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A Preliminary Analysis of MEA Experiences in Identifying and Facilitating the Transfer of Technology

What Insights Can Be Drawn for the WTO EGS Negotiations?

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United Nations Environment Programme (UNEP) and United Nations Conference on Trade and Development (UNCTAD), 2007

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UNEP-UNCTAD Capacity-Building Task Force on Trade, Environment and Development (CBTF)

The UNEP-UNCTAD Capacity-Building Task Force on Trade, Environment and Development (CBTF) was launched in March 2000. It is a collaborative initiative between the United Nations Environment Programme (UNEP) and the United Nations Conference on Trade and Development (UNCTAD) that provides support to countries on issues related to trade and environment in pursuit of national sustainable development and poverty reduction goals. It was created in response to requests by governments to help developing countries and countries with economies in transition to understand and address the complex trade-environment-development linkages at the national level and also to effectively participate in negotiations at the international level.

By combining UNEP's expertise on the environmental aspects of trade and UNCTAD's expertise on the developmental aspects of trade, and with access to both organizations' global networks and work programmes, CBTF provides a highly effective framework for implementing a comprehensive set of capacity building activities that respond to nationally-defined needs. In undertaking its activities CBTF also maintains close cooperation with the World Trade Organization (WTO), governments, intergovernmental organizations (IGOs) and non-governmental organizations (NGOs).

Since its inception in 2000, the CBTF has provided capacity building support to over 1,200 policymakers and stakeholders from 39 countries. So far, CBTF has convened more than 30 capacity building events in Asia, Africa and Latin America, and has sent advisory missions to China, Jordan, Kenya, Tanzania and Uganda. In addition, the CBTF has implemented 10 country projects on issues ranging from the promotion of trade in organic agriculture to supporting national wildlife trade policy reviews.

The CBTF supported the development of the East African Organic Products Standard (EAOPS), which is the world's second regional standard after the European Union. The EAOPS has been adopted by the East African Community as its official voluntary standard and will be applied by Burundi, Rwanda, Kenya, Tanzania and Uganda.

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Executive Summary

The critical role technology plays in reducing and controlling pollution, treating waste, managing natural resources, monitoring the state of the environment, and predicting environmental change has long been recognized by the international community. Agenda 21, adopted at the Earth Summit in 1992, highlighted the importance of technology in achieving environmental goals, and the need to make this technology accessible, by calling for favourable access to and transfer of environmentally sound technologies to developing countries. This call is reflected in a number of Multilateral Environmental Agreements (MEAs), which include provisions related to identifying appropriate technology as well as facilitating access to and encouraging the transfer of technology.

The international trade community also reflected the potential for technology to support environmental objectives in the WTO Doha Ministerial Declaration, which calls for negotiations on the reduction or elimination of tariff and non-tariff barriers on environmental goods and services as a means of enhancing the mutual supportiveness of trade and the environment. The negotiations, however, are currently at an impasse as negotiators struggle to agree on what constitutes “environmental goods.”

Created through the process of multilateral negotiation and consensus building, MEAs provide a baseline of widely agreed upon environmental objectives. MEA Secretariats and their Parties have been engaged for a number of years in identifying relevant technology and promoting technology transfer as a step towards achieving these environmental goals. This paper examines this experience with a view to enriching WTO negotiations on the liberalization of trade in environmental goods and services.

The paper provides a summary of provisions related to technology found in five of the major MEAs, including the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Convention on Biological Diversity, the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Montreal Protocol on Substances that Deplete the Ozone Layer, and the Stockholm Convention on Persistent Organic Pollutants. The paper also provides an overview of the activities undertaken by the respective MEA Secretariats and their Parties in identifying technology and facilitating its transfer.

This analysis led to the identification of a number of commonalities related to technology identification and transfer across MEAs that may be relevant to the WTO negotiations. For example, the paper finds that MEAs and their Parties generally adopt a dynamic mechanism for technology identification; designed to respond to the changing nature of environmental challenges, scientific discoveries, technological development, as well as changing economic, social and cultural circumstances. The paper also notes that MEA Secretariats and Parties often adopt a “package” approach to technology and technology transfer, where the transfer of the technology is complemented by capacity building, technical assistance, training of personnel, sharing of know-how, and exchange of information.

These conclusions are presented as take-away lessons from the MEA experience, and serve as a foundation from which further research can be conducted. The paper suggests a number of areas where further analysis may be warranted, including: (1) identification of specific technologies or groups of technologies that support MEA implementation; (2) analysis of the impact of tariffs and non-tariff barriers on the flow of MEA-related technologies and to what extent further liberalization would increase this flow; (3) further examination of the role of technology in MEA implementation at the national level; and (4) examination of the current challenges to increased MEA technology transfer.

Acronyms and Abbreviations

BCRCs	Basel Convention Regional Centres for Training and Technology Transfer
CBD	Convention on Biological Diversity
CBTF	Capacity Building Task Force on Trade, Environment and Development
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CFCs	chlorofluorocarbons
COP	Conference of the Parties
DMD	Doha Ministerial Declaration
GEF	Global Environment Facility
HCB	Hexachlorobenzene
MEAs	Multilateral Environmental Agreements
MOP	Meeting of the Parties
NGO	Non-governmental Organisation
ODS	ozone-depleting substances
OEWG	Open-Ended Working Group
PBBs	Polybrominated Biphenyls
PCBs	Polychlorinated Biphenyls
PCDDs	Polychlorinated dibenzo-p-dioxins
PCDFs	Polychlorinated dibenzofurans
PCTs	Polychlorinated terphenyls
POPs	Stockholm Convention on Persistent Organic Pollutants
PVC	Polyvinyl chloride
SBSTTA	Subsidiary Body on Scientific, Technical and Technological Advice
UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
TEAP	Technology and Economic Assessment Panel
TWG	Technical Working Group
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

I. Introduction

Over the last few decades, the promotion and use of environmentally sound technologies has become a key objective of the international community. Interactions between humans and the environment are largely conditioned by technology. As one commentator has noted, “to a large extent, the state of the environment today is the result of technological choices of yesterday. The state of the environment in the 21st century will be determined largely by the technologies we choose today.”¹

Technology is an essential tool for reducing and controlling pollution in production and consumption processes, for treating waste, for the sustainable management of natural resources, for monitoring the state of the environment, and for predicting environmental change, such as natural disasters. In the environmental field, much effort has been devoted to identifying the best technologies to reach these goals, taking into account economic, social and cultural factors.²

The critical role technology plays in addressing environmental objectives is reflected in a number of Multilateral Environmental Agreements (MEAs), which often include provisions related to identifying, facilitating access to and encouraging the transfer of technology. Moreover, many MEAs include explicit provisions for making these technologies accessible to developing countries and countries with economies in transition.³

The international trade community has also recognized the importance of technology for supporting environmental objectives. At the Fourth Ministerial meeting of the World Trade Organization (WTO) in Doha, Qatar, WTO Members adopted a mandate to negotiate the reduction, or as appropriate, elimination

¹ Sergio Trinidad et al., “Managing Technological Change in Support of the Climate Change Convention: Framework for Decision-Making.” *Methodological and Technological Issues In Technology Transfer: IPCC Special Report on Climate Change*. § 1.3 1991 (<http://www.grida.no/climate/ipcc/tectran/007.htm>).

