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The Chinese Government's Role in Implementing Multilateral Environmental Agreements: The Case of the Montreal Protocol*

Jimin Zhao and Leonard Ortolano

ABSTRACT The Multilateral Fund created by amendments to the Montreal Protocol played a key role in motivating the Chinese government to ratify and comply with the Protocol. Two other factors have affected China's actions in meeting the Protocol's requirements: the nation's desire to appear as a responsible and co-operative actor in solving global environmental problems, and the interest of China's principal implementing agency in expanding its responsibilities and authorities. Three factors have had significant roles in enhancing the national government's ability to implement the Protocol: expanded administrative capacity, participation of local government units with capability to enforce regulations, and the employment of market-based environmental policy instruments.

Developing countries are making increasingly significant contributions to global environmental problems (such as climate change), so their co-operation in solving these problems is essential. However, in comparison to industrialized countries, developing countries have fewer resources to implement multilateral environmental agreements (MEAs), and they are often unwilling to compromise national development goals for the sake of global environmental protection.

China can play a major role in solving global environmental problems because of its size and surging economic development. For example, China is the second largest emitter of gases that cause climate change, after the United States, and it is the world's largest producer and consumer of substances that damage the ozone layer. It is thus not surprising that the United States has demanded the participation of China (and other developing countries) as a condition for the US to join any global climate change agreement. The factors that affect the willingness and ability of China and other developing countries to participate in MEAs are, therefore, of great significance. However, thus far, little research on those factors has been conducted systematically.

This article tries to fill this gap by examining factors affecting China's compliance with requirements of the Montreal Protocol on Substances that Deplete the Ozone Layer (hereafter referred to as the Montreal Protocol or the Protocol). The Protocol, which stipulates control measures and schedules for countries to phase out ozone-depleting substances (ODS), is the first multilateral environmental agreement that has engaged

* We are grateful to Albert Park for his helpful comments on a draft of this article.

many developing countries, and thus far China has successfully satisfied its requirements. Understanding China's behaviour in response to the Protocol is important because of the continued existence of ozone depletion. It is also significant in providing insights into how China may respond to other global environmental problems.

China's government, including central and local government agencies, plays a critical role in ratifying and implementing MEAs. This paper analyses factors affecting the government's interests in signing and complying with the Protocol and factors influencing the government's capacity to implement the Protocol. The analysis centres on conflicts and co-ordination among central agencies and between central and local governments.

Background on China and the Montreal Protocol

Since the 1972 United Nations Conference on the Human Environment in Stockholm, many MEAs have been negotiated. Among them was the Vienna Convention for the Protection of the Ozone Layer, a framework convention ratified by 21 countries in 1985. The ozone layer, the reaches of the earth's atmosphere between 10 and 50 km above the ground, protects people from the harmful effects of ultra-violet radiation from the sun. Chlorofluorocarbons (CFCs), halons and a broad range of industrial chemicals, generally called ozone-depleting substances, are known to deplete the ozone layer.

In 1987, the Montreal Protocol, which provided specific requirements and deadlines for countries to cut production and use of ODS, was put in place.¹ A key provision of the Protocol requires signatory developing countries to phase out use and production of CFCs and halons by 2010. The Protocol was strengthened in 1990 when the London Amendments created an interim Multilateral Fund (MLF or Fund). The Fund, which was permanently established in 1992 in London, was designed to assist signatory developing countries with an annual consumption of ODS lower than 0.3 kg per capita ("Article 5 countries") in meeting their obligations under the Protocol. The London Amendments, which added a number of significant requirements to the 1987 Protocol, was signed by a majority of developing countries.

Further revisions to the Montreal Protocol were made in Copenhagen (1992), Vienna (1995), Montreal (1997) and Beijing (1999), but these did not change basic requirements for developing countries. They tightened phaseout deadlines for ODS for developed countries, created deadlines for methyl bromide and hydrochlorofluorocarbons for developing and developed countries, and established a licensing system for controlling the trade of methyl bromide. China ratified the London Amendments to

1. For more on development of the Montreal Protocol, see R. E. Benedick, *Ozone Diplomacy: New Directions in Safeguarding the Planet*, enlarged edition (Cambridge, MA: Harvard University Press, 1998).

the Montreal Protocol in 1991, but it has not yet ratified subsequent amendments.

Two CFCs (CFC 11 and CFC 12) together with halon 1211 have accounted for a majority of China's total ODS consumption and production. Since 1996, China has been the world's leading consumer and producer of ODS, accounting for 30 and 34 per cent respectively of the world's total consumption and production in 1997.² China's share increased because industrialized countries that had previously been the major ODS producers and consumers phased out major halons in 1994 and CFCs in 1996. In addition, China's demand for ODS increased because of the nation's 12 per cent growth in GDP during the Eighth Five-Year Plan period. During that time, some ODS consumption and production sectors, such as household refrigerators, fire protection and foams, were among China's fastest growing industrial sectors.

China has changed from a net importer to a net exporter of ODS. During the late 1980s and early 1990s, China could not produce enough ODS to satisfy domestic demand. For example, CFC and halon imports in 1991 accounted for 40 per cent of China's CFC consumption and 10 per cent of its halon consumption.³ ODS imports increased in 1992 and 1993 due to rising demand linked to rapid economic growth. As domestic ODS production increased in 1994 and 1995, net imports decreased. In 1997, China became a net exporter of halon, and imported CFCs dropped to only 5 per cent of China's total consumption. Exports of CFCs and halons went primarily to South-East Asian countries, and exports increased after industrialized countries phased out halons and CFCs in the mid-1990s.

