

Such measures should include:

- reduction of energy use and GHG emissions due to the introduction of energy saving technologies and re-use of secondary raw materials and wastes;
- enhancement of storage and utilisation of materials that replace halogen containing substances; use of alternative technologies and materials with low GWP;
- optimisation of industrial processes.

6.2.5. Agriculture

The contribution of agriculture to the emission of carbon dioxide has grown from 7.3% in 1990 to 17.3% in 2000. Reduction of carbon dioxide emissions in agriculture can be achieved through the discontinuance of agricultural waste combustion. In the total structure of methane emission, agricultural methane emissions have grown from 50.4% in 1990 to 65.3% in 2000. Here, methane emission reduction is possible through the enhancement of manure storage systems. The share of this sector in total methane emissions constitutes up to 10.5%.

Measures of GHG emission reduction include:

- development of bio-technologies for crop yield increase (including energy crops);
- discontinuance of agricultural waste combustion;
- use of manure to get bio-gas and fertilisers;
- expansion and enhancement of informational and educational services to farmers;
- facilitation of seed-growing and cattle breeding, as well as adequate provision with modern equipment and fertilisers;
- strengthening of state inspections;
- enhancement of land cultivation systems in agriculture to decrease energy consumption and prevent soil erosion.

6.2.6. Waste

Annual methane emission of 34-112 Gg constitutes 25-39% of the total GHG emissions. If the emissions from manure storage systems in agriculture are added, then the total share of methane emissions makes up 33-45% of the total GHG emissions and reaches 130 Gg a year, which corresponds with the country's 10% forecasted natural gas needs in 2020.

Methane capture from waste and manure storage systems with biochemical methods will not only allow reducing GHG emissions, but also will simultaneously provide farms with fuel and secure organic fertiliser.

The following measures need to be undertaken:

- stimulating systems of collection, sorting and processing of domestic and agricultural waste;
- introducing modern bio-technologies of waste processing;
- supporting scientific research in the sphere of waste processing;
- strengthening government control.

6.2.7. Development of sinks

The development of sinks is an important element in the National Climate Strategy.

Kyrgyzstan's forestry sector is connected to the regulation of land use and other macroeconomic strategies that facilitate the use of forest land for other types of land use (for example farming, pasturing, and manufacturing).

Planting new trees in existing forests and creating new woods are important for carbon uptake. The National Forestry Strategy envisages an increase of forestland of up to 6% by 2025. Rehabilitating forests, planting new trees, increasing forest density and productivity, and reducing illegal tree cutting are expected to lead to a 50% increase of CO₂ sinks.

The potential of forest rehabilitation and planting in Kyrgyzstan is estimated at about 1,200 thousand hectares. If the planned measures are carried out, then the total CO₂ sink in forests will amount to about 1,336 Gg a year, 30% of which will be attributable to afforestation, and 70% to existing forests.

Beside the rehabilitation of natural forests, the development of industrial plantations of fast-growing trees such as poplar is promising for Kyrgyzstan.

6.3. Evaluation of basic GHG reduction measures

Table 6.2 illustrates the cost analysis for specific measures that can lead to the reduction of GHG emissions to the atmosphere if implemented within the framework of national development programmes. Lacking financial resources could jeopardise the implementation of these measures. Therefore, the country should try to involve all interested parties, including domestic and foreign investors.

Analysis of the data reveals the significant potential of GHG emission reduction if these measures are actually carried out.