² See “Environmentally Sound Technologies for Sustainable Development” prepared by the UNEP International Environmental Technology Centre, Division of Technology, Industry and Economics of UNEP, 2003 (http://www.unep.or.jp/ietc/techTran/focus/SustDev_EST_background.pdf). The publication includes information on different applications of environmentally sound technologies, their adoption, performance and assessment. It also includes appendices with practical tools, such as a checklist for identifying and selecting environmentally sound technologies.

³ It should be noted that even technology transfer provisions that contain binding language generally do not obligate direct transfer of technology, which may be proprietary in nature. Instead, such provisions envisage the use of government incentive measures that lead to conducive forms of technical cooperation. Such measures are discussed in further detail below, within the relevant sections addressing specific MEAs.

of tariff and non-tariff barriers to promote trade in environmental goods and services.⁴ This mandate was adopted with the objective of enhancing the “mutual supportiveness of trade and environment.”⁵

The link between trade liberalization for environmental goods and services and promoting access to and the transfer of environmentally sound technologies was made by governments at the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa. The Plan of Implementation adopted at WSSD called on countries to “promote mutual supportiveness between the multilateral trading system and the multilateral environmental agreements,” and more specifically, to “complement and support the Doha Ministerial Declaration” by encouraging “market based initiatives for the creation and expansion of domestic and international markets for environmentally friendly goods and services.”⁶

Given the great variety of objectives that can be termed “environmental,” WTO negotiators have found a common definition of an environmental good or service to be elusive. The MEAs, created through the process of multilateral negotiation and consensus building, provide a baseline of widely agreed upon environmental goals. MEA Secretariats and their Parties have already been engaged in promoting technology transfer as a step towards achieving these environmental goals. This paper examines the activities of MEA Secretariats and their Parties in identifying and facilitating the transfer of technology, to determine if these experiences can provide any insights to WTO negotiators as they deliberate over methods to identify and foster the dissemination of environmentally sound technologies. Most significantly, this preliminary analysis points to the tendency of MEA Secretariats and their Parties to:

- (i) adopt a dynamic mechanism of identifying technology; and
- (ii) approach technology transfer as a “package,” involving more than just adoption of the actual technology but also capacity building and information exchange.

These conclusions are presented as take-away lessons from the MEA experiences, but also as a foundation from which further research can be conducted. In-depth analysis into the MEA technology transfer provisions could provide both more specific recommendations for trade negotiators, as well as promotion of technology transfer beyond the context of the WTO-- thereby improving the capacity of MEA Parties to meet their obligations. With these goals, this paper represents the latest in a series of UNEP-UNCTAD

⁴ See WTO Doha Ministerial Declaration (“DMD”), Paragraph 31(iii). Although WTO negotiators are still in the process of defining environmental goods, most WTO Member submissions have focused on the identification of specific technologies.

⁵ WTO DMD, Paragraph 31. This statement should also be read in light of Paragraph 6 of the DMD, which reaffirmed the commitment by WTO Members “that the aims of upholding and safeguarding an open and non-discriminatory multilateral trading system, and acting for the protection of the environment and the promotion of sustainable development can and must be mutually supportive.”

⁶ WSSD, Plan of Implementation, Paragraph 98 and 99(b). The link between trade in goods and technology transfer was recently examined in a paper produced by the CBD Secretariat, which noted that in many countries barriers to trade constitute an obstacle for the effective transfer of technology. This is particularly the case where barriers affect the import of technologically-intensive machinery and equipment. See UNEP/CBD/COP/8/INF/9, pages 18-19.

Capacity Building Task Force on Trade, Environment and Development (UNEP-UNCTAD CBTF) publications developed in response to requests by governments to “promote understanding, dialogue and the dissemination of information about multilateral environmental agreements” and “to develop capacity to ensure that trade and environmental policies are mutually supportive.”⁷

The following section of the paper briefly describes the importance of environmentally sound technologies and their emphasis in relevant international discussions. Section III provides a summary of the relevant MEA provisions related to technology and some activities undertaken by MEA Secretariats and their Parties in identifying and facilitating technology transfer, with a focus on the following MEAs:

- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (“Basel Convention”);
- Convention on Biological Diversity (“CBD”);
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (“CITES”);
- Montreal Protocol on Substances that Deplete the Ozone Layer (“Montreal Protocol”); and
- Stockholm Convention on Persistent Organic Pollutants (“Stockholm Convention”).

Section IV concludes by highlighting some of the common characteristics related to technology across the MEAs that may provide insight to WTO negotiators as they discuss the possible reduction of tariff and non-tariff barriers to environmental goods and services. Section IV also suggests a few areas requiring further exploration, as this paper represents a first step in examining the relationship between MEA implementation and WTO environmental goods and services negotiations.

⁷ UNEP Governing Council Decision 21/14. Moreover, the importance of capacity building with respect to technology transfer was highlighted in the UNEP Bali Strategic Plan, which called for UNEP to continue its efforts to facilitate “access to and support for environmentally sound technologies and corresponding know-how.” UNEP/GC.23/6/Add.1, Section IV.D.20 (a) (x).

II. International Calls for Promoting Environmentally Sound Technologies

Promoting environmentally sound technologies was one of the main issues addressed at the 1992 Rio Conference on Environment and Development. Adopted at the conference, Agenda 21 defined environmentally sound technologies as “process and product technologies that generate low or no waste, for the prevention of pollution,” including “end of the pipe technologies for treatment of pollution after it has been generated.”⁸ Agenda 21 further stated that these “are not just individual technologies, but total systems which include know-how, procedures, goods and services, and equipment as well as organizational and managerial procedures.”⁹

Agenda 21 also noted the importance of making environmentally sound technologies accessible to all countries, including through technology transfer by stating that “[t]here is a need for favourable access to and transfer of environmentally sound technologies, in particular to developing countries, through supportive measures that promote technology cooperation and that should enable transfer of necessary technological know-how as well as building up of economic, technical, and managerial capabilities for the efficient use and further development of transferred technology.”¹⁰ The importance of providing access to technologies was also expressed in Principle 9 of the Rio Declaration, which calls upon States to strengthen endogenous capacity-building for sustainable development through the exchange of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies.

More recently, at the World Summit on Sustainable Development in Johannesburg, South Africa (the ten-year follow-up to the Rio Conference), governments adopted a Plan of Implementation, which recognized that one of the means of maintaining and increasing global progress towards sustainable development is “access to and the development, transfer and diffusion of environmentally sound technologies and corresponding know-how, in particular to developing countries and countries with economies in transition on favourable terms, including on concessional and preferential terms, as mutually agreed . . .”¹¹ Moreover, as previously noted, the Plan of Implementation highlighted the link between liberalizing trade in environmental goods and services and promoting access to and transferring environmentally sound technology.

⁸ Agenda 21, Chapter 34, paragraph 2.

⁹ Agenda 21, Chapter 34, paragraph 3.

¹⁰ Agenda 21, Chapter 34, paragraph 4.

¹¹ WSSD, Plan of Implementation, paragraph 105.

III. Technology and MEA Implementation

MEAs are negotiated to respond to specific international environmental concerns. Technology has become essential to achieving MEA objectives; whether by enhancing the exchange of information for tracking products across borders, supporting cleaner production processes, or managing natural resources in a more efficient manner. Depending on their history, subject matter and objectives, different MEAs approach technology in different ways. While some MEAs include specific procedures to identify, adopt and disseminate technologies, others include more general practices for exchanging information on technologies.