Once it had committed to complying with the London Amendments to the Montreal Protocol, the Chinese government moved quickly to satisfy procedural requirements. By 1996, however, the government realized that its new procedures and institutions for managing ODS had not been effective in bringing consumption and production below targets China had set for itself in its country programme. The government responded by modifying its ODS-reduction strategies. By 1999, China fully satisfied the Protocol's requirements for a mandatory freeze on consumption and production of CFCs (for 1999) and halons (for 2002). Thus, after some initial difficulties, China was successful in meeting the requirements of the Protocol.

Government Interests in Ratifying the Protocol

Although the Montreal Protocol had the potential to hurt many industries during China's period of rapid economic development, by signing it, China was able to advance several objectives: to display concern about the ozone layer problem; to show that China could be a co-operative

2. See Sebastian Oberthur, *Production and Consumption of Ozone Depleting Substances 1986–1997* (Eschborn: Deutsche Gesellschaft für, 1999).

3. For details about China's ODS consumption and production, see Jimin Zhao, "Implementing the Montreal Protocol in China," Ph.D. dissertation, Stanford University, 2000.

player in the international arena, thereby helping it retain a leading voice in the developing world; to help China keep abreast of changes in international technology; to give it access to financial and technical assistance; and to expand its export markets.⁴

The Chinese scientific community played a major role in persuading China's leaders of the need to protect the ozone layer. In 1984, Peking University Professor Tang Xiaoyan began researching the impacts of ozone layer depletion and China's potential role in accelerating that depletion. This research received national attention. It also prompted Song Jian, then Director of the State Science and Technology Commission (currently the Ministry of Science and Technology) and a Politburo member, to send observers to attend an Ozone Layer Protection Working Group meeting organized by the United Nations Environment Programme in Rome in May 1986. This marked China's initial participation in negotiating the Montreal Protocol.

Different concerns among ministries led to debates about whether China should be a part of the Montreal Protocol. The then Ministry of Chemical Industry worried that extensive use of CFC substitutes would harm the chemical industry if those substitutes were supplied by imports. Officials argued that substitution might cause some ODS-producing enterprises to close. These potential closures were viewed with alarm since most ODS-producing enterprises had just been created.⁵ The State Planning Commission (which became the State Development and Planning Commission after March 1998) opposed China's participation in the Montreal Protocol at the outset, primarily because it felt China lacked the financial and technical capabilities to substitute other chemicals for ODS. The Commission also feared that participation in the Protocol would constrain China's economic progress.⁶

In contrast, some ministries, such as the former Ministry of Light Industry, favoured ratification of the Protocol. To counter concerns of the State Planning Commission, the Ministry of Light Industry argued that eliminating CFCs would not cause significant economic problems if CFC substitutes were available. As the unit supervising enterprises producing household refrigerators, the Ministry wanted China to ratify the Protocol for trade-related reasons. Chinese refrigerators made with CFCs could not be exported to countries that were parties to the Protocol unless China ratified the agreement.⁷

In 1987, the State Council called upon the National Environmental Protection Agency (NEPA, currently the State Environmental Protection Administration, SEPA)⁸ to co-ordinate an evaluation of costs and benefits

4. See J. Poppele, "The CFC challenge," *The China Business Review*, Vol. 21, No. 40 (1994).

5. Interview with a chemical expert, 21 July 1997, Shanghai. All interviews for this research were conducted by Jimin Zhao.

6. Interview with an official in the State Planning Commission, 15 April 1997, Beijing.

7. For details about trade restrictions, see Article 4 of the Montreal Protocol.

8. In March 1998, NEPA was upgraded to a full ministry and renamed the State Environmental Protection Administration (SEPA). For events that occurred before March 1998, we use NEPA instead of SEPA.

of signing the Protocol. Ministries involved in the evaluation were preoccupied with trade issues since Article 4 of the Protocol prohibits trade of controlled substances (such as CFCs and halons), products containing controlled substances, and products manufactured with controlled substances between party and non-party countries. Such trade was important for China. Some officials involved in the benefit-cost evaluation felt China had an international duty to reduce ODS production.⁹ Moreover, they believed that by signing the Protocol, China could help lead an effort by developing countries to obtain assistance from developed countries for ODS substitution. These officials felt such an effort was needed because the 1987 Protocol did not contain specific financial and technical assistance provisions. As a move in this direction, Chinese ministries agreed that China would not sign the Protocol until provisions were added to ensure financial and technical aid to China and other developing countries.¹⁰

Once the ministries had achieved this consensus, China began to participate in international-level negotiations to modify the 1987 Protocol. China possessed considerable bargaining power because it was the largest ODS consumer and producer in the developing world, and it had the potential to increase its ODS consumption and production rapidly.¹¹ Working with India, which also had high estimated future CFC production levels, China lobbied for establishment of an international fund.¹² China and India felt that because developed countries had caused most of the damage to the ozone layer, they should bear most of the cost of solving the problem. They also argued that developing countries could not afford the costs of CFC abatement because they needed to address more pressing domestic issues such as poverty and disease. Consequently, financial aid and technology transfer would be necessary for the participation of developing countries.¹³ At that time, industrialized countries realized that “the promises of Montreal would have to be translated into tangible assistance to enable developing countries to forgo significantly expanded use of CFCs.”¹⁴

After heated debate, China, India and other developing countries

9. Interviews with NEPA officials, August 1997, Beijing.

10. See M. Oksenberg and E. Economy, “China’s accession to and implementation of international environmental accords 1978–95,” in E. B. Weiss and H. K. Jacobson (eds.), *Engaging Countries: Strengthening Compliance with International Environmental Accord* (Cambridge, MA: The MIT Press, 1998); Interview with officials of the State Planning Commission, NEPA and the Ministry of Chemical Industry in Beijing between April and August 1997.