Table 6.2. Assessment of planned measures for GHG reduction

Specific measures	Total cost (in mln. dollars)	State contribution (in mln. dollars)	Lacking resources (in mln. dollars)	GHG emission reduction (in Gg)
1. Energy sector:				
1.1. Improving electricity supply to Osh & Batken oblasts: • completion of 220 kV HVL Alay-Batken, 220/110/1kV SS Aygul/Tash; • reconstruction of 220 kV DF SS Alay, reconstruction of 110 kV SS Batken, Batken oblast	3.6 3.1	3.6 3.1	0.0 0.0	
1.2. Transformer replacement for 220 kV SS Uzlovaya in Osh city	1.4	1.4	0.0	
1.3. Reconstruction of 110 kV SS Izbasken in Jalal-Abad oblast	0.5	0.5	0.0	
1.4. Construction of 500 kV SS Datka with 220 kV HVL	44.3	0.0	44.3	
1.5. Construction of 220 kV HVL Frunzenskaya – Ala Archa	16.4	0.0	16.4	
1.6. Construction of 500kV HVL Toktogul HPS – Kamarata – Kemin with SS Kemin	327.7	0.0	327.7	
1.7. Construction and reconstruction of objects: • Toktogul HPS • Kurpsay HPS • Tashkumyr HPS • Shamaldy-Sai HPS • Uch-Kurgan HPS • Reconstruction of TPS Bishkek • Kamarata HPS –1; 2	1.3 1.3 2.9 4.7 4.3 8 323.4	1.3 1.3 2.9 4.7 4.3 8 0.0	0.0 0.0 0.0 0.0 0.0 0.0 323.4	
1.8. Rehabilitation, (re)construction of small HPS: • rehabilitation of HPS “Issyk-Ata” • construction of 7 small HPS in Batken oblast with a total power of 20 MW; • construction of Sokuluk HPS-1, power 1200 kW; • rehabilitation of HPS in Bashkaindy, power 1600 kW; • construction of HPS in Minkush, power 1000 kW • rehabilitation of HPS “Chaek”, power 800 kW; • reconstruction of KA HPS; • construction of HPS on Nayman canal in Naukat rayon; • construction of HPS “Kudurgu”, power 800 kW	6.5 21.6 0.9 1.3 0.9 0.9 0.7 0.5 0.9	6.5 0.0 0.0 0.0 0.0 0.0 0.7 0.5 0.0	0.0 21.6 0.9 1.3 0.9 0.9 0.0 0.0 0.9	
1.9. Organisation of series manufacture of the electronic ignition system “Zhel-Argy” for motor vehicles	1.0	0.5	0.5	610
1.10. Buildings and other structures. Organisation of heat saving measures				210
Energy sector total:	778.04	39.3	738.8	
2. Agro-industrial sector (includes agriculture and the industry that processes agricultural products):				
2.1. Stimulation of environment friendly manufacturing: • organisation of seminars on clean technologies; • modernisation of equipment of the Ministry of Agriculture and Water Resources’ Inspection Service, and timely action against random and agro-chemical emissions; • product quality control	4.1	4.1	0.0	
2.2. Stimulation of intensive methods of agricultural development through: • training for farmers and rural inhabitants on implementation of new production techniques; • completion of irrigation systems rehabilitation and irrigation network management reform within the WB and ADB- sponsored projects. General overhaul and maintenance of water supply facilities.	70.2 26.8	22.7 20.2	47.5 6.6	
2.3. Food and processing industry development: • formation of agricultural production and processing associations; • formation of a nation-wide system of commodity and raw material exchange engaged in distributing agro-industrial products; • enlargement of credit facilities for the food and processing industry	0.1 0.2 19.1	0.1 0.0 19.1	0.0 0.2 0.0	
Agro-industrial sector total:	120.6	66.35	54.3	
3. Waste processing:				
3.1. Biogas production from waste of animal husbandry and urban domestic waste.	1.6	0.8	0.8	130
4. Sinks development:				
4.1. Expansion of forest area to 340,000 ha by 2025	272	136	136	1336
Total:	1,172.3	242.3	929.8	

DF – distributive facility

HVL – high-voltage line

SS – substation

7. IMPROVING EDUCATION AND PUBLIC AWARENESS ON CLIMATE CHANGE ISSUES

Enhancing public awareness and knowledge of the climate change problem, its anthropogenic impacts and its adverse consequences are of great importance to promoting effective measures and developing new governmental policies in this area.

Development and implementation of measures toward education and public awareness of climate change issues, promotion of public access to information on climate change, training of scientific, technical and management personnel – all these are among the Kyrgyz Republic's commitments to the UN Framework Convention on Climate Change and the Aarhus Convention.

To achieve the above-mentioned purposes, the Concept of Continuous Environmental Education is being developed in Kyrgyzstan. Global climate change has been distinguished in the Concept as one of the most important applied environmental issues. The panel of the UNDP/GEF Project on Climate Change in Kyrgyzstan took active participation in the process of developing both the Concept of Environmental Education and standard programmes on Ecology and Safety of Human Activities. These are mandatory within education standards for all professions acquired via higher education. The standards are designed to study global warming issues and their impact on human activities.

