Second National Communication of the Republic of Moldova

under the United Nations Framework Convention on Climate Change

MINISTRY OF ENVIRONMENT
AND NATURAL RESOURCES

Second National Communication of the Republic of Moldova

under the United Nations Framework
Convention on Climate Change

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FOREWORD

It is well known that climate change is a global ecological problem that endangers sustainable development of humanity. It can have diverse negative impact such as world ocean level rise, increased frequency of natural disasters (floods, droughts, heat waves, hurricanes, tornadoes, etc.), higher vulnerability of natural and artificial ecosystems to new climate conditions, etc. This requires from the world's nations to undertake actions aimed at both minimisation of climate change, and its possible consequences.

This Report has been developed with the assistance of the Global Environment Facility through the Project "Republic of Moldova: Enabling Activities for the Preparation of the Second National Communication under the United Nations Framework Climate Change Convention" managed by the United Nations Environment Programme and the Ministry of Environment and Natural Resources. It has systemised the research outputs of the Moldovan scientists in such areas as air pollution, national and regional climate change trends, vulnerability and adaptation to climate change of natural and artificial ecosystems, human health, etc.

It is important that these results underpinned the forecast of climate changes for the XXI century, which served as basis for developing a set of recommendations to minimize the negative impact of such change. These recommendations underlie the Adaptation to Climate Change National Action Plan and National Strategy on Climate Change Mitigation, pending to be approved by the Government of the Republic of Moldova.

This report and implementation of the Adaptation to Climate Change National Action Plan and National Strategy on Climate Change Mitigation represent the Republic of Moldova's input to finding a solution to the global climate change problem.

Violeta Ivanov
Minister of Environment and Natural Resources

LIST OF ACRONYMS, ABBREVIATIONS AND MEASURE UNITS

ADD	Acute Diarrhoea Diseases
ADR	Accord Dangerousness Route
AEL	Air Electrical Line
AGeoM	State Agency for Geological Prospecting
AITT	Agency of Innovation and Technology Transfer
ALRC	Agency for Land Relations and Cadastre
ANRE	National Agency for Energy Regulation
APA	Academy of Public Administration
AR4	Forth IPCC Assessment Report
Art.	Article
ASEM	Academy of Economic Studies of Moldova
ASM	Academy of Science of Moldova
a. s.	active substance
AT	Agency for Transport
ATULBD	Administrative Territorial Units on the Left Bank of Dniester
B	Billion
BLS	Base Line Scenario
BNM	National Bank of Moldova
BOD	Biochemical Oxygen Demand
BPC	Biphenyl Polychlorates
^0C	Celsius degrees
¢	Cents
C	Carbon
Ca^{++}	Calcium ions
CAPMU	Consolidated Agricultural Projects Management Unit
CCI	Chamber of Commerce and Industry
CDM	Clean Development Mechanism
CEA	Central Environmental Authority
CEMT	European Conference of Ministers of Transport
CF_4	Perfluoromethane
C_2F_6	Perfluorethane
C_3F_8	Perfluoropropane
C_4F_{10}	Perfluorobutan
c-C_4F_8	Perfluorciclobutan
C_5F_{12}	Perfluorpenthan
C_6F_{14}	Perfluorhexan
CFC	Chlorofluorocarbons
CFM	Moldovian Railways
CH_4	Methane
CHEAP	Hydro-power plant with accumulation by pumping
CHP	Combined heat and power plant
CHPO	Combined heat and power plant in Ocnita
C.I.F.	Cost, Insurance and Freight
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
Cl^-	Ions of chlorine
cm	centimetre
cm^2	square centimetre
CO	Carbon monoxide
CO_2	Carbon dioxide
COD	Chemical Oxygen Demand
COP	Conference of the Parties
CORINAIR	European Emissions Inventory Guidebook developed by European Environment Agency
CPA	Central Public Authorities
CPI	Consumer Price Indexes
CR	Crop Residues
CS	Country Specific
CSI	Commonwealth of Independent States
D	Default
dal	dekalitre
DEPA	Danish Environment Protection Agency
DOC	Degradable Organic Carbon
DOC_F	Dissimilated DOC Fraction
dm	Decimetre
d.m.	Dry Matter
E	East
EB	Energy Balance
EBRD	European Bank for Reconstruction and Development
EEA	Energy Efficiency Agency
EECAC	Eastern Europe, Central Asia and the Caucasus
EEF	Energy Efficiency Fund
EF	Emission factor
EIC	Environmental Information Centre
EMEP	Programme on Observations and Assessment of Long-Range Transboundary Air Pollution in Europe
ENPEP	Energy and Power Evaluation Program
ENVSEC	Environment and Security Initiative
eq	Equivalent
ERTP	Emissions Register and Transfer of Pollutants
ETAC	Electric Transport Administration of Chisinau
EU	European Union
EV	Emissions Volume
F_{AM}	Amount of nitrogen applied to soil with manure
F_{COMP}	Annual amount of total compost N applied to soils
F_{CR}	Annual amount of N in crop residues returned to soils
F_{ON}	Annual amount of managed animal manure, compost, sewage sludge and other organic N additions applied to soils
F_{PRP}	Annual amount of urine and dung N deposited by grazing animals on pasture, range and paddock
F_{SOM}	Annual amount of N in mineral soils that is mineralized, in association with loss of soil C from soil organic matter as a result of changes to land use or management
F_{SN}	Annual amount of synthetic fertilizer N applied to soils
FAO	Food and Agriculture Organization
FOB	Free on Board
FOD	First Order Decay Method
FTDC	Forestry Technology and Design Centre

g	Grams
g.c.e.	Grams of coal equivalent
Gcal	Gigacalory
GDP	Gross Domestic Product
GEF	Global Environmental Facility
Gg	Gigagram (10^9 grams)
GHG	Greenhouse gases
GOST	Regional Standardization System used by the Euro-Asiatic Council for Standardization, Metrology and Certification in the Commonwealth of Independent States
GPG	Good Practice Guidance
GR	Government Resolution
GWP	Global Warming Potential
h	hour
ha	hectare
HAS	High Alternative Scenario
H_2CO_3	Carbonic Acid
HCl	Hydrochloric acid
HDNR	Human Development National Reports
HFC	Hydrofluorcarbons
hl	Hectolitre
HNO_3	Nitric acid
H_2O	Water
HPP	Hydro Power Plant
H_2S	Hydrogen Sulphide
IAAE	International Agency for Atomic Energy
IAS	Intermediary Alternative Scenario
IBRD	International Bank for Reconstruction and Development
ICPDR	International Commission for Protection of the Danube River
IDA	International Development Association
IE	Included Elsewhere
IE ASM	Institute of Energy of the Academy of Science of Moldova
IEMINC	Integrated Ecological Monitoring and Information Management Centre
ILB	International Labour Bureau
IMF	International Monetary Fund
INTAS	International Association for the promotion of co-operation with scientists from the New Independent States of the former Soviet Union
IPCC	Intergovernmental Panel for Climate Change
JSC	Joint Stock Company
K^+	Ions of potassium
kg	kilogram
kg c.e.	kilograms coal equivalent
km	kilometre
km^2	square kilometre
kPa	kilopascal
kt	kilotonne
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
KC	Key Categories
L	Level
l	Litre
LAS	Low Alternative Scenario
LPA	Local Public Authorities
LPG	Liquefied Petroleum Gases
Ltd.	Limited liability company
LULUCF	Land Use, Land-Use Change and Forest
m	meter
m^2	square meter
m^3	cubic meter
MAED	Model for Analysis of the Energy Demand
MEAEI	Ministry of Internal Affairs and European Integration
MAI	Ministry of Internal Affairs
MAFI	Ministry of Agriculture and Food Industry
MCTD	Ministry of Construction and Territory Development
MCT	Ministry of Culture and Tourism
MD	Moldova
MDL	Moldovan Lei
MDG	Millennium Development Goals
MID	Ministry of Information Development
MEC	Ministry of Economy and Commerce
MENR	Ministry of Environment and Natural Resources
MEY	Ministry of Education and Youth
MF	Ministry of Finance
Mg^{++}	Ions of magnesium
mg	Milligram
MH	Ministry of Health
MIA	Integrated Water Management
mil.	Million
MJ	Megajoule (10^6 joule)
MLPA	Ministry of Local Public Administration
ml	Millilitre
mm	Millimetres
MoD	Ministry of Defence
MoJ	Ministry of Justice
MOP	Meeting of the Parties to the Kyoto Protocol
MR	Ministry of Reintegration
MRS	Medium Realistic Scenario
MSPFC	Ministry of Social Protection, Family and Child
Mt	Megatonne (10^6 tonnes)
MTPP	Moldovan Thermal Power Plant
MW	Megawatt (10^6 watt)
N	North
Na^+	Ions of Sodium
NaOH	Sodium Hydroxide
NA	Non Applicable
NATO	North Atlantic Treaty Organization
NBS	National Bureau for Statistics
NCAC	National Certification and Accreditation Committee
NE	Not Estimated
NEEG	Norwegian Energy Efficiency Group

NEF	National Ecological Fund
NGO	Non-Governmental Organisation
NH_3	Ammonia
NH_4^+	Ammonium
NIATT	National Institute of Advanced Training for Teachers
NIR	National Inventory Report
NMVOC	Non Methane Volatile Organic Compounds
NO	Not Occurring
NO_x	Nitrogen Oxide
NO_3^-	Nitrate
N_2O	Nitrous Oxide
NPD	National Political Dialogue
Nr.	Number
NSPCPM	National Scientific-Practical Centre for Preventive Medicine
O_3	Ozone
ODA	Official Development Assistance - Technical Assistance and Cooperation Program between the Republic of Moldova and Czech Republic on implementation of environment protection projects
ODP	Ozone Depleting Potential
ODS	Ozone Depleting Substances
OECD	Organisation for Economic Cooperation and Development
OSCE	Organization for Security and Cooperation in Europe
Pag.	Page
PCN	First National Communication
PDD	Project Design Document
PFC	Perfluorcarbons
PIN	Project Identification Note
PJ	Petajoule (10^{15} joule)
PM10	10 µm fraction particulate matter
POP	Persistent Organic Pollutants
ppm	parts per million of volume
PPP	Purchasing Power Parity
PR	Parliament Resolution
RCVD	Republican Centre for Veterinary Diagnostics
REC	Regional Environment Centre
RDITT	Research, Development, Innovation and Transfer of Technology
RM	Republic of Moldova
SACA	State Administration of Civil Aviation
SAR	IPCC Second Assessment Report
SAUM	State Agrarian University of Moldova
SB	State Budget
SCSTD	The Supreme Council for Science and Technology Development
SE	State Enterprise
SEI	State Ecological Inspectorate
SEV	Specific Emissions Values
SF_6	Sulphur Hexafluoride
SGTI	Steam-Gas Turbine Installations
SHS	State Hydrometeorological Service
SIDA	Swedish International Development Cooperation Agency
SME	Small and Medium Enterprises
SMS	Standardization and Metrology Service
SN	Synthetic N Fertilisers
SNC	Second National Communication
SO_2	Sulphur Dioxide
SRA	State Roads Administration
SWDS	Solid Waste Disposal Sites
T	Trend
t	ton
T1	Tier 1
T2	Tier 2
TACIS	Technical Aid to the Commonwealth of Independent States
TAR	IPCC Third Assessment Report
t.c.e.	tonnes of coal equivalent
TDC	Total Discounted Costs
TG	Teragram (10^{12} gram)
TJ	Terajoule (10^{12} joule)
TI	Total Investments
TMS	Tractors and Machinery Stations
TOW	Total organic waste in waste-water
TPP	Thermal Power Plant
TTI	Transfer of technologies and innovation
TV	Television
UCTE	Union pour la Coordination du Transport de l'Electricite
UN CEE	United Nations Economic Commission for Europe
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNO	United Nations Organisation
UPA	Utility Patent Application
USSR	Union of Soviet Socialist Republics
USA	United States of America
USAID	United States Agency for International Development
US EPA	United States Environment Protection Agency
USD	US$
USM	State University of Moldova
UST	State University of Tiraspol (based in Chisinau)
UTM	Technical University of Moldova
VAT	Value Added Tax
WASP	Wien Automatic System Planning
WB	World Bank
WMO	World Meteorological Organization
$	US Dollars
°	Degrees
′	Seconds
%	Percent
‰	Promile

CONTENTS

SUMARRY

SUMMARY

S.1 Introduction

S.1.1 Convention's Ultimate Objective

The ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) is aimed to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. To-date 196 countries are Parties to the Convention. The Republic of Moldova signed the UNFCCC on June 12, 1992 and it was ratified by the Parliament on March 16, 1995.

Article 4, paragraph 1(a) and Article 12, paragraph 1(a) of the UNFCCC stipulate that each Party has to make available to the Conference of the Parties (COP) a national inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be agreed upon by the Conference of the Parties; also a general description of steps taken or envisaged by the Party to implement the Convention; and any other information that the Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, material relevant for calculations of global emission trends".

S.1.2 Reporting under the Convention

The main mechanism for making this information available is national communications. COP 2 (Geneva, 1996) adopted the Guidelines on national communications from non-Annex I Parties (Decision 10/CP 2). In conformity with the respective Guidelines, in 1998-2000 under the *UNDP-GEF Project "Enabling Activities for the preparation of the FNC under the UNFCCC"*, Republic of Moldova developed its First National Communication to UNFCCC (including a national GHG inventory for a time series from 1990 through 1998), submitted to the COP 6 (Hague, 2000).

The COP 8 (New Delhi, 2002) adopted new Guidelines on national communications from non-Annex I Parties (Decision 17/CP 8). In conformity with these Guidelines, in 2005-2009 under the *UNEP-GEF Project "Enabling Activities for the preparation of the SNC under the UNFCCC"*, Republic of Moldova developed its Second National Communication under the UNFCCC (including a national GHG inventory for 1990-2005 time periods).

The COP 3 (Kyoto, 1997) adopted the Kyoto Protocol, representing an instrument setting binding targets for the Parties under Convention, by committing industrialized countries and economies in transition included in Annex I to Convention, to reduce total emissions of direct GHG by at least 5 percent, against 1990 levels over the five-year period 2008-2012. The Republic of Moldova ratified the Kyoto Protocol on February 13, 2003 (the official date of accession was April 22, 2003). As a non-Annex I Party, the Republic of Moldova has no commitments to reduce GHG emissions under this Protocol.

S.2 National Circumstances

S.2.1 Physical Context

Geographical Location. Republic of Moldova, covering an area of 33,846 square km, is located in Central Europe, in the north-western Balkans. Moldova borders on Ukraine in the North, East and South and on Romania in the West, with the Western border line going along the river Pruth. The Republic of Moldova is a Black Sea region country. Its southern border extends almost as far as the Black Sea coast, and the access to the Black Sea is open for Moldova through the Dniester estuary and the Danube.

Relief. The relief of the Republic of Moldova is represented by hills and flatland areas, with uplands mostly in the central part of the country. The absolute altitudes are within the range of 429 m (Balanesti Hills) and 4 m above the sea level in the Dniester flood land (Palanca village).

Climate. The climate of the Republic of Moldova is moderately continental, characterized by relatively mild winters with little snow, long warm summers and low humidity. The average annual air temperatures vary between 8-12°C, and amount of precipitations, respectively between 450-900 mm per year.

S.2.2 Natural Resources

Land Resources. Republic of Moldova has unique land resources characterized by: (a) predominant black earth soils with high productivity potential, very high utilization rate (>75%); and (c) rugged topography (above 80% of the total arable land are located on hill slopes).

Water Resources. The hydrographical network accounts for circa 2.7% of the country's territory and has a total length of circa 16 thousand km. The main rivers are Dniester and Pruth, with a small opening to the Danube in the South. Moldova's hydrographical network density is 0.48 km per square kilometre on the average, varying between 0.84 km/

km^2 in the northern regions and 0.12 km/km^2 in the regions on the left bank of the Dniester. There are approximately 60 natural lakes and more than 3.5 thousand water storage reservoirs. There are also seven thousand boreholes (water-wells) in the RM drawing from the ground water resources, estimated at circa 3.5 mil. m^3/day.

Biological Resources. The flora of the Republic of Moldova comprises about 5513 plant species (with 1989 superior plants and 3524 inferior plants). The ecosystems which have the richest flora composition include: the forest (above 850 species), steppe (above 600 species), high-water basin (approximately 650 species), petrophyte (about 250 species), water and swamp (about 160 species) systems. Moldova's fauna is relatively rich and manifold. There are above 15.5 thousand species of animals in Moldova, including 461 species of vertebrates and above 15 thousand species of non-vertebrates. The vertebrates include 70 species of mammals, 281 bird species, 14 reptile species, 14 amphibian species and 82 fish species. Birds are highest in number among the vertebrates (281 species and subspecies), and insects - among non-vertebrates (above 12 thousand species). There are five natural reservations established for scientific research purposes with the total area of 19.4 thousand ha in the RM.

Mineral Resources. In the RM mineral resources are extracted from 425 deposits, the most important being limestone, granite, slate clay, bentonite clay, sand, diatomite, gypsum and chalk stone. Most of the minerals are extracted from open mines, and only certain limestone varieties are mined from stone quarries (underground galleries).

S.2.3 Administrative-Territorial Organization, Population and Human Context

Administrative-Territorial Organization. The Republic of Moldova is administratively divided into 32 regions (Anenii Noi, Basarabeasca, Briceni, Cahul, Cantemir, Calaraşi, Cauşeni, Cimislia, Criuleni, Donduseni, Drochia, Dubasari, Edinet, Falesti, Floresti, Glodeni, Hinceşti, Ialoveni, Leova, Nisporeni, Ocnita, Orhei, Rezina, Riscani, Singerei, Soroca, Straseni, Soldanesti, Stefan Voda, Taraclia, Telenesti, Ungheni), 5 municipalities (Chisinau, Balti, Comrat, Tiraspol and Bender) and 2 administrative-territorial areas: Administrative-Territorial Unit Gagauzia (ATU Gagauzia) and the administrative-territorial units on the left bank of the Dniester (ATULBD).

Population. As of 01.01.2008 Moldova's population was 4.1 million people, with the density of approximately 122 persons per square kilometre. Thus, numerically the Republic of Moldova outruns such European countries as Lithuania, Ireland and Slovenia. Females prevail with 52.3 percent in the nation's population - as opposed to 47.7 percent of males in the total population. The majority of the population is concentrated in the rural areas. The existing 1614 rural settlements have 2.3 million residents (55.1 percent of the total population), averaging about 1400 residents per settlement. The urban population is 1.8 million making 44.9 percent of the total (on average circa 27 thousand population in a settlement). According to the data of the 2004 population census held separately in the areas on the right bank of the Dniester and in the administrative-territorial units on the left bank of the Dniester, Moldovans accounted for about 69.6 percent of the country's population, Ukrainians – 11.2 percent, Russians – 9.4 percent, Gagauz – 3.8 percent, Bulgarians – 2.0 percent, Romanians – 1.9 percent, Gypsies – 0.3 percent, Jews – 0.1 percent and other nationalities – 1.6 percent.

Demographic situation. During 1990-2007 the demographic processes featured a distinctive negative development pattern, which showed itself in the general instability of demographic indicators and phenomena as well as falling birth rate, growing mortality, depopulation, demographic ageing, etc. For example, the 2007 birth rate was 10.6‰ (17.7‰ in 1990), while the mortality was 12.0‰ (9.7‰ in 1990); the infant mortality rates was 11.3‰ (19.0‰ in 1990); the share of population aged under 15 decreased down to 19.2 (27.9 percent in 1990), and the age group of persons above 60 increased respectively from up to 14.8 (12.6 percent in 1990); the 'average life expectancy at birth' indicator somewhat decreased - from 69.0 years in 1990 to 68.8 years in 2007 (the respective indicator decreased from 65.5 years to 65.0 years for males and increased from 72.3 years to 72.6 years for females).

Public Health. By the end of 2007 the health facilities network in the Republic of Moldova included: 83 hospitals, 706 medical facilities of ambulatory or polyclinic type, 40 sanitary-epidemiological facilities, 132 emergency stations and posts, three children homes and two tuberculosis sanatoriums. The number of beds in hospitals was circa 21.9 thousand or 61.3 beds per 10,000 population; respectively, the total number of doctors was 12.7 thousand, or 35.6 doctors per 10,000 population. In 2007 the health care expenditures accounted for circa 12.9% of the State Budget for 2007. Over the period from 1990 to 2007 the overall mortality rate tended to increase. The mortality breakdown analysis has demonstrated that cardiovascular pathologies are still the principal cause of death (56.2 percent), followed by tumours (12.5 percent) and intestinal diseases (9.9 percent). The mortality rates by region are not uniform, registering dramatic differences between the regions. In the last few years the lowest mortality rates were reported in the municipality of Chisinau and in Balti, whereas the highest rates in Donduseni, Briceni and Edinet districsts.

Educational System. The Ministry of Education and Youth, the Municipal Education Departments, Regional General Departments of Education and Educational Establishments are responsible for the delivery of the primary, secondary general, secondary professional, secondary vocational and university education. At the beginning of the 2007/2008 school year the RM had 1534 operating primary and secondary general educational establishments, 75 secondary professional educational establishments, 49 secondary vocational education establishments (colleges), and 31 higher education establishments; post graduate studies for a doctoral degree being provided in 44 scientific research institutes and higher education establishments. The expenditures for education accounted for circa 10.3% of the State Budget for 2007.

S.2.4 Institutional Arrangements

Institutional Arrangements Relevant for the Preparation of the NCs. On behalf of the Government of the Republic of Moldova, the Ministry of Environment and Natural Resources (MENR) is responsible for implementation of international environment treaties to which Moldova is a Part (including the United Nations Framework Convention on Climate Change). Representatives of the MENR and subordinated institutions also perform the function of the GEF Policy and Operations Focal Points, as well as the UNFCCC Focal Point. The Climate Change Office under the MENR is totally responsible for the activities related to preparation of National Communications in the Republic of Moldova.

S.2.5 Economical Context

Gross Domestic Product. In 2008 the share of Industry Sector in the GDP structure was 14.6 percent, Agriculture – 9.9 percent, Transport and Communications – 12.0 percent, Constructions – 5.4 percent, Wholesale and Retail Trade – 11.6 percent, Financial Activities – 6.4 percent, Other Sectors - 24.2 percent, Net Product and Import Taxes – 18.6%.

The country's economy was in decline even before 1991, but the separation from the USSR has accelerated that process considerably. Gross Domestic Product levels were decreasing continuously during the period from 1990 to 1999 inclusively, when it fell down to as little as 34 percent of the 1990 level (Figure S-1). The only exception was year 1997, when a slight increase by 1.6 percent versus the previous year was registered due to the excellent agricultural yields as result of the very favourable weather.

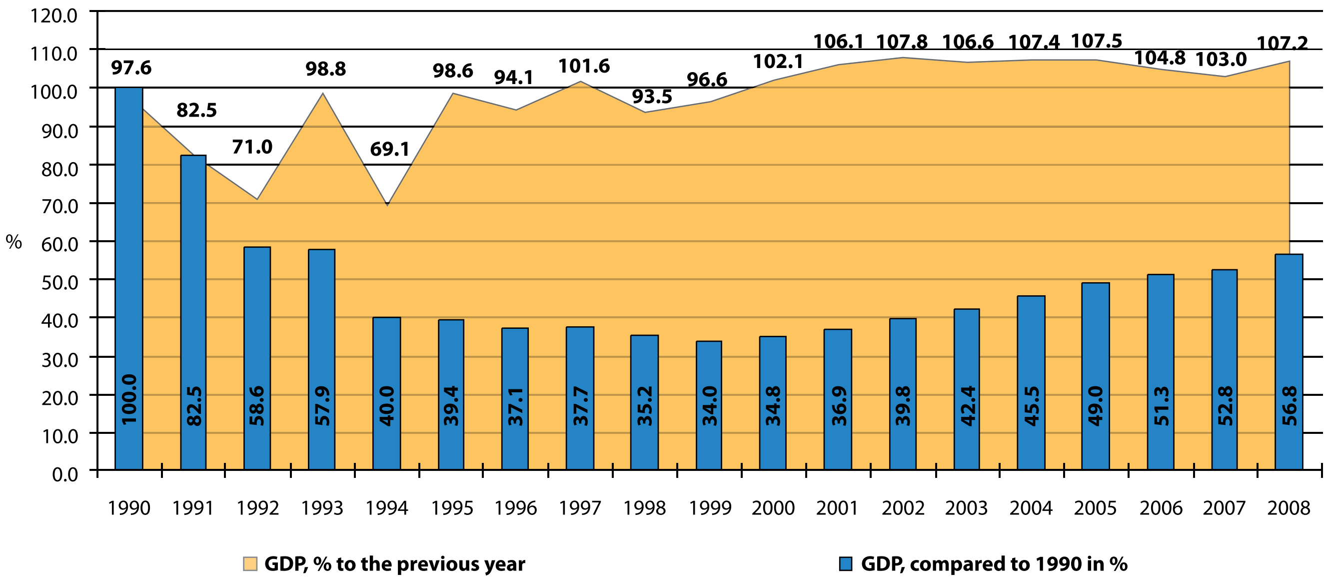


Figure S-1: Gross Domestic Product in the Republic of Moldova, 1990-2007

The reasons for the economic collapse were multiple. First, Moldova had been integrated completely in the USSR economic system, and the independence resulted, among other things, in the termination of any subsidies or cash transfers from the centralized government. Second, the end of the Soviet Era with its well established commercial links has resulted in the emergence of multiple obstacles for free circulation of products, and in access restrictions introduced by the emerging markets. Third, the lack of domestic energy resources and raw materials in Moldova has contributed considerably to the nation's strong dependence on other former Soviet Republics. Certain internal reasons should be mentioned as well, such as: transit to the market economy from the centralized economy; loss of the industries located in Transnistria; frequent droughts; and the civil hostilities. The considerable GDP growth achieved since 2000 seems to indicate that the economy is finally developing in the correct direction, although it should be remembered that in 2008 the GDP reached only 56.8 percent of the 1990 level.

Inflation. The inflation rate grew dramatically up to approximately 1200 percent in 1993 and slowed down to 8 percent in 1998. The 1998 depreciation of the Russian Rubble caused rapid growth of the inflation up to 39 percent. Moldova has since achieved a significant progress in terms of controlling its inflation rate, and the inflation rate decreased to 5.2 percent in 2002; however, the 2003 average inflation rate for the year grew up to 11.6 percent driven by the growing prices for agricultural products (as result of a severe drought), and the above growth pattern persisted in the subsequent years; the inflation reached 12.4 percent in 2004, but decreased to 11.9 percent in 2005 – only to grow up to 12.7 percent in 2006, in particular due to the increased prices for the natural gas imported from Russian Federation, for fuel and medications. The average inflation rate for the year was about 12.3 percent in 2007 and 7.3 percent in 2008.

Trade Balance Deficit. Moldova's import expenses exceed considerably the nation's proceeds from its exports, thus indicating a very grave problem in terms of the nation's trade balance deficit. That deficit reached 24 percent of the GDP in 2000 and exceeded 54 percent of the GDP in 2007. The above reflects the nation's dependence on the imports of energy resources and the growing demand for the imported products. The imports growth is driven by the massive inflow of cash transfers from abroad, which are channelled in domestic consumption.

Cash Transfers and Remittances. Cash transfers from outside the country, and in particular cash inflows from the Moldavians working abroad are of major importance for the economy of Moldova. In 2007 the total net inflow of foreign currency from the Moldavians employed abroad was approximately USD 1,437 million (about 32.7 percent of the GDP). According to unofficial data, the above figures considerably underestimate the actual volumes of cash transfers. Notwithstanding the trade balance deficit for products and services (53.4 percent in 2007), increasingly higher cash inflows from the Moldavians employed outside the country have contributed to the decrease of the current account deficit of Moldova from 19.7 percent of the GDP at the end of 1998, down to 15.8 percent of the GDP in 2007.

Investments. In 2007 the direct foreign investments attracted to the national economy (net values) accounted for USD 448 million (10.2 percent of GDP), increasing considerably as compared to the preceding years' levels (in 2006 - USD 399 million; in 2005 - USD 267 million; in 2004 - USD 239 million; in 2003 - USD 184.5 million; in 2002 - USD 116.2 million; in 2001 - USD 146.1 million). The top investor countries for the Republic of Moldova include: the Netherlands, Russian Federation, Spain, USA, Germany, Romania, France, UK and Turkey.

Social Sphere. The average monthly salary of an employee in the national economy was MDL 2529 in 2008, a 22.6 percent increase versus the same period of 2007. The average monthly old-age pension was MDL 548.3 as of January 1, 2008, increasing by 24 percent as compared to its level as of January 1, 2007, whereas the real value of the pension grew only by 9.6 percent. According to the International Labour Organization (ILO), the number of unemployed in 2008 was 48.7 thousand, compared to 66.7 thousand in 2007 and 99.9 thousand in 2006.

S.2.6 Current State of the National Economy

Industry. In 2007 the industrial production reached approximately MDL 26.17 billion (in current prices), or as little as 53.8 percent of the 1990 level (Figure S-2). During 1990-2007 the industrial production featured certain fluctuations, showing the best performance in 2001 and 2003 and the worst performance in 1992 and 1994. The situation in the manufacturing industry was determined mainly by the processing industry which in 2007 accounted for 85.3 percent of the total production of the large enterprises whose main business was manufacturing. Food and drinks industry accounted for the highest share in the processing industry performance - 39.7 percent of the total production (processing and canning of meat and meat products, fruit and vegetables, production of diary products, pastry, fodder, bread and baked products, sugar, confectionary, cocoa, chocolate, confectionary, alcoholic drinks, wine, beer, etc.), as well as production of other products of non-ferrous minerals (13.1 percent of the total volume) (manufacturing of glass and glass products; fritted bricks and tiles; cement; lime; gypsum and concrete elements).

Energy. Total energy consumption in 2007 in the RM accounted for as little as circa 21.7 percent versus the level of 1990 (Figure S-2) (electricity consumption – 31.1 percent, and heat consumption, respectively circa 12.2 percent). The principal power generation facilities in the RM are: Moldovan Thermal Power Plant (MTPP) in Dnestrovsk (ATULBD) with the installed capacity of 2520 MW (available output of around 950 MW); Combined Heat Power Plant No. 1 (CHP-1) in Chisinau with the installed electricity generation capacity of 46 MW (available output of about 40 MW) and installed heat generation capacity of 455 MW; Combined Heat Power Plant No. 2 (CHP-2) in Chisinau with the installed electrcity generation capacity of 240 MW (available output of around 210 MW) and installed heat generation capacity of 1425 MW; Combined Heat Power Plant North (CHP-North) in Balti with the installed electricity generation capacity of 28 MW (available output of about 24 MW) and installed heat generation capacity of 610 MW; CHPs of the sugar mills with the total installed capacity of 98 MW (available output of around 20 MW), Dubasari Hydro-Power Plant (HPP) with the installed capacity of 48 MW (available output of about 30 MW) and Costesti HPP with the installed capacity of 16 MW (available output of about 10 MW).

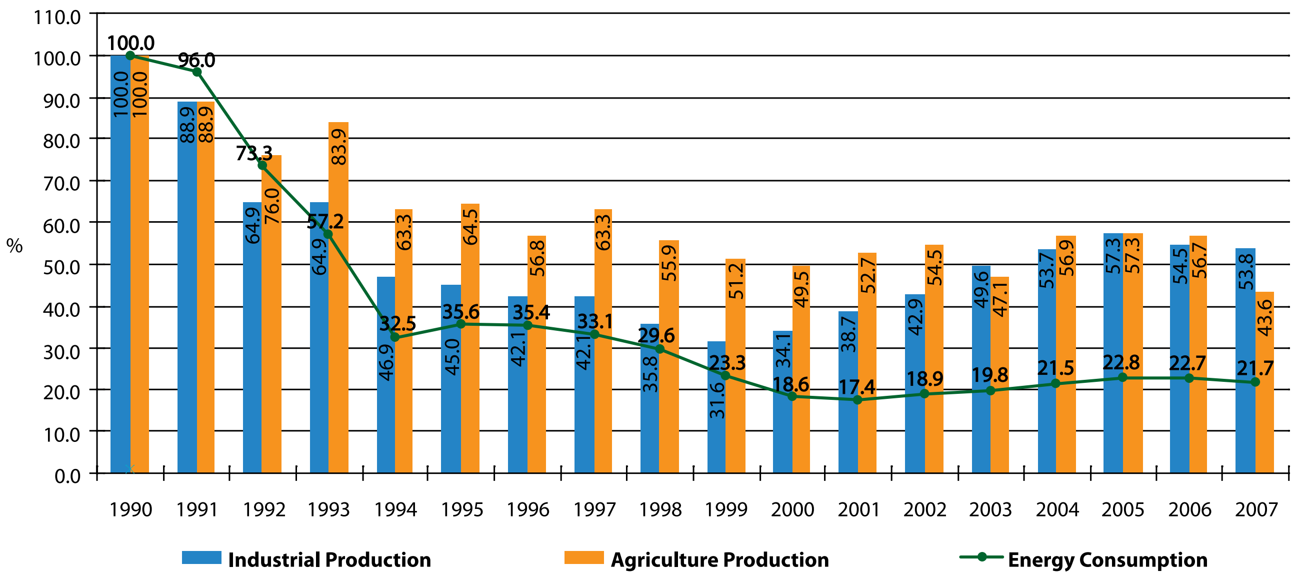


Figure S-2: Dynamics of the Main Economic Indicators of the RM, (compared to 1990 in %), 1990-2007

Agriculture. In 2007 the agriculture production by all categories of producers totalled MDL 12.55 billion in current prices, or only 43.6 percent of the 1990 level (Figure S-2). The agricultural production over 1991-2008 was characterized by fluctuations, with the best performance reported in 1993, 1997, 2004 and 2008, and with poor results – respectively in 1992, 1994, 1996, 1998, 2003 and 2007, in most cases being caused by unfavourable climate conditions (severe droughts in 2003 and 2007). In 2007 irrigation was available on 32.4 thousand ha of the agricultural plantations, or 88.9 percent less than in 1990 (291.6 thousand ha). The amount of synthetic and organic fertiliser applied to soil has reduced significantly as compared to 1990: 20.1 thousand tonnes of synthetic fertilisers in 2007, and 7.9 thousand tonnes of organic fertilisers, or by 90.7 percent and respectively 99.9 percent less than in 1990 (217.2 thousand tonnes of synthetic fertilisers and 9.7 million tonnes of organic fertilisers). As compared to 1990 (standing by the end of the year), the number of domestic livestock and poultry has reduced considerably: cattle - by 79.1 percent (1,112 thousand in 1990, 232 thousand in 2007), sheep and goats - by 36.2 percent (1,338 thousand in 1990, 853 thousand in 2007), swine - by 85.4 percent (2,045 thousand in 1990, 299 thousand in 2007), and poultry - by 31.4 percent (25,003 thousand in 1990, 17,157 thousand in 2007).

Transport. RM's transport sector is comprised of the following segments: road transportation, railway transport, air transportation and naval transportation. The national network of roads has a total length of 10,537 km (including 6,537 km of modern roads, 3,400 km of hard-surface roads, 600 km of dirt roads as well as 25.9 km of bridges), and is sufficiently developed, but the state of the roads and the infrastructure in general is deplorable. In 1990-2007 the number of road vehicles in the RM has significantly increased: trucks – by 23.3% (from 76.9 thousand in 1990 to 94.8 thousand in 2007), buses and minibuses – by 86.6% (from 11.3 thousand in 1990 to 21.1 thousand in 2007), and cars - by 62.2% (from 208.9 thousand in 1990 to 338.9 thousand in 2007). The history of railway transportation dates back 140 years. The total length of railway lines is 1,809 km, of which above 1,100 km are main lines. RM's river transport is in the process of development and growth in terms of both the number of ships (the National Register of Ships has entries for 74 transport ships) and the number of river ports (operating ports are located in Bender, Dnestrovsk, Malovata, Ungheni, Ribnita and in Giurgiulesti, the latter providing access to the Black Sea on the Danube). There are 4 airports in the RM: in Chisinau, Balti, Cahul and Marculesti, of which only the Chisinau airport offers regular scheduled flights. The airports in Cahul and Marculesti are still in the process of obtaining the required statutory approvals and certificates. The Balti Airport is certified, but it offers only charter flights. The National Register of Planes has entries for 202 air transport units. In comparison with 1990 the freight transportation has reduced considerably, both in terms of the freight transportation turnover (by 87.2%: from 331.1 mil. tonnes in 1990, to 42.3 mil. tonnes in 2007), as well as freight transportation distance (by 73.1%: from 21,648 mil. tonnes-km in 1990, to 5,824 mil. tonnes-km in 2007). The same period of time witnessed the significant reduction in number of passengers (by 58.0%: from 757.7 mil. passengers in 1990, to 318.1 mil. passengers in 2007), as well as in passengers transportation distance (by 58.8%: from 10,102 mil. passengers-km in 1990, to 4,166.9 mil. passengers-km in 2007).

