

## Monitoring the Montreal Protocol

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The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer is generally regarded as one of the most, if not the most, successful environmental conventions in existence. Not only is it dealing effectively with the problem that it was set up to solve—to phase-out a family of industrially useful, but environmentally damaging, chemicals—but it has provided the international community with a series of valuable lessons in the design and implementation of multilateral environmental agreements (MEAs).<sup>1</sup> The development of the protocol’s data reporting and non-compliance systems (the main focus of this chapter) has been an important factor in its success.

### Ozone depletion

Ozone is a molecule comprising three oxygen atoms. It is comparatively rare in the earth’s atmosphere; 90 percent is found in the stratospheric ‘ozone layer’, ten to 50 kilometres above the planet’s surface. The Montreal Protocol was a response to growing evidence of the accumulating damage to the ozone layer caused by the release into the atmosphere of chemical substances known as halocarbons, compounds containing chlorine (or bromine), fluorine, carbon and hydrogen. The most common ozone-depleting substances (ODS) were chlorofluorocarbons (CFCs). Stable and non-toxic, cheap to produce, easy to store and highly versatile, CFCs proved to be immensely valuable industrial chemicals, employed as coolants in refrigeration and air conditioning systems, as ‘foam-blowing agents’, and as solvents, sterilants and aerosol propellants. As scientific knowledge developed, other chemicals—halons, carbon tetrachloride, methyl chloroform, hydrochlorofluorocarbons (HCFCs), methyl bromide and bromochloromethane—also came

to be identified as ozone depleters. The characteristic that they all share is their propensity, when released, to diffuse up into the stratosphere, where they are broken apart by solar radiation, releasing chlorine or bromine atoms, which, in turn, destroy ozone molecules.

Throughout the 1970s and 1980s, scientists began to detect a steady thinning of the ozone layer: between 1997 and 2001, ozone losses averaged four percent (compared to 1980 levels) in northern mid-latitudes (between the tropics and the poles) in winter and spring, and six percent in southern mid-latitudes the year round. Atmospheric circulation tends to move ODS in the stratosphere away from the tropics and towards the poles. Ozone destroying reactions are particularly intense on the surface of the ice particles inside the polar stratospheric clouds. Hence, ozone depletion is at its worst over the Antarctic and Arctic: an average 40–55 percent reduction in the Antarctic spring (September and October), and up to 25 percent in the Arctic spring (March and April). The almost total disappearance of the ozone layer above Antarctica for a few weeks in spring—the ‘ozone hole’—was first observed in 1985, and has occurred every year since.<sup>2</sup>

A depleted ozone layer allows more ultraviolet-B (UV-B) radiation to reach the earth’s surface; levels are now on average between six and 14 percent higher than values recorded prior to the emergence of the ozone hole. Not surprisingly, UV-B irradiation increases dramatically nearer the poles, particularly in spring—now 22 percent higher in the Arctic and 130 percent higher in the Antarctic. As the areas of ozone depletion around the poles rotate to cover different parts of the globe, some inhabited areas have experienced much higher levels of UV-B irradiation. The southern tip of South America, for example, has seen the occasional doubling of UV-B levels.

Moderate exposure to UV-B poses no risks; indeed, in humans it is an essential part of the process that forms vitamin D in the skin. But higher levels have potentially harmful effects on human health, animals, plants, micro-organisms, materials like plastics, rubber and wood, and air quality. In humans, long-term exposure to UV-B is associated with the risk of eye damage (including severe reactions, such as snow blindness, cancer and cataracts), suppression of the immune system, and the development of skin cancer—the most serious form of which, melanoma, is now one of the most common cancers among white-skinned people. Animals

suffer similar health effects; marine life is particularly vulnerable to UV-B, a matter of some concern, since more than 30 percent of the world's animal protein for human consumption comes from the sea.

Due to rising scientific concern from the mid-1970s onwards, a number of governments began to impose restrictions on the use of CFCs, especially in aerosol propellants, where alternatives were already available—although the rapid spread of air-conditioning systems in the early 1980s saw CFC production accelerate. As a global problem, however, it was clear that ozone depletion needed a global solution. The Vienna Convention for the Protection of the Ozone Layer was eventually agreed on 22 March 1985 and entered into force on 22 September 1988. It contained pledges to co-operate in research and monitoring, to share information on CFC production and emissions, and to draw up control protocols if and when warranted. This was an important milestone: nations agreed in principle to tackle a global environmental problem before its effects were clear, or its existence scientifically proven—probably the first example of the acceptance of the ‘precautionary principle’ in a major international negotiation.

