

DRAFT

**Methods for Climate Change
Technology Transfer Needs
Assessments and Implementing
Activities: Experiences of Developing
and Transition Countries**

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EXECUTIVE SUMMARY

This document presents methods and steps for conducting climate change technology needs assessments and implementation activities. These methods are based on the experiences of countries which have participated in such needs assessments, and on the perspectives of technical experts from governments, the private sector, international donor organizations, financiers and research institutions who have participated in workshops and other fora to consider issues related to technology transfer. This report is provided for the use of countries undertaking technology needs assessment activities, including countries currently undertaking such assessments sponsored by the GEF through UNDP.

The methods and step-wise approaches presented here are oriented toward a country-driven approach and allow for adjustments to fit national circumstances. Experience has shown that technology needs assessments and the other elements are most effective when they are undertaken through a strategic approach to technology transfer that brings together numerous stakeholders and objectives. While allowing for national differences, the following are main elements of successful integrated technology transfer programs:

Elements of Strategic Approaches for Climate Change Technology Transfer Needs Assessments and Implementing Activities:

1. *Establishment of collaborative partnerships between key stakeholders with the common purpose of enhancing technology transfer.*
2. *Implementation of technology transfer needs assessments (including both evaluation of alternative technologies and definition of technology transfer priorities).*
3. *Design and implementation of technology transfer plans and specific actions.*
4. *Evaluation and refinement of the actions and plans (an ongoing process).*
5. *Dissemination of technology information.*

This document discusses these elements in further detail and presents a convenient step-by-step methodology, which can be tailored to the national circumstances and institutional structures of individual countries.

Methodological Approaches for Climate Change Technology Transfer Needs Assessments and Implementing Activities: Experiences of Developing and Transition Countries

I. INTRODUCTION

A number of countries, including Mexico, the Philippines, China, Brazil, Egypt, South Korea, Kazakhstan, as well as the fourteen countries comprising the Southern African Development Community, have undertaken climate change technology needs assessments and implemented technology transfer activities in cooperation with various bilateral and multilateral assistance programs.. This document presents methods and step-by-step approaches based on the experiences of these countries. Technology needs assessment and implementation have also been the focus of considerable discussion by experts involved with the climate change negotiations and relevant information from these discussions is also presented in this report.

Based on countries' previous experiences of technology cooperation programs, this report presents the various elements of an integrated framework to promote technology transfer. In order to present a methodology that is more robust than a series of steps, each major implementation step is discussed in depth, including fundamental elements, recommended steps, variations that can cater to country-specific considerations, case examples of approaches in different countries, and schematic representations of various processes.

The document is structured as follows: the first section presents a background overview of the technology transfer aspect of the climate change negotiations, as well as other workshops and activities that have considered technology needs assessments methodologies. The second section begins the methodological discussion by introducing approaches and frameworks for technology transfer. The following sections focus in greater depth, respectively, on: institutional arrangements which engage all relevant stakeholders; the technology needs assessments process; implementing follow-on technology transfer actions; and reviewing and refining these actions. The final section addresses the contribution to these processes of information on climate-friendly technologies and vehicles for their transfer.

Background on Technology Transfer under the UNFCCC

Article 4.5 of the UN Framework Convention on Climate Change (UNFCCC) states that developed countries "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." In this context, technology transfer is designed to assist developing countries with responding to climate change through the diffusion and use of appropriate climate change mitigation and adaptation technologies. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Methodological and Technological Issues in Technology Transfer defines technology transfer "as a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders..."

Based on a request made by the Parties to the UNFCCC at COP-4, the UNFCCC Secretariat conducted a consultative process to assist Parties to identify and define key elements of a framework for technology transfer under the UNFCCC. This consultative process included input from regional workshops in Africa, Asia and Latin America, the aforementioned IPCC report, submissions by Parties, as well as the negotiations themselves (see Appendix for additional information and documentation on these workshops, reports and negotiating decisions). This consultative process and the negotiations under the UNFCCC have produced a draft decision incorporating a framework to enhance technology transfer on

which Parties reached agreement at the resumed session of the 6th Conference of the Parties, in July 2001 (please see Appendix for documentation).¹ The five elements of this framework are:

- Technology needs and needs assessment
- Technology information
- Enabling environments
- Capacity building
- Mechanisms for technology transfer

This framework to facilitate and enhance additional technology transfer activities under the UNFCCC is based in large part on examination of past and current experiences of technology transfer initiatives between developing countries and donor organizations. Already a wide range of material, literature, and experience on technology transfer and technology transfer programs is available. For example, the IPCC Special Report on Methodological and Technological Issues in Technology Transfer discusses several types of programs that could facilitate technology transfer. These programs include comprehensive approaches to technology transfer which integrate technology needs assessment, capacity building, information and enabling environment activities (referred to in the IPCC report as National Systems of Innovation). Vehicles for technology transfer programs include Official Development Assistance programs, GEF projects, and Multilateral Development Bank activities, the private sector and other institutions. The IPCC report also mentions the potential contribution that the Kyoto Mechanisms could make to enhancing technology transfer.

Additionally, a variety of activities in recent years have advanced common understanding on practical methods that countries and donors can employ in assessing technology transfer needs and implementing technology transfer activities. First among these is the experiences of countries which have undertaken technology needs assessments, and of the international donors who have contributed to or participated in these assessments. These countries include: Mexico, China, Korea, the Philippines, Brazil, Egypt, Kazakhstan and the 14 member countries of the Southern African Development Community. There also have been a number of workshops and other fora which have considered technology transfer processes, and methodologies for technology needs assessments. In addition to the consultative process on technology transfer and the negotiations under the UNFCCC, these include workshops and seminars convened by UNDP, the Climate Technology Initiative (CTI), and various bilateral and multilateral aid programs and organizations. These fora have been convened with the recognition that further development of practical methods, through exchange of information and experiences, can be of value both to countries that are currently conducting needs assessments and implementing technology transfer activities and to donors that are supporting this work. In the process, these discussions have also contributed to the development of the technology transfer framework under the UNFCCC.

Recognizing the critical first step to facilitating technology transfer involves identification and communication of prioritized technology needs, the COP requested the GEF to enable Parties to "identify and submit to the Conference of the Parties their prioritized technology needs, especially as concerns key technologies needed in particular sectors of their national economies conducive to addressing climate change and minimizing its adverse effects"². The GEF has responded to this request by providing assistance through Additional Financing for Capacity Building in Priority Areas (Phase II top ups) of up to \$US100,000 per country. Of the 54 countries that have requested this funding, most are focusing on technology transfer activities.

¹ This decision (FCCC/CP/2001/L.10) will be forwarded to the 7th Conference of the Parties (COP-7) in November 2001 for inclusion in the package of decisions to be considered there in their entirety.

² Paragraph 1(b) Decision 2 CP/4

II. APPROACHES AND FRAMEWORKS FOR TECHNOLOGY TRANSFER

This document reviews countries' experiences and summarizes possible practical steps that can be pursued in undertaking technology transfer needs assessments and implementing technology transfer activities. Experience has shown that technology needs assessments are most effective when undertaken in a framework that integrates the various elements of technology transfer activities. Although more than one possible framework is included in this discussion, fundamental elements such as the basic steps, the stakeholders, and, key interactions remain the same. The following sections address each of these possible steps in more depth.

The IPCC special report on "Methodological and Technical Issues in Technology Transfer", identifies key stages in the technology transfer process while acknowledging that the process of technology transfer is complex and intertwined. The stages identified in the IPCC report include identification of needs, choice of technology, assessment of conditions of transfer, agreement, implementation, evaluation and adjustment to local conditions, and replication. For each of these stages or implementation steps, the stakeholders, technology transfer pathways, and barriers to technology transfer encountered will vary. The challenge of the UNFCCC process on development and transfer of technology is to reach an understanding and agreement on a broad and flexible framework for facilitating technology transfer through each of these stages through a country-driven process.

While there are some aspects of climate change-driven policy that are unique, many of the activities of a successful climate change technology transfer program provide benefits toward a broad range of development objectives, and the lessons learned through the needs assessment process can be applied to a range of development challenges where technology transfer and international cooperation can contribute. Furthermore, although the primary model for technology transfer under the UNFCCC is to encourage technology flows from developed to developing countries, it is important to recognize that the process can work in both directions. Indeed, one of the fruits of successful technology transfer is the enhancement of indigenous capacities in developing countries to develop and transfer technologies.

Possible Steps for Implementation of Technology Transfer Activities

The experiences and lessons learned from multilateral and bilateral climate change technology transfer programs provide valuable insights regarding the important implementation steps of successful approaches to technology transfer. Successful technology transfer programs have included variations of the following 5 steps or components:

