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Protecting the Global Atmosphere: Beyond the Montreal Protocal

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PROTECTING THE GLOBAL ATMOSPHERE: BEYOND THE MONTREAL PROTOCOL

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I. INTRODUCTION

On January 1, 1989, the Montreal Protocol on Substances that Deplete the Ozone Layer[1] entered into force, binding forty-six signatory nations to limits on the production and consumption of chemicals believed to be destroying the protective layer of ozone that encircles the earth. Negotiated in rapid response to mounting evidence of potentially irreversible damage to the global environment, the treaty is a milestone in the history of international cooperation. It marks the first effort of the international community to avert an environmental crisis, instead of waiting for the crisis to occur before acting.

Unfortunately, the treaty does not end the production or use of chemicals suspected of destroying ozone. Further, the Protocol cannot

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1. Montreal Protocol on Substances that Deplete the Ozone, Final Act, September 16, 1987, *reprinted in* 26 I.L.M. 1541 (1987) [hereinafter The Protocol]. As of this writing, the Protocol has yet to receive an official United Nations citation.

prevent already released chemicals from harming the earth's atmosphere.[2] The accord, therefore, cannot be viewed as a definitive solution to the problem of ozone depletion. It does, however, represent an important first step toward successfully attacking the significant political, economic and scientific barriers that have doomed previous environmental agreements and may even point the way to a new era of international cooperation in protecting the global environment from other potential catastrophes.

After a brief discussion of the nature of the ozone problem, this comment will review the advances in international environmental law that culminated in the Montreal Protocol. It will then focus on the treaty's methods for overcoming many of the difficulties that have plagued previous environmental agreements. Finally, this comment will review the accord's limitations and suggest ways to use it as a basis for the development of new mechanisms to protect the global environment.

II. The Ozone Depletion Problem

High above the earth's surface, an invisible layer of ozone serves as a shield, absorbing the sun's ultraviolet rays and preventing them from ever reaching the planet. The formation of ozone atoms is a relatively simple process; it requires only the interaction of ordinary oxygen and ultraviolet radiation from the sun. Through natural chemical reactions dependent upon variations in sun strength and the amount of oxygen in the atmosphere, stratospheric ozone is continually produced and destroyed.

Scientists formerly presumed that there was a constant level of ozone in the upper levels of the atmosphere, where oxygen is abundant. But, as early as 1974, speculation occurred that the "ozone layer," a relatively thin layer of gas in the stratosphere, was subject to depletion.[3] Only eleven years later, researchers reported a hole in the ozone

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2. Current ozone measurements reflect only gases released in the 1970s and earlier; gases now in the lower atmosphere (ground level to about five miles from the earth's surface) will take seven to ten years to reach the stratosphere (which stretches from the lower atmosphere to approximately thirty miles above the earth's surface). As the chemicals in refrigerators and insulating foams continue to break down over the next decade, even more gases will gradually be released. Government scientists estimate that the levels of these gases will not stop rising until they reach six to eight parts per billion, more than double their present levels. Gleick, *Treaty Powerless to Stem a Growing Loss of Ozone*, N.Y. Times, March 20, 1988, at 1, col.2.

3. Molina and Rowland, *Stratospheric Sink for Chlorofloromethanes: Chlorine Atom Catalyzed Destruction of Ozone*, 249 Nature 810 (1974). (Two years after Molina and Rowland's article appeared, the National Academy of Science ("NAS")

layer over Antarctica. A natural filter, ozone screens out much of the dangerous solar radiation thought to be responsible for increased incidence of skin cancer, crop reductions and even harm to the body's immune system. Although the size of the hole in the ozone layer varies seasonally and with weather patterns, recently released data has sparked fears of wider depletion than originally postulated.[4] Researchers just back from the Arctic report surprisingly high levels of the chemicals thought to precede ozone destruction.[5]

The prime suspect in the ozone layer's destruction appears to be chlorine.[6] High levels of chlorine are in turn thought to be the byproducts of chlorofluorocarbons ("CFCs"), industrially produced synthetic compounds of varying types and numerous applications. Commercial

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issued a study supporting the team's theory. One month later, the United States Environmental Protection Agency ("EPA") announced a ban on aerosol propellant uses of CFCs effective in 1978).

4. Fifteen years ago, scientists assumed ozone depleted only at the Poles and at a rate of about one percent annually. But a new government panel sponsored by NASA estimates a 1.7 percent loss in the latitudes from Florida to Pennsylvania and three percent from Pennsylvania north to mid-Canada. These discoveries are alarming and, as indicated by Senator Max Baucus in an address to the Senate, "[a]n ozone hole over the darkened ice-sheet of Antarctica when the Sun is low presents a much different threat than unrestrained ultraviolet radiation pounding on the surface of the ocean when the Sun is high in the sky." 134 CONG. REC. S2110 (daily ed. March 14, 1988). According to EPA estimates, the increased ultraviolet light from only one percent depletion will result in a three to six percent increase in the rate of most skin cancers. Gleick, *supra* note 2, at 30.

