

The Experience of the Montreal Protocol: Particularly Remarkable, and Remarkably Particular

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I.

INTRODUCTION

By most accounts, the treaty process for addressing ozone depletion is an unqualified success. It has achieved near universal participation, with 170 states party to the Montreal Protocol, and a substantial fraction of those party to the London, Copenhagen, and Montreal Amendments to the Protocol.¹ It has fundamentally changed the way certain industries conduct their business, already creating in some countries a complete phaseout of certain classes of chemicals.

The process itself is particularly impressive. Negotiations began under conditions of uncertainty, over both the existence and extent of environmental harm and the costliness of taking action to mitigate it. The Vienna Convention, the Montreal Protocol, and subsequent amendments have created the ability to adapt to changes in scientific understanding of the problem and its potential solutions. The environment is responding as well. Although it is too soon to expect to see improvement in the ozone layer, measurements indicate that it is deteriorating at a decreasing

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1. As of September 1999 171 states were party to the Vienna Convention, 170 to the Montreal Protocol, 136 to the London Amendments to the Montreal Protocol, 99 to the Copenhagen Amendments, and 24 to the Montreal Amendments. Ozone Secretariat, "Status of Ratification/Accession/Acceptance/Approval of the Agreements on the Protection of the Stratospheric Ozone Layer," <http://www.unep.org/ozone/ratif.htm> (last visited Sept. 11, 1999).

rate, and concentrations of some ozone depleting substances in the atmosphere are starting to decline.²

Moreover, the process operated under circumstances that made its success seem unlikely. The Montreal Protocol was the first global environmental treaty to address an environmental problem that was still only theoretical. The idea that halogenated compounds could destroy ozone had been demonstrated in the laboratory, and Sherwood Roland and Mario Molina had theorized that human-created chlorofluorocarbons (CFCs) could migrate into the stratosphere where the ozone layer protected the earth from harmful ultraviolet rays. But no one had seen the destruction of the ozone layer by these chemicals and, more importantly, no one had witnessed actual environmental damage resulting from this potential problem. This process addressed a truly precautionary issue in a way that had not previously been attempted on such a large scale.

In addition, there was uncertainty about the effects of regulation. Although industries in the United States had undertaken some research on substitute chemicals, no substitution was readily apparent and any were likely to be expensive. Industries were reluctant to agree to restrict the use of an important class of chemicals, and states were reluctant to make them bear such uncertain costs.

The ways in which this set of agreements has accomplished its goals are important to examine. The primary one involves the way the possibility for adjustments, of a variety of types, is integrated into the treaty process. The use of a Convention/Protocol structure allowed for official negotiations to begin when there was little consensus over science or the need to act, and create or deepen commitments once information became accepted. In a more radical move, the Protocol process allowed for non-negotiated adjustments to take place that would bind all signatories, thereby skirting some of the major difficulties in changing treaty obligations. Much work is done behind the scenes by Secretariat members or other committees that result in implicit adjustments as well as processes, in ways that smooth over potential problems before they become serious. In short, the treaty process is not rigid, but is constantly adjusting new situations.

2. S.A. Montzka, J.H. Butler, J.W. Elkins, T.M. Thompson, A.D. Clarke, and L.T. Lock, *Present and Future Trends in the Atmospheric Burden on Ozone-Depleting Halogens*, 398 *NATURE* 690, 690-93 (1999).

Although criticized by many for bowing to industry influence, the process has taken care to work within or create incentive structures that encourage industry action to protect the ozone layer. As a result, the change to substitute chemicals or manufacturing processes cost far less than many predicted, and caused less of a disruption in industrial activity than it could have.

Finally, the Montreal Protocol process broke new ground in addressing issues relating to developing countries. States that had not been the primary creators of the environmental problem and for whom global atmospheric protection ranked fairly low on any list of concerns, were given special consideration in order to bring them into a system of regulations in which they would eventually need to participate. Article 5 of the Montreal Protocol addresses measures to help developing states with an annual consumption of ozone depleting substances (ODS) less than .3 kg per capita. In particular, a well-specified financial transfer mechanism has provided the funding and technical assistance to Article 5 countries to reduce or eliminate the use of ozone depleting substances. Many efforts at addressing global environmental issues following the Montreal Protocol have adopted this approach.

The process of responding to ozone depletion has not been entirely simple. It has faced a number of unforeseen problems, some of them more serious than they appear; some less so. As a representative of the environmental group Friends of the Earth pointed out, "None of our models predicting when CFC releases will peak and when the ozone hole will close up take into account smuggling and large countries that don't comply."³ These difficulties, primarily relating to the thriving black market in ozone depleting substances and the uncertainty over developing country phaseout of these substances, are both in some ways side effects of precisely the things that made the Montreal Protocol successful. The black market arises in part out of the non-treaty ways states have chosen to implement the agreement.⁴ While not part of the agreement, these mechanisms of implementation were important in setting up the industrial incentives to create and use non-ozone depleting substances. It is thus a side effect, and probably not a fatal one. The possibility that large developing

3. W. Wayt Gibbs, *The Treaty that Worked — Almost*, 273 SCI. AM. 20 (Sept. 1995).

4. The black market is also made possible by some specific characteristics of ozone depleting substances that may not be at issue with other environmental issues.

countries may ultimately refuse to phase out their use of ozone depleting substances is an open question at this point but a greater potential danger. It is a more direct effect of the way the treaty enticed developing countries to join, and it too may not have had any reasonable alternatives. These potential difficulties should not, for now, overshadow the dramatic improvements the treaty has initiated.

Ozone depletion thus presented a number of regulatory challenges that the international system surmounted in creative ways. But compared to many global environmental agreements, ozone depletion had some characteristics that made it potentially easy to address. The scientific uncertainty was easier to resolve here than is likely to be the case in comparable issues. The industrial incentives in the states most responsible for ozone depletion could be made to line up relatively simply with an ultimate phaseout of the chemicals they depended on. Although widespread and important, the types of chemicals in question were also specific, human-created, and their uses more circumscribed than we are likely to find in newly-appearing environmental issues. In short, although the process of mitigating ozone depletion had difficult pioneering challenges, it has also benefited from a number of fortuitous factors. To that extent, it has been a remarkable treaty process, but a particular one as well.

II.

ADJUSTING OBLIGATIONS

One of the notable features of the Montreal Protocol process is the extent to which it is designed to allow for adjustments when scientific understanding or political willingness to address the issue changes. This flexibility was particularly important for a treaty that was negotiated when there was no clear evidence of human-induced destruction of the ozone layer and certainly no measurable effect or environmental damage as a result of such depletion. The major factors allowing for change in regulations include the type of treaty used to regulate, an additional adjustments process included in the treaty, and the existence and autonomy of bodies within the treaty organization that have the ability to study or suggest changes in various policies.

a. *Convention-Protocol Structure*

The use of a Convention/Protocol treaty structure allowed negotiation to begin when there was uncertainty about the extent of

the environmental problem, and a disinclination to take action under those conditions. While this regulatory format did not begin with the Vienna Convention and the Montreal Protocol, the experience with the ozone depletion issue popularized this approach, which is now seen as commonplace in international environmental regulation.⁵

The Vienna Convention for the Protection of the Ozone Layer creates a framework in which states agree to take “appropriate” (but unspecified) measures to protect the ozone layer, cooperate in scientific research, and exchange information.⁶ It indicates that the Conference of the Parties to the treaty “may adopt protocols” in order to create substantive obligations.⁷ The 1985 Convention was followed by the negotiation in 1987 of the Montreal Protocol on Substances that Deplete the Ozone Layer, which required specific abatement measures for ozone depleting substances. As laid out in the Vienna Convention, amendments to the Protocol can be made with a 2/3 majority vote and are then subject to ratification by the Parties.⁸ Only those that ratify the Amendments are bound by them, although states that ratify the Protocol are bound by any Amendments in force at the time of ratification. Amendments were agreed to in London in 1990, Copenhagen in 1992, and Montreal in 1997.