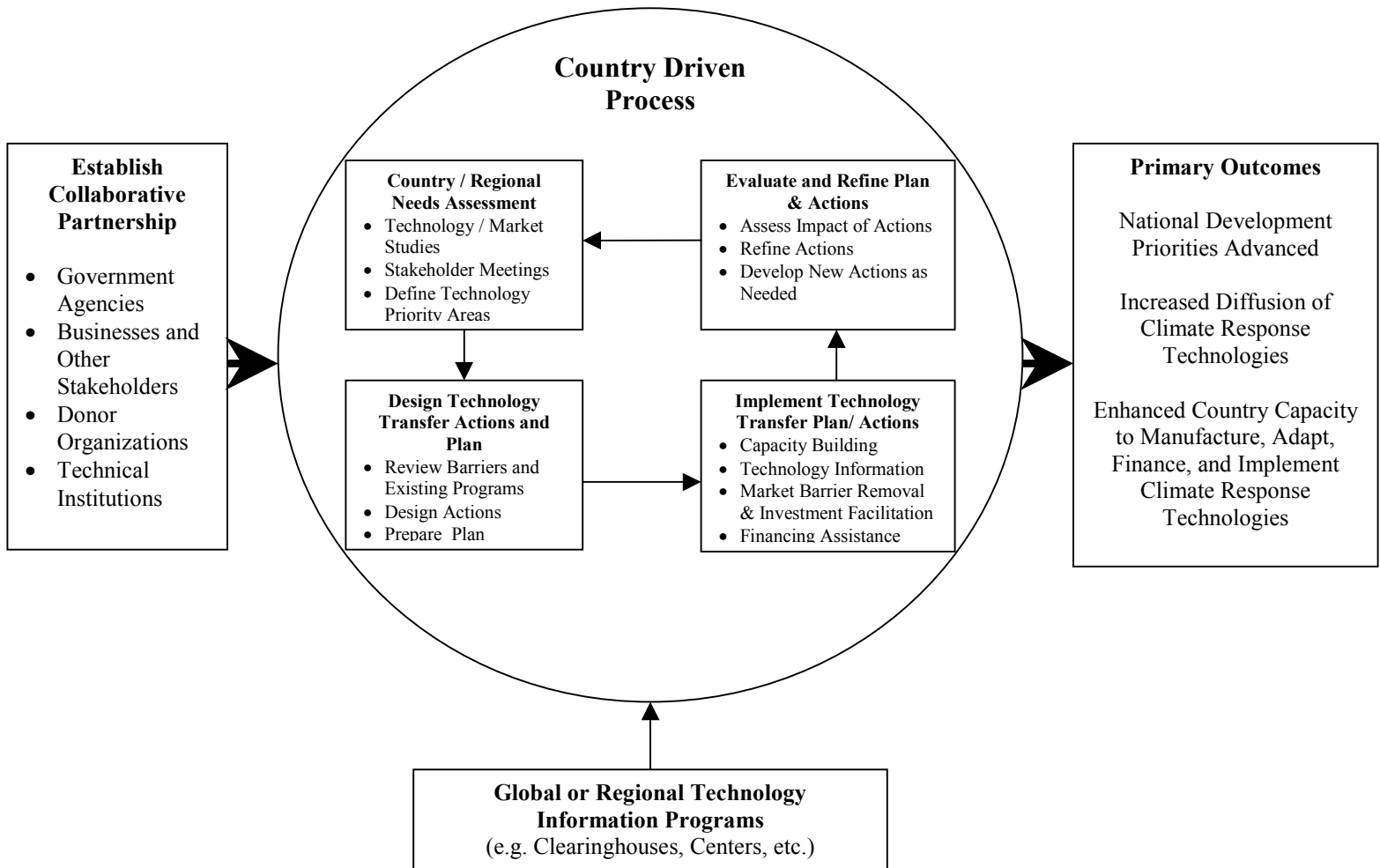
1. *Establishment of collaborative partnerships between key stakeholders with the common purpose of enhancing technology transfer*
2. *Implementation of technology transfer needs assessments (including both evaluation of alternative technologies and definition of technology transfer priorities)*
3. *Design and implementation of technology transfer plans and specific actions*
4. *Evaluation and refinement of the actions and plans (an ongoing process)*
5. *Dissemination of technology information.*

The first four of these activities are country-driven and have been lead by developing and transition country teams with assistance from bilateral and multilateral donors and international technical experts and engagement of the business community and other key stakeholders. The fifth activity, dissemination of technology information has occurred and will likely continue to occur both through global and regional activities (e.g. technology clearinghouses) and through country-specific activities (e.g. technology assessments, technology training, study tours, etc.)

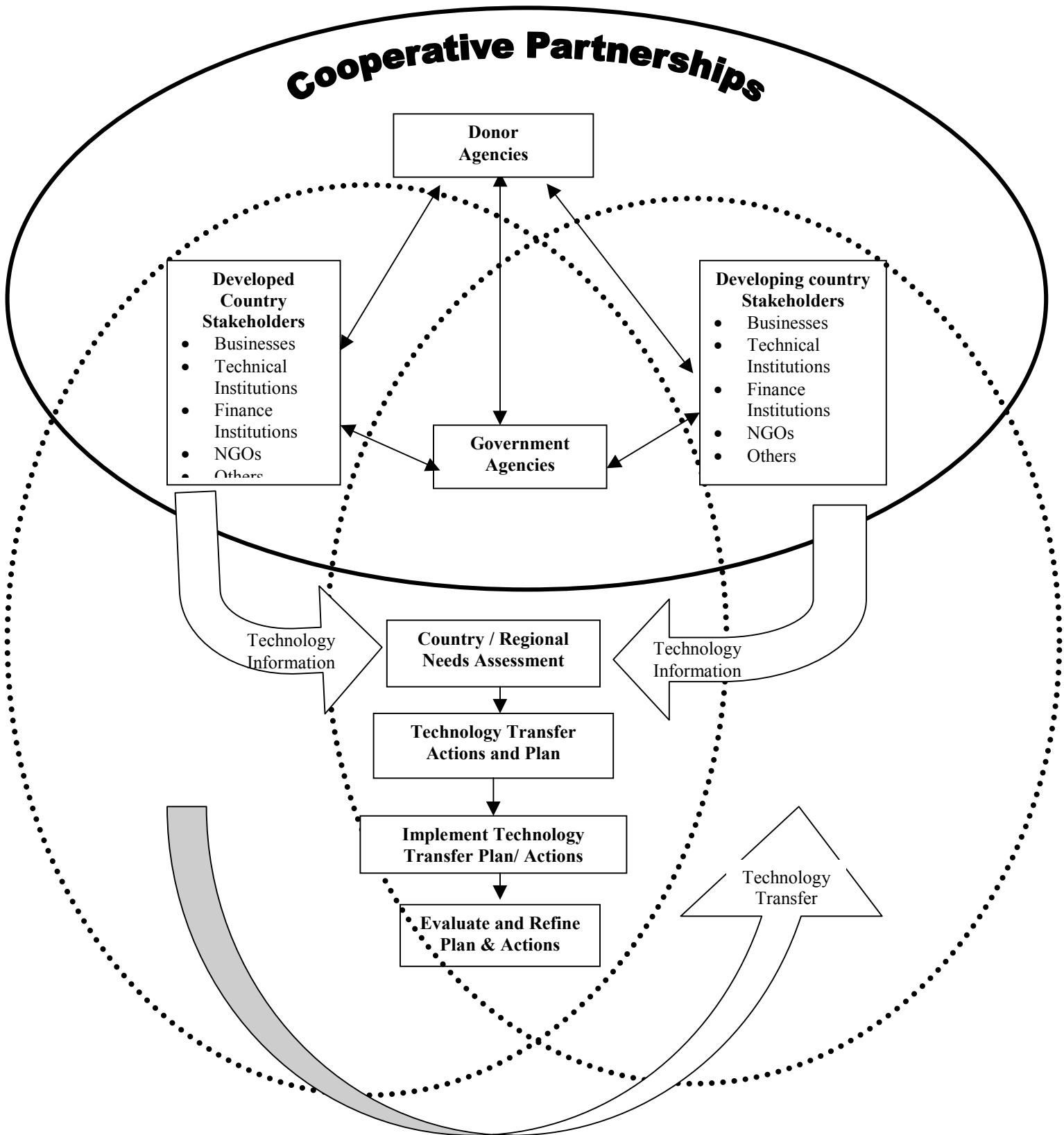
When considering possible frameworks for establishing country-based technology transfer programs, several possible models could be suggested. In any model, however, it is important that the structure and process of technology transfer be open, not restrictive in nature. The process needs to be country driven and country guided to take into account the special circumstances and situations of each participant country, particularly with respect to stakeholder participation and formation of formal or informal bodies or working groups associated with this process. The model must recognize that role of government is crucial, however, what role government can play to help promote, facilitate and guide the process will, in large part, be determined individually by national circumstances.

All these issues point to the need for a flexible, country-driven, integrated model that establishes a transparent process for linking the above key components of a technology transfer process together. Below are two representations of models that could form the basis for undertaking a technology needs assessment within an overall strategic framework for promoting technology transfer.

Example Model 1: Possible Key Elements of an Approach to Technology Transfer Implementation



Example Model 2: Possible Key Elements of an Approach to Technology Transfer Implementation



Key Considerations in Design of Technology Transfer Approaches and Frameworks

Through the experiences of countries, the Consultative Process and the discussions of technology transfer at the climate change negotiations, several key considerations have been identified that can help guide the design of technology transfer approaches. Some of the most often-cited considerations are listed below:

- Technology transfer includes both "soft" and "hard" elements of technology
- Technology transfer should address both climate change adaptation and mitigation technologies
- The role of governments is crucial, even though the transfer of technology usually involves many stakeholders, and is a complex process
- Technology transfer should enhance the endogenous capacity of developing and transition countries to develop and implement climate change response technologies
- Some parties and stakeholders have noted that technology transfer activities should help leverage and facilitate private investment where such investment will support a developing or transition country's technology transfer and development goals, while others have highlighted the need for technology transfer under the UNFCCC to go beyond facilitating market-driven transactions.
- There should be firm linkage between overall development plans, commitments under the Convention, and a strategy to enhance the transfer of technology
- The technology transfer process should be country-driven and should support sustainable development objectives of the host country
- Climate change technology transfer activities should supplement and complement current activities that promote technology transfer of environmentally sound technologies
- Climate change technology transfer activities should be integrated with current development programs in the host country
- The technology transfer process should be flexible so that it can be adapted to the specific needs and circumstances of individual countries or regions
- All stakeholders (including government agencies, businesses, donors, technical institutions, and other NGOs) must be actively engaged in the technology transfer process
- The donor community should assist countries in conducting technology transfer needs assessments and must be ready to respond in a coordinated manner to the needs identified through these assessments.
- Technology transfer should include the transfer of "soft" and "hard" technologies among developing and transition countries
- Technology transfer is a "two-way" process where developed countries not only support transfer of technologies to developing countries, but also partner with developing and transition countries in promoting common use of soft and hard technologies developed in these countries

Many of these fundamental considerations are included in the following case study of a technology transfer program conducted in the Philippines.

Example of Comprehensive Approach to Technology Transfer: the Philippines

Through a cooperative Technology Cooperation Agreement Pilot Project (TCAPP) with the U.S., the Philippines is addressing governmental sustainable development priorities, including energy services to support economic development in rural areas.

The Philippines' approach to the TCAPP project is guided by the overall objectives of the Philippines National Action Plan on Climate Change:

- ❖ To integrate climate change concerns into the country's national development plans and programs;
- ❖ To develop adaptation responses to climate change impacts;
- ❖ To design mitigation measures which are "no regrets" in character (i.e., can be justified for other reasons besides mitigating GHG emissions).