Talks on a control protocol began almost immediately, spurred by mounting scientific evidence of the ozone destruction hypothesis, and, on 16 September 1987, 46 countries signed the Montreal Protocol on Substances that Deplete the Ozone Layer. The protocol required that industrialised parties cut production and consumption of the five main CFCs by 50 percent from 1986 levels by 1999, with interim reductions. Production and consumption of the three main halons were frozen at 1986 levels from 1993. These control measures represented a compromise between the still uncertain science of ozone depletion and the priorities of important industrial sectors. Within six months, however, convincing evidence of the link between ozone depletion and CFCs was published and opposition to the principle of controls on ODS largely collapsed.

### **The Montreal Protocol**

An important feature of the Montreal Protocol was its inherent adaptability to evolving scientific knowledge and technological developments. Even before it entered into force on 1 January 1989, plans were being made to strengthen its provisions. Over the past 14 years, the protocol has been modified no less than five times,

accelerating the phase-out schedules, adding new ozone depleting chemicals to its control provisions, and introducing other new features. In the industrialised world, consumption of CFCs was phased out completely by 1996, other than for a few essential uses; by 2005, consumption of all categories of ODS other than HCFCs (which have very low ozone depleting potentials), and methyl bromide for approved critical uses, will have ended in industrialised countries.

The protocol has proved to be a highly effective agreement, with a better record of achieving its aims than many of the 250 or so MEAs now in existence. By September 2003, a total of 184 countries had ratified it. No producers or significant consumers are left outside. Even though it allows developing nations, unlike industrialised states, a grace period in which to implement controls, world production of CFCs fell by 86 percent between 1986 and 1999.<sup>3</sup> The total combined abundance of ODS in the lower atmosphere peaked in 1992–94, and is now declining; in the stratosphere, concentrations lag by up to six years and are now thought to be at or near their peak. Current average ozone losses should, therefore, now be close to the maximum.<sup>4</sup> And although the rate of recovery of the ozone layer is affected by interactions with other pollutants, such as greenhouse gases, full recovery is expected by the middle of the century.

As well as its adaptability to changing scientific and technological developments, a number of other factors have contributed to the protocol's success.

- The recognition—now commonplace, but in 1987 an innovation—of ‘common but differentiated responsibilities’, recognising the special needs of developing countries through slower phase-out schedules.
- The ‘adjustment’ procedure for control schedules in the protocol, allowing countries to accelerate phase-out without the need for repeated treaty amendments, each requiring ratification (amendments have been used to add new substances to the protocol, and other new features).
- The participation, in regard to negotiation and implementation, of key sectors of society: governments, industry, scientists and non-governmental organisations (NGOs).
- The extent to which industry responded to the control schedules. Once initial resistance was overcome, companies rushed to compete in the markets for non-ozone depleting substances and technologies, developing alternatives (which

often proved cheaper and more effective than the originals) at a speed that no one initially anticipated.

- The incentives for compliance built into the protocol, in the form of ‘sticks’ (trade measures) and ‘carrots’ (financial and technical assistance).

It is the last point that is the focus of the remainder of this chapter.

### **Control schedules and data reporting**

At the heart of the Montreal Protocol lies the control measures that it imposes on the production and consumption of ODS, defined in Article 2. These phase-out schedules, consisting of percentage reductions in consumption and production by specified years,<sup>5</sup> have been progressively tightened through agreements reached in London (1990), Copenhagen (1992), Vienna (1995), Montreal (1997) and Beijing (1999). Developing countries have longer phase-out periods (see below). The various categories of ODS are listed in four annexes to the protocol: Annex A (main CFCs, halons); Annex B (other CFCs, carbon tetrachloride, methyl chloroform); Annex C (HCFCs, hydrobromofluorocarbons, bromochloromethane); and Annex E (methyl bromide).

‘Production’ is defined as the total ‘amount of controlled substances produced’ minus any amounts used as chemical feedstock or process agents, or destroyed. ‘Consumption’ is defined as production plus imports minus exports. Most of the annexes listing ODS have a number of sub-groups, and it is total production and consumption aggregated by group, rather than each individual substance, that must be controlled. Each substance is also given an ozone depleting potential (ODP), measured against the reference point of CFC-12, which is allocated an ODP of 1.0; the production and consumption targets are calculated in ODP tonnes.

Trade in recycled and used ODS is not included in the calculation of production, in order to encourage recovery, reclamation and recycling. ‘Essential uses’ for which no alternatives have yet been identified are exempt from the controls; the main exemption is currently for CFCs for use as propellants in metered-dose inhalers for asthmatics. In addition, parties are permitted to exceed their control targets by a specified percentage to allow for exports to meet the ‘basic domestic needs’ of developing nations. This provision was included in the protocol to allay developing countries’ fears of a lack of access to ODS after phase-out in the industrialised

world; in fact, the provision has become less important as several developing states have developed significant production capacities of their own. Phase-out schedules for these extra production allowances were agreed in Beijing, China, in 1999.