5. According to Adrian Tuck of the National Oceanic and Atmospheric Administration, the level of lethal chemicals was 50 times higher than normal and comparable to that found in the Antarctic where dramatic ozone depletion occurs each spring. *Arctic Data Raises Fear of Wider Ozone Depletion*, Boston Globe, February 18, 1989, at 1, col.1. Scientists are also alarmed by new evidence that the chemistry causing ozone depletion can take place at higher temperatures than those found in the Arctic circles. *Id.*

6. Chlorine destroys stratospheric ozone (03) by "stealing" ozone's third oxygen atom. The result is a free oxygen atom and a highly reactive radical, chlorine monoxide, a compound just as destructive as the chlorine element itself. Comment, *The Montreal Protocol: Confronting the Threat to the Earth's Ozone Layer*, 63 WASH. L. REV. 997, 1000, n.21 (1988).

Warnings regarding the extraordinarily destructive power of CFCs should be heeded. It has been postulated that one molecule of chlorine can destroy as many as 100,000 molecules of ozone. If this estimate is accurate, the ultimate effect of an annual release of approximately one million tons of CFCs would be grave. *Ozone Layer Depletion: Hearings Before the Subcomm. on Health and the Environment of the House Committee on Energy and Commerce*, 100th Cong., 1st Sess. 15-16 (1987) (statement of Professor F. Sherwood Rowland, Department of Chemistry, University of California at Irvine) [hereinafter *Hearings*].

production of CFCs as refrigerants began in 1931 and, by the end of World War II, scientists had discovered CFCs' remarkable propellant properties as well.[7] Currently, CFCs are also used as blowing agents, producing approximately three billion pounds of plastic raw materials.[8] Both non-toxic and non-flammable, CFCs have proven ideal for industrial uses because they are chemically inert. In other words, they are immune to decomposition or oxidation in the atmosphere. It is this ability of CFCs to withstand quick destruction that makes them so environmentally damaging. Instead of being destroyed in the lower atmosphere, these chemicals rise to the stratosphere where they slowly decompose in the sunlight, giving off deadly chlorine atoms.

In addition to their ozone depleting capabilities, CFCs also contribute to global warming by absorbing energy that is normally emitted back into the stratosphere. Accumulated in the atmosphere, these gases create a virtual blanket around the earth's surface, resulting in an atmospheric temperature rise known as the "greenhouse effect."[9] Carbon dioxide is by far the most prevalent of these "greenhouse gases." Of the trace gases which account for approximately one-sixth of the entire gas total, however, CFCs account for approximately one-third.[10] Notably, too, CFCs are increasing more rapidly than any other type.[11]

Because of their two-fold capability for assaulting the earth's atmosphere, CFCs clearly pose a threat to the global environment. Frustrating a solution to this threat is the virtual impossibility of pinpointing and controlling all of the sources of these chemicals: CFCs are produced and used all over the world, yet the damage is occurring where we can be almost certain that no CFCs are being produced — in Antarctica. Even if it were possible to somehow trace all of the sources of these hazardous chemicals, prior international accords offer little

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7. These two uses alone probably account for the dramatic changes in American lifestyles that ushered in the post-war period. For instance, CFCs as coolants made large air-conditioned areas such as shopping malls, high-rises and indoor stadiums a reality. Air conditioning is arguably the factor most responsible for the development of the Sun Belt. The chemical's importance to the U.S. is also demonstrated by the 100 million auto air conditioners currently in use. Weisskopf, *CFCs: Rise and Fall of a Chemical Miracle*, Wash. Post, April 10, 1988, at A1, col. 1.

8. *Id.*

9. Comment, *Thinning Air, Better Beware: Chlorofluorocarbons and the Ozone Layer*, 6 DICK. J. INT'L L. 87, 92 (1987). Current measurements estimate the annual rise in global temperatures due to increased atmospheric concentrations of gases to be 0.5 degree centigrade. *See* Comment, *supra* note 6, at 1000, n.24.

10. *Hearings*, *supra* note 6, at 253. (statement of David A. Wirth, Senior Project Attorney, Natural Resources Defense Counsel).

11. *Id.*

guidance for solving environmental problems where responsibility cannot be apportioned. A solution to the problem of ozone depletion thus depends on unprecedented international cooperation.

III. THE ROAD TO MONTREAL

The dramatic development of environmental law that occurred in the 1970s and 1980s was largely a response to local and national pollution problems in developed countries. Despite this heightened environmental conscience in some countries, the international community was ill prepared to address the possibility of a global catastrophe produced by destruction of the earth's ozone layer. The threat of ozone depletion barged onto the international agenda before a legal or institutional framework had been constructed to address such a threat. The Montreal Protocol is therefore exceptional as the global community's quick response to this challenge, especially when viewed in contrast to the international agreements that predated it.