S.3 National Greenhouse Gases Inventory

S.3.1 Republic of Moldova's Contribution to Global Warming

In 1990, RM contributes only about 0.3 percent of total global GHG emissions. Within the 1990-2005, the total national GHG emissions (excluding LULUCF) decreased by 72.3 percent, from 42,886.0 Gg CO_2 eq. in 1990, to 11,883.5 Gg CO_2 eq. in 2005.

S.3.2 Institutional Arrangements for Inventory Preparation

Within the Ministry of Environment and Natural Resources (MENR), the Climate Change Office (CCO) is totally responsible for the activities related to preparation of National Communications (NCs) and Greenhouse Gas Inventories, comprising the National Inventory Reports (NIRs) and Common Reporting Framework Tables (IPCC Sectoral and Summary Report Tables).

S.3.3 Methodological Issues

The national inventory is structured to match the reporting requirement of the UNFCCC and is divided into six main sectors: (1) Energy, (2) Industrial Processes, (3) Solvents and Other Products Use, (4) Agriculture, (5) Land Use, Land-Use Change and Forestry and (6) Waste. Each of these sectors is further subdivided within the inventory. Emissions of direct (CO_2, CH_4, N_2O, HFC and SF_6) and indirect (NO_x, CO, NMVOC, SO_2) greenhouse gases were estimated based on methodologies contained in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1997), Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000), Good Practice Guidance for LULUCF (IPCC, 2003), Atmospheric Emissions Inventory Guidebook (CORINAIR, 1996, 1999, 2005) and 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006).

S.3.4 Key Categories

In order to prioritize efforts aimed at improving the overall quality of the inventory, based on recommendations set forth in the Good Practice Guidance (IPCC, 2000), the key categories were identified for the time series 1990 through 2005, the analysis of which was carried out based on Tier 1 methodological approach, with LULUCF: 18 key categories by level (L) and 16 key categories by trend (T); without LULUCF: 17 key categories by level (L) and 13 key categories by trend (T).

S.3.5 Quality Assurance and Quality Control

The basic Quality Assurance and Quality Control activities carried out in the Republic of Moldova included detailed specific procedures implied by Tier 1 approach (general procedures) and Tier 2 approach (source-specific), and standard verification and quality control forms and checklists that serve to standardize the process of implementing quality assurance and quality control activities meant to ensure the quality of the national inventory; technical review (audit) carried out by experts who were not directly involved in the national inventory compilation/development process; activity data quality check, including by comparing data obtained from different sources, as well as further documentation of the national inventory development process. As the entity responsible for the national inventory development, the CCO holds all documentation used for inventory compilation.

S.3.6 Recalculations

The National GHG Inventory Team revised and recalculated GHG emissions and CO_2 removals for each calendar year covered by the First National GHG Inventory for the period from 1990 through 1998, a component part of the FNC (2000). These activities were carried out during the ongoing process of improving the quality of the National GHG Inventory. Under current inventory cycle, improvements were made in all sectors (use of higher tier methodologies, revision of previously used methodological approaches and emission factors, activity data, inclusion of new emission sources, etc.), entailing the need to make recalculations of national GHG emissions for the time period from 1990 through 1998. In comparison with the results reported under the FNC (2000), the changes made during the development of the current inventory, resulted in increased values of national direct greenhouse gas emissions for the 1990-1998 periods, with a variation from a minimum of 18.7 percent in 1998, to a maximum of 34.5 percent in 1995.

S.3.7 Inventory Uncertainty

In the Republic of Moldova, the GHG emissions were estimated with the highest possible accuracy, however, the obtained results have a certain degree of uncertainty. Some emissions estimates, such as for example, CO_2emissions from fossil fuels combustion, or CO_2 emissions from cement production, are considered to have minimal uncertainty. For other source categories, because of the poor quality of activity data, as well as a consequence of limited understanding of the emissions generation process, the uncertainty is quite high. The overall inventory uncertainty was estimated using a Tier 1 methodological approach (IPCC, 2000), that is ±16.0 percent uncertainty by level, and ±3.9 percent uncertainty by trend.

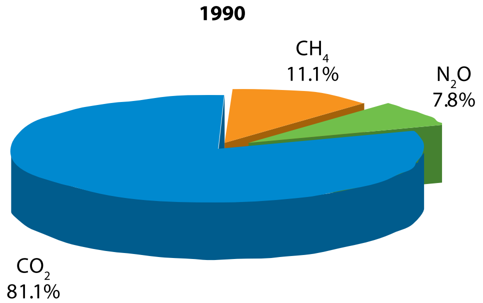
S.3.8 Completeness Assessment

Generally speaking, the national inventory of the Republic of Moldova is a complete register of the following direct greenhouse gases – CO_2, CH_4, N_2O, HFC and SF_6 (emissions of perfluorocarbons – PFC have not been registered yet). The national inventory also covers the following indirect greenhouse gases: CO, NO_x, NMVOC and SO_2. Despite the effort to cover all existent source/sink categories, the inventory still has some gaps, most being determined by lack of activity data needed to estimate certain emissions and removals.

S.3.9 Reporting Greenhouse Gas Emissions

Carbon dioxide continue to contribute most to the total national direct GHG emissions in the Republic of Moldova. (Figure S-3).

In the time series from 1990 through 2005, the total CO_2 emissions (without LULUCF) decreased by circa 78.2 percent; reduction of CO_2 emissions is even more significant, if contribution of LULUCF Sector is considered, circa 81.3 percent; emissions of CH_4 (without LULUCF) have decreased by 39.5 percent, while emissions of N_2O (without LULUCF) decreased by 58.1 percent (Table S-1).



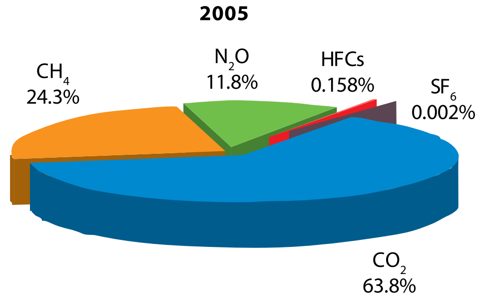


Figure S-3: Republic of Moldova's GHG Emissions by Gas, 1990 and 2005

Table S-1: Greenhouse Gas Emission Trends in the RM in Gg CO_2 eq., 1990-2005

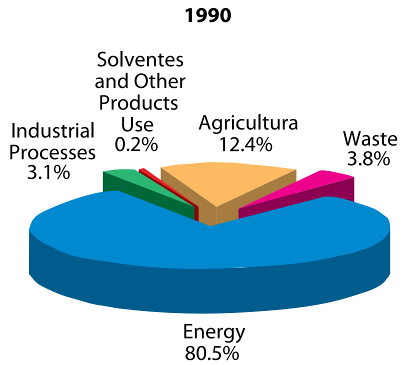
	1990	1991	1992	1993	1994	1995	1996	1997
CO_2 (without LULUCF)	34765.28	30343.62	21197.71	16317.45	13704.76	10852.00	11092.66	9380.50
CO_2 (with LULUCF)	33088.79	29184.86	20279.14	15772.25	12829.33	10093.24	10350.88	8051.67
CH_4 (without LULUCF)	4766.08	4571.88	4416.79	4057.75	4026.04	3920.22	3875.33	3507.32
CH_4 (with LULUCF)	4768.39	4573.85	4418.62	4060.43	4027.81	3922.22	3876.88	3510.13
N_2O (without LULUCF)	3354.66	3259.97	2761.74	2385.69	2116.82	1985.93	1803.34	1763.00
N_2O (with LULUCF)	3355.64	3260.75	2762.45	2386.76	2117.53	1986.70	1803.94	1764.08
HFCs	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
SF_6	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
Total (without LULUCF)	**42886.02**	**38175.48**	**28376.24**	**22760.89**	**19847.63**	**16758.16**	**16771.33**	**14650.82**
Total (with LULUCF)	**41212.82**	**37019.46**	**27460.21**	**22219.44**	**18974.66**	**16002.16**	**16031.71**	**13325.88**
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
CO_2 (without LULUCF)	7759.55	6008.48	5206.70	6415.19	6484.98	7086.39	7283.96	7576.58
CO_2 (with LULUCF)	6599.56	4694.30	3852.41	5025.16	5252.71	5772.36	5964.54	6195.17
CH_4 (without LULUCF)	3292.29	3347.72	3209.71	3026.60	3031.39	3025.00	2961.96	2883.82
CH_4 (with LULUCF)	3294.80	3350.04	3210.53	3027.81	3031.65	3025.07	2962.18	2884.06
N_2O (without LULUCF)	1553.28	1466.15	1419.33	1377.52	1442.63	1409.15	1421.59	1404.06
N_2O (with LULUCF)	1554.27	1467.06	1419.65	1378.04	1442.75	1409.20	1421.75	1404.16
HFCs	NE, NO	NE, NO	4.21	5.41	7.56	10.02	13.07	18.72
SF_6	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	0.01	0.28	0.28
Total (without LULUCF)	**12605.12**	**10822.35**	**9839.95**	**10824.72**	**10966.56**	**11530.56**	**11680.85**	**11883.46**
Total (with LULUCF)	**11448.63**	**9511.40**	**8486.80**	**9436.42**	**9734.67**	**10216.65**	**10361.81**	**10502.40**

Abbreviations: NE – 'Not Estimated'; NO – 'Not Occurring'.

Monitoring of F-gases emissions (in particular HFC used in refrigeration and air conditioning equipment, aerosols, etc.), and sulphur hexafluoride (SF_6) (including gas insulated switchgear (GIS), chemical lasers and circuit breakers) commenced in 2000, considered as a reference year for F-gases in the Republic of Moldova. Evolution of these emissions denote a steady trend towards increase, though their share in the total national GHG emissions structure is insignificant for now.

Energy Sector is the most important source of national direct GHG emissions (without LULUCF), its share varying from 80.5 percent to 65.0 percent over the time series from 1990 through 2005. Other relevant sources are represented by Agriculture Sector (having a share of 12.4 percent in 1990 and respectively 17.9 percent in 2005), Waste Sector (3.8 percent in 1990 and respectively 11.8 percent in 2005), and Industrial Processes Sector (3.1 percent in 1990 and respectively 4.9 percent in 2005) (Figure S-4).

In the time series 1990 through 2005, total direct emissions and removals in the Republic of Moldova tended to decrease, so emissions under Energy Sector decreased by circa 77.6 percent; Industrial Processes Sector – by circa 56.9 percent; Solvents and Other Products Use Sector – by circa 25.3 percent; Agriculture Sector – by 60.0 percent; LULUCF Sector – by 17.5 percent; and Waste Sector – by 14.0 percent (Table S-2).



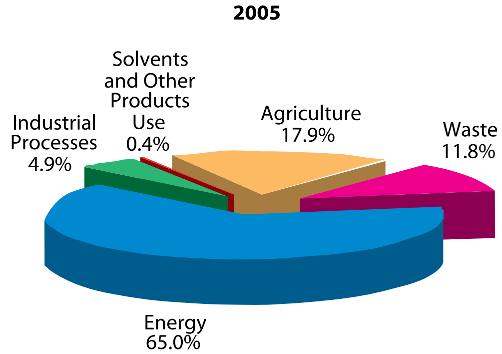


Figure S-4: Sectoral Breakdown of the RM's GHG Emissions in 1990 and 2005

Table S-2: GHG Emission and Sink Trends in RM by Sector in Gg CO_2 eq., 1990-2005

	1990	1991	1992	1993	1994	1995	1996	1997
1. Energy	34520.39	30220.38	21384.24	16475.22	13975.19	11135.71	11430.27	9526.58
2. IP	1348.75	1103.55	575.77	516.87	382.14	380.65	389.81	434.97
3. SOPU	65.62	59.68	46.88	37.07	31.29	28.06	28.21	29.88
4. Agriculture	5323.92	5035.34	4494.45	3839.78	3599.75	3386.18	3046.47	2839.22
5. LULUCF	-1673.20	-1156.02	-916.03	-541.45	-872.97	-756.00	-739.62	-1324.94
6. Waste	1627.34	1756.53	1874.89	1891.95	1859.26	1827.57	1876.57	1820.17
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
1. Energy	7938.33	6184.74	5437.82	6639.87	6738.33	7328.40	7490.74	7724.81
2. IP	354.72	339.26	325.60	331.13	344.10	408.04	479.52	581.90
3. SOPU	30.39	29.77	33.06	34.71	40.78	41.67	47.82	49.00
4. Agriculture	2518.31	2438.03	2312.19	2215.97	2313.91	2253.13	2210.72	2127.79
5. LULUCF	-1156.49	-1310.95	-1353.15	-1388.30	-1231.89	-1313.91	-1319.04	-1381.06
6. Waste	1763.38	1830.55	1731.28	1603.04	1529.44	1499.32	1452.05	1399.96

S.3.10 Reporting Ozone and Aerosol Precursors Emissions

Photochemically active gases, such as carbon monoxide (CO), nitrogen oxides (NO_x) and non-methane volatile organic compounds (NMVOC) are not regarded as greenhouse gases, however they contribute to greenhouse effect in an indirect way. These gases are considered to be ozone precursors influencing formation and disintegration of ozone in the atmosphere. The national GHG inventory of the RM includes emissions of the following ozone precursors and aerosol gases: NOx, CO, NMVOC and SO_2. In 1990-2005, NO_x emissions decreased by 77.1 percent; CO emissions decreased by 73.1 percent; NMVOC emissions decreased by 59.0 percent, while SO_2 emissions deceased by 96.0 percent (Table S-3).

Table S-3: Ozone and Aerosol Precursors Emission Trends in the RM in 1990-2005, Gg

	1990	1991	1992	1993	1994	1995	1996	1997
NO_x	137.7408	119.3428	80.2690	63.4771	54.0902	47.1408	44.4726	39.9567
CO	429.0537	371.6038	190.4780	155.4473	141.2932	139.2113	136.9144	131.5095
NMVOC	103.1150	90.6729	54.1789	44.0071	39.3583	39.8312	38.6704	38.0953
SO_2	294.9678	256.2761	170.1090	145.6472	102.5218	60.8743	58.8716	33.8937
	1998	1999	2000	2001	2002	2003	2004	2005
NO_x	32.8847	23.7914	22.0042	25.3798	27.1859	29.9830	31.1675	31.5802
CO	116.0268	79.5244	75.5600	78.9760	95.1302	110.2302	112.6899	115.2218
NMVOC	34.4315	25.6009	26.7160	28.2556	33.9985	36.9111	40.9736	42.2495
SO_2	26.9145	13.9877	9.8661	9.4254	10.4569	12.9969	11.1841	11.7886

S.4 General Description of Steps Envisaged to Implement the Convention

S.4.1 Republic of Moldova's Commitments under the UNFCCC

Under the UNFCCC the RM undertook commitments in four important areas: (1) GHG inventory and emissions mitigation commitments implied by Art. 4 p. 1 par. a, b, c, d and Art. 12 p. 1 and 4; (2) climate change adaptation commitments implied by Art. 4 p. 1 par. e, f; (3) commitments to promote research and systematic observations implied by Art. 4 p. 1 par. g, h and Art. 5; (4) commitments to promote education, training and build public awareness implied by Art. 4 p. 1 par. i and Art. 6 par. a, b.

S.4.2 National Priorities for Meeting Convention Objectives

Based on the country's commitments under the UNFCCC, the Republic of Moldova identified the national priorities regarding to Convention implementation: (1) strengthening the national policies on climate change; (2) assessing vulnerability and adaptations measures to climate change; (3) strengthening the National Inventory System; (4) Mitigation of GHG emissions and Increase in Carbon Removals; (5) wider use of the Clean Development Mechanism of Kyoto Protocol; (6) implementing a more aggressive policy on transfer of the environment-sound technologies; (7) further developing of the research and observations system on climate change; (8) public awareness raising and ecological education; (9) intensifying the process of international cooperation, inclusive under the post-Kyoto negotiation process.

S.4.3 Sectoral Policies and Activities Envisaged to Implement the Convention

Energy Sector. The following relevant policies envisaged to implement the Convention were identified for the energy sector: (1) improvement of the legislative-regulatory sector framework and implementation of sector policies with direct or indirect impact on UNFCCC implementation in the Republic of Moldova, in particular the Energy Strategy of the Republic of Moldova until the year of 2020 and the National Development Strategy for 2008-2011; (2) assuring energy security of the country by improving the interconnection capacities with the neighbouring countries and construction of new local sources of power generation based on the most recent and advanced environment friendly technologies; (3) full implementation of measures stipulated in the National Gasification Program of the Republic of Moldova until the year of 2010; (4) increasing the share of renewable sources of energy in the energy balance of the country up to 6 percent in 2010 and up to 20 percent in 2020, what will allow to reduce national GHG emissions by circa 167-210 thousand tonnes CO_2 equivalent annually; (5) full implementation of measures stipulated in the National Energy Conservation Program for 2003-2010, which implies significant reduction of energy consumption by developing and implementing energy efficient technologies, thermal rehabilitation of buildings, energy transport and distribution grids, use of renewable sources of energy, education of all categories of consumers, pilot projects implementation, etc.

Transport Sector. The following relevant policies envisaged to implement the Convention were identified for the transport sector: (1) strengthening the legislative-regulatory sector framework (Law on Civil Aviation, 1997; Road Transport Code, 1999; Code of Commercial Maritime Navigation, 1999; Railway Transport Code, 2003; Concept of Waterborne Navigation Development, 2008) and implementation of sector policies with direct or indirect impact on UNFCCC implementation, in particular the Strategy for the terrestrial transport infrastructure for 2008-2017; (2) rehabilitation and development of the terrestrial transport infrastructure, thus assuring a positive impact on health and safety of population by decreasing the number of accidents and reducing air pollution due to a more constant driving speed achieved on the rehabilitated segments of the road; (3) identification and implementation of organizational and technological measures to reduce polluting emissions (inclusively, by technical verification of vehicles, certification of vehicles, authorization of re-equipment, repairs and technical servicing stations, training and re-training of road transport professionals, evaluation of conformity of transport products and services, implementing the drivers' work-rest regime control, etc.); (4) renewal of the rolling stock park in conformity with the Urban Transport Development Action Plan, etc.

Industry Sector. The following relevant policies envisaged to implement the Convention were identified for the industry sector: (1) reducing the consumption of energy resources by promoting energy efficiency and energy conservation policies in the industry sector (National Energy Conservation Program for 2003–2010; Energy Efficiency Improvement Program in Industry for 2004–2008; Industry Development Strategy until the year of 2015; National Strategy for Sustainable Development of Agribusiness in the Republic of Moldova for 2008-2015; National Development Strategy for 2008-2011); (2) promoting clean production; (3) incentivising enterprises to reduce the amount of waste they generate and recycling waste into secondary raw materials; (4) modernization and use of installations to collect and treat toxic substances, etc.

Agriculture Sector. The following relevant policies envisaged to implement the Convention were identified for the agriculture sector: (1) strengthening the legislative-regulatory sector framework (Land Code, 1991; Code of Waters, 1993; Law on Selection and Reproduction in Animal Breeding, 1995; Law on Horticulture, 1996; Law on Animal Breeding, 1999; Law on Plant Protection, 1999; Law on Nut Crops, 1999; Law on Phyto-Sanitary Products and Fertilisers, 2004; Law on Subsidising Agricultural Risks, 2004; Law on Grapes and Wine, 2006; Law on Tobacco and Tobacco Products, 2008; Law on Sanitary-Veterinary Activity, 2008; Law on Plant Varieties Protection, 2008, etc.) and fullest implementation of sector policies with direct or indirect impact on the UNFCCC implementation, in particular the Action Plan to National Complex Program to Enhance Soil Fertility in 2001-2020; National Complex Program to Use Degraded Lands and Enhance Soil Fertility, Land Consolidation Program; National Development Strategy for 2008-2011, and National Strategy for Sustainable Development of Agribusiness for 2008-2015; (2) revitalization of the animal breeding sector by renewing the high productivity livestock; assuring support in view of creation of modern dairy and meat farms by using advanced technologies; maintaining and improving the genetic pool of the breeding animals; incentivising equipment and upgrading of small and medium animal breeding farms in rural areas outside villages; developing a complex and stable agricultural system in each agro-pedo-climatic zone, inclusively through integration of a plant growing and animal breeding sectors, etc. (3) sustainable development of agribusiness, inclusively through optimized crop structure and increasing the share of leguminous crops which enrich the soil with nitrogen; enriching agricultural soils with carbon by sustainable fertilisation practices of applying manure and crop residues to soil (other components of sustainable agriculture such as: forestry practices, practicing integrating crops and green fertiliser, are also efficient in this sense); reducing soil cultivation (traditional ploughing favour decomposition of organic matter in the soil, thus essentially contributing to increased concentration of CO_2 in the atmosphere), etc.

Forestry Sector. The following relevant policies envisaged to implement the Convention were identified for the forestry sector: (1) strengthening of the legislative-regulatory sector framework (Law on Environment Protection, 1993; Forestry Code, 1996; Law on Natural Areas Protected by State, 1998; Law on Improving the Degraded Lands by Afforestation, 2000), and fullest implementation of sector policies with direct or indirect impact on the UNFCCC implementation, in particular of Strategy for Sustainable Development of the Forestry Sector (2001), National Strategy and Action Plan on Biologic Diversity Conservation (2001), National Complex Program to Use Degraded Lands and Enhance Soil Fertility (2003), State Program for Re-Generation and Afforestation of the Lands Belonging to the Forest Fund for 2003-2020; (2) strengthening of eco-protective and bio-productive potential of the existent forests by stopping their degradation, conservation, regeneration and re-construction of forests ecosystems by switching from the grove mode to the 'Codrii' (forest) mode, wider use of massive regeneration treatments, gradual replacement of poorly productive standing stock which does not comply with stationary conditions; (3) rational use of forestry resources; (4) increasing the efficiency of the forest fund guarding and protection activities, decreasing the illegal logging, elimination of other infringements of forestry legislation; (4) assuring scientific support for sustainable development of the national forestry sector; (5) expansion of forest covered areas and creation of ecological interconnection corridors between wooded areas; (6) increasing the area and quality of grasslands; (7) development of communal forests; (8) creation of energy forests, etc.

Waste Sector. The following relevant policies envisaged to implement the Convention were identified for the waste sector: (1) strengthening the legislative-regulatory sector framework (Law on Environment Protection, 1993; Law on Domestic and Industrial Waste, 1997; Law on Atmospheric Air Protection, 1997; Law on Environment Pollution Payment, 1998; etc.) and fullest implementation of sector policies with direct or indirect impact on the UNFCCC implementation, in particular of National Program on Using Domestic and Industrial Waste (2000); National Strategy to Reduce and Eliminate the Persistent Organic Pollutants, and National Plan for Stockholm Convention Implementation (2004); Program for Water Supply and Sewerage in the Settlements of the Republic of Moldova until the 2015 year (2006); the Concept of Sanitation of Settlements in the Republic of Moldova (2007); Strategy on Water Supply and Sewerage in the Settlements of the Republic of Moldova (2007); (2) minimization, separate collection and recycling of recyclable elements (paper, glass, metals, PET) of the municipal solid waste; (3) centralized depositing of waste at the solid waste disposal sites in conformity with the Standard Technological Scheme for the Solid Waste Deposit Sites (2001); (4) construction and putting into operation the Waste Incineration Plant in Chisinau, starting the year of 2011, with a maximal capacity of 660 thousand tonnes of municipal solid waste annually; (5) reconstruction of the existent and construction of new waste water treatment plants, assuring aerobic treatment of the whole amount of the generated domestic and industrial wastewater.

S.5 Vulnerability and Adaptation Assessment

S.5.1 Climate Change Scenarios

The possible climate development scenarios for the RM were identified on the basis of the calculations under seven general atmospheric circulation models - HadCM2, ECHAM4, CGCM1, GFDL-R15, CSIRO-Mk2, NCAR-DOE and CCSR. IS92a scenario served as the basis for the determination of the greenhouse gas emissions development patterns. To identify the climatic models yielding the most accurate projections of the key future climate indicators in the Republic of Moldova within the framework of the study on the climate change phenomenon, a comparison was performed between the monthly temperature averages and the daily precipitation averages – as calculated using the above climatic models – and the similar values actually registered in the RM during 1961-1990 time series. The assessments helped identify three general atmospheric circulation models (ECHAM4, HadCM2, CSIRO-Mk2) that yielded the results closest to the similar climatic values actually observed in the RM during 1961-1990 time series.

S.5.2 Possible Climatic Scenarios for the RM for the period till 2100

Air Temperature. According to the ECHAM4, HadCM2 and CSIRO-Mk2 climatic models, chosen to identify the climatic scenarios for the RM during 2010-2100 time series, the development patterns of the monthly temperature averages have shown some clearly pronounced changes under all three applied models. The negative temperature averages for the winter months may become a thing of the past already in the late 60s of the 21st century. In a similar way, all the climatic models used have yielded the results showing a more significant growth of the monthly temperature averages for the winter months as compared to that for the summer months. The projected heat resource development patterns have demonstrated that the annual air temperature averages will register an increase of 1.7-1.9°C by the end of 2039. During 2070-2099 the air temperature averages will grow considerably in spring and summer – not only in winter. Thus, the temperature averages for July - the warmest month of the year – may grow by 3.6-5.3°C. The annual air temperature averages may grow by 4.0-5.0°C by the end of this century as compared to the temperature levels in the reference period (1961-1990). The days typical of the winter period will disappear to all practical purposes in the Central and Southern zone by 2100. In the North the number of the days typical for the winter period will decrease at least by half and reach 50-52 as compared to the 105 days registered for the climate during the reference period (1961-1990). The resultant effect will be a higher number of the days typical of autumn, spring and summer. Thus, summer will be 25-40 days longer in the Central and Southern zone and at least 35-53 days longer in the Northern zone.

Precipitations. The projected precipitation levels have fluctuated depending on the season as well as the particular climatic model applied to make the forecast. The analyzed scenarios have shown that the annual precipitations will grow by 107.71 mm under the HadCM2 and by 51.81 mm under the CSIRO-Mk2, but decreasing by 48.61 mm under the ECHAM4 model by the year of 2100. The development pattern of the precipitation levels has yielded considerable differences throughout the year. Thus, the growth will be more pronounced during the winter months (December-February) and in spring (March-May) under the scenarios, which have yielded the growing pattern of the annual precipitation averages. All the applied climatic models have yielded the reduced monthly precipitation averages for summer (August) and autumn (September-November) already by 2040'.

Heat Insurance. The indicator characterizing the level of insurance with heat were assumed to mean the length of the periods with the average daily air temperatures above 0°C, 5°C, 10°C and 15°C and their cumulated temperature. The respective values were modelled for the RM's 3 zones (North, Centre and South) for the next 100 years, using this approach as well as the actual data registered in the RM during the reference period (1961-1990) and CSIRO-Mk2, HadCM2 and ECHAM4 models. The assessment performed for RM's Central zone show that the length of the period with the average daily temperatures above 5°C varied within the range of 220 days in the North and 235 days in the South for the reference period (1961-1990). The results yielded under the climatic models show that such periods would be longer in the future on the total territory of the RM. By the year 2099 such periods will be by 29-67 days longer in the Centre zone. The length of the period with such temperatures determines the duration of the vegetation period for the majority of the cultivated crops and wild species in the RM. An increased length of such period will result in longer vegetation periods for such species. It has been demonstrated that the periods with the average daily temperatures above 5°C, 10°C and 15°C would also become significantly longer. To be noted, that the cumulated temperatures determine the specific spreading areas for diverse species of plants, animals and insects, which may impact on the Republic of Moldova's economic, social and environmental situation. The obtained results show that a pronounced pattern of the significant cumulated air temperatures growth will persist during the next 100 years for the days with the temperatures above 0°C, 5°C, 10°C and 15°C. Already by 2039 the sum of biologically active temperatures will grow by 429°C and 479°C and make 3174°C and 3224°C in the North of the RM for the days with the averages above 10°C under CSIRO-Mk2 and HadCM2 models; the respective values will constitute 431°C and 3226°C under the ECHAM4 model. By the year of 2099 the sum of biologically active temperatures for the days with the averages above 10°C will be within the range of 3763-4175°C in the North of the Republic of Moldova and as high as 4379-4715°C and 4472-4861°C respectively in the Central and in the Southern zone. For comparison, the observed mean annual sum of active temperatures above 10°C for the reference period (1961-1990) was 2745°C in the North; 3165°C in the Centre and 3222°C in the South.

Humidity. To perform a more ample analysis of the temperature/humidity ratio development, an assessment was performed on aridity coefficient (K): K=P/E, where P is the sum of precipitation values (mm) and E is the evaporation-transpiration rate. That indicator allows assessing the development of the climate aridity rate throughout the year or during certain periods which are crucial for certain crops or species. The aridity rate was assessed using the following assessment scale: K≤0.05 – hyper-arid climate; K=(0.05-0.20) – arid climate; K=(0.21-0.50) – semi-arid climate; K=(0.51 – 0.65) – dry-sub-humid climate; and K≥0.65 – sub-humid and humid climate. According to the above classification, most of the RM's territory is characterized currently with dry or sub-humid climate (0.50≥K≤0.65). Certain areas in the South-East have semi-arid climate (K≥0.48), and the Northern zone and the areas with altitudes above 350-400 metres above sea level have sub-humid and humid climate (K≥0.65). The conclusions made after the analysis of the obtained results have shown that the climate aridization process may accelerate considerably on the territory of the RM in the future. Thus, already in the early 2040s that process would intensify noticeably as compared to the period of 1961-1990. That phenomenon will be more pronounced during June to October. By 2100 the climate aridization will be felt during the total plant vegetation period (April to October); it will be much more pronounced and may result in the values characteristic of the semi-arid climate (K = 0.21-0.50). All the climatic models applied for the assessment purposes have demonstrated that the aridity would be higher as compared to 1961-1990, and in August those levels can achieve even the values characteristic of the arid climate (K = 0.05-0.20). An assessment of the hydro-thermal coefficient (HTC) was also performed to identify the climate change patterns during the plant vegetation period. HTC is a relative empirical index, which reflects the humidity rate and which is calculated as the ratio between the cumulated precipitation level (R) expressed in millimetres for the period with the average daily air temperatures above 10°C and the cumulated daily average temperature above 10°C (Σ T) for the same period of time divided by 10, i.e.: HTC = R/0.1 x Σ T, when the value of that index is 1.0 it means that the amount of the precipitations is equal to the amount of the evaporated moisture.

In the Republic of Moldova's the current climatic conditions HTC ranges from 1.2 in the North to 0.7 in the South-East of the country, i.e. registers the values characteristic of the moderately dry climate in the former case and of the dry climate in the latter case. The assessment of that index has shown that the insufficiency of moisture would become more pronounced in the future as compared to the climate of the reference period. Thus, by 2100 the growing evaporation rates caused by higher temperatures will result in an increase of 12.7–33.3 percent in soil humidity deficit as compared to the reference period (1961–1990).

S.5.3 Approaches Used for Vulnerability and Adaptation Assessment

Within the context of respective assessments, the system vulnerability shall mean the inter-dependence of the nature, extent and variation of the climatic indicators affecting the system and its capacity to become adapted to such conditions.

The absolute values and the duration of the exposure to the climatic conditions determine the extent of their potential impact on the system; and the system's ability to respond to that impact determines its adaptability. In the systems where such relationships involve biological components (e.g. artificial cenoses of the agricultural plants in agriculture, flora and fauna in natural ecosystem s, people in human settlements, etc.) the capacity to get adapted is determined by the biological, social and economic mechanisms of the individual agents as well as the system as a whole.

The range and intensity of the factors determining the threat of the potential impact for the system were determined as

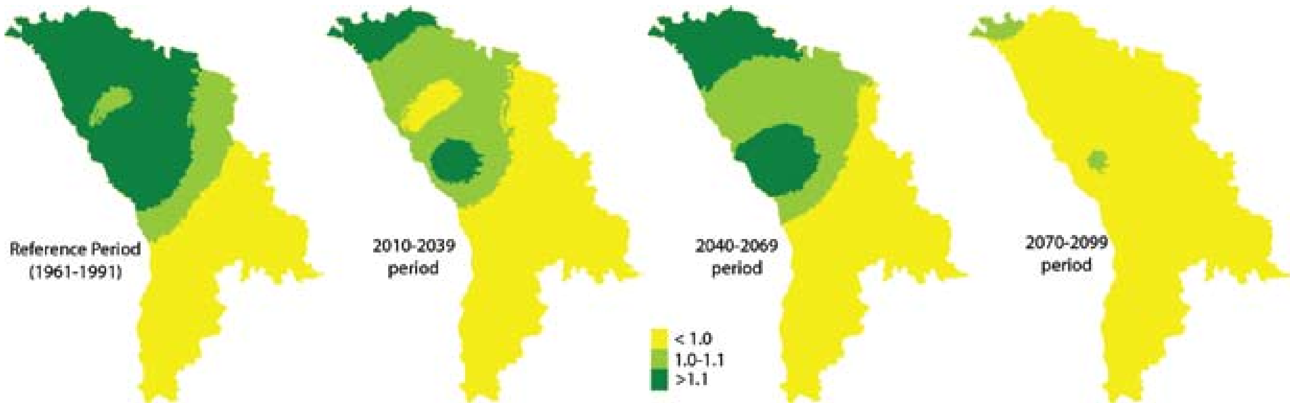


Figure S-5: Development of the HTC Indices for 2010-2099 Periods According to the ECHAM4, HadCM2 and CSIRO-Mk2 Models, as Compared to the Reference Period (1961-1990)

the risks causing vulnerability. The assessment of the potential impact of the climate change upon the Republic of Moldova's principal economic sectors was performed in two stages: (1) the first stage comprised the identification of the risks and the system vulnerability rates depending on the actual climatic conditions; and 2) the second stage involved the identification of the risks and the vulnerability rate under new climatic conditions generated by the climate change; (2) the second step was to assess the impact and identify opportunities to adapt to new climate conditions determined by climate change.

S.5.4 Risks Factors Conditioning Vulnerability

Agricultural Ecosystems. As of 2008, 156 plant species represented by 1263 varieties, hybrids and clones were registered and approved for cultivation in the agriculture sector of the RM. As compared to the data presented in the FNC of the RM under the UNFCCC (2000) for the year of 1998, the current number of the species approved for cultivation has increased by 82 species, and the number of the varieties, hybrids and clones – by 752. As few as six species account currently for above 50 percent of total agricultural land area (2,506,200 hectares) of the RM. These species are: corn with 18.6 percent; wheat with 12.3 percent; sunflower with 6.3 percent; barley with 5.1 percent; and soy with 2.0 percent. The trend to increase the number of such species and in particular the number of their varieties, hybrids and clones is a positive pattern; but the relatively low number of the actually cultivated species is just another potential risk for the actual agrocenosis in the Republic of Moldova's agriculture sector.

Forest Ecosystems. As of January 1, 2008 forestry ecosystems were represented by forestland and other forestry vegetation, which covered 456.2 thousand hectares, what accounted for 13.5 percent of the land resources of the RM. The forestry resources of the RM comprise the resources of the forestry fund and forest vegetation on the lands not belonging to the forestry fund (84.1 percent) owned by the state, the rest belonging to the LPA (15.7 percent) and private owners (0.2 percent). The ecosystems within the limits of the forestry fund are characterised by a wide diversity comprising 28 types of ecosystems and a series of biogeocenotic sub-types (by productivity). These types of ecosystems include the following principle types of forests: oak woods, durmast woods, beech woods, water meadows and mixed varieties woods. The forestry ecosystems include 123 associations, of which over 25 phytocenotic taxons are regarded as standard phytocenosis. Currently there are no forestry ecosystems not affected by human impact, expressed by destroyed biotopes, unregulated defalcation of biologic resources or inappropriate ecosystem management. The ecosystems of the small and relatively small forest vegetation bodies are affected structurally and functionally to a larger extent, as their biotopes are usually degraded and to a large extent occupied by arborescent (*Acer negundo*), scrubby (*Sambucus*) and herbaceous (*Urticaceae, Lamiaceae, Apiaceae, Brasicaceae*) invasive species. The national forestry fund also includes rare types of ecosystems, such as beech woods and petrofite ecosystems of oak and durmast woods, unique in terms of biodiversity.