Article 7 describes parties' obligations to report data to the Ozone Secretariat in Nairobi, Kenya. Within three months of becoming a party, each country must provide data on production, imports and exports of ODS for the *base year* for each category of ODS: 1986 for Annex A, 1989 for Annexes B and C<sup>6</sup> and 1991 for Annex E. These provide the reference points against which production and consumption target reductions are calculated.<sup>7</sup> Parties then provide *annual data* on production, feedstock and process agent use, destruction, imports and exports, enabling calculations of 'production' and 'consumption', as defined in the protocol, to be made. The deadline for reporting annual data is 30 September of the following year.

Developing countries have one additional set of data to provide: the *baseline* data for each category of ODS. As mentioned above, developing countries have longer phase-out periods than developed states, and their starting 'reference points' are also set later. Defined in Article 5 of the protocol, these are the annual average of production or consumption: in 1995–97 for Annex A ODS; average 1998–2000 for Annex B; 2015 for HCFCs;<sup>8</sup> and average 1995–98 for Annex E. As this renders their *base year* data largely irrelevant, non-reporting of base year data is more or less overlooked in the compliance process, although the secretariat does encourage reporting of best estimates.

The secretariat provides forms for countries to fill in when reporting their data,<sup>9</sup> together with written guidance. The raw information is entered into a database, which carries out all of the necessary calculations, including working out the ODP tonnage involved and aggregating the groups of ODS. Data reports are produced, initially for the Implementation Committee (see below) and then for the Meeting of the Parties (MOP) and the general public.<sup>10</sup>

Timeliness of data reporting is a constant problem, although the Montreal Protocol fares much better than most MEAs in this respect. By 30 September 2002 (the deadline for reporting 2001 data), just over 50 percent—91 of then 180 parties—had actually reported; a further 29 had reported by the time that the data report for the 2002 MOP was published, 18 days later.<sup>11</sup> By June 2003, a total of 153 parties

(85 percent) had reported 2001 data. These are similar percentages to those of recent years.

In addition, several parties regularly report data earlier than they need to. By June 2003, for example, 56 of the protocol's 183 parties had reported 2002 data, three months before the deadline, and several more submitted data at or just before the July meeting of the protocol's Open-Ended Working Group (the preparatory meeting for the main MOP later in the year). However, 11 parties have never reported any data at all. MOPs regularly issue requests for parties to report data more quickly, and direct assistance is available to developing countries in this regard (see below).

Inevitably, the quality of the data received by the secretariat is also somewhat variable.<sup>12</sup> The data reporting forms introduced in 1997 dealt effectively with a number of earlier problems, including confusion over terms like 'feedstock', or whether to adjust the quantities reported by ODP value. But problems are still experienced, ranging from simple input errors to changes in the way in which countries collect data. As Sebastian Oberthür observed in his comprehensive survey of the data reporting system:<sup>13</sup>

there is generally little information available on the methods used by parties in collecting data. For example, parties could rely on either information provided by producers, importers and exporters; information generated through a licensing system; customs data; or estimates ... Such different methods might result in very divergent figures of varying accuracy'. Perhaps more importantly, 'no review mechanism is available to check the accuracy of the data submitted. Doubts exist about the reliability of a number of figures provided by governments.

There is no formal procedure for verifying the accuracy of submitted data. In practice, though, governments of countries receiving financial assistance with phase-out (see Section 5) will work together with the implementing agencies—the United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP), the United Nations Industrial Development Organization (UNIDO) and the World Bank—in collecting and reporting data, so there is some external monitoring. Scientific measurements of atmospheric concentrations also

provide an overall check on total volumes (although not, of course, on particular countries' data); the latest (2002) science assessment concluded that 'the observed abundance of CFCs, HCFCs, and methyl chloroform in the lower atmosphere continue to be consistent with reported production and estimated emissions'.<sup>14</sup> Oberthür concluded that 'the quality of data submitted by the parties to the Montreal Protocol has been improving over recent years ... in general, the coverage of the Secretariat data with regard to the main producers and consumers of controlled substances is quite comprehensive'. Overall, 'despite the inadequacies regarding the parties' data submissions, the overall quality of the Secretariat data appears to be sufficient as a basis for political decision-making, at least with respect to the major ODS'.<sup>15</sup>

### **Monitoring compliance: the Implementation Committee**

In 1987, negotiators decided, wisely, not to try and agree the details of the protocol's non-compliance procedure at the time, setting the trend for a number of later MEAs.<sup>16</sup> Article 8 of the original Montreal Protocol simply said that: 'The Parties, at their first meeting, shall consider and approve procedures and institutional mechanisms for determining non-compliance with the provisions of this Protocol and for treatment of Parties found to be in non-compliance'. It was not until 1992 that the full structure was agreed, but it has subsequently evolved into what most observers consider to be one of the most effective non-compliance mechanisms of any MEA.