The Convention/Protocol process resulted in a more robust agreement, at an earlier point, than would have occurred if negotiations had only begun once serious abatement measures could have been agreed upon. The Montreal Protocol added specific abatement measures and the amendments added new regulated substances and new regulatory processes. The London amendments added regulations for carbon tetrachloride, methyl chloroform, and fully halogenated CFCs, as well as introducing the funding mechanism to provide assistance to developing countries.⁹ The Copenhagen Amendments added HCFCs, hydrobromide fluorocarbons, and methyl bromide to the list of controlled substances, and made the funding mechanism permanent.¹⁰ The Montreal Amendments adjusted the timetable for

5. James K. Sebenius, *Designing Negotiations Toward a New Regime: The Case of Global Warming*, 15(4) INT'L SECURITY, 110, 116-17. (1991).

6. Vienna Convention for the Protection of the Ozone Layer (1985), Article 2 (hereinafter Montreal Protocol).

7. Vienna Convention, Art. 8(1).

8. Vienna Convention, Art. 9(4, 5).

9. London Amms. to the Montreal Protocol (1990).

10. Copenhagen Amms. to the Montreal Protocol (1992).

phaseout of some substances and modified trade restrictions, including the creation of a licensing system to attempt to decrease the black market in ozone depleting substances.¹¹ An agreement that would have addressed all these issues could certainly not have been negotiated in 1985 or even 1987, and arguably is only because of the incremental action that further regulations were made possible within an existing framework.

b. *Adjustments*

It is astonishing that more has not been written about the Montreal Protocol adjustment system, which circumvents both of the standard approaches to the making of international environmental law.¹² It neither empowers a commission to make rules that states are allowed to opt out of, nor requires that all changes be ratified by all parties before they take effect. Unusual among treaties that follow the Convention/Protocol approach, the Montreal Protocol also allows for adjustments within the agreement. Adjustments require the consent of 2/3 of the Parties, representing a majority of both developed and developing countries (the latter part an addition of the London Amendments). They become binding on all Parties six months after they are formally notified about them, even those states that did not vote in favor of them.¹³

Adjustments have taken place at meetings of the parties and other negotiations and have addressed such issues as faster phaseout of certain chemicals. Many of the most dramatic changes in the phaseout schedule for various ozone depleting substances have come through adjustments rather than Amendments.¹⁴ For example, the original Montreal Protocol called for a

11. Montreal Amms. to the Montreal Protocol (1997).

12. Geoffrey Palmer, *New Ways to Make International Environmental Law*, 86 AM. J. OF INT'L L. 274-76 (1992)

13. Montreal Protocol (as amended), Art. 2(9)(d). [It is also worth noting that the ability of the Parties to make policy without the consent of some important actors was increased in the London Amendments to the Protocol. While the adjustment provision originally required that the 2/3 majority needed for passing adjustments include parties "representing at least fifty percent of the total consumption of controlled substances," that provision was replaced by the requirement of a double majority voting system (requiring a majority of both Article 5 and non-Article 5 countries) under the London Amendments.]

14. For a comparison, see Edith Brown Weiss, *The Five International Treaties: A Living History*, in EDITH BROWN WEISS & HAROLD K. JACOBSON, *ENGAGING COUNTRIES: STRENGTHENING COMPLIANCE WITH INTERNATIONAL ENVIRONMENTAL ACCORDS* 140-44 (The MIT Press, 1998).

freeze at 1986 levels for the main halons by 1993 for non-Article 5 countries. That was first adjusted in 1990 to a freeze in 1992 and a complete phaseout by 2000. In 1992 it was adjusted to consumption by 1994 at 25% of 1989 levels and a complete phaseout by 1996. Similarly, the initial Montreal Protocol requirement that developed countries cut their use of the major CFCs to 50% of 1986 levels by 1999 was ultimately adjusted to a complete phaseout by 1996.¹⁵ Similar adjustments were made for developing country parties.

The adjustments process circumvents the lengthy and uncertain negotiation and ratification process encountered by protocols and amendments, and has made substantive and dramatic changes in abatement obligations possible more quickly than would have taken place otherwise. It allows for changes when new information on environmental damage or technological options suggest that faster phaseout is necessary or possible.

c. *Autonomy of Secretariat and Role of Committees*

Both for the agreement as a whole and particularly in the case of the Multilateral Fund, the role of the organization's secretariats and decisionmaking bodies in modifying the way treaty obligations are implemented has been important. The Protocol and Fund Secretariats provide oversight and guidance as regulatory decisions are made, in ways that likely result in better decisions than would have been taken absent their involvement. The Protocol Secretariat, for example, prepares a report on implementation of the agreement for each Meeting of the Parties.¹⁶ The content of these reports are discussed at the meetings and any issues that arise are addressed there or referred to other committees.

The role of the oversight mechanisms within the functioning of the Multilateral Fund is particularly pronounced and valuable. The Executive Committee (the 14-state decisionmaking body known as the ExCom) and the Secretariat of the Fund could well have rubber-stamped all projects brought before them for proposed funding, from states and funding agencies, but gave indications early on that it would not. The ExCom at its third meeting rejected all the work programs put forth by the implementing

15. *Id.* at 140-41.

16. Owen Greene, *The System for Implementation Review in the Ozone Regime*, in *THE IMPLEMENTATION AND EFFECTIVENESS OF INTERNATIONAL ENVIRONMENTAL COMMITMENTS* 94 (The MIT Press, 1998).

agencies for being confusing and overlapping.¹⁷ This action came as a shock to the implementing agencies, and resulted in greater coordination among work programs. The Secretariat has taken on the oversight of projects as it packages the large amount of information received from implementing agencies for consideration by the Executive Committee. During its first few meetings the ExCom gradually delegated more and more responsibility to the Secretariat for commenting on proposals before meetings and returning those that it feels are not adequate to countries or implementing agencies for revisions prior to presenting them.¹⁸ Projects are also reviewed at several other stages, including by the implementing agency and the ExCom's Subcommittee on Project Review, but the Secretariat's review is generally acknowledged as the most important.¹⁹ The Secretariat's review of individual proposals also leads to consideration of policy issues, as issues that arise in particular projects with broader implications are put on the agenda for consideration by the ExCom. Further examples are discussed in the section addressing developing country concerns.

Other subsidiary bodies of the Montreal Protocol itself have been central in providing for changes as well. At their first meeting, the parties to the Protocol established four Technical and Economic Assessment Panels to advise them on various matters relating to the protection of the ozone layer.²⁰ The Parties have also established an Open-Ended Working Group, which negotiates issues between official Meetings of the Parties. It allows for continuity in discussion of issues and is a less politically-charged arena in which new concerns can be raised, before subject to actual negotiation or complaint.

Potential loopholes have been avoided as well, by the oversight made possible by the independence of subsidiary organs to take action without complete renegotiation. The Montreal Protocol, for example, allows for continued use of ozone depleting sub-

17. United Nations Environment Program, *Draft Report of the Third Meeting of the Executive Committee of the Interim Multilateral Fund*, UNEP/OzL.Pro/ExCom/3/18 (1991).