The Government of the Philippines defined specific goals in implementing TCAPP:

- ❖ Addressing government sustainable economic development priorities by improving energy services to support economic development in rural areas.
- ❖ Using clean energy technologies for improved energy services because of concerns about climate change.
- ❖ Looking at possible technology transfer models.

Institutional Arrangements to Involve Relevant Stakeholders

In identifying the country-driven TCAPP priorities and establishing the implementation approach, several Philippines government agencies provided technical and policy direction for the TCAPP efforts including, contacts in the Office of the President – National Anti-Poverty Commission, the Department of Energy, and the Department of Environment and Natural Resources. The Department of Energy, through its Energy Utilization and Management Bureau, serves as the lead coordinating and implementing institution. The country-driven process for priority selection featured strong public participation, to ensure the local relevance to the TCAPP priorities. This process was assisted by the fact that previous meetings of stakeholder groups regarding renewable energy and energy efficiency opportunities, as well as previous analytic work, had already gathered information about a set of priority technologies and issues. Building on these efforts, TCAPP developed priority selection criteria, shown below.

TCAPP Priority Selection Criteria

Priorities for the TCAPP should:

- ❖ Be priorities of the energy efficiency and renewable energy sectors
- ❖ Require reasonably achievable financing
- ❖ Contribute to social development and improvement of the environment and human health
- ❖ Have commercial potential
- ❖ Develop enabling mechanisms and build capacity

Based on the priority selection process, criteria, and government agency input, the TCAPP team selected renewable energy for rural development, along with associated support activities, as the central focus of Philippines TCAPP. Energy efficiency and cross-cutting support activities were also identified as important priority areas for future action.

Example of Comprehensive Approach to Technology Transfer: the Philippines Continued...

Technology Cooperation Actions

The initial focus of investment action was to research and recommend policy reforms that would facilitate private investment in clean energy technologies. These recommendations were developed in partnership with others, including policy reform initiatives of USAID/Manila, the World Bank, and Preferred Energy Incorporated. These efforts led to the following "Fast Track" modifications of energy regulations to enhance the policy environment in the Philippines for clean energy technologies:

- ❖ Streamline the corporate track-record requirement for new and renewable electricity generation projects.
- ❖ Establish a case-by-case evaluation for a spinning reserve requirement on new and renewable electric generation projects for the backbone grid, and clarifies that spinning reserve requirements do not apply to new and renewable energy on small grids;
- ❖ Remove the thermal energy requirement for cogeneration facilities using new and renewable energy;
- ❖ Eliminate the requirement for a power purchase agreement for new and renewable electricity generation projects; instead, requires demonstration of foreign exchange savings;
- ❖ For projects that supply electricity to a designated utility or user, remove DOE power development plan review and approval requirements.

The resulting streamlined accreditation process, and removal of unnecessary requirements which could inhibit efficient projects, provides an opportunity for more private sector participation and investment in renewable energy development and deployment. This will ultimately lead to stronger competitive forces and lower costs for renewable energy products and services, particularly in small-grid areas.

In addition to these policy reforms, rural clean energy projects are being developed in other technology application areas. Interested participants are working on a pilot program in Solar Energy-Powered Agricultural Water Pumping which may ensure that solar-powered pumping is considered on an equal basis with diesel powered pumping when agricultural subsidies are rationalized. In the area of Isolated Grid Hybridization with Wind Energy, training was provided to assist electric cooperatives to evaluate the benefits of diesel-wind hybrid project opportunities. The TCAPP team is also working with BreezElectric Philippines, a local company, and international organizations to explore opportunities for financing and institutional acceptance of such projects. And the TCAPP team is working with the Department of Energy and international organizations to build Hydropower Development Markets by distributing data via the internet on hydropower opportunities in the Philippines, and exploring several potential commercial hydropower retrofit projects.

The Philippines TCAPP program has been formulated to support overall government policy objectives such as climate change mitigation, poverty alleviation, rural development and sustainable development. Activities under TCAPP have been geared toward stimulating the participation of private sector in the development and widespread utilization of new and renewable energy systems as viable and clean technologies in providing energy services in the rural communities. The Fast Track Action initiative has produced several policy and regulatory reforms that removed provisions of existing laws disadvantageous to new and renewable energy projects. The Hydropower Market Development activity has successfully informed the government and the energy sector of the various potential of international investments for local hydro projects. These and other initiatives are expected to yield specific projects with high levels of involvement and financing by the private sector.

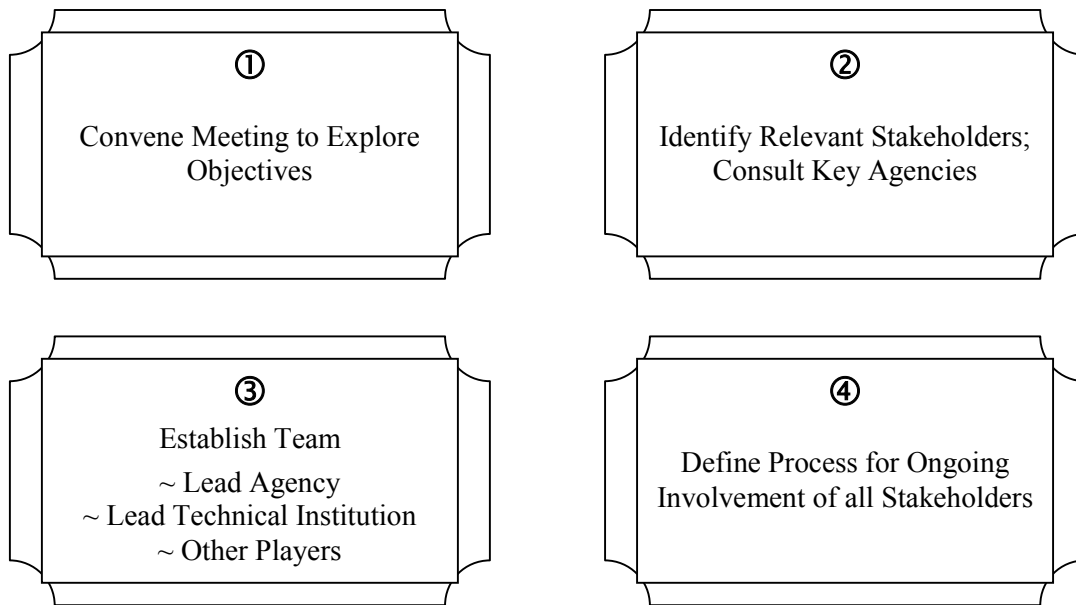
III. A METHODOLOGY FOR TECHNOLOGY TRANSFER ACTIVITIES BUILDING UPON ASSESSMENTS OF NEEDS AND PRIORITIES

The first two sections of the following methodological guidelines address the process of conducting effective technology needs assessments. The third section focuses on follow-on actions to implement the priorities identified in the needs assessment, and the last section discusses the role of technology information, which contributes to all stages of the technology transfer process.

A. Institutional Arrangements to Engage Relevant Stakeholders

One of the most important steps in the technology transfer process is creating a team which provides a foundation for needs assessments and all other aspects of technology transfer activities. There are a number of options for countries to go about establishing a team; each option incorporates certain fundamental elements:

STEPS IN FORMING INSTITUTION ARRANGEMENTS



Successful technology cooperation requires collaboration at many different levels. Partnerships between different stakeholders build upon their common interests and create an important pathway for successful technology transfer. Key stakeholders may include developers, owners, suppliers, buyers, recipients and users of a technology; financiers and donors; governments; international institutions; NGOs and community groups. Governments may be able to play a key role in facilitating these partnerships. Experience with successful technology cooperation programs has highlighted the importance of encouraging and facilitating working partnerships

among the following groups of key stakeholders:

- Among host country government agencies, businesses, NGOs, and technical experts. Cooperation among these stakeholders is needed to define and implement technology cooperation actions.
- Between developing country and developed country technical experts and government officials to exchange technology information and experiences and to design technology cooperation actions. Regional efforts that share and build upon capabilities and expertise in national governments and regional institutions can be especially important for smaller countries.
- Between developing countries and international businesses and investors. Engagement of host country and international companies and investors can help promote sustainable technology development and implementation.
- Between developing countries and international donors to attract donor support for financial and technical assistance
- Between developing and transition countries to facilitate exchange of soft and hard technologies among developing and transition countries

One successful model for developing and enhancing cooperation among relevant stakeholders has been the establishment of a technology transfer collaborative team. The composition and makeup of these teams depends on individual country situations. However, one common element of these teams has been the central role of government, which serves the purpose of coordinating and focusing activities and actions of team members toward achievement of overall government goals with respect to technology transfer and other economic and social development concerns. The role and responsibility of the technology transfer team would be to design and to implement technology transfer activities. Achieving broad representation of stakeholders on the technology transfer team provides several important benefits: it can ensure that planning for technology transfer activities is consistent with the country's broader development objectives and sustainable development policies, that there will be both business and consumer interest in the technologies identified, and that selected policies will receive sustained support from stakeholders. Key members of a technology transfer collaborative team should include:

- Climate change government officials
- Government officials responsible for sectoral development programs that either contribute to greenhouse gas emissions (e.g. energy, forestry, agriculture, waste management, etc.) or are vulnerable to the impacts of climate change (e.g. water resources, coastal management, agriculture, forestry, health, etc.)
- Businesses and business associations interested in participating in technology transfer activities in each sector of interest
- Non-government organizations and community organizations with an interest in technology transfer activities
- Technical institutions with expertise in technology assessments, technology implementation, market analysis, and business project development and financing for each sector of interest

- Representatives from donor agencies and other international organizations. Donor agencies and international organizations can provide countries with technical assistance in the implementation of their technology transfer activities, can help link these activities with other development programs, and can facilitate participation of international businesses and investors.

