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DEVELOPMENT AND TRANSFER OF TECHNOLOGY

**STATUS OF THE CONSULTATIVE PROCESS
(DECISION 4/CP.4)**

Submissions from Parties

Note by the secretariat

1. At its twelfth session, the Subsidiary Body for Scientific and Technological Advice invited Parties to submit their views, by 30 June 2000, on a framework for implementation of meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention (FCCC/SBSTA/2000/5, para. 52 (d)). That invitation replaced the earlier invitation, made at the eleventh session, for submission by 15 July 2000 (FCCC/SBSTA/1999/14 para. 75 (i)).
2. Nine such submissions* have been received. In accordance with the procedure for miscellaneous documents, these submissions are reproduced in the language in which they were received and without formal editing.

* In order to make these submissions available on electronic systems, including the World Wide Web, these contributions have been electronically scanned and/or retyped. The secretariat has made every effort to ensure the correct reproduction of the texts as submitted.

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PAPER NO. 1: CANADA

DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

The SBSTA chair invited Parties to submit views (FCCC/SBSTA/2000/CRP.1) on a framework for meaningful and effective actions to enhance the implementation of the development and transfer of technologies (Decision 4/CP.4). This submission responds to that invitation and outlines Canada's views on a framework for the development and transfer of technologies and related issues. In addition, this submission also provides an update on how the development of the transfer of technology process is developing within Canada.

I) Introduction

Canada is pleased with the fruitful work carried out in the consultative process and congratulates the chair, the secretariat and Friends of the Chair on the success of the three regional workshops in Tanzania, El Salvador and the Philippines. Canada has been an active participant and supporter of this consultative process from the beginning and is pleased to assist in furthering the process by offering its views. As a separate, but overlapping and complementary process, it should be noted that Canada welcomes the publication of the Intergovernmental Panel on Climate Change (IPCC) Special Report on Methodological and Technological Issues in Technology Transfer. In providing a state-of-the-art overview and frame for technology transfer, the IPCC SR represents a major step forward, and Canada's views are considered in its light.

It is Canada's view that although much work remains, significant progress has been made on technology transfer since the signing of the United Nations Framework Convention on Climate Change (UNFCCC), including specific action taken by Canada as described below. Nonetheless, it should be clearly recognised that the climate technology transfer process is not simple: it is a complex process that can involve both private and public entities and require a variety of actions in both the investor and host countries. As the IPCC Special Report notes, technology increasingly flows through multiple organizations and partnerships. To successfully execute appropriate and workable frameworks, cooperation between the private sector, from where the majority of climate technologies are derived, and governments, which can help to facilitate the technology transfer process, is essential, as is input from academic research communities.

Canada views bilateral and multilateral partnerships, between countries and between stakeholders, as central to the technology transfer process. Such partnerships should be facilitated both within the context of the FCCC and the Kyoto Protocol. Maximizing the use of, and building upon the foundation of, existing institutions and facilities is the most effective approach.

II) Possible elements of a framework for meaningful and effective actions to enhance the implementation of technology transfer

General approach to technology transfer under the Convention

While a universally applicable methodology for international technology transfer does not exist, effective frameworks feature a number of common elements. These elements have been broadly identified and reported through the consultative process (FCCC/SBSTA/2000/4) with the support of many Parties. Building on this work, in Canada's view, a general approach may be reiterated as follows:

- The development and transfer of adaptation and greenhouse gas abatement technologies is of importance and concern to all countries;
- The term "technology transfer" includes both "soft" and "hard" technologies;
- The role of governments is crucial, even though the transfer of technology is a complex process, involving many stakeholders, and is primarily driven by the private sector;
- Many bilateral and multilateral projects and programmes in developing countries that include climate environmentally-sound technology transfer activities can be integrated with local sustainable development benefits, priorities, needs and constraints, while building upon local knowledge and expertise;
- For all governments, there should be firm linkage between overall development plans, sustainable technologies and a strategy to enhance the transfer of technology;
- Capacity-building is an important aspect of technology transfer; and
- Country-specific, market-based technology transfer programmes are an effective way of enhancing the implementation of technology transfer.

Issues of scope and accountability related to a framework for action

The transfer of environmentally-sound technologies (ESTs) to facilitate achievement of climate change related objectives is the goal. Since technology transfer activities under the Convention would be inextricably linked to such activities under the Protocol a distinction between them does not serve a purpose. For example a Clean Development Mechanism (CDM) or Joint Implementation (JI) project under the Protocol could well contain important technology transfer elements that supports broader technology transfer goals. What is crucial is that technology transfer take place and this requires the establishment of an appropriate enabling environment. Such an enabling environment will become even more effective when combined with added incentives for climate change mitigation projects. Thus Canada's submission takes a broad view of technology transfer, where both public and private sector actions, including CDM & JI projects from either sector, Official Development Assistance (ODA), and multilateral and bilateral assistance, contribute toward meeting the goals of, and commitments under, the UNFCCC and Kyoto Protocol.

Establishing an enabling environment

There is consensus that establishing the enabling environment necessary for the flow of technology transfer demands both common and individual efforts in all countries, including developing and developed countries as well as economies in transition. That said, the specific actions needed to establish an enabling environment can significantly differ between

countries. For this reason, it may be helpful to explore how ODA can act as a catalyst for technology flows. Establishing an enabling environment for technology transfer means eliminating barriers in all countries. A number of barriers can prevent implementation of climate-relevant ESTs. To overcome them, the existence and causes of each must be well understood. Barriers vary from case to case but are typically informational, technological, economical or legislative in nature. Work on identifying barriers has progressed substantially since the Convention was signed, namely in the Technical Paper entitled Barriers and Opportunities Related to the Transfer of Technology and the IPCC SR. Canada supports the IPCC findings on the need for action in both Annex I and non-Annex I countries to aid the transfer of ESTs. These measures include the enforcement of regulations, taxes, codes, standards, the reform of legal systems, the protection of intellectual property rights conducive to the encouragement of innovation, the fostering of foreign direct investment, the simplification of public programmes and projects and the promotion of open and competitive markets for ESTs, and the increase of transparency through the inclusion of participation by civil society.

Government plays a pivotal role in climate technology transfer because it helps create an enabling environment for industry and in turn motivates private sector involvement. The success of climate technology transfer in Canada, however, is contingent upon the cooperation of private sector parties. There are potential benefits for those companies involved in international climate technology transfer. However, incentives must be in place to ensure that companies remain proactive in R&D. It should be noted that to further perpetuate the climate technology transfer process, Canadian industries and governmental bodies, including R&D centres, should be encouraged to form partnerships with research units, including academics. Moreover, these bodies should strive to work closely with counterparts within host countries, in order to help eliminate technological barriers. Canada believes that the establishment of an enabling environment, including the elimination of barriers, should be a part of the elements of a framework for technology transfer.

Measuring technology transfer

Seeking improvements in measuring, reporting and accounting procedures for technology transfer would be a protracted exercise, and is not an immediate priority. Few, if any, agreed methodologies exist for measurement or quality evaluation. The revised guidelines for Annex I national communications (Decision 4/CP.5) currently provide for adequate reporting on relevant technology transfer activities. To the extent feasible, non-Annex I Parties should report on the status of technology transfer in their country—in particular their needs—through their national communications. Additional information on technology-related activities and projects is readily available at the national level. Canada supports the view that any framework should attempt to incorporate such information as it would be useful to Parties. This issue is linked to the larger one of ways to improve the flow of, access to, and quality and comparability of technology transfer information. Canada believes that, at the present time, issues relating to measurement should be placed lower in terms of the prioritized list of elements of a framework for technology transfer.

Technology needs and technology needs assessments

The feasibility of climate technologies should be assessed using clear criteria. Since all countries face particular technological challenges based on their national circumstances, and

hence have varying technological capabilities, technological systems should be fully screened and assessed before being transferred.

Through the consultative process, it has been suggested that Parties should consider developing cooperative programmes to conduct technology needs assessments. Such assessments could include technology impact analysis, the identification and prioritization of technological needs, and the development of appropriate institutional and human capacity for sustainable technology transfer. Coordination could provide a platform for government, business, technical institutions, and NGOs, from both Annex II and non-Annex II countries, to be more involved in the technology transfer process. Needs assessments could lead to a prioritized set of technology needs and related capacity building needs and a portfolio of climate technology activities for both mitigation and adaptation. A number of non-Annex II countries have made progress in the development of their needs assessments.

Canada recognizes the importance of needs assessments in the technology transfer process and favours moving forward in this regard. Process is important, but focus must always be on developing long-term business to business joint ventures and partnerships to build environmental and economic benefits to both parties. In support of this, it is Canada's view that a country-driven approach, focussed on sectoral needs and barrier assessments, should be a foundation of the framework for meaningful and effective action on technology transfer. For example, capacity should be reinforced through sector strategies and generic tools (e.g., a handbook on how to conduct a technology needs assessment). But the needs assessment process is not static. Sectoral needs assessments should be designed to develop and/or sustain indigenous abilities to further develop future needs assessments. Canada believes that technology needs and technology needs assessments are essential in the assurance of successful technology transfer, and should be included in the elements of a framework for technology transfer.

Access to and the dissemination of technology information

The consultative process has drawn attention to the importance of access to, and the dissemination of, technology information (e.g., completed needs assessments for non-Annex II countries, available technologies in Annex II countries, etc.). Consideration should also be given to the provision of inventories of available climate change technologies and the desirability of an international information clearinghouse to create an appropriate network. Canada encourages building on the success of current work, including that undertaken by the secretariat, in cooperation with the Climate Technology Initiative (CTI), to develop a new search engine that allows for quick access to reliable information on ESTs, know-how and good practice.

At the national level, Canada is already moving in this direction and has created a virtual forum to link various public and private sector agents in the Canadian Technology Network. This is a website created by the National Research Council, which aims at connecting small and medium technology-related businesses with experts in their respective fields across the country (http://www.nrc.ca/ctn/questionnaire/ctn_orig.html). Canada supports the view that the means to facilitate accessibility and dissemination should be included in the elements of a framework for technology transfer.

Capacity-building for technology transfer

Technology transfer does not solely concern so-called "hard technologies" but is almost always also about so-called "soft technologies" (e.g. know-how and practices). Indeed, sometimes it is exclusively about soft technologies. Transferring experience, knowledge, skills, know-how and practices are key elements of capacity building.

It was recognized in the consultative process that capacity-building is one of the mechanisms to help eliminate barriers to technology transfer. In addition, capacity building is seen as integral to the long-term success of technology transfer as it will help the transfer to be more effective and sustainable. Effectiveness in the transfer process and sustainability may be strengthened in various ways, including the utilization and enhancement of existing endogenous capacities and technologies. The type of capacity-building required will vary based on the particular circumstances at hand (e.g., the technological import capacity of the host country, capabilities of existing training and educational facilities in the host country, etc.). National Communications can serve as an appropriate mechanism for non-Annex I countries to identify their technological needs.

The development of long-term relationships among academic and government-based R&D institutes and agencies is crucial to successful capacity-building and ultimately to business partnerships and the private sector.

Canada supports the inclusion of the recognition of the importance of capacity-building in the elements of a framework for technology transfer.

Transfer of technology mechanisms

Many activities are already underway. A wide range of Canadian groups have undertaken projects to help facilitate the transfer of climate technologies to developing countries. Canada is working actively in other international organizations to facilitate and promote technology transfer. For example, the Canadian International Development Agency (CIDA) has over 50 projects underway in Africa, Asia and the Americas that involve technologies that will contribute to addressing climate change. These technologies, including skills, knowledge, equipment and techniques are transferred in a way that builds the capacity of the partner country and contributes to sustainable development. Again this year, the Canadian government reaffirmed its commitment to supporting international climate change technology transfer, as attested in the February 28, 2000 budget. This budget allots Official Development Assistance funding of \$100 million over four years through CIDA for technology transfer and related initiatives to help developing countries reduce their greenhouse gas emissions and promote sustainable development.

