Transfer of environmentally sound technology, cooperation and capacity-building

Environmentally sound technologies protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products, and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes.

Environmentally sound technologies in the context of pollution are "process and product technologies" that generate low or no waste, for the prevention of pollution. They also cover "end of the pipe" technologies for treatment of pollution after it has been generated.

Environmentally sound technologies are not just individual technologies, but total systems which include know-how, procedures, goods and services, and equipment as well as organizational and managerial procedures. This implies that when discussing transfer of technologies, the human resource development and local capacity-building aspects of technology choices, including gender-relevant aspects, should also be addressed. Environmentally sound technologies should be compatible with nationally determined socio-economic, cultural, and environmental priorities.

There is a need for favourable access to and transfer of environmentally sound technologies, in particular to developing countries, through supportive measures that promote technology cooperation and that should enable transfer of necessary technological know-how as well as building up of economic, technical, and managerial capabilities for the efficient use and further development of transferred technology. Technology cooperation involves joint efforts by enterprises and Governments, both suppliers of technology and its recipients. Therefore, such cooperation entails an iterative process involving government, the private sector, and research and development facilities to ensure the best possible results from transfer of technology. Successful long-term partnerships in technology cooperation necessarily require continuing systematic training and capacity-building at all levels over an extended period of time.

The activities proposed in this chapter aim at improving conditions and processes on information, access to and transfer of technology (including the state-of-the-art technology and related know-how), in particular to developing countries, as well as on capacity-building and cooperative arrangements and partnerships in the field of technology, in order to promote sustainable development. New and efficient technologies will be essential to increase the capabilities, in particular of developing countries, to achieve sustainable development, sustain the world's economy, protect the environment, and alleviate poverty and human suffering. Inherent in these activities is the need to address the improvement of technology currently used and its replacement, when appropriate, with more accessible and more environmentally sound technology.

Basis for action This chapter of Agenda 21 is without prejudice to specific commitments and arrangements on transfer of technology to be adopted in specific international instruments.

The availability of scientific and technological information and access to and transfer of environmentally sound technology are essential requirements for sustainable development. Providing adequate information on the environmental aspects of present technologies consists of two interrelated components: upgrading information on present and state-of-the-art technologies, including their environmental risks, and improving access to environmentally sound technologies.

The primary goal of improved access to technology information is to enable informed choices, leading to access to and transfer of such technologies and the strengthening of countries' own technological capabilities.

A large body of useful technological knowledge lies in the public domain. There is a need for the access of developing countries to such technologies as are not covered by patents or lie in the public domain. Developing countries would also need to have access to the know-how and expertise required for the effective utilization of the aforesaid technologies.

Consideration must be given to the role of patent protection and intellectual property rights along with an examination of their impact on the access to and transfer of environmentally sound technology, in particular to developing countries, as well as to further exploring efficiently the concept of assured access for developing countries to environmentally sound technology in its relation to proprietary rights with a view to developing effective responses to the needs of developing countries in this area.

Proprietary technology is available through commercial channels, and international business is an important vehicle for technology transfer. Tapping this pool of knowledge and recombining it with local innovations to generate alternative technologies should be pursued. At the same time that concepts and modalities for assured access to environmentally sound technologies, including state-of-the-art technologies, in particular by developing countries, continued to be explored, enhanced access to environmentally sound technologies should be promoted, facilitated and financed as appropriate, while providing fair incentives to innovators that promote research and development of new environmentally sound technologies.

Recipient countries require technology and strengthened support to help further develop their scientific, technological, professional and related

capacities, taking into account existing technologies and capacities. This support would enable countries, in particular developing countries, to make more rational technology choices. These countries could then better assess environmentally sound technologies prior to their transfer and properly apply and manage them, as well as improve upon already existing technologies and adapt them to suit their specific development needs and priorities.

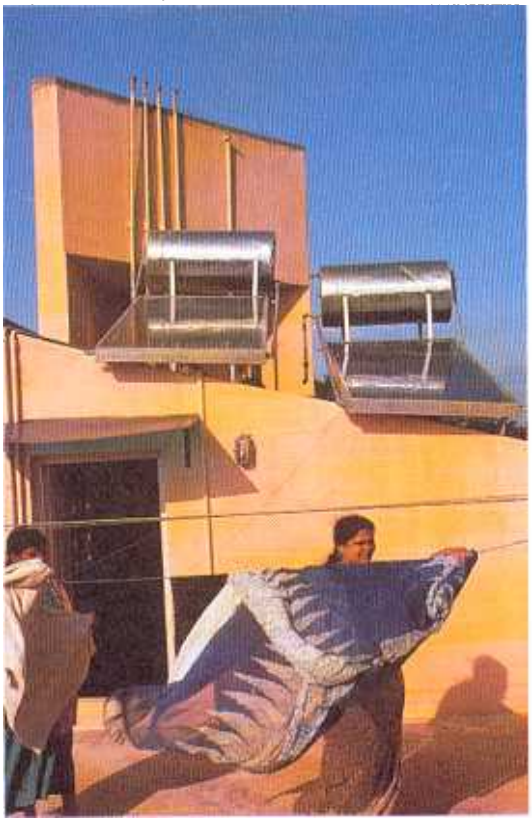
A critical mass of research and development capacity is crucial to the effective dissemination and use of environmentally sound technologies and their generation locally. Education and training programmes should reflect the needs of specific goal-oriented research activities and should work to produce specialists literate in environmentally sound technology and with an interdisciplinary outlook. Achieving this critical mass involves building the capabilities of craftspersons, technicians and middle-level managers, scientists, engineers and educators, as well as developing their corresponding social or managerial support systems. Transferring environmentally sound technologies also involves innovatively adapting and incorporating them into the local or national culture.