11. Interview with a NEPA official, 9 April 1997, Beijing.

12. At the first meeting of the parties to the Protocol held in Helsinki in 1989, Chinese delegates offered a proposal entitled “Establish an international fund for protecting the ozone layer” and suggested that developed countries should assist developing countries in gaining access to new ODS-reduction technologies. See NEPA, *Renlei gongtong de zeren – baohu chouyangceng (Humans’ Common Responsibility – Protect the Ozone Layer)* (Beijing: Chemical Industry Publisher, 1996).

13. See Armin Rosencranz and Reina Milligan, “CFC abatement: the needs of developing countries,” *Ambio*, No. 19 (1990), pp. 6–7.

14. See Benedick, *Ozone Diplomacy*, p. 124.

convinced key developed countries that a new mechanism for transferring funds and technologies was needed. In 1990, the London Amendments to the Protocol established an Interim Multilateral Fund that would provide financial and technical assistance for ODS reduction to developing countries. In June 1991, with the approval of the National People's Congress, China ratified the London Amendments.

China has not yet ratified the Copenhagen, Vienna, Montreal and Beijing Amendments. The main reason centres on China's lack of commercially viable substitutes for methyl bromide, a highly versatile, broad-spectrum pesticide used extensively by Chinese farmers.¹⁵ The 1992 Copenhagen Amendments called for a phaseout in use of methyl bromide but did not list a schedule for developing countries. The 1995 Vienna Adjustments strengthened controls by requiring developing countries to freeze consumption and production of methyl bromide at 1995–98 levels by 2002. The 1997 Montreal Amendments required developing countries further to reduce use of methyl bromide by 20 per cent in 2005 and phase it out by 2015. The 1999 Beijing Amendments had no further phaseout requirements for methyl bromide.

Alternatives to methyl bromide exist for almost all agriculture applications in developed countries, but the Chinese government wants to test them under China's climate and soil conditions and agriculture practices. In contrast to methyl bromide, which is effective under a broad array of conditions, alternative pesticides are often crop and pest specific. To employ these alternatives under local conditions, significant efforts will be required in terms of applied research and field-testing, on-farm demonstrations, technology transfer, and user education. SEPA (formerly NEPA) has been pushing for a timely ratification of the Copenhagen Amendments, but the Ministry of Agriculture and the State Bureau of Tobacco Monopoly are opposed. They are worried about the impact of a methyl bromide phaseout on agriculture and tobacco development in China.

China faces a dilemma. The country needs financial and technical aid to examine the impact of alternatives to methyl bromide before it makes a decision on ratifying the Copenhagen Amendments. However, without ratifying the Copenhagen and subsequent Amendments, it is not eligible to obtain such aid.¹⁶ The Chinese government also faces a challenge relating to the Montreal Amendments. If China ratifies the Amendments in 2002, it will face the 2002 freeze deadline immediately. However, if it ratifies the Amendments after 2002, it would be forced to meet the 20 per cent reduction deadline in a short time.

15. Telephone interview with a PMO official, 18 June 2001.

16. China has worked out "China's strategy framework for methyl bromide control" with the support of the United Nations Environment Programme (UNEP). Two MLF training and research projects related to methyl bromide have been conducted in China, but China cannot receive more funds for demonstration projects unless it ratifies the Copenhagen Amendments. UNEP, *Methyl Bromide Phase-Out Strategies* (Paris: UNEP, 1999).

Government Incentives to Comply with the Protocol

Multilateral Fund – dominant incentive. The MLF was a driving force in China's ratification of the Montreal Protocol, and it has significantly influenced the Chinese government's organization of ODS-reduction activities. Because Article 5 countries that do not meet the Protocol's procedural requirements cannot obtain MLF money, China had strong incentives to satisfy those requirements. Moreover, the desire to obtain increasing amounts of MLF support motivated China to improve its implementation strategies. The need for improvement was evident after China failed to meet voluntary ODS-reduction goals for 1996 set out in its country programme.

The Policies, Procedures, Guidelines and Criteria of the Multilateral Fund (MLF Guidelines) formulated by the MLF Executive Committee requires each Article 5 party requesting support from the Multilateral Fund to develop a country programme.¹⁷ In addition to establishing a government's commitment to comply with the Protocol, a country programme must describe the nation's proposed institutional and policy frameworks. Within the MLF Guidelines, "institutional framework" refers to organizational arrangements relevant to implementing the phase-out of ODS, such as establishing a "National Ozone Unit" and creating a system for monitoring progress towards meeting goals. A "policy framework" consists of a country's policy instruments for promoting the phaseout of ODS, such as regulations or voluntary agreements. The MLF Guidelines also require Article 5 countries to report to the Fund Secretariat and to the Ozone Secretariat annually on progress in implementing their country programmes.¹⁸

Under pressure from Chinese ministries and enterprises that wanted to obtain MLF support, NEPA began to draft China's Country Programme for the Phaseout of Ozone Depleting Substances under the Montreal Protocol in 1991.¹⁹ After a review by the Environmental Protection Commission of the State Council, the draft was revised. A final version was approved by the State Council in January 1993, and by the MLF Executive Committee two months later. China satisfied other procedural requirements related to accessing the MLF by establishing a national administrative system to orchestrate the country's ODS-reduction activities: the "National Leading Group for Ozone Layer Protection" served as a decision-making body, and the "Project Management Office" within NEPA was China's National Ozone Unit. The government also formulated national policies and regulations to encourage ODS-reduction by specific industries. Since 1993, China has reported annual ODS consumption and production data to the Ozone Secretariat and the Fund Secretariat.

China has paid great attention to the amount of MLF money it receives.

17. See MLF Secretariat, *Multilateral Fund for the Implementation of the Montreal Protocol: Policies, Procedures, Guidelines and Criteria* (Nairobi: UNEP, 1997), p.45.