The woods are predominantly composed of deciduous species (97.8 percent), including Quercus spp. –39.6 percent, Fraxinus spp.– 4.6 percent, Carpinus spp.– 2.6 percent, Robinia spp. –36.1 percent, Populus spp.– 1.6 percent etc., Pinus spp. – 2.1 percent. The standing stock of oak species are the most valuable woods in the national forestry fund. Of the total surface of such woods 27 percent originate from seeds and 73 percent – from offshoots. The big share of oak species originating from offshoots is one of the consequences of the grove mode management of these species over centuries. Such a distribution has an impact on the oak species productivity, of which 43 percent are of high productivity and 57 percent of low productivity. About one third of the standing stock forming the forestry fund represent artificially introduced species which do not fit into the natural ecosystems of the RM. So, in the past years the area occupied by woods grew concurrently with a considerable growth of the share of acacia and resinous species. The total surface occupied by oak species though increased by circa 20 thousand ha, their share in the total structure of woods dropped by 14.3 percent.

The forestry ecosystems are populated by circa 860 species of plants which account for 43 percent of the total spontaneous floral biodiversity of the RM. Of all species of vertebrate an invertebrate animals, circa 60 percent can be frequently found in forestry biotic communities. It is als o significant that more than 50 percent of all vegetal and animal species included in the Red Book of the RM make part of forestry biotopes. Giving the overall characteristics of the forestry vegetation, it is necessary to mention the big share of acacia and other introduced species (38.7 percent). The existent circa 5 thousand wood bodies (with a surface from 5 ha to 15 thousand ha) are unevenly dispersed, with practically no interconnection forest corridors which are of major importance both for the viability of the forestry fund, as well as for the biologic diversity, soils and waters protection. Formation of forestry ecosystems and associations depend on climate, geomorphologic, pedologic, and other conditions. Most vegetal associations include durmast standing stock - 52 associations, English oak woods - 26 associations, and pubescent oak woods - 6 vegetal associations.

The fauna of forestry biotic communities comprises 116 species of animals included in the Red Book of the RM. The number of endangered species is much bigger, in particular, among invertebrates. The basic feature of many endangered vertebrate species, of carnivorous, birds and mammals in the first place, is dependence on massive trees (with hollows, semi-dry) eliminated in the process of sanitation treatments and cuttings, etc. Many species of endangered insects depend on the existence of sufficient amount of dead wood mass which is intensively eliminated during the woods sanitation treatments. Survival of such species can be assured by thorough observance of technical norms in terms of wild fauna protection in the process of woods sanitation works and forest use. These aspects, determined by the current state of things in the forestry ecosystems can serve as potential risk factors in the climate change context. The principal risk factors which determine the vulnerability of forestry ecosystems are as following: (a) low level of afforestation of the country's territory; (b) high dispersion and uneven distribution of the forest bodies; (c) vegetative origin from offshoots of the 2-4 generation of circa 60 percent of trees in the forests (in durmast this share reaches circa 90 percent); (d) low level of fructification which does not assure sexual regeneration of oak species; (e) highly degraded standing stock and standing stock of introduced species which compete with indigenous species; (f) extended areas with accelerated and high rate of drying; (g) high risks of diseases and pests, etc.

Land Resources. The available land in the RM as of 1.01.2008 was 3,384.6 thousand hectares. The agricultural land area is 2,506.2 thousand hectares, or 74.0 percent of the RM's total available land. The arable land area is 1,821.7 thousand hectares, or 53.8 percent of the total available land. We selected the principal risks connected with the land quality as the indicators reflecting soil degradation rate. Generally the soil degradation is determined as the persisting natural or anthropogenic processes, which have a negative impact on the soil, decreasing its fertility (productivity) and the quality of the yielded products. Furthermore, additional costs are required to eliminate the consequences of such processes and to restore the initial productivity levels of the affected soils. The principal factors affecting currently the soil quality in the Republic of Moldova and presenting the potential risks in view of the climate changes include: (i) erosion (caused by the surface water as well as underground water); (ii) land slides; (iii) drift soil silting; (iv) primary and secondary soil compaction; (v) deep tillage of soil; (vi) loss of the humus layer on un-eroded arable soils; (vii) salinization; (viii) degradation due to non-compliance with the irrigation techniques; (ix) biological degradation; and (x) degradation caused by certain social-economical aspects of the economy in transit.

Water Resources. The water resources of the RM are represented by surface waters and sub-surface waters. The surface waters are still and moving waters the surface of which is in contact with the atmosphere. In the RM surface waters are represented by hydrographical basins of the Dniester and Pruth rivers which are transborder water sources, inland rivers and natural and man-made reservoirs. The sub-surface waters grid includes circa 112 thousand of springs and wells (public and private) and more than 3,000 functional artesian wells. Sub-surface waters are the main source of potable water supply in the Republic of Moldova, for 100 percent of rural population and 30 percent of the urban population, or 65 percent of the total population of the country. The remaining 35 percent of the population use surface waters as a source of potable water, including 32 percent from the Dniester river, 2.8 percent from the Pruth river and 0.2 percent from other surface waters.

The principal factors affecting the water sources in the RM refer to: (a) low quality of the drinking water and uneven distribution across the territory of the country; (b) high degree of technical and moral depreciation of the centralized water supply systems; (c) high dependence on the seasonal amount and distribution of atmospheric precipitations; (d) insufficient water resources for irrigation determined by inadequate quality, uneven territorial distribution and lack of distribution grids; (e) lack, or unsatisfactory condition of the water protective zones.

In conformity with hydro-chemical indicators, the waters of the Dniester and Pruth rivers are considered to be cle an and moderately polluted. The waters of small rivers are highly polluted. The share of samples non-compliant with the required sanitary-chemical norms collected from the centralized sub-surface sources account for more than 50 percent and more than 80 percent in case of samples collected from the phreatic waters wells. Circa 44 percent of the population in the country do not have access to safe drinking water sources. At present all towns and municipalities and over 65 percent of rural settlements have centralized drinking water supply systems. Only 50 percent of this type of systems are in satisfactory technical condition. The rest needs capital repairs or rather reconstruction.

The possibility to use water resources for irrigation depends on their condition and quality. The waters of the Dniester and Pruth rivers are of suitable quality to be used for such purposes. As a rule, the waters of inland rivers and reservoirs are polluted, its mineralization exceeds 1 gram/litre and it can be used for technological purposes only. Of the sub-surface water reserves only 50 percent comply with water quality requirements. So, for irrigation purposes the waters of transborder rivers can be used, in the first place. The waters of the inland rivers and lakes can be used for irrigation only after improving the quality of the water to exclude salinization and alkalinization of soils. Wide use of water resources for irrigation purposes is limited due to a high weariness degree of the irrigation systems and their scarcity.

Agricultural Sector. Respe ctive sector plays an important role in the country's economy. Lately (2001-2006) the contribution of the agricultural sector in the GDP ranged between 14.5–22.4 percent. The principal production means of the agricultural sector in the RM are preponderantly privately owned agricultural lands, which by January 1, 2009 accounted for 1,984,550 thousand ha. The destination of this category of lands is production of agricultural commodities. The share of privately owned agricultural lands is 85 percent. The main economic actors involved in agricultural activities on privately owned land are: (i) agricultural cooperatives, (ii) joint stock companies, (iii) limited liability companies, (iv) peasant farms, and (v) individual farming of land by land owners. As of January 1, 2009 the numeric composition of such entities was as follows: agricultural cooperatives – 283, joint stock companies – 81, limited liability companies - 1423, peasant farms (family farms) – 380935 (including peasant farms (family farms) with an area up to 1 ha – 151617, from 1 ha to la 5 ha – 223526, from 5 ha to 10 ha – 4320, from 10 ha to 50 ha – 1126, from 50 ha to 100 ha – 143, over 100 ha – 203), and individual farming of land by land owners – 765921. The remaining 15 percent of agricultural lands are managed by the state or Local Public Authorities.

The main factors currently affecting the agricultural sector relate to two general aspects, the sector's vulnerability to the climate factors and excessive orientation towards some unstable markets. The main risk factors in the agriculture sector of the RM are as following: (a) relatively low productivity and quality in comparison with other countries in the region; (b) high dependence of the productivity and quality of agricultural vegetal and animal products on environmental conditions; (c) slow and unstable growth in the past seven years (2000-2006) of the Gross Agricultural Product of less than 10 percent; (d) high frequency of extreme natural phenomena and exceptional situations in agricultural sector (heavy rains, hail, freezing, floods, droughts); (e) old age of vineyards and orchards; (f) obsolete infrastructure of irrigation systems; (g) preponderance of low value crops and low level of processing of the final products; (h) excessive fragmentation of privately owned agricultural lands; (i) poor relation of the current agricultural practices with the concept of sustainable development of the agricultural sector.

Human Health. The average life expectancy in the RM demonstrates similar trends as in the neighbouring countries and some Eastern European countries. At present the decline of this indicator has been stopped and its average value for 2007 was 65.0 years for men and 72.6 years for women. The situation on the evolution of the number of patients registered with primary diagnosis per 1000 population, is positive and stable since 2000. So, in the past three years this indicator dropped from 366.7 to 325.9 persons. The most frequent types of diseases for the primary diagnosis per 1000 population for 2007 are: (i) respiratory diseases (99.6 cases), (ii) of pregnancy, child birth and postnatal complications (40.4 cases), (iii) traumas, intoxic ations and other consequences of external causes (38.1 cases), (iv) infectious and parasitic diseases (29.3 cases), (v) skin and hypoderm diseases (23.4 cases). Other diseases which currently account for a relatively big share are digestive system and blood circulation diseases. The most important causes of lethal events in the RM are blood circulation diseases, trauma and intoxications, malignant tumours. The digestive system diseases are also an important cause of deaths in the country. In 2006, 66.0 percent of the total number of deaths among active adults were caused by blood circulation diseases, respiratory system diseases, as well as malignant tumours. This proportion is the same in most age categories of the active population in the country. The most frequent types of diseases at children (aged 0-17 years) in 2007 were respiratory system diseases (45 percent), infectious and parasitic diseases (13.2 percent), traumas, intoxications and other consequences of external causes (8.9 percent), skin and subcutaneous diseases (8 percent), as well as nervous system and sensory organs (7 percent). The ratio of morbidity by the main types of diseases features the same values in the time period 2003-2007. Under the circumstances of the RM the blood circulation diseases and the infectious diseases are most of all related to climate indicators values. During the past years the number of persons with the blood circulation diseases as a primary diagnosis tended to slightly decrease, reaching 19.7 persons per 1000 population in 2007. Infectious diseases also featured a slightly decreasing trend starting 2000. At present the principal risk factors for human health are preponderantly determined by socio-economic conditions: (a) increasing air temperature which may cause heart attack, severe circulatory diseases (e.g., hypertensive disease, Ischemia, myocardial infarction) and respiratory diseases (e.g., pneumonia); as well as potential spread of malaria due to growing mosquito population and increasing number of vector-borne diseases; (b) polluted air basin which may cause increased frequency of respiratory diseases (e.g., bronchial asthma) due to higher concentrations of ground level ozone in urban areas and changes in pollen distribution related to climate change; (c) polluted drinking water which may cause frequent cases of diarrhea, dysentery, salmonellas, typhoid fever; as well as increasing number of digestive system sicknesses (e.g., gastric ulcer, cholecystitis malfunctions), also urinary-genital system (e.g., urinary lithiasis) and bone articulations (e.g., arthritis, polyarthritis); (d) floods which may cause drowning, injuries, diarrhea diseases, vector-borne diseases and circulatory illnesses; also, damage to infrastructure for health care and water and sanitation, etc.

S.5.5 Impact and Opportunities to Adapt to Climate Change

These assessments were made in conformity with the climate change concept which takes into account the aspects of the potential impact and the climate change mitigation opportunities. In terms of methodology two approaches were used. The first approach is about using well formalized new climate change impact assessment methods and instruments (computation methods, software, etc), while the second was based on the expert analysis. Also it has been taken into account that current assessment should elaborate and complement the results obtained in this area and described in the Republic of Moldova's First National Communication under the UNFCCC. This chapter features only the most important results obtained by applying strictly formalized climate change impact assessment models.

Sector Action Plans on Mitigation and Adaptation to Climate Change, containing the most relevant mitigation and adaptation measures, as well as the corresponding costs on their implementation are presented in the Annexes 2.6-2.7 and 2.8 of the present report.

Potential Impact of Climate Change of Forest Ecosystems. Natural forests in the Republic of Moldova are a well preserved component of the landscape which however greatly depends on climate factors. Current mesophilic beech, durmast and oak forests preponderantly depend on two basic climate factors – temperature and amount of precipitation. The impact of the future climate change on the forest ecosystems was estimated based on the following approach: (1) a case study based on evolution in time of the phytosanitary condition of forests; (2) a case study based on evolution in time of the introduced species, acacia groves and ash trees monocultures; (3) a case study based on extreme climate conditions of year 2007; (4) a mathematic simulation of the forestry fund stability and forestry productivity under climate change conditions.

Case study based on evolution in time of the phytosanitary condition of forests. Keeping account of the current phytosanitary condition, bio-ecological peculiarities of forests in the Republic of Moldova, the forthcoming climate change, calculated versus CSIRO-Mk2, HadCM2 and ECHAM4 models, the following trends were revealed. Climate prospections made by applying CSIRO-Mk2 and HadCM2 models. Within 2010-2039 periods the phytosanitary condition will change significantly. Unfavorable changes will occur in the forests in the Northern part of the country where high level trees drying area will expand by circa 15-25% by the end of this period. In between 2040-2069 the change of the phytosanitary condition determined by the trees drying level in the Northern part of the country will strongly aggravate expanding towards South and South-East. Significant changes under this aspect will take place in between 2070-2099. In the Northern part the forests will dry out intensely. The forests in the Balti steppe incorporating exclusively artificial stands will be subjected to particularly serious mass drying out and it is quite likely that current species of forest trees may completely disappear. The same may also occur with the forest species in the Southern and Central parts of the country, in particular in the Eastern part of the Central zone. Because in the South the stands mostly originate from the shoots of multiple generations, they will also be subjected to the serious phenomena of mass drying out. Intensive forests drying out area in the Central part of the country will expand by more than 25%, covering practically the entire Eastern and South Eastern areas of Codrii. In conformity with the climate scenario developed by applying the ECHAM4 model, the current ecosystems drying out phenomenon will be much stronger. So, in conformity with this climate scenario, by the end of this century climate aridization in the Northern part of the country will entail particularly serious drying effects with possible gradual disappearance of forests. The same situation may occur in the South where the oak groves from offshoots will become less consistent being unable to dominate the stand, unless not regenerated in due time from seeds.

Case Study Based on Evolution in Time of the Introduced Species, Acacia Groves and Ash Trees Monocultures. Of the current forest ecosystems, the future climate change can mostly affect introduced forest species and ash trees monocultures. Such ecosystems were set up preponderantly on degraded lands. In most cases, being regenerated from offshoots, they have a fasciculated radicelar system which is more superficially rooted compared to trees grown from seeds. Due to aforestation technologies used in the past, at the age of 40-50 years, the oak species become pure even though initially were conceived as mixed species. In such conditions a protective shadow sub-level is strictly necessary and ecologically useful. If such protection is missing, the unfavorable effect of the herbage covering becomes stronger while the trees stems suffer from solar radiation. In the context of the forthcoming changes, if climate changes in conformity with climate scenarios CSIRO-Mk2 and HadCM2, by the end of this century, and in conformity with ECHAM4 scenario – already in the middle of this century – these species may find themselves in improper development conditions which may entail substantial decrease of volume growth, occurrence of important diseases and pests hotbeds and result in a mass drying out of these trees. Such situation may be prevented only through complex and costly works of ecologic reconstruction aimed at introducing sub-level species to prevent the above mentioned situation.

Case Study Based on the Extreme Climate Conditions of Year 2007. This case study was accomplished in the scientific reserve „Codrii". The reserve is situated in the Central part of the country (Lozova village, Straseni district) and has a total area of 17,475.8 ha (720 ha – strictly protected zone, 4,455.8 ha – buffer zone and 12,300 ha –transitory zone). It contains a body of mesophilic forest of Central European type having the oldest statute of a protected area in the Republic of Moldova. The forests of the reserve are well studied floristically and include 991 species of vascular plants, 60 species of rare plants and 24 species included in the Red Book, publication of 2001. From the typological point of view these forests contain beech trees stands, durmast stands with beech, durmast stands with linden and ash trees, durmast stands with hornbeam, oak stands with hornbeam, poplar stands and willow stands. The climate conditions of year 2007 in the „Codrii" scientific reserve were different from those observed earlier and featured annual average temperatures higher by +2.1°C (the multiannual average is +9.1°C) and the amount of precipitation by 85.7 mm higher than the multiannual average of 475 mm. Such climate conditions are similar to annual average temperatures identified by applying CSIRO-Mk2, HadCM2, ECHAM4 climate models to the geographical habitat of the Republic of Moldova for 2070'. For these reasons, the climate conditions of year 2007 can serve as a projection of future climate change and their impact may be interpreted as a potential model to assess the impact of future climate element son the forest ecosystems. The results of this assessment showed that mesophilic trees, bushes and herbs of the beech, durmast and ash trees forests bloomed abundantly, while fructification was scarce or even absent. The trees shed their leaves early (May – June), or the leaves dried and stayed on the head for a long time. Thickness growth of the oak and ash trees stems in 2007 accounted for as little as 50% of the previous year and compared to the multiannual average of the past 10 years. The most affected were the forest-forming trees – ash trees, oak trees, and acacia, and among those co-dominants – hornbeam, red linden, sycamore maple, common maple, elm trees shed their leaves early (1.5 months earlier) as compared to previous years. The summer herbs species started vegetation in April and dried out in May-June without blooming and bearing fruit. So, climate conditions of year 2007 as a hypothetic model demonstrated a rather strong potential impact of the future climate change. As a consequence, these changes can lead to the decrease of mesophilic forests areas (beech trees stands, durmast trees stands and oak trees stands) in favor of thermophilic forests of durmast with wig trees and of xerofile pastures.

Mathematic Simulation of Forest Ecosystems Evolution Based on Climate Change. To assess the impact on forests the JABOWA III dynamic model describing the evolution of species composition and productivity depending on local conditions, species features and climate elements, was used. The assessment of the impact of climate change on forest ecosystems has been made based on two approaches. The first approach was at the species level, while the second – on the level of ecosystem. Summarizing this assessment the following has been stated. The difference between biomass accumulations scenarios increase with the age of the trees. Among the mix species the hornbeam and the ash tree may be the most vulnerable species in the new climate conditions determined by climate change. In the first half of the production cycle, starting 2010 the ash tree may feature a 20-40% decrease in biomass growth, while in the second half both species may feature much less growth than under the baseline scenario which does not account for climate change. The significant decrease of the trees population in both species, by decline and drying out, also contributes to the decrease of the total output. Foul lime tree features active growth in the first years, benefits from favorable conditions generated by environmental change, and will have a sharp decline in total biomass around 2030. The durmast–beech stands zone is highly sensitive under new environmental conditions characterized by fewer precipitation and higher average temperatures. The sycamore maple tree and foul lime tree, unlike the ash tree, may accumulate significantly more biomass under new environmental conditions. The ash tree may have an output by 30-40% smaller than normal along the entire production cycle. The sycamore maple tree and foul lime may accumulate significantly more, on average over 30 % more than normal, but only in the first part of the production cycle (approximately until 2040), followed by a decrease in total biomass under environmental change, due to reduced population as a result of species decline. The durmast may respond positively to the new environmental conditions, by accumulating 10-20% more biomass. At lower altitudes, in the open, the pedunculate oak may accumulate more biomass under normal environmental conditions in the first part of production cycle. Of the mix species, the hornbeam may be seriously affected, and to a wider extent than the ash tree.

Potential Impact of Climate Change of Agriculture Sector. The impact of the future climate change on the agriculture sector was estimated based on the following approach: (1) an assessment of climate change impact on the main crops productivity; and (2) a case study on impact of the agricultural soil management systems change in relation to climate change phenomena.

Assessment of the Climate Change Impact on the Main Crops Productivity. The assessment of the climate change impact on agricultural sector was made based on the assumption that this sector development implies the structure and share of the main crops similar to the current one. Climate scenarios were derived from average air temperatures and amount of precipitation calculated for the conditions of the Republic of Moldova until 2100 year based on global atmosphere circulation scenarios CSIRO-Mk2, HadCM2 and ECHAM4. The impact of the amount of precipitation and temperature on winter wheat, grain maize, sunflower and sugar beet productivity was assessed by using regression analysis. The respective analysis was made in several steps: the first one was to identify the trends in the crops productivity over the 1961-1990 time series; the second step was to identify multiple regression equations, with the highest level of statistical significance, linking the crops productivity variability with the average monthly temperature and precipitations values during the plants vegetation period; while the third step was to assess the impact of future changes in the temperature and precipitation patterns on the productivity of main crops without undertaken any adaptation measures. The analysis was made with the help of the *Statgaphics Plus and Microsoft Office Excel* software. Climate indicators were selected in conformity with the step by step regression principles taking into account their contribution to the crops productivity.

The obtained results reveal that the influence of the climate factors on the variability level of the productivity of the main agricultural crops in the Republic of Moldova over the 1961-1990 periods was differentiated. Analysis of the data obtained shows that the influence of climatic conditions on yield of winter wheat in the 1961-1990 years was statistically significant at 95% level of significance ($p \leq 0.05$). Coefficient of determination R^2 shows that the combined effect of precipitation and temperature determined about 36.68% of the variability of the annual average productivity of the winter wheat. The dependence of the variability of winter wheat productivity from the individual factors of temperature and precipitation was weaker, being respectively 21.17% and 22.36%. Analysis of the relationship of grain maize productivity on climate conditions during vegetation period revealed a statistic significance only of one factor - for temperature, whereas the effect of the other investigated factors - precipitation, as well as the combined effect of precipitation and temperature was not statistically significant ($p = 0.21$ and $p = 0.16$ respectively). Variability of grain maize productivity in the years 1961-1990 only 14.05% was determined by the influence of average air temperature. The productivity of sunflower in the assessed period by 36.68% was due to the combined effect of precipitation and air temperature during the vegetation period ($p = 0.007$). Influence of individual factors - the temperature was not statistically significant, while the precipitation determined the variability in the productivity of sunflower during the respective period by 24.81%. Based on the values of the coefficient of determination R^2, the climatic conditions have had a significant influence on the productivity of sugar beet in the 1961-1990 periods. Precipitation and air temperature during the vegetation period determined by 56.64% the average variability of sugar beet productivity ($p \leq 0.01$). Dependence of the sugar beet productivity, separately from air temperature and precipitation was less pronounced, the coefficient of determination R^2 being 24.90% and 22.92% respectively. In conformity with the trends identified for the baseline period (1961-1990) several scenarios of the expected climate change impact on the productivity of the main agricultural crops in the Republic of Moldova were assessed without undertaken adaptation measures.

The analysis of the obtained results revealed that due to the impact of the main climate indicators (temperature and precipitation), productivity of the winter wheat by year 2039 may decrease from 14.28% (HadCM2 model) to 17.79% (ECHAM4 model). In comparison with the baseline period, by 2069 year the crop productivity may decrease, in dependence of the assessed model, from 23.35% (CSIRO-Mk2 model) to 33.99 % (HadCM2 model). The maximum values of productivity decrease may be reached by 2099. So, due to changes in values of main climate indicators – precipitation and temperature - the productivity of winter wheat may decrease from 38.13% (CSIRO-Mk2 model) to 53.59% (ECHAM4 model). The sharp decline in the productivity of winter wheat can be explained by a shift of vegetation phases in a more unfavorable period due to temperature increase. The vegetation period of winter wheat (starting with temperatures higher than 5^0C in spring), according to CSIRO-Mk2, HadCM2 and ECHAM4 models will start in the Republic of Moldova by 2040' earlier by 15 days. By the 2099 year the vegetation period of winter wheat will start earlier: in the North by 1.0-1.5 months, while in the Center and South by 1.5-2.5 months. By use of the index 'sum of effective temperatures' there were calculated for winter wheat, according to CSIRO-Mk2, HadCM2 and ECHAM4 models, the average initiating date of main development phases in the spring-summer season. Analysis of the data obtained, revealed that by 2039 output in the tiller initiating phase at winter wheat may have shifted in average from 2 days (HadCM2 model) up to 11 days (CSIRO-Mk2 model). By 2069 the shift in the respective phenological phase will account from 7 days (HadCM2 model) up to 15 days (CSIRO-Mk2 model), while by 2099 year according to the ECHAM4 model the tiller initiating phase will start at the end of March, that is by 24 days early the onset of respective phase in the 1961-1990 period. According to the projections, by 2039 year the phenological phase of jointing may come for winter wheat earlier from 4 days (HadCM2 model), up to 9 days (CSIRO-Mk2 model). According to the assessment performed the humidity conditions in this period will be close to optimal (HTC = 1.15-1.35). However, by 2069 year the phenological phase of jointing may shift in average by 11 - 13 days, while by 2099 year this shift can already draw from 10 days (HadCM2 model) up to 24 days (ECHAM4 model). Humidity conditions for this period would be sufficient only in accordance with the CSIRO-Mk2 model (HTC = 1.00-1.03), while according the other two models (HadCM2 and ECHAM4) there will be recorded insufficient humidity conditions (HTC = 0.81-0.74), thus the critical period for jointing at winter wheat will take place in dry conditions, which will impact a sharp decrease in the productivity. For technical crops such as sunflower, which is relatively drought-resistant, there are projected more favorable climate conditions during the growing season than for winter wheat. In comparison with the reference period, by 2039 year a slight decrease in productivity, from 0.63% (HadCM2 model) to 1.61% (ECHAM4 model), is projected for sunflower. While, according to CSIRO-Mk2 model it is possible even a small increase in the productivity, by 2.87% compared with the average recorded productivity of sunflower in the reference period. By 2069 year it is also projected a slight increase in the sunflower productivity, by 2.58% (HadCM2 model), respectively by 2.82% (CSIRO-Mk2 model). By 2099, based on the assessment of combined influence of temperature and precipitation, at sunflower there will persisted the increasing trend in productivity, from 2.48% (HadCM2 model) to 2.49% (CSIRO-Mk2 model). A slight decrease in the productivity, by 1.41% relative to the base period, will be registered according to the ECNAM4 model. For sugar beet by 2039 year, when assessing the combined effect of temperature and humidity during the growing season, it is expected a decrease in productivity by 6.12% - 6.58% under the all climatic models assessed. By 2069 year, there will persisting the decreasing trend in productivity due to climate change. The most severe decrease in productivity (by 23.84%) is predicted under the HadCM2 model. While under the ECHAM4 and CSIRO-Mk2 models the prognosis is more favorable, it is predicted a decrease of productivity by 12.54% and 12.76% respectively. In 2099 year, the most severe productivity reduction for sugar beet will be observed according to HadCM2 model - by 39.04% and ECHAM4 model - by 27.63%, while for CSIRO-Mk2 model the forecast is more favorable – a decrease by 19.40%. The assessment performed allow concluded that the negative effect of warming process, according to CSIRO-Mk2, HadCM2 and ECHAM4 models will not be offset by increase of precipitations. In these circumstances, without undertaken any adaptation measures it can be expected by 2099 a significant drop in the productivity for winter wheat (from 38.13% to 53.59%) and sugar beet (from 19.40 to 39.04%), a medium drop in the productivity for grain maize (from 20.07 to 29.77%), and a slight reduction in the productivity at sunflower (by 1.41%).

Case Study on Impact of the Agricultural Soil Management Systems Change in Relation to Climate Change. In partnership with the TACIS Regional Project "*Sustainable Integrated Land Use of the Eurasian Steppe*" implemented within the 2007-2009 period, a case study was carried out on assessing the potential to reduce the greenhouse gas emissions from the agricultural soils in the steppe zone of the Republic of Moldova by promoting alternative agricultural technologies focused on enhancing the carbon accumulation and storing process in these types of soils. For this purpose, it was improved the greenhouse gas emissions evaluation methodology used while compiling the Republic of Moldova's First National Communication under the UNFCCC. A long term polygon was set up, where research was initiated in 2008-2009 and will continue in the following 5 years. The need to undertake such studies is determined by the fact that currently the annual loses of humus from agricultural soils in the Republic of Moldova amount to 0.7-0.8 t/ha and this process is increasingly growing by circa 0.02% per year. At national level, humus losses from the entire surface of agricultural soils annually generate circa 1.8-2.0 million tones of CO_2 emissions. The main reason for this situation is the technologies currently used in the agricultural sector of the country.

Three scenarios were developed to identify the opportunities to reduce greenhouse gas emissions by increasing the amount of organic matter in soil: the baseline and two alternative scenarios (optimal and intermediary). The baseline scenario implies keeping the current soils management system on agricultural lands in the steppe zone (*outdated soil management technologies – e.g., shortage by 45-50% of root and on ground crops residue left to compensate the carbon loss, low level of organic fertilizers use, the intensive use of tined tillage for inter-row processing of soil, increasing the decomposition of organic staff in soil, etc.; as well as limited crop rotation possibilities - during the last decade the basic crop rotation was: (1) pea been + annual plants; (2) winter wheat; (3) sun flower; (4) winter barley + winter wheat, and (5) grain maize*) entailing medium annual losses of circa 1.48

t/ha of humus, which is equivalent to approximately 0.86 t/ha of carbon. The consequences of such soil management system on agricultural lands in the steppe zone lead to: (i) increased CO_2 emissions from the soil due to intensification of humus mineralization processes; (ii) reduced amount of humus in soil with a risk of losing black earth as a separate type of soil; (iii) affected soil structure and strong settling of the arable soil layer; (iv) development of desertification processes in some steppe zones of the Republic of Moldova; (v) low productivity of agricultural crops, etc.

To change this situation there should be implemented alternative agricultural soil management practices, inclusive with application of technologies entailing reduction of CO_2 emissions from soil and enhancing soil fertility. The following advanced agricultural technologies would be used in the Republic of Moldova under the two alternative agricultural soil management scenarios:

- More rational combination of classical plough with technologies of minimal soil use;
- The application of trench agriculture (in-line plough) on hillsides, which consists of ploughing the land across the hillside, observing the entire complex of agro-technical measures in order to minimize the soil erosion;
- Pulverization and tillage of secondary agricultural production in the shape of vegetable residue;
- Implementation of diverse forms of crop rotation with significant share of multi-annual plants, up to 20-30% (e.g., option of crop rotation with multi-annual plants: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat; (4) sunflower; (5) winter barley + winter wheat; (6) grain maize);
- Sowing and plantation of green crops (e.g., option of crop rotation with multi-annual plants and green crops: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat + winter vetch on the green fertilizer; (4) sun flower; (5) winter barley + winter wheat + winter vetch on green fertilizer; (6) grain maize);
- Wider and more rational use of mineral fertilizers (e.g., option of crop rotation with multi-annual plants and mineral fertilizers: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat + 150 kg of ammonium nitrate; (4) sunflower + 100 kg of ammonium nitrate; (5) winter barley + winter wheat + 100 kg of ammonium nitrate; (6) grain maize + 100 kg of ammonium nitrate);
- Wider use of organic fertilizers (e.g., option of crop rotation with multi-annual plants and manure - 60 tons of fire-fanged manure under plough on each field: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat; (4) sunflower; (5) winter barley + winter wheat; (6) grain maize).

The techniques of soil cracking and soil moling are supposed to be used for better implementation of anti-erosional technology. The seed bank is supposed to be established in order to improve the soil through the use of multi-annual crops and "green" (natural) fertilizers. The implementation of minimal tillage will be concomitantly associated with execution of several operations. The livestock sectors needs to be reviewed, thus creating a concordance between livestock and agricultural sector, in order to use the manure. The mineral fertilizers are supposed to be used in moderated doses as supplement to others. The ploughed fields difficult to traverse and with degraded soil will be sowed with multi-annual crops and will be used for hay-mowing. Big importance will be paid to the use of internal resources (solar and terrestrial energy, bacteria retaining nitrogen and living in soil, breeding species and hybrids resistant to diseases, drought and extreme temperatures, sustainable use of water for irrigation, reduction of purchased resources).

The range of measures planned to be undertaken in conformity with two alternative scenarios, based on the assessments made in a farm situated in the southern part of the Republic of Moldova reveal that these measures may ensure a reduction in humus losses from 1.48 t/ha (baseline scenario) to 0.29 t/ha (intermediary scenario) and 0.22 t/ha (optimal scenario). These measures may lead to an annual reduction of CO_2 emissions from agricultural soils by 2.54 t/ha under the intermediary scenario (from 3.15 t CO_2/ha/year to 0.62 t CO_2/ha/year), and by 3.62 t CO_2/ha under the optimal scenario (from 3.15 t CO_2/ha/year to -0.46 t CO_2/ha/year). At the national level the application of the proposed agricultural technologies in the frame of two alternative scenarios may lead to an annual reduction of greenhouse gas emissions by circa 144.5 thousand tones CO_2 under the intermediary scenario, if these measures are implemented at least on 10% of arable lands located in the steppe zone (what makes circa 57 thousand hectare), and by circa 722.6 thousand tones CO_2 under the optimal scenario, if these measures are implemented at least on 50% of arable lands located in the steppe zone (what makes circa 285 thousand hectare). Along the reduction of greenhouse gas emissions the alternative agricultural practices will also have a beneficial impact on the process of agricultural sector adaptation to new climate conditions.

S.6 Projections of Greenhouse Gas Emissions

S.6.1 Methodological Approaches

To assess the GHG emissions abatement potential in the Republic of Moldova, the following tools were used: the ENPEP software pack – for the Electrical Power Sector; LEAP software - for the Thermal Power Sector and Transport Sectors; Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997) - for Industrial Processes, Agriculture and LULUCF Sectors; CO_2 FIX V2.0 Model developed by the European Forestry Institute under the CASFOR Project - for LULUCF Sector; INFRAS (Swiss Company) Tool for calculating CH_4 emissions from Solid Waste Disposal Sites following the First Order Decay Method and Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997) – for wastewater handling category under Waste Sector.

S.6.2 Projections of Aggregate Greenhouse Gas Emissions at National Level

The aggregated projections regarding the evolution of direct GHG emissions in the Republic of Moldova for 2005-2030 were made on the basis of the three scenarios considered under current assessment: Baseline Scenario - BLS, High Alternative Scenario - HAS and Intermediary Alternative Scenario - IAS. It should be noted that the BLS, as a rule, does not provide for abatement measures, while the alternative scenarios (HAS and IAS) have taken into account the policies and measures designed to mitigate the greenhouse gas emissions, included in the Sectoral Action Plans on greenhouse gas emissions abatement, in conformity with the Party's commitments under the UNFCCC and Kyoto Protocol. So, in comparison with the level of total national greenhouse gas emissions (without LULUCF) reported in 2005, by the year of 2030 it is expected that total direct GHG emissions will increase by 155.7 percent under the BLS, by 123.0 percent under the HAS, and by 138.7 percent under the IAS. Relative to the BLS, implementation of the planned abatement measures, in particular of the ones specified in the individual Sector Action Plans on greenhouse gases emissions abatement, in conformity with the Party's Commitments under the UNFCCC and Kyoto Protocol, by the year of 2030, will allow to reduce the total national greenhouse gas emissions (without LULUCF), by 12.8 percent under the HAS and by 6.6 percent under the IAS; and respectively, the net national greenhouse gas emissions (with LULUCF) by 14.5 percent under the HAS and by 5.9 percent under the IAS (Figure S-6, Table S-4).

S.6.3 Projections of Aggregate Greenhouse Gas Emissions by Category

Implementation of the planned abatement measures will produce and impact on the re-distribution of the share of different sectors in the structure of total and net national greenhouse emissions. So, if in 2005 circa 65 percent of the national direct GHG emissions were generated from the Energy Sector, 17.9 percent from Agriculture Sector, 11.8 percent from the Waste Sector, and the rest of 4.9 percent from Industrial Processes Sector, by year 2030 the share of these sectors in the structure of total national GHG emissions will change essentially, in particular under the alternative scenarios, which will feature an increase of the share of the Energy and Industrial Processes Sectors and a decrease of the share of the Waste and Agriculture Sectors.