Another example is the CDM and JI Office based out of the Department of Foreign Affairs and International Trade (DFAIT), which was established to enhance Canada's capacity to take advantage of the opportunities offered by these mechanisms. The specific objectives of the Office are to act as the federal government contact point on the CDM and JI, to facilitate Canada's participation in the CDM and JI by assisting Canadian project proponents with host country approval and exploring strategic co-operation arrangements with host countries, and to provide technical guidance to companies participating in the CDM and JI.

Under Canada's Climate Change Action Fund (CCAF), Technology Early Action Measures (TEAM), a governmental virtual programme facilitating partnerships between the public and private sectors in the area of climate change, has supported 14 international projects. These projects have involved several federal departments and have provided a wide sectoral and geographic distribution of new technology opportunities for Canadian and host country businesses by attracting \$75 million of foreign government and foreign private sector investment. These projects provide a source of practical insights into various issues encountered in the development and execution of technology transfer projects involving government and private sectors in Canada and host countries. Combined, these efforts have helped remove some barriers preventing the transfer of climate technologies from Canada to host countries.

Additionally, Canada has developed, and continues to develop and expand on, a number of mechanisms and initiatives that help facilitate both hard and soft climate technology cooperation and transfer. These include:

- WINExport (managed by the Department of Foreign Affairs and International Trade) (Online at: http://www.infoexport.gc.ca/winexports/home_e.htm);
- The Virtual Office of the Environment (Industry Canada) (Online at: <http://virtualoffice.ic.gc.ca/BEPO/main/english/cc.htm>);
- Canadian Forest Services - Climate Change Network (Online at: <http://www.nofc.forestry.ca/climate/maine.html>); and
- Other Canadian Government initiatives run through individual departments and agencies such as Natural Resources Canada, Environment Canada, Transport Canada, Agriculture and Agri-Food Canada and the Export Development Corporation.

Canada is also working actively in other international organizations to facilitate and promote technology transfer. Through the International Energy Agency (IEA), for example, the Committee on Energy Research and Technology, chaired by Canada, is examining ways to encourage the transfer of low greenhouse gas emitting technologies to developing countries. In addition to those mentioned above, Canada also participates in a variety of other multilateral initiatives, including the following:

- Global Environment Facility (GEF);
- Asia-Pacific Economic Cooperation (APEC) Energy Working Group;
- Hemispheric Energy Initiative (under the Summit of the Americas);
- The Climate Technology Initiative (CTI); and
- The Organization for Economic Co-operation and Development (OECD).

Canada supports the recognition of various existing technology transfer mechanisms in the elements of a framework for technology transfer.

Next steps in the SBSTA

Canada supports the proposal by the SBSTA chair (FCCC/SBSTA/2000/4) that the SBSTA may wish to consider, prioritize and develop a more focused list of possible elements of a framework for meaningful and effective actions to enhance the implementation of technology transfer. Discussion of this list could begin at SBSTA 13.

III) Canada's experience in the development and transfer of technology

As noted in our March 1999 submission on the development and transfer of technologies, Canada continues to hold the view that technology is critical to achieving the long-term goals of the Convention and the Kyoto Protocol. We recognize that this is a new challenge for us all. Over the last decade, Canada has been working to identify and address our own needs, capabilities and barriers in the context of the development and transfer of technologies. We seek to do our part in managing global climate change.

As noted above, the transfer of technology and know-how can take many forms, particularly that of private sector direct investment, trade in technology goods and services, and public sector investment, such as development assistance. We also noted the need to establish an enabling environment that maximizes the opportunity for the full participation of key government and private sector players in both host and investor countries. It was clarified that, in Canada's view, an "enabling environment" could only be achieved through implementation of a broad range of legal, institutional and policy frameworks that first and foremost foster awareness, domestic innovation and capacity-building in host countries, and second, stimulate effective engagement of the private sectors in countries that supply technology and know-how.

Matching needs and supply

In our domestic experience, both the private and public sectors have identified the areas in which environmental contributions can be made. It is generally agreed that the five major areas in which ESTs can best respond to both domestic and international needs are found in:

- Energy supply
- Energy production
- Energy end-use
- Carbon dioxide management
- Non-energy related source areas

Canadian policy makers and technological analysts have identified many climate technologies for use in these areas, which collectively, over the long-term, would help to reduce emissions of greenhouse gases. As part of Canada's national climate change process, an options paper entitled Technology Issues Table: Enhancing Technology Innovation for Mitigating Greenhouse Gas Emissions, was produced by a group of experts from a broad cross-section of government, business and industry, the academic community, environment groups and non-government organisations.

This paper identified some promising technologies for use in the energy generation process (energy supply, energy production and energy end-use) including natural gas pipelines, equipment for increased natural gas supply, biomass combustion technologies and fuel cells. As far as non-energy related source areas are concerned, some strategies identified include methane capture from manure, anaerobic digestion of municipal waste, and carbon dioxide capture from cement production.

Developing a framework for analyzing climate change technology transfer potential

The general policy needs for technology transfer may be regarded as the result of interplay between incentives, capabilities and institutions. Technology transfer is a two-way process, involving cooperation between investor and host countries. Therefore, the needs and roles of all stakeholders involved, along with planning details must be stated upfront in policies. In Canada, several important issues need to be addressed during preliminary planning and policy-making stages, including first defining the needs, defining exactly what is being transferred, identifying suppliers and costs, identifying stakeholder parties involved, preparing thoroughly for negotiations by collecting information from a variety of sources, and preparing contractual agreements.

Canada has found that policies serve as the blueprints for the processes involved, and signify that the procedure, although comprehensive, has been carefully planned, and has in writing the steps to be taken and specific instructions for all of those involved. In Canada, it means crafting plans that outline the roles of private and public sector parties, addressing measures to overcome barriers, and giving suggestions for needed activities in the recipient country. Although each policy and plan may contain generic components, every framework for climate technology transfer will contain unique strategies and information, reflective of the different needs and governmental priorities of different host countries.

Socioeconomic cost-benefit analyses can be conducted to determine which technologies are “best fit” overall. Further, stakeholder needs should be accounted for up front, which helps to avoid unanticipated social and economic problems brought on by the implementation of the technology. Endogenous technologies need to be adaptable to the local environment so local engineers, scientists and community leaders in developing countries can make the appropriate alterations to make them sustainable.

Taking into account the above information, a framework for decision-making for climate technology transfer was developed for Canada (see Table 1). This, or a strikingly similar template, could be a useful tool to assist in the selection of appropriate technologies to manage various aspects of climate change. It was recognized when designing the framework that the development and transfer of technology is a broad process that includes several stages of identification and interaction.

Lessons in the Canadian experience

The framework developed here draws heavily upon Canada’s own learning experience, in particular the Technology Issue Table, which forms part of the input to the development of Canada’s national climate change strategy. The table is based on the integration of an analysis of the emerging needs for climate technologies in domestic and international markets, the present availability of new and emerging technological solutions, an inventory of existing measures employed by governments to advance their development, and the current needs and capabilities of innovation systems related to greenhouse gas mitigation technologies. It is recognized that, from a domestic point of view, several stages are required for technology transfer to reach fruition. The framework has been designed for the purpose of generic application within Canada and may also be useful in the international context. It could be used as a tool for analyzing technology transfer feasibility.

Table 1: *A potential framework for analyzing climate technology transfer potential in Canada*

Technology Inventory	Demand	Supply	Potential for Reduction, Removal, Adaptation¹	Barriers	Needs / Capacity Building	Collateral Aspects²
1. Fossil Fuel Supply						
2. Energy Production Technology						
3. End-Use Technologies						
4. GHG Management Technologies						
5. Non-Energy Technologies						
6. Other Technologies & know-how						

¹ Included here are technologies relating to the reduction of greenhouse gases, removals by sinks and/or adaptation technologies in response to climate change.

² This includes positive and negative aspects of the technology such as clean air emissions, jobs, etc.

PAPER NO. 2: PEOPLE'S REPUBLIC OF CHINA

SUBMISSION ON DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

1. China noted the progress of the consultative process with the objective of achieving agreement on a framework for meaningful and effective actions to enhance implementation of Article 4.5 of the Convention. We think the result of this process, as mentioned above, shall be based on the following output: (1) Three regional workshops (FCCC/SBSTA/2000/4, FCCC/SBSTA/2000/INF.6, FCCC/SBSTA/2000/INF.2 and FCCC/SBSTA/1999/11) and the forthcoming informal consultation in August. (2) Submissions from Parties. (3) IPCC Special Report on Methodological and Technological Issues in Technology Transfer.

2. China already submitted our preliminary position on technology transfer, which was included in the document FCCC/SBSTA/2000/MISC.2. This submission follows that one.

3. We endorse the G77 and China Position Paper on Development and Transfer of Technologies, which had been put on the table during SBSTA12. This submission mainly bases on this position paper, with some modifications and additions.

Possible Elements of a Framework for Meaningful and Effective Actions to Enhance the Implementation of Article 4.5 of the Convention

1. Technology needs and technology needs assessments

---Developing cooperative programmes through which financial and technical assistance could be provided to developing countries to conduct technology needs assessments.

---Technology needs assessments could include technology impact analysis, identifying and prioritizing technology needs, and building appropriate institutional and human capacity for sustainable technology transfer.

---Such programmes should evaluate local EST needs and coordinate stakeholders from both donors and developing countries in the technology transfer process.

---The outcome of these needs assessments could be a prioritized set of technology needs and a portfolio of climate technology activities for both mitigation and adaptation.

2. Technology information

---Information should be specific, case-study/project-based, and target at real-world problems with lessons learned.

---Establish, in each developed country, a one-stop technology transfer "shop" to coordinate and implement technology transfer programmes. These "shops" could assist with the preparation of projects and programmes to respond to prioritized EST needs for mitigation and adaptation.

---Develop inventories of available environmentally-sound technologies including those in the public domain.

---Establish specific information centers (clearinghouse) at international, regional and sub-regional levels.

3. Capacity-building for technology transfer

---Capacity-building activities which can most successfully help to achieve and sustain effective technology transfer are those which measurably utilize and enhance existing endogenous capacities and technologies.

---Technology transfer concerns not only so-called "hard technologies" , but also so-called "soft technologies" (e.g. know-how and practices)

---Transferring experiences, knowledge, skills, know-how and practices is of a great importance in capacity building;

---The assessment of existing capacities and the identification of gaps where capacity-building activities can be targeted is a critical step.

---Existing projects incorporating country-driven, multi-stakeholder assessments of technology needs provide a useful model in relation to the assessment of capacity-building needs, especially those closely linked to technology transfer;

---Capacity-building through international bilateral or multilateral activities is usually a two-way process resulting in the building of capacities on both sides, i.e. the host country as well as the donor countries or organizations themselves

---In practical terms, often the best way to build capacity is through demonstration or pilot projects.

---Capacity-building elements related to technology transfer that could be considered include assisting developing countries to:

- Identify technology needs;
- Improve organizations and institutions;
- Strengthen human resources;
- Overcome technological barriers; and
- Access to technology information.

4. Mechanisms for Technology Transfer

---Existing mechanisms are inadequate for the implementation of Article 4.5 of UNFCCC and innovative mechanism in the context of UNFCCC shall be established without delay.

---The purpose of the Mechanism for Technology Transfer (MTT) in the context of the Convention is to assist developing country Parties to obtain environmentally-sound technologies and know-how helpful to address climate change in non-commercial and preferential terms, thus contributing to the ultimate objective of the Convention.

---Such a Mechanism for Technology Transfer is an umbrella conception, through which the technology needs of developing countries can be identified, capacity and capability building can be enhanced, and the needed technologies and know-how can be transferred, operated, disseminated and maintained.

--- The most fundamental components for this mechanism are as follows:

Institutional mechanism, under which national focal points specific for technology transfer, an intergovernmental technical advisory body, and a unit in the UNFCCC secretariat shall be established, with their TORs to be addressed in detail.