18. *Ibid.* p.46.

19. See Poppele, "The CFC challenge," pp. 34–38.

In 1996, the government indicated that China would meet the Protocol's requirements, provided "sufficient funds are made available and needed technologies are transferred in accordance with the provisions of the Protocol."²⁰ Chinese officials pushed for a phaseout of ODS well before any Protocol deadlines because they believed early phaseout would ultimately be less costly. The government also feared that developed countries would stop providing funds if interest in the Protocol waned.²¹ These fears were fuelled by a shortfall of nearly US\$10 million in funds for eligible projects that occurred at the MLF Executive Committee's 15th Meeting in December 1994.²² By then, an increasing number of developing countries had ratified the Protocol and submitted country programmes, but the MLF Executive Committee was not receiving timely contributions from industrialized countries and countries with economies in transition. Some Protocol experts believe developed countries slowed their contributions to the MLF once they had met their initial objective of having developing countries ratify the Protocol.²³

In 1995, the MLF Secretariat introduced a sector approach for funding ODS-reduction projects, and the Chinese government immediately expressed interest.²⁴ NEPA expected the sector approach to be more cost-effective in reducing ODS than the project-by-project approach it had previously used to obtain MLF grants. In addition, NEPA believed the sector approach would improve the continuity of MLF funding. Even though China could not receive all funding for a sector at one time, it could acquire sector funds on a year-by-year basis provided it met annual ODS-reduction targets detailed in a sectoral plan.

China implemented the sector approach for halons in 1998, and the results illustrate the approach's advantages. The MLF Executive Committee saw decreases in China's halon consumption and production, and the Chinese government gained control over the distribution of MLF money within the halon sector. The government is now implementing this approach for more sectors, such as CFC production, mobile air conditioning, solvent, tobacco and foams.

China's interest in appearing as a co-operative and responsible international actor. Another factor motivating implementation of the Protocol was China's concern for its international image.²⁵ The Protocol gave China a good opportunity to demonstrate its commitment to solving

20. See NEPA, *Human's Common Responsibility*.

21. Based on interviews with over 20 officials from NEPA and other ministries during August and September 1997, Beijing.

22. Executive Committee, *Report of the Fifteenth Meeting*, UNEP/OzL.Pro./ExCom/15/45, 16 December 1994, paras. 21 and 88–89.

23. See E.R. DeSombre and J. Kauffman, "The Montreal Protocol Multilateral Fund: partial success story," in R.O. Keobane and M. A. Levy (eds.), *Institutions for Environmental Aid* (Cambridge, MA: The MIT Press, 1996).

24. NEPA, *Ozone Action in China*, No. 3 (July 1995).

25. See M. Oksenberg and E. Economy, "Introduction: China joins the world," in E. Economy and M. Oksenberg (eds.), *China Joins the World: Progress and Prospects* (New York: Council on Foreign Relations, 1999), p. 5.

international environmental problems.²⁶ In comparison to other issues, such as global climate change, China's compliance with the Protocol involves low costs and a modest impact on the economy. Moreover, financial and technical assistance provided by the MLF reduces the difficulty and costs of compliance.

In November 1999, China highlighted its commitment to helping solve global environmental problems by voluntarily hosting the Eleventh Meeting of the Parties to the Montreal Protocol and the Fifth Meeting of the Parties to the Vienna Convention. This cost China about US\$2.2 million.²⁷ In a speech to top officials at the meeting, President Jiang Zemin announced that China would continue to work hard on ozone layer protection.²⁸ In a welcoming speech, Xie Zhenhua, the Minister of SEPA, indicated that China hosted the meetings "to demonstrate to the international community what China has achieved in addressing environmental problems, both domestic and international, particularly since the time when the policy of reform and opening to the outside world was adopted."²⁹

China's efforts to be a responsible and co-operative international actor were recognized by Richard Benedick, a principal architect and the chief American negotiator of the Protocol. He argued: "China has also been from the beginning one of the most co-operative and conscientious parties to the Montreal Protocol, notwithstanding the needs of its large and rapidly expanding economy."³⁰ To support his view, Benedick noted that China had created a high-level inter-agency task force to work on ozone layer protection; been among the first to submit a country programme; taken quick action to have industrial facilities reduce use of ODS; and offered to delay its disbursements of MLF money so that other countries could receive support during 1994, a year when the Fund was short of money.

SEPA and the Project Management Office's interests in compliance. Inter-agency rivalries led NEPA to take a particular interest in implementing the Montreal Protocol effectively.³¹ Several ministries, including the former State Planning Commission, the Ministry of Chemical Industry and the Ministry of Light Industry, had wanted to be the lead agency for implementing the Protocol.³² These ministries argued that

26. Interviews with officials at the PMO, Director of Air Pollution Control at NEPA, Deputy Administrator of NEPA, and an official in the State Development and Planning Committee, 22 August–16 September 1997.

27. Interview with the PMO director, 1 December 1999, Beijing.

28. Jiang Zemin, "A welcoming statement at the opening ceremony of the high-level segment of the fifth meeting of the Conference of the Parties to the Vienna Convention and the 11th meeting of the Parties to the Montreal Protocol," 3 December 1999.

29. Xie Zhenhua, "A welcoming statement at the opening ceremony of the preparatory segment of the fifth meeting of the Conference of the Parties to the Vienna Convention and the 11th meeting of the Parties to the Montreal Protocol," 29 November 1999, Beijing.

30. Benedick, *Ozone Diplomacy*, p. 264.

31. Interviews with SEPA officials, July 1997 and December 1999; interview with an official in the former State Planning Commission, August 1997, Beijing.

32. Interviews with officials in the State Planning Commission and in the Ministry of Chemical Industry, 6 and 15 April 1997, Beijing.