18. Elizabeth DeSombre Joanne Kauffman, *The Montreal Protocol Multilateral Fund: Partial Success Story*, in INSTITUTIONS FOR ENVIRONMENTAL AID 116-17 (The MIT Press, 1996).

19. Greene, *supra* note 16, at 102.

20. OZONE SECRETARIAT, HANDBOOK FOR THE MONTREAL PROTOCOL ON SUBSTANCES THAT DEplete THE OZONE LAYER 41 (3d ed. 1993). Two of the committees were later combined, leaving only three.

stances by parties “necessary to satisfy uses agreed by them to be essential.”²¹ Instead of leaving these decisions unregulated, the Meeting of the Parties in 1992 created a process for evaluating applications for exemptions based on essential use.²² It has denied a number of applications, and the denials have been upheld by the parties.

In short, the role that the secretariats, committees, and subsidiary bodies to the Conference of the Parties play in working behind the scenes has added flexibility to the static language of the Treaty in ways that make implementation of the agreement more successful. The combination of the overall Convention/Protocol process and the adjustments process, allow for adaptations to policies without the need to renegotiate and ratify the entire agreement for every change taken. These elements of flexibility have been essential in allowing the Montreal Protocol process to adapt to changing environmental conditions, scientific and technical understanding, and political realities.

III. ROLE OF INDUSTRY

Industry has played a central role in the Montreal Protocol process. Although the environmental problem itself is the result of chemicals used in primarily industrial processes, industry involvement has also been central to the successful mitigation of ozone depletion. In particular, market forces have played a valuable role in the successes of the Montreal Protocol, some of them as a direct result of the way the Protocol process is structured, and others because of serendipity in the way industry has made or used ozone depleting substances. Due to what is in part a happy coincidence, and in part well-developed regulatory incentives, some of the main ODS-producing industries were the main innovators of the substitutes used to replace them.

The fact that some countries, particularly the United States, passed domestic regulations restricting the use of ozone depleting substances before international regulation was attempted strongly influenced the role industry played in the process. In the first place, this U.S. regulation created the push for initial development of substitutes. Industries that made or used CFCs were put on notice that CFCs would not be available for certain

21. Montreal Protocol, *supra* note 6, as amended, Arts. 2A-E.

22. Greene, *supra* note 16, at 99.

applications. The push for increasingly strict U.S. legislation gave domestic CFC industries an additional incentive to join the call for international regulation. The U.S. industry organization, The Alliance for Responsible CFC Policy, as well as the major CFC manufacturer, DuPont, joined the call for international regulation of ozone depleting substances during the negotiations of the Montreal Protocol.²³ U.S. industries did not want to suffer the disadvantage that would come when their international competitors were not subject to the costly environmental restrictions to which they were held, and would rather have uniform international regulations than the stricter domestic ones that seemed otherwise inevitable.²⁴ In addition, those industries that were creating substitute chemicals would benefit from international regulation and the increased overseas demand for their new products it would bring.

The Montreal Protocol set the parameters for international abatement measures, but left the manner of implementation up to the member states. The way the primary ozone producing developed states chose to regulate within the bounds of the protocol had effects on the actions of industry. In particular, the excise tax in the U.S. made ozone-depleting substances increasingly expensive relative to their substitutes. For most industrial uses, this shift in relative prices encouraged a move away from ozone depleting substances. This and other regulatory elements helped create the incentives for industry to create and use substitute technologies, though they also leave the system open to the criticism that only technical or chemical solutions to the ozone depletion problem are chosen.

The other important industrial factor to consider is the incentives created for individual actors to circumvent the regulations. The unanticipated emergence of a fairly significant black market in regulated substances threatens to undermine the phaseout of ozone depleting substances in the North. This problem, while serious in the short run, is likely to prove less important overall than many fear.

23. Alliance for Responsible CFC Policy, *Press Advisory*, as reprinted in U.S. Congress, Senate, Subcommittees on Environmental Protection and Hazardous Wastes and Toxic Substances of the Committee on Environment and Public Works, *Ozone Depletion, The Greenhouse Effect, and Climate Change*, pt. 2, 100th Cong., 1st sess., 28 January 1987, 176-77; see also p. 171 for DuPont's statement.

24. ELIZABETH R. DESOMBRE, *DOMESTIC SOURCES OF INTERNATIONAL ENVIRONMENTAL POLICY: INDUSTRY, ENVIRONMENTALISTS, AND U.S. POWER* (The MIT Press, 2000).

a. *Technology Forcing*

It is often mistakenly assumed that there were readily available substitutes for ozone depleting substances at the time of the Montreal Protocol, and that the existence of these substitutes made the negotiation process simpler.²⁵ That perception is incorrect. DuPont, after introducing non-CFC propellants for use in aerosol spray cans due to consumer pressure in the 1970s, had ceased research into other CFC substitutes at the beginning of the 1980s. It began again in 1986, only after the Vienna Convention was signed and negotiations for the Montreal Protocol underway.²⁶ The realization that international regulation was likely (and, in the United States, that domestic regulation was inevitable), jump-started the search for alternatives.

In the intervening years, industry downplayed the possibility that substitutes or recycling would be cost effective or viable. The Alliance for Responsible CFC Policy indicated that "all promising compounds identified have one or more limitations . . . consequently, we conclude that fully satisfactory fluorocarbon alternatives will not become available in the foreseeable future."²⁷ More importantly, it is not simply that DuPont and others publicly underestimated the potential for substitutes while secretly undertaking research to find alternatives. All evidence suggests that these industries truly stopped developing substitute chemicals in the pre-Montreal Protocol period in the 1980s.²⁸

It is all the more remarkable to note, then, how quickly substitutes became available and widely adopted after the negotiation of the Protocol, and how quickly consumers adopted them. In 1988 several traditional CFC producers such as AT&T and Du-

25. Alan S. Miller, *Incentives for CFC Substitutes: Lessons for Other Greenhouse Gases*, in *COPING WITH CLIMATE CHANGE: PROCEEDINGS OF THE SECOND NORTH AMERICAN CONFERENCE ON PREPARING FOR CLIMATE CHANGE* 547 (John C. Topping, ed., Climate Institute, 1989). Miller does not himself make this argument, but mentions others who do. For others who follow this logic implicitly, see Detlef Sprinz & Tapani Vaahtoranta, *The Interest-Based Explanation of International Environmental Policy*, 48(1) in *INTERNATIONAL ORGANIZATION*, 77, 93-94 (1994) (citation omitted); James K. Sebenius, *Challenging Conventional Explanations of International Cooperation: Negotiation Analysis and the Case of Epistemic Communities*, 46(1) in *INTERNATIONAL ORGANIZATION*, 323, 358 (1992).

26. RICHARD ELLIOT BENEDICK, *OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET*, 31, 33 (Harvard University Press, Enlarged Ed., 1998).

27. Alliance for Responsible CFC Policy, *A Search for Alternatives to the Current Commercial Fluorocarbons*, (1986), as quoted in Miller, *supra* note 25, at 549.

28. Benedick, *supra* note 26, at 33; Miller, *supra* note 25, at 549.

Pont announced the availability of competitively-priced CFC substitutes for use in electronics, food packaging and other applications.²⁹ Other substitutes followed in the early 1990s. Ultimately most OECD countries phased out their use of ozone depleting substances faster than was required under the Protocol.³⁰ While meeting obligations ahead of time could be seen as evidence that the obligations were not onerous or were not due to the treaty process,³¹ in this case the fundamental shift in industrial processes is evident and would have been inconceivable without international regulation. Several factors, both from the Protocol itself, and from the ways that individual states chose to implement it, contributed to this profound industrial transformation.

