

TECHNOLOGY TRANSFER NEEDS AND BARRIERS IN MONGOLIA

D.Dagvadorj, Ph.D

National Agency for Meteorology, Hydrology and Environment
Monitoring of Mongolia

Khudaldaany – 5, Ulaanbaatar 46, Mongolia

Tel: 976-1-318460, Fax: 976-1-326611, e-mail: d_dagvadorj@env.pmis.gov.mn

Introduction

The Government of Mongolia signed the UNFCCC on June 12, 1992 at the Rio Summit and the Great Khural (Parliament) of Mongolia ratified it on September 30, 1993. In order to comply with the obligations and commitments under the UNFCCC, the Government of Mongolia has constituted a National Climate Committee. The Parliament has passed a package of environmental laws pursuant to a framework of consensus, which includes the Law on Land, the Law of Air, the Law on Protected Areas, the Law on Underground Resources, and the Law on Mineral Resources, etc.

Mongolia is a landlocked country with dry and cold continental climate. Mongolia's economic development depends more heavily on agriculture and use of natural resources, and at the same time has less developed infrastructure and social service network. Due to these specific features, the physical environment as well as socio-economic development of the country might be effected significantly by global climate change. Beyond scientific and impact uncertainties decisionmakers have to take into account the socio-economic uncertainties in order to estimate how expected changes will affect human society, including economic wealth and social welfare.

Potential options and opportunities for Greenhouse gases (GHGs) emissions mitigation in Mongolia were identified based on analysis of results of the ranking of GHGs emissions by sources and sectors, and its projection up to 2020. The largest source of GHGs in Mongolia is fuel combustion for generation of power and heat, followed by livestock herding and grassland conversion to croplands. The smallest source is the waste management sector. Carbon uptake from changes in forest and woody biomass stocks will play an important role in the net GHGs emissions projections. Therefore, the primary areas for GHGs emissions mitigation in the case of Mongolia are the energy and forestry sectors.

Policymakers should develop and implement a policies and strategies at the national, regional or international level against to the issue. Studies to date

show that sustainable development of the country depends on the results of the actions to be undertaken for adaptation to the climate change and mitigation of source of the greenhouse gas emissions in national, regional or global scale. In these actions, the technology transfer will play an essential role. Environmentally-sound technologies and practices that could be implemented in the country will contribute both GHGs emissions mitigation and national development efforts.

The UNFCCC emphasizes the requirement of transfer of technology as an important element for mitigating climate change. The commitments under Article 4 cover the provision of new and additional financial resources to developing countries, for meeting costs of adaptation and to “promote, facilitate, finance” the transfer of, or access to, environmentally-sound technologies and know-how. These commitments are essential for developing country Parties.

Technology needs and technology needs assessments

Since 1990, Mongolia experiences a transition period from the central planned economy to free market economy. GDP declined more than by 20% between 1990-1993. However, starting in 1994 growth resumed with 2.3% growth in 1994, 6.3% in 1995 and 3.3% in 1997. The inflation rate declined by a factor three times in 1997 compared with that of 1996, to 17.5%.

Although the economy of the country is experiencing many transition difficulties, it has been undergoing radical structural changes providing conditions for multifaceted economic relations. The private sector role in the economy has been increasing with the continuing privatization of state assets.

The industrial sector is an active consumer of natural resources and extensively pollutes the environment. At present stage, the industrial sector in general is suffering from obsolete machinery and technology and a lack of the latest scientific and technological advances. Research carried out on the current situation of industrial machinery and technology in the country reveals that only 40% of all equipment within the social industry have been utilized for less than 5 years. The process of equipment modernization has been slow in major industrial sectors.

Application of advanced technologies during the recent decade has been mainly concentrated partially within the industries of mining, power supply and construction materials production, although the progress in those industries remains inadequate. Application of the achievements of science and technology to production is usually faced with obstacles due to the lack of proper research and testing facilities in specific industries other than the

mining and light industry sectors, coupled with weak development of innovative design facilities. In the industrial sector, there is a growing need to implement highly effective national technologies coupled with cost-effective, environmentally friendly and waste free foreign technologies in order to develop ecologically clean production.