Funding mechanism, under which a trust fund specifically for technology transfer shall be established. Funding sources can be from the Annex II Parties, international organizations, and multilateral development banks, etc.

A monitoring, reporting and evaluation system for the implementation of Article 4.5 of the Convention shall be established.

--- As the first step, a pilot phase for MTT in the context of the Convention shall be established. Under the pilot phase, those necessary institutions shall be set up. A specific amount of money shall be made available for pilot projects, which targeting at capacity building and transfer of ESTs to developing countries. Meanwhile, the monitoring, reporting and evaluation system will be operated in this regard.

5. Creating the enabling environment

Both developed and developing countries shall take actions to create an enabling environment for technology transfer.

Developed Countries

- Provide financial and technical assistance for developing countries to carry out needs assessments, including technology impact analysis, to identify and prioritize technology needs and develop a portfolio of climate technology actions for mitigation and adaptation;
- Develop and implement domestic programmes which discourage industries in Annex II countries from utilizing restrictive business practices. These efforts could also include reassessment of national development assistance programmes which promote tied aid;
- Remove restriction of transfer of advanced technologies proven climate sound;
- Enhance export credits and other instruments which provide incentives for the private sector to participate in the transfer of ESTs;
- Develop and implement domestic actions and incentives, e.g., ear-marked subsidies linked with development and transfer of ESTs, government purchase contracts, tax preferences, as well as appropriate regulations to promote the transfer of ESTs by the private sector;
- Purchase of patents and licenses on commercial terms for their transfer to developing countries on non-commercial terms, taking into account the need to protect intellectual property rights;
- Enhance or develop linkages between the climate technology related research and development communities and the official development assistance communities within donor countries with a view to delivering support more efficiently to developing countries;
- Examine options to boost the effectiveness of the private sector as an important and successful delivery vehicle for transferring technology for mitigation and adaptation technologies;

Developing Countries

Supported by the developed countries, developing countries may also make efforts to improve the enabling environment for transfer of technology. Some of the targeted efforts may be as follows:

- Identify and establish "focal points" to coordinate domestic technology transfer activities and actions related to the transfer of ESTs and develop a portfolio of climate technology actions (strategies) for mitigation and adaptation;
- Build public awareness and support for development and adoption of ESTs through development of effective standards and labelling programmes, consumer education, as well as documentation of the social, environmental and human health related benefits of ESTs;
- Develop regional and South-South technology transfer initiatives with an integration of appropriate assistance from developed countries;
- Enhance, develop and strengthen research and development programmes for ESTs and promote complementary policies for their diffusion;

PAPER NO. 3: GROUP OF 77 AND CHINA

**DEVELOPMENT AND TRANSFER OF TECHNOLOGIES
PURSUANT TO ARTICLE 4.5 OF THE CONVENTION**

The presentation of this position paper does not preclude further submissions to be made by the group as negotiations proceeds. G77 & China will like to have separate decisions made on Article 4.5 of the Convention and Article 12 of the Kyoto Protocol.

Basic Position and important issues:

1. CDM shall not be seen as a mechanism to implement Article 4.5 of the Convention.
2. Technology transfer should be put on a fast track in the same way as is being done for the other Convention/Protocol operational entities
3. A prioritized set of technology needs to be identified for each region or sub-region respectively with inputs from each country within the region/sub-region.
4. Inventories of ESTs, which have been tried and tested or are being developed, should be compiled with sufficient information to allow developing countries to make informed decisions on what is best for their peoples.
5. A technology transfer clearinghouse with national, sub-regional and regional linkages should be established to facilitate an access to information on technology, projects on technologies transferred and on financial sources.
6. Financial assistance should be provided to developing countries in order for them to create the enabling environment for private sector investment and to set up the internal mechanisms to prevent “dumping” of inefficient technologies and to ensure transfer of state-of-the-art ESTs.
7. Capacity building should be emphasized as a major need to allow for the development and transfer of technologies under Article 4.5.
8. An evaluation and monitoring mechanism should be put in place to assess the effectiveness of actions to be carried out to implement Article 4.5.
9. A fund should be established within the Convention financial mechanism to support capacity-building, information transfer, needs assessment and research and development in developing endogenous capacities to screen mitigation and adaptation projects for environmental friendliness and enhancement of commitments under the Convention.
10. South-south transfer of technology to be supported by developed country parties.
11. Some developing countries will have a priority for adaptation technology transfer while others will have a priority for mitigation technology transfer.
12. All Parties shall be involved in the creation of the enabling environment for technology transfer.
13. The critical role of the private sector in the Annex 1 and non-Annex 1 countries must be taken into consideration.
14. Research, development and demonstration projects are effective means for technology transfer.
15. Technology transfer should be approached in an integrated, country driven and coordinated manner.

16. The industrial sector (including SMEs) should be afforded access to information on available technologies and financial resources.
17. Monitoring, reporting, evaluating and assessing transferred technologies must be done on a continuous basis.
18. Education, training, public awareness and stakeholders' involvement are essential.

Possible Elements of a Framework for Meaningful and Effective Actions to Enhance the Implementation of Article 4.5 of the Convention

(The main sources are documents FCCC/SBSTA/2000/4, FCCC/SBSTA/1999/11, FCCC/SBSTA/2000/INF.2, INF.6 and MISC.2)

1. Financial Commitment for Technology Transfer

It is recognized that there must be a commitment by the Developed Countries to fund the programmes identified under Art.4.5. Also, all Parties must work towards a COP6 decision on a clear timetable to start the process of technology transfer such that ,by the time of COP7, the following milestones will have been achieved:

- Needs assessment
- Creation of necessary enabling environment
- Clearinghouse set up
- Capacity building needs identified and capacity building initiated
- Initiation of Pilot Projects

2. Technology needs and technology needs assessments

- Countries should be assisted to carry out their technology needs and needs assessment.
- Developing cooperative programmes through which financial and technical assistance could be provided to developing countries to conduct technology needs assessments.
- Technology needs assessments should include technology impact analyses, identifying and prioritizing technology needs, and building appropriate institutional and human capacity for sustainable technology transfer.
- Such programmes should coordinate the activities of stakeholders from both donors and developing countries in the technology transfer process.
- The programmes should evaluate local EST needs and barriers to technology transfer by providing for processes that include all stakeholders, for example, government, business, technical institutions, and NGOs.
- The outcome of these needs assessments could be a prioritized set of technology needs and a portfolio of climate technology activities for both mitigation and adaptation.

3. Creating the enabling environment

Both developed and developing countries shall take actions to create an enabling environment for technology transfer.

Developed Countries

- Provide financial and technical assistance for developing countries to carry out needs assessments, including technology impact analysis, to identify and prioritize technology needs and develop a portfolio of climate technology actions for mitigation and adaptation;
- Develop and implement domestic programmes which discourage industries in Annex II countries from utilizing restrictive business practices. These efforts could also include reassessment of national development assistance programmes which promote tied aid;
- Remove restriction of transfer of advanced technologies proven climate sound;
- Enhance export credits and other instruments which provide incentives for the private sector to participate in the transfer of ESTs;
- Develop and implement domestic actions and incentives, e.g., ear-marked subsidies linked with development and transfer of EST, government purchase contracts, tax preferences, as well as appropriate regulations to promote the transfer of ESTs by the private sector;
- Enhance or develop linkages between the climate technology related research and development communities and the official development assistance communities within donor countries with a view to delivering support more efficiently to developing countries;
- Examine options to boost the effectiveness of the private sector as an important and successful delivery vehicle for transferring technology for mitigation and adaptation technologies;

Developing Countries

Developing countries may also make efforts to improve the enabling environment for transfer of technology. Some of the targeted efforts may be as follows:

- Identify and establish "focal points" to coordinate domestic technology transfer activities and actions related to the transfer of ESTs and develop a portfolio of climate technology actions (strategies) for mitigation and adaptation;
- Build public awareness and support for development and adoption of ESTs through development of effective standards and labeling programmes, consumer education, as well as documentation of the social, environmental and human health related benefits of ESTs;
- Develop regional and South-South technology transfer initiatives with an integration of appropriate assistance from developed countries;
- Enhance, develop and strengthen research and development programmes for ESTs and promote complementary policies for their diffusion;

International Bodies

The GEF must initiate programmes to implement COP decisions under Art. 4.5. Some of the above actions may be conducted by developed and developing countries respectively, or jointly by both developed and developing countries and related intergovernmental organizations.

4. Capacity-building for technology transfer

- Capacity-building activities which can most successfully help to achieve and sustain effective technology transfer are those which measurably utilize and enhance existing endogenous capacities and technologies.
- Technology transfer concerns not only so-called "hard technologies" , but also so-called "soft technologies" (e.g. know-how and practices)
- Transferring experiences, knowledge, skills, know-how and practices is of a great importance in capacity-building;
- The assessment of existing capacities and the identification of gaps where capacity-building activities can be targeted is a critical step.
- Existing projects incorporating country-driven, multi-stakeholder assessments of technology needs provide a useful model in relation to the assessment of capacity-building needs, especially those closely linked to technology transfer;
- Capacity-building through international bilateral or multilateral activities is usually a two-way process resulting in the building of capacities on both sides, i.e. the host country as well as the donor countries or organizations themselves
- In practical terms, often the best way to build capacity is through demonstration or pilot projects.
- Strengthen existing regional institutions, taking into consideration country and sector specific peculiarities.
- Capacity-building elements related to technology transfer that could be considered include assisting developing countries to:
 - Identify technology needs;
 - Improve organizations and institutions;
 - Strengthen human resources;
 - Overcome technological barriers; and
 - Access to technology information.

5. Transfer of technology mechanisms

- Existing mechanisms are inadequate for the implementation of Article 4.5 of UNFCCC and innovative mechanism in the context of UNFCCC shall be established without delay.
- The purpose of the Technology Transfer Mechanism in the context of the Convention is to assist developing country Parties to obtain environmentally-sound technologies and know-how helpful to address climate change in non-commercial and preferential terms, thus contributing to the ultimate objective of the Convention.
- Technology Transfer Mechanism is an umbrella conception, through which the technology needs of developing countries can be identified, capacity and capability building can be enhanced, and the needed technologies and know-how can be transferred, operated disseminated and maintained.
- The most fundamental components for this mechanism are as follows:
 - Institutional mechanism, under which national focal points specific for technology transfer, an intergovernmental technical advisory body, and a unit in the UNFCCC secretariat shall be established, with their TORs to be addressed in detail.

- Funding mechanism, under which a trust fund specifically for technology transfer shall be established. Funding sources can be from the Annex II Parties, international organizations, and multilateral development banks, etc.

6. Technology information

- Information should be specific, case-study/project-based, and target real-world problems with lessons learned.
- Establish, in each developed country, a one-stop technology transfer "shop" to coordinate and implement technology transfer programmes. These "shops" could assist with the preparation of projects and programmes to respond to prioritized needs for mitigation and adaptation.
- Develop inventories of available environmentally-sound technologies including those in the public domain as well as technology transfer activities in the past or at present.

7. Monitoring, Reporting, Evaluation and Assessment

Technologies which have been transferred must be assessed on a continuous basis in order to verify its environmental soundness and to bring, to the attention of the COP, any information which will allow it to make informed decisions on future use of the technology or on modifications which will be necessary for making them ESTs.

PAPER NO. 4: JAPAN

General Comment

Japan has been implementing actively technology transfer addressing climate change through economic cooperation, in particular through official development assistance (ODA) and other official financing schemes. Furthermore, the private sector in Japan is also moving forward in its transfer of technologies through its business operations, focused on industry- and energy-related technologies such as energy conservation and fuel substitution technologies. The government is also actively promoting technology transfer by the private sector through its support and guidance measures.

Japan intends to continue this promotion of technology transfer and hopes to use such experiences to make active contributions to the framework for the promotion of technology transfer.