Table S-4: Projections of Greenhouse Gas Emissions and Sinks in the RM by sector under the Scenarios Considered for the 2005-2030 time series, Gg CO_2 equivalent

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Energy	7724.8	10271.9	12335.3	14442.8	16420.1	19582.2
Industrial Processes	581.9	757.8	983.8	1286.2	1735.7	2430.8
Agriculture	2127.8	2653.7	3157.8	3728.0	4337.2	4840.9
LULUCF	-1381.4	-1415.9	-1451.3	-1487.6	-1524.8	-1562.9
Waste	1400.0	1540.4	1836.6	2244.8	2770.6	3401.9
Total (with LULUCF)	10453.1	13807.9	16862.2	20214.2	23738.8	28692.8
Total (without LULUCF)	11834.5	15223.8	18313.5	21701.8	25263.7	30255.8
High Alternative Scenario (HAS)						
Energy	7724.8	9425.8	11049.6	12991.9	14785.1	17865.6
Industrial Processes	581.9	726.6	909.3	1176.9	1554.6	2059.5
Agriculture	2127.8	2603.8	2995.7	3404.7	3871.5	4187.4
LULUCF	-1381.4	-1557.5	-1669.0	-1785.1	-1829.8	-1875.5
Waste	1400.0	1281.1	1495.0	1672.9	1962.0	2282.3
Total (with LULUCF)	10453.1	12479.8	14780.5	17461.2	20343.4	24519.3
Total (without LULUCF)	11834.5	14037.4	16449.6	19246.3	22173.2	26394.8
Intermediary Alternative Scenario (IAS)						
Energy	7724.8	9875.9	11786.7	14147.2	16114.4	18946.9
Industrial Processes	581.9	742.5	937.8	1215.3	1612.0	2232.1
Agriculture	2127.8	2636.4	3077.3	3594.0	4082.9	4458.2
LULUCF	-1381.4	-1274.3	-1233.6	-1190.1	-1219.8	-1250.3
Waste	1400.0	1422.6	1637.5	1866.5	2188.7	2614.4
Total (with LULUCF)	10453.1	13403.1	16205.8	19632.9	22778.1	27001.2
Total (without LULUCF)	11834.5	14677.4	17439.4	20823.0	23998.0	28251.6

S.6.4 Projections of Aggregate Greenhouse Gas Emissions by Gas

It is expected that over the 2005-2030 time series, CO_2 emissions (without LULUCF) will increase by 161.5 percent under the BLS, by 147.4 percent under the HAS, and by 153.4 under the IAS; CH_4 emissions (without LULUCF)

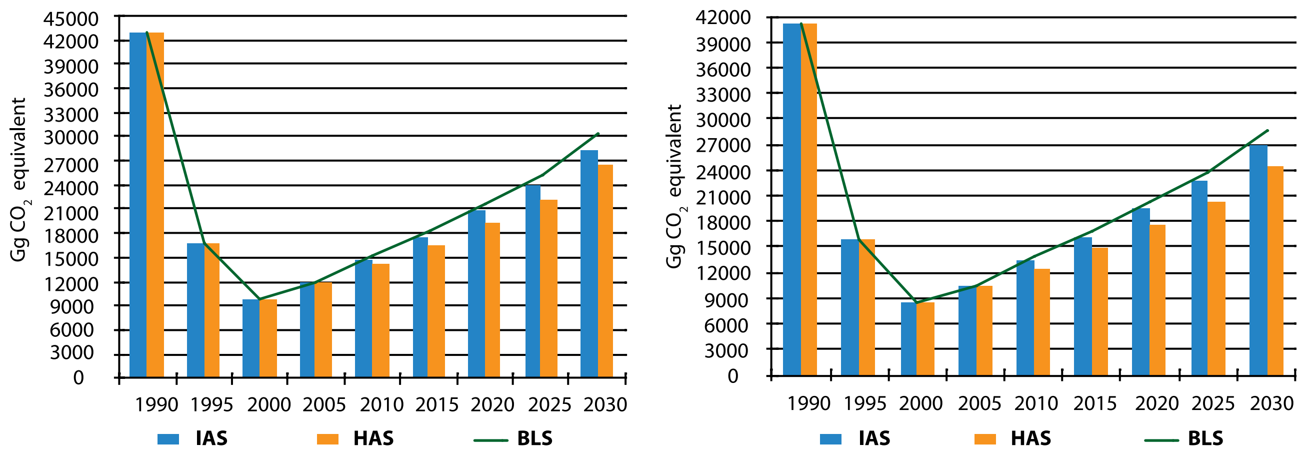


Figure S-6: Projections of Total (left figure) and Net (right figure) Greenhouse Gas Emissions in the RM under the Scenarios Considered for the 1990-2030 time series

will increase by 125.1 percent under the BLS, by 42.5 percent under the HAS, and by 84.9 percent under the IAS; N_2O emissions (without LULUCF) will increase by 129.2 percent under the BLS, by 122.0 percent under the HAS, and by 124.6 percent under the IAS, respectively, emissions of F-gases will increase by 4431 percent under the BLS, by 2756 percent under the HAS, and by 3520 percent under the IAS (Table S-5).

Table S-5: Projections of Greenhouse Gas Emissions and Sinks in the RM by Gas under the Scenarios Considered for the 2005-2030 time series, Gg CO_2 equivalent

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
CO_2	7527.6	10078.5	12240.6	14358.4	16424.7	19683.5
CH_4	2883.8	3380.7	3903.7	4640.6	5532.4	6492.8
N_2O	1404.1	1711.7	2063.0	2489.8	2878.2	3218.5
F-gases	19.0	52.9	106.1	213.1	428.3	860.9
Total Direct GHG	11834.5	15223.8	18313.5	21701.8	25263.7	30255.8
High Alternative Scenario (HAS)						
CO_2	7527.6	9269.2	11243.4	13279.6	15326.4	18625.5
CH_4	2883.8	2851.4	2908.3	3250.3	3696.9	4109.6
N_2O	1404.1	1864.6	2221.5	2569.6	2867.6	3117.1
F-gases	19.0	52.0	76.4	146.8	282.2	542.6
Total Direct GHG	11834.5	14037.4	16449.6	19246.3	22173.2	26394.8
Intermediary Alternative Scenario (IAS)						
CO_2	7527.6	9686.2	11689.5	14076.0	16113.2	19077.7
CH_4	2883.8	3148.7	3502.5	4020.4	4695.3	5332.6
N_2O	1404.1	1790.1	2161.9	2562.4	2867.2	3153.4
F-gases	19.0	52.4	85.4	164.2	322.3	687.8
Total Direct GHG	11834.5	14677.4	17439.4	20823.0	23998.0	28251.6

S.7 Measures to Mitigate Climate Change

S.7.1 Energy Sector

The following priority GHG emissions abatement measures have been identified for the Energy Sector: (1) promoting abatement policies and measures in all sub-sectors of the Energy Sector: in production (inclusively through upgrading and modernization of the power plants and increasing the energy units efficiency), transportation (reduce costs and losses of energy in electricity transport and distribution networks (including through rehabilitation and upgrading of existent systems to technically and scientifically more advanced level, as well as through streamlining and optimization of networks as a whole), and consumption (increasing energy efficiency in all branches of the national economy); and wide implementation of new energy efficient technologies (use of heat pumps, co-generation and three-generation); (2) including the local fuels, secondary energy resources, renewable energy sources (in particular biomass, wind and solar energy), and domestic and industrial wastes into the energy balance of the country; (3) use of low intensity GHG emissions fossil fuels (natural gas and residual fuel oil rather than coal); (4) compliance with the European environment pollution prevention norms and standards; (5) development of a State Program on Liberalization of the Energy Market and providing conditions for attracting investments in the Energy Sector; (6) maintenance in good condition of the main gas pipelines and gas distribution networks; (7) replacement of corrosive pipelines made of cast iron and steel by pipelines made of non-corrosive materials, what will allow to reduce methane leakage from distribution systems; (8) use of the most advanced technologies at compression and distribution systems; (9) putting into practice good management systems and operational procedures to reduce ventilation (10) implementing management practices aimed at detecting leakage and technological losses; (11) implementing electronic monitoring programs, including with a view to regulate the distribution systems operating at higher pressure than required; (12) flaring of methane at well-sites (in conformity with the GWP for a period of 100 years, 1 kg of CH_4 emitted in the atmosphere equals 21 kg CO_2, while flaring of 1 kg CH_4 produces only 2.75 kg CO_2); (13) re-injecting fugitive emissions from oil extraction back into the oil fields, etc.

S.7.2 Transport Sector

The following priority GHG emissions abatement measures have been identified for the Transport sector: (1) applying economic and fiscal measures to stimulate renewal of the vehicles pool, rolling stock, naval and maritime fleet; (2) rehabilitation and reconstruction of roads and railways, re-arranging internal navigation ways and improving the operation parameters of the hydraulic engineering installations; (3) optimization of urban and interurban transport networks, freight and passenger traffic, including by deviation of the traffic from the densely populated areas (construction of circuit roads around the towns, imposing circulation restrictions in the central parts of the towns, etc.); (4) facilitation of the public transport use and development of public transport networks in the main towns of the country; (5) large scale use of electric transport, including by extending urban and interurban electric transport networks; (6) increasing the share of road vehicles using LPG and LNG as fuel; (7) use of road vehicles operating on hydrogen and biofuel, other state-of-the-art technologies applicable in transport sector; (8) limiting the effective life of the road vehicles at import (from 7 to 5 years for passenger vehicles and from 10 to 7 years for trucks and buses); (9) implementing mandatory technical check-up of all vehicles and trailers.

S.7.3 Industrial Processes Sector

The following priority GHG emissions abatement measures have been identified for the Industrial Processes sector: (1) maintenance in good condition of the equipment and employment of modern technological processes in view of rational use of natural resources and energy, and reducing production wastes; (2) accounting the consumption of the raw materials and energy, efficient management of production process; (3) employment of efficient management systems and reducing production losses, inclusively by use of recycled materials; (4) fugitive emissions recovery; (5) improving and supplementing the legal framework with the European efficiency and emissions standard (Admissible Emissions Limits); (6) implementing the initiatives on differentiated application of taxes for energy efficiency and emissions reduction; (7) entering into voluntary agreements on reducing emissions from the industrial enterprises in the country; (8) pursuing aggressive policies on transfer of environmental sounds technologies and commercial demonstration of clean technologies within the industrial and innovation parks, etc.

S.7.4 Agriculture Sector

The following priority GHG emissions abatement measures have been identified for the agricultural sector: (1) gradual replacement of breeds of livestock and poultry currently used in the Republic of Moldova with higher productivity breeds; (2) quality improvement of the forage supply reserve by reducing the specific forage consumption in livestock breeding sector; (3) use of sustainable manure management systems; (4) improving the crops range, including through optimization of crop rotation, increasing the share of perennial and annual crops, extending the areas sown with forage crops and reducing the areas planted with sunflower; (5) improving soil fertilization techniques, correct application of industrial fertilisers, using all organic matter sources to enrich soils with carbon and achieving a balanced content of humus and nutrients in soil; (6) implementing sustainable soil management practices, combating soil degradation through diverse complex measures, including anti-erosion measures, etc.

S.7.5 Forestry Sector

The most efficient measures to increase the carbon dioxide removal capacities under the Forestry Sector are as following: (1) speeding up expansion of areas covered by forests and other types of forest vegetation on account of public and private lands; (2) implementing a new phase of expanding the areas covered with forests (on the account of eroded lands and, planting energy forests, etc.); (3) keeping the indicators regarding wood mass harvesting from sanitation treatments at the current level compliant with provisions of effective legislation; (4) decreasing the amount of wood mass from illegal cuttings; (5) ecological reconstruction of the forest stand; (6) in conformity with some models of climate evolution in the first half of the XXI century, a slight increase of woods productivity is possible (up to 10 percent), what will also result in an increased amount of removals of carbon dioxide emissions; (7) significant expansion of areas covered with forest vegetation in the context of more active promotion of agricultural-forestry and forestry-pastoral practices: improving grasslands by planting groups of trees and shrubs, delimitation of external boundaries and internal plots of the grasslands by planting forest belts, etc.; (8) implementing grasslands improvement / revitalization activities: increasing the current capacity of 0.6–1.2 tonnes of constant mass per hectare up to 4-5 tonnes of constant mass per hectare; (9) expansion of grasslands on the account of agricultural lands affected by erosion.

S.7.6 Waste Sector

The following priority GHG emissions abatement measures have been identified for the Waste Sector: (1) recovery of recyclable materials (objectives: recovery of paper and cardboard in proportion up to 20 percent of the total by 2010, in proportion up to 30 percent by 2015, in proportion up to 40 percent by 2020; in proportion up to 50 percent by 2025 and in proportion up to 60 percent by 2030); (2) biogas recovery at the domestic solid waste deposits sites (in 2009 the company "Biogas Inter" Ltd has already initiated methane recovery at the Cretoaia landfill, Anenii-Noi district; objective: recovery of circa 3-5 thousand tonnes of biogas annually over the period of time up to year 2018); (3) construction and putting into operation of a waste incinerating plant in Chişinau starting year of 2011, having a maximal rated capacity of circa 660 thousand tonnes of municipal solid waste annually; (4) reconstruction of wastewater treatment facilities in the country and proper management of the water supply and sewage sector focused on employment of aerobic treatment of wastewater and anaerobic treatment of sludge technologies allowing to capture methane emissions.

S.8 Other Information

S.8.1 Research, Development, Innovation and Technology Transfer

Academy of Sciences of Moldova (ASM) has full powers to implement the governmental policy in the sphere of science and innovation (RDITT) in the RM. This policy is implemented within the framework of the Partnership Agreements between the Government and the Academy of Sciences of Moldova (1st Agreement I covers the period of 2005-2008) and 2nd Agreement, respectively the period of 2009-2012). The Supreme Council for Science and Technology Development (SCSTD), as the executive governance body of the ASM, distributes the budget allocations, acting upon the above *Partnership Agreement,* among six strategic activity directions in science and innovation identified for 2006-2010 time series.

During the period from 1991 to 2000, budget allocations for the RDITT sector were almost constantly decreasing, then followed by some increase. In 2007 financing of the RDITT sector (0.65 percent of the GDP) was three times smaller than the average of the 27 EU member states (1.84 percent of the GDP). The RM started to allocate budget funds for technology transfer programs since 2005, and the amount of allocations tend to increase each year (1.6 mln. MDL in 2005, 3.0 mln. MDL in 2006, 9.0 mln. MDL in 2007), what allowed to increase the number of financed technology transfer projects (8 projects in 2005, 27 in 2006 and 54 in 2007). The technology transfer projects are approved for funding by the SCSTD, while financing and monitoring is effected by the Agency for Innovation and Technology Transfer (AITT).

In the new-type thinking, the environmental sound technologies are those contributing to the preservation of the environment and conservation of natural resources rather than economic growth. The objective of the current sustainable development policy is gradual transit to the pollution-reducing technologies and the environmental impact of the integrated non-polluting technologies. There are multiple options for the technology transfer in the Republic of Moldova, such as: direct procurements of the plants and equipment and production lines; direct investments in the case of implementing new appropriate technologies in new industrial facilities under construction, rehabilitation, facility modernization, etc.; sale of turn-key enterprises; establishment of joint ventures whose business is not focused mainly round imports of goods and leasing operations; leasing and franchising; sub-contracting, co-production agreements, joint scientific research and engineering activities, etc.; trade in know-how, commercial secrets, manufacturing experience, technical documentation; trade in patents and licenses in respect of any patented or registered industrial property (excepting trade marks); secondments for engineering and scientific personnel; hosting of scientific-technological conferences, trade fairs and exhibitions; training and education, business visits, Governmental assistance programs, etc. Within the framework of the technology transfer assessment, we must state that the current situation in the Republic of Moldova regarding the use of modern environmental-sound technologies in the sectors relevant to the UNFCCC can be hardly considered satisfactory: the nation has a limited capacity to implement efficiently the diverse technology options and services available at the market.

S.8.2 Systemic Observations and Information Sharing

Environmental Monitoring. The environment monitoring in the Republic of Moldova is done by a number of organizations, the most important of which are: Ministry of Environment and Natural Resources (MENR) and its subordinated entities: State Hydrometeorological Service (SHS), State Ecological Inspectorate (SEI) and the Geology Agency AGeoM, Ministry of Health (MoH), the National

Scientifical-Practical Centre for the Preventive Medicine (NSPCPM); Ministry of Agriculture and Food Industry (MAFI), Academy of Sciences of Moldova (ASM), Forestry Agency "Moldsilva", Department of Emergency Situations within the Ministry of Internal Affairs (MIA), and others.

Monitoring the Quality of Atmospheric Air. Atmospheric air quality is monitored through a grid of 17 stations of the State Hydrometeorological Service in the five industrial centres of the RM; also the National Scientific-Practical Centre for Preventive Medicine (NSPCPM) has its own specialized grid for permanent air quality monitoring in 12 urban settlements; and the State Ecological Inspectorate has its own grid for specific and fluctuating survey of pollutant emissions from permanent stationary and mobile sources of pollution, the survey network covering approximately 170 pollution sources in Chisinau and 470 enterprises and social facilities in other towns and districts of the RM .

Surface Water Quality Monitoring. The State Hydrometeorological Service has been performing systematic surface water quality surveys based on 52 observation points located at 17 large and small rivers, 6 water storage basins, 3 natural lakes and 1 coastal lake, testing 49 hydro-chemical indicators and concentrations in 5 groups of hydro-biologic elements; also, the Moldovan Geology Agency "AGeoM" is in charge of managing the network for ground water monitoring (186 observation wells located on 33 fields); the NSPCPM has its own specialized networks for permanent monitoring of the quality of drinking water in 3550 wells in the rural area and 11 surface water storage basins; the SEI takes samples of water, including residual water in the vicinity of industrial facilities as well as permanent stationary and mobile pollution sources - as provided for in the Environment Pollution Monitoring Programme and the need for operations control.

Soil Quality Monitoring. Soil quality monitoring is assured through the national grid administered by the SHS consisting of observation plots in 12 farms in 12 districts of the Republic of Moldova, where soil samples are collected from 60 fields with the total area of approximately 35,000 ha (in spring prior to planting/sowing of agricultural crops and in autumn after the harvest is over); also, the NSPCPM has its own specialized grid for permanent soil quality monitoring in recreation areas, in settlements and in the areas round drinking water wells; the institutions subordinated to the Ministry of Agriculture and Food Industry (MAFI) have their own network to monitor the quality of soil and agricultural products, the operation of that network being ensured by the Institute of Pedology, Agrochemistry and Soil Protection "N. Dimo", National Centre of Applied Soil Science, National Water Management Concern "Apele Moldovei", National Institute of Grapes and Wine and other institutions in conformity with the scheduled research work and activity plans, on the orders from MAFI, MENR, other governmental institutions and enterprises.

Monitoring the State of Natural Ecosystems. The ASM institutes (Institute of Zoology, Botanical Garden (Institute), Institute of Ecology and Geography, etc.) have their permanent and fluctuating grids of observation plots to monitor the state of natural ecosystems, and the research and monitoring is performed in conformity with the research schedules and action plans, including orders and requests from the Government, other public institutions; also the Forestry Agency "Moldsilva" manages the national forest monitoring grid which covers 700 areas selected for observation purposes out of the total areas under forests in the Republic of Moldova; the grid density is 2 by 2 km or one observation plot per 400 hectare;. furthermore, there is a grid of 12 observation plots with the density of 16 by 16 km or one plot per 25,600 hectares.

Integrated Environmental Monitoring and Information Management. The SHS' Centre for Integrated Ecological Monitoring and Information Management (CIEMIM) is the authority in charge of storage, generalization, statistical analysis and evaluation of the data on the quality of the environmental components, which has been obtained as result of laboratory tests and from the stations of the SHS monitoring network. The CIEMIM acquaints systematically the ministries, departments, duly authorized institutions, decision-makers, population, etc. with the information regarding the environment pollution levels in the Republic of Moldova. The CIEMIM has created and is managing a database on the environmental situation in the Republic of Moldova, which the relevant authorities need for the purposes of decision-making and determination of the environmental management strategies at all management levels. To disseminate the most veritable and objective information, the Department of Monitoring published several Yearbooks, including: Hydro-Chemical Quality of Surface Water; Hydro-Biological Quality of Surface Water; Quality of Atmospheric Air; Soil Quality; and Radiological Situation in the Environment Components.

Data Collection and Information Transfer Systems. Certain actions have been taken in the recent years to improve the environmental information system through consolidation of the Governmental, departmental and private information networks. The continuous improvements has been registered in MENR and its subdivisions (SHS, IES and AGeoM) in terms of access to the environmental information, development of the geographic information system, computerized electronic networks, a system of environmental indicators, etc. The improvement of the information systems in sectors has been registered in the Ministry of Health, Ministry of Agriculture and Food Industry, National Bureau of Statistics, etc. However, the cases of coordination and data sharing among the institutions monitoring different environmental quality aspects have remained sporadic and are more often than not the product of personal initiative rather than a viable operational system. It must be noted that efforts have been made during the last decade to integrate the environmental data and information stored in the diverse institutions, by data sharing is still lacking altogether.

At present statistics is collected on 17 environmental areas and aspects. But the important databases (e.g. on polluting emission and discharge levels; water consumption; ground water quality; the state of forests and environment in general) are administrated using obsolete software applications and often not accessible for the decision-makers and broad public. The necessity is evident to establish a single centre which would ensure the integration of the ecological information flows and contribute to the improvement of interdepartmental liaison in terms of collection and management of the environmental data.

A somewhat better situation has been registered in the administration of the system used to collect and transfer hydro-meteorological information, because its operation in the Republic of Moldova is ensured by the SHS telecommunications network. The SHS' Telecommunications Centre ensures: data transfer based on the information commuting principle; translation of the communication formats and codes for different data transfer channels and networks; establishment of databases; production of weather reports; user control and guidance in the information transfer network, etc.

Database Development, Maintenance and Update. Within the SHS, the Automation Centre is responsible for the development and maintenance of the systems for database programming, maintenance and update, collection of meteorological information from observation points and stations, data control and creation of archive files, procession of tables of annual averages, support and storage of all hydro-meteorological information groups, including the information on the pollution levels in the environment components, and maintenance of the National Hydrometeorological Bank of Data.

The Automation Centre employs a team of professionals in its *Group for Technical Maintenance and Programming Systems,* which is responsible for the development of the software for automated procession of the meteorological, hydrological, actinometrical and agricultural-meteorological information as well as the data on the water, air and soil pollution levels; furthermore, the professionals in the *Group for Technical Maintenance and Programming Systems* are responsible for the input in the computer of the coded written information on the findings of the meteorological observations, arriving monthly from all observation points and stations of the national observation grid and for the procession of that information using the software PERSONA MIS MIP, ACTIN, DAVL and generation of the tables with the results.

It should be noted that all the information input in the computer is printed in hard copy and stored on data carriers, backed-up and filed in the archive of the State Hydro-Meteorological Bank of Data established in October 1957. The information on files of the above Bank of Data is the intellectual property of the Republic of Moldova. The List of the documents on the environmental situation to be filed with the National Bank of Data (RD52, 19-143-87) was developed and approved in 1987 and adjusted in 1998. That document provides main guidance for the archive staff on determination of the information storage terms in the National Hydrometeorological Bank of Data. The data in the Bank are used as hydro-meteorological evidence to substantiate the design, construction and operation of the diverse social and industrial facilities, generation of the long-term development strategies for the national economy, applied and fundamental scientific research, for the purposes of hydro meteorological information sharing within WMO and to fulfil the obligations under the international Conventions and Agreements to which the Republic of Moldova is a Part.

S.8.3 Education, Training and Public Awareness

Public Participation in the Decision-Making Process and Access to Information. The legal framework regulating the access to information is ensured by the Constitution of the Republic of Moldova (1994), in particular, Article 34 (1, 2, 3, 4) and Article 37 (2, 3). Public involvement in the development and adoption of decisions in environmental matters is regulated by a number of the environment laws, such as: Article 3(d), Article 30 of the Law on the Environment Protection (1993); Articles 10, 11, 12, 13, 14 of the Law on Ecological Expertise and Evaluation of the Environmental Impact (1996); Article 27 of the Law on the Principles of Urbanism and Territory Development (1996); Article 20 (3), 29 (4) of the Law on Green Areas of the Urban and Rural Settlements (1999).

The legal framework for public participation in the decision-making on environmental issues has been improved after the ratification in 1999 of the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998). To fulfil the obligations regarding the implementation of the above Convention, the RM adopted the Law on Access to Information (2000), and developed the Regulation for education of the public on the development and adoption of decisions in environmental matters (2000).

A number of laws with reference to environment protection contain provisions related to public access to information, such as Law on the Fund of the Natural Areas Protected by the State (1998) - Art. 16(f); Law on Protection of Atmospheric Air (1997) - Art. 8(1); Law on Natural Resources (1997) - Art. 29 (3); the Forest Code (1996) - Art. 23.

It should be noted that one of the specific attributions of the MENR is to inform the population about the environmental situation and use of the natural resources, to ensure public access to information and public participation in the decision-making in environmental matters in conformity with the applicable laws. Furthermore, the MENR is responsible for: involvement of the media, NGO's and public in its actions in the relevant spheres of its operations; informing of the broad public of the environmental situation and use of the natural resources in the country; ensuring the public access to information and its participation in the decision-making in environmental matters. In the MENR, the Environmental Information Centre (EIC) has the following functions: satisfaction of the demand for environmental information with public officers and broad public and pro-active dissemination of the environmental information; creation of electronic databases which would satisfy the need of the decision-makers and environmental professionals on the one hand and be accessible in terms of providing the information to the broad public on the other hand; management of the MENR's Environmental Library. The Inventory of Environmental Information was developed to inform the prospective users about the principal sources of the environmental information obtained from the various Moldovan public institutions; it can be accessed at the EIC web site (<www.cim.moldova.md>).

Education and Training. Ecological education (including the education on climate changes) takes place in the educational establishments of Moldova along three directions: as part of the mandatory hours; as optional hours and as part of the out-of-school activities. Ecological education is present at all stages of the education process: pre-school, primary, gymnasium, lyceum, professional, university and post-graduate.

Learning the subject "Health education", pre-school children (aged 5-6) extend their knowledge of healthy lifestyle (day regimen, healthy nutrition, hygiene of breathing, etc.) and its dependence on the environmental situation. The general objectives of "Science" as a primary school discipline (grades I-IV) are: familiarization with the basic notions of nature and its diversity; protection of nature through rational use of the natural resources and conservation of biodiversity; creating of the environmental awareness; learning of the basic relationships among the components 'wildlife' – 'lifeless nature' – 'human society'.

The studies of nature as the environment for human existence and activities are continued at gymnasium education cycle (grades V-IX), so in grade V the same discipline "Science" covers the ecological problems examined in more detail in the module "Nature – Human Being - Ecology"; the issues which include environmental protection are examined also in grades VI-IX as part of some other disciplines, such as: geography, biology, chemistry and physics. During the lyceum education cycle (grades X-XII), ecological training is integrated also in general disciplines, including geography (grades X-XII), general biology (grade XII) and physics (grades X-XI).

Discipline "Environmental Geography" (grade XII) teaches the students such modules as: natural environment; environmental monitoring; geographic environment components; geographic environment structure; relationship types in the geographic environment; environment evolution; space diversity of the environment; environmental impact of human activities; natural degradation of the environment and the sources of environment pollution; local, regional and global environment protection (of air, water, flora, fauna, soil, human health); environment conservation; conservation of natural systems and human heritage; fundamental environmental problems: ecology, climate changes, desertification, demography, food security, energy security and availability of natural resources, etc.; natural and anthropogenic hazards; sustainable environmental development, etc.

The education plan for primary schools, gymnasiums and lyceums suggests a number of optional disciplines: ecological education, human ecology, man and his environment for primary schools and gymnasiums; environment protection for lyceums. For the future, the Ministry of Education and Youth (MEY) expects to develop and adjust the curriculum and teacher guidelines also for the optional disciplines. The textbook "Ecology and environment protection" has been published already and used in the optional hours.

The MEY has been organizing an ecology hour in the beginning of each new school-year jointly with the MENR. In March-April all educational establishments participate in the voluntary landscape gardening program "A tree to continue" intended to create more green areas in Moldova. The MEY holds topical competitions jointly with the relevant social organisms. Biology, Chemistry, Geography and Ecology Olympiads are held annually (housed by lyceums as well as in out-of-school work sections); summer schools are organized for the lyceum students (as field seminars and lectures in the open air), etc.

There is a network of professional schools and industrial schools in Moldova, educating and training skilled workers for agriculture, forestry and floriculture. The training course for such professions includes many ecological aspects. The national network of the vocational educational establishments includes, in particular: Ecological College in Chisinau (training junior environmental engineers), Industrial and Construction College in Chisinau (training junior water management and water protection engineers), Forestry College in Balti (training junior forestry engineers) and Multi-profile Vocational School in Cuhuresti (training foresters).

University training on environment research, protection and management is delivered in the following universities: State University of Moldova (SUM): faculty of biology and soil science (ecology and environment protection), faculty of chemistry (industrial and ecological chemistry), faculty of law (environmental legislation), faculty of physics (meteorology and hydrology); Technical University of Moldova (TUM): faculty of urbanism and architecture, department "Eco-technology, environmental management and water engineering" (training professional construction engineers specialised in "Water management and protection" in construction, as well as water supply and sewerage systems; engineers-managers specialised in "Engineering and Management in Environment Protection" in operation of the environment protection systems); State University of Tiraspol (SUT) (located in Chisinau): faculty of biology and chemistry (biology and chemistry, biology and ecology, biology and sanology, chemistry and biology, chemistry and physics), faculty of geography (geography and biology, geography and tourism, geography and informatics), faculty of physics, mathematics and information technology (mathematics and physics, physics and informatics, physics and astronomy); State Agricultural University of Moldova (SAUM): faculty of agronomy (agronomy/ecological agriculture, tourism, ecology/environmental inspection), faculty of horticulture (plant protection, forestry and management of public green areas), faculty of land cadastre and law (territory layout, environment engineering).

Post-university (post-graduate) ecological education is offered by the ASM with its relevant research institutes (Institute of Ecology and Geography, Botanic Institute, Institute of Zoology, Institute of Microbiology, Institute of Chemistry, etc.) and the state universities mentioned in the above (SUM, TUM, SUT and SAUM). Thus, post-graduate training for MS or PhD is offered in Moldova by SAUM and the Botanical Garden (Institute) in forestry and plant protection; by TUM in energy conservation and renewable energy sources; by SUM, SUT, SAUM, TUM and ASM (Institute of Ecology and Geography and Chemistry Institute) in environment protection and natural resource conservation; the above post-graduate educational establishments have specialized scientific councils for the respective areas.

Professional development courses in environment protection are offered systematically, in the specialized training centres by the relevant ministries, including: the Academy of Public Administration (APA) – for the professionals employed in CPA and LPA; National Professional Development Institute for Teaching Staff (NPDITS) – for the teaching staff employed in gymnasiums and lyceums; Centre of Forestry Technologies and Design (CFTD) – for the forestry sector professionals; State University of Medicine and Pharmaceutics "N. Testimiteanu" – for the professionals employed in the hygiene and epidemiology centres; National Centre of Veterinary Diagnostics (NCVD) by MAFI – for the professionals employed in veterinary laboratories, etc.

Professional development courses (programmes) are offered also by the state universities. Such courses are usually offered sporadically, depending on the number of the received applications.

Raising Public Awareness. In the Republic of Moldova, the public is informed continuously on the quality and state of environment components in printed media (press) and on TV and radio (audio-visual methods). In addition, to consult the opinion of the civil society on the draft laws and regulations developed by MENR, round table discussions, public hearings, conferences are organized , inclusively with the participation of the NGOs.

S.8.4 Capacity Building

The national climate change capacity building in the Republic of Moldova is effected through implementation of technical assistance projects, projects implemented under the Clean Development Mechanism (CDM) of the Kyoto Protocol, as well as environmental infrastructure projects.

Technical Assistance Projects: UNDP-GEF Project "Republic of Moldova: Enabling Activities for the Preparation of the First National Communication under the United Nations Framework Climate Change Convention (UNFCCC)" (1998-2000); UNDP-GEF Project ""Climate Change: Enabling Activities (Phase II)" (2000-2002); UNDP-GEF Project "Moldova: National Capacity Needs Self Assessment for Global Environmental Management" (2003-2005); UNDP-GEF Regional Project "Capacity Building for Improving the Quality of Greenhouse Gas Inventories (Europe/CIS region)" (2003-2006); TACIS Regional Project "Technical Assistance to Armenia, Azerbaijan, Georgia and Moldova in the fulfilment of their global climate change engagements" (2004-2006); GEF – WB Project "Renewable Energy from Agricultural Wastes" (2005-2008); UNEP-GEF Project "Republic of Moldova: Enabling Activities for the Preparation of the Second National Communication under the United Nations Framework Climate Change Convention (UNFCCC)" (2005-2009); UNDP Moldova Project "National Human Development Reports" (2005-2009); UNECE Project "Regional Energy Efficiency Investment Project Development for Climate Change Mitigation" (launched in 2008);

TACIS Project "Support for Kyoto Protocol Implementation in twelve CIS countries" (launched in 2008).

CDM Projects. Currently in the Republic of Moldova are implemented four CDM Projects: "Moldova: Soil Conservation Project" (2002-2023), expected total GHG reduction: 3,215,296 tonnes CO_2 eq.; reduction costs as compared to the baseline - USD 13.340 million; the cost per ton of reduction in CO_2 equivalent - USD 3.5; beneficiary: Forestry Agency "Moldsilva"; "Use of biomass as energy source in rural communities" (Projects 1 and 2) (2005-2015); expected total GHG reduction: 357,768 tonnes CO_2 eq.; reduction costs as compared to the baseline - USD 8.183 mil.; the cost per ton of reduction in CO_2 equivalent – USD 5.65; beneficiary: Local Public Authorities (LPA); "Moldova: Energy conservation and reduction of GHG emissions" Project (2006-2015); expected total GHG reduction: 114,469 tonnes CO_2 eq.; beneficiaries: MEY (schools and orphanages), MoH (hospitals), or LPA (public buildings). There are some more projects currently under the DNA consideration for being approved: "Biogas recovering for energy production at Tintareni landfill" Project (2009-2018); expected average annual reduction of GHG - circa 75,412 tonnes CO_2 eq.; beneficiary: Moldovan-Italian Company 'Biogas Inter Ltd'; "Construction of a Co-Generation Plant with the Capacity of 31 MW at State Enterprise "Tirotex" in Tiraspol, Moldova" Project (2009-2034); expected average annual reduction of GHG, 47,640-54,760 tonnes CO_2 eq.; the cost per ton of reduction in CO_2 equivalent - circa 10 €; beneficiary: "Tirotex" State Enterprise, Tiraspol.

Environmental Infrastructure Projects: ERBD/DEPA/TACIS Project "Rehabilitation of Water Supply Services in Chisinau" (1997-2001); total cost – USD 26.6 mil., of which the ERBD credit – USD 14.3 mil.; benefits: annual reduction in the electricity consumption by approximately 80 million kWh, which allowed to reduce GHG emissions generated from power generation in Moldova; reduction of water consumption by approximately 26 percent owing to prevented losses/leakages; improved monitoring over used water treatment and sludge deposits; improved drinking water quality control, etc.; beneficiary: Chisinau Municipal Council; DEPA Project 'Ensuring drinking water supply to Borceag village' (2001-2003), volume of water supplied annually -circa 70,080 m^3/year for circa 1,700 inhabitants; total cost: 2.2 mil. DKK; DEPA Project 'Ensuring drinking water supply to Chircaiesti village' (2001-2003), volume of water supplied - circa 180,000 m^3/year for circa 4,000 inhabitants and reduction in the energy consumption by approximately 0.5 mil. kWh/year, total cost: 9.4 mil. DKK; DEPA Project 'Rehabilitation and expansion of the drinking water supply system for the town of Stauceni' (2001-2003), volume of water supplied - 50,000 m^3/year for circa 2,500 inhabitants, total cost – 8.7 mil. DKK; the WB - SIDA - IBRD/IDA "Energy II" Project (2004-2012); benefits: improved access to heating during the heating season for approximately 35 institutions (including schools, hospitals, kindergartens (pre-schools), orphanages) and 37 apartment houses; total cost: USD 46 mil.; the WB-GEF Project "Treating Soroca Municipal Wastewaters" (2007-2011); benefits: reducing the pollution of the Dniester; improved quality of the sanitary services in Soroca through rehabilitation of the domestic sewage water collection system and construction of a domestic wastewater treatment plant; demonstration and dissemination through feasibility studies and seminars the cost-efficiency of the wastewater treatment technologies used in the wetland zones; total cost: USD 4.562 mil.

S.8.5 Financial Needs

As result of the assessments performed, by taking into account the national strategies, policies and short and medium term development plans, there were identified the financial needs of the RM at the sector and national level for climate change mitigation and adaptation measures implementation within the 2009-2013 period (Table S-6).