A number of MEAs also include provisions to ensure that technology is accessible to all Parties, in particular developing and transition countries. Consequently, projects and initiatives carried out under MEAs often include a technology component.

The following section considers the promotion of technology as it relates to the Basel Convention, CBD, CITES, Montreal Protocol and Stockholm Convention.¹² Each MEA discussion begins with an overview of the MEA's objective and how technology relates to achieving this objective. This discussion is followed by a summary of the MEA's main provisions relating to technology and examples of activities being undertaken to identify, provide access to and facilitate the transfer of environmentally sound technologies. The activities discussed simply provide an illustration and do not exhaust the full range of activities being undertaken pursuant to the MEAs. Further information on activities related to technology can be obtained through the MEA websites or by contacting the MEA Secretariats directly.¹³

1. Basel Convention

a) Objective

The overall goal of the Basel Convention is to protect human health and the environment against adverse effects resulting from the generation, transboundary movement and improper management of hazardous wastes. To achieve this goal, the Convention establishes a system of prior notification for the export of hazardous wastes and other wastes, and a requirement that Parties provide written consent (referred to as "prior informed consent" or "PIC") before shipments of such wastes can transit or be imported into the areas under their national jurisdiction. The use of appropriate technologies is an essential element in achieving these goals, as stated in the Preamble of the Convention:

¹² These five MEAs were chosen for analysis because they are all UNEP-administered MEAs and because they are the MEAs most often cited by WTO Parties and commentators as being relevant to trade issues.

¹³ See, e.g., Basel Convention (<http://www.basel.int>), CBD (<http://www.cbd.int>), CITES (<http://www.cites.org>), Montreal Protocol (<http://ozone.unep.org>), and Stockholm Convention (<http://www.pops.int>).

Aware of the need to continue the development and implementation of environmentally sound low-waste technologies, recycling options, good house-keeping and management systems with a view to reducing to a minimum the generation of hazardous wastes and other wastes . . .¹⁴

Moreover, Parties have recognized the “limited capabilities of the developing countries to manage hazardous wastes and other wastes,” and, therefore, underlined “the need to promote technology transfer for the sound management of hazardous wastes and other wastes produced locally, particularly to the developing countries . . .”¹⁵

The Basel Declaration on Environmentally Sound Management, adopted through Decision V/1 of the Conference of the Parties to the Basel Convention (“Basel COP”) in 1999, reaffirms the transfer and use of cleaner technologies as one of the fundamental aims of the Basel Convention and recognizes the need to focus during the next decade on, among other things, activities destined to promote the use of cleaner technologies and production and the “[i]mprovement and promotion of institutional and technical capacity-building, as well as the development and transfer of environmentally sound technologies, especially for developing countries and countries with economies in transition.”¹⁶

b) Technology identification

According to the Basel Convention, Parties shall cooperate “in the development and implementation of new environmentally sound low-waste technologies and the improvement of existing technologies with a view to eliminating, as far as practicable, the generation of hazardous wastes and other wastes and achieving more effective and efficient methods of ensuring their management in an environmentally sound manner . . .”¹⁷

The Parties mandated the establishment of a Technical Working Group (“TWG”) to aid in the preparation of technical guidelines for the environmentally sound management of wastes. The TWG was later replaced by an Open-ended Working Group (“OEWG”) after the adoption of new institutional arrangements in 2002. While it was still in existence, the TWG prepared, *inter alia*, a “Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Hazardous Wastes Subject to the Basel Convention” (“Guidance Document”) that was adopted by Decisions I/19 and II/13 of the Basel COP.¹⁸ This Guidance Document provides information to Parties on waste avoidance and management of wastes, guidance in deciding whether to consent or reject a proposed transboundary movement of wastes, and a framework for the further preparation of technical guidelines for wastes subject to the Basel Convention.¹⁹

Over the years, the TWG and OEWG have prepared a number of technical guidelines for wastes subject to control by the Basel Convention. To date, there are more than 30 such guidelines, training manuals and methodological guides on the environmentally sound management of prioritised waste streams, the

¹⁴ Basel Convention, Preamble, paragraph 17.

¹⁵ *Id.*

¹⁶ “Basel Declaration on Environmentally Sound Management,” paragraphs 3 and 6(e) (www.basel.int/meetings/cop/cop5/ministerfinal.pdf).

¹⁷ Basel Convention, Article 10, paragraph 2(c).

¹⁸ Basel COP Decision I/19 (<http://www.basel.int/meetings/cop/cop1-4/cop1dece.pdf>); Decision II/13 (<http://www.basel.int/meetings/cop/cop1-4/cop2dece.pdf>).

¹⁹ See “Guidance Document on the Preparation of Technical Guidelines for the Environmentally Sound Management of Wastes Subject to the Basel Convention,” paragraph 2 (<http://www.basel.int/meetings/sbc/workdoc/framework.doc>).

identification of hazardous characteristics and the elaboration of national plans.²⁰ These guidance documents are subject to revision and updating based on technological and scientific development.²¹

For example, the technical guideline series on polychlorinated biphenyls (PCBs) and other persistent organic pollutants (POPs) includes fact sheets on technologies recognized as environmentally sound for POPs treatment and a decision-making model for selecting technologies based on the technical level and other circumstances of the country using the model.²² In addition, a training manual for hazardous waste management of PCBs and POPs has been developed that includes a section on “Technology Selection Process,” which describes established and emerging technologies, including their benefits, disadvantages and cost-benefit factors.²³

c) Access to and transfer of technology

Parties to the Basel Convention are required to actively cooperate in technology transfer related to the environmentally sound management of wastes and the development of technical capacity among Parties.²⁴ To fulfill this mandate, the Convention calls for the establishment of Basel Regional Centres for training and technology transfer.²⁵

To date, the following Regional Centres have been established in response to this call:²⁶

- Africa and West Asia: Basel Convention Regional Co-ordinating Centre in Nigeria, Basel Convention Regional Centre for the Arab States in Egypt, Basel Convention Regional Centre in Senegal, Basel Convention Regional Centre in South Africa;
- Asia and the Pacific Region: Basel Convention Regional Centre in China, Basel Convention Regional Centre in Indonesia, Pacific Regional Centre for Training and Technology Transfer for the Joint Implementation of the Basel and Waigani Conventions in the South Pacific region; Basel Convention Regional Centre in Tehran;

²⁰ See Basel Convention website, Technical Guidelines (<http://www.basel.int/meetings/sbc/workdoc/techdocs.html>).

²¹ See, e.g., Basel COP Decisions II/13 paragraph 3, III/13 paragraph 2, VI/37 annex and VII/12 annex (<http://www.basel.int/meetings/frsetmain.php>). For instance, one of the tasks included in the Work Programme for the Technical Working Group in 1999 was the “[r]eview of available and forthcoming scientific information concerning the evaluation of the potential environmental health effects of the disposal of PVC wastes and PVC-coated cables.” Basel COP Decision V/26, Annex, Task I. The Work programme of the Open-ended Working Group for the period 2005–2006 includes the review and update of “general technical guidelines and the guidelines on PCBs, PCTs and PBBs, if appropriate”; the review of “selected technical guidelines as appropriate” and their “updating as necessary, e.g., incineration on land (D10), specially engineered landfill (D5), and wastes collected from households (Y46).” Basel COP Decision VII/12 annex (<http://www.basel.int/meetings/cop/cop7/docs/33eRep.pdf>).