A. Early International Environmental Precedents

One of the earliest cases recognizing problems with the international transport of pollutants, the 1941 Trail Smelter Case,[12] provided the first recognition of a state's responsibility for pollutants it could not contain within its boundaries. Still, the case sparked no international dialogue on the matter. In oft-cited language, the international tribunal that heard the case noted only that "no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the property or the persons therein. . . ."[13]

The Corfu Channel Case eight years later was no more enlightening.[14] The court there recognized only ". . .every State's obligation not to allow knowingly its territory to be used contrary to the rights of other states."[15] While these two cases provided a starting point, the decisions were simply too narrow to deal adequately with the problems caused by pollution from greatly expanded worldwide economic activity. As the decades following World War II brought increased levels of industrial development all around the world, international environmental standards noticeably lagged.

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12. Trail Smelter Case (U.S. v. Can.), 3 R. Int'l Arb. Awards 1905 (1941).
13. *Id.* at 1965.
14. Corfu Channel Case (U.K. v. Alb.), 1949 I.C.J. 4.
15. *Id.* at 22.

B. Previous Environmental Negotiations

Seemingly overnight, an international agenda on the problems of pollutants came sharply into focus in the early 1970s. The most likely forum for addressing these problems, the United Nations ("UN"), responded by sponsoring the United Nations Conference on the Human Environment in Stockholm in June of 1972. While the Stockholm Conference failed to resolve the difficulties associated with unprecedented levels of transnational pollution, the Conference did result in two significant accomplishments. First, it produced a twenty-six principle Declaration, which, while according countries the right to exploit their own resources, explicitly acknowledged that every nation has a responsibility to ensure that such exploitation does not damage the environment beyond its boundaries.[16] The Conference also led to the 1973 establishment of the United Nations Environmental Programme ("UNEP"), designed specifically to stimulate environmental awareness.

Although the UN has made other sporadic attempts to deal with transnational pollution,[17] it is essentially UNEP which has forged an international consensus on the ozone depletion issue.[18] After a successful decade of sponsoring projects and cooperative ventures, UNEP organized the Conference of Plenipotentiaries on the Protection of the Ozone Layer in Vienna in 1985.[19] This Conference, though it did not achieve its original goal of a draft protocol,[20] was in itself a striking

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16. *Declaration of the United Nations Conference on the Human Environment, Report of the United Nations Conference on the Human Environment*, at 3, U.N. Doc. A. CONF. 48/14/Rev. 1, U.N. Sales No. E.73.II. A.14. (1972). The Declaration however, included no substantive provisions, and thus, was of limited assistance to drafters of a treaty intended to impose specific limits on ozone depleting chemicals.

17. Seven years later after the Stockholm Conference, the U.N. sponsored the Geneva Convention on Long-Range Transboundary Air Pollution. Convention on Long-Range Transboundary Air Pollution, Geneva, Nov. 13, 1979, U.N. Doc. ECE/HLM.1 R.1 (1979), *reprinted in* 18 I.L.M. 1442. That meeting, too, while successful at developing a process for the exchange of information on air pollutants, produced no substantive guidelines on reductions. The agreement's only substantive provision, article 2, contains a vague command that the participants "gradually reduce and prevent air pollution, including long-range transboundary air pollution." 18 I.L.M. at 1443.

18. Only four years after its inception, the Programme identified ozone depletion as one of five areas deserving of priority treatment. *See generally* Smith, *The United Nations and the Environment: Sometimes a Great Notion?*, 19 TEX. INT'L L. J. 335, 338 (1984).

19. *Proceedings of the Governing Council at its Thirteenth Session*, United Nations Environment Programme, 47 Doc. UNEP/GC.13/16 (1985) [hereinafter Vienna Conference].

20. One point of contention preventing the establishment of the protocol was the discrepancy between the U.S. proposal for a total international aerosol ban and the

accomplishment. It produced a treaty, the Vienna Convention for the Protection of the Ozone Layer,[21] and, more importantly, it marked the first time in history that the international community adopted anticipatory safeguards to an environmental threat.

While the Convention adopted in Vienna contained no substantive provisions, it was combined with the resolutions from the Conference to create a framework for the Montreal Protocol. For instance, the Convention included a resolution to convene a series of international workshops on "both short and long term strategies to control equitably global production, emissions and uses of CFCs, taking into account the particular situation of developing countries as well as updated scientific and economic research."[22] Participants also authorized UNEP to "convene a Diplomatic Conference, if possible in 1987, for the purpose of adopting such a protocol."[23] The Convention also imposed obligations on signatories to exchange research, cooperate in the formulation of standards, and adopt domestic legal or administrative measures to protect human health and the environment from ozone-depleting chemicals.[24] These extensive provisions, while only a first step, provided the baseline for future negotiations. Given the lack of any effective environmental law precedents, the Convention must be praised for achieving a new level of cooperation. More importantly, the drafters who met in Montreal came equipped with knowledge of the Convention's deficiencies. Thus, once the groundwork was laid in Vienna, the participant nations were qualified to conclude an accord that would address the most obvious limitations in previous international negotiations — an absence of both substantive controls and incentives that encouraged full participation by the global community.