Table S-6: Financial Needs of the Republic of Moldova for Climate Change Mitigation and Adaptation Measures Implementation for the period 2009-2013

Areas / Sectors	Financial Needs		% from the total
	Million MDL	Million USD[1]	
Electrical and Thermal Power	18,824	1,666	24.0
Transport and Road Administration	25,632	2,269	32.7
Gas and Oil Products Supply	2,300	204	2.9
Industry	3,341	296	4.3
Agriculture	6,536	578	8.3
Forestry	6,045	535	7.7
Waste Management	5,516	488	7.0
Water Supply and Sewerage Systems	7,467	661	9.5
Human Health	2,818	249	3.6
Total	**78,480**	**6,946**	**100.0**

Note: [1] the official exchange rate of the National Bank of Moldova of the Moldovan lei to US dollar on 01.05.2009 - 11.2986 MDL/USD has been used (<http://www.bnm.md/md/official_exchange_rates>)

In view of combating the adverse effects of climate change in the period 2009-2013 the Republic of Moldova would need approximately 78.5 billion lei or 6.9 billion USD (for comparison, in 2008 the Republic of Moldova reported a GDP of circa 62.8 billion MDL, or circa 6.1 billion USD).

1 NATIONAL CIRCUMSTANCES

1. NATIONAL CIRCUMSTANCES

1.1 Physical Context

1.1.1 Geographical Location

The Republic of Moldova, covering an area of 33,846 square km, is located in Central Europe, in the north-western Balkans. Moldova's capital city is the municipality of Chisinau (mentioned in the historical records for the first time in 1436) with the population of approximately 785 thousand people (as at 2008). Moldova borders on Ukraine in the North, East and South and on Romania in the West, with the Western border line going along the river Pruth (Figure 1-1). The total length of Moldova's national border is 1389 km, including 939 km of the border with Ukraine and 450 km of the border with Romania.

Moldova is situated at longitude 28˚50' east and latitude 47˚ north. The exact location of the extreme points on Moldova's territory is as follows: the northernmost point is Naslavcea (latitude 48^0 21' north and longitude 27^0 35' east); the southernmost point is Giurgiulesti (latitude 45^0 28' north and longitude 28^0 12' east) which is also Moldova's sole location on the bank of the Danube; the westernmost point is Criva (latitude 48^0 16' north and longitude 26^0 30' east); the easternmost point is Palanca (latitude 46^0 25' north and longitude 30^0 05' east). The distance between the extreme points is about 350 km from Naslavcea to Giurgiulesti and only 120 km from the West to the East at the latitude of the municipality of Chisinau.

The Republic of Moldova is a Black Sea region country. Its southern border extends almost as far as the Black Sea coast, and the access to the Black Sea is open for Moldova through the Dniester estuary and the Danube.

1.1.2 Relief

The region between the Pruth and the Dniester is a part of the Moldovan Plateau, which starts at the foothills of the Bukovina Mountain Crest and Moldova's Sub-Carpathians in the West and reaches as far as the Dniester in the East. The south-western part of the Podol Upland extends along the left bank of the Dniester. Hills and flatland areas can be observed next to the upland relief within the framework of those major relief-forming units. The absolute altitudes are within the range of 429 m (Balanesti Hills) and 4 m above the sea level in the Dniester flood land (Palanca). The relief has contributed to the formation and development of geographic landscapes and ecosystems - next to the other geo-ecological, biotic and socio-human factors. The current geo-ecological

Figure 1-1: Map of the Republic of Moldova

complex took shape at the end of the Late Pleistocene Epoch and in the first half of the Holocene (Recent) Epoch. The current biotic complex (flora, fauna, soil) and soils appeared in the second half of the Holocene epoch.

1.1.3 Climate

The climate of the Moldova is moderately continental, characterized with relatively mild winters with little snow, long warm summers and low humidity. The country is located in the area where the air masses coming from the Atlantic Ocean via Western Europe interact and mix with the air from the extreme continental north-eastern regions and the Mediterranean air from the south-west. Two distinctive patterns can be observed as regards territorial distribution of the climatic features in Moldova: (i) distinct zoning of the annual rainfall averages which show a decreasing trend from the North to the South; and (ii) the increase by approximately 100 mm of the multi annual rainfall averages in the upland regions depending on the neighbouring flatland areas. The average annual air temperatures vary between 6.5°C (1987) in the North and 12.3°C (2007) in the South (Table 1-1).

Table 1-1: The Average Annual Air Temperatures and Precipitations Reported at the Stations Briceni (North), Chisinau (Centre) and Cahul (South) in Moldova, 1985–2007

	Average annual air temperatures, °C			Annual average precipitations, mm		
	Briceni	Chisinau	Cahul	Briceni	Chisinau	Cahul
1985	6.5	8.0	8.2	672	593	564
1986	7.9	9.6	9.7	463	400	379
1987	6.5	8.1	8.5	619	593	525
1988	7.5	9.0	9.3	740	652	569
1989	9.3	10.9	10.9	653	460	441
1990	9.5	11.3	11.4	471	360	359
1991	8.0	9.4	9.3	655	673	661
1992	8.5	10.1	10.2	518	417	369
1993	7.8	9.4	9.3	557	533	537
1994	9.5	11.3	11.3	456	403	383
1995	8.4	10.0	10.0	609	702	401
1996	7.1	9.1	9.1	835	711	603
1997	7.7	9.4	9.1	587	607	813
1998	8.2	10.3	10.1	891	666	584
1999	9.2	11.0	10.9	564	484	674
2000	9.7	11.2	11.2	451	437	342
2001	8.8	10.3	10.4	711	618	600
2002	9.5	10.8	11.0	578	604	568
2003	8.6	9.8	10.3	618	459	307
2004	9.0	10.3	10.9	515	591	470
2005	8.7	10.5	10.8	800	638	513
2006	8.4	10.2	10.8	683	564	367
2007	10.1	12.1	12.3	618	480	517

The observation records of the past 20 years show the average monthly air temperatures varying between -8.5°C in January (1996) and +26.0°C in August (1992). The warm period of the year is approximately 190 days long. The annual precipitation intensity decreases from the North-West to South-East. During 1985-2007 the annual rainfall averages varied between 451 mm (2000) and 891 mm (1998) in the Northern part of Moldova and 307 mm (2003) and 813 mm (1997) in the South of the country. The total number of rainy days (with no less than 0.1 mm of rainfall) varied between 121 (1986) and 174 days (1987) in a year in the northern regions and respectively between 91 (2003) and 152 days (1991) in a year in the southern regions.

1.2 Natural Resources

1.2.1 Land Resources

Moldova has unique land resources characterized by: (a) predominant black earth soils (chernozems) with high productivity potential; (b) very high utilization rate (>75%); and (c) rugged topography (above 80% of the total arable land are located on hill slopes).

As of January 1, 2008 Moldova's total available land amounted to 3384.6 thousand hectares (ha), including 1978.9 thousand ha (or 58.5%) of agricultural land ('lands for agricultural purpose'); 502.1 thousand ha of the surplus land ('surplus fund') comprised of the areas intended for social development of the respective communities and land in public use (such as land under pastures; plantings; flooded areas; land under roads, diverse structures, etc.) (14.8%); 444.1 thousand ha of land under forests and natural preserves ('lands of the forestry fund and for nature protection purposes')(13.1%); 315.7 thousand ha of land belonging to localities (villages, towns and cities/municipalities) (9.3%); 85.2 thousand ha of land under water basins ('lands of water fund') (2.5%) and 58.6 thousand ha of land under industrial facilities, transportation routes and other special purpose land ('lands for industry, transport, communications and other special purposes') (1.7%) (Table 1-2).

Moldova's soil cover is very diverse and comprised of above 745 soil types. Chernozems accounts for approximately 73.7% of the country's total territory; grey forest soil (found mainly on elevations with altitudes above 200 m on the Northern Plateau, on hills along the Dniester and in the Codrii Zone) accounts for about 9.4%, and brown forest soil (found on hilltops at altitudes exceeding 300 m, covered currently or previously with beech, hornbeam and oak tree forests) - respectively for about 0.6%; alluvial soils (found in river floodplains and water meadows on recent alluvial deposits) account for approximately 10.2%; and deluvial

Table 1-2: Available Land by Category in Moldova within 1990-2008, thousand hectares

	1990	1994	1996	1998	2000	2002	2004	2006	2008
Lands for agricultural purpose	2537.7	2050.2	2018.3	1980.9	2087.2	1946.7	1950.9	1952.6	1978.9
Lands that belong to localities	400.8	434.6	446.4	449.0	299.8	309.9	309.3	309.1	315.7
Lands for industry, transports, communications and other special purposes	77.6	57.8	58.2	58.4	58.6	58.6	58.7	58.5	58.6
Lands of the forestry fund and for nature protection purposes	327.1	333.3	346.6	350.4	354.4	356.2	405.8	432.3	444.1
Lands of water fund	26.2	45.9	47.2	47.3	36.3	57.1	81.2	83.7	85.2
Surplus land	6.6	463.3	467.8	498.4	548.1	655.8	578.7	548.4	502.1
Total lands	3376.0	3385.1	3384.5	3384.4	3384.4	3384.3	3384.6	3384.6	3384.6

Sources: Statistical Yearbooks of the Republic of Moldova for the years 2008 (page 21), 2003 (page 20), 1999 (page 18) and 1994 (page 36)

soils (formed on hill slopes and in vineyards from soil particles brought by the land erosion processes) - respectively about 3.7%; rendzine (soddy-calcareous) soils (formed on limestone under the influence of the steppe and forest grass aggregations) – about 1.0%; chernozem-like, swamp and humus-peaty soils (found in fragments in forest-steppe zones) – about 0.7%; vertisol soils (formed predominantly in the steppe and forest-steppe environment, under grass canopy on the bed of hard clay rock) – about 0.4%; and alkaline (solonetzic) and saline soils account for about 0.2% of Moldova's total territory. The extremely high land utilization rate in agriculture dictates the necessity of resource conservation, amelioration and protection of soils from erosion, land slides and other types of ill-considered human intervention.

1.2.2 Water Resources

Rivers. There are 3621 rivers and water-springs in Moldova. All of them form part of the Black Sea basin and can be categorized as follows: the Dniester Basin Rivers, the Pruth Basin Rivers and the southern region rivers falling into either the Danube estuary or in the Black Sea coastal salt lakes. The majority of rivers are small in size. The largest rivers include: the Dniester (1352 km long, including 657 km in Moldova, with the annual water debit of approximately 10 cubic km), the Pruth (976 km long, including 695 km in Moldova, with the annual water debit of about 2.4 cubic km), the Raut (286 km long), the Cogilnic (243 km long, including 125 km in Moldova), the Bic (155 km long), the Botna (152 km long). Moldova's drainage network density is 0.48 km per square kilometer on the average, varying between 0.84 km/km^2 in the northern regions and 0.12 km/km^2 in the regions on the left bank of the Dniester. The principal water sources feeding the rivers are snowfalls and rainfalls, whereas the subsoil water plays only a minor role. The majority of precipitations occur in the form of rainfall, whereas snow accounts for as little as 10% of the total precipitations. High water levels are observed in spring due to the melting snow (40-50% of the annual flow). In summer the water levels in rivers - and in particular in small rivers – can rise considerably after storm rainfall, sometimes causing disastrous floods.

Lakes. There are approximately 60 natural lakes in Moldova. Most of them are the lakes located in the high-water beds of the rivers Pruth (Beleu, Rotunda, Fontan) and Dniester (Old Dniester, Cuciurgan). There exist in addition above 3500 water storage ponds created and maintained for diverse economic purposes (such as: irrigation, fishing, recreation, industrial and household needs, protection from floods). The large water-storage reservoirs have been created for hydro-power plants: Costesti–Stinca (735.0 mln. m^3) on the river Pruth jointly with Romania; and Dubasari (277.4 mln.m^3) on the Dniester river.

Groundwaters. Ground waters have a special role in the surface water balance in Moldova. They participate actively in the hydrological cycle as a component of the ground water debit. The distribution of the available ground waters is not even across Moldova, because their major portion is concentrated in the high-water beds of the Dniester and the Pruth. The water supply capacity of the ground water-bearing horizons decreases with the increasing distance to those rivers.

There are approximately 7 thousand boreholes (water-wells) in Moldova, drawing the available water from 10 horizons and water systems: (1-2) the alluvial horizon dating back to the Quaternary and Middle Pliocene Epochs is in use in the valley of the Dniester and the Pruth; (3) the Pontian horizon is exploited in certain localities in the south-west of Moldova; (4-5) the Late Sarmatian – Meotian system is used in the southern regions of the country; (6-7) water from the Middle Sarmatian horizon can be found in the central, southern and south-eastern regions of Moldova (8) the Badenian (Middle Miocene) – Early Sarmatian water system forms the basis for centralized water supply to the capital city and localities in the central regions of Moldova; (9) the Cretaceous-Silurian water system is used in the northern parts of the country; (10) the water-bearing layers in the Vendian and Late Riphean deposits are exploited in the north-east of Moldova. Moldova's available ground water capacity was approximately 3465.0 thousand m^3 per day as at 01.01.2007, including the approved ground water sources with the total capacity of 2198.5 thousand m^3 per day.

Mineral Waters. There are 27 types of mineral water being approved for use and certified in the Republic of Moldova; these are drawn from 47 table, table/therapeutic or therapeutic water springs; furthermore, there are water sources with balneological (spa) characteristics. Water mineralization levels vary between 1.0 and 10.0 g/dm^3. Therapeutic mineral water springs are typical for the southern and north-eastern regions of the country. Their water contains hydrogen sulphide (30.0-80.0 mg/dm^3), iodine (17.0-26.0 mg/dm^3), bromine (132.0-139.0 mg/dm^3) and other chemical elements (lithium, radon, strontium, boron).

The existence of mineral waters in combination with the appropriate climate and natural conditions creates the adequate pre-requisites for the development of an extensive network of health treatment facilities of the health resort type. One more pre-requisite is the fact that the Moldovan mineral waters are similar in their therapeutic characteristics and properties to the worldwide popular waters of Karlovy Vary (Czech Republic), Borzhomi (Georgia) and Essentuki-17 (Northern Caucasus, Russian Federation).

As at the beginning of 2007, the acknowledged available mineral water capacity totalled 13774 m^3 per day, including 10488 m^3 per day of potable mineral water and 3286 m^3 per day of mineral water for external use.

Industrial Waters. The industrial ground water available in Moldova contains less-common extractable chemical elements, with the waters containing iodine, bromine, strontium, cesium, rubidium, boron and helium being the most widespread. The highest concentration of chemical elements in the water with mineralization levels of 70-100 g/dm^3 is: 60 mg/dm^3 for iodine; 360 mg/dm^3 for bromine; 380 mg/dm^3 for strontium; 1.0 mg/dm^3 for cesium; 3 mg/dm^3 for rubidium; and 15.0 ml/dm^3 for helium.

Thermal Waters. Thermal water is common in the high-water bed of the Pruth and in the southern regions of Moldova. The water temperature is 20.0-80.0^{0}C, and the water debit of the wells is 10-100 m^3 per day.

1.2.3 Biologic Resources

Flora. Moldova's geographic location, climate and relief have pre-conditioned the development of the extremely variable vegetation with a large number of species; currently Moldova's flora comprises about 5513 plant species (with 1989 superior plants and 3524 inferior plants). The ecosystems which have the richest flora composition include: the forest (above 850 species), steppe (above 600 species), high-water basin (approximately 650 species), petrophyte (about 250 species), water and swamp (about 160 species) systems.

In terms of landscape, Moldova's territory is located in two natural zones – wooded steppe and steppe. The steppe zone comprises the fields and elevations in the regions to the south of the Codrii Upland and to the south and east of the Tigheci Hills. In addition to the above, the steppe flora can be found also in the North - in the Cubolta Upland, in the Ciulucuri Hills and in the Middle Prut Upland. Most of the steppe regions are used currently in agriculture; and therefore the typical steppe flora represented by mat-grass, feather grass, fescue and diverse other grass types has persisted solely on small hill slope areas with old land slides or on more inclined erodible slopes. Of the total number of steppe plant species, 18 have been included in the Red Book of Moldova, including 9 species (*Astragalus dasyanthus Pall.*, *Belevallia sarmatica (Georgi) Woronow*, *Bulbocodium versicolor (Ker.-Gawl.) Spreng.*, *Colchicum triphyllum G.Kunze*, *C. Fominii Bordz.*, *Galanthus elwesii Hook. fil.*, *Ornithogalum amphibolum Zahar.*, *O. oreoides Zahar.*, *Sternbergia colchiciflora Waldst. et Kit.*) which are included also in the Red Book of Ukraine (1996) and in Romania's Red List of superior plants (1994).

The forest flora can be found - in addition to the steppe regions - in the wooded steppe zone, on higher hills more frequent in the Codrii Region. The deciduous forests typical of the Central Europe prevail and account for 97.9%, whereas resinaceous forests account for as little as 2.1%. Moldova's forest ecosystems have 45 native species of trees, 81 native species of shrubs and 3 native species of forest vines (lianas). The most common native woody plant species found in our forests include: English Oak *(Quercus robur)*, Durmast Oak *(Quercus petraea)*, Pubescent Oak *(Quercus pubescens)*, Common Ash *(Fraxinus excelsior)*, European Hornbeam *(Carpinus betulus)*, European White Elm *(Ulmus laevis)*, Sycamore Maple *(Acer pseudoplatanus)*, Small-Leaved Linden *(Tilia cordata)*, European Weeping Birch *(Betula pendula)* and European Beech *(Fagus sylvatica)*.

Fauna. Moldova's fauna is relatively rich and manifold. There are above 15.5 thousand species of animals in Moldova, including 461 species of vertebrates and above 15 thousand species of non-vertebrates. The vertebrates include 70 species of mammals, 281 bird species, 14 reptile species, 14 amphibian species and 82 fish species. Birds are highest in number among the vertebrates (281 species and subspecies), and insects - among non-vertebrates (above 12 thousand species).

The most widespread native species of mammals include: brown long-eared bat *(Plecotus auritus)*, hedgehog *(Erinaceus europaeus)*, European mole *(Talpa europaea)*, common shrew *(Sorex araneus)*, noctule bat *(Nyctalus noctula)*, red squirrel *(Sciurus vulgaris)*, brown hare *(Lepus europaeus)*, European ground squirrel *(Citellus citellus)*, spotted squirrel *(Citellus suslicus)*, house mouse *(Mus musculus)*, Norway rat *(Rattus norvegicus)*, wood mouse *(Apodemus sylvaticus)*, yellow-necked mouth *(Apodemus flavicollis)*, red fox *(Vulpes vulpes)*, European roe deer *(Capreolus capreolus)*, wild boar *(Sus scrofa)*, Eurasian badger *(Meles meles)*, beech marten *(Martes foina)*, European polecat *(Mustela putorius),* and least weasel *(Mustela nivalis)*. Rare and endangered species are protected by the law; 116 animal species have been entered in the Red Book of Moldova (the edition of 2001), including 14 mammal species, 39 bird species, 8 reptile species, 1 amphibian species, 12 fish species, 1 Cyclostomata species, 37 insect species, 1 Crustacean species and 3 Mollusc species.

There are five natural reservation established for scientific research purposes with the total area of 19.4 thousand ha in the Republic of Moldova. Two natural forest reservations – "Codrii" and "Plaiul Fagului" – are located in the central regions of Moldova; two more reservations – "Prutul de Jos" and "Padurea Domnească" – in the Pruth valley; and the fifth reservation – "Iagorlic" (Dubasari district) – has been established to protect and study the unique water ecosystem of the Dniester river.

1.2.4 Mineral Resources

As of 01.01.2008, minerals were extracted from 425 deposits in Moldova. Most of the minerals are extracted from open mines, and only certain limestone varieties are mined from underground galleries (limestone quarries).

The most popular minerals are: (1) carbonate strata rocks dating back to the Early Sarmatian and Badenian Era (used in construction of industrial facilities and housing, cement production, sugar refining, road construction, as additives to animal feed, etc.; (2) clint rocks (siliceous limestone, diatomite/kieselgur, fossil meal/tripoli) (used in food industry, production of artificial leather, paper, thermal and electrothermal materials, etc.); (3) clay rocks (slate clay, bentonite clay, ordinary clay) (used in production of cement, claydite, ceramite, bricks, tiles and ceramic pipes); (4) sand and broken stone (gravel) (used in the manufacture of glass, concrete, in the various construction sectors including road construction); (5) sulphate rocks (gypsum) (used in construction, medicine, pharmaceutics); (6) crystal rocks (gabbro, granite, gabbro-norite) (used in production of ferro concrete, in road construction); (7) caustobioliths (petrol, gas, brown coal) available in insignificant quantities in the South (Valeni, Victorovca, Vladiceni).

1.3 Administrative-Territorial Organisation, Population and Human Context

1.3.1 Administrative-Territorial Organisation

According to Law No. 764 as of 27.12.2001 on the administrative territorial organisation, the Republic of Moldova is divided into 32 districts (rayons), 5 municipalities and 2 administrative-territorial units (Figure 1-2).

In most districts (Anenii Noi, Basarabeasca, Briceni, Cahul, Cantemir, Calarași, Caușeni, Cimislia, Criuleni, Donduseni, Drochia, Edinet, Falesti, Floresti, Glodeni, Hincești, Ialoveni, Leova, Nisporeni, Ocnita, Orhei, Rezina, Riscani, Singerei, Soroca, Straseni, Soldanesti, Stefan Voda, Taraclia, Telenesti, Ungheni) the administrative centre is located in a town, and only the district of Dubasari has Cocieri community as its centre.

By January 2008, the number of population in the regions varied between a minimum of 29.5 thousand people (Basarabeasca district) to a maximum of 129.5 thousand people (Orhei district).

In the Republic of Moldova municipalities are urbanized areas which play a significant role in the nation's economic, social-cultural, scientific, political and administrative life, with relevant industrial, commercial, health care and cultural facilities as well as educational establishments.

In most cases municipalities are an agglomeration of several settlements. For example, the municipality of Chisinau, which is the capital city of the Republic of Moldova, comprises 35 settlements, which include 5 city districts, 6 towns and 12 communities (the latter comprising the total of 26 settlements). The other 4 municipalities are: Balti, Comrat, Tiraspol and Bender.

The purpose of dividing the territory of the country into a number of administrative territorial units is to ensure the execution of the principles of local autonomy, decentralise public services, electiveness of the local public administration authorities, the access for the citizens to their authorities and to the advice on the local problems and issues of particular interest.

All local problems and issues fall within the authority and powers of the local administrative councils, which are elected. The prefects and mayors for the districts and municipalities are nominated by the local administrative councils and appointed by the President of the Republic of Moldova.

Figure 1-2: Administrative-Territorial Map of the Republic of Moldova

There are two administrative-territorial units in the Republic of Moldova: the Administrative-Territorial Unit Gagauzia (ATU Gagauzia) and the administrative-territorial units on the left bank of the Dniester (ATULBD). The area of ATU Gagauzia is approximately 3000 km^2 (159.8 thousand people), and the area of ATULBD is respectively about 4163 km^2 (540.6 thousand people). Since the collapse of the Soviet Union (USSR), the administrative-territorial units on the left bank of the Dniester started promoting the separatist policy in respect of Moldova's centralized public administration authorities. At present the official authorities of the Republic of Moldova monitor that area only in part.

1.3.2 Population

As of 01.01.2008 Moldova's population was 4.1 million people, with the density of approximately 122 persons per square kilometre. Thus, numerically the Republic of Moldova outruns such European countries as Lithuania, Ireland and Slovenia. During 1990-2008 the number of population decreased by about 5.3 percent (230 thousand people). That decrease was caused by the negative natural balance as well as the negative external migration flow balance. The above dynamics resulted in the decrease in the average population density from 129 persons per square kilometre in 1990 down to 122 persons per square kilometre at the beginning of 2008. However, even in such conditions the density of population in the Republic of Moldova is almost twofold of Europe's average and approximately threefold of the global average.

Females prevail with 52.3 percent in the nation's population - as opposed to 47.7 percent of males in the total population. This evident misbalance with prevalence of females in the population structure by gender has rated Moldova among the top 10 states worldwide according to that indicator, thus impacting adversely the nation's demographic development.

The majority of the population is concentrated in the rural areas. The existing 1614 rural settlements have 2.3 million residents (55.1 percent of the total population), averaging about 1400 residents per settlement. The urban population is 1.8 million (44.9 percent of the total). The urbanization rate is among the lowest in Europe. Urban settlements are small in size, with about 27 thousand residents on the average, and only 5 thereof can boast the population exceeding 50 thousand residents: Chisinau (785.1 thousand people), Balti (148.1 thousand people), Tiraspol (140.4 thousand people), Bender (95.0 thousand people) and Ribnita (52.2 thousand people).

According to the data of the 2004 population census held separately in the areas on the right bank of the Dniester and in the administrative-territorial units on the left bank of the Dniester, Moldavians accounted for about 69.6 percent of the country's population (64.5 percent in 1989), Ukrainians – 11.2 percent (13.8 percent in 1989), Russians – 9.4 percent (13.0 percent in 1989), Gagauz – 3.8 percent (3.5 percent in 1989), Bulgarians – 2.0 percent (2.2 percent in 1989), Romanians – 1.9 percent (0.1 percent in 1989), Gypsies – 0.3 percent (0.3 percent in 1989), Jews – 0.1 percent (1.5 percent in 1989), other nationalities – 1.6 percent (1.3 percent in 1989), etc. (Table 1-3).

Table 1-3: Resident Population by the Main Nationalities in the Republic of Moldova (According to the 2004 Population Census Data)

Ethnic origin	Republic of Moldova (the right bank of the Dniester)	%	ATULBD (the left bank of the Dniester)	%	Republic of Moldova (total)	%
Moldovans	2564.8	75.8	177.1	31.9	2741.9	69.6
Ukrainians	282.4	8.3	159.8	28.8	442.2	11.2
Russians	201.2	5.9	168.4	30.4	369.6	9.4
Gagauz	147.5	4.4	4.1	0.7	151.6	3.8
Romanians	73.3	2.2	1.0	0.2	74.3	1.9
Bulgarians	65.7	1.9	13. 8	2.5	79.5	2.0
Gypsies	12.3	0.4	0.1	0.0	12.4	0.3
Jews	3.6	0.1	1.2	0.2	4.8	0.1
Other	32.5	1.0	28.9	5.2	61.4	1.6
TOTAL	3383.3	100	554.4	100	3937.7	100

1.3.3 Demographic Situation

Between 1990 and 2007 the demographic processes registered a distinctive negative development pattern, which showed itself in the general instability of demographic indicators and phenomena as well as falling birth rate, growing mortality, depopulation, demographic ageing, etc.

For example, the 2007 birth rate was 10.6‰ (registering a decrease in comparison with the 1990 rate of 17.7‰), and the mortality was 12.0‰, i.e. higher than the 1990 rate of 9.7‰). The infant mortality rates remained among the highest in Europe (11.3‰,) but were lower than the 1990 figures (19.0‰). Beginning in 1999, the natural balance of the population was negative (-1.4‰ in 2007; for comparison, the 1990 figure showed the natural population growth of 8.0‰). That dynamics has resulted, among other things, in the demographic ageing of the population which shows itself as the reduced portion of the young and the increased portion of the elderly. During 1990-2007, the portion of the population aged under 15 decreased from 27.9 percent in 1990 down to 19.2 percent in 2007, and the age group of persons above 60 increased respectively from 12.6 percent in 1990 up to 14.8 percent in 2007.

During 1990-2007 the 'average life expectancy at birth' indicator somewhat decreased - from 69.0 years in 1990 to 68.8 years in 2007 (the respective indicator decreased from 65.5 years to 65.0 years for males and increased from 72.3 years to 72.6 years for females). The values of this particular indicator are relatively modest - as opposed to other countries, thus rating Moldova among the last in Europe on the force of those levels.

1.3.4 Public Health

It is believed that the state of public health is determined by four major groups of factors: life style (accounting for 50-55 percent), the environmental situation (20-25 percent), genetics (15-20 percent) and the effectiveness of the health care and preventive health care facilities (8-10 percent). The nature of the environmental factors affecting public health may be chemical, physical, biological, psychological, genetic, cultural, or behavioural.

The current environmental situation in Moldova cannot be characterized as the one contributing to healthy and long life. The principal problems are caused by the negative impact of polluted air, water, soil and food on human health. The neglect of the public health problems (in particular in the rural areas), which are caused by the environmental factors, threatens with very grave consequences for the public as well as for the national economy.

During 2000-2007 the overall mortality rates tended to increase (Table 1-4). The overall mortality rate is an integral indicator among those defining the state of public health. The mortality breakdown analysis has demonstrated that cardiovascular pathologies are still the principal cause of death (56.2 percent) - followed by tumours (12.5 percent) and intestinal diseases (9.9 percent). It should be noted that during 2000-2007 the rates of mortality, caused by the above three pathology types tended to increase. The mortality due to traumas and intoxication is also growing. The mortality rates by region are not uniform, registering dramatic differences between the regions. In the last few years the lowest mortality rates were reported in the municipality of Chisinau and in Balti, whereas the highest rates in Donduseni, Briceni and Edinet districts.

The situation regarding diseases with acute diarrhoea (ADD) remains extremely grave. That group of diseases poses a major public health problem due to the high incidence as well as grave clinical manifestations. According to the data provided by the Ministry of Health for 2006, the incidence of acute diarrhoea diseases was 458 cases per 100 thousand persons – as compared to 474 morbid events per 100 thousand persons in the preceding year and 355 cases per 100 thousand residents in 2004. A slight decrease in the 2006 mortality rates due to ADD resulted primarily owing to the decreased bloody flux incidence because this disease has a natural cycle. However, the incidence of toxic conditions caused by *Salmonella* increased considerably. The high incidence of ADD in Moldova is caused primarily by microbiological contamination of the potable water sources and centralized water supply systems and by the life style and hygiene habits of the population. Thirty outbreaks of infectious intestinal diseases were registered on the total. Young persons (aged under 17) accounted for above 70% of the victims. The official statistics shows that ADD incidence has been higher in urban areas (including the municipality of Chisinau) than in the rural areas. The above may be an indication of possible problems with medical statistics regarding revealing and reporting ADD.

Table 1-4: The mortality rates in Moldova during 2000-2007, by principal cause of death (per 100 thousand residents)

Year	Tumours	Diseases of the circulatory system	Respiratory diseases	Intestinal diseases	Traumas and intoxication	Total
2000	125.0	632.0	69.4	103.4	92.9	1132.8
2001	128.2	618.2	64.6	109.5	98.4	1103.8
2002	134.7	654.8	74.4	110.0	98.4	1155.4
2003	138.5	679.6	79.0	114.1	103.2	1192.6
2004	141.5	653.7	69.3	116.3	101.6	1156.4
2005	145.8	700.1	79.2	128.6	108.4	1243.2
2006	153.4	671.4	72.9	122.5	105.0	1203.2
2007	150.6	675.9	72.1	119.4	101.9	1203.6

Source: Statistical Yearbooks of the RM for 2008 (page 56), 2006 (page 65), 2005 (page 54), 2003 (page 67), 2001 (page 53); Public Health in Moldova in 2006, Ministry of Health of the Republic of Moldova. Chisinau, 2007

In the recent years Moldova has made considerable efforts to improve the national public health situation. A number of strategies, concepts, programs and action plans have been adopted, the most important strategic papers among them being: The National Health Policy of Moldova (2000); The National Action Plan on Health in Relation to the Environment (2001); The Concept on the Organization and Implementation of the Socio-Hygienic Monitoring in the Republic of Moldova (2002); Economic Growth and Poverty Reduction Strategy (2004-2006); The Program on Water Supply and Sewage in the Moldovan Settlements for the period till 2015 (2005); The National Program to ensure the Environmental Security for the years 2007-2015 (2006).

1.3.5 Education

The Ministry of Education and Youth, the Municipal Education Departments, Regional General Departments of Education and educational establishments are responsible for the delivery of the primary, secondary general, secondary professional, secondary vocational and university (higher) education. The legal framework for the education system is the Concept Paper on education development in the Republic of Moldova and the Curriculum by disciplines.

Primary and secondary general education. As per statistical data, at the beginning of the 2007/2008 school year Moldova had 1534 operating primary and secondary general educational establishments including: 96 primary schools; 668 gymnasiums; 442 lyceums; 291 general secondary schools and 37 specialized schools for handicapped children with mental or physical development deficiencies. The total number of students enrolled in primary and secondary general educational establishments was 461 thousand, by 27% lower than in the school year 2000/2001 (Figure 1-3).

Of the total number of students, 33.4 percent were covered by the primary education; 52.0 percent - by gymnasium education; and 14.6 percent - by the lyceum education. The number of the first form students decreased by 3.2 percent as compared to the preceding school year and by 35.1 percent as compared to the school year 2000/2001. At the same time, the number of students in the graduate forms decreased by 5.8 percent as compared to the preceding school year and by 11.2 percent as compared to the school year 2003/2004. The number of students graduating from gymnasiums in 2007 was 51.5 thousand (39.2% gymnasium graduates were from the urban settlements and 60.8 percent - from the rural areas). The number of graduates from lyceums and general secondary schools was 26.2 thousand (with 61.5 percent graduates from the urban settlements and 38.5 percent from the rural areas).

The number of students enrolled in specialized schools for the school year 2007/2008 decreased by 6.1 percent as compared to the preceding year and totalled 4.0 thousand. Most of such students had mental development deficiencies (79.3 percent), whereas the children handicapped due to polio and cerebral palsy accounted for 7.2 percent; children with impaired hearing – for 6.1 percent, deaf children – for 3.3 percent; children with impaired eyesight – for 2.9 percent and children with behavioural problems – for 1.2 percent.

Secondary professional education. As at the beginning of the school year 2007/2008, the number of secondary professional educational establishments was 75, inclusive: 2 professional lyceums, 50 professional schools and 23 industrial schools, including 6 industrial schools within penitentiaries. The total number of students was 24.5 thousand (an increase of 7.5% as compared to the school year 2000/2001). In the school year 2007/2008, the total number of students grew by 3.6 percent as compared to the school year 2006/2007 (Figure 1-4).

The professional lyceum students accounted for 7.7 percent of the total; the professional school students – for 78.9 percent; and the industrial school students – for 13.4 percent. In the school year 2007/2008 16.2 thousand students were enrolled in professional secondary education establishments (by 4.8 percent more as compared to the preceding school year). The breakdown of the total number of the first year students by institution was as follows: 7.5 percent - in professional lyceums; 72.7 percent - in professional schools; and 19.8 percent - in industrial schools. The first year students from the rural areas accounted for 68.4 percent of the total.

The breakdown of the total number of students by profession groups shows a distinctive shift towards and preference of certain professions: cook (15.7 percent of the total number of the first year students); car mechanic (9.5 percent), plasterer and tailor/dressmaker (7.9 percent and 6.9 percent respectively), computer operator (5.2 percent), welder (electric and gas welding)/fitter and carpenter (4.9

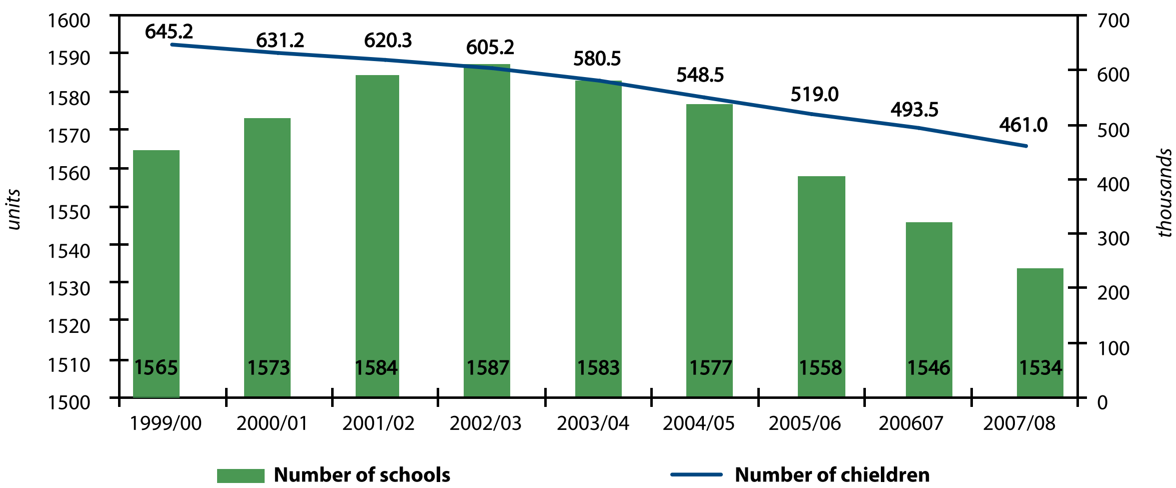


Figure 1-3: Educational Institutions and Students Enrolled in the Primary and Secondary General Education in the Republic of Moldova

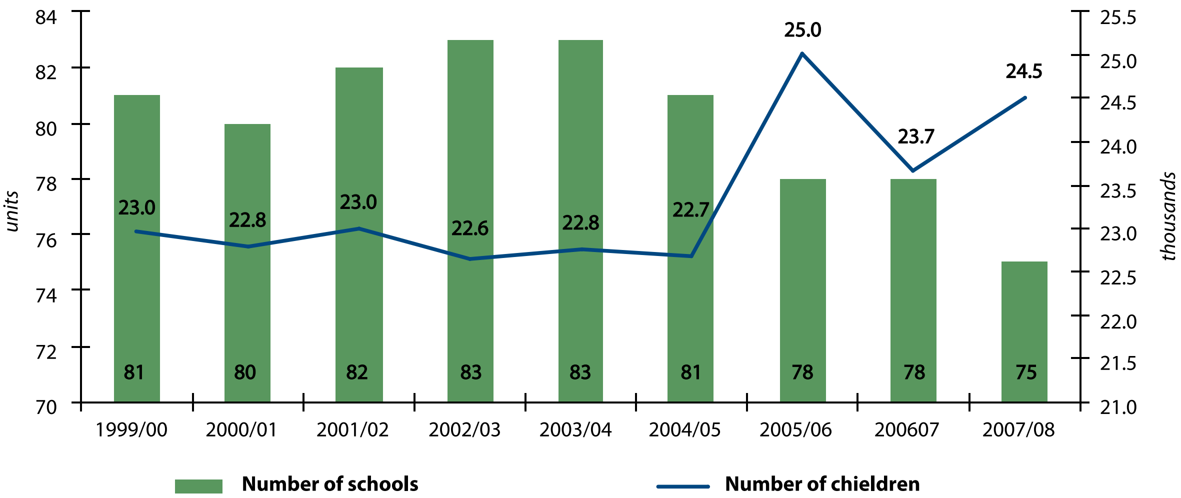


Figure 1-4: Educational Institutions and Students Enrolled in the Secondary Professional Education in the Republic of Moldova

percent each). The number of graduates from the secondary professional education establishments was 12.9 thousand in 2007 (a decrease by 11.0 percent as compared to the preceding year). The graduates from professional lyceums accounted for 8.4 percent of the total number of graduates; professional school graduates – for 68.8 percent; and industrial school graduates – for 22.8 percent.