NEPA had little experience in either managing projects or collaborating with international organizations. Once NEPA received the State Council's designation as lead agency, it had reason to use its work on implementing the Protocol to demonstrate its capabilities. This would allow it to gain increased control over China's other efforts to solve international environmental problems. Given this opportunity to extend its domain, NEPA made implementing the Protocol a priority. It established its own Leading Group for Ozone Layer Protection and, every 16 September, International Ozone Day, NEPA (and later SEPA) and the industrial ministries organized ceremonial and educational activities that were attended by top-ranking NEPA officials. These events showcased NEPA's work in implementing the Protocol to citizens and the media.

By the late 1990s, NEPA was able to enhance its control over domestic execution of MEAs.³³ After the 1998 government restructuring, which transformed NEPA into SEPA, the latter gained authorities related to global environmental matters that had been previously held by the Ministry of Foreign Affairs. These included new authority to participate in negotiating and co-ordinating MEAs, such as the Biological Diversity Convention and the Climate Change Convention.³⁴

The Project Management Office (PMO), a division of SEPA, has also had incentives to implement the Montreal Protocol effectively. It was established in 1992, and carries out the daily activities of Protocol implementation and manages ODS-reduction projects supported by the MLF. Its work with the Fund has given the PMO access to administrative equipment and power to allocate MLF money. In addition, PMO officials have opportunities for training and travel abroad. Maintenance and enhancement of these opportunities are among the PMO's unstated goals, and this has motivated it to secure its position as the key implementing unit.³⁵

The PMO, which co-ordinates with several international agencies implementing the MLF and with more than ten industrial sectors, has a substantial workload. At one point, it became so overloaded that the application and implementation process for MLF projects was slowed. While the PMO might have been able to reduce its workload by shifting some responsibilities to other agencies, it was reluctant to diminish its powers. Instead, in 1998 it created, within its own office, special working teams for halons, CFC production, mobile air conditioning, solvents, tobacco and foams. These teams, which included staff from industrial ministries, were responsible for preparing and implementing sector plans for ODS reduction. In 1999, the PMO had more than 40 employees, half

33. Prior to the Montreal Protocol, other agencies had controlled the domestic implementation of MEAs. For example, the Convention in Trade in Endangered Species (CITES) was managed by the former Ministry of Forestry, and the London Convention against Ocean Dumping was managed by the State Oceanic Administration.

34. Environomics ERM China, "The State Environmental Protection Administration: a new environment in government?" *ERM China*, August 1998.

35. Interviews with SEPA officials, August 1997; June 2001, Beijing.

of them temporary. This is notable given that SEPA had a total staff of about 200 in 1999.

Factors Influencing the Government's Ability to Implement the Protocol

The Chinese government's actions during the early 1990s did not effectively promote ODS reduction, and China did not meet voluntary 1996 ODS consumption and production goals specified in its country programme. Overall ODS production and consumption in 1996 exceeded targets by 94 and 65 per cent, respectively.³⁶ In contrast, by the end of 1999 China met the Protocol's goals to freeze production and consumption of major CFCs and halons at average levels of 1995–97 in advance of the 1999 and 2002 deadlines. This section examines key factors affecting the government's ability to reduce China's ODS production and consumption.

Administrative capacity. The Chinese government's efforts to implement the Protocol during the early 1990s were impeded by deficiencies in administrative capacity, that is, the management, funds, knowledge and information that an agency can use to design and implement policies. One limitation was the PMO staff's inexperience. In addition to orchestrating MLF proposal preparation and submission, the PMO manages implementation of individual MLF-supported projects. During 1992 and 1993, when China began to apply for MLF funds, the PMO did not have systematic procedures for enterprises to follow in preparing funding applications. Enterprises did not know how to write project proposals to meet MLF requirements, and neither NEPA nor the industrial ministries could offer them much assistance. When asked about the major obstacles besetting China's phaseout efforts in 1994, a knowledgeable World Bank official placed "the lack of experience of NEPA as an executing agency for ODS projects" at the top of his list.³⁷

The PMO's lack of project management ability was compounded because China's ODS-reduction programme expanded rapidly. The programme covers a wide spectrum of enterprises in almost all provinces, and it involves industrial sector bureaus at both national and local levels. Moreover, the PMO has to deal with multiple agencies administering the MLF: UNEP, the World Bank, the United Nations Development Programme and the United Nations Industrial Development Organization. It also has to work directly with the MLF Executive Committee, bilateral agencies and technology suppliers. During the early 1990s, as a unit

36. For details about China's compliance with the Protocol, see Jimin Zhao, "Implementing the Montreal Protocol in China."

37. The other obstacles listed were the lack of overall phaseout strategy at the inception of the ODS programme; and the large number of enterprises, including state and non-state and different ministries involved, which imposed a management nightmare for any one agency to co-ordinate. Interview with an official in the World Bank, Washington DC, 10 September 1997.

under NEPA, the PMO had neither the experience nor the capacity to deal with its many responsibilities.

In addition to learning by doing, NEPA and other ministries involved in implementing the Protocol tried to enhance their capacity by obtaining training, financial support and technical assistance from the MLF. For example, the China Ozone Information Clearinghouse within NEPA was created in 1993 with the help of UNEP and MLF money. Officials at the PMO and UNEP believe the Clearinghouse greatly improved data management and reporting systems, and enhanced information exchange within China and between China and international organizations.³⁸

The four international agencies implementing the Fund have used MLF money to provide technical assistance and training. Numerous training courses have strengthened the capabilities of managers and technical personnel in selecting and using ODS-reduction technologies. According to the PMO's director, training of officials in central government agencies, local environmental protection bureaus (EPBs) and customs offices has been essential in improving China's implementation of the Protocol.³⁹

Involvement of local governments. Before 1997, implementation of the Protocol suffered because it was controlled from the centre. National organizations worked with industrial enterprises without involving local EPBs.⁴⁰ NEPA argued that EPBs were not included in ODS-reduction work to simplify management procedures, but some EPBs believed NEPA excluded them in order to control the resources it received from the MLF.⁴¹ Exclusion of EPBs from implementation of the Protocol created tensions between national and local environmental protection agencies.