The full procedure developed under Article 8, which was reviewed and modified slightly in 1998, is set out in 16 paragraphs of explanatory text, together with a short 'indicative list of measures that might be taken by a meeting of the parties in respect of non-compliance with the Protocol'.<sup>17</sup> It revolves around the protocol's Implementation Committee, which comprises two members from each of the UN's five geographical regions (countries, not individuals, are nominated). It normally meets twice a year and receives reports from the Ozone Secretariat on the data reported by the parties and their levels of compliance with their obligations.

The committee's procedures evolved rapidly in the mid-1990s to address problems associated with non-compliance in transition economies (see below). They are now changing again, as developing countries report data on their compliance, or non-compliance, with their first targets under the protocol: the 1999 freeze on CFC



consumption and production; and the 2002 freeze on halons and methyl bromide. The sheer number of developing country parties to the protocol (140 as of September 2003) has meant that the committee's work has expanded dramatically over the past two years, with meetings now being scheduled for three days each instead of one. Indeed, in many ways, along with the Executive Committee of the Multilateral Fund (see below), the Implementation Committee is one of the two most important institutions in the ozone regime today.

The secretariat itself is the main channel for reporting possible cases of non-compliance to the committee. In fact, the non-compliance procedure allows parties to report to the secretariat any party about which they have 'reservations regarding [its] implementation of its obligations under the Protocol'.<sup>18</sup> In practice, though, this provision has never been taken up, although the third option allowed under the procedure, self-reporting of non-compliance,<sup>19</sup> has occurred occasionally. While there is no formal way for any other organisation—like an NGO—to bring possible cases of non-compliance to the committee's attention, there is no reason why they should not informally raise any concerns they may have with committee members.

The main route for considering possible cases of non-compliance remains, however, the data report presented by the secretariat to each meeting of the Implementation Committee. This highlights those parties that have not reported data, in breach of their obligations under Article 7 of the protocol, together with those that have reported data showing production and/or consumption above the control schedules set out in Article 2 or Article 5. In many cases, there may be justifications for these deviations: agreed consumption for essential uses, for instance, or production for export to developing countries. Where the divergence cannot be explained, the first step is for the secretariat to write to the countries concerned asking them to clarify the discrepancies; in some cases, the data may simply include errors and can be revised.

If no satisfactory explanation is received, the party concerned is invited to appear before the committee to explain the reasons. The committee focuses on working with the party to discover why non-compliance has occurred and to suggest ways and means by which it can satisfy its obligations. In cases where the committee agrees that a state of non-compliance exists, the next step is to request that the party draw up an action plan for its return to compliance. This action plan centres

on a list of time-specific benchmarks, setting out annual production and/or consumption levels for the party until it returns to compliance. Other features include commitments to adopt key regulatory measures, such as establishing export and import licensing and quota systems and banning imports of equipment that uses ODS. Once the MOP agrees these action plans, the Implementation Committee monitors compliance with them, through reports from the countries concerned and from the relevant implementing agencies. It also considers what to do should the benchmarks not be met.

The committee itself only makes recommendations, all of which are referred to the MOP for adoption as decisions. Given the expansion of its work, these draft decisions are taking up an increasingly large proportion of the MOP agenda: at the 2002 MOP, for example, no less than 25 of 43 decisions originated from, or were related to, the Implementation Committee.<sup>20</sup> Underlying this relatively non-confrontational approach is the threat of the use of the 'sticks'. The 'indicative list of measures that might be taken by a meeting of the parties in respect of non-compliance with the Protocol' includes issuing formal cautions and the suspension of specific rights and privileges under the protocol, such as those dealing with finance and trade (see below); sometimes these are explicitly mentioned in the decision dealing with the party. Whether or not non-complying parties really feel threatened by these measures is, perhaps, questionable, but it is clear that they do not like being identified in MOP decisions, often saying so openly in the meeting. Conversely, officials from non-complying parties have sometimes found it useful for their country to be listed, helping them to argue with colleagues at home the need for greater urgency in dealing with the issue.