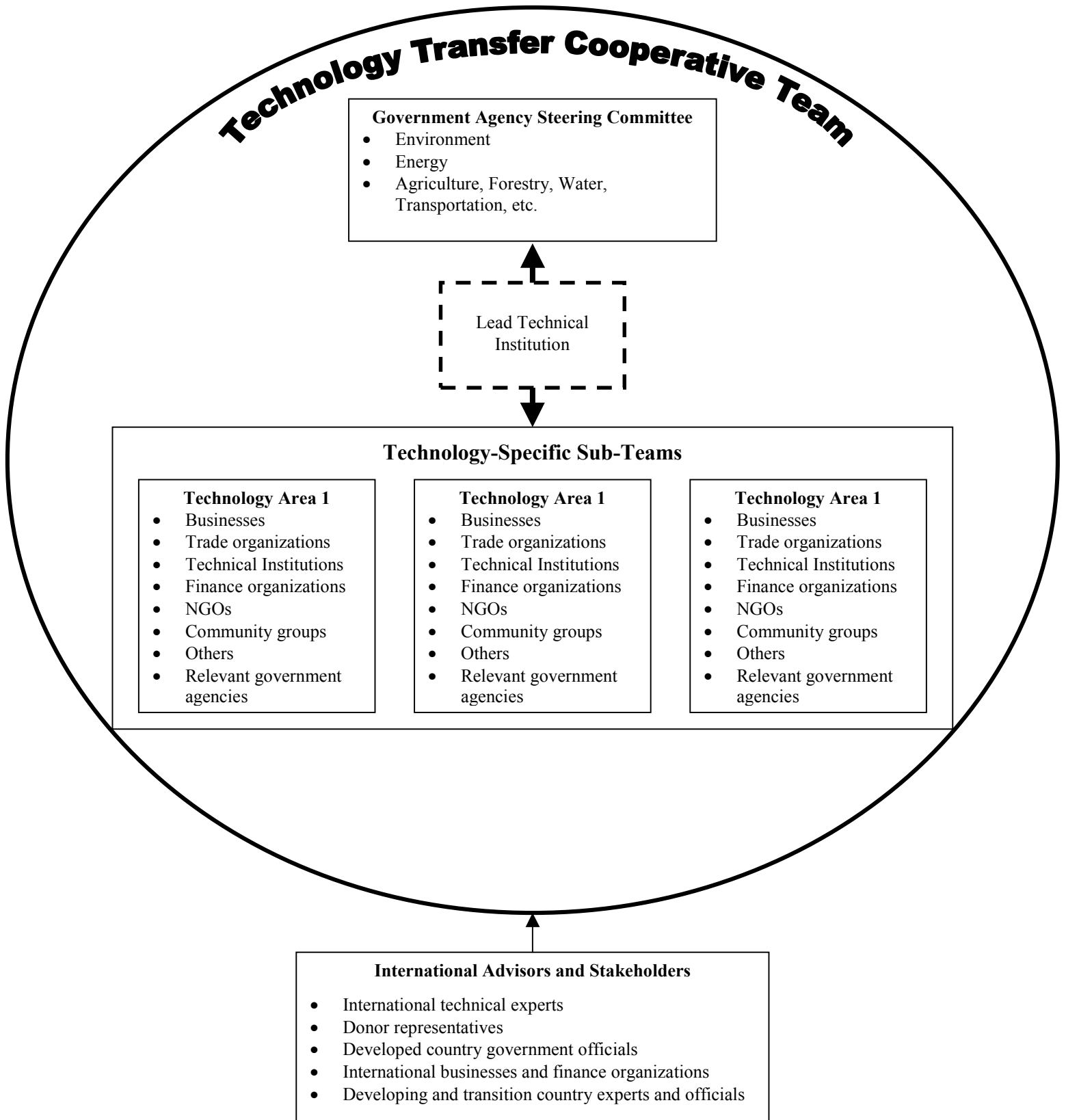
A national collaborative technology transfer team should represent a broad range of interests, including sectoral implementing ministries such as energy, transportation, agriculture, forestry, water resources, environmental agencies, climate change delegates, private companies and trade associations, technical institutions, and non-government organizations. The ministries that implement energy and other sectoral programs and policies are particularly important, because these ministries often have controlling or regulatory authority that is needed for implementation of technology transfer actions. Climate officials should be involved as well, even if they do not have implementation responsibilities, so that they can integrate the work of the team with key climate change issues and identify opportunities to build on previous climate change studies and activities. Governments may be able to play a key role in facilitating these partnerships. In particular, effective inter-ministry cooperation can help maximize synergies between various programs and avoid conflicts with other government programs and objectives.

A second potential model would be to form a collection of technology transfer “teams”. Additional teams enable specialization of expertise or interests, and can be formed or disbanded as interest in specific technology sectors grows or wanes and provides the opportunity for more focused, technical interaction with issues associated with technology transfer in specific sectors. Furthermore, establishment of teams of stakeholders such as in-country businesses, investment organizations and non-government organizations could be formed to provide focused input and advice to an interagency government group charged with providing overall direction and coordination of the various specialized teams. A group of technical teams could be formed to address the issues and technologies associated with each of the main priority technology transfer areas made up of organizations with expertise or interests in a particular technology priority area.

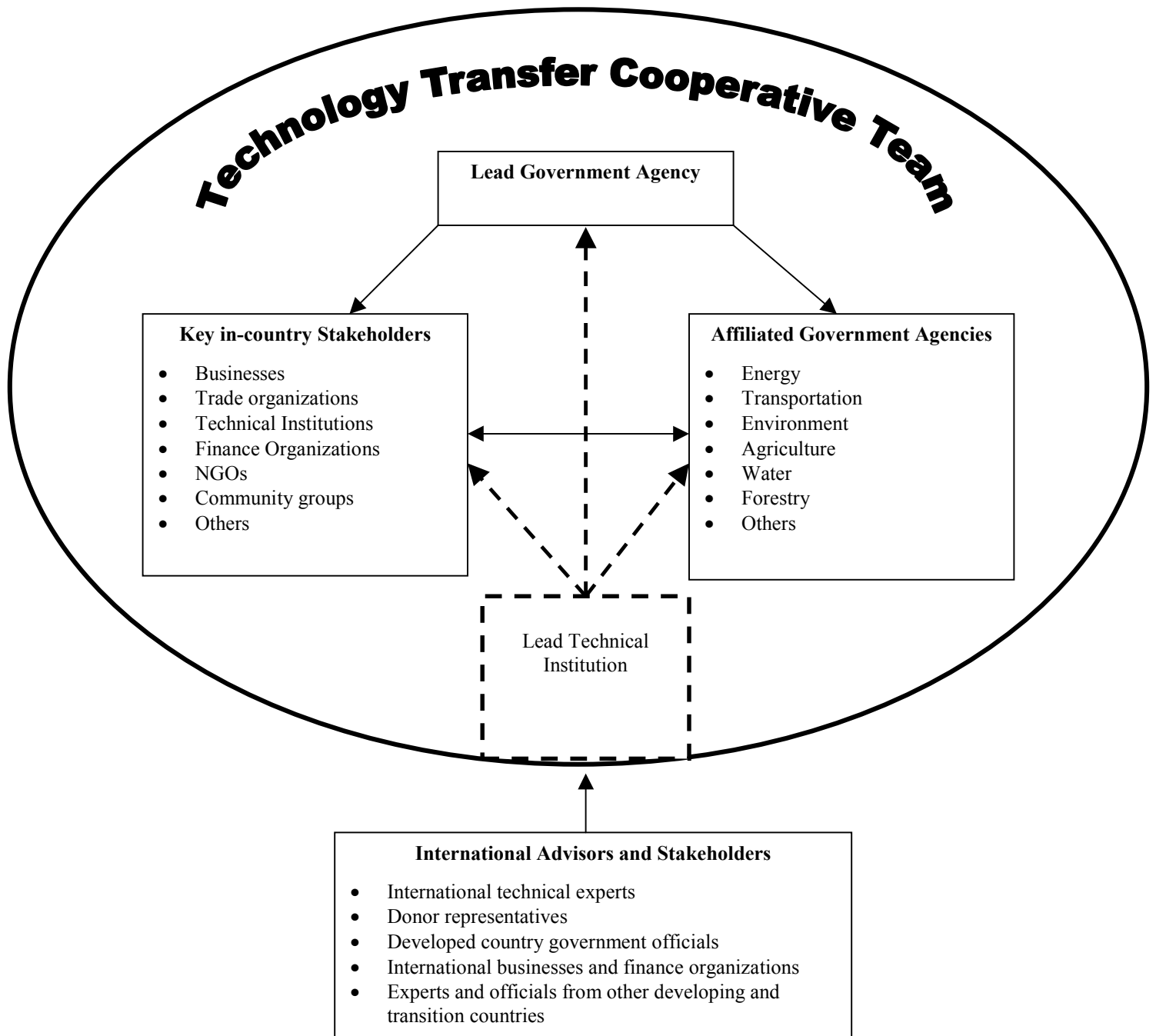
Finally, a critical element of the collaborative team is the identification of a country coordination and support organization. Any number of different organizations, including technical institutions or other NGOs, private firms and government agencies could play this role. Essential, however, is that these organizations and individuals must have the full support and backing of the in-country government and the technical expertise to maintain the respect of other important stakeholders. Coordinating institutions perform a wide variety of duties, depending on the needs of the team. The primary function, however, is to coordinate the involvement of all of the in-country participants. They may also compile information on technologies, conduct market research, and design technology actions.

Below are two possible models that could be adopted by countries seeking to develop and establish their own country teams to promote collaboration for successful technology transfer.