Japan's experience has proven that successful technology transfer, while being a complicated process, first begins with the cooperation of multiple stakeholders in both the developed and the developing country and requires efforts over an extended period for the technology transfer to take root. As pointed out in the consultative process, there is no "one fit for all measure" nor "magic bullet" for promoting technology transfer.

Technology transfer as provided for under the United Nations Framework Convention on Climate Change (UNFCCC) is the subject discussed so much. It is necessary to move quickly to decide upon a possible framework that enables effective and meaningful actions. On the one hand, in view of the complex nature of technology transfer, we should not make a quick-fix framework just to meet a deadline. We should instead adopt a step-by-step approach, making what we can do a reality, then reevaluating the situation and improving the setup over time.

With regard to financial source and financing mechanisms, Japan believes that it is most effective to, upon working out the bilateral and multilateral efforts which have been made since the entry into force of the Convention, undertake an evaluation of the situation, and improve any points to be improved.

Through the consultative process since COP4, there have emerged specific areas for consideration, such as technology needs assessments, technological information, enabling environments, and capacity building. In addition to the continued implementation of already-existing support efforts, it is necessary to examine areas of improvement and then go on to take actions which are considered feasible.

Basic Position

(1) Evaluation of activities to date (Chairman's notes, three regional workshops, IPCC special report)

The three regional workshops have contributed greatly to the consultative process. In addition, we believe that the IPCC report included appropriately-balanced analyses of a broad

range of items. The results of these activities could, along with the Chair's notes, form the basis for analyses to be undertaken in the future.

(2) Scope of targeted technology transfer

The target in advancing technology transfer should be broad in scope for the following reasons:

- (a) No clearly-defined criteria have been established for determining whether a given instance of technology transfer is one as defined in Article 4.5.
- (b) Technology transfer is conducted under a broad variety of stakeholders and the degree to which each instance of technology transfer is connected to climate change may also vary. Thus it is not feasible to determine whether any given instance of technology transfer is one as defined in Article 4.5.
- (c) Once the kinds of targeted technology transfer are defined too narrowly, cases of useful technology transfer being held back or prevented can be foreseen.
- (d) Both mitigation technologies and adaptation technologies are important to be transferred. It is vital to keep the balance between those two in the light of countries/region's needs.
- (e) There are many kinds of mitigation technology and adaptation technology which are beneficial not only for climate change but also for economic development in their ability to boost energy efficiency, strengthen the robustness of the agriculture and forestry sectors, and so on. There should be broad-based promotion of technology transfer of this sort.

(3) Basic points when considering possible elements of framework for the advancement of technology transfer

- (a) Bottom-up, country-driven approach.
Technology transfer needs is to be identified and formulated, adopting a bottom-up approach, by those who work in technology transfer in the field and know much about their problems and needs of each country/region/locality.
- (b) Needs assessment
It is necessary to conduct an assessment of each country/region's circumstances and its needs, and to follow these up by adopting appropriate approaches.
- (c) Insofar as there exist no means of quantitatively measuring the degree to which technology transfer has been achieved, it is both impossible and meaningless to evaluate countries' efforts in one set manner.
- (d) In consideration of the fact that measures to promote technology transfer are already underway in developed countries and that the content and setup of these approaches are quite varied, it is necessary to incorporate flexibility into the framework so that a framework would not constrain the efforts currently being undertaken.
- (e) It is not uncommon to take a long time before efforts to promote technology transfer actually bear fruit. Furthermore, for those efforts to take root, it is crucial for the recipient country to undertake sincere self-help efforts.
- (f) Technology transfer is a complex process involving a large number of stakeholders and thus it is necessary to allow a large number of stakeholders to participate in the process.

- (g) The private sector has a significant amount of resources relevant to technology transfer, including both technological know-how and human resources. Furthermore, in light of the fact that regeneration and dissemination within the country is possible via the process of commercialization and industrialization, the partnership of the private sectors in developed and developing countries is important in technology transfer. For this reason, the framework should bring about incentives to promote technology transfer by the private sector and not diminish the motivation of the private sector to participate.
- (h) The role of the government in the promotion of technology transfer by the private sector is important. Consideration could be given to various things such as the provision of information, the use of publicly-funded export credits and the like, harmonization of the term limits of patents, and the like. However these should be effected taking into consideration the conditions particular to each country.
- (i) Technology, as similar to capacity building, is not finalized only in a design plan. Wide-ranging related technologies and know-how in adjacent areas, institutional arrangement and human resource for quality control, supply of parts and materials, basic social infrastructure such as electric power supply and telecommunications supporting technology, wide ranging qualified human resources from the top of design to the down of production line and construction site are essential. Enhancing a piece of those resources do not give fruit of technology transfer, development of all those resources in a balanced manner. Efforts of both developed and developing countries should be allocated for this purpose, taking into account necessary environment and conditions thoroughly.
- (j) Know-how and techniques at manufacturing sites often serve as highly cost efficient climate change mitigation measures, rather than cutting-edge technology, which brings with it associated costs for related technology and social infrastructures. Appropriate balance should be struck.
- (k) Transferring cutting-edge technologies often faces difficulties in maintenance and dissemination, thus transferring appropriate technology that fit the situation of the transferred site is important.
- (l) Bilateral assistance rather easily fits the country driven needs. In addition, donor country takes advantage of well-matching recipient needs and donor supply, and of securing the resources for assistance. For this reason, bilateral assistance should play an important role. Coordination between bilateral assistance is inevitable to keep the balance of distribution of assistance and achieve efficient implementation.

Comments on proposed elements of framework

(1) Technology assessment and needs assessment

- Needs assessment is a fundamental element. Needs should be surveyed, investigated and prioritized to fit each countries' circumstances.
- To promote effective and substantial technology transfer, needs for technology transfer should be placed in the national development plans covering economic development, sustainable development and technology development in a consistent manner. For these purposes, required resources for receiving technology transfer should be allocated.
- Prioritization of needs assessment should take into account various factors including the magnitude of effects and cost effectiveness in climate change abatement, priority in

development agenda, condition and circumstances in recipient partner, and capacities for receiving assistance.

- Needs are to be assessed by the developing country itself on a country-driven basis in principle. It is important that the developed country assists the developing country to assess its needs, where necessary and appropriate.
- Assistance could be provided through either bilateral or multilateral channels. Coordination among those channels is vital to avoid duplication and to take into account the balance of geographical distribution. It is more desirable to keep coherence of methodology, scope and items to some extent in the assessment.

(2) Technology information

- Information on ESTs, such as overview, environmental performance and adaptability of EST in various circumstances in developing countries should be developed with enhanced accessibility and quality.
- On the other hand, technologies have been continuously developed and evolved, and commercialization and diversification to fit the needs have been carried out in the private sector. It might be useful to cover the new information, however, it is difficult to make a complete set of information covering whole range of technologies. In addition, heavy burden to private sectors may disturb information collection. It is necessary to keep the balance between coverage, completeness and practicality.
- Environment performance evaluation for each EST is important. To achieve this, it is essential to establish objectivity of the evaluation through full international consideration and coordination on methodology and its application.
- Information on good practices of past and on-going technology transfer and assistance projects for technology transfer is also essential. It is significant that such information is collected and accumulated with high accessibility through some mechanism. Japan has carried out a large number of technology transfer project at the governmental level and is ready to provide information on good practices.
- However, several existing institutions and organizations have already collected and provided such information to some extent. It is important to use such available information sources to a maximum, and then to consider what information is needed, and see whether and what new mechanism of information collection is necessary.
- For considering development and provision of information, current activities taken by the secretariat of the Convention as well as CTI should be taken into account.
- Japan would like to seek for clarification on the idea of "one stop shop" stated in the Chairman's note.

(3) Enabling environment

- Enabling environment which targets to remove various barriers in the recipient country is quite essential to promote technology transfer substantially. As summarized in the IPCC special report, barriers in enabling environment relates to various areas including governmental decisions such as legal institution, regulations and codes, policy and planning, subsidies, taxation, etc. and social factors such as investment risk, trade and commercial practices, intellectual property rights and its practice, etc.
- For enabling environment, sequence of efforts consisting of identification of barriers, analysis of identified barriers, considering options for improvement and implementation

of selected options should be addressed, and primarily the recipient country's government should play an independent and key role to address them.

(4) Capacity building for technology transfer

- Framework for capacity building should be basically considered by the group of capacity building. From the point of view in technology transfer, only necessary information focusing on actual needs and on specific aspects which may require coordination with technology transfer should be provided to capacity building consultative process.
- According to the result from consultative process for technology transfer, the following two areas should have priorities;
- Capacity building should be promoted for activities related to possible elements of framework on needs assessment, technology information and enabling environment.
- The Kyoto mechanisms are expected to have a potential to promote technology transfer especially in private sectors. Capacity building for formulating projects of the Kyoto mechanisms in developing countries and EITs should be encouraged.

(5) Mechanism for promoting technology transfer

- It is no doubt that dialogues and assistances taken in existing bilateral and multilateral mechanisms have been played and will play an important role for technology transfer basically. In addition to this, it should be taken into account the large potential for the Kyoto mechanisms of which details will be determined.
- Regarding the role of the GEF, as stated in the Japanese submission of 1999, new guidance to the GEF was given at the COP4 and the guidance should be evaluate in the GEF reviews to be held every four years, therefore it is too early to discuss on the role of the GEF for technology transfer.
- It is useful to consider the idea that the Party may report the activities related to technology transfer of Article 4.5 through its national communication, and, based on this, information is compiled to be utilized for promoting technology transfer after the in-depth expert review. In this case, such information should be analyzed in an objective and scientific manner, and actual barriers and their solutions should be identified in a concrete, fair and practical manner. It should be stressed that there is no quantitative and objective methodologies for measurement of effects of activities related to technology transfer. The role of such framework should be to encourage the Parties by identifying good practices rather than to try in vain quantify effects and achievements of their activities. It is important to promote this in cooperation with the GEF, OECD/DAC as well as OECD/CTI.

PAPER NO. 5: REPUBLIC OF KOREA

Development and Transfer of Technologies

I. Introduction

0 Technology Transfer as defined in Article 4.5 of the Convention and Decision 4/CP.4 (BAPA)

should focus on the actions which could be taken by the Parties in addition to what is already happening as business as usual in the market

in spite of the fact that the private sector and the market play the major role in disseminating (not exactly in the sense of Technology Transfer as defined in article 4.5) climate related technologies according to conventional economic paradigm.

0 The idea of government and public sector playing a leading role in making a framework for meaningful and effective actions (BAPA) to enhance the Transfer of EST Technology represents a new paradigm yet to be defined and designed taking into account the fact that market is playing a major role and that there is the need to protect intellectual property rights.

- Yet there are precedents and programmes in most developed countries already that address climate change R&D and demonstrations through public funding.

0 However, the challenge of climate change is unconventional and unprecedented that requires an unconventional and innovative New Paradigm: a framework for meaningful and effective actions by the parties of the convention in partnership with private sector.

0 In addition to the fact that unconventional challenges of climate change requires an unconventional New Paradigm, the fact that private sector and market, especially environment technology market, in developing countries are in many cases in its early stage of emergence and still remain inefficient, immature and imperfect in its function due to various reasons like lack of information, capacity building etc., makes conventional paradigm of relying only on private sector and market insufficient.

0 The focus of meaningful and effective actions by the governments of the Parties could be:

- How government can

- i) first, directly involve itself in the R&D and transfer

- ii) second, indirectly harness and facilitate the market and private sector for the development and transfer of ESTs.

II. Basis for New Paradigm Action

0 Basis for Direct Role of Government

- In view of the fact that government (public sector) directly sponsor Public R&D programmes, often in partnership with private sector,
 - * On average about 30-40% of total national R&D expenditure of OECD countries comes from public sector.
 - * Many developing country Governments also sponsor public R&D programmes.

Government could play leading role and involve itself in the development and transfer of ESTs which are supported by public R&D programmes.