The first big challenge to confront the non-compliance regime was the problems associated with the transition economies in Central and Eastern Europe and the former Soviet Union. Between 1995 (the last year before the total phase-out of CFCs in industrialised countries) and 1999, a total of 24 decisions were taken on compliance by 12 countries, all of them transition economies; six of them had warned the 1995 MOP that they were unlikely to achieve compliance due to internal political and economic disruption. The decisions followed the formulations described above, centring on commitments to meet time-specific phase-out benchmarks. The record in regard to all of these countries has been positive, with almost every

state identified gradually moving back into compliance,<sup>21</sup> with relatively few diplomatic feathers ruffled along the way (despite a walk-out by the Russian delegation at the 1995 MOP). In the case of Russia, the most serious non-complying party to the treaty (and the only producer of CFCs among the transition economy parties), a World Bank special initiative mobilised additional funding to ensure production sector phase-out, which was achieved in 2000.

The next, and probably more serious, challenge that is beginning to manifest itself concerns compliance by developing countries. All of the 12 decisions of the 2002 MOP that requested or presented action plans dealt with developing countries—it seems likely that several more will be dealt with similarly in 2003. New issues are also emerging, including the problems faced by low volume consuming states, which cannot cost-effectively import quantities small enough, in a single year, to fall below their phase-out thresholds (although, as the quantity is used over several years, actual use in any one year does fall below the threshold), and by countries that experienced abnormal conditions during their baseline data years (for example, Bosnia–Herzegovina, which was in the midst of a civil war) and thus have unusually low baselines against which to measure future consumption. A more serious problem has arisen in regard to a number of parties' requests for upwards revisions of baseline data. To a certain extent, this was to be expected, as data reporting systems tend to improve over time, and original data may often be of low quality. But there is a clear danger in simply accepting revisions, since this could provide an easy way out for parties experiencing difficulty in meeting their obligations. The committee has proceeded very cautiously in relation to these requests, and has not yet found a satisfactory way to deal with them.

The committee itself has worked relatively harmoniously, although, in general, the two members from the 'Western Europe and Others' group have tended to play a much more active role than other members—not surprising perhaps, as these countries tend to have the largest delegations and the greatest capacity to devote to the task. Nevertheless, there has been broad consensus on the evolution of the non-compliance system and, importantly, no draft decision originating from the committee has ever been rejected by the MOP or has had to be referred back to it for further refinement.

### Encouraging compliance: trade measures

The key weapon in the protocol's non-compliance armoury is the threat of restrictions on trade in products controlled by the agreement.<sup>22</sup> These were built into the regime from the outset, as measures designed to be employed against non-parties, but they now also constitute an important potential tool for use against non-complying parties.

Article 4 of the protocol required that parties ban the import of Annex A ODS from non-parties from 1990 (one year after the protocol came into force); exports to non-parties were prohibited from 1993. Imports of goods containing CFCs (listed in Annex D and including, for example, refrigeration and air-conditioning equipment) were proscribed from 1993; a ban on imports of products made with, but not containing, ODS (such as electronic components) was contemplated under the protocol, but the parties decided, in 1993, that its introduction was impracticable due to difficulties concerning detection. As new substances have been added to the control schedules, the trade provisions have gradually been extended to cover them, too. The trade restrictions are not applicable, however, to a non-party that a MOP decides is otherwise in compliance with the control schedules.

The trade provisions had two aims. One was to maximise participation in the protocol, by denying non-signatories supplies of ODS, which always originated from a relatively small number of countries. The other goal, should participation not become universal, was to prevent industries from migrating to non-parties to escape the phase-out schedules and then exporting to states that are parties. (In fact, as industrial innovation proceeded far more quickly than expected, many of the substitutes proved significantly cheaper than the original ODS—but this was not foreseen in 1987.) In practice, the trade restrictions have not often been applied, largely because every major producer and consumer is now a party to the protocol. There is direct evidence from some countries that the trade provisions were important in persuading them to accede to the treaty; a good example is the Republic of Korea, which initially expanded its domestic CFC production, but realising the disadvantages of being shut out of Western markets, became a party.<sup>23</sup>

These trade measures can also be employed against non-complying parties, which can be suspended under the 'indicative list of measures' from 'specific rights and privileges under the Protocol ... including those concerned with ... trade'.<sup>24</sup> As

noted above, their use has been threatened, in a series of MOP decisions, usually in the following terms: ‘These measures may include the possibility of actions available under Article 4, such as ensuring that the supply of CFCs ... is ceased and that exporting parties [parties exporting to the non-complying party] are not contributing to a continuing situation of non-compliance’. So far, this provision has never had to be used, but, as with the former non-parties that decided to accede, its existence appears to be important in encouraging compliance. The measures can also be applied relatively flexibly; in the case of Russia, for instance, the only case to date of a major producing country that has been in non-compliance, a 1995 decision of the parties<sup>25</sup> specified that it could continue to export, despite its non-compliance, to former Soviet states, for which it was historically the main supplier.