The mere existence of the Vienna Convention, which promised abatement measures, followed by the negotiation of the Montreal Protocol, which required them, put industry on notice that it would not be able to continue profiting from ozone depleting substances to the extent it previously had. In the same way that DuPont found substitute propellants for aerosol spray cans in anticipation of certain U.S. regulation (and with the support of consumer demand), the ODS industry responded to the inevitability of international regulations.

More importantly, the same industries that several years before had reasonably concluded that substitutes would not be cost-effective now had reason to change their assessments. In addition to adding the element of necessity, international regulations provided additional incentives for the creation of viable substitutes to ozone depleting substances. Alan Miller argues that "the competitive incentive brought forth by a recognition that those companies who develop the best alternatives will capture a multi-billion dollar world market" created a sufficient incentive for innovation.³² Investment in research could pay off with the promise of a huge set of potential consumers required to

29. Miller, *supra* note 25, at 547.

30. David Victor, *The Operation and Effectiveness of the Montreal Protocol's Non-Compliance Procedure*, in *THE IMPLEMENTATION AND EFFECTIVENESS OF INTERNATIONAL ENVIRONMENTAL COMMITMENTS: THEORY AND PRACTICE* 137, 147 (David G. Victor et. al., eds. 1998).

31. Edward A. Parson, *Protecting the Ozone Layer*, in *INSTITUTIONS FOR THE EARTH: SOURCES OF EFFECTIVE INTERNATIONAL ENVIRONMENTAL PROTECTION* 26, 66-8 (Peter M. Haas et. al. eds., 1993).

32. Miller, *supra* note 25, at 550.

use non-ozone depleting chemicals,³³ in a way that it might not for a purely domestic market.

The other major hurdle for the development of substitutes, their likely cost, was surmounted both by the existence of the Protocol itself and by the way states chose to regulate under it. Many substitutes were projected to, and in fact did, sell for five to ten times the price of the CFCs they would replace. Only the presence of an assured market of consumers that would be required to use them, despite the increased cost, would make them reasonable to develop.³⁴

The cost itself became even less important as developed states chose to implement domestic phaseout obligations through imposing excise taxes, making the use of ozone depleting substances progressively more expensive. The United States created the most significant tax. Begun in 1990, the U.S. tax started at \$1.37 per pound multiplied by the ozone depletion potential (ODP) of the substance, or the extent to which a substance depleted the ozone layer relative to CFC-11, which was given an ODP value of 1. This tax was to increase to \$2.65 per pound (times ODP) by 1993, and was to increase by forty-five cents each year thereafter.³⁵ Later regulations increased the tax even further, so that by 1995 the tax rate was at \$5.35 per pound times ODP. By the mid-1990s in the United States, the price of many ozone depleting substances was triple what it would have been absent the tax, and greater still than it would have been absent regulation altogether.³⁶ At that rate, substitute chemicals that might have been more expensive than ozone depleting substances before the Montreal Protocol and domestic regulation suddenly became the most cost effective option. The excise tax in Europe was smaller, but still significant enough to lower the relative cost of alternatives. Some, in fact, attribute the success in phaseout of ozone depleting substances overall more to the tax

33. Elizabeth DeSombre & Joanne Kauffman, *The Montreal Protocol Multilateral Fund: Partial Success Story*, in *INSTITUTIONS FOR ENVIRONMENTAL AID: PITFALLS AND PROMISE* 89, 95 (Robert O. Keohane & Marc A. Levy eds., 1996).

34. KENNETH A. OYE & JAMES H. MAXWELL, *Self-Interest and Environmental Management*, in *LOCAL COMMONS AND GLOBAL INTERDEPENDENCE: HETEROGENEITY AND COOPERATION IN TWO DOMAINS* 191, 198 (Robert O. Keohane & Elinor Ostrom, eds., 1995).

35. H. R. REP. NO. 101-386, at 607 (1989).

36. J. ANDREW HOERNER, *Taxing Pollution*, in *OZONE PROTECTION IN THE UNITED STATES: ELEMENTS OF SUCCESS* 39, 46 (Elizabeth Cook, ed., 1996).

than to the regulations themselves,³⁷ although domestic taxes, particularly in the United States, would have been unlikely to exist had it not been for the international regulations.

Other ways in which industry has been involved in the Montreal Protocol process has added to its willingness to work within the regulatory system. For example, much of the funding from the Multilateral Fund (discussed below) goes to purchase equipment, chemicals, or expertise from developed country industries, thereby disseminating technology and increasing the advantages to the main ODS industries of the overall regulatory process. In addition, the role of industry actors within the committees discussed above may also contribute to the implementation of regulations. Owen Green suggests that the participation of industry actors on the Technology and Economic Assessments Panels increased the likelihood that new ozone-friendly technologies will be adopted within the industries represented. He gives the example of oil and gas industry representatives who, after serving on panels discussing the options for phasing out the use of halons, were able to change the way fire fighting was conducted within their own companies and ultimately in the industry as a whole.³⁸ In short, the Montreal Protocol process has found a way to give industry actors incentives to create and use the substitute chemicals and processes required to implement the agreement.

b. *Black Market*

The black market in ozone depleting substances was an unforeseen but perhaps not unforeseeable consequence of the Montreal Protocol Process. CFCs are smuggled into the United States, Europe, and other developed countries where CFC manufacturing for domestic consumption is no longer allowed. High excise taxes (particularly in the United States) made legal purchase of these substances too costly even before the total developed country phaseout, and some who want cheap access to these chemicals have been willing to skirt the law to obtain them. CFCs are currently the main component of the black market for

37. John C. Dernbach, *Sustainable Development as a Framework for National Governance*, 49 CASE W. RES. L. REV. 1, 93 (1998).

38. Owen Greene, *The System for Implementation Review in the Ozone Regime*, in THE IMPLEMENTATION AND EFFECTIVENESS OF INTERNATIONAL ENVIRONMENTAL COMMITMENTS: THEORY AND PRACTICE 89, 97-8 (David G. Victor et. al., eds. 1998).

ozone depleting substances, but it is feared that other substances will also be subject to illegal trade.

The extent of the black market, though unknown, is significant. In some U.S. ports, CFC smuggling is second only in value to the smuggling of narcotics.³⁹ Industry estimates suggest that up to 20 percent of CFCs currently in use may have been purchased on the black market.⁴⁰ Predictions of when the ozone layer will recover have been based on consumption numbers that assume complete compliance with Montreal Protocol requirements, and the increase in CFC use, made possible by the black market, is certain to delay the environmental recovery foreseen by the treaty process. Jerry Mahlman, of the U.S. National Oceanic and Atmospheric Administration, suggests that a "cheating rate of only 10% can keep stratospheric CFC levels from declining."⁴¹ The lack of progress in fixing the ozone layer can be seen already in the fact that of the two main types of CFCs, the concentration of one in the atmosphere changed not at all during the 1990s, and the other has increased during that period.⁴² In addition, the Montreal Protocol regulatory system as a whole depends on the adoption of substitute chemicals and processes in a way that reinforces the phaseout process and is undermined when CFC smuggling becomes prominent.⁴³

The causes of the black market are several. First, the differential phaseout dates between Article 5 (developing) and non-Article 5 countries means that production is allowed in some states even when consumption in the developed world is supposed to cease. Moreover, even after the phaseout date, production of these chemicals allowed in non-Article 5 countries, if made for export.⁴⁴ Production is also allowed for "essential" use even after phaseout of particular chemicals. The fact that some produc-

39. Saleem S. Saab, *Move Over Drugs, There's Something Cooler on the Black Market - Freon*, DICK. J. INT'L L. 633, 634 (1998).