Because EPBs were not involved, national ODS-reduction regulations were not well enforced. Under most circumstances, EPBs enforce regulations issued by SEPA. The centralized administrative approach to ODS reduction also led to data collection problems. SEPA is responsible for collecting data on ODS production, import and export, and reporting these data to the Ozone Secretariat. Before 1997, industrial ministries collected ODS data in their sectors and reported to NEPA, but the data, which were frequently submitted late, were often inaccurate. Industrial ministries had incentives to overstate ODS consumption in order to be eligible for more MLF money. In addition, during the early 1990s, some industrial ministries were not familiar with the status of ODS production and consumption within their sectors.⁴² Moreover, as a result of China's

38. Interview with an official of PMO, SEPA, 5 December 1999, Beijing; interview with an official at UNEP Ozone Action Programme, 3 December 1999, Beijing.

39. See UNEP, *OzoneAction*, No. 28 (October 1998).

40. Shanghai is an exception. As with other local governments before 1997, local agencies in Shanghai did not participate in China's formal administrative system for implementing the Protocol. In contrast with other areas, however, Shanghai government agencies voluntarily participated in ODS-reduction efforts as early as 1993.

41. Interview with five EPB officials, 18 July 1997, Hangzhou; 8 August 1997, Shanghai and 13 August 1997, Beijing.

42. Interviews with officials in the PMO, the Plastic Industry Office and China Household Electrical Appliance Association, 9 and 15 May 1997, Beijing.

post-1978 reforms to reduce the role of government in the economy, industrial ministries have had less access to enterprises. Without EPB involvement, NEPA could not verify the accuracy of data that industrial ministries had submitted.

Another shortcoming of China's centrally-administered system concerned deficiencies in monitoring ODS-reduction projects. When enterprises applied for MLF money, they submitted proposals directly to ODS-reduction offices within their supervisory industrial ministries or, in some cases, to the PMO. Typically, EPBs were not informed. In general, an enterprise would only notify an EPB about an ODS-reduction project if the international agency managing the project required environmental impact assessment (EIA) approval from the EPB. Even though national regulations require EIAs for new industrial projects or expansions of existing facilities, not all enterprises implementing MLF-funded ODS-reduction projects conducted EIAs. Some EPBs did not discover ODS-reduction projects until they were invited to participate in official project commissioning activities (*yanshou*) after construction had been completed.⁴³ In addition, NEPA did not require EPBs to monitor ODS-reduction activities. The central agencies – NEPA and the industrial ministries – had neither staff nor time to determine whether completed projects were meeting required goals.

The centralized system also led to conflicts between EPBs and enterprises because EPB officials were asked to commission MLF projects they knew nothing about. For example, one EPB refused to certify a completed project when it participated in the commission for the project. Instead, it required the enterprise to improve its environmental protection measures before starting its operations. This led to a six-month delay. The enterprise manager believed the EPB deliberately made things difficult because the enterprise had not notified the EPB earlier.⁴⁴

Under the centrally-controlled system for implementing the Protocol, small and medium-sized enterprises owned by township governments or village committees were not able to access information about MLF funds and ODS-reduction technologies. Most of these firms served local markets and did not receive information from outside their areas. For example, more than 1,000 small enterprises manufacturing foams did not receive MLF money and many were unaware of either the MLF or CFC-reduction requirements.⁴⁵ This is one reason ODS consumption continued to increase between 1991 and 1997 in the foam sector.

Even though NEPA was reluctant to relinquish control over implementing the Protocol and managing MLF funding, it recognized the problems caused by excluding EPBs. Beginning in 1997, NEPA gave EPBs responsibilities for data collection, enforcement and project man-

43. Interviews with four local EPB officials, June and July 1997 in Hangzhou and Shanghai.

44. Interview with a manager of a foam manufacturing enterprise in Tianjin, 16 July 1997.

45. See J. Zhao and L. Ortolano, "Implementing the Montreal Protocol in China: use of cleaner technology in two industrial sectors," *Environmental Impact Assessment Review* (September/November 1999).

agement for China's implementation of the Protocol. In February 1997, NEPA issued a circular requiring EPBs to monitor the phaseout of CFC.⁴⁶ The 1998 update of China's country programme further clarified the responsibilities of EPBs in policy implementation, monitoring, data collection and project management.⁴⁷

Since 1997, EPBs have included ODS data in their routine information-gathering and reporting procedures. The bureaus also inspect enterprises to verify self-reported data. EPBs send their ODS data to SEPA, thereby allowing SEPA to cross-check information submitted by industrial ministries.

EPBs have also taken on project management responsibilities. This first occurred in Shanghai when, in 1997, NEPA made the Shanghai EPB the local implementing agency for ODS reduction in Shanghai's solvent sector. Activities in Zhejiang and Guangdong provinces provide other examples of local governments undertaking ODS-reduction implementation tasks.⁴⁸

With the involvement of local governments, SEPA and other ministries have more information about ODS consumption and production from small and medium-sized enterprises. In 1996, the MLF Executive Committee decided that these enterprises should use an "umbrella approach," by which a number of enterprises come together to apply for MLF funds. EPBs also required ODS reduction by small foreign firms that are not eligible for MLF funds (such as foam firms that moved from Hong Kong to Guangzhou in the early 1990s).⁴⁹

Regulations and enforcement. Before 1997, NEPA and other government agencies primarily employed "command-and-control" approaches to cut ODS consumption and production, which were ineffective. Agencies had issued about 30 ODS policies and regulations, mostly in the form of circulars (*tongzhi*). Most regulations were aimed at preventing the use and production of ODS in *new* enterprises; existing enterprises were exempted. Except for aspects of China's environmental labelling programme,⁵⁰ ODS-reduction regulations before 1997 were not effectively enforced and had little influence.⁵¹

46. Circular on Strengthening the Monitoring and Supervision Function for Ozone Layer Protection by Local EPBs (Jiaqiang difang huanbaoju zai chouyangceng baohu zhong de jiandu zhineng).