Secondary vocational education. As at the beginning of the school year 2007/2008, the total number of Moldova's secondary vocational education establishments (colleges) was 49 with a total number of students of 31.3 thousand (by 57.3 percent more than in the school year 2000/2001). In the school year 2007/2008 the total number of their students increased by 3.6 percent as compared to the school year 2006/2007 (Figure 1-5). In the school year 2007/2008 the training delivered to 49.4 percent of the students was free of charge for them (i.e. totally funded from the national budget); 50.1 percent of the students were paying for their training; and training for 0.5 percent of the students was funded from other sources.

In the school year 2007/2008 colleges had 10.1 thousand first-year students (a 2.5 percent increase in comparison with the preceding school year). The total number of the first-year students was broken down by pre-college training received as follows: gymnasium graduates accounted for 73.1 percent of the total; general secondary school graduates – for 16.6 percent; and lyceum graduates – for 10.1 percent. The breakdown of the total number of students by profession groups shows a distinctive shift towards certain sectors: health care (13.0 percent of the total first-year students); economy (11.7 percent), transports (10.4 percent); services (8.4 percent); teaching (8.0 percent); constructions (5.5 percent); computer science (5.4 percent), etc. The number of graduates in 2007 totalled 6.4 thousand persons, increasing by 68.4 percent in comparison with the preceding year.

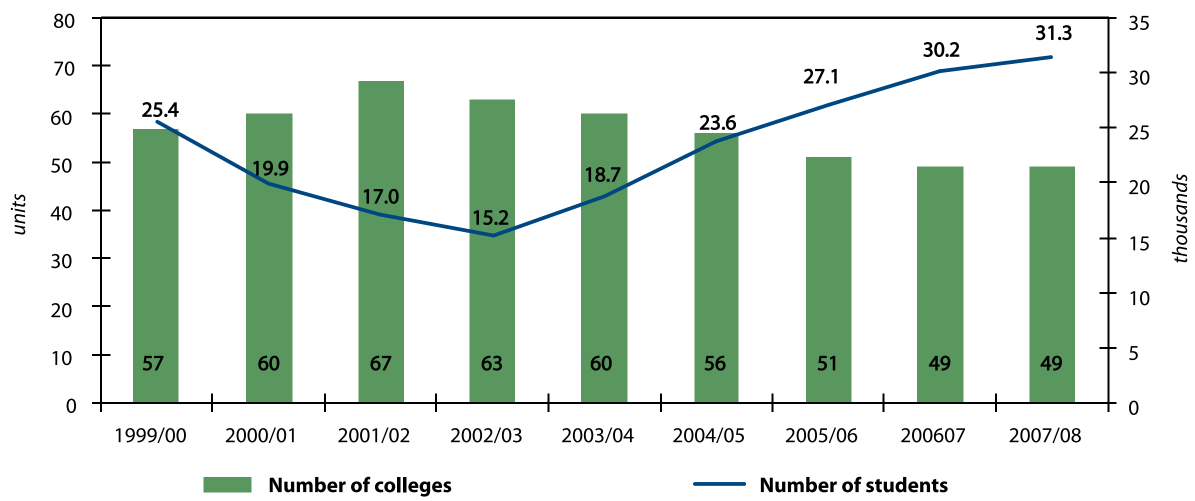


Figure 1-5: Educational Institutions and Students Enrolled in the Secondary Vocational Training in the Republic of Moldova

Higher education. As at the beginning of the training year 2007/2008, the total number of higher education establishments (universities) in the Republic of Moldova was 31, including 17 state-owned and 14 private establishments. The total number of their students was 122.9 thousand (or 343 university students per 10,000 inhabitants). In the academic year 2007/2008 the total number of university students grew by 55.5 percent as compared to the academic year 2000/2001; however it decreased by 4.0 percent in comparison with the academic year 2006/2007 (Figure 1-6). In the academic year 2007/2008 the training delivered to 21.8 percent of the university students was free of charge for them (i.e. totally funded from the national budget); 77.7 percent of the students were paying the tuition fee; and the education being delivered to 0.5 percent of the university students was funded from other sources.

In the academic year 2007/2008 the universities had 23.8 thousand first-year students (by 8.1 percent less than in the preceding academic year). The total number of the first-year students was broken down by pre-university training received as follows: the lyceum graduates accounted for 61.0 percent of the total first-year students; graduates from general secondary schools – for 24.5 percent; college graduates – for 11.9 percent; and professional school graduates – for 0.8 percent. The breakdown of the first-year students by specialities in the training year 2007/2008 was as follows: education – 21.3 percent of the total first-year students; humanities and arts – 6.3 percent; social science, economy and law – 31.0 percent; sciences – 5.8 percent; engineering, processing technologies, architecture and constructions – 24.2 percent; agriculture – 2.8 percent; health care – 3.8 percent; services – 4.8 percent. The total number of university graduates was 20.0 thousand in 2007, a 17.6 percent increase as compared to the preceding year. Among the speciality areas the biggest share of school graduates chose: economy (25.9 percent) and law (21.0 percent), with philology (8.5 percent) and computer science (4.2 percent) rating third and fourth respectively.

Post-graduate education. Among the total of 67 research (R&D) institutions operating in the Republic of Moldova as at the beginning of 2007, 44 institutions (29 research institutes and 15 universities) offered post-graduate studies (doctoral degree). The total number of post graduate students was 1610 (an increase by 29.0 percent as compared to 2000, but a decrease by 4.5 percent as compared to 2006) (Figure 1-7). As at the beginning of 2007, the total number of the institutes offering post-doctoral studies was 17: 10 research institutes and 7 universities. The total number of post-doctoral students was 52. In 2007 the total number of post-doctoral students grew by 2.6 times as compared to the year 2000 and by 1.3 times as compared to the year 2006.

1.4 Institutional Arrangements

1.4.1 Institutions

The Republic of Moldova proclaimed its independence on August 27, 1991; it remained however a part of the Soviet Union until the latter's formal dissolution in December of 1991. Moldova's new constitution was approved in the national referendum and ratified by the Parliament on July 28, 1994. According to the Constitution, the Republic of Moldova is a neutral country. The Constitution guarantees the voting right to all its citizens who have reached the age of 18 and provides for the diverse civil rights and liberties.

The President is the head of the state. Prior to the amendments to the Constitution introduced in 2000 presidential

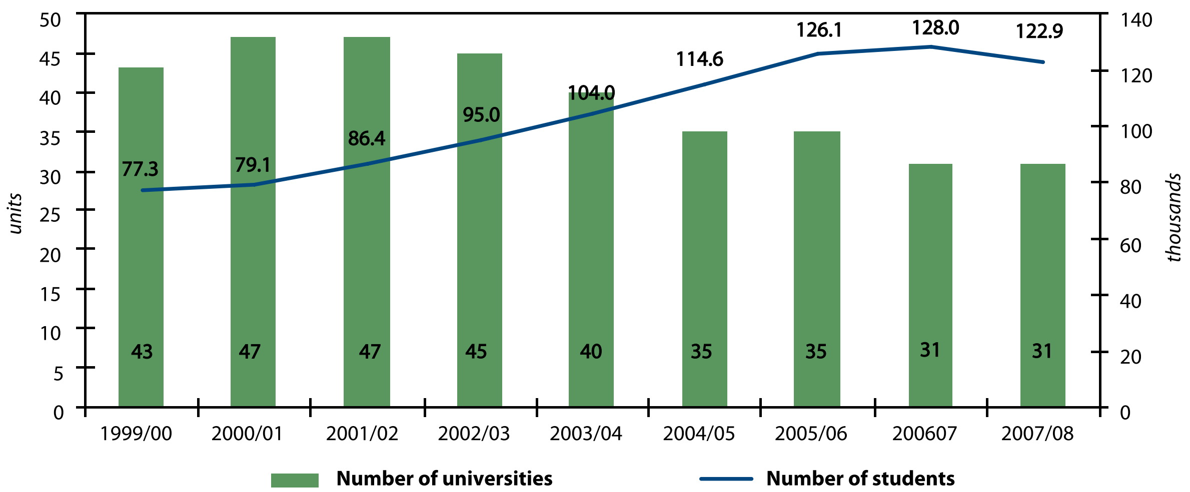


Figure 1-6: Educational Institutions and Students Enrolled in the Higher Education in the Republic of Moldova

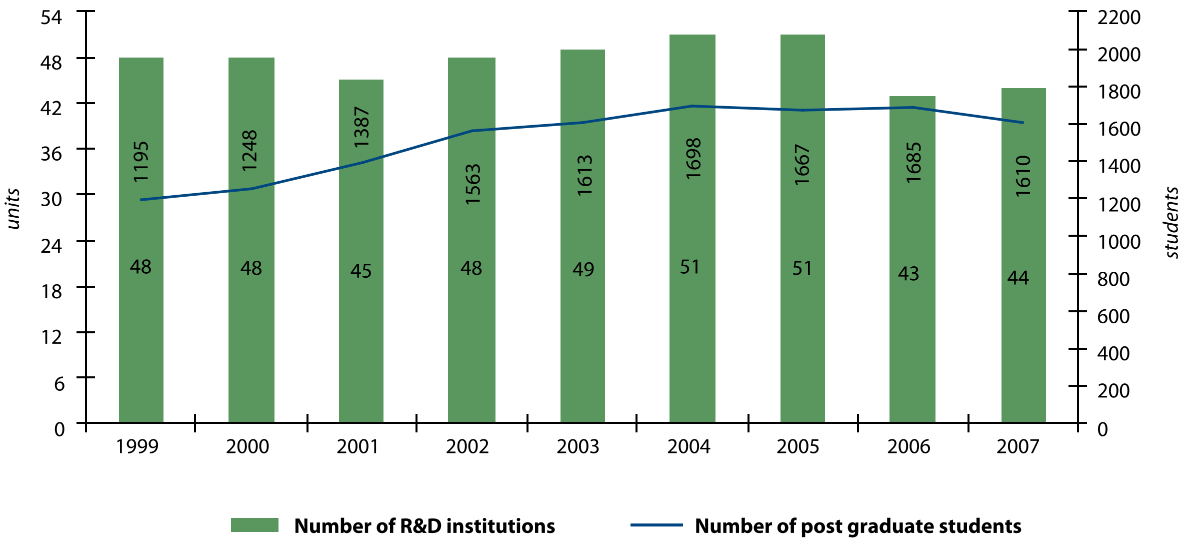


Figure 1-7: Number of Institutions Providing Post Graduate Education and Number of Post Graduate Students in the RM

elections used to be direct. Currently the President is elected by the Parliament for the term of 4 years and may hold the presidential office no more than two consecutive terms. The President has the power to dissolve the Parliament. The Constitution provides for the possibility to accuse the President of a penal or constitutional infringement.

The President appoints the Prime Minister and (upon the latter's recommendations) the Cabinet of Ministers. The Prime Minister and the Cabinet require the approval of the Parliament. The current Government (formed after the elections held in March 2005) is comprised of 16 ministries:

1. Ministry of Foreign Affairs and European Integration (MAEIE) (<www.mfa.gov.md>)
2. Ministry of Economy and Trade (MET) (<www.mec.gov.md>)
3. Ministry of Finance (MF) (<www.mf.gov.md>)
4. Ministry of Agriculture and Food Industry (MAIA) (<www.maia.gov.md>)
5. Ministry of Constructions and Territorial Development (MCDT) (<www.mcdt.gov.md>)
6. Ministry of Environment and Natural Resources (MENR) (<www.mediu.gov.md>)
7. Ministry of Education and Youth (MET) (<www.edu.gov.md>)
8. Ministry of Health (MS) (<www.ms.gov.md>)
9. Ministry of Social Protection, Family and Child (MPSFC) (<www.mpsfc.gov.md>)
10. Ministry of Culture and Tourism (MCT) (<www.tourism.gov.md>)
11. Ministry of Justice (MJ) (<www.justice.gov.md>)
12. Ministry of Internal Affairs (MAI) (<www.mai.gov.md>)
13. Ministry of Defence (MA) (<www.army.gov.md>)
14. Ministry of Information Development (MDI) (<www.mdi.gov.md>)
15. Ministry of Reintegration (MR) (<www.reintegrarea.gov.md>)
16. Ministry of Local Public Administration (MAPL) (<www.mapl.gov.md>)

The nation's supreme legislative authority is the one-chamber Parliament. It is composed of 101 deputies (MPs) elected directly for the term of four years. The Parliament has two ordinary sessions per year; furthermore, it is possible to convene an extraordinary parliamentary session. In addition to adoption of laws and exercising other basic legislative functions, the Parliament may declare the state of national emergency, martial law or war.

The judiciary system includes three supreme courts: the Supreme Court of Justice, the Court of Appeals and the Constitutional Court – the supreme authority on constitutional issues issuing final decisions which can not be appealed against. Tribunals and courts exercise judicial procedures at the local level. The President appoints judges for the Supreme Court of Justice and the Court of Appeals from the nominees submitted by the Supreme Council of Magistrates.

The Supreme Council of Magistrates composed of 11 magistrates and elected for a five-year term is in charge of appointments, transfers and promotions of judges. The

Council includes the Minister of Justice, the Chairman of the Supreme Court of Justice, the Chairman of the Court of Appeals, the Chairman of the Economic Court and the Attorney General, three members elected from among the members of the Supreme Court of Justice and another three members elected by the Parliament from among the accredited university professors.

1.4.2 Institutional arrangements relevant for the preparation of the NCs

The Ministry of Environment and Natural Resources (MENR) of the Republic of Moldova is the state authority vested with the power to:

- develop and promote policies and strategies addressing environment protection, rational use of natural resources and biodiversity conservation;
- identify priorities, develop and promote national programs and action plans which address such priorities, coordinate relevant actions and monitor their implementation in the best way;
- integrate environment protection policies in the social-economic processes and corresponding parts of sector policies based on principles of sustainable development and harmonization of relevant legislation with the EU legislation;
- promote the state policy and determine the priority directions of the environmental research and development, make possible and coordinate implementation of research and development programs, promote implementation of new technologies, equipment and machinery;
- ensure international collaboration in environment protection;
- gather, systematize and manage own information data base to support own activities, ensure maintenance and optimization of the sector information system;
- undertake regulatory and control actions to ensure ecological and biological security of the country;
- ensure state ecological expertise and exercise state control in the environment protection area, use of natural resources, implementation of forest extension programs and activities aimed at forests regeneration and exploitation, ecological reconstruction;
- manage the National Environmental Fund (NEF), coordinate the activity of local ecological funds;
- carry out integrated ecological monitoring, develop and broadcast synoptic, aeronautical, agro-meteorological and hydrological forecasts, forecast the dangerous meteorological phenomena and appropriately warn the public authorities, population and economic agents about their features and scale;
- involve mass-media, non-governmental organizations and population in implementation of environmental protection, promote educational activities with all categories of population.

On behalf of the Government of the Republic of Moldova, MENR is responsible for implementation of international environment treaties to which the Republic of Moldova is a Part (including the United Nations Framework Convention on Climate Change, signed by the Republic of Moldova on June 12, 1992, ratified by the Parliament on March 16, 1995, as well as the Kyoto Protocol, ratified by the Republic of Moldova on February 13, 2003; the official date of accession is April 22, 2003).

Representatives of MENR and subordinated institutions (State Hydrometeorological Service) also perform the function of the GEF Political and Operational Focal Points, as well as UNFCCC Focal Point.

Through the Government Resolution No. 1574 as of 26.12.2003 it was established the „National Commission for Implementing Provisions of the United Nations Framework Convention on Climate Change and Provisions and Mechanisms of Kyoto Protocol" (Designated National Authority). In conformity with Article 2 of its working regulations, the „National Commission" (DNA) is the supreme authority in the Republic of Moldova responsible for implementation of the UNFCCC provisions, as well as the mechanisms and provisions of Kyoto Protocol (the National Commission was vested with the authority to develop and promote policies and strategies under the Clean Development Mechanism). The National Commission collaborates with the Inter-Ministerial Committee for Sustainable Development and Poverty Reduction, with the Commission for European Integration, with the National Participation Council, other National Commissions and Committees. The activity of the National Commission and execution of its decisions is coordinated and monitored by the Commission's Secretary, who is also the Manager of the Climate Change Office under the MENR.

The Climate Change Office was established through the Order No. 21 as of February 11, 2004 of the Ministry of Ecology, Constructions and Territory Development of the Republic of Moldova (reorganized into MENR based on Government Resolution No. 357 as of April 23, 2005 'On reorganization of ministries and central administration authorities of the Republic of Moldova').

The main tasks of the Climate Change Office are:

- providing logistical support to the Government, central and local public administration authorities, non-government and academic organizations, in activities implemented and promoted by the Republic of Moldova under the United Nations Framework Convention on Climate Change and the Kyoto Protocol;

- implementing climate change related projects and programs providing for such activities as: greenhouse gas emissions assessment and development the national inventory reports; development and implementation greenhouse gas emissions mitigation activities; development and implementation of measures aimed at adapting to climate change; assessment of the climate change impact on biologic and socio-economic components; cooperation, promotion and implementation of activities and projects under the Clean Development Mechanism of the Kyoto Protocol; implementation and facilitation of activities aimed at building awareness and information among civil society, relevant experts and decision makers on issues related to climate change, etc.

Thus, the Climate Change Office under the Ministry of Environment and Natural Resources is totally responsible for the activities related to preparation of National Communications in the Republic of Moldova (Figure 1-8).

The Climate Change Office comprises four working groups (teams): National GHG Inventory Team, Climate Change Mitigation Assessment Team, Vulnerability and Adaptation Assessment Team and Cross-Cutting Team.

Below is a brief description of functional responsibilities of the participants in the process:

- National experts (hired on a contract basis) are responsible for the process of activity data gathering (collection), application of decision trees in terms of selecting suitable assessment methods, assessment at sectoral level, taking correction measures as a response to quality assurance and quality control activities as well as developing some component parts of the key chapters of the Second National Communication.
- Team leaders are responsible for the coordination of the process of compilation the key chapters of the Second National Communication. They supervise the process at sectoral level, are responsible for interpreting the results obtained by national experts, coordination of quality assessment and quality control activities, documentation and archiving the materials used and aggregating the reports submitted by national experts.

The activity data needed for the National Communications and National GHG Inventories compilation are available in Statistical Yearbooks, Energy Balances and others sector statistic publications of the National Bureau of Statistics of the Republic of Moldova. Additional statistical data (non-published) may be provided at request, in conformity with provisions of the *Law nr. 412 as of 09.12.2004 on Official Statistics, Article 9 (2), item a) and b),* according to which "the official statistics authorities must disseminate statistical data to users in the amount, manner and terms specified in the statistical works programme", as well as to "to ensure access of all users to non-confidential statistic on equal conditions in terms of amount and terms of dissemination".

Other relevant activity data are collected at request, from various partner organizations (Ministry of Transports and Roads (in 2008 reorganised in Transport Agency), Ministry of Industry and Infrastructure (in 2008 reorganised by a merger with the Ministry of Economy and Trade), Ministry of Information Development, Ministry of Agriculture and Food Industry, Ministry of Defence, Ministry of Health, Ministry of Intern Affaires, Academy of Sciences of Moldova, Forestry Agency "Moldsilva", Agribusiness Agency "Moldova-Vin", Land Relations and Cadastre Agency, Civil Aviation State Administration, Customs Service, State Ecological Inspectorate, Ozone Office under the MENR, IPROCOM State Projections Institute, State Enterprise "Moldavian Railways", "Moldova-Gaz" J.S.C., "Lafarge-Ciment" J.S.C., etc.), based on the provisions of the *Law on Access to Information*, adopted by the Parliament Resolution No. 982-XIV as of 11.05.2000.

So, Article 1 of the *Law on Access to Information* regulates the relationships between information providers and individual/legal entity in the process of ensuring and implementing the constitutional right of access to information; principles, conditions, ways and manner of accomplishing access to official data owned by information providers; aspects of access to and protection of personal information within the scope of access to such data; rights of data solicitants, including petitioners of personal data; obligations of information providers in the process of ensuring access to official information; ways to protect the right to access to information.

Article 4 (1) stipulates that "anyone, under this law's conditions, has the right to look for, receive and make public official information".

According to Article 6 (1), "official information are deemed to be all information owned and available to information providers, developed, selected, processed, consolidated and /or adopted by authorities or official persons or made available to them by other legal entities". This Article is a review of information bearing documents as stipulated by the provisions of this law. Article 7 refers to cases of limited access to official information. Rights of data solicitants are reflected in Article 10, while Article 11 refers to the obligations of information provider.

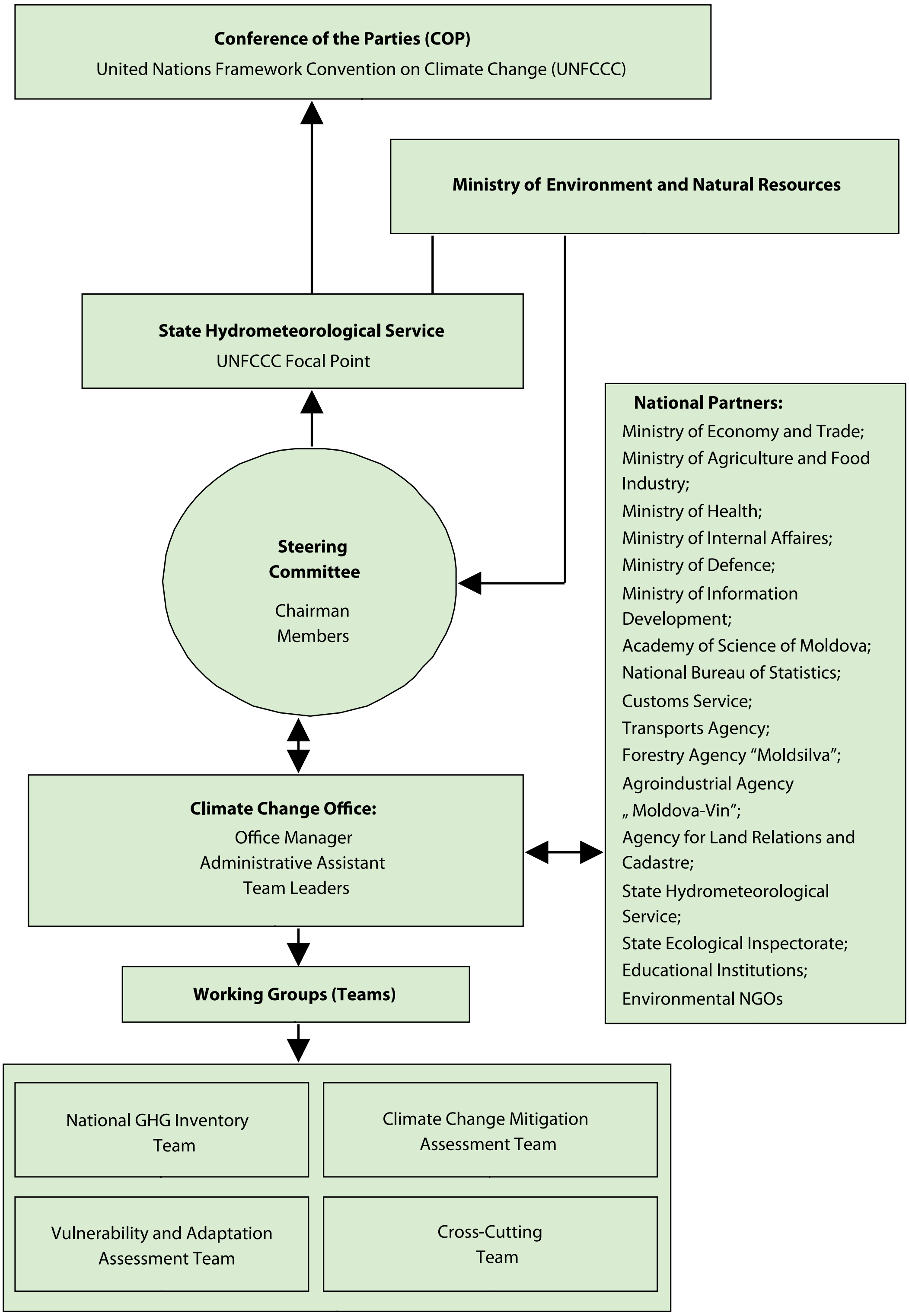


Figure 1-8: Institutional Arrangements Relevant for the Preparation of the Second National Communication.

According to Article 13 (1), ways of access to information are the following: hearing of information which can be provided verbally; document review on the premises of the institution; issuing a copy of the requested document or information; issuing a copy of the document, information translated into a different language than the language of the original, for an additional charge; sending by mail (including e-mail) of a copy of the document, information, a copy of the translated document, information into a different language, at the solicitant's request, for a payment. Article 13 (2) stipulate that extracts from registers, documents, information, as per solicitant's request, can be made available to the solicitant in a reasonable and acceptable to the solicitant form.

Article 16 of the Law refers to the requirements that have to be met to ensure access to information: the requested information or documents shall be made available to the solicitant from the moment it becomes available for issuing, but not later than 15 working days from the date the application for access to information is registered; the leadership of the public institution may extend the term of providing the information, or document by 5 working days if : (i) the request refers to a very big volume of information requiring their selection; (ii) additional consultations are needed to satisfy the request. The solicitant will be informed about any extension of the information delivery term and about the reasons for such extension 5 days prior to the expiry of the initial term. The Law also refers to cases when access to information is denied, to payments for official information provision, to modalities of protecting the right for access to information and prosecution in court of information providers' actions.

Also, a series of other laws contain provisions pertaining to wide public to environment protection related information. So, Article 29 (3) of the *Law on Natural Resources*, adopted by the Parliament Resolution No. 1102-XIII as of 06.02.1997, stipulates that „Government, local public administration authorities, state bodies assigned with natural resources management and environment protection, as well as businesses, shall make public valid and accessible information regarding natural resources use and environment protection activities".

Article 23 of the *Forestry Code*, adopted by the Parliament Decision no. 887 as of 21.06.1996, stipulates that citizens and NGO-s are entitled to receive information from the state forestry authorities and environment protection bodies about forestry and hunting resources, planned and accomplished conservation measures and use of such resources.

The *Regulation regarding trading and regulated use of halogenated hydrocarbons that deplete the ozone layer*, approved by the *Law of the Republic of Moldova No. 852-XV as of 14.02.2002*, stipulates the procedure of presenting by the MENR of information regarding production, import, export, trading and use (recycled and reclaimed quantities of controlled substances) of halogenated hydrocarbons that deplete the ozone layer, regulated by Montreal Protocol.

1.5 Economical Context

After the break up of the Soviet Union and declaration of the Republic of Moldova's independence, the nation had to face a particularly grave crisis in view of both the size of the country and the scope of the crisis as compared to the other economies in transit. Moldova rated among the medium income countries in 1991, and it has turned at present to one of the poorest countries in Europe, with its per capita Gross Domestic Product (GDP) below the average for both the Commonwealth of Independent States (CIS) and the Central European countries. In terms of its structure, Moldova's economy is closer to that of the Central Asia countries than that of the other western former Soviet Union republics.

1.5.1 Gross Domestic Product

The separatist actions of the industrialized Transnistria (i.e., the current administrative-territorial units on the left bank of the Dniester) have left Moldova with an undiversified economic base, dependent in practical terms solely on the agricultural production and food industry.

In 1993 the agricultural sector accounted for 31.2 percent of GDP, and the manufacturing industry – for 39.0 percent of GDP. In 2008 the portion of GDP accounted for by the agriculture decreased to 9.9 percent, and that of the manufacturing industry to 14.6 percent (Table 1-5). Nevertheless, the agriculture is still a dominating GDP driver, whereas the industrial sector bases to a considerable extent on food procession. According to the 2007 Statistical Yearbook of the Republic of Moldova, the manufacturing industry accounts for as little as 12.8 percent of the total employment – as opposed to the agriculture accounting for 33.6 percent of the total employment.

It should be noted that certain economic decline patterns had been registered prior to 1991, but the separation from the USSR has accelerated that process considerably. GDP level were decreasing continuously during the period from 1990 to 1999 inclusive, when it fell down to as little as 34 percent of the 1990 level (Table 1-6). The only exception was 1997 year, when a slight increase by 1.6 percent versus the previous year was registered due to the excellent agricultural yields as result of the very favourable weather.

Table 1-5: GDP Structure in the Republic of Moldova, 1993-2008 (%)

	1993	1994	1995	1996	1997	1998	1999	2000
Total GDP	100	100	100	100.0	100.0	100.0	100.0	100.0
Gross Value Added	99.0	93.4	88.6	87.5	86.0	84.6	89.3	87.5
Production, Total	70.2	58.6	54.3	50.6	46.2	42.5	41.9	41.7
Agriculture	31.2	27.3	29.3	27.5	26.0	25.8	24.9	25.4
Industry	39.0	31.4	25.0	23.1	20.2	16.7	17.0	16.3
Services, Total	32.9	38.6	36.6	41.7	43.5	46.9	53.0	48.2
Wholesale and Retail Trade	7.9	7.8	8.0	8.3	8.2	10.3	15.3	12.5
Transports and Communications	4.4	6.3	5.1	5.6	6.5	7.4	8.2	9.5
Construction Sector	3.3	4.5	3.5	3.8	4.7	3.2	3.3	2.7
Financial Sector	4.8	5.2	3.7	6.6	6.0	7.4	8.2	5.3
Other	12.5	15.0	16.3	17.4	18.2	18.7	18.0	18.2
Agent (Intermediary) Services	-4.1	-3.9	-2.2	-4.7	-3.8	-4.8	-5.6	-2.4
Product and Import Taxes, Net	1.0	6.6	11.4	12.5	14.0	15.4	10.7	12.5
	2001	2002	2003	2004	2005	2006	2007	2008
Total GDP	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Gross Value Added	88.0	87.3	85.2	85.9	84.0	83.4	83.0	81.4
Production, Total	41.1	38.3	35.9	34.7	32.2	29.2	24.7	24.5
Agriculture	22.4	21.0	18.3	17.6	16.4	14.5	9.9	9.9
Industry	18.7	17.3	17.6	17.1	15.8	14.7	14.8	14.6
Services, Total	49.2	51.0	51.6	53.5	53.8	56.7	61.1	59.6
Wholesale and Retail Trade	12.0	11.0	10.7	10.6	10.4	11.5	12.0	11.6
Transports and Communications	10.4	10.0	10.8	11.8	12.2	11.8	12.1	12.0
Construction Sector	3.1	2.9	2.9	3.4	3.3	4.0	4.8	5.4
Financial Sector	4.5	4.3	4.5	4.7	4.6	5.0	6.7	6.4
Other	19.2	22.7	22.6	23.0	23.2	24.5	25.5	24.2
Agent (Intermediary) Services	-2.3	-2.1	-2.3	-2.3	-2.0	-2.5	-2.8	-2.7
Product and Import Taxes, Net	12.0	12.7	14.8	14.1	16.0	16.6	17.0	18.6

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

Table 1-6: Gross Domestic Product in the Republic of Moldova during 1990-2007

	1990	1991	1992	1993	1994	1995	1996	1997	1998
GDP, B MDL (Rubbles in 1990-1992) billions	13.00	25.90	191.90	1.82	4.74	6.48	7.80	8.92	9.12
%, versus the preceding year	97.6	82.5	71.0	98.8	69.1	98.6	94.1	101.6	93.5
% of the 1990 level	100	82.5	58.6	57.9	40.0	39.4	37.1	37.7	35.2
	1999	2000	2001	2002	2003	2004	2005	2006	2007
GDP, B MDL	12.32	16.02	19.05	22.56	27.62	32.03	37.65	44.75	53.43
%, versus the preceding year	96.6	102.1	106.1	107.8	106.6	107.4	107.5	104.8	103.0
% of the 1990 level	34.0	34.8	36.9	39.8	42.4	45.5	49.0	51.3	52.8

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

The above mentioned economic decline had multiple reasons. First, Moldova had been integrated completely in the USSR economic system, and the independence resulted, among other things, in the termination of any subsidies or cash transfers from the centralized government of the Soviet Union. Second, the end of the Soviet Era with its well established commercial links has resulted in the emergence of multiple obstacles for free circulation of products, and in access restrictions introduced by the emerging markets. Third, the lack of domestic energy resources and primary materials in Moldova has contributed considerably to the nation's strong dependence on other former Soviet Republics. That dependence has caused a shock in the sphere of imports due to the increased prices of the energy resources imported from Russian Federation.

Certain internal reasons should be mentioned as well, such as: transit to the market economy from the centralized economy; loss of the industries located in Transnistria; frequent droughts; and the civil hostilities. Against that background, the considerable GDP growth achieved since 2000 seems to indicate that the economy is finally developing in the correct direction, although it should be remembered that – according to the most recent available data, the 2008 GDP reached only 55.3 percent of the 1990 level. The substantial cash inflows from the Moldavians working abroad have reduced to a certain extent the negative impact of the declining economic activity.

Table 1-7: GDP of the Republic of Moldova, 1993-2008

	1993	1994	1995	1996	1997	1998	1999	2000
GDP, mil. US $	1358.3	1164.8	1441.4	1694.3	1928.7	1699.0	1173.5	1288.8
% versus the preceding year		85.7	123.8	117.5	113.8	88.1	69.1	109.8
GDP, mil. US $ (CPI)	10830.2	10948.0	7586.4	7658.7	8064.4	7622.1	7413.1	7685.6
% versus the preceding year		101.1	69.3	101.0	105.3	94.5	97.3	103.7
Per capita GDP, lei	493.3	1287.2	1797.8	2166.7	2440.5	2497.5	3379.2	4402.2
% versus the preceding year	96.2	69.3	100.7	94.2	100.1	93.5	96.8	102.3
in US $	368.1	316.5	400.0	470.8	527.8	465.2	321.8	354.2
in US $ (CPI)	2935.0	2975.0	2105.0	2128.0	2207.0	2087.0	2033.0	2112.0
	2001	2002	2003	2004	2005	2006	2007	2008
GDP, mil. US $	1480.3	1662.3	1981.3	2597.9	2988.2	3408.6	4394.9	6117.8
% versus the preceding year	114.9	112.3	119.2	131.1	115.0	114.1	128.9	139.2
GDP, mil. US $ (CPI)	8351.0	9135.8	9713.3	10918.0	12077.9	12880.2	13504.5	14786.2
% versus the preceding year	108.7	109.4	106.3	112.4	110.6	106.6	104.8	109.5
Per capita GDP, lei	5247.1	6227.0	7645.9	8889.6	10474.6	12483.1	14916.2	17565.5
% versus the preceding year	106.4	108.1	106.9	107.6	107.8	105.1	103.2	107.7
in US $	407.7	458.9	548.5	721.0	831.3	950.7	1228.7	1713.7
in US $ (CPI)	2300.0	2522.0	2689.0	3030.0	3360.0	3592.6	3775.5	4141.9

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

1.5.2 Inflation

The inflation rate grew dramatically up to approximately 1200 percent in 1993 and slowed down to 8 percent in 1998. The 1998 depreciation of the Russian Rubble caused rapid growth of the inflation up to 39 percent. Moldova has since achieved a significant progress in terms of controlling its inflation rate, and the inflation rate decreased to 5.2 percent in 2002; however, the 2003 average inflation rate for the year grew up to 11.6 percent driven by the growing prices for agricultural products (as result of a severe drought), and the above growth pattern persisted in the subsequent years; the inflation reached 12.4 percent in 2004, but decreased to 11.9 percent in 2005 – only to grow up to 12.7 percent in 2006 - in particular, due to the increased prices for the natural gas imported from Russian Federation; as well as for fuel and medications. The average inflation rate for the year was about 12.3 percent in 2007, and the nature of inflation was mainly non-monetary, because it was driven by the growing global prices for oil, increase of the government-regulated tariffs for certain services (utilities) and the growing purchasing power of the population owing to the increased salaries and old-age pensions as well as hard-currency flows to Moldova from the Moldavians working abroad. The 2008 inflation rate remained relatively high (the inflation rate was 6.2 percent in January to June), driven by the increase in utility tariffs, growing demand for food (in particular meat and rice) as well as increased purchasing power of the population.