40. *Chemical Production: Holed Up*, ECONOMIST, Dec. 9 1995, at 63.

41. Better Hileman, *Ozone Treaty: Successful but Pitfalls Remain*, CHEM. & ENG'G NEWS Sept. 1997, at 24.

42. S.A. Montzka, J.H. Butler, J.W. Elkins, T.M. Thompson, A.D. Clarke, & L.T. Lock, *Present and Future Trends in the Atmospheric Burden on Ozone-Depleting Halogens*, 398 NATURE 690, 690 (1999).

43. Frederick Pool Landers Jr., *The Black Market Trade in Chlorofluorocarbons: The Montreal Protocol Makes Banned Refrigerants a Hot Commodity* 26 GA. J. INT'L & COMP. L. 457, 478-9 (1997).

44. Jennifer Clapp, *The Illegal CFC Trade: An Unexpected Wrinkle in the Ozone Protection Regime*, 9 INT'L ENVTL. AFF. 259, 261 (Fall 1997). The amount exported is limited to 15% of a country's 1986 consumption level.

tion is legal means that the mere presence of these substances cannot be taken as a sign of their illegality, making detection of illegality more difficult.⁴⁵ Related is the fact that ODS production companies based in non-Article 5 countries have set up joint ventures with industries in Article 5 countries so as to be able to continue producing ODS. Some argue that this type of co-production results in an increased use of ODS in developing countries over what would have happened absent such joint ventures.⁴⁶ In addition, particularly if joint ventures result in greater production of CFCs than would otherwise have been the case, they create additional sources for black market CFCs that make it across borders illegally.⁴⁷

Second, the difficulties faced by countries with economies in transition⁴⁸ means that non-Article 5 countries with production capabilities are not actually phasing out production when they were supposed to have done so. The financial incentives to sell these illicit CFCs on the black market for foreign currency increase with the other forms of economic hardship that often accompany the process of economic transition. Russia, in particular, has been granted extra time before which it is required to phase out CFC consumption,⁴⁹ and it is suggested that much of the black market CFCs can be traced to Russian production.⁵⁰

Third, smuggling CFCs and other ozone depleting substances is relatively easy. It is difficult to distinguish virgin CFCs from those that are recycled (and therefore legal to use).⁵¹ Ozone de-

45. Note that the difficulty experienced here where some trade is legal and some is not is akin to the discussion of managed trade under the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

46. Stella Pappasava & William R. Moomaw, *Adverse Implications of the Montreal Protocol Grace Period for Developing Countries*, 9 INT'L ENVTL. AFF. 219, 222 (Summer 1997).

47. JIM VALLETTE, *OZONE ACTION, ALLIED SIGNAL, QUIMOBASICOS AND THE FRIO BANDITOS: A CASE STUDY OF THE BLACK MARKET IN CFCs* (1996).

48. These states are classified for the purposes of the Montreal Protocol as non-Article 5, or developed, states. It was only after the Montreal Protocol was negotiated that they experienced economic and political transition.

49. Pappasava & Moomaw, *supra* note 46 at 222.

50. DUNCAN BRACK, *INTERNATIONAL TRADE AND THE MONTREAL PROTOCOL* 105 (1996).

51. Handbook for the Montreal Protocol on Substances that Deplete the Ozone Layer, Ozone Secretariat 32 (1993); FREDERICK POOL LANDERS JR., *THE BLACK MARKET TRADE IN CHLOROFLUOROCARBONS: THE MONTREAL PROTOCOL MAKES BANNED REFRIGERANTS A HOT COMMODITY* 26 GA. J. INT'L & COMP. L. 457, 473 (1997).

pleting substances can be imported (without excise tax) into non-Article 5 countries as transshipments, destined for other locations where they are legal to use. It is fairly simple to prepare a false bill of lading that indicates the shipment will be offloaded in the United States only to be bound for somewhere else, and then not send it on the next part of its journey. Similarly, smuggling CFCs across land borders has grown as well. Some of the same factors that made these substances initially so attractive to use — their stability and lack of toxicity — make them simple to hide, and the fact that they can be produced cheaply in Mexico or bought with low excise taxes in Canada has made them easy to purchase and bring across the U.S. border. Similar smuggling takes place between Eastern and Western Europe.⁵² Another strategy some countries use is to claim they are exporting recycled CFCs when they do not have the capability to recycle them; in all probability these exports are of virgin CFCs.⁵³

The most important cause for the black market in ozone depleting substances, however, is the demand in non-Article 5 countries. As with any black market, demand is the ultimate creator of supply. In the case of ozone depleting substances, the demand comes from two main factors, neither of which is directly connected to the Montreal Protocol itself. The first is the excise tax that most developed countries have placed on ozone depleting substances in an effort to increase the attractiveness of the phaseout process, as discussed above.⁵⁴ This tax is highest in the United States.⁵⁵ Taxes in Europe increased the prices of CFCs as well, though prices of ozone depleting substances have not risen as quickly as predicted. In fact, some of the lower-than-expected cost of CFCs in Europe is attributed to the widespread availability of black market CFCs,⁵⁶ which makes measurement difficult. Although the demand for illegal CFCs exists absent any scarcity of these substances created by the phaseout of their legal use,

52. Jennifer Clapp, *The Illegal CFC Trade: An Unexpected Wrinkle in the Ozone Protection Regime*, 9 INT'L ENVTL. AFF. 259, 265 (Fall 1997).

53. *Id.* at 266.

54. Saleem S. Saab, *Move Over Drugs, There's Something Cooler on the Black Market — Freon*, DICK. J. INT'L L. 633, 648 (1998).

55. Stella Pappasava & William R. Moomaw, *Adverse Implications of the Montreal Protocol Grace Period for Developing Countries*, 9 INT'L ENVTL. AFF. 219, 221 (Summer 1997); Saab, *supra* note 54 at 648.

56. DUNCAN BRACK, *INTERNATIONAL TRADE AND THE MONTREAL PROTOCOL* 110 (1996).

that factor only increases the demand for, and therefore the cost savings from, illegal CFCs.

The other demand-side element of the black market involves the high cost of retrofitting some CFC-based equipment to use other non-ozone depleting substances. The primary culprit in this case is automobile air conditioning, which exists in 90 percent of U.S. automobiles⁵⁷ and to a lesser degree in Europe and other developed countries. Air conditioning units that had been made to use CFCs could either be recharged using increasingly expensive and less available CFCs, or could be retrofitted to use substitute chemicals. The retrofitting can cost between \$200 and \$800,⁵⁸ depending on the model year of the car. Garages that buy cheap, black market CFCs can charge their customers significantly less for recharging their air conditioners, while at the same time making a profit of up to \$2000 per canister of CFCs.⁵⁹

Although the black market in CFCs is less than ideal and should ameliorated to the extent possible, its existence does not pose a long-term threat to the health of the Montreal Protocol system. The demand for black market CFCs is already smaller than it could have been and is likely to have a finite lifespan. It has, for instance, generally been limited to the mobile air conditioning sector. Large industrial users of CFCs have been reluctant to invest in CFCs of questionable origin. This reluctance stems in part out of concern for the legality of the interaction — legitimate businesses are unlikely to risk difficulties with the IRS from using black market products. More importantly, black market CFCs that have been seized often contain a high degree of impurities; those who are responsible for large-scale refrigeration or cooling units are unlikely to risk refilling them with CFCs whose origin is uncertain.⁶⁰

Even within the mobile air conditioning sector, the cost of retrofitting automobile air conditioners has been steadily falling.⁶¹ Moreover, the type of equipment most likely to make use of black market CFCs is small, easily replaceable, and has a finite, and rather short, life cycle. Air conditioners, particularly those found in automobiles, tend to have life cycles shorter than large

57. *Id.* at 105.