Example Model 1: Technology Transfer Cooperative Team

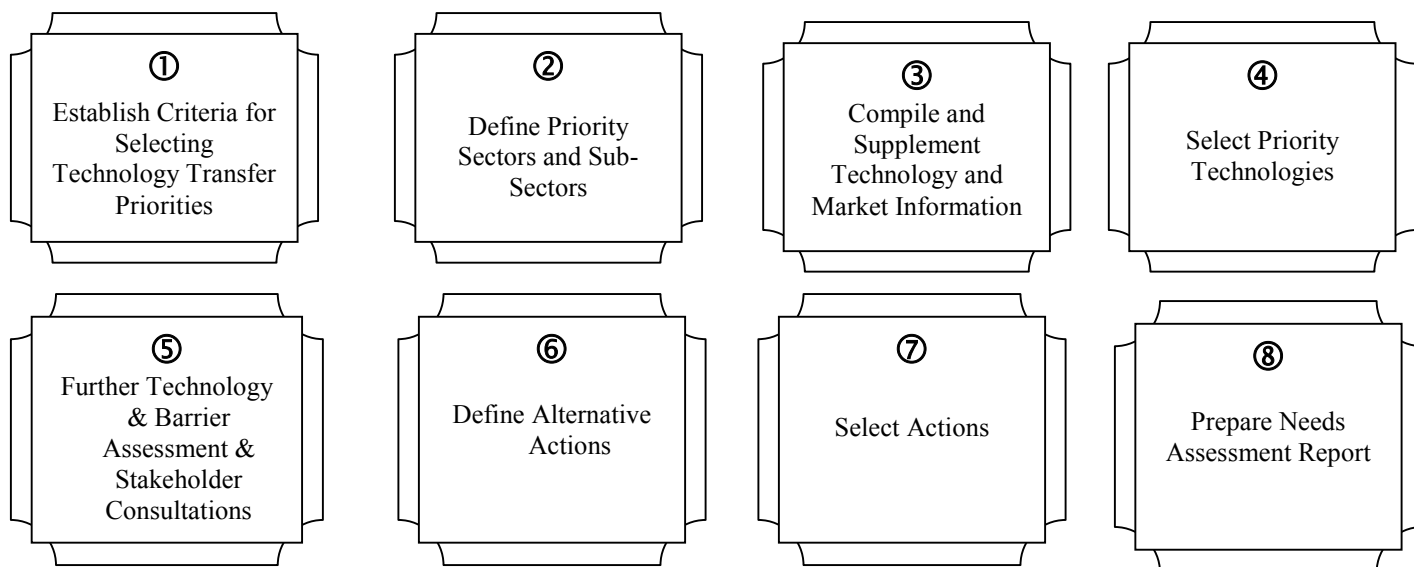


Example Model 2: Technology Transfer Cooperative Team



B. The Needs Assessments Process

After a technology transfer team is established, the work can begin on defining a country's (or region's) technology transfer highest priority needs. The technology transfer needs assessment process, which includes both definition of technology transfer priorities and evaluation of alternative technologies and their penetration potential, can involve several steps, including:



Every country will want to design their own process and could pick and choose from these possible steps. Each of these steps is described further in this paper.

Establishing Criteria

Establishing criteria for selecting technology transfer priorities creates a common framework for identifying the highest priority technologies and technology transfer activities. Many countries have used three basic criteria in technology transfer needs assessments that have been conducted to date:

- ❖ Development benefits – Which climate change mitigation and adaptation technologies offer the greatest value to the country in meeting current national development priorities?
- ❖ Implementation potential – What scale of implementation and diffusion of the technology can be realistically achieved if key barriers are addressed?
- ❖ Contribution to climate change response goals – Which technologies will make the biggest contributions to the country's efforts for mitigating greenhouse gas emissions and for facilitating adaptation to climate change?

Defining Priority Sectors and Sub-Sectors

Once established, the criteria can then be applied to select sectors of interest. Countries can use these criteria to determine which sectors (e.g. energy, forestry, agriculture, water resources, etc.) should be the primary focus of technology transfer activities. The selection of sectors of interest will help focus the detailed technology assessment work to follow. Countries may find it helpful to focus initially on just 1 or 2 sectors since significant effort is required to define and implement technology transfer activities for one sector and then to add additional sectors over time. In some cases, it may be appropriate to identify preliminary sectors of interest that will be the focus of this technology assessment work and to leave open the possibility of revisiting the selection of sectors after the technology assessment is complete.

It may also be helpful to identify (at least in a preliminary fashion), the sub-sectors of interest. For instance, in the energy sector, sub-sectors might include use of renewable energy for rural electrification, increased industrial energy efficiency, power plant efficiency, use of alternative fuels for transportation, etc. This can help further focus the technology assessment work. However, the selection of sub-sectors may need to be revisited after further technology and market information is available to confirm that these sectors are the most appropriate.

Compiling and Supplementing Technology Information

After identifying the sector(s) of interest, country teams together with international experts can then proceed with collection of information on alternative climate change response technologies and related market information for that sector. This includes soliciting input from key stakeholders on the alternative technologies. This information can include:

- A summary of alternative climate change response technologies for each sector and sub-sector that could best meet (or be adapted to meet) local needs and circumstances and a summary of possible applications of the technology in the country.
- Development benefits of the alternative technologies. This could include information on the contribution of the technologies to economic development, social, and environmental goals
- Implementation and investment potential for the alternative technology. This would include characterization of the potential scale of implementation and market penetration for the technology through alternative applications and identification of the applications that hold the greatest potential for near-term success in the country.
- Contribution to climate change response goals. A summary of the potential impact that the technology could have on a reducing greenhouse gas emissions or facilitating adaptation to climate change.
- Information on technology performance and costs. This would include existing information on the performance and capital and operating costs of alternative applications of the technologies. It may be helpful to compare this information to the technologies in most common use in the country for selected applications.
- Policy, regulatory, investment and financing, institutional, and business capacity barriers to widespread use and investment in the technology. Identification of implementation barriers is of critical importance since technology transfer activities will need to be structured to overcome these barriers for whatever technology priority is selected. Therefore, countries may want to only select technology priorities where they feel they can make real progress in addressing the critical implementation barriers.
- Summary of existing and planned programs designed to promote technology implementation and opportunities to complement these programs through technology transfer activities
- Identification of key organizations active in facilitating implementation of the alternative technologies in the country, including in-country businesses and government agencies, and international private sector suppliers and investors.

Much of the above information may be available from existing studies and development plans for the sectors of interest. The resources discussed in the last chapter of this paper, on Technology Information,

can provide a valuable source for the required information. Countries may want to first compile existing information and then decide if this information needs to be supplemented with additional analysis. Since this stage of the process is designed to select priority technologies for which more in-depth analysis will be conducted, it may not be necessary to conduct any new assessments at this stage.

In addition to reviewing existing studies, country teams and international experts should also consult with key stakeholders working in the sector (including government program managers, businesses, technical institutions, community groups) to solicit their input on the above topics as this relate to the alternative priority technologies. Early input from stakeholders is of vital importance for an effective priority setting process.

Selecting Priority Technologies and Sectors

After compiling information on alternative technologies for the priority sectors and sub-sectors, country teams can then proceed with selection of priority technologies and service needs. While countries may wish to develop a list of up to 15-20 priority technologies, it is recommended that countries put the most emphasis on identifying 3-4 high priority technologies for immediate attention. Experience has indicated that it is not practical to act on more than 3-4 priority technologies at a time.

This selection of priority technologies has most often occurred through convening a meeting (or several meetings) of all key stakeholders to rank the priority technologies according to the criteria previously established and based on the compiled information. Broad stakeholder participation is essential to ensure that there is broad support for these priorities and that they reflect the best near-term opportunities for accelerated implementation. It is recommended that countries include government officials from all agencies with an interest in these technologies, business representatives, technical institutions, and key NGOs. Many countries have found it helpful to have international technical experts, international businesses active in the technology markets under consideration, and donor representatives participate in these meetings as advisors, but not always participating in the actual ranking of the priority technologies. These efforts to include all relevant experts and stakeholders must be balanced with the need to move toward action implementation. While some countries have ranked priorities in one meeting that addresses all priority sectors or sub-sectors, other countries have convened meetings to identify priority technologies for each sector or subsector and then hold a cross-sectoral meeting to select priorities across all the sectors. In all cases, assessments should not be conducted in isolation of the implementation process. In other words, the prospects for success of the implementation step should be considered early on, while priority technologies are being selected.

In-Depth Technology and Barrier Assessment, including Evaluation of Availability of and Barriers to Financing, and Stakeholder Consultations

Following the selection of priority technologies, countries can then proceed with more in-depth analysis of these technologies. This analysis tends to address similar topics as addressed in the initial compilation of information on alternative technologies (e.g. technology performance, costs, benefits, market potential, implementation barriers, existing programs, etc.), but in much greater depth. An additional facet in this stage is the need to consider sources for financing that will be required to fund potential pilot projects or to expand a program. The probability for securing adequate local in-country financing, private foreign company financing, or international donor financing should be examined at this stage because the availability of financing can define the success of a project. The purpose of the technology assessments at this stage is to support decisions on the actions that will be pursued to overcome key technology transfer and diffusion barriers.

This technology assessment and stakeholder consultation activity can include:

- a. Conduct detailed technology assessment for each priority technology. This assessment would benefit from being conducted in consultation with business and investment organizations, government agencies, technical institutions, and donor and international institutions.

This detailed technology assessment could include:

- Identification of the specific applications for the technology (by use and by location within the country)
 - Estimation of the scale of implementation and market penetration that can be achieved for each of these applications
 - Analysis of the costs and development benefits (including contribution to climate change response goals) of each of these technology applications
 - Identification of in-country businesses, governments, and other stakeholders and international businesses and institutions that can be partners in increasing investment and use of the technology
- b. Identification and analysis of specific barriers (e.g. policy, regulatory, information, financing, capacity building, etc.) that would need to be overcome to achieve the full implementation potential. This review might define the primary reasons why the technology is not currently in widespread use and why the private and public sectors have not made greater investments in the technology. The review could consider, for instance, whether there exist any critical policy or other barriers stages in companies' decision-making process that prevent them from implementing investment actions. One country found, for example, that the prohibitive cost for some companies of conducting project feasibility assessments if they cannot be assured of winning a contract against their competitors was preventing their entry into the market. Possible policy barriers may include policies that do not allow adequate control over a project or a satisfactory return on investment, thus discouraging potential investors. Another possible barrier to more widespread dissemination of useful technologies may be inadequate communication about technology needs, products and services between developing countries and possible technology suppliers in developed countries.
- c. Evaluate effectiveness of existing country and donor programs and anticipated impact of planned programs. Country teams can determine how current and planned programs are addressing the barriers defined in the prior step and identify possible refinements to these programs and new initiatives that would further address the remaining barriers. This step would involve a more detailed assessment of existing programs than conducted previously.
- d. Identification of specific opportunities to accelerate implementation of these technologies through private and public investment in these technologies. This could include assisting in-country businesses in expanding their operations, promoting partnerships between in-country and international businesses and finance organizations, and promoting public investment in selected technologies.
- e. Initial identification of potential actions that could be implemented to address critical implementation barriers while building on existing or planned programs and taking advantage of opportunities for further business development and investment. These actions might include capacity building, commercial pilot projects, technology education and outreach programs, policy and program reforms, investment conferences and competitive solicitations, business financing, government procurement and labeling, and related initiatives. The building of endogenous developing country capacity for adapting and developing climate change response technologies is one benefit of successful technology transfer, and can be an important means for countries to accomplish development goals such as supporting local industries and building human capital. In some countries, assessments have been focused on defining specific business projects in need of support, saving time and ensuring that the private sector is fully engaged in the implementation step. These actions ideally would be designed to complement existing and planned programs. Selection of actions that enjoy strong support of government program managers, the business community, and other key stakeholders would increase the likelihood of effectiveness.