Preparatory Actions to be undertaken to transfer the environmentally-sound technologies

To implement the opportunities for the environmentally-sound technologies diffusion, the following preparatory actions should be undertaken at the national level:

- To identify technology needs for main sectors
- To evaluate in-depth the priority mitigation technologies
- To identify the opportunities to promote the technologies diffusion
- To identify barriers to the development and transfer of technologies
- To identify the priority of barriers and practical steps should be undertaken to remove the barriers
- To establish a capacity building and institutional arrangements
- To identify the ways to participate in the bilateral and multilateral mechanisms for technology transfer
- To promote the participation of the private sector in technology transfer

Capacity building needs

Mongolia has a limited experiences in technology transfer in the context of climate change. There are a few initiatives related to technology diffusion in terms of climate change consideration in Mongolia. Therefore, the future of technology transfer will depend on suitable capacity being created and institutional arrangements being established for successful implementation of environmental policies. In order to develop the necessary conditions for the investment and transfer of technology, national capacity building will be required.

The knowledge of the decisionmakers and stakeholders about the climate change related problems as well as environmentally-sound technologies is very limited. Also, lack of human capital with the requisite

technical knowledge and skills is crucial for technology development and transfer. Poor maintenance of equipment is a common problem which affects their performance. Therefore, education and training of the related people is essential.

Efforts of bilateral and multilateral organizations should focus on the creation of capacity. Essentially, these efforts would involve the development of knowledge networks that combining know-how in select organizations with responsibility for implementation of suitable choices of technology in other organizations.

Barriers to technology needs

As mentioned earlier, Mongolia has very limited knowledge on technology transfer in terms of climate change. Market imperfections and institutional barriers have been identified as the main causes of lack of successful diffusion and implementation of technological innovations. There are a number of difficulties which the Government of Mongolia faces in choosing climate friendly technologies. One of the main barriers is the high initial capital costs of many climate friendly technologies. In addition to the financial barrier, there are a number of institutional and information barriers which the Government has to address before the deployment of climate friendly technologies will become more widespread in government facilities. These are:

1. distorted prices and limited competitive pressures; and
2. weakness of structures for generating and managing technical change in response to price signals and competitive environment. This weakness has the following features:
 - limited human and organizational resources needed to plan and manage the environment and operations involved in the use of technologies;
 - low technical capability to operate and maintain reasonable efficiency levels. In many situations technologies are operated at sub-optimal levels and usually below the design levels and standards of efficiency;
 - Lack of a system of innovation that would allow maintaining or increasing high efficiency levels through incremental technical and organizational changes;
 - Weakness of the service-supplier network which means that the operation of technologies stalls when some spare parts or aftersale service are lacking.

In Mongolia, projects and programmes focusing on the implementation and development of new and renewable energy technologies offer a good opportunity. Population and extension of these technologies has faced a number of constraints including: -

- *Lack of funds and routine maintenance:* After project operation of the equipment and facilities will depend on availability of spare parts and its systematic maintenance;
- *High cost of investment:* in some cases successful demonstration has not been followed by successful extension because of the high investment cost of units such as windmills and, photovoltaics,
- *Technical assessment problems:* Lifetime of the equipment and facilities installed under a project will depend on pre-project technical assessments and analysis,
- *Lack of people's participation* right from initiation to implementation of projects,
- *Negative attitudes* where in some cases the sponsors were unwilling to teach the beneficiaries how to operate the plant because they did not believe they could not grasp "sophisticated" technology.

Actions and initiatives to remove barriers

At the national level, linking GHG abatement with development agendas of the government is important for adoption and spread of the technology. The areas such as infrastructure development, local air pollution abatement, energy deficiencies and growth of small and medium industries are high in the development priorities of the country.

Successful adoption and diffusion of a new technology is a long drawn process. The following major steps promote the successful technology transfer. These are:

- Dissemination and networking of information about the new technologies;
- Demonstration projects and capacity building exercise;
- Training and education system.

Proper choice of technology is the key element of any technology process. Technologies will be selected using certain criteria based on the

special conditions in terms of current state of technologies-their adaptation and absorption, market, infrastructure and human resources etc.

Opportunities for investment and private sector participation

Including of representatives from leading private sector, industrial units and NGOs in policy formulation and implementation is a background of successful transfer of technology.

