EarthTrends: Featured Topic

Title: **Stratospheric Ozone Depletion: Celebrating Too Soon**
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Since 1987, the international community has made great strides toward eliminating the manufacture, trade, and use of ozone-destroying substances such as chlorofluorocarbons (CFCs), with global consumption of these chemicals dropping more than 70 percent (Oberthür 1997:65). (see Figure 1). In fact, the Montreal Protocol has been held up as a model of international mobilization in the face of a global environmental threat.

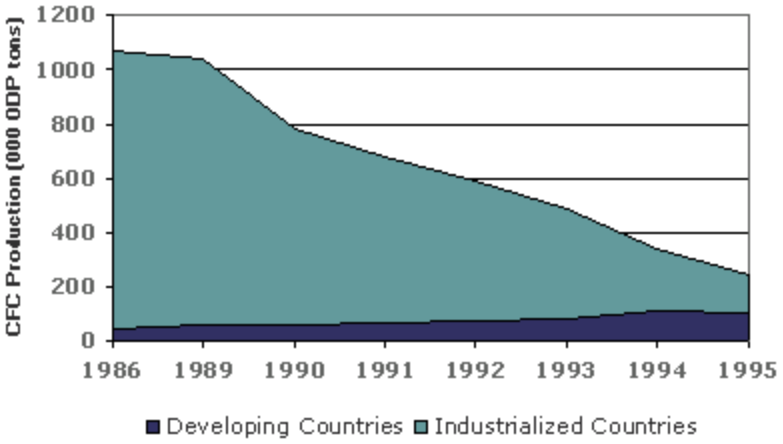
Despite these efforts, the stratospheric ozone layer is not safe yet. The conversion process from CFCs to less damaging substances is not complete in developed nations and is still at an early stage in many developing nations. Moreover, the Montreal Protocol's ambitious plan to replace ozone-depleting chemicals is threatened by the recent growth of a black market in CFCs, and by the difficulty a few Eastern European countries have had in phasing out CFC production and consumption. Perhaps of most concern is the increasing production and use of CFCs in some rapidly developing nations.

The good news is that the speed of the transition away from CFCs and other ozone-depleting chemicals has been more rapid than many thought possible, given the ubiquity of these chemicals in commerce just a decade ago. As refrigerants, foam-blowing agents, solvents, aerosol propellants, fire retardants, and cleaning agents, these chemicals reached into nearly every household and workplace in the developed world in one product or another. In the United States, which alone accounted for roughly one third of global CFC use in 1987 when the Montreal Protocol was negotiated, CFCs played a role in delivering some US$28 billion in goods and services and were essential to the functioning of some US$130 billion worth of installed equipment such as refrigeration units and air conditioners (Cook 1996:1). Despite widespread use, most developed countries were able to meet the Protocol's 1996 deadline to cease CFC production.

Reaching this goal required a remarkable level of cooperation among governments, CFC producers, and various industries. Reluctant at first, but faced with the international community's resolve to meet

Success Story: CFC Production Has Fallen Sharply

Figure 1: Annual Production of CFCs, 1986-95



Note: Ozone-depleting potential (ODP) tons is a measure by which ozone-depleting substances are weighted according to their ability to destroy ozone.

Source: Oberthür 1997.

the problem head on, industry groups accepted the challenge of retooling products and processes to avoid CFC use. Industry estimates of the final price tag for a global phaseout of CFCs and halons are as high as US$40 billion, excluding the costs governments and international organizations have incurred organizing and promoting the transition (Vogelsberg 1996:1).

In response to these efforts, atmospheric concentrations of CFCs are beginning to level off or decline (Prinn et al. 1992:187-191; Butler et al. 1992:401-405; Elkins and Thompson 1993:780). If the plan to eliminate all ozone-depleting substances proceeds as set forth in the Protocol, the levels of stratospheric chlorine—the CFC breakdown product that actually destroys ozone—should peak between 1997 and 1999 and then decline gradually for more than a century (Hofmann 1996:222-223). In turn, ozone loss will diminish gradually as well until, around 2050, the Antarctic ozone hole disappears (Prather et al. 1996:554).

The bad news is that several factors, key among them illegal trade, threaten to undermine full compliance in the years ahead (Brack 1996:105-114). Substantial demand for these chemicals still exists in the developed world, mostly to service existing refrigeration and cooling equipment. In most developed countries, servicing requirements for these units can be met legally with either recycled CFCs or new CFCs from preexisting stocks. However, because these sources are limited, there is added incentive to illegally import virgin CFCs.

Estimates of the size of the CFC black market range from 20,000 to 30,000 metric tons annually worldwide (Brack 1997). In late 1995, the chemical industry estimated that as much as 20 percent of the CFCs then in use in the world had been obtained on the black market (Brack 1996:105). A good deal of this illegal trade is focused in the United States, which has imposed a high excise tax on CFCs since 1990 to encourage recycling of CFCs already in use and to spur conversion of equipment away from CFC use. Since the excise tax has substantially increased the cost of CFCs in the U.S. market, it has provided a potent driving force for the illegal trade. Europe has also experienced considerable black market trade, probably in the range of 6,000 to 10,000 metric tons per year (Brack 1997).