²² See “Review of Emerging, Innovative Technologies for the Destruction and Decontamination of POPs and the Identification of Promising Technologies for Use in Developing Countries” (http://www.basel.int/techmatters/review_pop_feb04.pdf).

²³ See “Destruction and Decontamination Technologies for PCBs and Other POPs Wastes Under the Basel Convention: A Training Manual for Hazardous Waste Project Managers” (<http://www.basel.int/meetings/sbc/workdoc/TM-A.pdf>). For instance, the document identifies the following as “established” technologies for POPs treatment: incineration, thermal desorption, dechlorination, and solvent extraction. The following are identified as “emerging” technologies: solidification, stabilization, bioremediation, vitrification and ball milling.

²⁴ Basel Convention, Article 10, paragraph 2(d).

²⁵ Basel Convention, Article 14.1.

²⁶ See “Basel Convention Regional Centres for Training and Technology Transfer (BCRCs)” (<http://www.basel.int/centers/contacts.doc>).

- Central and Eastern Europe: Basel Convention Regional Centre in the Russian Federation, Basel Convention Regional Centre for Central Europe in Slovakia; and
- Latin America and the Caribbean: Basel Convention Coordinating Centre for Training and Technology Transfer for the Latin America and Caribbean Region in Uruguay, Basel Convention Regional Centre in Argentina, Basel Convention Regional Centre in El Salvador, Basel Convention Regional Centre in Trinidad and Tobago.

One of the core functions of the Regional Centres is to create the appropriate conditions to carry out transfer of technology in developing and transition countries.²⁷ The Centres fulfill this function through the implementation of specific activities and projects.

For example, the Basel Secretariat is currently working with the Regional Centre in Senegal to address the need to manage and dispose of PCBs in West Africa. In addition to creating the legal and institutional infrastructure, the project aims at establishing a regional facility for the environmentally sound management and disposal of PCBs. Since West African countries do not presently possess the necessary equipment and capacity to install such a facility, the project will, *inter alia*, identify a provider and explore possibilities for technology transfer. Developing processes for identifying appropriate technologies given the specific circumstances of the West African region and building capacity to negotiate with the private sector are also key elements of this project.²⁸

At the seventh meeting of the Basel COP held in October 2004, the regional Centres were invited “to carry out an evaluation of the technology transferred so far and requested the Secretariat to report on such evaluation to the Conference of the Parties at its ninth meeting.”²⁹

Thus, under the Basel Convention technology transfer has been pursued in a comprehensive manner, rather than with a focus on specific technologies. Regional Centres have focused on fostering enabling environments in Member countries, and have often facilitated technological transfer via project implementation. The technology transfer mechanisms and documents have furthermore been subject to frequent review and revision, creating an evolving approach to technology transfer.

2. CBD

a) Objective

The objective of the CBD includes the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising from the use of genetic resources.³⁰

²⁷ See Basel COP Decision VI/3, Appendix I: “Core Functions of the Basel Convention Regional Centres” (<http://www.basel.int/meetings/cop/cop6/english/Report40e.pdf>). See, also, the Basel COP Decision V/33 (<http://www.basel.int/meetings/cop/cop5/cop5reportfinal.pdf>), which calls for the establishment or strengthening of the activities of the Regional Centres in, *inter alia*, the transfer of technology.

²⁸ For more information, see <http://www.gefonline.org/projectDetails.cfm?projID=2770>.

²⁹ See Basel COP Decision VII/9 (<http://www.basel.int/meetings/cop/cop7/docs/33eRep.pdf>).

³⁰ See CBD, Article 1.

Parties to the CBD are required to develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity, and to integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.³¹

The CBD recognizes that both access to and technology transfer among Parties is essential to the achievement of its objectives.³² Given this, the Convention requires Parties to provide, facilitate access to, and transfer to other Parties technologies that are relevant to the conservation and sustainable use of biological diversity or make use of genetic resources.³³

The Convention also establishes that access to and transfer of technology “shall be provided and/or facilitated under fair and most favourable terms, including on concessional and preferential terms where mutually agreed,” and in a way “consistent with the adequate and effective protection of intellectual property rights.”³⁴

In fact, the Convention notes that, “[t]he extent to which developing country Parties will effectively implement their commitments under this Convention will depend on the effective implementation by developed country Parties of their commitments under this Convention related to financial resources and transfer of technology ...”³⁵

b) Technology identification

A Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) was established by the Parties to, *inter alia*, “identify innovative, efficient and state-of-the-art technologies and know-how relating to the conservation and sustainable use of biological diversity and advise on the ways and means of promoting development and/or transferring such technologies . . .”³⁶ SBSTTA divides its work on technology transfer according to particular themes, such as inland waters, forests and agriculture. A programme of work is established related to each specific theme. For instance, under the agricultural biodiversity theme, one of the main elements of the programme of work is “[t]o identify management practices, technologies and policies that promote the positive and mitigate the negative impacts of agriculture on biodiversity . . .”³⁷ One of the specific activities foreseen under this element is the identification, promotion and “dissemination of information on cost-effective practices and technologies.”³⁸

³¹ See CBD, Article 6.

³² See CBD, Article 16.1.

³³ See CBD, Article 16, paragraph 1.

³⁴ CBD, Article 16, paragraph 2. The CBD also includes technology transfer provisions related to its third objective, the fair and equitable sharing of benefits arising out of the utilization of genetic resources. The access and benefit sharing aspects of technology transfer are quite unique to the context of the CBD and are therefore not examined in detail in this paper, which primarily focuses on provisions related to the promotion of environmentally sound technologies.

³⁵ CBD, Article 20, paragraph 4.

³⁶ CBD, Article 25.

³⁷ See Agricultural Biodiversity Work Programme, Element 2 (<http://www.cbd.int/agro/pow.shtml>). See also CBD COP Decision III/11 and V/5.

³⁸ See Agricultural Biodiversity Work Programme, Element 2, Activity 2.2 (<http://www.cbd.int/agro/management.shtml>). It should be noted, however, that to date the work on technology under SBSTTA has been rather limited. SBSTTA has considered technology identification for the conservation and sustainable use of biodiversity, see UNEP/CBD/SBSTTA/9/INF/13 (<http://www.cbd.int/doc/meetings/sbstta/sbstta-09/information/sbstta-09-inf-13-en.pdf>), and mountain biodiversity, see UNEP/CBD/SBSTTA/8/7/Add.1 (<http://www.cbd.int/doc/meetings/sbstta/sbstta-08/official/sbstta-08-07-add1-en.pdf>).