7.1. Education and training

The system of education and training in the Republic comprises the following institutions: pre-schools and other educational centres, elementary, general and secondary schools, lyceums, gymnasiums, vocational schools, technical schools, colleges, universities, and institutions and other centres for post-graduate education (advanced training) and graduate schools (master's, doctor's degrees).

Curricula of pre-school and general education institutions include courses that, in a comprehensible way, cover climate formation conditions, the main climatic factors, and their importance to the environment.

For the purpose of providing information to schools, higher education institutions, interested experts and the wider community, the Project Panel has prepared the following items for publication:

- Climate and Environment (paperback);
- three issues of the Information Bulletin 'Enabling the Kyrgyz Republic to Prepare its First National Communication in response to its Commitments to the UN Framework Convention on Climate Change', both in electronic and hard copy versions;
- Sustainable Development of Environmental and Economic Systems Under Conditions of Climate Change (manual on sustainable development issues), a thematic collection of articles covering climate change issues.

The Kyrgyz-Russian Slavic University trains experts in meteorology and climate studies. Professions related to environmental protection, ecology and nature management, which



might be oriented to climate change issues, can be acquired at the following higher education institutions in Kyrgyzstan:

- Kyrgyz National University
- Kyrgyz State University of Construction, Transport and Architecture
- Kyrgyz Mining University
- International University of Kyrgyzstan
- Kyrgyz State Pedagogical University
- Bishkek Humanities University
- Kyrgyz Technical University
- Issyk-Kul, Osh, and Jalal-Abad Universities

7.2. Mass media

Press, radio and television are the main mass media in the Kyrgyz Republic. According to public awareness assessment conducted in the country's regions, television is the main source of information on environmental issues. Within the framework of the present project on climate change, six videos have been prepared and shown on the main television channels in Kyrgyzstan. Moreover, several debates and four round-table discussions on television have been conducted. Finally, information on the main climate change issues has been published in the country's popular newspapers.

7.3. Other information sources

Other information sources can be found in the major public libraries in Kyrgyzstan, the UNDP library in Bishkek, and the libraries of leading universities. Materials include publications by IPCC, WMO, the Conferences of Parties to the UN-FCCC, National Communications on Climate Change of different countries, information provided by Kyrgyzstan's ministries and other state bodies, information from/ about the country's major enterprises, opinions of national and international experts etc. The Internet is a good channel to receive information on climate change issues. Information is selected and stored in electronic form at the Project Implementation Unit. There is a web-site on the Kyrgyzstan and UNFCCC Project, where project results and all necessary information on climate change issues are stored.

7.4. Environmental organisations

Environmental non-governmental organisations (NGOs) play a vital role in public awareness and environmental education, and they can contribute to solving environmental problems, mainly at the local level. At present, there are about 200 environmental NGOs in the Kyrgyz Republic. Some of them are engaged in ecological education and attitude development, the rest implement activities in the field of environmental protection. Thus, NGOs have taken measures to clean up ecologically vulnerable natural areas, to organise a Keep your City Clean campaign, and to plant trees. They have also carried out demonstration projects in the area of alternative (i.e. renewable) energy sources.

The adoption by Kyrgyzstan of the Aarhus Convention on access to information on the environment provides new prospects for the dialogue between governmental bodies and public organisations. However, at present, NGOs do not pay adequate attention to climate change issues. Only some of them are concerned with climate change problems, but the implementation of some measures is not feasible without broad public involvement (for instance, separate collection of wastes). Therefore, measures on enhancing non-governmental organisations' involvement in this area are needed.

Civil sector experts have been engaged in the present project's implementation – those were experts from schools, higher education and research institutions (more than 100 people), including ten experts from NGOs.

Climate change issues, the purposes of the current project and its results have been discussed in more than 40 round-tables, seminars, and conferences on environmental problems and sustainable development organised by various NGOs.

Within the framework of the project itself, five workshops with extensive community and NGO participation were conducted with the purpose of informing them about the goals and tasks of the project, the results of particular stages, and of the project as a whole.

