial institutions like the World Bank, who will argue that these institutions already suffice to meet any funding needs. In the long run these countries may be willing to accept another "special facility" within the framework of the existing financial institutions; this would avoid extra administrative costs, and would also protect the wealthier countries' dominant position in decision making.

Finally, a strong *institutional machinery* will be necessary to keep the new regime going; it may well be UNEP again or some new agency jointly sponsored by UNEP and WMO.

VIII.

CONCLUSIONS

The ozone depletion regime is not only a model for the regime on global warming, but also a part of it, because chlorofluorocarbons play a major role in global warming. The new regime is about to be established along the lines of the ozone depletion regime, which to some extent followed the example of the regime on long-range transboundary air pollution.⁴¹ Due to scientific uncertainty and the complex issue of economic feasibility, one can safely predict that it will take a much longer time to get this new regime working. Unless we find a viable solution to meet the rising energy requirements of developing countries other than by fossil fuel combustion, real progress will elude mankind. Partial achievements may be at hand in the years to come. However, definitively arresting global warming will remain one of the major tasks of the twenty-first century.

41. For further consideration, see STEPS TOWARD AN INTERNATIONAL CONVENTION STABILIZING THE COMPOSITION OF THE ATMOSPHERE, especially: Benedick, *The Ozone Experience as Analogue for International Action on the Greenhouse Effect*, at 27; Scovazzi, *A Future International Convention Stabilizing the Composition of the Atmosphere: Analogue Treaties*, at 31; Ramakrishna, *An International Convention for Stabilizing the Greenhouse Gas Composition of the Atmosphere*, at 37; Siddiqi, *A Comprehensive Law of the Atmosphere as a Framework for Addressing Carbon Dioxide and Climate Change Issues*, at 59 (Sept. 1988) (available from the Woods Hole Research Center). See also Bothe, *Global Climate Management - The Role of International Law 61* (Conference Report: Bergen, May 8-12, 1990 and Oslo, Aug. 1990) (available from the Norwegian Research Council for Science and the Humanities, Sustainable Development - Science and Policy); Handl, *International Efforts to Protect the Global Atmosphere: A Case of Too Little, Too Late?* 1 EUR. J. INT'L L. 250 (1990).