### **Encouraging compliance: the Multilateral Fund**

Arguably more important than the protocol’s ‘sticks’ are its ‘carrots’, the financial and technical assistance available for aiding compliance. Article 10 of the protocol provides for a financial mechanism to meet the incremental costs facing developing countries<sup>26</sup> in phasing out ODS. The Multilateral Fund was thus established, as an interim mechanism in 1990, and in its final form in 1992. Industrialised parties contribute to it according to the standard UN assessment scale. Funding was set at US\$240 million for 1991–93, US\$510m for 1994–96, US\$540m for 1997–99, US\$476m for 2000–02, and US\$573m for 2003–05. This amounts to about US\$2 billion over 15 years.<sup>27</sup> Around 90 percent of the promised funding has been received, an excellent record for an international agreement (the main non-contributors, unsurprisingly, being the transition economies).

The fund has its own secretariat (based in Montreal, Canada) and is directed by an Executive Committee, comprising representatives of seven developing and seven developed countries selected by the annual MOP. The fund operates through four implementing agencies, each with a slightly different role.

- UNEP’s Division of Technology, Industry and Economics assumes clearing-house functions, carries out institutional strengthening activities and helps to prepare country programmes, especially for low volume consuming states. In 2002, it initiated its Compliance Assistance Programme geared towards achieving total

phase-out, and decentralised most of its resources to the regional level, facilitating direct support to developing countries.

- UNDP organises demonstration and investment projects, provides technical assistance and conducts feasibility studies.
- UNIDO prepares and appraises investment project proposals and implements phase-out schedules at the plant level.
- The World Bank, which disburses almost half of the total funding, concentrates on large-scale phase-out and investment projects at the plant and country levels.

Each developing state, assisted by one or more of these agencies, prepares a country programme, showing its present and projected use of ODS and identifying opportunities for reduction. The 'incremental costs' that countries can claim include the costs of conversion to alternative technologies and substances, patents, designs and royalties, training and research and development. Recycling controlled substances and modifying or replacing equipment can also be eligible. The Executive Committee has discretionary powers to include costs other than those listed. An early, and important, step was its decision to allow finance for 'institutional strengthening', creating the institutional capacity, in terms of personnel, to carry out the phase-out process. This process, which is UNEP's main function as an implementing agency, usually involves providing funding to, and training for, a National Ozone Unit within the relevant ministry, and running regional networks and training events. A later important development was the decision to help fund the phase-out of ODS production (as well as consumption), covering, to date, Argentina, China, the Democratic People's Republic of Korea, India and Mexico.

The Executive Committee approves both the country programmes and subsequent proposals for investment projects and institutional strengthening. By the end of 2002, a total of US\$1.06bn had been spent to support the phase-out of about 130,000 ODP tonnes of consumption and more than 50,000 ODP tonnes of production.

In addition to Article 10 of the protocol, Article 10A calls on all parties to transfer 'the best available, environmentally safe substitutes and related technologies' to developing countries. Effectively this function has been taken over by the Multilateral Fund, and appropriate measures built into its decisions on investment projects.

Clearly, the activities of the fund and the decisions of its Executive Committee are of key importance to the work of the Implementation Committee. In recognition

of this, the latter decided, in 1994, to invite the chair and vice-chair of the Executive Committee to attend its meetings, and this is now normal practice; the president of the Implementation Committee has also, on occasion, been invited to participate in Executive Committee meetings. More broadly, countries in receipt of Multilateral Fund assistance are required to report data to it as part of the conditions for receiving support; although the format and deadlines are different from the protocol's procedures under Article 7, this can provide a helpful check on data reported (or not reported) to the Ozone Secretariat.

More importantly, the four implementing agencies work closely with those nations in receipt of Multilateral Fund assistance; they possess a high degree of knowledge about the local situation and often help non-compliant parties prepare their compliance action plans. They are also frequently involved in helping to collect the data reported by countries to the Multilateral Fund, thereby providing something of an external monitoring system (in common with data reported under Article 7 of the protocol, there is no formal verification procedure). The agencies' degree of participation in Implementation Committee meetings has grown in recent years, particularly during discussions of compliance by individual parties that are invited to attend<sup>28</sup>—with considerable benefit for the Implementation Committee's deliberations.