As with the previous steps, consultations with stakeholders (including in-country and international businesses) are of vital importance in addressing these issues. Governments can play a vital role in

identifying and removing market barriers to entry and dissemination of technologies. And because businesses can play a critical role in the long-term success of technology transfer projects, and are usually the only pathway by which a full market transformation can be achieved, early engagement of businesses is necessary. When businesses engage in technology needs assessment and implementation actions, they can offer the perspective of profit-driven companies with practical experience of market barriers and a realistic sense of market potential.

Many countries have prepared reports on each of the priority technologies that summarize their analysis of each of these technologies, identify key implementation barriers, describe opportunities to build on existing or planned programs and opportunities for supporting business development and investment partnerships, and propose alternative actions for consideration. These reports can form the basis for further development and selection of high priority actions to promote technology transfer and implementation. Some countries have developed individual reports on each priority technology and other countries have developed a comprehensive technology cooperation framework that provides a summary of technology information, barriers, and potential actions for all the priority technologies.

Further Define Alternative Actions

While the previous step usually includes identification of alternative actions that could be implemented to address key barriers to technology transfer and diffusion, in many cases countries have found it helpful to further define these alternative actions before making final decisions on the selection of actions for implementation. This can include working with key government program managers, businesses, and technical institutions to define in more detail the scope of alternative actions and how they can make progress in addressing the most important barriers and have a near-term impact on technology transfer and implementation. Countries may want to prepare short descriptions of alternative actions and their expected impacts in addressing barriers and the criteria established for the needs assessment. These descriptions can then be integrated with the technology reports or frameworks that were prepared in the earlier step.

Selection of High Priority Actions for Further Development and Implementation

Following the more in-depth analysis of priority technologies, stakeholder consultations, and definition of alternative actions, country teams can then proceed to select high priority actions for further development and implementation for each priority technology. In previous experiences with climate change technology needs assessments, countries have generally selected 1-3 high priority actions for each priority technology. Most countries have convened meetings of all key stakeholders to select the highest priority actions based on the criteria previously established and utilizing the results of the analysis of the technologies and alternative actions and results of the stakeholder consultations on these technologies and actions.

Prepare Needs Assessment Report

Countries may want to prepare a summary report that describes the process they used to select these high priority actions, the results of each stage of this process, and summarizes these proposed high priority actions. In describing the actions, it will be helpful to document how these actions will address key implementation barriers and be integrated with existing development programs. It is also helpful to provide information on the impact of these actions according to the previously established criteria. In addition, countries may want to describe the proposed roles of key stakeholders in implementation of these actions and preliminary ideas on needs for technical and/or financial assistance to support implementation of these actions. These reports can provide the basis for securing the technical and financial assistance from donors and securing the necessary domestic resources to support implementation of the high priority actions.

Example of a Regional Participatory Needs Assessment Process: Cooperative Technology Implementation Plan for Southern Africa (CTIP SA)

Through the Climate Technology Initiative's³ Cooperative Technology Implementation Plan for Southern Africa (CTIP SA), the fourteen countries of the region are developing a technology cooperation program. Stakeholders have identified clean energy technology priorities that have the greatest potential across the Southern African region for meeting sustainable development needs while reducing greenhouse gas emissions through accelerated private investment. Six technologies have been identified as priorities: biomass power generation, solar crop drying, efficient and solar-powered home systems, natural gas development, green house design, and efficient motors and boilers. At present, CTIP SA is developing actions to promote investment in three technologies: solar water heaters, biomass power generation, and industrial energy efficiency.

The Zimbabwe-based Southern Centre for Energy and the Environment and the U.S. National Renewable Energy Laboratory provide technical support for this effort. Country officials, technical experts, and regional and international businesses have been closely involved in identifying technology priorities and developing actions to promote investment.

Objectives:

The Southern African countries began by establishing a set of shared objectives for the program:

- ❖ Identify shared priorities within the region for attracting investment in clean energy technologies that will meet sustainable development priorities and reduce greenhouse gas emissions.
- ❖ Develop a cooperative technology implementation plan that identifies actions that Southern African countries and regional institutions can undertake in partnership with international donors and the private sector to accelerate investment in these technologies.
- ❖ Assist the region in securing international donor support and private sector participation in implementation of actions to attract private investment.
- ❖ Enhance the technical and institutional capacity of Southern African countries and regional institutions to attract international investment in clean energy technologies.

Technology Priorities

During a workshop in September 1999, the Southern African countries reviewed and refined the project workplan and established criteria for selecting priority technologies. These criteria are:

- ❖ Development benefits the technology would provide
- ❖ The technologies' market readiness
- ❖ Greenhouse gas (GHG) avoidance potential
- ❖ Appropriateness of the technology for the region as a whole, and
- ❖ Local environmental benefits (besides GHG avoidance) the technology might offer

³ The Climate Technology Initiative (CTI) was launched at the First Conference of the Parties to the UNFCCC. CTI is a multilateral initiative of 23 International Energy Agency/OECD countries and the European Commission to promote the objectives of the UNFCCC by fostering international cooperation for accelerated development and diffusion of climate friendly technologies and practices for all activities and greenhouse gases.

Cooperative Technology Implementation Plan for Southern Africa (CTIP SA) Continued...

After these priorities were defined, the participating counties conducted national consultations to identify specific technology priorities, define market barriers to these priorities, and propose regional actions to address these barriers and accelerate investment and implementation. Representatives from key government agencies met with businesses, technical experts and other stakeholders to identify the specific technologies within the six broad priority areas that will support the region's sustainable development goals while addressing the other selection criteria. Following these consultations, a report was prepared synthesizing the results of the consultations and focusing on the following specific technologies and recommended actions for each. The report outlined these priority technologies and actions that could be taken to promote investment in each technology:

Efficient and PV (Photovoltaic) Lighting

- K Develop regional standards and ratings
- K Establish revolving loan fund

Efficient Motors and Boilers

- K Training program for industries and guidelines
- K Establish low-cost financing

Efficient Housing Design

- K Regional seminar to develop standards and design guidelines
- K Training program for architects, developers, etc.

Solar Crop Drying

- K Public education campaign
- K Business network for manufacturing and distribution

Biomass Electricity Generation

- K Regional model independent power purchase agreements (PPAs)
- K Investment workshop

Natural Gas

- K Assistance with gas development plans, legal frameworks and guidelines
- K Regional loan fund for capital investments

At present, CTIP SA is finalizing workplans for three priority technologies. The actions to promote private investment are outlined below:

- ❖ ***Solar Water Heaters.*** CTIP will assist solar water heater (SWH) manufacturers and installers in Durban, South Africa in meeting the projected increase in demand for SWHs created by impending tariff restructuring. It is expected that the restructuring will increase the cost of electricity and make SWHs cost competitive. CTIP will provide business development assistance to SWH businesses to enable them to assess the market, create business development plans, and secure loans to finance capital expansion. In addition, enterprise training will identify and train individuals as installation technicians, providing businesses with a pool of potential employees to draw from as they expand operations.

Cooperative Technology Implementation Plan for Southern Africa (CTIP SA) Continued....

- ❖ ***Biomass Power Generation.*** Businesses and country officials in Tanzania, Mauritius, and Swaziland have expressed interest in developing a CTIP action to address market barriers to increased power generation from sugar mills. CTIP would assist in the development of independent power purchaser (IPP) agreements and would also educate facility managers about more efficient technologies. This project is currently under development.

- ❖ The workplan for a third priority technology, Industrial Energy Efficiency is currently under development.

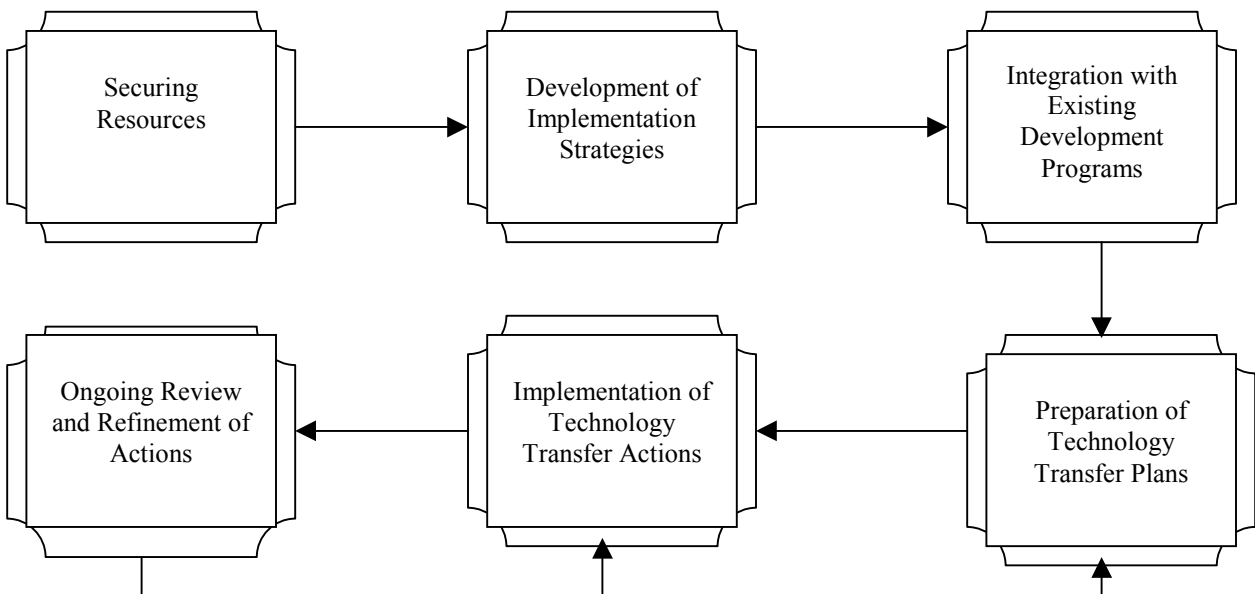
CTIP SA is complementary to regional development objectives and approaches, including many countries' energy policy of providing sustainable energy to trigger economic efficiency. The integration of a wide range of stakeholders and countries ensures that the prioritized needs and actions are integrated with other development objectives in the region and will receive sustained support from a broad constituency. The CTI process will help countries in the region prepare not only for investment in the energy sector, but also can support related development goals including environmental and natural resource protection, social development, housing and transportation planning. Though a regional-level needs assessment is necessarily more ambitious and complex than one performed at the national level, the Southern African experience is showing that these challenges can be met and that regional efforts can usefully pool limited resources to attract international donors and potential investors.