47. SEPA, *Update of China's Country Program for Ozone Depleting Substances Phaseout* (Beijing: SEPA, 1999).

48. In Zhejiang, the provincial EPB surveyed enterprises that produce and consume ODS in the province. And the Guangdong Provincial Bureau of Public Security has issued rules to control use of halon 1211 and halon 1301. Interview with Fang Min, official of Zhejiang province EPB, 2 July 1997, Hangzhou; and SEPA, *Ozone Action in China*, No. 23 (September 1999).

49. Interview with the Director of NEPA's Division of Air Pollution Control, 24 July 1997, Beijing.

50. For more information about China's environmental labelling programme, see J. Zhao and Q. Xia, "Environmental labeling program in China," *Environmental Impact Assessment Review*, Vol. 19, No. 5/6 (September/November 1999).

51. Interviews with the Director of NEPA's Division of Air Pollution Control and an official in PMO at NEPA, 24 July 1997; and with three professors at Peking University, 25 July 1997, Beijing.

Use of ODS-reduction circulars demonstrate the central government's intention to control ODS, but this strategy was deficient in several respects. Circulars occupy the lowest level in China's hierarchy of laws and regulations. In addition, the language and objectives in most ODS-related circulars were vague. Generally, the circulars did not include guidelines, procedures, penalties or enforcement mechanisms. Moreover, resources were not allocated to enforce their provisions. And as previously mentioned, EPBs were excluded from ODS-reduction activities before 1997.

China's early ODS-reduction regulations would have been more effective if they had been integrated into existing environmental programmes. One example of this involves China's highly developed environmental impact assessment policy. Even though NEPA issued a 1995 notice to EPBs about EIA requirements for ODS-reduction projects,⁵² the notice did not require EPBs to use the EIA process to stop new projects that produced or consumed ODS. Instead, it only required them to simplify EIA procedures in order to shorten the time required to conduct EIAs for ODS-reduction projects. Two factors explain why this was.⁵³ First, EIA is under the purview of SEPA's Department of Pollution Control, and the PMO has no authority to participate in EIA activities. Secondly, the PMO wanted to play down EIA to avoid the lengthy procedures associated with the EIA process.

China's National Leading Group for Ozone Layer Protection and NEPA recognized deficiencies in their ODS-reduction policies.⁵⁴ Since 1997, China has tried to integrate ODS-reduction policies into broader national environmental programmes. For example, in June 1997, the State Economic and Trade Commission, NEPA and the Ministry of Machine-Building issued a notice listing 15 types of production technologies and equipment that must be phased out because they pollute the atmosphere. The list includes technologies that use CFCs as propellants to produce aerosol products.⁵⁵ As another example, later in 1997 the State Council's Decisions Regarding Some Environmental Protection Issues called on agencies to develop and implement policies to limit production, import and use of CFCs and halons.⁵⁶

Another reform that occurred in the late 1990s involved using market-based instruments to supplement China's command-and-control policies. As the government cut its role in industrial management, such policies became harder to implement. In contrast, market-based policy instru-

52. NEPA, *Humans' Common Responsibility*.

53. Interviews with NEPA officials, June 1997, Beijing.

54. See Wang Yangzu, *Jiwang kailai, tuidong woguo baohu chouyangceng gongzuo de shenru kaizhan (Carrying Forward the Cause and Forging Ahead into the Future: Pushing Forward the Deepgoing Development of China's Protection on the Ozone Layer)* (Beijing, 1996).

55. This circular, issued on 5 June 1997, is Notice on Publishing the First List of Phased-out Technologies and Equipment that Severely Pollute the Environment (Air) (Guanyu gongbu diyipi yanzhong wuran huanjing (daqi) de taotai gongyi yu shebei minglu de tongzhi).

56. See NEPA, *Ozone Action in China* (September 1996).

ments became more attractive because they provided financial incentives for ODS reduction.

China's environmental labelling programme illustrates how market-based instruments have been employed to cut ODS. After pressure from refrigerator manufacturers who hoped that an environmental label would allow them to satisfy requirements imposed by European countries, China created an environmental labelling programme in 1993.⁵⁷ Household refrigerators manufactured with low quantities of CFCs were eligible to receive labels. Some enterprises obtained labels when they switched to low- or non-CFC refrigerators in 1994, and this helped spur an increase in China's exports of refrigerators. While trade with Europe motivated the small number of refrigerator firms producing for export to switch to low-CFC refrigerators, the expectation that using environmental labels would increase domestic sales led many other refrigerator manufacturers to use reduced-CFC technologies. As of July 1998, 27 of the less than 40 refrigerator manufacturers in China had received environmental labels for their low- or non-CFC refrigerators.

In 1998, SEPA introduced additional market-based instruments for ODS reduction under the sector plans for halons and CFC production. The MLF Executive Committee approves a phaseout plan for an entire sector, and commits to providing total incremental costs needed to implement the plan.⁵⁸ As part of this approach, SEPA has used production quotas to help meet ODS-reduction goals. For example, total CFC production quotas are issued by the government and reduced each year in accordance with the overall CFC phaseout plan. Enterprises with quotas can sell them to other CFC producers or the government.