1.5.3 National Currency Exchange Rate

The national currency (MDL – Moldovan Lei) has been put into circulation in November 1993. During 1994-2006 the average MDL exchange rate for the year (in nominal terms) registered a significant depreciation against United States Dollars (USD) (Table 1-8).

Table 1-8: The Average Annual Exchange Rate of the Republic of Moldova's National Currency (MDL) against United States Dollars (USD) in Nominal Terms, 1994-2007

	1994	1995	1996	1997	1998	1999	2000
Exchange rate, MDL /US $	4.07	4.50	4.60	4.62	5.37	10.50	12.43
	2001	2002	2003	2004	2005	2006	2007
Exchange rate, MDL /US $	12.87	13.57	13.94	12.33	12.60	13.13	12.14

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

However, during year 2007, the Moldovan national currency appreciated by approximately 12.3 percent against the USD (from 12.91 MDL for 1 USD as at 01.01.2007 to 11.32 MDL for 1 USD as at 31.12.2007). The MDL appreciation against

Euro made 1.9 percent. Year 2008 featured a similar trend. Thus, e.g. in January to August 2008 the MDL exchange rate appreciated by 14.7 percent against the USD in nominal terms (growing from 11.32 MDL for 1 USD as at 01.01.2008 to 9.65 MDL for 1 USD as at 31.08.2008). The Moldovan Lei appreciated against Euro as well (by circa 14.3 percent). The two principal drivers of the above changes in the exchange rate were: significantly increased inflows of cash transfers from abroad and the depreciation of the US dollar on the international monetary markets. Due to the continuing depreciation of the US dollar on the global monetary markets, the number of transactions with that currency has decreased considerably on the foreign currency market of the Republic of Moldova (Table 1-9). Against that background, the period of 2003-2008 featured a growing number of transactions in Euro and Russian Rubble. To support the stability of the Moldovan Lei, the National Bank of Moldova purchased foreign currency to the net amount of USD 376.9 million on the domestic market in 2007. Those actions resulted in an increase of foreign currency provisions, which totalled USD 1.3 billion at the end of 2007, growing by approximately 1.7 times versus the 2006 closing level.

To prevent the excessive appreciation of the Moldovan Lei in January-August 2008, the National Bank of Moldova (NBM) purchased foreign currency to the net amount of USD 297 million on the domestic inter-bank market. Those actions resulted in an increase of foreign currency provisions, which totalled USD 1.8 billion as at the end of July 2008, increasing by 38 percent as compared to the 2008 opening level.

Table 1-9: Structure of Transactions on the Currency Market during 2003-2008, **%**

	2003	2004	2005	2006	2007	2008
USD	82.2	78.7	79.5	73.0	67.0	58.1
Euro	11.7	15.9	14.4	21.2	28.5	25.3
Russian Rubble	5.4	4.6	4.5	4.5	3.2	15.7
Other	0.7	0.8	1.6	1.3	1.3	0.9
Total	100	100	100	100	100	100

Source: National Bank of Moldova

1.5.4 Trade Balance Deficit

Moldova's import expenses exceed considerably the nation's proceeds from its exports, thus indicating a very grave problem in terms of the nation's trade balance deficit. That deficit reached 24 percent of the GDP in 2000 and exceeded 54 percent of the GDP in 2007 (Table 1-10).

Table 1-10: Trade Balance Deficit of the Republic of Moldova, 1992-2007

	1992	1993	1994	1995	1996	1997	1998	1999
GDP, millions USD	1700.0	1358.3	1164.8	1441.4	1694.3	1928.7	1699.0	1173.5
Exports (CIF), millions USD	470.0	483.0	565.4	745.5	795.0	874.1	631.9	463.4
% versus the preceding year	5802.5	102.8	117.1	131.9	106.6	109.9	72.3	73.3
Imports (FOB), millions USD	640.0	628.0	659.3	840.7	1072.3	1171.2	1023.7	586.4
% versus the preceding year	7619.0	98.1	105.0	127.5	127.5	109.2	87.4	57.3
Trade balance deficit, millions USD	170.0	145.0	93.9	95.2	277.3	297.1	391.8	123.0
Coverage of IMP with EXP (%)	73.4	76.9	85.8	88.7	74.1	74.6	61.7	79.0
% of GDP: exports	24.9	26.5	48.5	51.7	46.9	45.3	37.2	39.5
imports	33.5	34.5	56.6	58.3	63.3	60.7	60.3	50.0
balance	-8.6	-8.0	-8.1	-6.6	-16.4	-15.4	-23.1	-10.5
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
GDP, millions USD	1288.8	1480.3	1662.3	1981.3	2597.9	2988.2	3408.6	4394.9
Exports (CIF), millions USD	471.5	565.5	643.8	789.9	985.2	1091.3	1051.6	1341.8
% versus the preceding year	101.7	119.9	113.8	122.7	124.7	110.8	96.4	127.6
Imports (FOB), millions USD	776.4	892.2	1038.0	1402.3	1768.5	2292.3	2693.2	3689.9
% versus the preceding year	132.4	114.9	116.3	135.1	126.1	129.6	117.5	137.0
Trade balance deficit, millions USD	304.9	326.7	394.2	612.4	783.4	1201.0	1641.6	2348.1
Coverage of IMP with EXP (%)	60.7	63.4	62.0	56.3	55.7	47.6	39.0	36.4
% of GDP: exports	36.6	38.2	38.7	39.9	37.9	36.5	30.9	30.5
imports	60.2	60.3	62.4	70.8	68.1	76.9	79.0	84.0
balance	-23.7	-22.1	-23.7	-30.9	-30.2	-40.2	-48.2	-53.4

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

The above reflects the nation's dependence on the imports of energy resources and the growing demand for the imported products. The imports growth is driven by the massive inflow of cash transfers from abroad, which are channelled in domestic consumption. The range of Moldova's exports is relatively narrow, thus complicating the nation's efforts to penetrate the western markets.

Food and alcoholic drinks, as well as textiles and textile articles, vegetable products, base metals and products thereof, machinery and mechanical appliances, electrical equipment, etc. prevail in the exports. In 2007, food and alcoholic drinks accounted jointly with textiles and textile articles for approximately 42 percent of the total exports (Table 1-11).

Table 1-11: Exports by Sections According Harmonized System within 2000-2007, %

	2000	2001	2002	2003	2004	2005	2006	2007
Total exports, including:	100	100	100	100	100	100	100	100
Food, drinks and tobacco	42.1	44.5	41.5	39.8	35.1	36.3	26.3	20.6
Vegetable products	14.0	13.9	16.5	11.6	12.2	12.1	13.0	12.1
Live animals and animal products	4.8	3.2	2.4	3.6	2.1	1.6	1.6	1.0
Animal or vegetable fats and oils	0.8	1.5	2.6	3.7	4.2	3.5	3.3	4.1
Mineral products	0.6	1.1	1.8	2.6	3.1	1.8	2.6	4.3
Chemical products	1.8	1.5	1.1	1.1	0.9	1.4	2.0	2.0
Plastics, rubber and articles thereof	0.4	0.6	0.4	0.7	0.9	1.1	1.5	2.5
Raw hides and skins, leather, fur skins and articles thereof	2.8	2.0	3.6	5.7	7.9	6.6	2.2	2.2
Wood and articles of wood (excluding furniture)	0.2	0.3	0.1	0.2	0.4	0.2	0.4	0.3
Paper, paper-board and articles thereof	0.4	0.6	0.8	1.3	0.8	1.1	1.7	2.0
Textiles and textile articles	17.7	18.4	16.7	16.4	17.3	17.8	21.7	20.6
Footwear, headgear, umbrellas and similar articles	0.8	0.9	1.5	1.9	2.2	2.4	2.9	3.0
Articles of stone, gypsum, cement, ceramic, glass or similar materials	3.1	2.4	2.2	2.0	1.7	1.7	3.1	3.8
Base metals and articles of base metals	2.5	0.6	1.1	2.5	3.0	4.5	7.2	8.2
Machinery and mechanical appliances, electrical equipment	5.1	5.4	3.9	3.8	4.0	4.2	5.1	6.8
Vehicles and associated transport equipment	1.1	1.3	2.1	1.4	2.3	1.4	1.6	1.4
Instruments and apparatus	0.7	1.1	1.0	0.9	0.8	0.7	1.2	1.8
Miscellaneous manufactured articles	1.1	0.7	0.7	0.8	1.1	1.6	2.6	3.3

Source: National Bureau of Statistics. Social-economic development of the Republic of Moldova in 2007, Chisinau, 2008

The majority of the exports have as their destination the European Union member countries (EU-27) (about 50.6 percent of the 2007 total) and the CIS countries (about 41.0 percent of the 2007 total). The top 14 destination countries for Moldova's exports, which accounted for about 90 percent of the total 2007 exports were: Russia (17.3 percent), Romania (15.7 percent), Ukraine (12.5 percent), Italy (10.4 percent), Germany (6.4 percent), Belarus (6.1 percent), Poland (3.6 percent), Kazakhstan (3.4 percent), UK (2.5 percent), Turkey (2.4 percent), Austria (2.3 percent), Bulgaria (2.0 percent), France (1.8 percent) and Switzerland (1.7 percent).

1.5.5 Cash Transfers and Remittances

Cash transfers from outside the country, and in particular cash inflows from the Moldavians working abroad are of major importance for the economy of Moldova. In 2007 the total net inflow of foreign currency from the Moldavians employed abroad was approximately USD 1,437 million (about 32.7 percent of the GDP) (Table 1-12). According to unofficial data, the above figures considerably underestimate the actual volumes of such cash transfers. Notwithstanding the trade balance deficit for products and services (53.4 percent in 2007), increasingly higher cash inflows from the Moldavians employed outside the country have contributed to the decrease of the current account deficit of Moldova (from 19.7 percent of the GDP at the end of 1998 down to 15.8 percent of the GDP in 2007).

Moldova's evident dependence on cash transfers from its citizens employed abroad presents a potential threat and indicates the lack of sustainability because the inflow of funds from outside the country creates incentives to increase consumption rather than production, thus leading to growth of imports and inflation, and a direct negative economic shock may ensue, should the volume of such transfers decrease rapidly. It is possible that the flows of money transferred to Moldova from abroad will decrease in the long term, as some of the immigrants settle for permanent residence in other countries.

Table 1-12: Remittances from Moldavians Working Abroad, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Remittances, million US $	178.0	242.2	322.6	484.0	701.4	915.0	1176.0	1437.0
% versus the preceding year	161.2	136.1	133.2	150.0	144.9	130.5	128.5	122.2
% of the GDP	13.8	16.4	19.4	24.4	27.0	30.6	34.5	32.7
Share of remittances in the GDP growth, %	58.6	33.5	44.2	50.6	35.3	54.7	62.1	26.5

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts.

1.5.6 Investments

Investments are of major importance for economic growth in Moldova. In 2007 the direct net foreign investments (DFI) attracted to the national economy were 448 million USD (10.2 percent of GDP), registering a considerable increase as compared to the preceding years' levels (2006: 399 million USD; 2005: 267 million USD; 2004: 239 million USD; 2003: 184.5 million USD; 2002: 116.2 million USD; 2001: 146.1 million USD). That increase was driven in particular by the growing equity investments and income re-investments in the diverse sectors of the national economy (the investments were directed in particular to the power industry, transports, communications and food industry). The top investor countries for the Republic of Moldova include: the Netherlands, Russian Federation, Spain, USA, Germany, Romania, France, UK and Turkey. The total foreign investments were 2.09 billion USD as at the end of 2006 (ex., in 2005: 1.72 billion USD; in 2004: 1.64 billion USD; in 2003: 1.69 billion USD).

1.5.7 Social Sphere

The average monthly salary of an employee in the national economy was 2,063 lei in 2007, increasing by 21.5 percent versus year 2006 (Table 1-13). The real salary increased by 8.2 percent. In December 2007 the average monthly salary was 2,630 lei (by 20 percent higher than in December 2006). The average monthly salary was 1,832 lei in the public sector and 3,054 lei in the real sector. The following national economy sectors have salaries below the national average: education (1,528 lei), recreation, culture and sports (1,863 lei), agriculture, hunting and forestry (1,921 lei), other public, social and personal services (2,156 lei), hotel and restaurant sector (2,271 lei), health care and social assistance (2,279 lei).

Table 1-13: Average Monthly Salary and Average Monthly Old Age Pension in the Republic of Moldova, 1994-2007

	1994	1995	1996	1997	1998	1999	2000
Nominal salary, MDL	108.4	143.2	187.1	219.8	250.4	304.6	407.9
Nominal salary growth, %	347.4	132.1	130.7	117.5	113.9	121.6	133.9
Real salary growth, %	59.2	101.6	105.4	104.9	105.5	87.3	102.1
Nominal salary, USD	26.7	31.9	40.7	47.5	46.6	29.0	32.8
Real salary growth, %	114.5	119.5	127.6	116.9	98.1	62.2	113.1
Nominal salary, USD (CPI)	250.5	167.7	183.8	198.8	209.2	183.3	195.7
Real salary growth (%)	135.0	66.9	109.6	108.2	105.3	87.6	106.8
Old age pension, MDL	55.2	64.3	78.7	82.8	83.9	82.8	85.1
Old age pension, USD	12.9	14.3	16.7	17.6	10.1	7.1	6.9
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Nominal salary, MDL	543.7	691.5	890.8	1,103.1	1,319.5	1,650.0	2,063.0
Nominal salary growth, %	133.3	127.2	128.8	123.8	119.6	125.0	121.5
Real salary growth, %	121.6	120.9	115.4	110.2	106.9	114.3	108.2
Nominal salary, USD	42.2	51.0	63.9	89.5	104.7	130.7	159.3
Real salary growth, %	128.7	120.6	125.4	140.0	117.1	124.8	121.8
Nominal salary, USD (CPI)	238.3	280.1	313.3	343.9	391.1	459.3	530.0
Real salary growth (%)	121.8	117.5	111.9	109.8	113.7	117.4	115.4
Old age pension, MDL	135.8	161.0	210.6	326.0	383.4	428.8	474.0
Old age pension, USD	10.4	11.6	15.9	26.1	30.4	34.0	37.5

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

The average monthly old-age pension was MDL 548.3 as of January 1, 2008, increasing by 24 percent as compared to its level as of January 1, 2007, whereas the real value of the pension grew only by 9.6 percent.

The 2007 unemployment, estimated according to the standards of the International Labour Organization (ILO), was 66.7 thousand (in 2006: 99.9 thousand). It should be noted that 69.7 percent of all unemployed had an employment record. The average unemployment period was 19 months long, but 35.5 percent of all unemployed remained without any employment for a long time (1 year and longer). The unemployment rate (the portion of unemployed among active population assessed according to ILO was 5.1 percent for Moldova in general in 2007, which is lower than 10 percent registered at the end of the 1990s. Significant differences were noted between the unemployment rate among males (6.3 percent) and among females (3.9 percent), between the urban areas (6.9 percent) and the rural area (3.6 percent). The unemployment rate was 14.4 percent among the young population (aged 15-24). In that age group the unemployment rates differed for males and females as well (14.9 percent and 13.8 percent, respectively). The young unemployed accounted for 30.5 percent of the total unemployed. It should be mentioned that a large part of the employed population (about 25 percent) are employed outside Moldova. The labour exchange offices registered 48.4 thousand unemployed during 2007 (by 6.6 percent more than the number of unemployed registered in January to December 2006). Of that number, 23.37 thousand unemployed succeeded to find new employment (by 2.1 percent less than in 2006). Of the total registered unemployed, approximately 4.95 thousand persons received unemployment allowances (an increase of 15.8 percent). The average unemployment allowance was MDL 549.49 in January-December 2007 (an increase by 15.7 percent as compared to January-December 2006).

1.6 Current State of National Economy

1.6.1 Industrial Production

The 2007 the industrial production reached approximately MDL 26.17 billion (in current prices), or as little as 53.8 percent of the 1990 level (Table 1-14). The 2007 industrial production levels show a decrease by 1.3 percent as compared to the 2006 level (Figure 1-9). During 1991-2007 the industrial production featured certain fluctuations, showing the best performance in 2001 and 2003 and the worst performance in 1992 and 1994.

Table 1-14: Evolution of Industry Sector in the Republic of Moldova, 1990-2007

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Industry, billion lei	11.50	22.20	129.80	1.19	3.75	4.27	4.69	5.89	5.98
% of 1990 level	100.0	88.9	64.9	64.9	46.9	45.0	42.1	42.1	35.8
Industry , million USD	–	–	–	885.3	921.3	948.8	1019.0	1273.8	1114.2
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Industry, billion lei	7.19	8.17	10.43	12.62	15.96	17.59	20.77	22.56	26.17
% of 1990 level	31.6	34.1	38.7	42.9	49.6	53.7	57.3	54.5	53.8
Industry , million USD	684.8	657.1	810.2	930.3	1145.1	1426.7	1648.4	1718.3	2156.0

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

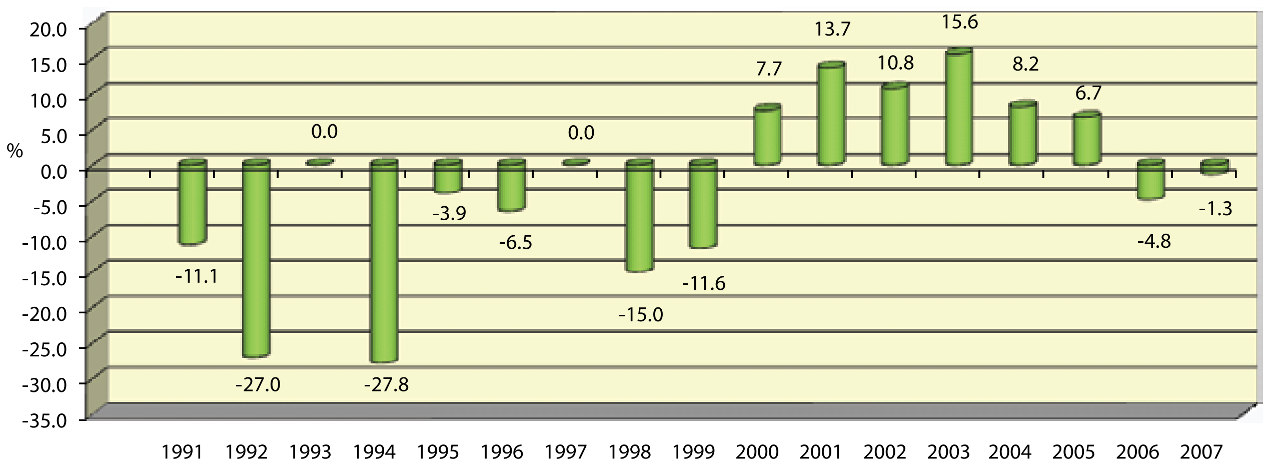


Figure 1-9: Evolution of Industry Sector within 1991-2007, in % versus the preceding year

Processing industry. The situation in the manufacturing industry was determined mainly by the processing industry which accounted for 89.1 percent of the total production of the large enterprises whose main business was manufacturing. The production of those enterprises totalled MDL 16.7 billion (a decrease by 3.3 percent in comparison with 2006). Food and drinks industry accounted for the highest portion in the processing industry performance (40.3 percent of the total production) (Table 1-15), but reported a decrease of production by 9.5 percent in comparison with 2006 and therefore had a negative impact (4.1 percent) on the total industrial production.

Table 1-15: Production of Main Industrial Products by Republic of Moldova's Manufacturing Industry, 2000-2006

	2000	2001	2002	2003	2004	2005	2006
Meat, thous. tonnes	11.8	6.5	10.1	14.2	9.0	5.9	9.0
Sausages, thous. tonnes	8.5	10.2	12.2	12.5	13.0	14.2	14.6
Fruit and vegetable juices, thous. tonnes	46.7	59.7	31.3	56.9	36.9	30.0	29.7
Vegetables canned, thous. ton	19.4	20.3	22.7	25.5	22.7	33.0	44.4
Fruits processed and canned, thous. tonnes	6.1	6.3	5.2	16.1	18.6	18.3	17.3
Raw vegetable oil, thous. tonnes	22.5	37.7	51.7	72.8	92.4	77.3	74.4
Margarine, tonnes	24	1034	2616	3301	3515	3390	3353
Milk and cream with fat content <6%, thous. ton	26.8	35.2	43.1	16.9	16.0	20.8	50.3
Solid milk and cream, tonnes	3114	5000	4186	3709	5059	4565	3806
Butter, tonnes	2544	3160	2617	2763	3640	3393	3321
Fat cheese and young sheep cheese, tonnes	1112	1443	1852	1836	1904	2380	2008
Ice-cream, tonnes	4395	5182	6321	8073	7287	8105	8609
Flour, thou. tonnes	147.7	132.4	151.4	116.7	118.2	144.0	133.5
Ready-made forage for animals, thous. tonnes	58.1	29.8	39.0	25.7	43.9	48.8	60.6
Bread and bakery foods, thous. tonnes	89.2	90.2	91.8	105.2	109.8	108.4	112.3
Flour confectionery, thous. tonnes	7.4	11.7	14.8	17.0	16.9	19.8	20.8
Sugar, thous. tonnes	102.4	129.9	165.5	107.1	110.9	133.5	149.0
Molasses, thou. tonnes	54.5	56.8	54.5	29.8	42.9	42.2	42.3
Sugar confectionery, thous. tonnes	6.7	8.0	11.1	11.9	11.1	12.3	12.2
Macaroni, thous. tonnes	12.4	10.5	10.6	7.7	8.8	7.8	7.2
Mayonnaise, tonnes	1559	1789	2183	2876	2647	2578	2141
Cognac (divin), thous. dal	426.7	595.6	674.1	661.1	812.0	1189.8	560.4
Sparkling wines, thous. dal	416	584	613	739	938	1051	402
Grape wine, mln. dal	10.7	15.5	14.8	19.1	33.1	36.3	19.3
Malt beer, mln. dal	2.5	3.2	4.4	5.7	6.5	7.2	8.4
Mineral and carbonated water, mln. dal	3.1	3.8	5.3	6.2	7.5	9.6	10.6
Soft beverages, mln. dal	1.9	2.6	4.5	6.0	6.5	6.4	7.5
Cigars and cigarettes, mln. pcs	9262	9421	6310	7126	7050	6195	5031
Fermented tobacco, thous. tonnes	20.4	19.3	12.3	8.4	7.6	8.2	5.2
Fabrics, thousand m^2	120	77	186	162	123	116	107
Carpets and carpeting items, thous. m^2	527	1177	2444	3537	4474	4430	5224
Hosiery, thous. pairs	822	1217	931	1139	988	1082	1034
Knitwear, mln. pcs	6.9	10.2	11.9	11.4	18.5	17.0	16.5
Footwear, thous. pairs	1112	1244	1925	2738	3033	3650	3673
Saw-timber, thous. m^3	13.8	15.2	15.8	16.1	23.0	21.7	25.9
Wooden blocks for doors and windows, thous. m^2	13.3	18.0	28.4	39.8	37.1	32.6	37.6
Wooden block parquet, thous. m^2	50.5	40.8	32.0	43.9	37.3	98.4	119.1
Paper and corrugated paper-board, thous. m^2	560	1284	863	617	1570	2002	737
Copy-books, mln. pcs	7.8	9.0	5.2	7.5	11.1	11.9	11.9
Carbon dioxide, tonnes	2316	2419	2523	3471	3409	3198	3227
Paintwork materials, tonnes	2054	2870	4095	3443	5136	6269	8295
Medicines, MDL millions	53.1	64.3	72.4	61.3	61.0	60.2	93.7
Soap, tonnes	231	280	232	306	386	240	272
Washing preparations, tonnes	386	821	255	243	493	533	769
Perfumery and make-up preparations, MDL millions	21.8	23.9	26.7	18.7	20.9	32.4	29.3

	2000	2001	2002	2003	2004	2005	2006
Natural essential oil, tonnes	9.7	28.6	19.8	11.3	45.3	62.5	66.9
Canning jars for sterilization, mln. pcs 0.5l	156.2	148.8	137.4	107.4	98.9	103.1	121.3
Bottles and vials of glass, mln. pcs	260.5	228.3	296.1	281.4	308.0	354.6	321.4
Ceramic building bricks for construction, mln. pcs	39.9	38.1	45.8	52.2	54.9	55.7	52.8
Cement, thous. tonnes	222.0	158.1	279.0	255.4	440.1	641.1	837.4
Lime, thous. tonnes	3.1	3.3	3.3	2.9	2.1	2.1	2.2
Gypsum, thous. tonnes	32.0	55.2	91.3	116.1	102.5	130.8	186.2
Dry gypsous mixtures, thous. tonnes	13.1	37.8	72.9	95.7	90.2	131.5	188.2
Rotary pumps, thous. pcs	3.7	4.8	3.1	4.3	4.4	3.7	3.3
Tractors, pcs	243	461	399	476	327	260	220
Machine-tools for wood processing, pcs	49	82	130	38	94	39	26
Washing machines, thous. pcs	25.2	24.9	40.1	47.7	53.8	35.4	21.5
Electric radiators, thous. pcs	20.0	16.9	15.4	15.1	2.9	3.1	1.1
TV sets, thous. pcs	2.2	1.9	7.6	10.3	12.5	11.7	13.7
Furniture, MDL million	69.0	86.3	112.5	183.8	241.2	363.1	434.6

Source: Statistical Yearbook of the RM for the year 2007, Chisinau, 2007; Statistical Bulletin for January-June 2008, Chisinau, 2008

Certain progress was achieved by the enterprises in the following sectors: mineral water and soft drinks (+29.5 percent), processing and canning of meat and meat products (+23.9 percent), oils and fats (+9.2 percent), brewing (+10.5 percent), procession and canning of fruits and vegetables (+10.6 percent), bread and baked products (+7.5 percent), etc. Very low wine exports to Russian Federation resulted in the decreased portion accounted for by wine industry (down to 7.5 percent) in the total industrial production (in 2006 it was 10.3 percent). During the period under review, the wine production fell 29.5 percent as compared to 2006 and had a negative impact (3 percent) on the total industrial production. A similar decrease of 22 percent was registered in the production of the distilleries of spirits. In 2007, the sugar production accounted for 3 percent of the total industrial production, but the decrease of its production by half as compared to 2006 had a negative impact (3 percent) on the total industrial production. The decrease was due to the reduction by 20 percent of the areas under sugar beets as well as the summer drought of that year, causing the decline of approximately 30 percent of the average yields per hectare. Next to wine and sugar industry, a decrease was registered in some other processing sectors: garments industry, treatment and coloring of fur skins (6.7 percent with the negative impact of 0.7 percent on the total industrial production); tobacco and tobacco articles (7.4 percent with the negative impact of 0.1 percent on the total industrial production), machinery and equipment (2.5percent), etc. The above is an indication of the existence of systemic barriers in addition to the unfavorable market situation, and those barriers create obstacles for the industrial development and transformation of the manufacturing industry into a competitive sector. They include: worn out and obsolete production capacities, the deficit of skilled labor, insufficient management and marketing skills, poor access to loan funding and external markets. In the period under review, progress was achieved in most of the processing industry sectors: production of cement, lime and gypsum (+26.3 percent), production of paper and paper-board (+17.1 percent), textiles (+9.5 percent), chemical industry (+4.7 percent), production of rubber and plastic articles (+4 percent), etc.

Energy sector. The energy sector enterprises accounted for approximately 9.0 percent of the total production of the large enterprises where industrial manufacture was the main business. The sales generated by those enterprises amounted to 2.4 billion MDL, which is by 1.9 percent more as compared to 2006. It should be noted however that power generation registered a decrease of 7.7 percent in terms of physical volumes as compared to 2006 and totalled 1100 million kWh.

The demand for electricity (domestic consumption) was covered to a major extent from imports. At the same time a decrease by 12.9 percent was registered as compared to 2006 in the heat generation volumes, which totalled 3094 thousand Gcal (Table 1-16).

Table 1-16: Power and heat production during 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Electricity, mln. kWh	904.0	1262.8	1179.8	1045.7	1022.1	1228.9	1191.7	1100.0
% versus the preceding year	79.5	139.7	93.4	88.6	97.7	120.2	97.0	92.3
Heat, thousand Gcal	3057.0	3298.0	3217.0	3347.0	3147.0	3591.0	3552.0	3094.0
% versus the preceding year	65.8	107.9	97.5	104.0	94.0	114.1	98.9	87.1

Source: National Bureau of Statistics, Energy Balance of the Republic of Moldova, Statistical Extract 2007, Chisinau, 2007; Statistical bulletin, January-June 2008; Chisinau, 2008

Moldova's principal power generation facilities are: Moldovan Thermal Power Plant (MTPP) in Dnestrovsk (ATULBD) with the installed capacity of 2520 MW (available output of around 950 MW); Combined Heat Power Plant No. 1 (CHP-1) in Chisinau with the installed power generation capacity of 46 MW (available output of about 40 MW) and installed heat generation capacity of 455 MW; Combined Heat Power Plant No. 2 (CHP 2) in Chisinau with the installed power generation capacity of 240 MW (available output of around 210 MW) and installed heat generation capacity of 1425 MW; Combined Heat Power Plant in Balti (CHP North) with the installed power generation capacity of 28 MW (available output of about 24 MW) and installed heat generation capacity of 610 MW; CHPs of the sugar mills with the total installed capacity of 98 MW (available output of around 20 MW), Dubasari Hydro Power Plant (HPP) with the installed capacity of 48 MW (available output of about 30 MW) and Costesti Hydro Power Plant with the installed capacity of 16 MW (available output of about 10 MW).

Moldova's principal heat generation facilities (excepting the above Power Plants) are comprised of large heating plants with the capacity of 55 up to 200 Gcal per hour (58-240 MW) accounting for approximately 24 percent of the total supplies of heat (as hot water and steam); medium-sized heating plants with the capacity of 20 up to 50 Gcal per hour (23-58 MW) accounting for approximately 16 percent of the total heat supplies, and respectively small heating plants with the capacity of up to 20 Gcal per hour (up to 23 MW) accounting for approximately 60 percent of the total heat supplies.

Mining and Quarrying. The extractive industry enterprises account for about 1.9 percent of the total production of large enterprises whose principal business is manufacturing. Those enterprises generated the sales of MDL 0.4 billion (3.6 percent more than in 2006). In 2007 the progress was achieved in that sector in particular by the enterprises extracting sand (+24.7 percent), gypsum stone (+19.0 percent), gypsum and anhydride (+16.6 percent), calcareous rocks as monumental or building stone (+7.0 percent).

1.6.2 Agricultural Production

The 2007 agricultural production data show a decrease by 23.1 percent as compared to 2006 (Figure 1-10), driven by the extremely unfavourable weather conditions in the year under review (one of the most disastrous droughts in the nation's history).

Table 1-17: Production of Main Industrial Products by the Republic of Moldova's Mining and Quarrying Industry during 2000-2006

	2000	2001	2002	2003	2004	2005	2006
Monumental or building stone, thousand m³	63.4	90.8	172.7	137.8	137.7	190.5	211.0
Gypsum stone, thou. tonnes	202	299	387	421	491	563	726
Sand, thousand m³	246.3	255.0	376.7	559.7	832.2	790.3	721.4
Road-metal and gravel, thousand m³	536.0	540.8	672.5	770.4	938.3	1085.1	1406.4
Sand-gravel mixture, thousand m³	22.4	26.7	36.5	52.3	47.8	101.2	196.6

Source: National Bureau of Statistics. Statistical Yearbook of the Republic of Moldova for the year 2007, Chisinau, 2007; Statistical Bulletin for January-June 2008, Chisinau, 2008

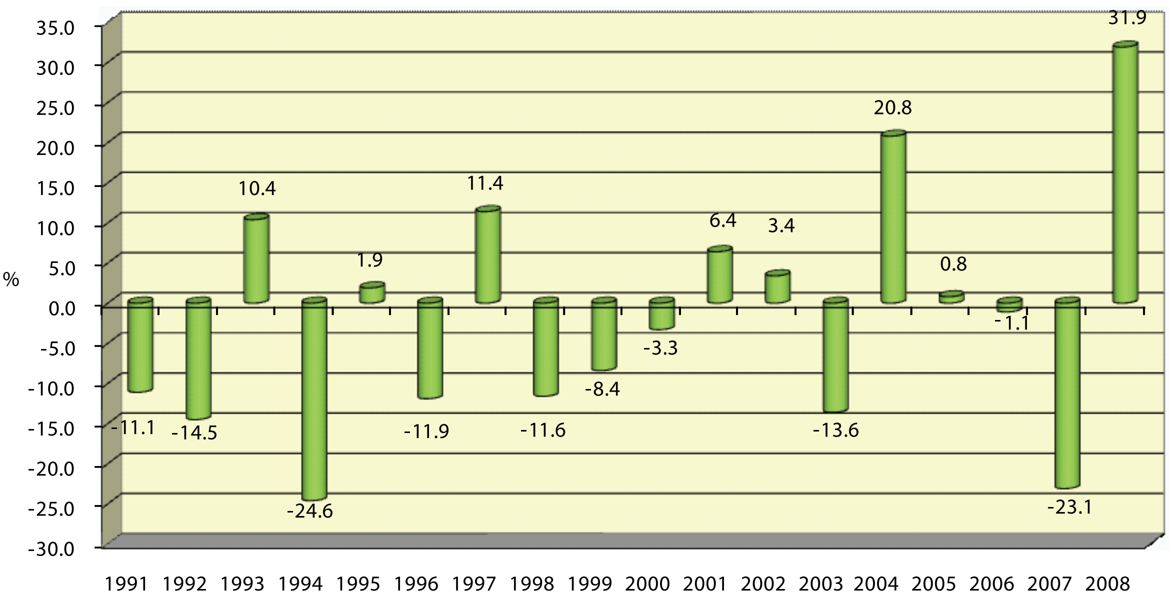


Figure 1-10: Dynamics of agricultural production over 1991-2007, in % versus the preceding year

The agricultural production over 1991-2008 was characterized by fluctuations, with the best performance reported in 1993, 1997, 2004 and 2008, and with poor results – respectively in 1992, 1994, 1996, 1998, 2003 and 2007. The 2007 agricultural production by all categories of producers totalled 12.55 billion MDL in current prices, or only 43.6 percent of the 1990 level (Table 1-18). The 2007 production of vegetables by all categories of producers, expressed in comparable prices, was by 33.4 percent smaller in comparison to 2006, thus resulting in 22.5 percent decrease of the overall agricultural production. Poor weather hampered the development of certain vegetable crops.

Table 1-18: Republic of Moldova's Agricultural Production, 1990-2007

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agricultural production, bill. MDL	6.10	11.30	97.30	1.07	3.21	4.24	4.64	5.10	4.78
% of the 1990 level	100.0	88.9	76.0	83.9	63.3	64.5	56.8	63.3	55.9
Agricultural production, mil. USD	–	–	–	796.4	789.8	943.9	1007.9	1103.0	889.4
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Agricultural production, bill. MDL	6.40	8.27	8.65	9.47	10.35	11.82	12.69	13.73	12.55
% of the 1990 level	51.2	49.5	52.7	54.5	47.1	56.9	57.3	56.7	43.6
Agricultural production, mil. USD	609.1	665.2	671.8	698.2	742.8	958.6	1007.0	1046.0	1033.8

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

Overall, 902 thousand tonnes of grain and leguminous crops were harvested in 2007, which is 2.5 times less than the 2006 (Table 1-19). 402 thousand tonnes of wheat were harvested from approximately 300 thousand ha of land under that crop (a decrease of 41 percent as compared to 2006). The decrease in the average yields of wheat per hectare almost by half resulted in the decrease in the total production of that crop. Similarly, the lower yields per hectare of grain corn, which were 3.7 times less than the 2006 yields, resulted in the declining general production of grain corn. The total production of sunflower seeds was 156 thousand tonnes, which was almost 40 percent (2.5 times less) than the 2006 level and due to a decline almost by half of the yields per hectare as well as the decrease of 19 percent in the areas under that crop.