Objectives

a To help to ensure the access, in particular of developing countries, to scientific and technological information, including information on state-of-the-art technologies;

b To promote, facilitate, and finance, as appropriate, the access to and the transfer of environmentally sound technologies and corresponding know-how, in particular to developing countries, on favourable terms, including on concessional and preferential terms, as mutually agreed, taking into account the need to protect intellectual property rights as well as the special needs of developing countries for the implementation of Agenda 21;

c To facilitate the maintenance and promotion of environmentally sound indigenous technologies that may have been neglected or displaced, in particular in developing countries, paying particular attention to their priority needs and taking into account the complementary roles of men and women;



Technology developed by the Karnataka State Council for Science and Tecnology has provided solar heating for houses in the village of Melamangala, India.

d To support endogenous capacity-building, in particular in developing countries, so they can assess, adopt, manage and apply environmentally sound technologies. This could be achieved through *inter alia*:

i Human resource development;

ii Strengthening of institutional capacities for research and development and programme implementation;

iii Integrated sector assessments of technology needs, in accordance with countries' plans, objectives and priorities as foreseen in the implementation of Agenda 21 at the national level;

e To promote long-term technological partnerships between holders of environmentally sound technologies and potential users.

Activities

A *Development of international information networks which link national, subregional, regional and international systems*

Existing national, subregional, regional and international information systems should be developed and linked through regional clearing-houses covering broad-based sectors of the economy such as agriculture, industry and energy. Such a network might, *inter alia*, include national, subregional and regional patent offices that are equipped to produce reports on state-of-the-art technology. The clearing-house networks would disseminate information on available technologies, their sources, their environmental risks, and the broad terms under which they may be acquired. They would operate on an information-demand basis and focus on the information needs of the end-users. They would take into account the positive roles and contributions of international, regional and subregional organizations, business communities, trade associations, non-governmental organizations, national Governments, and newly established or strengthened national networks.

The international and regional clearing-houses would take the initiative, where necessary, in helping users to identify their needs and in disseminating information that meets those needs, including the use of existing news, public information, and communication systems. The disseminated information would highlight and detail concrete cases where environmentally sound technologies were successfully developed and implemented. In order to be effective, the clearing-houses need to provide not only information, but also referrals to other services, including sources of advice, training, technologies and technology assessment. The clearing-houses would thus facilitate the establishment of joint ventures and partnerships of various kinds.

An inventory of existing and international or regional clearing-houses or information exchange systems should be undertaken by the relevant United Nations bodies. The existing structure should be strengthened and improved when necessary. Additional information systems should be developed, if necessary, in order to fill identified gaps in this international network.

B *Support of and promotion of access to transfer of technology*

Governments and international organizations should promote, and encourage the private sector to promote, effective modalities for the access and transfer in particular to developing countries of environmentally sound technologies by activities, including the following:

a Formulation of policies and programmes for the effective transfer of environmentally sound technologies that are publicly owned or in the public domain;

b Creation of favourable conditions to encourage the private and public sectors to innovate, market and use environmentally sound technologies;

c Examination by Governments and, where

UNCED dealt with a range of issues important for sustainable development, but did not deal seriously enough with the debt crisis, the stagnating flows of foreign aid, the need for more open trade and its environmental and developmental impacts. It did not take forward-looking decisions on population growth. The future will not be secured and everybody will ultimately lose unless the environment and development crisis is dealt with in a comparably responsible manner where all countries pool their interest. Much stronger international decision-making procedures must be developed. We cannot proceed at the snail's-pace decided by the most reluctant movers. We cannot afford to cover the cost of less determined actions.