C. Preparing and Implementing Technology Transfer Actions and Plans

Note: The following activities build upon the foundation laid in the establishment of institutional arrangements and the needs assessment process (sections A and B of this chapter).

The preparation and implementation of technology transfer actions and plans can involve several steps, including:

- Securing resources to support further design and implementation of high priority actions
- Development of implementation strategies for high priority actions
- Integration of these implementation strategies with existing development programs and stakeholder activities
- Preparation of technology transfer action plans
- Implementation of the actions
- Ongoing evaluation and refinement of the actions



Each of these steps is described briefly below.

Securing Resources for Action Design and Implementation

After country teams complete their needs assessments and define their highest priority technology transfer actions, they will be ready to work with donor organizations and domestic agencies to secure the necessary technical and financial assistance to support detailed design of the actions and implementation. In the pilot climate change technology transfer programs that currently exist, this process of securing resources has occurred through a matching of the proposed actions with the availability of resources from donor organizations and consideration of the availability of resources within the country to support implementation. This process has also looked for opportunities to leverage any new resources with existing country, donor, and stakeholder programs and activities so that these actions can be effectively integrated and the effectiveness of the actions can be improved. Such integration also helps avoid overburdening staff in country with new activities that are not connected to existing programs. This process of securing resources may occur in tandem with the development of detailed implementation strategies since such strategies may be required before resources are provided.

The financial mechanism of the Convention may be one of the important resources to support implementation of actions. Information about additional resources can be obtained through the technology information resources listed in the next chapter.

Development of Implementation Strategies

Once resources are secured for further development and implementation of selected actions, country teams in collaboration with international experts and donors can then develop detailed implementation strategies for each action. These implementation strategies would include information on:

- Objectives and scope of the action
- Barriers to be addressed
- Activities to be implemented
- How the action would supplement and complement existing and planned development programs
- Expected impact on development goals and on climate change response goals
- Summary of a long-term market development goal (e.g. 5-10 year target for level of deployment and investment) and key elements of the strategy to achieve that goal
- Lead institution and roles of other institutions engaged in implementation, including identifying the lead government officials responsible for each action and technical institutions, businesses, and other stakeholders that will be engaged.
- Key deliverables
- Schedule of activities
- Detailed budget showing how domestic and international resources will be allocated to support implementation of the action

Countries may want to prepare draft implementation strategies that are circulated for broad stakeholder review before final implementation strategies are prepared.

Integration with Existing Development Programs

It is important for countries to effectively integrate implementation of their technology transfer actions with other national, local, and international development programs and related stakeholder activities. This will ensure that technology transfer actions complement and support existing programs and activities and do not create unnecessary burdens on government program managers who will be responsible for these actions. In addition, such integration importantly eliminates or reduces redundancy among programs. When government agencies and stakeholders work together to plan technology transfer activities, this coordination can even leverage other activities and resources to support them. Such integration can best occur through discussion of the implementation strategies with government program managers, businesses, technical institutions, other in-country NGOs, and donor officials responsible for implementation of related programs. As countries develop their implementation plans, communicating them through various technology information vehicles, including the networks listed in Chapter 4, can both attract donor and private sector interest, and provide information to help other organizations design their technology transfer activities to complement these plans.

Preparation of Technology Transfer Plans

After detailed implementation strategies for each high priority action are developed, countries may want to present these strategies together in one integrated technology transfer plan. This will provide key decision-makers and stakeholders with one document that provides detailed information on the implementation approach for each action. Such a document will be valuable for stakeholder review and engagement and building domestic awareness and support for these actions and for engaging active

stakeholder. It can also help secure further donor support for the actions and can help facilitate integration of these actions with current programs. Such a plan also could also be used to report internationally on the technology transfer actions that are or will be implemented in the country. This can be particularly effective if the plan is an overall multi-year strategy for transfer and development of technologies, indicating specific needs that donors can address. In addition, countries could choose to include such plans or summaries of these plans in their national communications.

Implementation of Technology Transfer Actions

Implementation of the technology transfer plan, or high priority actions, can begin once resources and stakeholder support are secured and the implementation strategies are approved or adopted by the key decision-makers. In many cases, it is not possible to implement all actions immediately and countries may want to focus their initial efforts on a few of the highest priority actions. Active participation of all key stakeholders in implementation, including in-country and international businesses, which are an important source of sustained investment resources, will be critical to success. Countries will likely need to create separate team, with participation of government and non-government officials and experts, to lead implementation of each action. As noted earlier, implementation should be coordinated with related development programs and initiatives.

Ongoing Review and Refinement of Actions

In order to learn about areas for improvement and eventually replicate the process, countries can establish systems for ongoing evaluation and refinement of the technology transfer actions. This can include:

- ❖ Ongoing assessment of the climate change technology transfer and development impacts of actions
- ❖ Identifying and implementing refinements to the actions to improve the effectiveness
- ❖ Developing new actions and refining the plan to respond to initial implementation experiences

Example of Technology Transfer Implementation: Korea's Energy Management Program.

The Republic of Korea initiated a cooperative program with the U.S. Technology Cooperation Agreements Pilot Project (TCAPP) in 1999 to prioritize climate change technology needs and implement follow-on to promote the transfer of the selected technologies. The Ministry of Commerce, Industry and Energy (MOCIE) of the Republic of Korea chairs a TCAPP steering committee and has designated Korea Energy Management Corporation (KEMCO) to lead the implementation of technical TCAPP activities for Korea.

Technology Priorities

The Korean team held scoping meetings among relevant stakeholders in March 1999 to select priority technologies for climate change technology cooperation. In addition to greenhouse gas mitigation potential and energy development benefits, four additional criteria were used in selecting priority technologies:

- 1) The technology must hold near-term market potential
- 2) Successful widespread implementation of the technology requires intervention by public institutions to overcome market barriers
- 3) There is a need for demonstrating new technologies or energy management systems to open up new markets for advanced technologies.
- 4) Soft technologies (e.g., new management systems and other tools for use of advanced technologies) should be given consideration along with hardware.

Based on these criteria, three priority technologies were selected. The three priority technologies are:

- ❖ Energy management (Know-how in energy management, advanced energy auditing and energy service companies (ESCOs), etc.)
- ❖ Methane recovery from organic waste
- ❖ Waste energy recovery using heat pumps

Implementing Actions

For the Energy Management project, KEMCO, working with its U.S. counterpart, facilitated meetings between U.S. and Korean companies interested in partnering on future energy efficiency projects. One

Korean company (EPS Korea) and one U.S. company (Sempra Energy Services) were selected to work with KEMCO and Hyundai to perform an energy audit of the Hyundai company facility in Ulsan. The team developed a proposal prioritizing the plant's greatest potential priorities for energy savings. EPS Korea, Sempra and Hyundai coordinated the technical support, while KEMCO's role, in addition to providing technical assistance, includes review of the proposal, barrier reduction and financing assistance. Based on this proposal, Hyundai is now implementing a pilot heat wheel project with Honeywell Corporation for approximately US\$30 million. This project, if successful, should open the door for other energy service projects at this plant and others. Other projects have been agreed to or are being pursued in the Energy Management and Methane Recovery areas. To build capacity to implement additional projects, Korea TCAPP is supplementing these pilot projects with training and certification programs to improve energy auditing techniques in Korea.

According to Korea's implementers, the TCAPP project has been effective because the host country has played a pivotal role in the identifying and prioritizing of technologies. In the process of identifying and addressing barriers to technology dissemination, the participation of a wide range of stakeholders has been particularly important. It is also notable that Korea has chosen not just hard technologies, but energy services

The Korea experience is an example of how a successful technology transfer program can bring together government and other stakeholders, including research institutions and both domestic and international private companies to promote technology transfer. Korea has designed the prioritization of technology needs within an overall strategic approach that incorporates follow-on actions, including training, certification, and coordinated steps to develop pilot projects. Through the design and implementation of such projects, the experience and capacity of the host country institutions will be enhanced, so as to attract additional projects. Indeed, Korea does not consider the pilot projects to be the objective of the program, but rather tools for developing technology transfer models which can be replicated elsewhere.