Technology transfer is not merely a movement of hardware and equipment. Hardware or physical capital only embodies one element of an entire economic process covering the subject of technology in its entirety. If successful technology transfer is to take place, then an essential element that has to be put in place before any development or flow of hardware actually comes about relates to the establishment of local capacity only to adopt, and if necessary adapt and use a appropriate technologies for the purpose of reducing the environmental burden on the earth. Local capacity can be built essentially by two sets of activities. The first relates to training and human resource development and the second focuses on the software aspects of technology, which are often ignored.

Ongoing and planned technology transfer activities

Significant reductions in GHGs emissions are technically possible and economically viable. Technology transfer incorporating with some of the key elements of the country's sustainable development strategies will lead to the economic development, opening up new markets for products and services and technology sharing between countries.

The main economic sectors and subsectors where can be transferred environmentally-sound technologies are as following:

- Power and heat generation (End-use efficiency improvement, system loss reduction efficiency improvement, coal beneficiation etc.)
- Renewable energy development (Solar, wind, hydro and biomass energy for small appliances and in remote areas with long term goal of development of large-scale renewable energy system etc.)
- Mining and natural resource processing industries (efficiency improvement of energy use, technologies upgrading, etc.)
- Transport sector (Fuel efficiency standards and consumption testing programmes, vehicle taxation policy, etc.),

- Arable farming (Change planting dates, use different varieties of spring wheat, and apply the necessary amount of nitrogen fertilizer at the optimum time, Improve vegetation cover through soil fertilization and seeding of perennial plants etc.),
- Livestock (Change the technology of pasture use and livestock breeding, generate extra feed supply, change cattle breeding technology, generate new type of livestock more adapted to changed climate and refine the method of regeneration, establish the type and number of animals for selected region regarding to the dynamic of pasture and extra feed production capacities, improve the water supply for watering and water management policies, and develop policy to protect soil from overgrazing and desertification etc.),
- Forestry sector (Minimization of further reduction of forest area, development of better reforestation and afforestation methods, Balanced utilization of forest resources, development of wood harvesting methods, development and strengthening of forest management and forest protection measures etc.)
- Waste management (development of municipal and industry waste management system)

There are a few projects related to climate change concerns in Mongolia. These are mainly bilateral technical assistance projects. Since 1993, a projects on partial innovation of the obsoleted machinaries and technologies of old power and heat plants and improvement of energy efficiency in the thermal power plants are implemented under the technical assistance from the Governments of Japan and Germany. Some of them are underway now. Also, the Government of the Netherlands signed a project proposals on waste water and solid water management in November 1999.

These projects are implemented or ongoing according to the sectoral development plans and programmes as well as Climate Change policies.

Portfolio of the potential project proposals on GHGs emission mitigation were developed under the ALGAS (Asia Least-Cost Greenhouse Gases Abatement Strategies) project which was implemented under the assistance UNDP/GEF through the ADB and completed in 1998.

Now, Mongolia is preparing its national Action Programme on Climate Change which will include the Government strategies and policies concerning the climate change related problems, including technology transfer opportunities.

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

To achieve the technology transfer opportunities, the UNFCCC consultative process for technology transfer should be focused on:

- Mechanisms that facilitate the flow of information on technology transfer
- Bilateral and multilateral mechanisms for technology transfer. May be a new mechanisms are needed.
- An inventory of environmentally-sound technologies ready for transfer
- Terms of technology transfer
- Technology needs of developing countries
- Setting up specialized centres or coordination mechanisms
- Capacity building in developing countries
- Opportunities for investment and participation of private sector in technology transfer

Conclusions

Since mitigation analysis has to incorporate technological developments and efficiency in production, it is intended to link these with the national development plans and programmes, as well as the national sectoral policies. It is also intended to develop National Action Plan on Climate Change on the basis of these findings, as well as facilitating evolution of implementable projects or programmes to facilitate GHG mitigation.

Furthermore, since one of the development scenarios for Mongolia involves regional cooperation, there is a need to study the impact of regional collaboration on development of Mongolia as well as seeking avenues of implementing mitigation options through regional collaboration and technology transfer.