- In many countries, governments set the rules and guidelines for the use, access, commercialization and licensing of publicly supported technologies.
 - Co-funding, joint venture and partnership with private sector is encouraged.
- Especially for ESTs whose commercial viability still remain uncertain, (such as fuel cell, solar energy and wind power etc.,)

Government is the main driver of the development and commercialization. First, by providing regulatory framework to create market and demand and second, by providing financial support for R&D.

- However, until now, public R&D programmes for ESTs are only supported as part of domestic policy goal (for industrial competitiveness, local environment protection) not as part of international environmental policy goal, yet (for Climate Change Technology Transfer cooperation) and no government yet integrated the goal of global cooperation for climate change Technology Transfer objective of Article 4.5 into its Public R&D Programmes, according to the country case studies sponsored by the Korean Government and implemented jointly by the UCTAD, UNEP, and UN/CSD and reported at the "Expert Meeting on the Role of Publicly-funded Research and Publicly-owned Technology in the Transfer and Diffusion of ESTs" in February 1998, Kyongju, Korea.

- Attempts are being made to integrate public R&D programmes with technology cooperation activities but they still remain far from integrating the climate change Technology Transfer goals into Public R&D Programmes.
- Therefore, there still remains considerable room for action by Government to integrate Technology Transfer Goals into Public R&D Programmes to stimulate technology transfer as defined in the Convention.. as recently reported in the IPCC Special Report on Technology Transfer

- Government role of financing EST R&D programmes could directly catalyze not only the Transfer of Technology but also especially promotion of capacity building in developing countries.

or indirectly used as leverage or as incentive for the promotion of positive participation and collaboration of the private sector

- Government also plays additional key role in creating Enabling Environment which includes; Capacity Building, Information, EST Need Assessment

- CONCLUSION:

Government can play a leading and direct role in the development and transfer of ESTs through financing of R&D programmes, not necessarily remaining merely as a bystander and only playing a supplementary role for private sector.

0 Basis for Indirect Role of Government in relation to Market

- For ESTs in general, Governments are
 - i) creating market and demand by providing regulatory framework for climate change.
 - ii) providing Incentives and Disincentives: fiscal, financial, etc.
 - iii) and playing prudential supervisory role for fair and efficient functioning of market (Ex. fair competition, certification, verification of ESTs)
- Therefore, Government could play an indirect enabling and facilitating role for technology transfer,
 - by providing appropriate necessary regulatory framework,
 - by providing financial and fiscal incentives for technology transfer, and
 - by providing prudential supervision for efficient functioning of market.

0 SPECIAL FEATURES of EST MARKET

* It is important to understand special features of EST market, in particular in developing countries, in order to fully harness the major role played by private sector and market for technology transfer.

- EST market in developing country is newly emerging and immature yet,
- EST are in many cases not standardized and fast changing; diverse with short life span that makes technology assessment difficult.
- S&M Enterprises in developing countries lack capacity to assess ESTs in the market and face difficulty in dealing with large MNCs marketing ESTs.
- Due to short life span of many ESTs, firms marketing ESTs are often likely to transfer outdated models & old technology to developing countries.
- Due to imperfect competition in EST market, firms marketing ESTs often try to maintain their monopolistic and dominant position by resorting to Restrictive Business Practice (RBP). S&M Enterprises in developing countries are vulnerable and difficult to get fair competition. Those firms are defenseless to these practices and accept unfair restrictive

conditions in the contract for licensing ESTs. It is necessary to review the terms of licensing of ESTs.

- Government and Public Sector are the major end user of EST in many developing countries. Thus Government and Public Sector are also a major player in the EST market.
- Newly emerging EST market and private firms require considerable Government and public sector support since the markets and the technologies are often new and not yet commercially viable.

CONCLUSION:

In spite of many peculiar features of EST market, especially in developing countries, no systematic attempt and analysis has been made to better understand and evaluate the functioning of the EST market.

Simply emphasizing the major role of private sector and market is not enough.

- They function in close cooperation with public sector and Government.

Systematic attempt to analyze empirical experiences and the special features of EST market in developing countries is necessary in order to harness the full potential of market and private sector for Technology Transfer.

III. Strategy for Action: Long-term Win-Win Partnership

- 0 Technology Transfer can be better promoted and sustained when mutually beneficial long lasting Win-Win Partnership is forged between developed and developing countries as well as between the public and private sectors.
- 0 Technology Transfer can provide the basis for long-term market development for the developed country since technology transfer requires long term partnership.
- Already some developed countries are using public R&D support for long-term market development, as in the case of wind power generation.
- 0 Technology Transfer should not be viewed only as a Zero-Sum Game where donors lose as much as recipients gain. It should be a Positive Sum Game where both sides win.
- 0 The more you transfer your technology, the more your share of market increases. (Case of Beta Max and VHS VTR technology and free distribution of internet and dot com web software)
- 0 Negative Perception of Technology Transfer (such as government intervention, losing/denial of IPR, Zero-sum game) should also be transformed into a positive perception (such as partnership and market development, Win-win formula).
- 0 In view of the Convergence of Views on Key role of Government and National System of Innovation, (IPCC Special Report on Technology Transfer)

Need to harness the potential of private sector and market,
Recognition of the major role of private sector and market,
And Need to recognize and protect IPR, producing a consensus for mutually beneficial long-term Win-Win Partnership for Technology Transfer between Developed and Developing countries is increasingly feasible, desirable and achievable.

IV. List of Suggestions for Action

A. Practical steps to promote, facilitate and finance, as appropriate, transfer of, and access to, environmentally-sound technologies and know-how. Which barriers are a priority and what practical steps should be taken? (BAPA)

0 Barrier:

- Negative perception about Technology Transfer(TT) is underlying fundamental barrier.
- The perception that TT is losing IPR and is a Zero-sum game hinders the progress.
- Negative perception makes it difficult for Government and private sector to actively promote TT.

0 Practical steps:

New Paradigm for Win-Win Partnership which could be mutually beneficial for both developed and developing countries should be explored and established as the basis for a framework for meaningful and effective actions to enhance TT.

New Paradigm should be based on

- key role of government / national system of innovation,
- harnessing the potential of private sector
- respect for IPR, and
- linkage of long term TT partnership, and
- increased Market Share / Market Development

B. Government & Public Sector Actions

1. Integrate the climate change technology transfer objective into the objective of public R&D programmes.
2. Widen the accessibility to public R&D Programmes for developing country participation by removing administrative and legal restrictions and by promoting expert exchange and training programmes.
3. Promote joint R&D programmes and joint patenting between developed and developing country and among developing countries both bilaterally and multilaterally.
4. Incorporate incremental expense for TT activity into the public R&D programme at the time of approving the budget for projects in the field of climate change to facilitate timely starting of TT activities.
5. Establishment of EST Bank or Centre: to Pool, share and exchange publicly funded ESTs which could be offered on a voluntary basis.

6. Strengthen the linkage between R&D community and Development cooperation Agency to facilitate developing country access to public R&D programmes: incorporate the TT activity for public R&D programmes into ODA Technology Cooperation Programmes

C. Financial Mechanism

- 0 Establishment of Revolving EST Investment Fund:
 - to finance EST TT projects and programmes and pay back to the fund from the proceeds of the projects through profit sharing.
 - This fund could be created in cooperation with multilateral organizations such as World Bank or Regional Banks.

D. Institutional Mechanism

- 0 Establishment of "Technology Transfer Advisory Panel" to monitor the progress and promote TT as subsidiary organ of SBSTA.

* Current SBSTA does not have the capacity to deal with detailed and technical issues of TT. Operation of Friends of Chair proved to be quite useful and testifies to the fact that SBSTA needs expert group on TT to deal with diverse and complex issues related with TT.

- 0 Establishment of Multilateral Joint Climate Change R&D Programme

In order to promote joint R&D among and between Developed and Developing Countries, Multilateral arrangement for joint R&D for climate change. This could be organized with the participation of Public R&D Institutes of Developed and Developing Countries and Financial Institutions.

E. Actions for Market and Private Sector

- 0 Promote efficient market functioning and Green Marketing by addressing Restrictive Business Practice (RBP).
 - Abuse of IPR
 - Old Technology Dumping by supporting Technology Assessment, R&D, Commercialization Market Development
- 0 Launch systematic Analysis to monitor and evaluate functioning of EST market in developing countries to better understand peculiar features of EST market and address problems(RBP, terms of licensing, etc.), and to promote efficient market functioning especially focusing on the difficulties faced by S&M Enterprise in developing countries in accessing and licensing ESTs.

PAPER NO. 6: PORTUGAL, ON BEHALF OF THE EUROPEAN COMMUNITY AND
ITS MEMBER STATES

DEVELOPMENT AND TRANSFER OF TECHNOLOGIES

Introduction

1. Portugal, on behalf of the European Community and its Member States, would like to submit their views on a framework for implementation of meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention, as requested in the conclusions of the Subsidiary Body for Scientific and Technological Advice (SBSTA) at its twelfth session. The EU notes that the earlier deadline of 30 June 2000 for submissions, rather than 15 July 2000 as agreed at SBSTA 11, has given Parties a very limited time to consider the discussions at SBSTA12 before making their submissions.

General remarks

2. The EU has welcomed the progress of the consultative process on the development and transfer of technologies that was established in the Buenos Aires Action Plan (Decision 4/CP.4). The EU has actively participated in and provided funding for this process.

3. In taking forward the consultative process, the EU wishes to emphasise three important elements. First the submissions by Parties in response to decision 4/CP.4. Secondly, the three regional workshops and the outputs from them. Thirdly, the Intergovernmental Panel on Climate Change (IPCCC) Special Report on Methodological and Technological Issues in Technology Transfer. These three important elements are acknowledged in the Note by the Chairman on *Possible elements of a framework for meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention* (FCCC/SBSTA/2000/4, paragraph 2).

4. As part of the consultative process the EU has already provided two submissions (see documents FCCC/SBSTA/1999/MISC/Add.1 and Add.2). This submission should therefore be considered alongside the EU's earlier submissions.

5. The consultative process and the IPCC Special Report have clearly demonstrated that there are no easy or simple solutions to ensure technology transfer. Barriers and needs vary from country to country and from region to region as well as from sector to sector. Identification of needs and prioritising them should therefore be country-led, so that actions can be tailored accordingly.

6. Also there are many different stakeholders, all of whom have a role to play. Effective technology transfer will clearly require partnerships between the various stakeholders. Governments have a clear role to create the right enabling environment but action by Governments alone will not suffice. The EU wishes to emphasise the importance of the private sector in ensuring successful technology transfer. The transfer of technology can only be considered to be successful if the technology has been successfully introduced and adapted as necessary to local circumstances.

Regional Workshops

7. The EU welcomed the opportunity to discuss technology transfer offered by the three regional workshops that were held in Africa, Asia and the Pacific and Latin America and the Caribbean. As already mentioned, the EU has actively participated in and provided funding for this process. The EU has noted the reports of the workshops contained in documents FCCC/SBSTA/1999/11, FCCC/SBSTA/2000/INF.2 and INF.6. These reports contain valuable information, covering the specific concerns of each region and Parties require time to study them, particularly as the report of the third workshop has only been available recently. It also needs to be borne in mind that the reports make clear that they do not contain any assessment of the strengths and weaknesses of any of the proposals. Nor do the reports give any indication of the amount of support or consensus for each proposal at the workshop, i.e. whether it had the support of all those who attended or whether it was only mentioned by one person with no or limited discussion.

Intergovernmental Panel on Climate Change (IPCCC) Special Report on Methodological and Technological Issues in Technology Transfer

8. The EU welcomes this valuable report on technology transfer which was prepared by IPCC in response to a specific request from SBSTA. The Report was produced by over 180 experts from a range of disciplines representing all regions of the world. The Report also underwent two rounds of extensive review. The Report addresses the issue of technology transfer in a broad manner, looking at all aspects of the various processes that result in the development, application and diffusion of technology.