58. Ronald Begley et al., *Producers Set for CFC Phaseout*, *CHEMICAL WEEK*, Dec. 13, 1996, at 40.

59. David Sheff, *The Chilling Effect*, *OUTDOOR MAGAZINE*, Aug. 1997, at 91.

60. W. Wayt Gibbs, *The Treaty that Worked - - Almost*, *SCI. AM.*, Sep. 1995, at 18.

61. Paul Brand, *Hot Question for Air conditioner: Recharge or Convert?*, *MINNEAPOLIS STAR TRIBUNE*, Jul. 31, 1999, at M1.

industrial equipment. With all new air conditioners made in ozone-friendly ways, the demand for illegal CFCs will rapidly diminish.

For similar reasons, some of the other major ozone depleting substances are less likely to give rise to a black market than has been the case for CFCs. There is evidence of black market emerging in halons, but it has been small, generally outside of the United States, and is unlikely to be a major issue for several reasons. First, in the United States, halons were exempted from the severity of the excise tax placed on CFCs. The amount of the tax on a substance was supposed to be multiplied by its ozone depletion potential. Halons have a particularly high ODP, generally 10 or higher.⁶² Applying the excise tax according to formula would have resulted in a tax so large as to put halon producers immediately out of business. Due to lobbying from these actors, halons were exempted from the tax in 1990 and a cap of twenty-five cents per pound was placed on the excise tax levied on halons the following three years.⁶³ Therefore, the initial cost of legal halons relative to illegal ones, before the production phaseout, did not create a sufficient incentive to give rise to a black market in the United States in the way the tax on CFCs did.

The technology that uses halons also makes a black market less likely. These substances are used most frequently in fire suppression, either in individual fire extinguishers or in industrial fire protection systems. In the case of the former, when the substance within the fire extinguisher is used up, it is generally more cost-effective to get a new extinguisher, which will be made with substitute chemicals, than to recharge it. The halon gas in industrial fire suppression systems is most likely to be recharged, using recycled halon. Like large-scale industrial users of CFCs, they are unlikely to want to run the tax or quality risk of using black market chemicals. Moreover, there is no shortage of recycled

62. ARJUN MAKHIJANI & KEVIN R. GURNEY, *MENDING THE OZONE HOLE: SCIENCE, TECHNOLOGY, AND POLICY* 121-125 (The MIT Press 1995).

63. INTERNAL REVENUE SERVICE, DEPARTMENT OF THE TREASURY, *EXCISE TAX ON CHEMICALS THAT DEplete THE OZONE LAYER AND ON PRODUCTS CONTAINING SUCH CHEMICALS*, 56 Fed. Reg. 56303, 56308, 56317-20 (see e.g., §§ 52.4682-1(e) and 52.4682-4); Linda J. Collins, *Halon Limits Near But Substitute Still Distant*, BUSINESS INSURANCE, May 28, 1990, at 3.; J. Andrew Hoerner, *Taxing Pollution*, in *OZONE PROTECTION IN THE UNITED STATES: ELEMENTS OF SUCCESS* 39, 43 (Elizabeth Cook ed., World Resources Institute, 1996). This formula ended in 1994 at the same time that production of new halons ceased, so the excise tax was only applied to those imported.

halon (which is not subject to the excise tax), and it is therefore relatively inexpensive. These large fire suppression systems are primarily used to protect technological or computer equipment, and technological advances have spelled the demise of many large mainframe computer rooms. The fire suppression systems previously used in these environments have been taken out of service and their halons recycled.⁶⁴ These substances are therefore unlikely to produce the type of black market that we have seen for CFCs.

There certainly are, and have been, actions that can be taken to make smuggling less prevalent. Within the United States, tip lines to the Environmental Protection Agency (which passes these tips along to the IRS) are often used by those whose profits from legal CFCs are diminished by smugglers, to turn in industries participating in the black market.⁶⁵ In addition, the parties to the Montreal Protocol have adopted a new licensing system as part of the Montreal Amendment, to begin in 2000, which should make distinguishing legal CFC trade from illegal trade easier.⁶⁶ It is also worth noting that this new system is one of the policy changes made possible by the flexibility of the agreement. In addition to being passed as an amendment to the Protocol, the actual details of how the system works will be negotiated by the Conference of the Parties without being subject to re-negotiation and ratification.

More importantly, the very factors that gave rise to the black market are among those that have made the Montreal Protocol as successful as it has been. Many who write about the black market refer to the "loophole" that allows for continued Article 5 consumption of ODS while others are required to end their consumption of particular substances,⁶⁷ thus creating the supply side of the black market. As discussed below, the Montreal Protocol would not have been politically possible without this type of differentially timed obligations, so it is not realistic to imagine

64. Interview with Tom Cortina, Information Officer, Halon Alternatives Research Corporation, (Sep. 15, 1999).

65. Gibbs, *supra* note 60, at 20.

66. *Licensing Agreement on Trade in Ozone Depleting Substances Enters Into Force*, U.N. Environment Program (Aug. 23, 1999) <http://www.unep.org/ozone/press-rel/Press-Rel230899.htm>; Saleem S. Saab, *Move Over Drugs, There's Something Cooler on the Black Market - Freon*, 16 *DICK. J. INT'L L.* 633, 653 (1998).

67. Fredrick Pool Landers Jr., *The Black Market Trade in Chlorofluorocarbons: The Montreal Protocol Makes Banned Refrigerants a Hot Commodity*, 26 *GA. J. INT'L & COMP. L.* 457 (1997).

removing that element of the treaty in order to combat the black market. On the demand side, the other main contributor to the black market is the excise tax that makes legal CFCs at least ten times more expensive than illegal ones. The excise tax within the U.S. and Europe, however, also helped make the phaseout of these substances politically possible, and certainly made it happen more quickly. The increased cost of CFCs relative to substitute chemicals or processes gave industries the incentive to make the switch from ozone depleting substances much faster than they would have absent such a measure. The advantage to the ozone layer from this faster phaseout is likely to dwarf the damage caused by black market CFCs. A Montreal Protocol without these elements, while perhaps less likely to lead to a black market, would at the same time be less likely to have rescued the ozone layer as effectively as the current Treaty has.

IV.

INVOLVEMENT OF DEVELOPING COUNTRIES

The participation of developing countries was essential to the success of the Montreal Protocol process. Although at the time the Protocol was signed the per capita consumption of ODS by these countries was miniscule and production in most countries negligible, both these figures were likely to grow significantly. Chlorofluorocarbons had been essential in the process of industrialization for the countries of the North, and others at early stages of development were likely to use these cheap, safe chemicals in their process of industrialization as well. It was estimated at the time that India and China alone would account for one-third of the world's consumption of CFCs by 2008.⁶⁸

Moreover, the problem had clearly been created by Northern industries, and the concern about the environmental problem was most prevalent in the industrialized world. Absent sufficient incentives to join the agreement, developing countries showed every sign of remaining outside the regulatory system. By the time of the London negotiations in 1989 the only major CFC-using developing countries that had joined the agreement were Mexico, Nigeria, and Venezuela.⁶⁹ Any successful effort to pro-

68. FRIENDS OF THE EARTH, *FUNDING CHANGE: DEVELOPING COUNTRIES AND THE MONTREAL PROTOCOL* (1990).

69. RICHARD E. BENEDICK, *OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET* 151 (Harvard University Press 1991).

tect the ozone layer had to gain the participation of all the major developing countries.