The CBD has also identified several general categories of technologies that are recognized as key drivers of implementation: techniques for *in-situ* conservation (e.g., integrated pest management), technology for *ex-situ* conservation (e.g., preservation and storage technologies), and technologies related to the sustainable management of biodiversity resources (e.g., forest management).³⁹ In addition, many monitoring technologies, such as remote sensing, are essential for the generation of updated and accurate biodiversity information, which is a precondition to the design and implementation of policies for the conservation of biodiversity and the sustainable use of its components.⁴⁰

c) Access to and transfer of technology

As noted above, transfer of technology is closely tied to the overall objective of the CBD.⁴¹ To implement these provisions, the CBD COP adopted a programme of work on technology transfer and technological and scientific cooperation at its seventh meeting in 2004.⁴² This programme of work is grouped under four programme elements:

- a) Technology Assessments: consists of a consultative process to identify and determine the technology needs of Parties in response to national priorities and policies, including support for developing cost-effective analyses and risk assessments;⁴³
- b) Information Systems: these systems, including use of a Clearing-House Mechanism, will provide information on the availability of relevant technologies, the identified technology needs of Parties, as well as case-studies and best-practices on measures and mechanisms to create enabling environments for technology transfer and technology cooperation;⁴⁴
- c) Creating Enabling Environments: activities of governments at national and international levels that aim to create an institutional, administrative, legislative and policy environment conducive to private and public sector technology transfer and the adaptation of transferred technology, and to remove technical, legislative and administrative barriers to technology transfer and technology adaptation that are inconsistent with international law;⁴⁵ and
- d) Capacity-building and enhancement: activities focused on the implementation of effective technology analysis, establishment of appropriate national and regional information systems, and the creation of enabling environments for technology transfer and cooperation.⁴⁶

The programme of work also spells out a number of operational targets and related activities required from Parties, other governments, international organizations and the Secretariat.

³⁹ See CBD website, Introduction (<http://www.cbd.int/tech-transfer/introduction.shtml>).

⁴⁰ *Id.*

⁴¹ See CBD, Article 16.

⁴² See CBD website, "Programme of Work on technology transfer and technological and scientific cooperation," 2006 (<http://www.cbd.int/doc/publications/ttc-brochure-01-en.pdf>).

⁴³ See CBD website, "Programme of Work on technology transfer and technological and scientific cooperation," 2006 (<http://www.cbd.int/doc/publications/ttc-brochure-01-en.pdf>).

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

In response to this mandate, the CBD Secretariat established an Expert Group on Technology Transfer and Scientific and Technical Cooperation, developed options for applying measures and mechanisms to facilitate access to and adaptation of technologies, and established mechanisms for cooperation with other Conventions and international organizations. The Secretariat has also compiled information on technology needs assessment methodologies and case studies on institutional, administrative, legislative and policy frameworks to facilitate access to and adaptation of technologies within the public domain.⁴⁷

In addition to adopting a programme of work on technology transfer, the CBD COP adopted guidelines and a format for national reporting on transfer of technology.⁴⁸ Recently, the Secretariat prepared a synthesis of the information obtained from 22 national reports submitted by Parties.⁴⁹ According to this report, nearly one half of the reporting countries indicated that they had not achieved the outcomes identified in the programme of work through transfer of technology or technology cooperation.⁵⁰

In sum, the CBD Secretariat has relied on the work of technical expert groups and focused on identifying nation-specific needs in their implementation of the CBD technology transfer provisions. Despite this tailored approach, some specific technologies have been positively identified as of general importance to conservation efforts, such as monitoring technology. Under the CBD, technological transfer has been broadly construed as a package of initiatives, as evidenced by the heavy focus on enabling environments and capacity building.

3. CITES

a) Objective

The aim of CITES is to ensure that international trade in specimens of wild animals and plants does not threaten their survival by according more than 30,000 species of animals and plants varying degrees of protection. To accomplish this objective, CITES requires Parties to adopt a permit system for international trade in these species, which are listed in three Appendices according to the level of protection required: Appendix I includes species threatened with extinction; Appendix II includes species that are not currently threatened with extinction but may become so unless trade is strictly regulated; and Appendix III includes species subject to regulation within the jurisdiction of a Party who requests cooperation of other Parties in the control of trade.⁵¹

⁴⁷ For a full report on the first phase of implementation of the Programme of Work on technology transfer and technological and scientific cooperation, see UNEP/CBD/COP/8/19 (<http://www.cbd.int/doc/meetings/cop/cop-08/official/cop-08-19-en.pdf>). At COP 8, the CBD Secretariat launched a “Toolkit on Technology Transfer and Scientific and Technological Cooperation,” and presented a proposal to the Parties to adapt the UNDP-GEF Handbook, “Assessing Technology Needs for Climate Change”, to the needs of the CBD. See UNEP/CBD/COP/8/19, paragraph 24.

⁴⁸ See CBD COP Decision VI/25 (<http://www.cbd.int/decisions/cop-06.shtml?m=COP-06&id=7199&lg=0>).

⁴⁹ See UNEP/CBD/COP/7/INF/9, (<http://www.cbd.int/doc/meetings/cop/cop-07/information/cop-07-inf-09-en.pdf>). Countries that submitted national reports on transfer of technology include: Algeria, Austria, Australia, Canada, China, Colombia, European Community, Finland, Germany, Iran (Islamic Republic of), Ireland, Japan, Liberia, Mexico, Norway, Oman, Poland, Spain, Sri Lanka, Switzerland, Tajikistan, Thailand, and the former Yugoslav Republic of Macedonia.

⁵⁰ See, *id.* at paragraph 7.

⁵¹ See CITES, Article II. The Convention also includes procedures for amending the Appendices as appropriate. See CITES, Article XV and XVI.

There is no explicit reference to technology transfer in the Convention. However, as Parties, the Secretariat and other entities have carried out work on implementation, certain types of technologies have been identified as useful in achieving the CITES objectives.

b) Technology identification

Among the technologies that have been recognized as useful for the purpose of CITES are: software for computerized permit issuance/reporting, security stamps and security paper (measures that ensure that documents are difficult or impossible to alter), systems or methodologies for propagating animals or plants in a way that contributes to their survival in the wild (e.g. ranching, captive breeding, aquaculture, artificial propagation) and forensic techniques or materials for the identification of specimens.⁵²

At the eleventh meeting of the CITES COP in 2000, the Parties adopted a Strategic Vision and Action Plan with the purpose of ensuring “that no species of wild fauna and flora becomes or remains subject to unsustainable exploitation because of international trade.”⁵³ The Strategic Vision sets forth several objectives relevant to the identification of methods, practices and technologies, including those related to information management systems, management programmes for the conservation and recovery of species, technologies for strengthening the scientific basis of the Convention, and technologies relevant to research, forensic and species identification. Various bodies under the Convention disseminate information about the methods, practices and technologies regarded as useful in achieving the objectives of CITES. Some of the means used to disseminate information include: Resolutions adopted by the Parties, Notifications to the Parties issued by the Secretariat and capacity building or implementation tools developed to enhance the effectiveness of the Convention.

A Resolution on coded-microchip implants for marking live animals in trade is one example of a technology-related resolution adopted by the CITES COP.⁵⁴ Based on the wide use of coded-microchip implants for the individual identification of animals and the recognition of the potential of this method for marking animals of species covered by the Convention, the COP recommended Parties “to adopt the use of implantable transponders bearing permanent, non-programmable, unalterable and permanently unique codes for the identification of live animals.”⁵⁵ The COP also directed the Secretariat to consult with the International Standards Organization to solve standards issues; the CITES Management Authority of each Party to liaise with manufacturers of microchip-implants to urge them to strive towards the production of compatible equipment that can be applied universally; and the CITES Animals Committee to monitor developments in microchip-implant technology and to advise the Secretariat about such developments so that they may inform CITES Parties.⁵⁶

Certain methods or technologies are also recommended or encouraged through Notifications issued by the Secretariat, for example, the computerization of statistical and implementation reports. Through a specific Notification, the Secretariat “request[ed] that, if possible, the Parties submit their reports in electronic format, through email, on CD-ROM or on diskette.”⁵⁷

⁵² Personal communication with Marceil Yeater, Chief, CITES Legal Affairs and Trade Policy Unit on June 15, 2006.