9. The IPCC regards this Special Report as the most comprehensive and thorough assessment of the scientific and technical literature that is currently available on technology transfer. The final version of the Special Report was made available to Parties at SBSTA 12 and IPCC made a presentation of the Special Report in the informal meetings before SBSTA 12. The EU considers that Parties should be given as much time as possible to study the Special Report and would welcome a full consideration of the report, with a question and answer session at SBSTA 13. (The EU considers that the presentation at SBSTA 12 of the IPCC Special Report on Land Use, Land Use Change and Forestry to have been useful and suggests that a similar format is followed). We would propose to include in such a session short presentations by UNEP and UNDP on recent activities in the area of technology transfer.

Friends of the Chair

10. The EU welcomed the opportunity to participate in the consultative process through membership of the SBSTA Chairman's informal 'Friends of the Chair' meetings. These meetings provided a practical means to engage interested Parties and helped to develop a better understanding of the issues, difficulties and potential ways forward. The EU also welcomed the SBSTA Chairman's offer to all Parties to attend Friends of the Chair meetings during SBSTA 12, making it clear that the meetings were both open and transparent.

Possible elements of a framework for meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention: Note by the Chairman (FCCC/SBSTA/2000/4)

11. The Note by the Chairman provides a helpful synthesis of views submitted by Parties although it does not cover the IPCC Special Report. During SBSTA 12 a number of meetings of the Friends of the Chair were held which helped to clarify the current status of the consultative process and discuss possible elements for a framework. The discussions focused on proposed themes and the elements of those themes (i.e. 'what') and we now need to move on to discuss activities (i.e. 'how'). The main themes identified in the Note by the Chairman together with 'Enabling Environments' as discussed at SB12, and the broad areas that the EU considers they should cover, are given below.

12. When discussions are held on the detailed elements of a possible framework of future action, there is a clear need to understand the existing state of play and realistic options for action. A large number of actions are already underway, in both developed and developing countries, which enhance technology transfer. Also the majority of technology transfer occurs via the private sector. We therefore need to build on existing capacity, institutions and mechanisms and prioritise actions if we are to make progress.

Elements for a Framework

13. The consultative process and the IPCC Special Report have clearly demonstrated that there are no easy or simple solutions to ensure technology transfer. Barriers and needs vary from country to country and from region to region. Any proposals need to maintain a balance between adaptation and mitigation and adopt a flexible framework and approach. Decisions on technology transfer should be based on a bottom-up, country driven approach which takes account of national circumstances.

Technology needs and needs assessments

14. Identification of needs and priorities should be country-led and actions tailored accordingly. Assessments should cover both mitigation and adaptation technologies and 'hard' and 'soft' technologies and lead to a dialogue of all relevant stakeholders. Information on technology needs should be provided through the communications of non-Annex I Parties.

Technology Information

15. This theme covers the whole range of information; access, availability, quality and comparability and includes both public and private technologies. The EU welcomes the ongoing work by the Secretariat to develop technology web pages and a pilot project on a technology co-operation project inventory including both mitigation and adaptation technologies. The consultative process should also draw on the large amount of information already available from a number of sources, i.e. the Commission on Sustainable Development (CSD-UNGASS), other UN bodies like UNCTAD, the UNEP Industry and Environment Office (UNEP IE) and UNIDO, the International Energy Agency and the World Bank. Other initiatives underway should also be evaluated.

Enabling Environments

16. The EU considers that there is a major role for governments, in both developed and developing countries, in providing an enabling environment for effective technology transfer. This covers a wide range of actions from making commercial markets for environmentally-sound technologies work more effectively to ensuring a wide range of government policies help to encourage technology transfer. One option is to organise further networking amongst private and public stakeholders to help strengthen capacity for technology transfer, at the national level and possibly also to the regional level. Also sustainable technology transfer can be achieved alongside infrastructure development programmes, either multilateral, bilateral or national, and greater co-ordination should be considered.

Capacity Building

17. Capacity building for developing countries is a wider issue than technology transfer alone and as such will be covered as a separate agenda item at both SBSTA 13 and COP6. However, identification of specific technology transfer related capacity building needs will be helpful in deciding a framework for meaningful and effective actions. For example, identifying barriers, adaptation of technologies to local conditions, and strengthening human and institutional resources. Capacity building should be driven by developing countries themselves in partnership with developed countries. Developing local capacities to adapt technologies to local conditions and maintain and develop that technology locally is essential.

18. The Global Environment Facility's (GEF) Capacity Development Initiative is an important process that could provide further elements for technology transfer related capacity building in developing countries.

19. One option is the greater integration of developed and developing country priorities on technology transfer into research and development programmes. Capacity building activities for technology transfer should be integrated into other capacity building activities, based on an assessment of existing human and institutional resources and could take the form of sectoral and sub-regional approaches.

Transfer of Technology Mechanisms

20. The Chairman's note on possible elements of a framework acknowledges that there is a wide divergence of opinion on what mechanisms are appropriate for technology transfer. Some mechanisms already provide support for technology transfer, such as the Global Environment Facility (GEF). The EU recognises the importance of co-ordination of existing sources of funding, offered by the GEF, multilateral and bilateral development programmes. A way to achieve this could be through improving availability of information on existing activities, based on information provide by the National Communications of the Parties. Another existing mechanism is the Climate Technology Initiative (CTI) which held two seminars alongside two of the regional workshops. Reports of these CTI workshops are contained in documents FCCC/SBSTA/2000/INF.2 and INF.6. We are open to discussions about the future role of the CTI.

21. Parties could consider how to strengthen technology transfer within existing multilateral and bilateral development co-operation programmes.

22. Policies such as co-operation programmes which promote research and innovation for the adaptation of technologies for developing countries, in particular least developed countries, should be considered.
23. Adaptation technologies of regions prone to desertification and drought should also be considered, in particular the possible transfer of drought and salt resistant plants.
24. The EU wishes to underline the potentially significant role of the Clean Development Mechanism (CDM) as a vehicle for technology transfer.

Future meetings

25. The EU welcomes the informal consultations on technology transfer planned for August 2000. The EU also supports the SBSTA Chairman's decision to establish a contact group on technology transfer at SBSTA 13 in September 2000, with a view to taking decisions on a framework for meaningful and effective actions on technology transfer at the sixth Conference of the Parties in November 2000. The EU emphasises its willingness to engage in this continuing debate on technology transfer and looks forward to the further dialogue on this issue.

PAPER NO. 7: SWITZERLAND

Implementation of Article 4.5 of the Convention

In response to the call at the twelfth session of the SBSTA concerning a framework for implementation of meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention, Switzerland presents the following views.

1. The transfer of environmentally sound technologies to address mitigation of greenhouse gas emissions and adaptation to negative impacts of climate change should take place in relation to specific needs identified by developing countries.
2. The IPCC Special Report on technology transfer has identified a number of actions in both developed and developing countries that would allow improve the flow of environmentally sound technologies.
3. The IPCC Special Report on technology transfer notes the crucial role that capacity building plays in all aspects of technology transfer. Improvement of institutions and human resources issues should be addressed and given appropriate consideration.
4. Among other sources, the national communications of both Annex I and non-Annex I Parties are important means of identifying technology and technology information relevant to climate change. However, the identification of these technologies should not result from a theoretical exercise, but should result from real needs and should support the implementation of national strategies and national plans to combat climate change elaborated by each Party. In our view, the emphasis should be put on : assessment of experience of both Annex I and non-annex I Parties; assessment of emerging technologies; and building capacity to transfer technology.
5. In order to assure a successful transfer of technology, a number of elements should be taken into account, among which:
 - the national communications should correspond to a real national process for the elaboration of a national strategy to combat climate change in which all stakeholders have taken part; barriers to the implementation of the Convention should be removed;
 - no pressure of technology lobbies should interfere in the process of identifying technology needs;
 - human and institutional capacity building programmes should accompany the transfer of technology in order to assure sustainability;
 - the process of identifying technology needs should be decentralised and take into account real existing demand of local populations and of the economy;
 - a reform of the framework conditions for facilitating the transfer of technology and the removal of barriers should accompany this process;

- the private sector should be the driving force of the initiatives of technology transfer; Parties should create the appropriate framework conditions to accelerate this process.

6. The Global Environment Facility (GEF) is one important player for technology transfer. We are convinced that in its learning process, GEF is now able to include the lessons learnt in transferring technology. It is also able to take into account the specific national circumstances of non-Annex I Parties in order to assure sustainable technology transfer. To that purpose, the GEF should consider as a priority the identification of project concepts where social, environmental and economic benefits (locally and globally) could be combined and result in a win-win exercise.

7. Other sources of experience for technology transfer are the Cleaner Production Centres (CPC). An assessment of their experience would yield valuable information on elements for successful technology transfer.

8. A successful framework for technology transfer under the Convention should ensure that:

- identified needs for capacity building in developing countries are appropriately taken into account;
- existing experience, e. g. GEF and CPC, is taken into account;
- information is made available to the different stakeholders in developing countries on opportunities in mitigation and adaptation measures, availability of technologies and capacity building;
- technology transfer is integrated in existing mitigation and adaptation strategies and projects in private and public investment;
- financing mechanisms for technology transfer are identified.

PAPER NO. 8: TRINIDAD AND TOBAGO, ON BEHALF OF THE
ALLIANCE OF SMALL ISLAND STATES (AOSIS)

Consultative Process on Development and Transfer of Technology

Possible elements of a framework for meaningful and effective actions to enhance the implementation of Article 4.5 of the Convention

Introduction

AOSIS have made several interventions and submissions on development and transfer of technology. The following points serve to reiterate the AOSIS position and also contribute to the consultative process on development and transfer of technology under Article 4.5 of the Convention, under the broad areas outlined in document FCCC/SBSTA/2000/4. It is strongly linked to ongoing discussions on capacity building and implementation of Articles 4.8 and 4.9 of the Convention, particularly as these articles relate to the vulnerability of Small Island Developing States to climate change.

AOSIS is concerned about the need for these and other Convention processes to pay particular attention to the vulnerability of Small Island Developing States, and therefore stresses the need for adaptation technology and know-how in conducting vulnerability assessments.

1. Technology needs and technology needs assessments

- Need for Asoft technologies@ used in developing local and regional climate models, or other appropriate methodologies that could be developed with the IPCC, that will serve to reduce the uncertainty on vulnerability issues;
- Need for development of capacity and know how in Climate Change Impact Assessments across all sectors so that cross-cutting issues can be simultaneously addressed, particularly in those sectors important to Small Island Developing States identified in sustainable development objectives as outlined in the Small Island Developing States Programme of Action (SIDs PoA);
- Need for continuous assessment of vulnerability and adaptation options to avoid implementation of maladaptation options and costly remedial measures. This would also serve to adjust adaptation needs as uncertainties in climate change are addressed, and provide guidance on accelerated adaptation implementation as needed.

2. Technology Information

- Establishment of an international Technology Information Network involving public and private sector players to enable access to, and discussion of, adaptation and other climate technologies including mitigation among all parties on a continuous and sustained basis. This could be linked to the Small Island Developing States Network (SIDSNet) for more effective delivery to Small Island Developing States;
- Development of in-country network of institutions in public and private sector in climate change technologies and engender discussion on needs across sectors;

3. Capacity building for technology transfer

- Establishment and development of in-country networking and dialogue on technology needs and capacity gaps;
- Establishment of academic programmes in relevant national and regional institutions, including climate change curricula development and teaching, at all levels, but particularly at the tertiary level. Such programmes should also include relevant research components across all sectors at the post-graduate level that would involve active interaction with suitable institutions in the developed countries that are working on similar research issues. This would serve to assist in a continuous and sustained process for capacity building and technology transfer;
- Enhancement of existing endogenous capacities and technologies, including south-south cooperation and collaboration, especially among Small Island Developing States;

4. Transfer of technology mechanisms

- Establishment of regional and sub-regional Climate Change Centres that will serve as a clearing house on all aspects of climate change including technology and technology transfer. Such institutions will be in continuous liaison with relevant national, regional and international institutions involved in technology research and development, both in the private and public sectors. These Centres will also be able to serve as quality control nodes and will advise on adoption and operation and maintenance;
- It is possible that some developing countries, least developed countries and small island states may be ahead in the institutional arrangements that will allow for development and transfer of technology. In such cases, it is therefore proposed that priority be given to addressing the institutional and capacity development of such countries to accelerate their involvement in the process. Much can be gained in the encouragement of south-south collaboration on this as many developing countries experience similar problems. Such collaboration can also inform the creation of various aspects of an enabling environment to facilitate development and transfer of technology.