With the collapse of the Soviet bloc in the late 1980s and early 1990s, it became obvious that the countries that emerged would need assistance with meeting their protocol obligations, given the difficulties caused by the massive restructuring of their economies—yet very few of them were eligible for support from the Multilateral Fund.<sup>29</sup> The gap was met by the Global Environment Facility (GEF), which was created in 1991 to provide finance for environmentally sustainable development. The GEF has played a major role in assisting compliance among the transition economies, allocating some US\$155m between 1991 and 1999. On occasion, GEF assistance to Russia, then in non-compliance, was delayed until it had reported the data it was required to—a means of dealing with persistent non-compliance that may be of future application in the context of the Multilateral Fund.

The GEF operates in a similar way to the Multilateral Fund, largely borrowing its procedures, and using three of the same four implementing agencies (UNDP, UNEP and the World Bank). The GEF Secretariat has also participated in Implementation

Committee meetings, although it has tended to be absent in recent years, as most of its projects in transition economies were completed successfully. The approach of methyl bromide phase-out in 2005, however, together with a few continuing problems of non-compliance, prompted re-engagement; the GEF Secretariat was present at the July 2003 meeting of the Implementation Committee, and the GEF business plan for 2004–06 includes US\$12m for methyl bromide phase-out projects.

**Conclusion**

The Montreal Protocol’s compliance system is rightly regarded as a model worthy of emulation. Suggestions have been made at various times by parties to the 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for an implementation or compliance committee analogous to the protocol’s Implementation Committee.<sup>30</sup> The 1993 Lucerne Conference of European Environment Ministers called for the development of non-confrontational compliance procedures (à la Montreal) for all MEAs.<sup>31</sup> Conversely, in other fora, for example in the negotiations over the 1992 United Nations Framework Convention on Climate Change and the 1997 Kyoto Protocol, the regime has been regarded as too effective to be copied, mainly given its potential recourse to trade measures as an enforcement mechanism.<sup>32</sup>

The Montreal Protocol has a unique combination of strengths: an effective set of procedures and institutions, centred around the Implementation Committee, a well-funded financial mechanism to assist with compliance, and a credible threat of sanctions—chiefly trade measures—for use in cases of persistent non-compliance. It has a successful record in dealing with non-compliance among transition economies, and, although it faces a major challenge in regard to developing countries, there seems every reason to believe that it can cope with them just as successfully. Among the not always encouraging stories of international environmental co-operation, it stands as a shining light.

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## Endnotes

<sup>1</sup> See Clare Tenner, 'Multilateral environmental agreements: trends in verification', *Verification Yearbook 2000*, The Verification Research, Training and Information Centre (VERTIC), London, 2000, pp. 133–149.

<sup>2</sup> All figures are taken from the 'Synthesis of the 2002 reports of the scientific, environmental effects and technology and economic assessment panels of the Montreal Protocol', United Nations Environment Programme (UNEP), UNEP/OzL.Pro/WG.1/23/3, 25 February 2003.

<sup>3</sup> Sebastian Oberthür, *Production and Consumption of Ozone-Depleting Substances 1986–1999: The Data Reporting System of the Montreal Protocol*, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Eschborn, 2001, p. 42.

<sup>4</sup> Observations released in July 2003 by the National Aeronautics and Space Administration (NASA) suggest that the rate of ozone destruction is now beginning to fall—if confirmed, a significant development. See [www.nasa.gov/home/hqnews/2003/jul/HQ\\_03253\\_Ozone\\_Recovery.html](http://www.nasa.gov/home/hqnews/2003/jul/HQ_03253_Ozone_Recovery.html).

<sup>5</sup> The final schedule for reducing CFC production and consumption in industrialised countries, for example, was a freeze at 1986 levels by 1989, a 75 percent reduction by 1994, and total phase-out by 1996 (with specified exemptions).

<sup>6</sup> In fact, there is no requirement for reporting base year data for bromochloromethane, the one substance listed in Annex C Group III—given that the only control requirement is 100 percent phase-out by 2002, base year data would be irrelevant. The same argument could apply to the hydrobromofluorocarbons (HBFCs) in Annex C Group II, where the one control requirement is 100 percent phase-out by 1996. For some reason, though, the protocol still requires reporting of base year data for 1989.

<sup>7</sup> Except for HCFCs, common first generation replacements for CFCs, where the baseline figure against which consumption reductions are calculated is set at the 1989 HCFC consumption level plus 2.8% of the 1989 CFC consumption level. The production baseline is slightly more complicated, but based on similar principles.

<sup>8</sup> The other ODS in Annex C are treated in the same way as in developed countries (see endnote 4).

<sup>9</sup> Available at [www.unep.org/ozone/data-reporting-tools.shtml](http://www.unep.org/ozone/data-reporting-tools.shtml).