Another market-based instrument within the sector approach involves bidding, a process used by SEPA to allocate sector plan funds from the MLF for a particular year.⁵⁹ Bidding takes place annually and participation is voluntary. For example, each participating halon production firm offers SEPA a proposal to close or partly close its production line(s) with an "offer price" in *yuan*/kg of ozone depletion potential.⁶⁰ SEPA rank orders the offer prices and selects enterprises with the lowest prices until available MLF funds are allocated for that year. SEPA pays bid-winning factories their offer prices. In return, those factories close or convert their halon production lines.

Because bidding is competitive, enterprises have incentives to bid close

57. For more on the refrigerator manufacturer's shift to low and non-CFC refrigerators, see Zhao and Xia, "China's environmental labeling program."

58. Incremental cost is the difference between the actual cost of the phaseout activity and the baseline cost (i.e. the cost that would have been incurred to provide the same level of service to the country, using ODSs). For more information, see MLF Secretariat, *Multilateral Fund for the Implementation of the Montreal Protocol*.

59. For details on the operation of tradable quotas and the bidding system, see Jimin Zhao, "Implementing the Montreal Protocol in China."

60. Ozone depletion potential refers to a numerical estimate of the total quantity of ozone destroyed by a chemical substance over its entire atmospheric life relative to CFC 11. For example, halon 1211 has an ODP of 3 because it is three times as damaging to the ozone layer than CFC 11.

to their true estimates of costs, and thus the sector approach is more cost-effective in reducing ODS than the project-by-project approach. Projects carried out under the MLF project-by-project funding scheme typically were behind schedule, but halon and CFC reduction projects under the new sector approach have been completed on time.⁶¹ Much of the drop in halon consumption and production (beginning in 1998) and the decrease in CFC production and consumption (beginning in 1999) has been attributed to use of the quota and bidding mechanisms. These reductions contributed greatly to China's meeting the Protocol's targets for a freeze on CFCs by 1999 and on halon by 2002.⁶² SEPA plans to apply a similar bidding approach to CFC reduction in the solvent, foam and tobacco sectors.

China met its CFC freeze goal on time in 1999 and, in 1998, had already met its halon freeze goal for 2002. In comparison to the baseline 1995–97 average levels, halon consumption and production levels were both about 44 per cent lower in 1999.⁶³ Actual CFC consumption in 1999 was about 17 per cent lower than the freeze target, while CFC production in that year was slightly lower than the target. If China continues with its 1997–99 performance in ODS reduction, it has the ability to cut halon consumption and production by 50 per cent in 2005, which is the cutback target in the Protocol. It should also have no trouble meeting the 100 per cent reduction target for halon in 2010. Moreover, it appears likely that it will achieve the mandatory 50 per cent reduction in CFC consumption and production required for 2005 and the complete phaseout of CFC by 2010.

Conclusions and Policy Implications

The Multilateral Fund has played the key role in China's response to the Montreal Protocol. Creation of the Fund provided China with strong incentives to ratify the Protocol, and use of MLF money has given China the capability to create and implement strategies to meet the Protocol's requirements. China's use of the MLF supports a claim of China and other developing countries that they need financial and technical aid to help solve global environmental problems. This claim, which was advanced in the context of the Montreal Protocol, has been made frequently in international debates on global climate change.

In addition to the MLF, two other factors have affected China's interests in meeting the Protocol's requirements: the nation's desire to appear as a responsible and co-operative actor in solving global environmental problems, and the interest of SEPA and the PMO in expanding their responsibilities and authorities. NEPA (later SEPA) and its PMO were able to achieve some internal organizational objectives by ensuring

61. SEPA, *Zhongguo baohu chouyangceng xingdong (Ozone Action in China)*, No. 7 (30 July 1999).

62. See Jimin Zhao "Implementing the Montreal Protocol in China."

63. *Ibid.*

that China was cutting production and consumption of ODS effectively. Selecting an implementing agency that has interests consistent with meeting goals of an MEA can enhance implementation significantly.

China's domestic inter-agency conflicts play a key role in China's negotiation and compliance stance for an MEA. NEPA's ability to co-ordinate interests of disparate government agencies was important in shaping how China negotiated and implemented the Protocol. SEPA has not yet been able to build a consensus among ministries regarding amendments made in 1992 and subsequent years.

China's experience with the Protocol suggests three factors that can significantly influence the government's ability to implement an MEA: administrative capacity, involvement of government units with capability to enforce regulations, and use of market-based instruments. China's initial implementation strategies were ineffective in cutting ODS because the main unit in charge of co-ordinating China's MLF-related activities, the PMO within NEPA, did not have the capability to carry out its responsibilities. In addition, EPBs, the key actors in enforcing China's pollution control regulations, were excluded from ODS-reduction efforts, and thus the regulations were poorly enforced. Moreover, those regulations relied on command-and-control, an approach that has become increasingly difficult to apply as China has moved from a planned to a market economy. As a result of changes (in the late 1990s) in PMO capacity, EPB involvement and policy instruments, improvements began to be made.

These findings have implications for enhancing the Chinese government's ability to implement future MEAs, such as those linked to global climate change. The unit responsible for day-to-day implementation – the equivalent of SEPA's Project Management Office – must be given the staff, budget, training and other support needed to function effectively. EPBs must be integrated into the administrative structure for policy implementation from the outset because they play key roles in enforcing environmental rules and enhancing flows of environmental information to and from industries. Moreover, these local bureaus must be given the training and support needed to carry out their enhanced responsibilities. Finally, market-based instruments should be used to supplement traditional regulations as a strategy for reducing pollution. Given proper support and incentives, Chinese agencies should be able to implement MEAs effectively.