C. The Montreal Protocol

As signatories to the Vienna Convention suspected, deep cuts in global consumption and production of CFCs were required to change current ozone depletion rates. Accordingly, the Protocol contains rigor-

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EEC recommendation for only a thirty percent reduction in aerosol use, bolstered by limits on future CFC production capacity.

21. Vienna Convention for the Protection of the Ozone Layer, March 22, 1985, *reprinted in* 26 I.L.M. 1516 (1987) [hereinafter Vienna Convention]. (The Vienna Conference refers to the 1985 meeting; the Convention to the resultant treaty.)

22. *Id.* at 1523.

23. *Id.*

24. *Id.* at 1529-1530. Article 2 of the Convention also includes a dispute resolution provision, but there is no express obligation for signatories to arbitrate before litigating claims in the International Court of Justice.

ous limitations on production, consumption and trade of chemicals associated with the main sources of ozone depletion. The Protocol also takes an innovative approach to the issue of enforcement, adding incentives for countries to join the agreement.

1. Substantive Limits

The Protocol divides the eight chemicals it regulates into two groups, each having different schedules for reduction. Group I, consisting of five fully halogenated CFCs, is scheduled for a freeze at 1986 use levels to take effect January 1, 1989.[25] A thirty-percent reduction over the next three-year period will then be followed by an additional twenty-percent cut by January 1, 1999.[26] The treaty also freezes use at 1986 levels for a second group of three halons,[27] but these limits do not begin until January of 1991.

2. Impetus for Widespread Participation

To encourage global compliance, the Protocol bans signatories from importing CFCs or products containing them from any country not yet a party to the agreement.[28] Exports from signatories to non-signatories are to be banned unless they are determined to be in compliance with the reduction measures outlined in the Protocol.[29] The accord also prohibits signatories from reaching agreements with non-signatories which would provide the latter with financial assistance to produce controlled substances.

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25. The Protocol, *supra* note 1. The agreement gives participating countries six months to effect the reductions, thus, the freeze will actually begin in approximately July of 1989.

26. *Id.* Combined, these limits set a 1999 deadline for a fifty percent reduction in total CFC production, but do not guarantee reductions for any one chemical. Each chemical within a group is assigned an "ozone depletion weight", a measure of its relative potential ability to destroy ozone molecules, and production of either CFCs or halons, while limited to the 1986 totals, can be comprised of any combination of chemicals within the group.

27. *Id.* Halons, most commonly found in fire extinguishants, are chemicals having properties similar to CFCs. They are regulated separately under the agreement because they are currently produced in far smaller quantities and less is known about worldwide production and use of them. They are however, believed to be substantially more potent at destroying the ozone layer than CFCs.

28. 26 I.L.M. at 1554-1555.

29. *Id.* The Protocol suggests signatories are to refrain from exporting to non-signatories any technology for producing or utilizing the controlled substances and are to avoid any new subsidies or aid for exports of controlled products or substances to non-signatories. *Id.*

The Protocol also calls for multilateral and bilateral cooperation, specifically cooperation through international organizations on research, exchange of information, and development of public awareness. The accord establishes requirements for data reporting, calling for UNEP to convene a meeting of government experts to recommend to the parties measures for coordinating data on production, imports and exports. Emphasizing technology, the Protocol calls for reductions in emissions of controlled substances as well as the development of alternative chemicals and chemical products. Expanded technical assistance is also urged, particularly in helping the developing nations to comply and make the transition to new chemicals and technologies.[30]

Clearly, an enormous degree of cooperation was necessary to effect these extensive provisions. But many participants have acknowledged that agreement would never have occurred absent solid leadership from the United States, a major producer of CFCs. As early as 1978, the United States played a leadership role regarding CFC controls by enacting a near-complete domestic ban on aerosol use. Beginning in the fall of 1986 and extending through the spring of 1987, the U.S. took the lead, sponsoring a series of diplomatic initiatives and bilateral scientific and policy missions. The strong influence of the United States is also evident in the structure and concept of the final treaty — which is almost identical to the one the United States began advocating in early 1986. According to Richard Benedick, the principal U.S. negotiator for the Montreal treaty, absent the leadership of the American government, the negotiations may have lacked the "reasoned debate" that "emphasize[d] science as a neutral basis for discussion. . . ."[31]

Input from the American private sector and Congress also assured the treaty's success. United States-based environmental groups, making fastidious use of the international media, helped inform the policy makers and people of other nations of the dangers of ozone layer depletion. The U.S. Congress also gave an all-important urgency to the treaty negotiations by serving notice to the international community that if an acceptable agreement was not reached, the U.S. was prepared to legislate unilaterally with trade restrictions against countries not accepting responsibility for CFCs.

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30. 26 I.L.M. 1557. Some of the most successful international agreements have stressed diversity among contributors, including such varied groups as government officials, public interest groups and legal scholars. *See* Robinson and Waxmonsky, *The U.S.-U.S.S.R. Agreement to Protect the Environment: 15 Years of Cooperation*, 18 ENVTL L. 403, 407 (1988).