Gro Harlem Brundtland
Prime Minister
Norway

appropriate, by relevant organizations of existing policies, including subsidies and tax policies, and regulations to determine whether they encourage or impede the access to, transfer of and introduction of environmentally sound technologies;

d Addressing, in a framework which fully integrates environment and development, barriers to the transfer of privately owned environmentally sound technologies and adoption of appropriate general measures to reduce such barriers while creating specific incentives, fiscal or otherwise, for the transfer of such technologies;

e In the case of privately owned technologies the following measures could be adopted, in particular for developing countries:

i Creation and enhancement by developed countries, as well as other countries which might be in a position to do so, of appropriate incentives, fiscal or otherwise, to stimulate the transfer of environmentally sound technology by companies, in particular to developing countries, as integral to sustainable development;

ii Enhance the access to and transfer of patent protected environmentally sound technologies, in particular to developing countries;

iii Purchase of patents and licenses on commercial terms for their transfer to developing countries on non-commercial terms as part of development cooperation for sustainable development, taking into account the need to protect intellectual property rights;

iv In compliance with and under the specific circumstances recognized by the relevant international conventions adhered to by States, undertaking measures to prevent the abuse of intellectual property rights, including rules with respect to their acquisition through compulsory licensing, with the provision of equitable and adequate compensation;

v Provision of financial resources to acquire environmentally sound technologies in order to enable in particular developing countries to implement measures to promote sustainable development that would entail a special or abnormal burden to them;

f Develop mechanisms for the access to and transfer of environmentally sound technologies, in particular to developing countries, while taking into account development in the process of negotiating an international code of conduct on transfer of technology, as decided by UNCTAD at its eighth session in Cartagena.

C *Improvement of the capacity to develop and manage environmentally sound technologies*

Frameworks at subregional, regional and international levels should be established and/or strengthened for the development, transfer and application of environmentally sound technologies and corresponding technical know-how with a special focus on developing countries' needs, by adding such functions to already existing bodies. Such frameworks would facilitate initiatives from both developing and developed countries to stimulate the research, development and transfer of environmentally sound technologies, often through partnerships within and among countries and between the scientific and technological community, industry and Governments.

National capacities to assess, develop, manage and apply new technologies should be developed. This will require strengthening existing institutions, training of personnel at all levels, and education of the end-user of the technology.

D *Establishment of a collaborative network of research centres*

A collaborative network of national, subregional, regional and international research centres on environmentally sound technology should be established to enhance the access to and development, management and transfer of environmentally sound technologies, including transfer and cooperation among developing countries and between developed and developing countries, primarily based on existing subregional or regional research, development and demonstration centres which are linked with the national institutions, in close cooperation with the private sector.

E *Support for programmes of cooperation and assistance*

Support should be provided for programmes of cooperation and assistance, including those provided by United Nations agencies, international organizations, and other appropriate public and private organizations, in particular to developing countries, in the areas of research and development, technological and human resources capacity-building in the fields of training, maintenance, national technology needs assessments, environmental impact assessments, and sustainable development planning.

Support should also be provided for national, subregional, regional, multilateral and bilateral programmes of scientific research, dissemination of information and technology development among developing countries, including through the involvement of both public and private enterprises and research facilities, as well as funding for technical cooperation among developing countries' programmes in this area. This should include developing links among these facilities to maximize their efficiency in understanding, disseminating and implementing technologies for sustainable development.

The development of global, regional and subregional programmes should include identification and evaluation of regional, subregional and national need-based priorities. Plans and studies supporting these programmes should provide the basis for potential financing by multilateral development banks, bilateral organizations, private sector interests and non-governmental organizations.

Visits should be sponsored and, on a voluntary basis, the return of qualified experts from developing countries in the field of environmentally sound technologies who are currently working in developed country institutions should be facilitated.

F *Technology assessment in support of the management of environmentally sound technology*

The international community, in particular United Nations agencies, international organizations, and other appropriate and private organizations should help exchange experiences and develop capacity for technology needs assessment, in particular in developing countries, to enable them to make choices based on environmentally sound technologies. They should:

a Build up technology assessment capacity for the management of environmentally sound technology, including environmental impact and risk assessment, with due regard to appropriate safeguards on the transfer of technologies subject to prohibition on environmental or health grounds;

b Strengthen the international network of regional, subregional or national environmentally sound technology assessment centres, coupled with clearing-houses, to tap the technology assessment sources mentioned above for the benefit of all nations. These centres could, in principle, provide advice and training for specific national situations and promote the building up of national capacity in environmentally sound technology assessment. The possibility of assigning this activity to already existing regional organizations should be fully explored before creating entirely new institutions, and funding of this activity through public-private partnerships should also be explored, as appropriate.

G *Collaborative arrangements and partnerships*

Long-term collaborative arrangements should be promoted between enterprises of developed and developing countries for the development of environmentally sound technologies. Multinational

companies, as repositories of scarce technical skills needed for the protection and enhancement of the environment, have a special role and interest in promoting cooperation in and related to technology transfer, as they are important channels for such transfer, and for building a trained human resource pool and infrastructure.

Joint ventures should be promoted between suppliers and recipients of technologies, taking into account developing countries' policy priorities and objectives. Together with direct foreign investment, these ventures could constitute important channels of transferring environmentally sound technologies. Through such joint ventures and direct investment, sound environmental management practices could be transferred and maintained.

Finance and Costs Between $450 million and $600 million from the international community on grant or concessional terms.