<sup>10</sup> The latest version—*Production and Consumption of Ozone-Depleting Substances under the Montreal Protocol, 1986–2000*, Ozone Secretariat, Nairobi, UNEP, April 2002—is available at [www.unep.org/ozone/15-year-data-report.pdf](http://www.unep.org/ozone/15-year-data-report.pdf).

<sup>11</sup> See UNEP/OzL.Pro/14/3, p. 5.

<sup>12</sup> For a comprehensive review, see Sebastian Oberthür, chapter 2, pp. 11–32.

<sup>13</sup> Sebastian Oberthür, p. 19.

<sup>14</sup> 'Synthesis of the 2002 reports of the scientific, environmental effects and technology and economic assessment panels of the Montreal Protocol', paragraph 14. For a discussion of the other ODS for which measurements are more difficult, or where discrepancies appear to exist (mainly in regard to carbon tetrachloride), see the full Scientific Assessment Panel report, available at [www.unep.org/ozone/sap2002.shtml](http://www.unep.org/ozone/sap2002.shtml).

<sup>15</sup> Sebastian Oberthür, p. 19.

<sup>16</sup> For details of negotiations on this issue, see Patrick Széll, 'The Montreal Protocol: a new legal model for compliance control', in Philippe G. Le Prestre, John D. Reid and E. Thomas Morehouse, Jr. (eds), *Protecting the Ozone Layer: Lessons, Models and Prospects*, Kluwer Academic Publishers, Boston/Dordrecht/London, 1998; Richard Benedick, *Ozone Diplomacy: New Directions in Safeguarding the Planet*, Harvard University Press, Cambridge, 1998) (2nd ed); and Stephen O. Andersen and K. Madhava Sarma, *Protecting the Ozone Layer: The United Nations History*, Earthscan, London, 2002.

<sup>17</sup> See *Handbook for the International Treaties for the Protection of the Ozone Layer*, UNEP, Nairobi, 2003 (6th ed), Section 2.7, 'Non-compliance procedure', pp. 295–297.

<sup>18</sup> *Handbook for the International Treaties for the Protection of the Ozone Layer*, paragraph 1.

<sup>19</sup> *Handbook for the International Treaties for the Protection of the Ozone Layer*, paragraph 4.

<sup>20</sup> The decisions dealt with the following issues: membership and functioning of the committee (2); agreed changes in baseline data (1); general requests for data to be reported (2); specific requests (to listed parties) for data to be reported (2); requests for explanations of deviating data (2, listing six parties), requests to parties in non-compliance for plans of action (10); agreed plans of action for countries in non-compliance (3); notes of parties currently or previously in non-compliance but returned to, or expected to return to, compliance (2); others (1).

<sup>21</sup> Kazakhstan and Tajikistan, which acceded the protocol relatively late, were identified in 2001 as being in non-compliance.

<sup>22</sup> For a full description of the evolution and operation of the trade measures, see Duncan Brack, *International Trade and the Montreal Protocol*, Earthscan/Royal Institute of International Affairs, London, 1996.

<sup>23</sup> See Duncan Brack, pp. 54–58, for other examples.

<sup>24</sup> ‘Indicative list of measures that might be taken by a MOP in respect of non-compliance with the Protocol’, section c, *Handbook for the International Treaties for the Protection of the Ozone Layer*, p. 297.

<sup>25</sup> Decision VII/18, ‘Compliance with the Montreal Protocol by the Russian Federation’, adopted by the 7th MOP in December 1995.

<sup>26</sup> Strictly speaking, parties that are both developing countries and consume below a certain threshold level of CFCs and halons—‘Article 5 parties’—are eligible for assistance. A few of the richer developing countries, such as the Republic of Korea, were initially excluded from the category, and a few transition economies have subsequently been added.

<sup>27</sup> Each of the sums after the first included some money collected but not allocated from the previous period: US\$76m, for example, of the US\$573m for 2003–05.

<sup>28</sup> Although the section of the Implementation Committee meeting that finalises recommendations for the MOP is held in private.

<sup>29</sup> Most of them were not classified as developing countries—although some have since been reclassified—and, also, they consumed above the threshold set in Article 5 of the protocol.

<sup>30</sup> See Rosalind Reeve, *Policing International Trade in Endangered Species: The CITES Treaty and Compliance*, Earthscan/Royal Institute of International Affairs, London, 2002, pp. 268–272.

<sup>31</sup> Peter Sand, ‘The Montreal Regime: Sticks and Carrots’, in Philippe G. Le Prestre, John D. Reid and E. Thomas Morehouse, Jr. (eds), p. 107.

<sup>32</sup> See Patrick Széll, p. 94.