31. 19 Env't Rep. (BNA) No.8, at 274 (June 24, 1988).

IV. THE PROMISE OF THE PROTOCOL: SURMOUNTING OBSTACLES TO PREVENTIATIVE REGULATION

Collectively, both the limits and the sanctions found in the treaty effect an unusual approach to an international environmental problem. But these features alone cannot explain the surprising success of the negotiations. The mechanisms employed in the Protocol must also be appreciated as the international community's first attempt to surmount two of the most difficult barriers to effective environmental regulation — scientific uncertainty and economic impact.

A. Scientific Uncertainty

David Doniger of the NRDC probably summed up the difficulty with environmental regulation best when he noted the "high burden of proof" that is needed to "convict a chemical."[32] General indifference to early warnings has been a consistent problem for environmental regulators, and the experience with CFCs has been no different.[33] Doniger suggests that had the world properly dealt with early warnings and phased out CFCs in the early 1970s, we would not now be facing detectable depletion.[34] But the usual slowness to action has been even more striking with regard to ozone because of the huge gaps in scientific knowledge.[35] Even environmentally responsible governments and industries have been hesitant to act until the harmful impacts of certain chemicals have become clearly manifest. Yet clear evidence of harm often does not occur until long after chemicals are released.[36]

Atmospheric science, the discipline responsible for discovering the ozone problem, is still relatively young and untested. Thus, the normal

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32. Weisskopf, *supra* note 7.

33. Action on the early scientific findings stalled when Ronald Reagan took office — a 1979 EPA recommendation for a freeze on U.S. production went unheeded and DuPont halted its 15-year search for CFC substitutes — but interest reappeared in 1985 when researchers reported a hole in the ozone layer over Antarctica. Based on these recent findings, Dupont has reversed its original position and on March 24, 1988, announced its intention to halt production of CFCs altogether. *DuPont Will Stop Making Ozone Killers*, L. A. Times, March 25, 1988, at 1, col.3.

34. *Id.*

35. In fact, there still is no scientific consensus on the current damage to the ozone layer. Gleick, *supra* note 2. As summed up in a statement of Irving Mintzer, head of the Climate Program of the World Resources Institute, "we're asking people to reduce the risk of an invisible, odorless, colorless gas because we perceive that there will be a risk of destruction to an invisible shield, allowing penetration of invisible rays." *Id.*

36. *See supra* note 2.

difficulty preventative regulation has with scientific uncertainty is exacerbated when confronting ozone depletion. Even the most dire of predictions from computer models did not prepare scientists for the discovery of a hole in the ozone layer.

The effort to make such models more accurate has been hampered by the inability or failure to collect complete and consistent data.[37] Satellite information on ozone was not recorded prior to the last decade, a factor which has frustrated attempts to develop a reliable sense of ozone's long-term behavior. Inadequate data is not the only distraction for those addressing ozone depletion, however. There is still debate in the scientific community as to the severity of the ozone problem. Some scientists question the entire hypothesis on which ozone depletion theories rest, postulating instead that the interaction of chlorine and ozone is closely tied to the 11-year cycle of solar radiation and that the next few years are likely to bring a renewal of ozone as solar activity peaks.[38]

Uncertainty as to the relative effectiveness of various control strategies also remains a significant problem. Accordingly, there has been a substantial proclivity, particularly on the part of industry, to resist regulation until the research picture is complete. Even when DuPont announced its intention to halt CFC production,[39] it did not support unilateral U.S. moves and refused to submit a schedule for its phaseout. Advocating "extreme caution," the company's Freon Product Division Environmental Manager, Dr. Joseph Steed, warned that from DuPont's standpoint, eliminating the potential risk of depletion by taking an "unknown or potentially greater risk . . . using replacement products that have not been proven safe . . . is not acceptable."[40] The environmental community on the other hand, discounts the potential threats from alternatives as "minimal when compared with the threat of underestimating the problem and failing to impose adequate [and timely] controls."[41]

Remarkably, the Montreal negotiations did not succumb to such

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37. In fact, U.S. negotiator Benedick doubts that even the scientific knowledge of five years ago would have been an inadequate foundation for the treaty. Stanfield, *Global Guardian*, National Journal, Dec. 12, 1987.

38. *See* Gleick, *supra* note 2.

39. *See supra* note 33.

40. Steed, *Global Cooperation, Note Unilateral Action*, 5 ENVTL. F. 15, 19 (July/August 1988). The auto industry also supports the treaty but opposes any unilateral U.S. action. 18 Env't Rep. (BNA) No. 5, at 479 (May 29, 1987).