The most innovative and essential element in bringing these states into the agreement was the elaboration of a financial transfer mechanism. The Multilateral Fund, as the mechanism was ultimately named, was the element that allowed for universal participation in the agreement, and facilitated the process of moving away from ozone depleting substances in developing countries. It is a generally well-designed instrument for bringing developing states into the Montreal Protocol and helping their implementation of the agreement. However, two concerns arise from the functioning of the mechanisms to encourage developing country participation in the process. One is the precedent that the Multilateral Fund has set. The other is the uncertainty at this point over whether the major developing countries will actually stop using ozone-depleting substances. Although there are some encouraging signs there are also indicators of concern. Without success at this goal, the protection of the ozone layer will ultimately fail.

a. *Bringing Developing Countries In*

The initial efforts to bring developing countries into the agreement revolved around a grace-period (initially 10 years, though it has been renegotiated for a variety of different ODS) during which developing countries would not have to meet the obligations of the Protocol. This measure allowed member states operating under Article 5 (developing countries whose annual per capita consumption of ODS was less than 0.3 kg) to continue and even increase their use of these substances. The Protocol acknowledged that these countries had special needs for financial and technical assistance to meet their obligations, but without specifying the way in which these needs would be met, the lag-time was insufficient to convince most developing countries to join.

The second effort was a trade incentive: states that are party to the agreement can only trade in controlled substances with those that are in the agreement.⁷⁰ For states that did not produce ozone-depleting substances but hoped to use them, joining the

70. Montreal Protocol on Substances that Deplete the Ozone Layer, Sep. 16, 1987, art. 4, S. TREATY DOC. NO. 10, 100th Cong., 1st Sess. 2 (1987), 26 I.L.M. 1550 (entered into force Jan. 1, 1989).

agreement was the obvious way to guarantee their access to these chemicals. The scenario would only work, however, if the developing countries capable of producing ozone-depleting substances were brought into the agreement as well. Otherwise a separate trading bloc could emerge outside of the agreement that could undermine, rather than encourage, participation. Mexico was the only developing country producer of ODS that initially signed the Protocol.⁷¹ The reluctance of other producer states such as China and India to join the Montreal Protocol initially indicated that the trade sanctions would be insufficient to bring developing countries into the agreement. These states, potentially unaffected by the sanctions, would have to be convinced to join.

Although the Montreal Protocol acknowledged the special needs of developing countries for funding and access to technology, the actual funding mechanism was specified under the London Amendments to the Protocol and the details worked out in difficult negotiations. These created the mechanism that came to be known as the Multilateral Fund.

The organization of the Multilateral Fund is innovative and well designed to mitigate the North/South conflict that inspired it. The rotating membership on the Executive Committee that oversees fund decisionmaking involves equal numbers of Article 5 and non-Article 5 countries. Decisions are taken by consensus where possible; if votes must be taken they require a two-thirds majority vote that represents a majority among both developed and developing countries.⁷² Although votes remain unlikely, the double majority voting structure helped to convince both sets of parties that decisions could not be taken solely under the influence of the other group. As indicated above, the Fund is served by a Secretariat that operates independently.

The specification of the Fund had the intended effect. China joined the Protocol immediately, followed by India and Brazil in 1992 and eventually by almost all developing countries. Importantly, the operation of the Fund has gone a long way toward helping some developing countries avoid ozone depleting substances or change over their use of ODS to ozone-safe chemicals or processes. By early 1999 developed countries had contributed more than \$847 million to the fund, and the Executive Commit-

71. Elizabeth R. DeSombre & Joanne Kauffman, *The Montreal Protocol Multilateral Fund: Partial Success Story*, in INSTITUTIONS FOR ENVIRONMENTAL AID: PITFALLS AND PROMISE 89, 96 (The MIT Press 1996).

72. *Id.* at 99.

tee had approved nearly 3,000 projects, expected to result in the phaseout of the consumption of more than 119,000 OPD tonnes and the consumption of 42,000 ODP tonnes. Approximately one-third that amount has already been phased out.⁷³

The Multilateral Fund process has not been free of difficulties, but the independence of the Secretariat, the Executive Committee, and the ability of the system as a whole to adjust to changes has been invaluable in addressing these problems. For example, developing countries needed to submit information on consumption of ozone depleting substances in order to determine certain obligations, and by the mid-1990s much of this information was still lacking. In 1994, the Parties to the Montreal Protocol decided that countries that had not submitted information on their baseline ODS consumption within a year after their country program is accepted by the Multilateral Fund Executive Committee would not be eligible for the special consideration under Article 5.⁷⁴

The Executive Committee and the Multilateral Fund Secretariat have been instrumental in preventing some of the most egregious potential problems of developing country phaseout. At the recommendation of the Secretariat and the Executive Committee, a number of Multilateral Fund policies have been changed. For example states must now show that their overall consumption of a controlled substance goes down if they are to receive funding to close down or retrofit a production facility.⁷⁵ The Executive Committee also took the somewhat radical move of deciding that plants built after August 1995 would be ineligible for funding to retrofit or close them, and that no Article 5 countries would be allowed to build new plants after December of that year.⁷⁶ To the extent that the problems discussed below can be avoided, it will be because of the independence of these decision-making bodies and their willingness to make difficult or unpopular decisions.

73. The Secretariat of the Multilateral Fund, *General Information* (visited Sep. 17, 1999) at <http://www.unmfs.org/general.htm>.

74. Montreal Protocol Meetings of the Parties Decision VI/5.

75. Owen Greene, *The System for Implementation Review in the Ozone Regime*, in *THE IMPLEMENTATION AND EFFECTIVENESS OF INTERNATIONAL ENVIRONMENTAL COMMITMENTS* 89, 103 (The MIT Press 1998).

76. Edith Brown Weiss, *The Five International Treaties: A Living History*, in *ENGAGING COUNTRIES: STRENGTHENING COMPLIANCE WITH INTERNATIONAL ENVIRONMENTAL ACCORDS* 89, 156 (The MIT Press 1998).

b. *The Precedent*

One of the stumbling blocks to the initial creation of the Multilateral Fund was the fear of the precedent it would create. Initial U.S. opposition to a fund was based on this fear, and explicit efforts were made to indicate that it should not be taken as an indication that funding would be forthcoming to address other environmental issues.⁷⁷

The precedent has nevertheless been set, and strengthened, as all major global environmental agreements negotiated since Montreal have included provisions for aid to cover the incremental costs to developing countries of meeting their obligations under the agreements. Moreover, these new agreements have taken the funding precedent one step further, indicating (as in the Convention on Biological Diversity) that developing country requirements to uphold their obligations are contingent on “the effective implementation by developed country Parties of their commitments under this Convention related to financial resources and transfer of technology.”⁷⁸ This type of clause is a clear response to possible funding shortfalls or delays in the Montreal Protocol case.