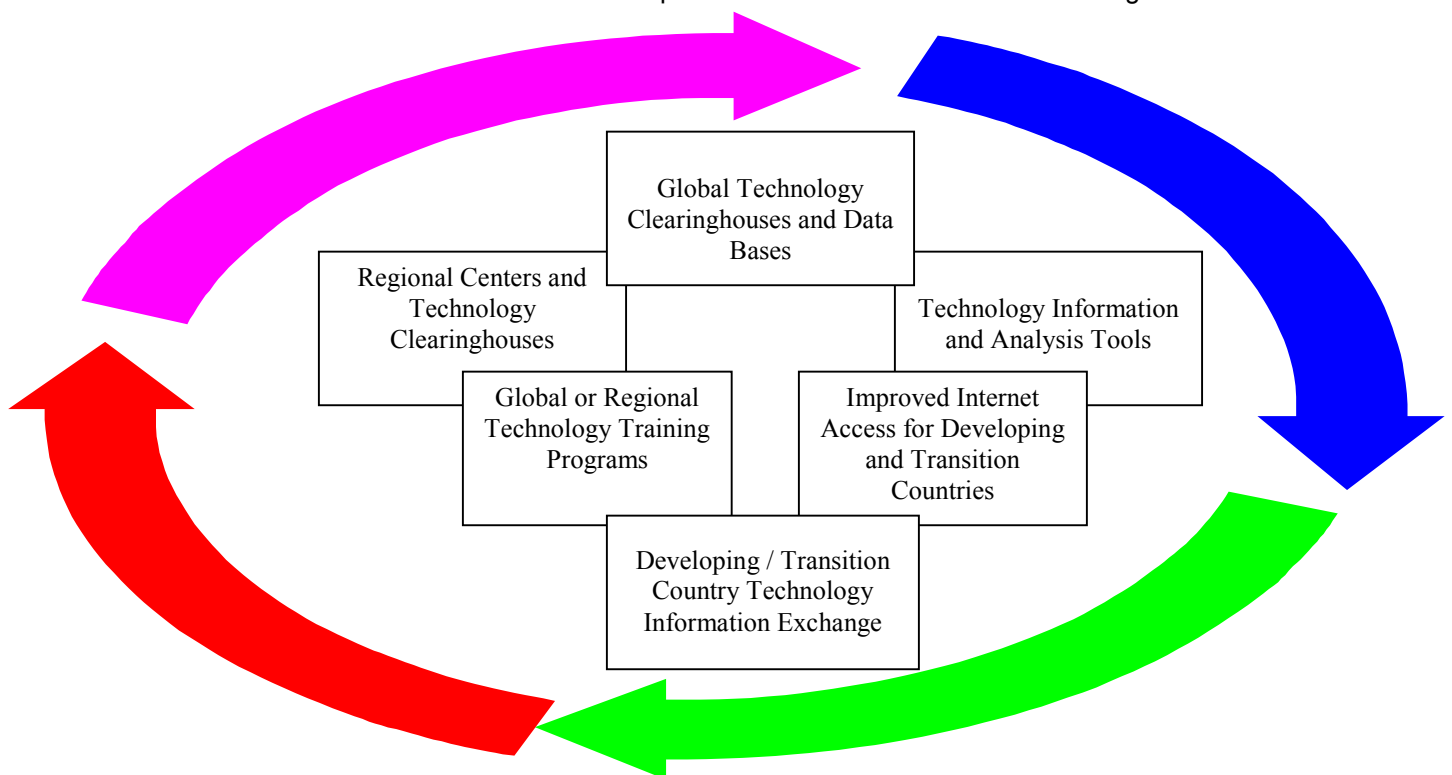
IV. TECHNOLOGY INFORMATION

The availability of accurate and comprehensive information on alternative technologies and technology transfer resources is a cornerstone for successful technology transfer efforts. Developing and transition countries will require a broad range of information on alternative climate change response technologies, including data on technology performance, costs, benefits, availability, suppliers, financing, non-climate environmental and sustainable development considerations, project case studies, and related topics. Countries not only require high quality information on technologies, but also need to have efficient mechanisms for disseminating this information to all key stakeholders (e.g. government agencies at all levels, businesses, technical institutions, NGOs, etc.) who may be engaged in technology development and implementation in the country. Countries also can benefit from improved access to tools for compiling and analyzing information on technologies. Likewise, the broad dissemination of information on technology needs can guide technology suppliers, both foreign and domestic, to respond to those needs.

While some technology information will be provided to countries through the support provided for needs assessment and implementation of technology transfer actions, there is also a need for global and regional activities to disseminate technology information. Several alternative approaches have been identified for dissemination of this information, including:

- Establishment of global technology clearinghouses and data bases available through the internet and other means
- Diffusion of technology information through regional centers
- Improving internet access for developing and transition countries so that key actors in those countries can access currently available technology information.
- Exchange of technology information and experiences between developing and transition countries (e.g. workshops, electronic networks and web sites,)
- Global or regional and technology training programs
- Improved access to information and analytic tools that developing and transition countries can use to help manipulate and analyze technology information

These activities are depicted in the diagram below:



There are several global and regional activities that have been initiated and others that are under consideration to support the diffusion of technology information to developing and transition countries. These activities include:

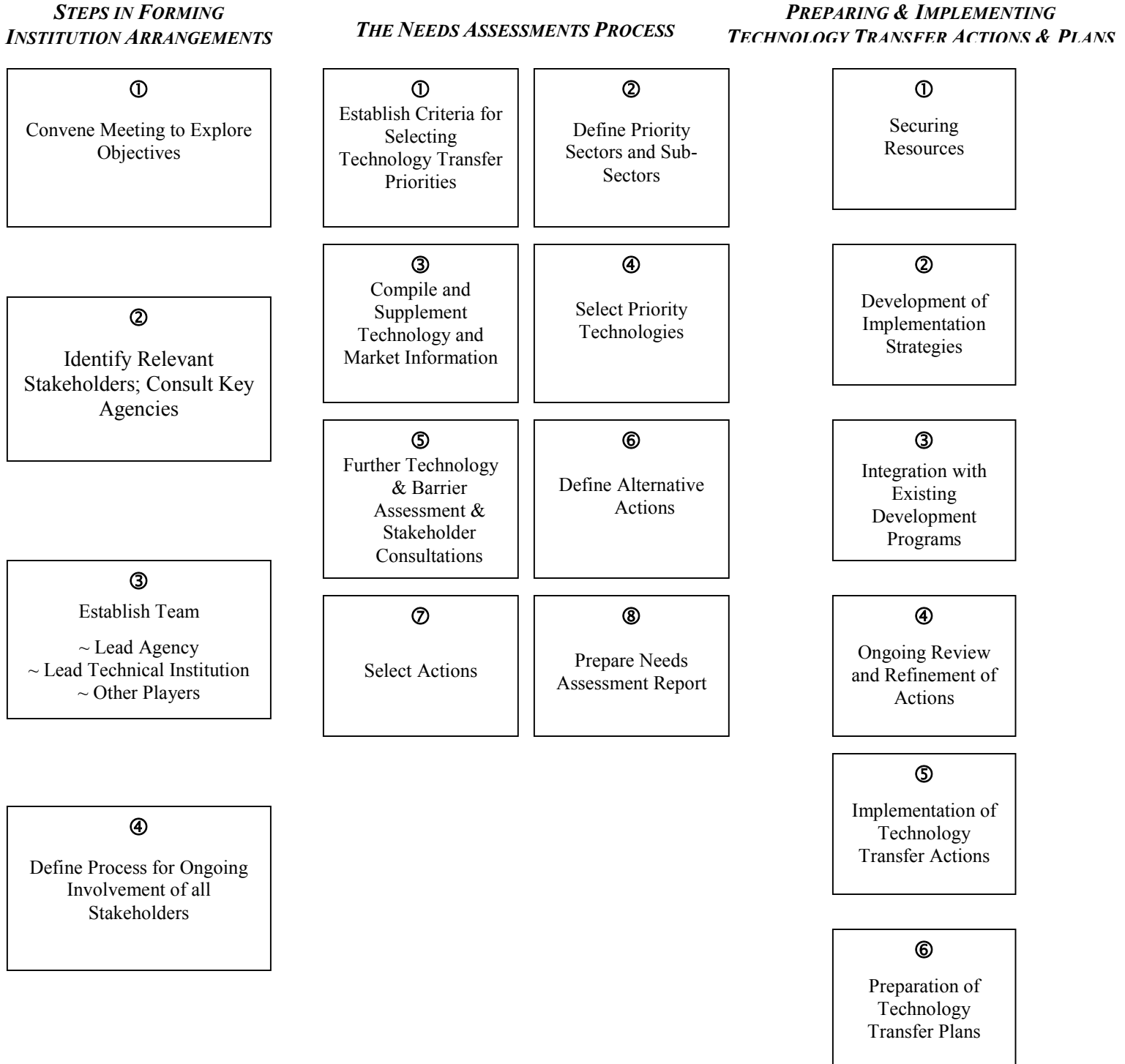
- The Climate Technology Website under development for the UNFCCC Secretariat, with assistance from the U.S. Government
- The UNFCCC's proposed technology transfer information system (agreed to by the Parties at COP 6.5 in July 2001)
- UNEP's proposed Sustainable Technology Alternative Network
- The existing GREENTIE/CADET technology data bases
- The UN Industrial Development Organization's technology information website and database.
- The work of the United Nations Information and Communication Technologies Task Force to close the digital divide through improved access to information and communication technologies
- The East Asia and Pacific Network (EAPNET), sponsored by Japan.
- Various other similar initiatives

In addition, there already exist a large number of technology data bases, information systems, and analytical tools, maintained by government agencies and technical institutions across the world for which developing and transition countries could have improved access.

APPENDIX 1

Diagram of Comprehensive Approach to Technology Transfer Needs Assessments and Implementing Activities

This diagram is a simplified compilation of the step-by-step methodology presented throughout this paper to develop a strategic approach to Climate Change Technology Transfer Needs Assessments and Implementing Activities. This methodology is developed from the experiences of a variety of developing countries which have undertaken such strategic technology transfer programs. While technology transfer approaches will vary somewhat according to the national circumstances of individual countries, these steps attempt to capture most of the fundamental activities which can contribute to making a successful technology transfer program.



APPENDIX 2

Additional Documentation and Reference Material on Technology Transfer Issues and the Technology Transfer Negotiations under the UNFCCC

The Intergovernmental Panel on Climate Change (IPCC) Special Report on Methodological and Technological Issues in Technology Transfer
(available at: www.ipcc.org).

Draft Decision on Development and Transfer of Technologies, agreed to at the resumed 6th Conference of the Parties, July 2001, in Bonn, Germany
(FCCC/CP/2001/L.10, available at www.unfccc.int)

UNFCCC Consultative Process:

Workshop Reports (available at www.unfccc.int)

Africa Workshop (August 1999, Arusha, Tanzania) (FCCC/SBSTA/1999/11)

Asia and the Pacific workshop (January, 2000, Cebu, Philippines) (FCCC/SBSTA/2000/INF.2)

Latin America and the Caribbean Workshop (March 2000, San Salvador, El Salvador)
(FCCC/SBSTA/2000/INF.6)

Submissions by Parties (available at www.unfccc.int)

Submissions by Parties on issues and questions listed in the annex to decision 4/CP.4 (FCCC/CP/1998/16/Add.1):

(contained in FCCC/SBSTA/1999/MISC.5)

Submissions by Parties on programs and experiences incorporating cooperative approaches to the transfer of technologies (contained in documents FCCC/SBSTA/1999/MISC.5, FCCC/SBSTA/1999/MISC.5/Add.1, and FCCC/SBSTA/1999/MISC.5/Add.2)