⁵³ See CITES COP Decisions 11.1 and 13.1 (<http://www.cites.org/eng/dec/valid13/13-01.shtml>).

⁵⁴ See Resolution Conf. 8.13 (Rev. COP 13) (<http://www.cites.org/eng/res/08/08-13.shtml>).

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ CITES Notification to the Parties, No. 2006/005, “Submission of national reports in electronic format” (<http://www.cites.org/eng/notif/2006/005.pdf>).

Implementation tools such as guidelines, manuals and training materials constitute another vehicle for disseminating certain methodologies, techniques and information about technologies. For example, at the Special Working Session in Geneva in 1977, Parties decided that an Identification Manual should be developed to assist enforcement agencies in verifying the identity of species in the CITES Appendices. The Manual consists of a collection of data sheets designed to help identify various species of flora with drawings, maps and concise descriptions, and to serve as a tool for Management and Scientific Authorities, customs officials, and all others involved in implementing and enforcing CITES.

c) Access to and transfer of technology

Given the Convention's objective to regulate cross-border trade in wild animals and plants, a certain degree of harmonization in the methodologies that are used to identify, track and monitor the stock of CITES-listed species is necessary. This common objective has sometimes led to technology transfer, particularly "soft" technology or know-how.

One example of a standardized method for tracking species is the use of universal tagging, such as that adopted under Resolution Conf. 11.12, which establishes a universal tagging system that should be applied by all Parties for crocodylian skins.⁵⁸ The Resolution is very specific in establishing the minimum requirements for the tags, including an ISO two-letter code for the country of origin, a unique serial identification number, a standard species code (as provided in Annex 1 of the Resolution), and the year of production or harvest.⁵⁹

Know-how and techniques are also transferred between Parties through the publication of successful experiences in CITES implementation. For example, information has been shared through countries' Operation Manuals, which include practical information on how to process and control CITES documents, verify shipments, deal with personal and household effects, handle detected violations, and dispose of confiscated specimens.⁶⁰

Another example of country-to-country transfer of experiences is an interactive course on CITES that was originally developed by the Canadian government. The CITES Secretariat, in cooperation with the Government of Canada, adapted the course for use by a global audience and made it available in English, French and Spanish, in order to reach not only customs officers throughout the world but also government departments involved in the import-export of CITES species, including ministries dealing with fisheries, agriculture, plant or animal health inspection, as well as international entities such as the World Customs Organization and Interpol.⁶¹

The experience of technology transfer within CITES is indicative of how particular technologies can be critical to achieving environmental goals. While under CITES technology transfer efforts have tended to focus on several specific technologies, this transfer has been accompanied by the spread of management techniques, standardization of procedures, and general know-how.

⁵⁸ See Resolution Conf. 11.12 (<http://www.cites.org/eng/res/11/11-12.shtml>).

⁵⁹ *Id.* It further establishes that the tags must have a self-locking mechanism, be produced in a way that is resistant to heat, have inertia to chemical and mechanical processing, and be provided with alphanumeric information applied by permanent stamping.

⁶⁰ For example, the CITES Operation Manual developed by the Government of Italy has been noted by the CITES Secretariat as a useful example for Parties. See CITES World, Official Newsletter of the Parties, Issue Number 12, December 2003, pages 4-5 (<http://www.cites.org/eng/news/world/12.pdf>).

⁶¹ *Id.* at page 2.

4. Montreal Protocol

a) Objective

The objective of the Montreal Protocol, which is a Protocol to the Vienna Convention for the Protection of the Ozone Layer, is to protect human health and the environment against adverse effects resulting from human activities that modify the ozone layer.⁶² The use of chlorofluorocarbons (CFCs) was found to have a direct link with the depletion of the ozone layer, and therefore the Protocol focuses on the control and elimination of CFCs and other ozone depleting substances.⁶³

The Protocol explicitly recognizes the importance of “promoting international cooperation in the research, development and transfer of alternative technologies . . .”⁶⁴ Indeed, Article 9 of the Montreal Protocol states that Parties shall cooperate “in promoting, directly or through competent international bodies, research, development and exchange of information on: (a) best technologies for improving the containment, recovery, recycling, or destruction of controlled substances or otherwise reducing their emissions; (b) possible alternatives to controlled substances, to products containing such substances, and to products manufactured with them; and (c) costs and benefits of relevant control strategies.”⁶⁵

b) Technology identification

As the process of technology development is dynamic, Parties are required to assess the control measures “on the basis of available scientific, environmental, technical and economic information.”⁶⁶ To fulfill this obligation, three expert panels have been established:

- Panel for Scientific Assessment – responsible for reviewing scientific knowledge on the use of CFCs and its impact on the ozone layer;
- Panel for Environmental Assessment – responsible for reviewing the environmental effects of ozone depletion; and
- Technology and Economic Assessment Panel (TEAP) – responsible for providing technical information related to alternative technologies that have been investigated and employed in eliminating the use of ozone depleting substances (ODS), including CFCs, halons etc.⁶⁷

⁶² See Montreal Protocol, Preamble, paragraph 2.

⁶³ Used in a variety of industrial, commercial, and household applications, CFCs represented an important component of the national and international industrial market. For statistical information, see <http://www.ciesin.org/TG/OZ/prodcfc.html>.

⁶⁴ Montreal Protocol, Preamble, paragraph 9.

⁶⁵ Montreal Protocol, Article 9.

⁶⁶ See Montreal Protocol, Article 6.

⁶⁷ See Montreal Protocol MOP 8 Report, Annex V (http://ozone.unep.org/Meeting_Documents/mop/08mop/MOP-8-12E.pdf).

Parties have requested that the Technology and Economic Assessment Panel (TEAP) annually update the status of technical feasibility and the phase-out progress of ozone depleting substances. On the basis of periodic scientific and technological assessments, the Montreal Protocol has been adjusted to accelerate the phase-out schedules of substances that deplete the ozone layer.⁶⁸

c) Access to and transfer of technology

The Montreal Protocol encourages access to and transfer of technologies identified as appropriate substitutes to ozone depleting substances. The Protocol requires each Party to “take every practicable step, consistent with the programmes supported by the financial mechanism, to ensure: (a) that the best available, environmentally safe substitutes and related technologies are expeditiously transferred to [developing countries]; and (b) that the transfers [...] occur under fair and most favourable conditions.”

The Protocol also notes that the capacity of developing countries to fulfill their obligations will depend in part on the financial cooperation and effective transfer of technology.⁶⁹ With this in mind, Parties established a financial mechanism, including a Multilateral Fund “for the purposes of providing financial and technical co-operation, including the transfer of technologies.”⁷⁰ Based on the principle of common but differentiated responsibility, the Multilateral Fund is expected to meet the incremental costs (costs incurred in converting to non-ODS technologies) of developing countries to comply with the control measures of the Protocol.