41. Shimberg, *A Sound Framework, A Flawed Regulation*, 5 ENVTL F. 15,19 (July/August 1988).

excuses for inaction. Instead, the treaty stands on a solid scientific foundation, relying on the most modern scientific techniques available, including complex computer modeling, satellite measurements and advanced atmospheric chemical theories. Rather than adopt an all too typical "wait and see" attitude, the drafters created a structure for implementing future controls if the scientific evidence indicates they are required. One article for instance, calls for parties to regularly assess new information and to meet periodically to adjust control measures.[42] Thus, the treaty not only manages current knowledge, but also demonstrates remarkable foresight and flexibility.[43]

B. Differential Economic Impacts

Perhaps the most difficult obstacle facing international environmental regulators is the uneven distribution of costs and benefits involved in imposing international controls. While all nations are certain to be affected by the depletion of the ozone layer, not all nations will be affected to the same degree. Considering that the annual world market for CFCs now approaches $2.2 billion, controls are likely to inflict disproportionate economic impacts upon countries heavily dependent upon CFC use or production. To overcome this problem, some of the most important provisions of the Protocol are intended to minimize the adverse economic effects on signatory countries. Prior international efforts were often hampered by the inability of drafters to recognize and make concessions for these differences. Like the acid rain deliberations between the U.S. and Canada, international agreements have failed largely because different players often have conflicting concerns. Thus, the agreement in Montreal is most unique for its accommodation of various parties' special economic circumstances.

For instance, at one point during the negotiations, progress stalled

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42. 26 I.L.M. 1556. The first of these meetings was held in March of this year in Great Britain. In April, Finland will host the first of the regular review meetings specified by the treaty.

43. As noted by then EPA Administrator Lee Thomas and head of the U.S. Delegation to Montreal, the agreement "keeps the door open for further action if it becomes necessary." 18 Env't Rep. (BNA) No. 21, at 1347 (Sept. 18, 1987). But even before the final ratification of the treaty, its flexibility was evident. A mere four months after the accord was signed, thirteen chemical companies from seven nations met and agreed to accelerate toxicity testing on CFC alternative compounds. These representatives also agreed to a tentative schedule for additional testing and plans for the publication of interim results. 18 Env't Rep. No. 41, at 2122 (Feb. 5, 1988). And by December of 1988, several non-governmental organizations, numerous countries, and UNEP itself was calling for a stepped up reassessment of the limits due to mounting scientific evidence. *Id.*

when the Soviet Union voiced fears over what the strict controls would do to its rather inflexible economy. Threatening to refrain from signing the accord, the Soviets requested special permission to utilize the production of CFC plants already under construction. To assure an orderly phaseout, an express clause was inserted which extended the U.S.S.R. permission to complete CFC production provided for in its most recent five-year plan. Article 2(6) allows the Soviets to add the output of the new plants to the 1986 base figures, for a maximum annual CFC consumption of 0.5 kilograms per Soviet citizen.

Final agreement on the treaty was also threatened by the European Economic Community's ("EEC") last-minute demand that it be treated as a single entity. Non-aligned participants opposed the demand, primarily because a question remained as to whether the treaty would be enforceable without ratification by all twelve individual member countries of the Community.[44] As now written, the compromise provides for the treatment of the EEC as a single entity, but only after all the member nations have individually ratified the treaty. Thus, the agreement permits the apportionment of production and consumption of the controlled chemicals among the Community's member nations, provided every member nation signs the treaty and the Community taken as a whole meets the general requirements of Article 2.[45]

The most significant response to differential economic impacts involves the exceptions granted to "developing countries."[46] Participant developing countries now using modest amounts of the chemicals have been allowed to increase consumption for ten years before being required to abide by the restrictions of the accord. Increases in developing countries' consumption will, however, be limited to a maximum of 0.3 kilograms per capita per year.[47] To allow for export to these quali-

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44. The United States also voiced opposition to common treatment, specifically expressing fear that the new approach would set a dangerous precedent for future international negotiations. Complete abandonment of the treaty was averted only through frantic negotiations moderated by UNEP executive Mostafa Tolba and Ambassador Winifred Lang, head of the Austrian delegation and chairman of the conference to negotiate the Protocol. *See* 18 Env't Rep. (BNA) No. 21, at 1347 (Sept. 18, 1987).

45. *See* 26 I.L.M. 1552. As of March of 1989, all 12 members of the EEC had signed the treaty.

46. Although Article 5 of the treaty classifies all signatories as either developed or developing, a definition of the term "developing" is conspicuously absent from the accord. Unfortunately, history suggests that as additional countries come under the agreement, the omission will inevitably become the topic of future debate. *See* 26 I.L.M. 1555.

47. These countries currently have an average consumption of 0.2 kilogram per capita per year. *See* 18 Env't Rep. (BNA) No. 21, at 1347 (Sept. 18, 1987).

fying developing countries, producing participants will accordingly be allowed to increase production by ten to fifteen percent.