AOSIS encourages the implementation of the Kyoto Protocol and the Clean Development Mechanism. However, AOSIS does not accept the notion that the use of the CDM will be the primary tool in implementing Article 4.5 of the Convention. While the CDM may assist technology transfer in the future, article 4.5 is a Convention commitment that urgently requires implementation now. Implementation of article 4.5 in the manner suggested by AOSIS will set in place the necessary mechanisms and institutions within which the CDM could very quickly become operational on the aspect of technology transfer.

PAPER NO. 9: UNITED STATES OF AMERICA

UN FRAMEWORK CONVENTION ON CLIMATE CHANGE ON A FRAMEWORK FOR MEANINGFUL AND EFFECTIVE ACTIONS TO ENHANCE THE IMPLEMENTATION OF ARTICLE 4.5 OF THE UNFCCC

Introduction

The United States is committed to working with developing countries and countries with economies in transition to advance cost-effective technology solutions to the global challenge of climate change. The U.S. government has a strong track record in the design and implementation of environmental technology transfer activities worldwide, has participated actively in the technology transfer Consultative Process under the UNFCCC, and intends to continue working with Parties to achieve an effective framework for enhancing the transfer of environmentally-sound technologies (ESTs).

The regional workshops organized by the secretariat as part of the Consultative Process have been instrumental in bringing Parties together to discuss transfer of ESTs in a constructive atmosphere with the benefit of the expertise of participating technical experts, private sector practitioners, non-governmental organizations and intergovernmental donor organizations. As a result, the process is helping Parties to achieve the overarching objective of reaching a consensus regarding the key principles and activities related to enhancing implementation of Article 4.5 of the Convention.

The Consultative Process has been greatly enhanced by the information provided by the IPCC, whose Special Report on Technology Transfer has helped to define the issues, as well as to provide guiding principles, borne out of the knowledge, expertise, and first-hand experience of many people and organizations throughout the world that have dealt with this issue. As the IPCC Special Report noted, technology transfer involves many actors, and accordingly, a framework for technology transfer should recognize and build upon the many vehicles for and forms of technology transfer, including bilateral assistance, multilateral organizations and financial institutions, regional organizations, private sector transactions, and the efforts of NGOs and academic and research institutions.

Through the Consultative Process, Parties have had the opportunity to clearly articulate their views regarding the issue of technology transfer in the context of the UNFCCC. For instance, there has been a clear indication that technology transfer for adaptation to the impacts of climate change, as well as for purposes of mitigation, is a major concern for many countries and must be addressed. Many countries have also spoken to the challenge posed by a lack of access to information regarding potential opportunities for technology transfer. Additionally, by presenting and discussing experiences and perspectives, countries have gained a more complete understanding of the type and degree of effort that is needed to support and sustain successful technology transfer initiatives.

The U.S. looks forward to the development of technology transfer approaches that are informed by the IPCC Special Report, build on experiences to date, and are responsive to the various needs and concerns identified through the Consultative Process. The lessons learned during this process should inform the evaluation of existing bilateral and multilateral programs of technology transfer. These approaches should be consistent with the relevant

provisions of the Convention, and should focus on improving its implementation. In order to develop sustainable flows of technology, the approaches should work to harness market forces by actively involving the private sector, to the maximum extent possible.

This paper addresses ways in which Parties can learn from and build upon existing activities, and from the Consultative Process, to advance the spirit and intent of Article 4.5 and other technology transfer-related provisions of the United Nations Framework Convention on Climate Change (UNFCCC). It begins by outlining several broad principles for successful transfer of ESTs and then provides initial U.S. views on the possible elements of a framework for improving implementation of technology transfer under Article 4.5 of the Convention. It then considers objectives of actions to enhance the implementation of Article 4.5 and possible elements of a framework.

Principles

In considering our experiences in technology transfer activities, the IPCC Special Report on Technology Transfer, and the information provided throughout the Consultative Process, the United States has identified several key lessons and principles which are relevant to potential technology cooperation approaches under the UNFCCC, including means to enhance implementation of Article 4.5:

1. Technology transfer includes both “soft” and “hard” elements of technology transfer. Specifically, in addition to equipment that controls, reduces or prevents anthropogenic emissions of greenhouse gases, the term “transfer of technology” encompasses practices and processes which support the adoption, maintenance and use of such equipment and can include capacity building, information exchange, training and research.
2. As we move to complete the Consultative Process, we should be guided by the language of Article 4.5 of the UNFCCC, which states, “The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally-sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention.” This Article suggests that while particular focus is given to the transfer of technology to developing countries, a framework for effective action should consider ways to promote technology transfer between all Parties. Moreover, technology transfer must be aimed at helping Parties meet their specific commitments under the Convention.
3. Private sector participation will be critical to any technology transfer programme. The private sector supplies most climate-friendly technologies around the world and can provide much of the human and financial capital for effective deployment. Government resources should be used to catalyze other investment in partnership with the private sector and other stakeholders.
4. Technology cooperation must be implemented in accord with country priorities.
5. Successful technology cooperation approaches must include development of in-country enabling conditions and capacities to achieve sustainable markets for environmentally-sound technologies (ESTs).

6. An integrated approach involving government agencies, private enterprises, international donors and other key stakeholders can address the technology needs of developing and transition countries most effectively.

Objectives

1. **Access to Information:** Access to accurate and useful information about both hard and soft technologies, and opportunities and resources available for technology transfer, is an important contribution to the transfer of ESTs between countries, especially to developing countries and countries with economies in transition. Broad efforts to improve access to information can have major benefits in improving the capacity of developing countries to address technology options and needs. Likewise, provision of information on technology needs can stimulate and focus the interest from suppliers of ESTs, including donor organizations and the private sector.
2. **Capacity building** in developing countries and economies in transition in the form of knowledge, techniques and management skills for the transfer of ESTs can assist the long-term successful adoption and dissemination of transferred technologies. Local capabilities to understand, operate, maintain and disseminate technologies should be enhanced as part of the technology transfer process. This applies to both mitigation and adaptation technologies.
3. **Technology needs assessments** must reflect the specific needs and situations of individual countries. Care must be taken to avoid a “one-size-fits-all” approach. For this reason, the successful transfer of ESTs begins with a country-driven process to establish national priorities for technology transfer. These priorities should be defined through a transparent, flexible approach that takes into account different national circumstances and the existing level of development and expertise.
4. **Multi-Stakeholder Involvement:** The successful transfer of ESTs requires a multi-stakeholder approach, which includes both the private and the public sector. Key stakeholders include developers, owners, suppliers, buyers, recipients and users of technology (such as private firms, state enterprises, and individual consumers), financiers and donors, governments, international institutions, NGOs, and community groups.
5. **Adaptation Technologies:** Recognizing that efforts to mitigate GHG emissions are unlikely to entirely avert human-induced climate change, the United States supports the inclusion of adaptation technologies in the discussions on technology transfer. Parties should be responsive to the message expressed by numerous participants during the Consultative Process that a framework for transfer of technologies should address adaptation to, as well as mitigation of, climate change. In doing so, Parties should take into consideration that there are several features unique to adaptation, including the following:
 - The most appropriate technologies for adaptation may often be indigenous technologies. Technology transfer between and within regions sharing similar characteristics (e.g., small island coastal ecosystems) may be particularly effective. Accordingly, South-South technology transfer can be expected to play an important role in adaptation.

- Market-based approaches may be less effective in the area of adaptation, where there is often less incentive for private sector engagement.
- Transfer of technologies for adaptation under the UNFCCC should make every effort to distinguish between calls for adaptation to natural climate variability and human-induced climate change. While there is clearly overlap and synergy between the two sets of issues, the focus of adaptation technology transfer under the UNFCCC should be on including the consideration of long-term, human-induced climate change in national planning and adaptation processes.
- For the most part, the impacts of climate change are not projected to be most strongly felt for several decades. Thus, much of the focus of current adaptation efforts should be on capacity building, information sharing, planning for resilience and sustainability, and perhaps prediction of climate change impacts.
- Adaptation is being addressed within at least two other groups under the current climate change negotiations, and our considerations must take these into account in order to avoid duplicating these efforts.

6. **Enabling Environment:** The proper enabling conditions are necessary for transfer of relevant climate-friendly technologies. These should be addressed in all countries and in some cases internationally. As the IPCC Special Report indicated, in most countries, the private sector is the primary vehicle for transfer of technology among and within countries. Any action taken in the context of Article 4.5 must leverage, rather than be isolated from, the existing and potential commercial flows of technology and finance. Government resources and regulations should be used and designed to catalyze private investment in the transfer of ESTs. The enabling environment includes broad policy and institutional conditions, such as protection of intellectual property rights, legal contracts, and energy pricing. It also includes targeted approaches to barriers to create enabling conditions relative to specific technologies or technology areas.

7. Governments should strive to build climate change considerations into national development strategies.

8. Finally, our efforts under technology transfer must be mindful of the issues under consideration in the ongoing negotiations on capacity building, adaptation and the Kyoto mechanisms, in order to avoid wasteful duplication of efforts with the limited resources available to address climate change.

Possible Elements of A Framework

Technology Information

Through the Consultative Process and in other discussions of technology transfer it has been made clear repeatedly that there is a need for increased access to information to facilitate technology transfer. This need must be addressed as one element of a framework if it is to be effective in enhancing the transfer of ESTs. This element includes improving user-friendly access to the wealth of information already available on the Internet, but which is often

difficult to locate and assess. It should also include efforts to identify gaps in existing information worldwide and provide a systematic effort to fill those gaps.

Enhanced information provision should include information on activities, opportunities and services available for technology transfer, as well as information on the identification and prioritization of countries' technology needs. This information should include activities and services of governments, international organizations and financial institutions, regional and sub-regional organizations, NGOs, the private sector, and academic and research institutions. Additionally, high-quality information on both mitigation and adaptation technologies should be easily accessible. Information ideally would be available regarding not only the technology itself, but its overall performance, its ability to adapt to local conditions, and on additional impacts that the technology might have, such as ancillary benefits with respect to the local environment, if possible. The provision of this information on ESTs and their associated benefits could help secure support and acceptance for their adoption. This information may be coordinated with other education and outreach efforts related to issues such as climate change, sustainable development, and the environment

One initial response to this general concern about access to information has been the effort by the UNFCCC Secretariat, with cooperation of the United States and Climate Technology Initiative (CTI), to enhance its technology webpage to help Parties and other stakeholders access technology information and services available on the Internet. Preliminary efforts have been demonstrated and discussed in two of the regional workshops and also in the informal meeting on the Consultative Process held in Bonn in June 2000. The United States will continue to support this effort through CTI as an element of its multilateral work programme. We envision that this effort will improve information on successful models of cooperation, and available technologies and services including those resulting from South-South exchange. Another useful example of information provision for technology transfer developed by the Secretariat is its webpage on issues related to adaptation to climate change.

The technology webpage effort should be continued and expanded in a framework to enhance technology transfer. The existing effort could be used as a prototype for the establishment of a broader clearinghouse to improve information access for developing and other countries on existing technology assistance programmes as a useful means of disseminating information on ESTs. Such a clearinghouse can also provide donors and private investors with information on countries' technology needs and opportunities. It should be noted that the current effort has only begun to identify, catalog and incorporate existing clean technology information and programmes on the Internet. This should be a major initial focus of any clearinghouse effort.