Substitutes for ODS and the products that incorporate them are predominantly privately-owned technologies. Widespread adoption of substitute technologies entails significant costs, including the purchase of access and the rights to use technology. Through the Fund, financial and technical assistance is provided in the form of grants or concessional loans and is delivered primarily through four implementing agencies.⁷¹ The Fund is replenished on a three-year basis by the donors. Pledges amounted to US\$ 2.2 billion over the period 1991 to 2007. Funds are used, for example, to finance the conversion of existing manufacturing processes, train personnel, pay royalties and patent rights on new technologies, and establish national Ozone Units.⁷² Thus, the availability of dedicated funds to pay the incremental costs of transition, a mechanism unique to the Montreal Protocol, has been a critical driver for transfer of technological know-how and investments related to ODS substitutes.⁷³

⁶⁸ Adjustments to the Protocol were introduced in London in 1990, Copenhagen in 1992, Vienna in 1995, Montreal in 1997, and Beijing in 1999 (http://ozone.unep.org/Treaties_and_Ratification/montreal_protocol_amendments.shtml).

⁶⁹ See Montreal Protocol, Article 5, paragraph 5.

⁷⁰ Montreal Protocol, Article 10, paragraph 1.

⁷¹ These include the United Nations Development Programme (UNDP), United Nations Industrial Development Organization (UNIDO) the World Bank and UNEP. See http://www.multilateralfund.org/about_the_multilateral_fund.htm.

⁷² See Multilateral Fund for the Implementation of the Montreal Protocol, Achievements (<http://www.multilateralfund.org/achievements.htm>).

⁷³ See, e.g., Zhao, Jimin. “Implementing International Environmental Treaties in Developing Countries: China’s Compliance with the Montreal Protocol” *Global Environmental Politics* 5:1, February 2005 (China’s ODS reduction efforts depended on access to multilateral funds); Cf. Biermann, Frank. “Financing Environmental Policies in the South—Experiences from the Multilateral Ozone Fund.” *International Environmental Affairs* 9 (3) 1997 (barriers to technological transfer remain despite fund, due to industry resistance to knowledge transfer).

In summary, the central role given to the adoption of new and phase out of old technology under the Montreal Protocol necessitate a highly dynamic technology identification process. The Parties have relied heavily upon technical experts to direct this process. The Montreal Protocol goes further than other MEA technology transfer provisions in its focus not only on a package of technology and knowledge, but also by attaching targeted funds to drive this holistic technology transfer process.

5. Stockholm Convention

a) Objective

The Stockholm Convention regulates the production, management and disposal of twelve persistent organic pollutants (POPs), which are scientifically recognized as possessing toxic properties, resisting degradation, and bioaccumulating in living organisms. The objective of the Convention is to protect human health and the environment through measures that will reduce and/or eliminate emissions and discharges of POPs.⁷⁴ The Convention covers the production, management and disposal of POPs, in order to prevent their adverse effect “at all stages of their life cycle.”⁷⁵ The Convention also regulates POPs released unintentionally.⁷⁶

Parties are required to implement a number of measures to fulfill the Convention’s objectives, such as the development of an action plan, which includes inventories of releases, evaluation of laws and policies, and strategies to meet obligations of the Convention.⁷⁷ In terms of technology, Parties are required to promote development in, and require the use of, substitute or modified materials, products and processes.⁷⁸

b) Technology identification

The Stockholm Convention actively encourages the identification of possible alternatives to POPs. Article 11 provides that Parties must encourage “appropriate research, development, monitoring and cooperation pertaining to persistent organic pollutants and, where relevant, to their alternatives...”⁸⁰ Information on alternatives to POPs, including information on their risks and their economic and social costs, must be made available through exchange of information.⁸⁰ For example, a guidance document, “Reducing and Eliminating the Use of Persistent Organic Pesticides: Guidance on Alternative Strategies for Sustainable Pest and Vector Management,” was developed to identify alternatives.⁸¹

⁷⁴ See Stockholm Convention, Preamble, paragraph 5 and Article 1.

⁷⁵ Stockholm Convention, Preamble, paragraph 16.

⁷⁶ See Stockholm Convention, Article 5.

⁷⁷ See Stockholm Convention, Article 5 (a).

⁷⁸ See Stockholm Convention, Article 5 (c).

⁷⁹ Stockholm Convention, Article 11, paragraph 1.

⁸⁰ See Stockholm Convention, Article 9, paragraph 1(b). Paragraph 4 of the same Article establishes that the Secretariat shall serve as a clearinghouse mechanism to collect and disseminate information submitted by the Parties. The mandate of such a clearinghouse mechanism is currently under discussion, see UNEP/POPS/COP.2/13 (http://www.pops.int/documents/meetings/cop_2/meetingdocs/default.htm).

⁸¹ See “Reducing or Eliminating the Use of Persistent Organic Pesticides – Guidance for alternative strategies for sustainable pest and vector management,” 2002 (<http://www.chem.unep.ch/pops/pdf/redelipops/redelipops.pdf>).

With respect to POPs released unintentionally, Parties are required to put in place “best available techniques and best environmental practices” to reduce such releases, and ultimately, eliminate them.⁸² The Convention defines “techniques” as including both the technology used and the way in which it is designed, built, maintained, operated and decommissioned.⁸³

For example, dioxin and furans generated during certain treatments of waste are a typical example of POPs unintentionally produced. The Basel and Stockholm Conventions are cooperating in the elaboration of Technical Guidelines on Dioxins and Furans.⁸⁴

The Basel and Stockholm Conventions are also collaborating closely in the elaboration of general technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with POPs, and Guidelines on Destruction and Decontamination Technologies for PCBs and other POPs wastes.⁸⁵

c) Access to and transfer of technology

In its Preamble, the Stockholm Convention recognizes the need to strengthen national capacities of developing countries in the management of chemicals, including through technology transfer, provision of financial and technical assistance, and promotion of cooperation among Parties.

The Convention calls for establishing arrangements for the purpose of providing technical assistance and promoting technology transfer through the establishment of regional and sub-regional centres for capacity building and transfer of technology.⁸⁶

⁸² This is done in accordance with Annex C, Part II and guidelines on BAT/BEP adopted by the COP. *See* Stockholm Convention, Article 5, paragraph (d).

⁸³ *See* Stockholm Convention, Article 5 (f), which further defines “best available techniques” as “the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques for providing in principle the basis for release limitations designed to prevent and, where that is not practicable, generally to reduce releases of chemicals listed in Part I of Annex C and their impact on the environment as a whole;” “Available” techniques means those techniques that are accessible to the operator and that are developed on a scale that allows implementation in the relevant industrial sector, under economically and technically viable conditions, taking into consideration the costs and advantages; and “Best” means “most effective in achieving a high general level of protection of the environment as a whole;” and “Best environmental practices” is also defined as “the application of the most appropriate combination of environmental control measures and strategies.”

⁸⁴ *See* “Draft technical guidelines for the environmentally sound management of wastes containing or contaminated with unintentionally produced polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs) or hexachlorobenzene (HCB),” UNEP/CHW/OEWG/4/INF/5, 15 July 2005 (<http://www.basel.int/techmatters/dioxifuran/guidelines/diofur-150705.doc>).

⁸⁵ *See* “General technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants (POPs)” (http://www.basel.int/techmatters/pops/pops_guid_final.doc); and “Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with Polychlorinated Biphenyls (PCBs), Polychlorinated Terphenyls (PCTs) or Polybrominated Biphenyls (PBBs),” SBC Nr. 2005/2 (http://www.basel.int/pub/techguid/pcb_guid_final.pdf).