This pragmatic attitude towards the needs of developing countries was critical to universal acceptance of the accord. At the time of the 1972 Stockholm Conference, Third World nations regarded environmental protection as a luxury of the rich, a ploy by the industrialized nations to keep developing countries poor. But the attitude of these nations is changing, due in large part to the shrewd paternalism of the U.S. Rather than imposing its point of view upon countries with needs divergent from its own, the U.S. is slowly convincing developing countries that economic development can and must be achieved without destruction of natural resource bases. By pointing to its own grave mistakes and by adopting stringent domestic measures, the U.S. has strengthened and extended its commitment to reducing CFC use. Fortunately, there is some evidence that this new approach is working: As of March of 1989, forty-four nations representing ninety-two percent of the world's CFC production capacity had either signed or expressed their intention to sign the Montreal Protocol.[48]

V. Beyond The Montreal Protocol

Although the Protocol represents an impressive first step, concern that it did not go far enough became evident almost immediately after its signing. For instance, the Protocol does not address any chlorine compounds other than five fully halogenated CFCs and three halons, even though there is mounting evidence that there are more environmentally damaging substances in use. Also, the signatories soon realized that the provision which permits developing nations to increase use of CFCs over the next decade could result in as much as a fifty percent rise in worldwide consumption.[49] Thus, by the time the Protocol was ratified by the United States Senate, even its sponsors were doubting the effectiveness of the adopted controls.[50]

The true test of the treaty will be whether it can provide a suitable foundation for strengthening controls on current producers and extending those controls to all potential producers. These criteria must be

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48. Moritz, *Third World and Ozone Blackmail*, Christian Science Monitor, March 23, 1989, at 18.

49. *See also infra* note 50.

50. Senator Claiborne Pell (D-R.I.) warned that the Protocol's reduction schedule was "neither sufficiently rapid nor sufficiently large in magnitude," while Senator John Chafee (R-R.I.) forthrightly stated that the version of the treaty signed in Montreal was too weak, especially in light of developing scientific findings. Wright, States News Service, March 14, 1988.

fulfilled in light of accumulating scientific evidence suggesting that the problem of ozone depletion is worse that originally suspected.

A. The Call for More Stringent Controls

Surprisingly, it has been the European Community, and not the United States, that has stepped up the fight against ozone destruction following the signing of the Protocol. In early March of 1989, the twelve member nations of the European Community met in Brussels and agreed to an immediate eighty-five percent reduction with total elimination by the year 2000. Just days after the Brussels meeting, a conference sponsored by British Prime Minister Margaret Thatcher gathered representatives of 123 nations in London to discuss, among other things, extending the accelerated phaseout schedules to all of the treaty's signatories.[51] While this goal was not achieved in London, the EEC, the United States and Canada did vow to go beyond the Protocol's requirements and completely phaseout CFC use by the turn of the century.[52]

The push for accelerated timetables however, has not met with universal acceptance. Third World countries, embarking upon economic developments that will necessarily involve large-scale dependence on industries that use CFCs, are simply not willing to forego growth they view as crucial.[53] According to the developing nations, it is the industrialized world, grown rich while creating the environmental crisis, that is most responsible for the current damage and capable of bearing the burdens associated with CFC elimination.[54] There is also some suspicion on the part of developing nations that the call for steep, immediate cuts by the West is an attempt to prevent poorer nations

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51. Participants at the London meeting included China, India and the Soviet Union, countries constituting the most vocal and influential opponents of accelerated phaseout schedules. The EC's action apparently jolted the U.S. into action. Just days after the unscheduled Brussels conference, William K. Reilly, President Bush's new EPA Administrator, called for the United States to match the European plan to speed up the timetables for phaseout.

52. President Bush, however, made it clear that the U.S. phaseout was conditioned on the development of adequate substitutes. Lemonick, *First Aid for the Ozone Layer: The Movement to Ban CFC's is Starting to Roll*, TIME, March 13, 1989, at 50.

53. China for instance, has recently completed 12 CFC production plants. The need for the capacity is unquestionable. Although the country has a population of 1.1 billion, fewer than 1 in 10 families have a refrigerator. Stammer, *Saving the Earth: Who Sacrifices?*, L. A. Times, March 13, 1989, at 1, col.6.

54. Stevens, *Ecological Threats, Rich-Poor Tensions*, N. Y. Times, March 26, 1989.

from becoming principal players in the global economy.[55] Lastly, Soviet and Chinese officials have balked at the idea of accelerating the phaseout schedules without more scientific evidence.

Because the revisions suggested in London supplant the very provisions that gained the treaty widespread acceptance from Third World nations, it will be a considerable challenge to get these nations to adopt the changes. The thought, favored by certain politicians and governments, that a period of dirty growth is unavoidable during large scale industrialization, must not be permitted to seduce regulators into sacrificing the health of people, if not the future of the planet. Switching to CFC substitutes is not expected to be cheap or easy. It is estimated that worldwide restructuring of equipment to handle CFC alternatives will cost $6 billion over the next decade.[56] According to Archie Dunham, a vice president at DuPont — the largest producer of CFCs — this figure pales in comparison to the cost of industry gearing up to make products such as refrigerators, air conditioners, and cleaning equipment that can operate with the new chemicals.[57] But the current hesitation on the part of Third World countries to agree to any controls, even the lax ones contained in the Montreal Protocol, unless they are given certain economic assurances from the West must be addressed. If populous Third World countries like China and India do not stop CFC production, the steps taken by the West, no matter how drastic, will be futile.