The U.S. does not believe that an effort to create a new "inventory of ESTs" is valuable in the context of the climate change Convention. In fact, previous work by the Secretariat in this regard has resulted in an "inventory of inventories" rather than one consolidated database. There are many partial and overlapping databases or inventories of ESTs already available. A more useful approach is the creation of specialized search functions which allow users to find information across many of these databases with a single search. Prototype work on this type of tool is being done by the Secretariat, in cooperation with the CTI and the U.S. As in many other areas, there is a need to provide better access and coordination of existing information. Then it may be possible to identify gaps in the inventories, which should be filled by collecting new information.

Technology Needs Assessments

Successful transfer of ESTs should begin with a comprehensive assessment of technology needs and priorities. These should be assessed and reported in a systematic and transparent manner, such as through Parties' National Communications. Needs assessment should be driven by in-country stakeholders, and should include sector-specific information, as well as information regarding both adaptation and mitigation technology needs. In addition, the assessments should encompass both hard and soft technology needs. Responding to the call from developing countries that a better understanding of their technology needs and of how appropriate technology choices can further their sustainable development priorities, developed country Parties have begun to assist, in selected cases, developing countries' efforts to conduct sectoral mitigation and adaptation technology needs assessments (to the extent resources can be made available), including the identification of any institutional, market, or other barriers, and how any such impediments might be eliminated. This effort should be continued as one element of a framework to enhance technology transfer. Such needs assessments should be country-driven, implemented in accord with developing country priorities, reflect local circumstances, and involve multiple stakeholders in a transparent process that would produce a limited and specific set of technology priorities. Some participants in the Consultative Process have expressed interest in conducting regional needs assessments, which may be particularly effective for some regions. Further, to be meaningful, technology needs assessments must be incorporated into an integrated approach which includes a specific plan of actions necessary to attract financial and technical support from various stakeholders, including bilateral and multilateral sources.

Existing bilateral and multilateral programmes and projects can be targeted toward working with national governments and other groups to develop technology needs assessments. The US Government's support of the Technology Cooperation Agreement Pilot Project (TCAPP) is a leading model of bilateral cooperation which includes a strong country driven needs assessment component, linked to other elements to form an integrated technology strategy. This model has received considerable attention in the regional workshops and in the IPCC Special Report. In addition, the multilateral Climate Technology Initiative already provides assistance with technology assessments, analysis and strategy. This proposed element of the Framework should incorporate and build on these successful beginnings in addressing the needs assessment element.

Capacity Building

During the Consultative Process, there was widespread consensus among Parties recognizing that capacity building is an essential part of technology transfer. True capacity building goes beyond past practices of installing "turn-key" projects. To be effective, it must involve helping to create local and regional infrastructure that integrates cultural values, technologies, capital stock, technical skills, regulatory mechanism and financing to supports a sensible and readily accepted approach to achieving sustainable technology transfer. At the same time, capacity building for technology transfer in the UNFCCC context will need to be justified on the basis of specific goals and requirements aimed at meeting the objectives of Article 4.5. It is also essential that capacity building for technology transfer be connected to an integrated approach for implementation of clean technology investments and establishment of sustainable markets. Otherwise, as experience has shown, there is a clear danger of engaging

in capacity building activities in isolation, which are not effectively applied to practical objectives.

Successful technology transfer activities enhance skills of enterprises in the installation, operation, maintenance and adaptation of specific technologies, and broaden understanding of methodologies for evaluating alternative technological options. This can include training for employees of companies in select industries, creating opportunities for business-to-business exchanges, and sponsoring business incubators. One of the strengths of the private sector's role in technology transfer springs from the fact that it has incentives to build capacity and transfer soft technologies necessary to ensure the success of its business ventures.

Capacity building can be enhanced by building climate change considerations into national development strategies. Integrating climate change into the planning of future projects and programmes is a way of ensuring long-term climate-related benefits, while capturing near-term economic, social and environmental benefits. In turn, technology cooperation should be consistent with sustainable development priorities, should build on local knowledge and expertise, and should take into account the synergies between local environmental concerns and climate change objectives. Capacity building for technology transfer should recognize existing programmes and seek to coordinate and enhance existing capacity before building new institutions or programmes. Capacity building for technology transfer should also recognize the potential synergies offered by the flexibility mechanisms proposed in the Kyoto Protocol and should build capabilities for the inclusion of these additional incentives in technology strategies in the future.

Enabling Environment

Efforts to transfer technology must involve many different stakeholders if they are to be effective in the long term. While it is clear that the private sector is a fundamental actor in technology transfer efforts, it is important to recognize that governments similarly play a crucial role in technology transfer by shaping enabling environments that encourage and facilitate the technology transfer process. As noted in the IPCC report, enhancing technology transfer means removing obstacles to increase the flow of technologies, and also improving the quality of technology transfer by shifting it to ESTs. Improving enabling environments includes, inter alia, the design and implementation of policy, regulatory and institutional reforms, protection of intellectual property rights, promotion of educational programmes on technology benefits and applications, technology testing certification and labelling efforts, and government procurement policies.

- Design and implementation of policy, regulatory and institutional reforms --Governments can encourage new investments in emerging technology markets by revising policies and reforming institutions that may be impeding technology investments. This can include revising tax and other financial incentives, streamlining project approval and accreditation procedures, revising codes and standards, improving enforcement of existing regulations, and reforming key institutions (e.g. judicial procedures, financial sector, utility restructuring). Reforms can be encouraged through training and capacity building in government regulatory and policy institutions that could include integrating clean technology strategies into national development plans, quantifying environmental benefits, addressing market-based approaches to environmental protection, and establishing and managing clear regulatory frameworks.

- Protection of intellectual property -- Protection of intellectual property rights is an important issue for both developing and developed countries. If the private sector does not have the means to protect ownership of assets due to slow and expensive enforcement of contracts by national courts or international arbitration and insecure property rights, it will be less likely to invest in further technology advancements and transfer. This in turn inhibits the ability of governments and the international community to achieve effective international technology transfer.

- Educational programmes on technology benefits and applications -- Governments can support initiatives to educate businesses, key government agencies responsible for approving new investment projects, and consumers about the benefits and applications of specific technologies. Such programmes can include labelling, promotional activities, documentation of social and environmental benefits of alternative technologies, and consumer education. Voluntary technology programmes can also raise the level of understanding of consumers, industry, professional associations, and other stakeholders of the opportunities and benefits of clean technologies. For example, awareness and understanding of the local air quality and public health benefits of climate-friendly technologies can provide added incentives and help build political and public support for technology substitutes.

- Technology testing certification and labelling -- Programmes to test, certify and label technologies that meet voluntary or mandatory government performance standards are a highly effective way of building markets for ESTs. Such programmes can help overcome private sector resistance to investment in new technologies due to concerns about technology performance, reliability, and competitiveness.

- Government procurement policies – Federal, state, and local government agencies have important influences on technology markets and transfer through their own procurement agencies that have direct purchasing authority for government buildings and vehicle fleets, government owned corporations, government land management programmes, and many other similar mechanisms. Broadening government procurement options can significantly expand the use of innovative technologies and provide a model for private sector investment.

Integrated Approach

Integrated approaches within countries and internationally can be particularly effective in delivering technology. This is a case where the whole is greater than the sum of the parts. As stated by the Co-Chair of IPCC WGIII, “The weakest component determines the overall strength of the system”. Many very effective training or capacity building programmes have ultimately had little effect on technology transfer in the national economy because they were not directly connected to implementation actions. Conversely, demonstrations, financing programmes, policy changes, etc., have often failed to achieve desired results because of lack of institutional capacity, information, effective regulatory and legal frameworks, technical training, etc. The US experience, the discussions in and Party submissions under the Consultative Process, and the IPCC Special Report, all contain the strong message that integrated approaches are needed to connect all of these links in the chain in an effective technology transfer system. The U.S.-sponsored Technology Cooperation Agreements Pilot Project is a model which incorporates key ingredients of such an integrated approach.

Donor Coordination

Integrated approaches looking to strengthen existing institutional arrangements are needed at the national level and internationally. Internationally, coordinated donor responses to country driven technology needs will increase effectiveness of international assistance programmes. One approach to donor coordination which should be considered is the Climate Technology Initiative (CTI) a dedicated multilateral response to Article 4.5 and the other technology transfer objectives of the Convention. The CTI was founded at COP-1 by 23 OECD member nations and the European Commission to foster international cooperation for accelerated development and diffusion of climate-friendly technologies and practices. CTI has engaged in a range of technology transfer activities, including training, research and development of climate-friendly technologies, joint industry seminars, and assistance for the study and prioritization of technology needs and identification and removal of barriers. It is important that whatever approaches to coordination are adopted be flexible enough to recognize voluntary bilateral and multilateral programmes such as the CTI.

The Clean Development Mechanism & Joint Implementation

The Kyoto mechanisms being elaborated under the Kyoto Protocol will create important incentives to enhance the transfer of ESTs and the implementation of Article 4.5. Many participants in the Consultative Process have noted the promise of the Clean Development Mechanism (CDM) to reduce greenhouse gas emissions and support sustainable development through enhanced technology transfer. Likewise, Joint Implementation (JI) will create incentives to transfer climate-friendly technology, and these positive linkages should be considered in the design of technology transfer actions. A framework to enhance implementation of Article 4.5 will need to embrace, utilize and promote the power of the CDM and JI to generate technology transfer.

Building on Existing Programmes

The IPCC Special Report has noted that existing international mechanisms including official development assistance, multilateral development banks, the GEF, UNEP, UNDP, UNIDO, and the Kyoto mechanisms (if implemented) have potential to further enhance technology transfer. Technology transfer activities should build upon these and other existing multilateral and bilateral efforts, as well as activities currently underway within developing countries and economies in transition, in order to take advantage of existing resources. Resources in this case refer to financial, institutional and technical resources, as well as the knowledge, expertise, and capabilities within the countries themselves.

Climate change action, including related technology transfer, is frequently complementary to and supportive of broader sustainable development. However, it is unreasonable to expect that the broader objectives of sustainable development can be resolved exclusively within the climate change debate. Thus, it is important for the process to focus on more effective utilization of existing resources, to ensure that these resources are targeted toward meeting the specific needs and objectives of the Convention. Resources of governments and intergovernmental organizations should be used to the maximum degree to leverage commercial flows of finance and technology.

The role of the GEF as the financial mechanism for the Convention should be maintained. Efforts to create new institutions specific to technology transfer would risk duplication of effort and precious resources available to address these issues. We believe that some new institutional coordination may be justified to improve the effectiveness of existing institutions, but consider any new centralized bureaucracy or financial instrument to be antithetical to the basic principles of effective technology transfer which have been described above.

An essential first step in determining actions to be taken is to take account of existing activities to promote, facilitate and finance transfer of ESTs. As we move to frame a draft decision for COP-6, Parties need to consider these existing activities before the SBSTA can effectively consider ways to improve the focus of these activities or consider any additional activities.

Conclusion

Our success in mitigating and adapting to global climate change will be greatly facilitated by the extent to which the international community is able to develop and disseminate technologies which enable us to pursue a cleaner path to development. Therefore, it is worth the investment of considerable time and effort through the Consultative Process and related activities, such as the CTI programmes and bilateral work, to find ways of improving technology cooperation and transfer of climate friendly technologies. Our goal should be to achieve results which are practical, effective and acceptable to all Parties.

The Consultative Process has served as a vehicle for expanded dialogue on technology cooperation, enabling Parties to present and consider new models and programmes that can be implemented, tested and adopted. It has provided an opportunity for technical experts, private industry, negotiators and policy officials from both developed and developing countries to share experiences and views in detail. This is essential to the development of a common understanding of technology cooperation as a basis for next steps under the Convention. The lessons of this process should inform our efforts as we move forward to frame an effective decision for consideration at COP-6.

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