⁸⁶ *See* Stockholm Convention, Article 12, paragraph 4.

Under the Stockholm Convention, a process is currently in place to identify and legally establish regional centres. A feasibility study carried out under the Stockholm Convention includes the analysis of the Basel Convention Regional Centres.⁸⁷

The Convention notes that “[t]he extent to which the developing country Parties will effectively implement their commitments under this Convention will depend on the effective implementation by developed country Parties of their commitments under this Convention relating to financial resources, technical assistance and technology transfer.”⁸⁸ In this context, the Global Environment Facility has been entrusted, on an interim basis, with the operations of the financial mechanism, which funds, among other activities, the elaboration of National Implementation Plans.⁸⁹

While the technology transfer activities under the Stockholm Convention remain at an earlier phase of elaboration, there is already an indication that these are being implemented in the dynamic and holistic manner of the MEAs discussed in this paper. The regional centres are likely to function similarly to or in partnership with those under the Basel Convention. The guidelines and techniques to control POPs releases will require revision over time in response to new scientific developments, leading to a dynamic mechanism to identify best technologies.

⁸⁷ See UNEP/POPS/COP.1/27 (http://www.pops.int/documents/meetings/cop_1/meetingdocs/en/default.htm). For an update on the establishment of regional and sub-regional centers, see UNEP/POPS/COP.2/15 (http://www.pops.int/documents/meetings/cop_2/meetingdocs/default.htm).

⁸⁸ See Stockholm Convention, Article 13, paragraph 4.

⁸⁹ See Stockholm Convention, Article 14, and UNEP/POPS/COP.2/28 (report of the GEF on its activities in support of the implementation of the Stockholm Convention) (http://www.pops.int/documents/meetings/cop_2/meetingdocs/default.htm).

IV. Summary and Conclusions

Technology is widely recognized as an essential tool for implementing MEAs and for achieving the objectives of sustainable development. The need to make technology accessible to all countries to achieve the goals established by MEAs has led to renewed efforts to increase the flow of technology to developing and transition countries.

One means of creating incentives to transfer environmentally sound technology is international trade. As stated in Agenda 21, “[p]roprietary technology is available through commercial channels, and international business is an important vehicle for technology transfer.”⁹⁰ The successful completion of the WTO negotiations on environmental goods and services may contribute to current efforts to make environmentally sound technologies accessible to all countries. Given this, in pursuing these negotiations, it may be valuable to reflect on the experience and lessons learned from MEA Secretariats and their Parties in identifying and facilitating the transfer of technologies.

The Secretariats and Parties have employed a number of different mechanisms for identifying appropriate technologies, including:

- Elaboration of technical guidelines, manuals and training materials (e.g., Basel and Stockholm Conventions);
- Regular assessment and evaluation of technologies and methods (e.g. subsidiary bodies in the case of CBD or panel of experts in the case of the Montreal Protocol);
- Exchange of information, experiences and lessons learned (e.g. CITES manual and other materials); and
- Establishment of training and technology transfer centers (e.g. Basel Convention).

⁹⁰ Agenda 21, Chapter 34, paragraph 11.

One of the challenges of identifying a specific technology is the risk that this selection will crowd out other options, with a single technology gaining a monopoly over alternatives. Yet technology evolves over time, and cheaper and more environmentally friendly developments should not be discouraged. In response to this challenge, the processes adopted by MEAs for identifying appropriate technologies tend to share the characteristic that they are dynamic in nature – designed to respond to the changing nature of environmental challenges, scientific discoveries, technological development, as well as changes in economic, social and cultural circumstances. To ensure this flexibility, MEAs often include procedures to amend the text of the Conventions and annexes,⁹¹ establish bodies or panels to carry out regular assessments,⁹² or include mechanisms for the revision of technical guidelines and other training material.⁹³

The fact that technology, methods and techniques must evolve makes the relationship between technology and MEA implementation a complex one requiring on-going dialogue between the providers/facilitators of technology and the recipients. This complexity may be one reason why MEA Secretariats and Parties regularly adopt a package approach in the transfer of technologies, whereby the actual technology is complemented by capacity building, training of personnel, sharing of know-how, and exchange of information. This is reflected, for instance, in the work programme for technology transfer adopted under the CBD where several elements are considered essential for the successful transfer of technology, including capacity building and enhancement.

Promoting technology transfer pursuant to MEAs is also often pursued by MEA Secretariats and their Parties by linking the technology to specific projects, such as the one discussed above on management and disposal of PCBs in West African countries. This initiative includes an assessment and cost-benefit analysis of the technologies, design of a policy system that allows for proper assimilation of the technology transferred, and training of personnel for using and sustaining the technologies.

These holistic approaches to technology transfer are compatible with Agenda 21, which notes that environmentally sound technologies “are not just individual technologies, but total systems which include know-how, procedures, goods and services, and equipment as well as organizational and managerial procedures.”⁹⁴

⁹¹ See Basel Convention, Articles 17 and 18; CBD, Articles 29 (e); CITES, Articles XV, XVI and XVII; Montreal Protocol, Article 11 paragraph 4 (h); and Stockholm Convention, Articles 21 and 22. Note that some Conventions (notably, the Basel Convention, CBD, CITES and the Stockholm Convention) have one mechanism for amending the text of the Convention and another for amending annexes. The latter is usually less stringent in order to facilitate amendments to annexes, which are more likely to be modified according to new scientific discoveries and technological development.

⁹² For example, a Subsidiary Body on Scientific, Technical and Technological Advice of the Convention on Biological Diversity and Panels for Scientific, Environmental, Technology and Economic Assessment of the Montreal Protocol. For example, UNEP/CHW/OEWG/4/4, the 2005-2006 work programme for the Open-ended Working Group of the Basel Convention includes the revision of certain Technical Guidelines (<http://www.basel.int/meetings/oewg/oewg4/documents/04e.pdf>).

⁹³ For example, UNEP/CHW/OEWG/4/4, the 2005-2006 work programme for the Open-ended Working Group of the Basel Convention includes the revision of certain Technical Guidelines (<http://www.basel.int/meetings/oewg/oewg4/documents/04e.pdf>).

⁹⁴ Agenda 21, Chapter 34, paragraph 3.

Although the MEAs discussed in this paper vary in their objectives and the way they operate, they nonetheless share a number of common characteristics, including the recognition that technology represents a key tool in realizing their objectives, albeit to different degrees. To ensure the mutual supportiveness of trade and environment, it is important that the experience gained by MEA Secretariats and their Parties in identifying and facilitating the transfer of technologies informs the WTO environmental goods and services negotiations.

This paper represents a first step in the analysis of these issues. Subsequent in-depth analysis has the potential to produce more specific recommendations for trade negotiators in the context of the WTO, regional, or bilateral agreements. Reciprocally, such analysis and adoption of appropriate policies could contribute to the enhanced capacity of the Parties to attain their environmental goals under the MEAs. Further examination in the following areas may be warranted:

- Identification of specific technologies or groups of technologies that support MEA implementation, including an analysis of the opportunities and challenges associated with such identification;
- Analysis of the impact of tariffs and non-tariff barriers on the flow of MEA-related technologies and to what extent further liberalization would increase this flow;
- Further examination of the role of technology in MEA implementation at the national level; and
- Examination of the current challenges to increased MEA technology transfer.