B. Building on the Protocol

In the face of the Third World's general reluctance to join the Protocol, it is imperative that industrialized nations take concrete steps to accelerate global participation. Developing countries must be extended trade, credit and/or direct financial assistance as incentives to join in the Protocol. Most importantly, Third World nations must be given assistance in developing and financing CFC-free industrialization.[58] Another idea suggested in London by India and China calls for

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55. Suspicions regarding motives have often been a point of contention in international negotiations. Similar charges were levied in the late 1960s against the United States and the Soviet Union for their attempts to curb the proliferation of nuclear weapons. And the Brazilian government has resisted much of the environmentalism directed towards its rainforest, claiming that it is merely a plot to keep the country poor. Giaimo, *Deforestation in Brazil: Domestic Political Imperative - Global Ecological Disaster*, 18 ENVTL. L. 537, 554-555 (1988).

56. Stammer, *supra* note 53.

57. *Id.*

58. China and India for instance, made it clear at the London Conference that

the creation of an international fund financed by developed nations to help developing nations switch to safer chemicals.

Some of the more innovative programs utilized in other areas of environmental law need to be expanded and adapted for use in the fight against ozone depletion. For instance, debt swaps, used most successfully to prevent deforestation in South America, could be implemented to compensate Third World countries for agreeing to halt CFC proliferation. Principal and interest payments owed to international lending organizations could be reduced by developed countries in return for the forbearance of CFC use and production. Such guarantees could be required in the future when new loans are made because international aid agencies such as the World Bank are now much more comfortable with conditioning loans on the recipient country's adoption of environmentally sound policies.[59]

Another promising option is one adopted just recently at a United Nations conference focusing on international shipments of hazardous waste. When delegates from developing countries balked, a clause was inserted into a draft treaty which expressly recognized the wealthier countries' responsibility for bearing a larger portion of the burdens of control.[60]

C. Unilateral Moves by the United States

The United States must, as it has before, take the lead in the fight against CFC use and production. Primary attention must be focused on the search for CFC alternatives; our own phaseout and future Third World development cannot be achieved without success in this area. Since the technologies to recover and recycle CFCs are available or discoverable, the government must develop appropriate policies to encourage research and implementation of these technologies, including economic incentives for stepped-up research projects. The United States must also make a full scale effort to educate and persuade its citizens to prevent CFC releases. The first step in this effort could be the offering of cash incentives to businesses and consumers for the return of discarded air conditioners and refrigerators.

The United States government must also be willing to make unpopular political moves when necessary. Senator Chafee, for instance, has introduced a bill that would quickly phase out CFCs domestically

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they will not accept any provisions that deduct the added costs of CFC substitutes from their foreign development assistance. *See* Stevens, *supra* note 54.

59. *Id.*

60. *Id.*

and eventually ban imports that are products of or contain CFCs, unless the country of origin has a similar phaseout program. Though this may not be economically advantageous to the U.S., it would be an effective weapon against potentially powerful Third World objections, especially if all developed countries were to adopt similar domestic measures. The United States should also consider using its trade leverage to effect an immediate worldwide ban on aerosol sprays.[61]

The government must also be willing to explore other alternatives if projected reductions in CFC use fail to materialize as rapidly as expected. A proper starting point would be the promulgation of new regulations to prohibit the use of CFCs in cleansing agents by the nation's armed services. Finally, if alternatives are not developed quickly enough by industry, the government must be willing to establish a tax on ozone depleting chemicals. The EPA must also forge ahead with its proposal to impose a regulatory fee on CFC producers in order to remove any windfall profits generated from future supply restrictions.[62]

VI. CONCLUSION

The difficulties of achieving international consensus on effective regulations to protect the global atmosphere are enormous. They are dwarfed, however, by the potentially catastrophic consequences of failing to reach such consensus. The Montreal Protocol represents a momentous advance in international environmental cooperation, but it will not by itself solve the ozone depletion problem. The Protocol's controls must be strengthened, and the economic concerns of developing countries must be addressed to achieve a more rapid phaseout of CFCs. It is simply unfair to expect nations which consume a disproportionately small share of the world's resources to bear most of the burden for a crisis created largely by the developed world.

The limited success achieved by the Montreal Protocol to date has raised the possibility of conquering ozone destruction. Now it has become necessary for the global community to recast the treaty in a form that will be fully effective. The ramifications of such an amended treaty's success will be significant beyond the problem of ozone depletion. For if the global community is able to overcome this one problem,

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61. Despite a near total ban by the United States, many countries have not followed suit and are still using CFCs as propellants for aerosols.

62. *See* S3 Fed. Reg. 30604 (1988) (to be codified at 40 C.F.R. pt. 82) (proposed Aug. 12, 1988), for a more detailed explanation of the EPA's attempt to deal with unintended economic consequences of regulations adopted to implement the Montreal Protocol domestically.

it will improve its chances of coping successfully with future environmental crises that are expected to be even more politically and economically challenging.