It is certainly possible to argue that such assistance to developing countries in cases of environmental problems caused primarily in the course of industrialization is fair, and that the precedent is therefore a valuable one. On the other hand, such a precedent may be seen to contribute to moral hazard. Developing countries may forego action they would otherwise take because they can persuade others to fund it. The funding undertaken in the Montreal Protocol, the result of a difficult negotiating process to agree upon, is modest compared with what will be required to address other environmental issues such as climate change. The precedent set that all developing country costs of environmental agreements will be borne by the developed world may make negotiation of obligations more difficult, and their implementation far more costly.

c. *Developing Country Phaseout Concerns*

As of July 1, 1999, the first actual control measures, a freeze on consumption of CFCs at 1995-7 levels, took effect for Article 5

77. DeSombre & Kauffman, *supra* note 71, at 105-06.

78. United Nations Convention on Biological Diversity, *opened for signature* Jun. 5, 1992, art. 20 para. 4, 31 I.L.M. 818.

countries. The extent to which these developing countries will actually meet the phaseout requirements for CFCs and then other ozone depleting substances is an open question, and one that will ultimately determine the overall success of the Montreal Protocol process. There are some encouraging signs. Some developing countries, such as Mexico and Venezuela, indicated an early interest in phasing out on the developed country schedule, and have been able to do so to some extent.⁷⁹ Others are making efforts to meet accelerated schedules as well.

There are also some concerns. In particular, the Montreal Protocol explicitly allows for the increase in consumption of ODS by Article 5 countries until control measures take effect, provided they do not exceed .3 kg per capita ODS consumption. Some developing countries, particularly the major producers of ozone depleting substances, have therefore increased their ODS consumption throughout the period leading to the CFC freeze. They have had every incentive (and legal right) to do so: many ozone depleting substances, particularly CFCs, are cheap, safe, and easy to produce. Moreover, with the implicit guarantee that the costs of their phaseout would ultimately be covered by the multilateral fund, they gained little advantage from refraining from increased production. These countries gain the benefit of using these chemicals and are assured of increased funding and technical assistance later for switching their already-increased technical capabilities over to newer production processes and chemicals. An increased consumption level during the 1990s also increased the level at which consumption would be frozen.

The way the Fund was initially structured, developing countries did not even need to forego funding during the period when their production was increasing. The issue that eventually convinced the Executive Committee to restrict funding for phasing out production at some plants when new production was increasing occurred in 1996. China applied for funding to retrofit one halon plant while simultaneously building others to increase its halon output,⁸⁰ something allowed by the letter of the law, but certainly contrary to the spirit. This type of funding was ultimately disallowed. So while this was an issue that the regulatory

79. Stella Pappasava & William R. Moomaw, *Adverse Implications of the Montreal Protocol Grace Period for Developing Countries*, 9 INT'L ENVTL. AFF. 228 (1997).

80. "Comments on China Tongxiang," CRP, 8 May 1996 [Multilateral Fund document].

process eventually addressed successfully, it indicated the willingness of major ODS-producing developing countries to work the system to their advantage, in a way that contributed to the environmental problem and increased mitigation activities required later.

The production capabilities of the major developing country ODS producers has grown dramatically. China now accounts for 90 percent of global production of halons,⁸¹ and the emissions of these substances are rising annually by three percent, despite the phaseout in developed countries.⁸² As the developed world has almost completely ceased the use of a number of ozone depleting substances and the developing world increased its production and consumption of these substances, developing countries increase their bargaining position to demand greater compensation or assistance with phaseout. There are signs already of this phenomenon. Developing countries preparing for the 1999 Meeting of the Parties to the Montreal Protocol agitated for greater funding when the Multilateral Fund was being replenished. Malaysia indicated that it would have to delay its planned phase-out of CFCs until more funding was made available.⁸³ Whether Article 5 countries will be able, or willing, to meet their phaseout obligations is therefore still unclear. An encouraging study by the Multilateral Fund Secretariat was generally optimistic about the "ability of Article 5 countries to comply with the [CFC] freeze."⁸⁴ But the increased production capacity, and the increased political bargaining power that confers, leaves open the question of whether, and at what price, developing countries will cease their use of ozone depleting substances.

V. CONCLUSIONS

The Montreal Protocol has been remarkable in its ability to bring almost all the world's states into an agreement that fundamentally changes the way industrial activity takes place. It shows every sign of eventually reversing the environmental problem

81. Fred Pearce, *The China Syndrome*, NEW SCIENTIST, 15 May 1999, at 49.

82. Fred Pearce, *The China Syndrome: Fred Pearce Reveals a New Threat to the Ozone Layer Carried by Winds from the East*, THE GUARDIAN, Mar. 4, 1999, at 5.

83. Padmaja Padman, *Developing Nations Seek More Funds to Phase Out CFCs*, NEW STRAITS TIMES, Jun. 13, 1999, at 9.

84. *Report of the Tenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, U.N. Environmental Program, UNEP/OzL.Pro.10/9, para. 83 (Dec. 3, 1998).

that caused its creation, despite the fact that no environmental effects were manifest when the regulations began. The agreement has done so through the creation of flexible instruments that can adapt to changing science and politics, through the use of industrial incentives, and through innovative and precedent-setting ways to bring developing countries into the global regulatory process.

The most identifiable problem with the system as it stands, the black market in ozone depleting substances, is not as bad as most fear. It has happened to some extent outside the regulatory framework of the treaty, which may in fact be part of the reason it causes so much concern. It has been created, however, in part because of a variety of incentives that are connected to the treaty process and that have, overall, made the treaty more effective. Without high domestic excise taxes, for instance, the creation of chemicals and industrial processes that do not deplete the ozone layer would have been less likely, and their adoption relatively costlier.

The potential problem to which not enough academic attention is currently directed is the possibility that developing countries, with increased political power and increasing consumption and production of ozone depleting substances, may either refuse to take action to protect the ozone layer or may demand increasingly costly compensation for doing so. Even if this type of assistance can be considered ethically necessary, it may make protection of the ozone layer less likely or more costly, and may make developed states even more hesitant to take action to prevent or mitigate other global environmental problems. It is also important to identify the elements of the Montreal Protocol that increased the likelihood of this problem. The combination of a lag time in obligations with compensation for abatement activity allows for the possibility that developing countries will receive funding for abatement measures while increasing their overall capacity to contribute to the environmental problem. This mismatch in incentives is particularly worth noting because both the Convention on Biological Diversity and the Framework Convention on Climate Change combine these two elements as well. To the extent that this problem can be avoided in the Montreal Protocol or other agreements – and important steps have already been taken within the Montreal Protocol to address elements of it – it will be due to the flexibility of the agreement itself and the competence of its subsidiary organs.

International legal efforts to protect the ozone layer have thus been impressive. But the Montreal Protocol process has some peculiarities that make drawing lessons from it difficult and made it a more likely success than other agreements to address future environmental problems. In the first place, the substances that need to be regulated, though increasing in number with scientific research, are still circumscribed and mostly created by humans and used in industrial processes. Problems like global climate change are the result of a large number of substances used in far more types of activities. The states most concerned about ozone depletion, those in the industrialized North, were also those most responsible for creating the problem. Thus they were willing to undertake domestic, or international, regulation of their own industries in a way that will be less likely for a global environmental problem where the concern, and the cause, are more widely or differently distributed. Lessons should therefore be drawn from the successes and difficulties of the Montreal Protocol process, but they should be drawn carefully. The particularities of the process have contributed to its remarkable successes, but, with effort, some of these can be replicated or improved upon.

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