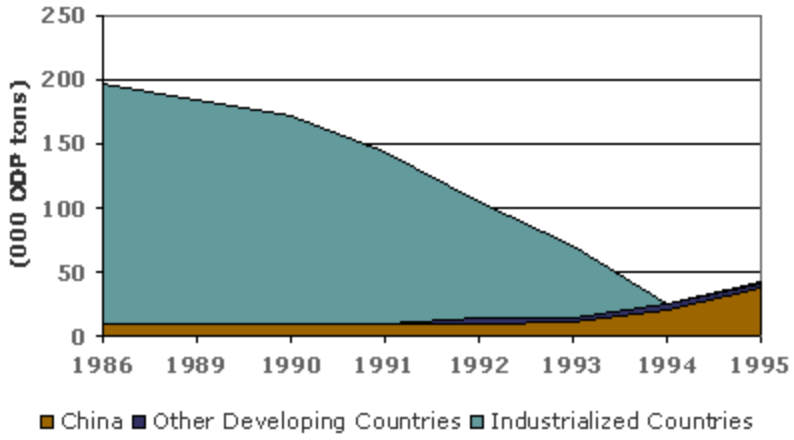
In the United States, enforcement agencies have begun to crack down on illegal trade, with some encouraging results. United States Customs authorities and law enforcement officials had impounded some 1,000 metric tons of smuggled CFCs by the end of 1997, and authorities report some tapering off in the flow of illegal materials (Land 1997). In Europe, enforcement has recently taken a significant step forward with the confiscation of about 1,000 metric tons of illegal CFCs in Germany (Brack 1997).

Apparently, much of the contraband CFCs both in the United States and Europe emanate from production facilities in China and Russia. The World Bank has launched a special program targeted at ending CFC production at Russian facilities, and the Russian government has recently instituted an export licensing system for CFCs to help control illicit shipments (Brack 1997; Land 1997). The situation appears to be more problematic in China, which can still legally produce CFCs for consumption in the developing world. As it now stands, China is apparently the biggest source of material for the CFC black market in developed countries (Brack 1997).

Even more troubling than black market trade in developed nations is an unexpectedly rapid rise in the use of CFCs and other ozone-depleting chemicals in some developing nations. The Montreal Protocol permits increases in production and use of ozone-depleting chemicals in developing nations until 1999, when production levels are to be frozen at 1995-97 levels; thereafter, production of ozone-destroying chemicals must be cut progressively until it ends in 2010. However, from 1986-95, production of CFCs rose nearly 2.5 times in the developing world, while

Backsliding: Halon Production Is Rising Again

Figure 2: Annual Production of Halons, 1986-95



Note: Ozone-depleting potential (ODP) tons is a measure by which ozone-depleting substances are weighted according to their ability to destroy ozone.

Source: Oberthür 1997.

consumption rose nearly 40 percent (Oberthür 1997:vi, 35). Most of this growth has taken place in a few rapidly industrializing nations: Brazil, India, Mexico, and particularly China. For example, China increased its production of halons—typically used as fire retardants—from 4,000 metric tons in 1991 to more than 10,000 metric tons in 1995 (UNEP 1996a:8) (see Figure 2). This increase is particularly worrisome because halons destroy 3 to 10 times more ozone than CFCs, and because halons were specifically targeted for early phaseout (1994) in developed countries. Recent measurements show that concentrations of halons continue to rise in the atmosphere, offsetting some of the progress attained through declining CFC use (Butler et al. 1998:1503).

The international community has already directed considerable attention to helping developing countries switch from CFCs before they become too dependent on them. The Multilateral Fund, which was set up under the Montreal Protocol to help pay for new technologies, equipment conversion projects, and training in developing nations, has so far contributed to some 1,800 separate projects in 106 countries at a cost of US$565 million. When complete, these projects will phase out the equivalent of more than 80,000 metric tons of CFCs (Lang 1997). A typical example is Venezuela's Plasticos Molanca plastic foam factory, which used Multilateral Fund money to pay for 80 percent of its conversion from the use of CFCs to butane as a foam-blowing agent (UNEP 1995a:9). Similar projects, aided by strong government commitment and substantial private investment, have allowed some developing nations to proceed quickly toward total phaseout.

A variety of actions on the part of both industrialized and developing countries could help complete the move away from ozone-destroying substances. Tackling the black market will require better tracking of trade in CFCs. Recognizing this need, the nations that signed the Montreal Protocol recently amended the treaty to establish a licensing system for all CFC exports and imports. Making this licensing system work, however, will require concerted efforts on the part of those nations that actively trade these substances. These efforts will require better training of customs agents, closer interagency and international collaboration to detect and follow up on illegal activity, and stricter penalties for those caught trafficking in black market CFCs.

Developed nations can help the developing world by continuing to aggressively fund conversion projects through the Multilateral Fund. The United Nations Environment Programme (UNEP) estimates that the US$466 million that developed countries have agreed to add to the fund over

the next several years should be sufficient to allow developing nations to meet the 1999 deadline to freeze production levels of ozone-destroying chemicals (Lang 1997). But additional funds, as well as increased transfer of CFC-free technologies, will be needed in the years after 2000 to complete the phaseout (UNEP 1996b:17-19).

Other steps could hasten the healing of the ozone layer. Developed nations could encourage faster phaseout of their own remaining CFC use by requiring retirement or retrofit of CFC-using machinery. In addition, more rapid elimination of halon production in the developing world and the destruction of some or all of the existing halon stocks still in industrialized countries would significantly lower ozone loss (UNEP 1995b).

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