Table 1-19: Production of Main Plant Products in Moldova in 2000-2007, thousand tonnes

Crops	2000	2001	2002	2003	2004	2005	2006	2007
Grain and Leguminous Crops	1934.6	2627.7	2587.2	1612.7	2993.7	2837.9	2290.2	902.0
Winter Wheat	725.0	1180.8	1113.1	100.6	853.9	1047.1	677.9	402.0
Barley	133.0	230.9	220.5	57.0	268.3	212.0	200.1	115.0
Grain Corn	1031.2	1117.6	1193.6	1413.6	1794.5	1492.0	1322.2	363.0
Leguminous Crops	29.4	77.6	48.0	29.6	50.1	64.5	67.5	22.0
Sunflower	268.6	254.5	317.5	390.0	335.2	331.1	379.9	156.0
Sugar Beets	943.5	1085.0	1129.4	656.8	911.3	991.2	1177.3	612.0
Tobacco Leaves	25.3	16.1	11.8	6.9	7.9	6.7	4.8	4.0
Potatoes	330.0	384.8	325.2	302.8	317.7	378.2	376.9	199.0
Vegetables	363.6	448.1	396.5	360.8	315.2	389.3	475.2	222.0
Fruits	255.4	317.1	327.1	617.2	430.4	386.2	329.2	266.0
Grapes	703.8	505.0	641.2	677.2	685.6	518.5	466.1	598.0

Source: National Bureau of Statistics, Statistical Yearbook of the Republic of Moldova for 2007 (page 339); Statistical Bulletin for January-June 2008, Chisinau, 2008

The total production of sugar-bearing root crops was 612 thousand tonnes. The decrease by half of the total production of the sugar-bearing root crops in 2007 was due to the reduction by 20 percent of the total areas under sugar beets and the decrease by 40 percent of the yields per hectare.

The reduction of the areas under tobacco by 12 percent and the yields per hectare decreased by 14 percent resulted in the considerable decrease of the total leaf tobacco production, which was 4 thousand tonnes, or 25.1 percent less than in 2006.

The production of field vegetables was 222 thousand tonnes (a decrease by half as compared to the 2006 production) due to the reduction of the areas under vegetable crops by 11 percent and the decrease by half of yields per hectare. The total production of potatoes (199 thousand tonnes) registered a similar decrease by half as compared to that of 2006.

All categories of producers harvested 266 thousand tonnes of fruits and berries, or 20 percent less than in the previous year, due to the decrease of 14 percent in the average yields per hectare. 5078 ha of new fruit and berry orchards were planted in 2007, including: 1750 ha of pip fruit trees, 2205 ha of drupaceous (stone) fruit trees, 1105 ha of walnut plantations and 18 ha of berry bushes.

During the period under review the production of grapes grew 28.3 percent (598 thousand tonnes) owing to an increase by 29 percent in the yields per hectare. During 2007 the production of young vines for planting totalled about 9.5 million pieces and new vineyards were planted on 5.3 thousand ha.

The efficiency of agricultural production depends to a major degree on the production process mechanization and automation levels. 27 new tractor and machinery repair and maintenance stations (RMS) were established in 2007, thus increasing their total number up to 178. 15 facilities were established or modernized in the rural areas to ensure pretreatment and procession of the agricultural raw materials.

In 2007 irrigation was available on 32.4 thousand ha of the agricultural plantations (an increase of 45.3 percent as compared to the 2006 level of 22.3 thousand ha); the existing irrigation systems were comprised of the total of 291 pump stations (including 174 operable ones), 1340 km of water lines connecting different producers, 786 watering installations and sprinkling units. Hail protection actions were performed during 2007 on the area of 1 million hectares.

The total livestock decreased by 1.8 percent in 2007. As of the end of 2007, all categories of producers reported a decrease in livestock population in comparison with the preceding year: by 43.8 percent for pigs; by 23.9 percent for poultry; by 22.4 percent for cattle, including by 18.4 percent for cows; and by 9.9 percent for sheep and goats (Table 1-20), in particular due to the decreased availability of feed as result of the long drought in summer of 2007.

Table 1-20: Livestock and Poultry Production in all Categories of Producers in Moldova in 2000-2007 (as of the end of the year), thousand heads

Animal Category	2000	2001	2002	2003	2004	2005	2006	2007
Cattle	394	405	410	373	331	311	299	232
of which cows	269	272	279	256	231	217	207	169
Pigs	447	449	508	446	398	461	532	299
Sheep and goats	938	947	956	938	942	938	947	853
Poultry	13041	14119	14955	15756	17522	22235	22531	17157

Source: National Bureau of Statistics, Statistical Yearbook of the Republic of Moldova for the year 2007 (page 353); Statistical Bulletin for January-June 2008; Social-Economic Development of Moldova in 2007.

During 2007, egg and milk production decreased for all categories of producers by 8 percent and by 3.8 percent respectively as compared to the 2006 levels, whereas the production (breeding) of cattle and poultry remained at the 2006 level (100.6 percent).

The situation in the livestock farming sector continues to be determined by the situation in private farms and peasant (family) farms, which account for 94 percent of the total cattle livestock (of which cows account for 97 percent), 85 percent of pigs, 96 percent of sheep and goats and where a major portion of animal products is produced (96.8 percent of milk; 84.1 percent of cattle and poultry; 66.1 percent of eggs).

The agricultural producers increased the livestock of cattle and poultry for breeding by 14 percent (in live weight), and in particular the number of pigs (by 20 percent) in 2007 as compared to 2006. The decrease by 18 percent of the number of egg-laying hens in agricultural enterprises led to the decrease (by 16 percent) in the production of eggs – notwithstanding the productivity increase by 3 percent. Milk production decreased 18 percent due to both the decrease in the livestock of cows by 16 percent and the declining milk yields per cow by 7 percent.

The processes of the rural infrastructure development for the provision of zoo-veterinary services by local offices and specialized agricultural companies and consolidation of agricultural land are progressing simultaneously with the process of establishing and modernization of animal-breeding farms, of investing in the development of the resource base for them. Thus, 11 new pig-breeding farms (with the livestock of 848 pigs) and 4 new cattle-breeding farms (with the livestock of 107 heads of cattle) were established in 2007. During the same period modernization and re-equipment works started at 6 pedigree cattle breeding farms, 6 pig-breeding farms, 3 slaughter-houses intended for exports of meat and 1 poultry farm – not to mention the establishment and equipment of 4 model mini-farms with the capacity of above 20 cows each.

1.6.3 Transport and Communications

Republic of Moldova's transport sector is comprised of the following segments: road transportation, railway transport, air transportation and naval transportation.

Road Transportation. The national network of motorways with the total length of 10,537 km (including 6,537 km of modern motorways, 3,400 km of hard-surface roads, 600 km of dirt roads as well as 25.9 km of bridges) has the municipality of Chisinau as its principal hub, intersection of the principal national and international roads crossing the country. The motorway network is sufficiently developed, but the state of the roads and the infrastructure in general is deplorable.

In the recent years Moldova registered a dramatic increase in the number of motor vehicles. As at 01.01.2007 the National Register of Vehicles had entries for approximately 520 thousand motor vehicles. In 2007 the total volume of freight transportation with motor vehicles was 28.8 million tonnes, which is a decrease of 89.0 percent as compared to the 1990 level, but an increase of 6.8 percent as compared to 2006 (Table 1-21).

Table 1-21: Goods transportation, by types of transport, in Moldova in 1990-2007

	1990	1995	1996	1997	1998	1999	2000
Transported goods, million tonnes							
Transport – total, of which:	**331.1**	**54.2**	**45.5**	**45.5**	**38.7**	**28.0**	**28.9**
railways, million tonnes	65.4	13.2	12.5	12.8	11.1	6.6	8.2
road transportation, million tonnes	262.8	41.0	33.0	32.7	27.6	21.4	20.7
river navigation, thousand tonnes	2885.5	19.7	19.7	39.1	13.1	15.9	30.8
air transportation, thousand tonnes	12.2	1.6	1.2	1.2	1.5	1.3	1.4
Turnover of goods, million ton-kilometre							
Transport – total, of which:	**21648**	**4296**	**3891**	**3968**	**3597**	**2267**	**2605**
railways, million ton-km	15007	3134	2897	2937	2575	1191	1513
road transportation, million ton-km	6305	1159	992	1028	1018	1073	1088
river navigation, million ton-km	317	0.20	0.15	0.32	0.01	0.18	0.06
air transportation, million ton/km	19.0	3.0	1.5	2.4	3.6	3.3	4.1
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Transported goods, million tonnes							
Transport – total, of which:	**27.8**	**31.8**	**34.3**	**34.7**	**36.4**	**38.2**	**42.3**
railways, million tonnes	10.6	12.6	14.7	13.3	11.7	11.1	11.8
road transportation, million tonnes	17.2	19.1	19.5	21.3	24.6	27.0	28.8
river navigation, thousand tonnes	103.7	107.5	120.0	119.7	111.8	141.5	166.5
air transportation, thousand tonnes	1.7	0.9	0.8	0.7	0.8	1.0	1.0
Turnover of goods, million ton-kilometre							
Transport – total, of which:	**3044**	**4007**	**4597**	**5168**	**5460**	**6242**	**5824**
railways, million ton-km	1980	2748	3019	3006 1	3053	3673	3120
road transportation, million ton-km	1060	1257	1577	2161	2405	2567	2862
river navigation, million ton-km	2.60	0.30	0.35	0.37	0.43	0.55	0.60
air transportation, million ton/km	2.0	1.3	0.9	1.0	1.1	1.3	1.3

Source: National Bureau of Statistics, Statistical Yearbooks of the RM for 2007 (page 395) and 1999 (page 385) years

Buses and minibuses transported 103.1 million passengers, or by 76.9 percent less than in 1990 and by 5.8 percent less than in 2006 (Table 1-22).

Railways. Moldova's history of railway transportation dates back 140 years. The total length of railway lines is 1809 km, of which above 1,100 km are main lines. The railway transport employs around 15 thousand persons.

An important railway segment 45 km long was constructed and commissioned in 2005 to connect Revaca and Cainari and to enable the transportation of freights and passengers to the south of Moldova without the necessity to go through the town of Bender, which forms part of the ATULBD area. Furthermore, the construction of the railway section Cahul - Giurgiulesti 50 km was completed in 2008 to connect the railway network with the port Giurgiulesti, ensuring a direct link to the Danube transport system.

In 2007 railways accounted for 28 percent (11.8 million tonnes) of the total freight transportation, registering an increase of 6.6 percent as compared to 2006 (Table 1-21). Around 5.6 million passengers used railway transportation services in 2007, which is 73.5 percent less than in 1990, but 5.8 percent more than in 2006 (Table 1-22).

River Navigation. Moldova's river navigation is in the process of development and growth in terms of both the number of ships and the number of river ports. Currently the National Register of Ships has entries for 74 transport ships.

Table 1-22: Passenger Transportation by Types of Public Transport in the Republic of Moldova, 1990-2007

	1990	1995	1996	1997	1998	1999	2000
Passengers transported, million passengers							
Transport – total, of which by:	**757.7**	**410.9**	**373.5**	**337.5**	**384.7**	**406.1**	**326.6**
Railway transport	21.1	11.7	10.4	10.3	9,4	5,4	4,8
Buses	446.9	84	77.8	65.6	71.7	65.5	72.4
Taxi	13.7	0.7	0.5	0.4	0.3	0.3	0.7
Trolley-buses	272.6	314.2	284.6	261	303.1	334.7	248.5
River transport	2.5	–	–	–	–	–	0.03
Air transport	0.90	0.24	0.23	0.24	0.22	0.20	0.22
Passenger turnover, million passenger-km							
Transport – total, of which by:	**757.7**	**410.9**	**373.5**	**337.5**	**384.7**	**406.1**	**326.6**
Railway transport	21.1	11.7	10.4	10.3	9,4	5,4	4,8
Buses	446.9	84	77.8	65.6	71.7	65.5	72.4
Taxi	13.7	0.7	0.5	0.4	0.3	0.3	0.7
Trolley-buses	272.6	314.2	284.6	261	303.1	334.7	248.5
River transport	2.5	–	–	–	–	–	0.03
Air transport	0.90	0.24	0.23	0.24	0.22	0.20	0.22
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Passengers transported, million passengers							
Transport – total, of which by:	**211.5**	**280.6**	**296.2**	**306.9**	**316.4**	**318.1**	**318.1**
Railway transport	4.8	5.1	5.3	5.1	5.0	5.3	5.6
Buses	72.7	83.9	93.4	99.3	105.6	109.4	103.1
Taxi	0.7	0.6	0.7	1.1	1.0	1.1	2.5
Trolley-buses	133.0	190.7	196.5	201.0	204.3	201.8	206.3
River transport	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Air transport	0.23	0.24	0.25	0.31	0.36	0.4	0.4
Passenger turnover, million passenger-km							
Transport – total, of which by:	**2131**	**2624**	**2963**	**3347**	**3549**	**3784**	**4167**
Railway transport	325	355	352	346	355	471	468
Buses	1069	1298	1640	1949	2059	2197	2472
Taxi	12	11	13	20	19	20	49
Trolley-buses	435	636	654	667	676	615	628
River transport	0.2	0.2	0.3	0.4	0.3	0.2	0.2
Air transport	290	324	304	365	440	481	550

Source: National Bureau of Statistics, Statistical Yearbooks for the years 2007 (page 401) and 1999 (page 389) year

There was an increase in the number of ports with the relevant infrastructure. Operating ports are located in Bender, Dnestrovsk, Malovata, Ungheni, Ribnita and in Giurgiulesti, the latter providing access to the Black Sea via the Danube. Freight transportation along the Dniester, suspended for above 10 years, was resumed starting in 2000.

In 2007 the river ships transported 166.5 thousand tonnes of freight, which is 94.2 percent less than in 1990, but 17.7 percent more than in 2006 (Table 1-21). The number of passengers transported along the Dniester was 119.2 thousand persons, which is 95.2 percent less than in 1990, but an increase of 16.1 percent as compared to 2006 (Table 1-22).

Air Transportation. Currently above 30 entities and about 15 air-carrier companies have operations in the air transport segment, of which 3 air carriers offer regular scheduled flights, the other 11 offer charter flights, and 5 companies offer specialized services. The National Register of Planes has entries for 202 air transport units. This segment employs above 2,000 persons.

There are 4 airports in Moldova: in Chisinau, Balti, Cahul and Marculesti, of which only the Chisinau airport offers regular scheduled flights. The airports in Cahul and Marculesti are still in the process of obtaining the required statutory approvals and certificates. The Balti Airport is certified, but it offers only charter flights.

In 2007 the air transport transported 1.0 thousand tonnes of freights, which is by 98.1 percent less than in 1990, but by 3.1 percent more than in 2006 (Table 1-21). The number of passengers using air transport services in 2007 was 415.2 thousand, or by 53.9 percent less than in 1990, but by 4.7 percent higher than in 2006 (Table 1-22).

Thus, the Moldovan road transportation, railways, river navigation and air transportation companies transported on the total 42.3 million ton of freights in 2007, which is 87.2 percent less than in 1990, but 10.7 percent higher than in 2006. The considerable decrease in the average transportation distance resulted in the decrease of total freight transportation turnover by 73.1 percent as compared to the 1990 level and by 6.7 percent as compared to 2006.

Communications. Long-distance phone calls (in the fixed phone network) decreased by 6.7 percent in 2007, whereas international calls registered an increase by 32.3 percent, in particular due to the substantial growth in calls to the CIS countries (+44.9 percent). At the same time, in 2007 there was an increase in the number of delivered parcels (+4.3 percent), newspapers and magazines (+0.5 percent) – as opposed to the decrease in the volumes of the other types of postings in mail as compared to 2006.

In the public telephone network, as of December 31, 2007 the number of main phone sets exceeded 1 million units and grew by 5.2 percent as compared to the level registered as on the same date of 2006 (Table 1-23).

Of these, 581 thousand sets were in the urban network and 475.9 thousand sets were in the rural network, which is an increase by 2.6 percent and 8.7 percent respectively, as compared to the situation reported for December 2006. The number of main phone sets in the public telephone network registered in apartments totalled approximately 953.1 thousand.

Table 1-23: Main Indicators for Post Communications and Telecommunications in the Republic of Moldova in 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Number of mailings:								
Written correspondence, million	12	17	25	31	34	37	38	38
Newspapers and magazines, million	19	21	22	23	29	29	29	29
Parcels, thousand	18	18	21	33	29	23	26	27
Money orders by post and telegraph, mln.	11	10	9	8	8	8	8	8
Number of telephone conversations ensured by means of fixed telephone service:								
Interurban (long-distance), million	117.4	163.0	195.9	246.7	293.8	340.8	373.3	348.1
International, million	17.5	18.6	21.4	25.3	30.7	33.1	37.4	49.4
Number of main phone sets in the public telephone network:								
Total, thousand	583.8	639.2	704.0	776.4	849.5	923.9	1004.2	1056.8
Of which in apartments, thousand	513.3	558.3	619.2	688.7	757.8	828.8	904.6	953.1

Source: National Bureau of Statistics. Statistical Yearbooks for the 2007 (page 414) and 1999 (page 398) years

1.6.4 Tourism

At present tourism accounts for a relatively insignificant portion in the national economy. The modest infrastructure in the tourism and low incomes generated by the tourist businesses rates the Republic of Moldova among the countries where tourism is developed poorly. In 2007 the total tourist accommodation capacity of the collective accommodation facilities was 27.6 thousand beds, registering an increase of 1.2 percent as compared to the preceding year (Table 1-24).

Table 1-24: Main Indicators for Collective Tourist Accommodation in the Republic of Moldova, 2004-2007

	2004	2005	2006	2007
Accommodation facilities– total, of which:	184	191	211	222
Hotels and similar facilities	69	71	76	78
Boarding facilities	7	7	6	7
Holiday homes and other	108	113	129	137
Rooms - total, of which:	7296	7374	7970	7960
Hotels and similar facilities	2576	2475	2457	2297
Boarding facilities	975	1037	1057	1066
Holiday homes and other	3745	3862	4456	4597
Accommodation capacity - total beds, of which:	23827	23992	27269	27608
Hotels and similar facilities	4850	4581	4519	4271
Boarding facilities	1780	1898	1959	1979
Holiday homes and other	17197	17513	20791	21358
Tourists serviced - total, thousand, - of which:	286.7	301.7	312.0	314.6
Moldavians	217.9	234.5	249.2	244.3
Foreign nationals	68.8	67.2	62.8	70.3
Man-nights spent - total, thousand – of which:	1487.6	1618.6	1753.0	1745.2
Moldavians	1313.2	1432.0	1539.0	1544.2
Foreign nationals	174.4	186.6	214.0	201.0
Accommodation capacity utilization rate, %	37.9	43.0	44.5	44.3

Source: National Bureau of Statistics, Moldova in figures. Statistical Outlook, 2008

In the total tourist accommodation capacity, summer camps for schoolchildren account for 29.0 percent , hotels and motels – for 27.3 percent, tourist villas, holiday villages and other holiday facilities – for 19.9 percent, health homes – for 15.9 percent, hostels for visitors – for 5.2 percent, tourist and agro-tourist boarding houses – for 2.7 percent.

The services of the collective tourist accommodation facilities were used in 2007 by 314.6 thousand tourists, or 0.8 percent more than in 2006, of which 70.3 thousand tourists were foreign nationals (11.9 percent more than in the preceding year). The countries accounting for the highest portions in the total number of foreign tourists using the services of the accommodation facilities were: Romania (21.1 percent), Ukraine (10.9 percent), Russia (9.4 percent), Turkey (7.8 percent), Italy (6.8 percent), USA (5.7 percent), and Germany (5.2 percent).

The total number of man-nights spent by the tourists in the collective accommodation facilities in 2007 was 1745.2 thousand (a decrease by 3.4 percent as compared to 2006). The total net utilization rate of the operating tourist accommodation facilities was 44.3 percent.

The economic revival period which started in 2000 was characterized with the growth of indicators in the tourist industry, and in particular owing to the growing domestic tourism (Table 1-25). During the last 8 years, the demand at the domestic tourist market grew 68.6%. The number of foreign tourists visiting the Republic of Moldova have grown as well. It should be noted that in the last 3 years a declining pattern was registered in the number of foreign tourists visiting Moldova; it is hardly possible however that the above pattern will persist in the long term, because both the infrastructure and the offered tourist destinations are developing rapidly.

Thus, for example, in 2007 travel agencies and tour operators provided their services to 149.9 thousand of tourists and excursionists (12.8 percent more than in the preceding year). The total number of foreign tourists and excur-

Table 1-25: Tourist Activities of the Travel Agencies and Tour Operators in the Republic of Moldova, 2000-2007

	2000	2001	2002	2003	2004	2005	2006	2007
Inward tourism, tourists	18964	15690	20161	23598	26045	25073	14239	14722
Outward tourism, tourists	32452	30264	51577	67328	67846	57231	67826	81790
Domestic tourism, tourists	37476	35628	44138	62541	75960	70525	50820	53383
Total, tourists	88892	81582	115876	153467	169851	152829	132885	149895

sionists, who visited Moldova and used the services of the Moldovan travel agencies and tour operators in 2007, was 14.7 thousand, or 3.4 percent more than in 2006.

The total number of Moldovan tourists and excursionists, who travelled abroad using the services of the Moldovan travel agencies and tour operators in 2007 was 81.8 thousand, or 20.6 percent more than in 2006. The above statistics reflects only the trips arranged by the Moldovan travel agencies and tour operators and does not include trips arranged by the travellers personally.

Moldova's current national policy in the sphere of tourism is reflected in the Strategy paper on the long-term development of tourism for 2003-2015 period. That strategy provides for the expansion of tourist areas, establishment and maintenance of special tourist routes, etc.

1.6.5 Retail Trade and Sales of Personal Services

The 2007 retail sales registered a growing pattern. The population purchased consumer goods to the total amount of 28.3 billion lei, or 8 percent more than in 2006 (Table 1-26).

The sales in the organized network retail grew 10.5 percent in comparable prices as compared to 2006 and totalled 16.9 billion MDL. Non-food goods accounted for 67.6 percent of the total retail sales. A considerable increase in sales (70.3 percent of total sales in the organized network retail) was achieved in the private retail sector, where the sales of consumer goods made 11.9 billion MDL (12.8 percent higher than in 2006). The sales of the retail companies with mixed capital (with the participation of foreign capital) and with foreign capital grew 8.6 percent, of those in public ownership – 9.2 percent, and of those in mixed (public and private) ownership registered a decrease of 16.3 percent.

The 2007 sales of personal services totalled 11.853 billion MDL or 3.9 percent more in real terms than in 2006 (Table 1-27).

The officially registered service facilities sold personal services to the total amount of 9.582 billion MDL, which is an increase of 4.2 percent (in comparable prices) as compared to 2006. Companies in public ownership accounted for 42.9 percent of the total sales of the services to the population, followed by the private companies (32 percent) and mixed capital companies (with participation of or with 100 percent foreign capital) (20 percent). The private sector companies registered growth in the sales of services by 15.2 percent and by 0.4 percent respectively. At the same time, however, there was a decrease in sales of the public sector companies by 5 percent and of companies with participation of or with 100 percent foreign capital – by 0.5 percent.

Table 1-26: Retail Trade in the Republic of Moldova, 1990-2007

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Retail sales of goods, bill. lei	6.4	11.0	47.3	0.4	1.4	2.8	3.8	4.0	3.7
% versus the preceding year	-	82.0	53.0	75.0	58.0	111.7	118.0	96.2	87.7
Retail sales of goods, mil. USD	-	-	-	322.4	335.2	613.4	834.2	858.7	685.3
	1999	2000	2001	2002	2003	2004	2005	2006	2007
Retail sales of goods, bill. lei	3.6	6.0	7.6	10.8	14.5	16. 6	19.5	23.4	28.3
% versus the preceding year	72.6	104.0	114.8	134.2	118.2	105.6	105.3	106.9	108.0
Retail sales of goods, mil. USD	343.0	483.7	591.5	792.4	1042.8	1344.3	1546.6	1778.9	2331.5

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

Table 1-27: Sales of Personal Services in the Republic of Moldova, 1990-2007

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Sales of personal services, bill. lei	0.900	1.200	5.800	0.070	0.424	0.652	0.820	1.237	1.299
% versus the preceding year	-	81.0	55.0	67.0	52.0	100.1	78.1	110.2	88.3
Sales of personal services, mil. USD	-	-	-	52.2	104.2	145.1	178.1	267.6	242.0
	1999	2000	2001	2002	2003	2004	2005	2006	2007
Sales of personal services, bill. lei	1.897	2.600	3.404	4.222	5.299	6.970	8.210	9.964	11.853
% versus the preceding year	89.8	100.1	121.2	111.8	113.3	105.3	109.2	105.6	103.9
Sales of personal services, mil. USD	180.6	209.1	264.5	311.1	380.1	565.3	651.5	758.9	976.4

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

1.6.6 Capital Investments

The 2007 data on the volumes of capital investments show an increase of 20.7% as compared to 2006. During 1991-2007 the development of that indicator was characterized with certain fluctuations, and positive results were recorded only in 1998 and, more recently, during 2001-2007 time series (Figure 1-11).

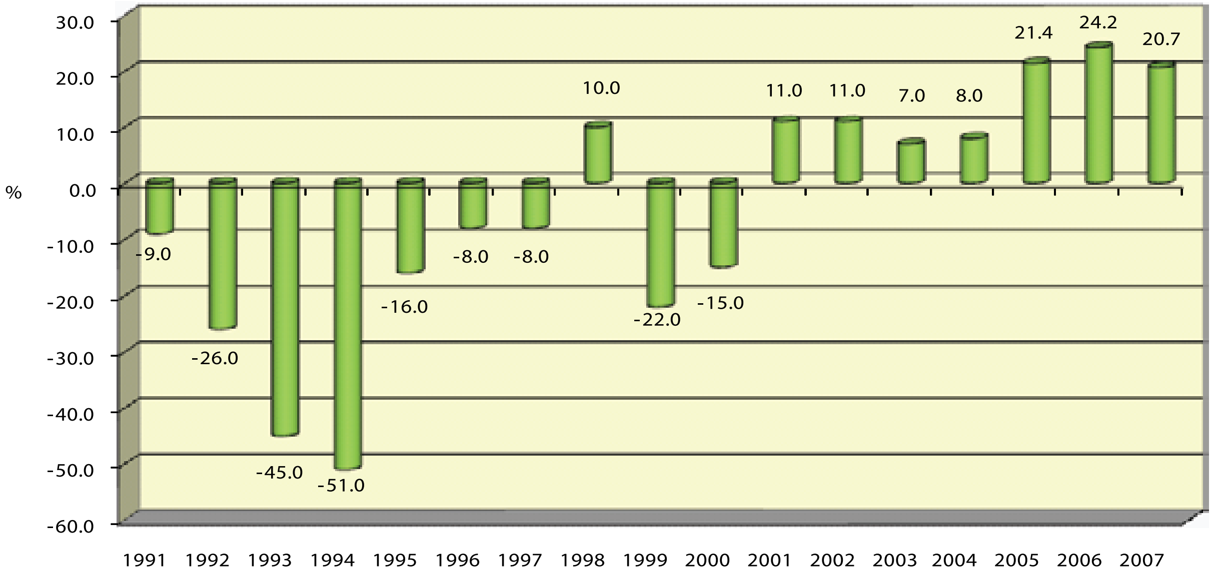


Figure 1-11: Capital Investments in 1991-2007 period, % versus the preceding year

In 2007 capital investments totalled MDL 15.18 billion in current prices, which amounts to approximately 24.4 percent of the 1990 level (Table 1-28). The growth of capital investments registered in 2007 was ensured mainly owing to the investments from the internal sources of companies and individuals (53.3%), from foreign investors (22.1 percent), from the state budget (9.4 percent), from the budgets of the administrative-territorial units (2.3 percent) and from other sources (12.9 percent). It must be noted that capital investments funded from the state budget grew by approximately 45 percent as compared to 2006.

In terms of the structure of capital investments, most of the investments were channelled into the construction of buildings (excepting housing) and structures (39.8 percent of the total used investments, or 3.6 percent higher than in 2006), in plant and equipment (30.8 percent of the total used investments, or 2.6 percent less than in 2006) and in the construction of housing (19.9 percent of the total used investments, or 0.3 percent higher than in 2006). The construction of housing was performed mainly by private companies (98.8 percent of the total commissioned housing). Enterprises and organizations of all forms of ownership commissioned 4,200 apartments with the total area of 486.6 thousand m^2 (8.9 percent less than in 2006).

The installation and assembly works were registered in the amount of 8.5 billion MDL, or by 20.5 percent more (in comparable prices) than in 2006. During 2007 the enterprises and organizations performed contract works to the total amount of 5.4 billion MDL (in current prices), or by 18.1 percent more than in 2006 (in comparable prices). The growth was ensured mainly by the private sector companies, which accounted for 82.6 percent (4.5 billion MDL) of the total contract work. The works delivered included predominantly new construction as well as reconstruction and expansion of the existing enterprises (4.1 billion MDL, or an increase by 20.5 percent as compared to 2006). Capital amounted to 1.0 billion MDL (an increase of 23.3 percent) and current repairs – to 0.3 billion MDL (a decrease by 15.7 percent).

Table 1-28: Capital Investments in the Republic of Moldova, 1990-2007

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Investments, bill. lei	2.50	3.30	28.30	0.17	0.71	0.84	0.99	1.20	1.44
% to the 1990 level	100.0	91.0	67.3	37.0	18.1	15.2	14.0	12.9	14.2
Investments, mil. USD	–	–	–	127.9	175.2	187.9	214.5	260.0	269.0
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Investments, bill. lei	1.59	1.76	2.32	2.80	3.62	5.14	7.80	11.01	15.18
% to the 1990 level	11.1	9.4	10.4	11.6	12.4	13.4	16.3	20.2	24.4
Investments, mil. USD	151.6	141.5	179.9	206.6	259.8	416.9	618.8	838.7	1250.5

Source: Ministry of Economy and Trade, Department of Macroeconomic Analysis and Forecasts

2 NATIONAL GREENHOUSE GAS INVENTORY

2. NATIONAL GREENHOUSE GAS INVENTORY

2.1 Introduction

2.1.1 Convention, Kyoto Protocol and Party's Commitments

The UNFCCC was adopted on May 9, 1992 at the UN Conference on Environment and Sustainable Development in Rio de Janeiro, being regarded as a response of the international community to the global warming phenomenon caused by the increased concentrations of greenhouse gases.

The overall objective of the UNFCCC is aimed at stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. To-date 196 countries are Parties to the Convention. The Republic of Moldova signed the UNFCCC on June 12, 1992 and it was ratified by the Parliament on March 16, 1995.

Article 4, paragraph 1(a) and Article 12, paragraph 1(a), (b) and (c) of the UNFCCC stipulate that each Party has to develop, periodically update, publish and make available to the Conference of the Parties (COP), national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, to the extent its capacities permit, using comparable methodologies to be agreed upon by the Conference of the Parties; also a general description of steps taken or envisaged by the Party to implement the Convention; and any other information that the Party considers relevant to the achievement of the objective of the Convention and suitable for inclusion in its communication, including, if feasible, material relevant for calculations of global emission trends.

The main mechanism for making this information available is national communications. COP 2 (Geneva, 1996) adopted the Guidelines on national communications by non-Annex I Parties (Decision 10/CP 2). In conformity with the Guidelines, in 1998-2000, under the UNDP-GEF Project "Republic of Moldova: Enabling Activities for the Preparation of the FNC under the UNFCCC", the Republic of Moldova developed the First National Communication to the UNFCCC (including a national greenhouse gas emissions inventory for the time series 1990 through 1998), made available at the COP 6 (Hague, 2000).

COP 8 (New Delhi, 2002) adopted a new Guidelines on national communications from non- Annex I Parties to the Convention (Decision 17/CP 8). In conformity with this document, in 2005-2009 under the UNEP-GEF Project "Republic of Moldova: Enabling Activities for the Preparation of the SNC under the UNFCCC", the Republic of Moldova developed the Second National Communication to the UNFCCC.

The COP 3 (Kyoto, 1997) adopted the Kyoto Protocol, representing an instrument setting binding targets for the Convention Parties, by committing industrialized countries and economies in transition included in Annex I to Convention, to reduce total emissions of direct GHG by at least 5 percent, against 1990 levels over the five-year period 2008-2012.

The Republic of Moldova ratified the Kyoto Protocol on February 13, 2003 (the official date of accession was April 22, 2003). It should be noted however, that as a non-Annex I Party, the Republic of Moldova has no commitments to reduce emissions under the Protocol.

Detailed principles regarding implementation of the Kyoto Protocol were outlined at COP 7 (Marrakesh, 2001), covered in Marrakesh Accords. COP 11 (Montreal, 2005), which also served as the first Meeting of the Parties to Kyoto Protocol (COP/MOP), adopted the Kyoto Protocol implementation rules, previously discussed in Marrakesh. At present, international negotiations focus on future commitments of the Convention Parties for post-Kyoto period (after 2012).

2.1.2 Greenhouse Gases

The most important greenhouse gas in atmosphere is water vapours (H_2O), responsible for approximately 2/3 of the total greenhouse effect. The content of water in atmosphere is not directly influenced by anthropogenic activities, but rather is determined by the cycle of water in nature, expressed in a simpler way, as a difference between evaporation and precipitations. Carbon dioxide (CO_2) has a 30 percent share in the greenhouse effect, while methane (CH_4), nitrous oxide (N_2O) and ozone (O_3) taken together account for 3 percent. The group of artificial substances (man-made): chlorofluorocarbons (CFC) and their substitute, hydrofluorocarbons (HCFC, HFC) and other substances, as well as perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) are also attributed to direct GHG.

There are other photochemically active gases, such as carbon monoxide (CO), nitrogen oxides (NO_x) and non-methane volatile organic compounds (NMVOC) (include substances such as: propane, butane and ethane), which are not attributed to direct GHG, but have an indirect contribution to greenhouse effect. Such gases influence the formation and destruction of ozone in the atmosphere in the presence of solar rays (ultraviolet radiation) and are considered to be ozone precursors in the troposphere.

Though GHG are considered to be natural components of the air, their presence in atmosphere is strongly affected by anthropogenic activities. Increased concentrations of GHG in atmosphere (caused by emissions of anthropogenic origin) contribute to strengthening of greenhouse effect thus leading to additional warming of the atmosphere. The GHG concentration in atmosphere is determined by the difference between GHG emissions and removals. It has been stated with certainty that GHG concentration in atmosphere have increased significantly in comparison with pre-industrial period. So, since 1750 the concentration of CO_2 increased by 35 percent, concentration of CH_4 - by 143 percent, and concentration of N_2O – by 18 percent (Table 2-1).

Table 2-1: Atmospheric concentration, concentration change rate and direct GHG lifetime in atmosphere

Variables	CO_2	CH_4	N_2O	SF_6	CF_4
Pre-industrial atmospheric concentration (year 1750)	278 ppm	0.715 ppm	0.270 ppm	0 ppt	40 ppt
Current atmospheric concentration (at 2005 level)	379 ppm	1.774 ppm	0.319 ppm	5.6 ppt	74 ppt
Atmospheric concentration change rate	1.4 ppm/yr	0.005 ppm/yr	0.26 ppm /yr	linear	linear
GHG lifetime in atmosphere	50-200	12	114	3200	>50000

To a great extent these trends can be attributed to human activities — in particular, to fossil fuels combustion and continuous deforestation of forest lands.

Globally, the amount of annual emissions of carbon dioxide is circa 23.9 Gt, which in the past 45 years has increased more than significantly (by circa 3.7 times). The most important sources of carbon dioxide emissions are fossil fuel combustion, deforestation and industrial processes (for example, cement production). The carbon dioxide lifetime in atmosphere vary between 50 and 200 years. It can be removed from atmosphere through a complex set of natural sinks mechanisms. Also, it is considered that circa 40 percent of the emitted carbon dioxide can be absorbed by oceans. Photosynthesis, in particular in sea vegetation and plankton is an important, though transitory, mechanism of CO_2 emissions removal, because after the perishing of plants, carbon dioxide is again emitted into the atmosphere.

Concentration of methane in atmosphere is affected by anthropogenic activities such as rice cultivation, animal breeding (enteric fermentation and manure management), coal, oil and natural gas extraction, transportation and distribution of natural gases, solid waste disposal on lands, biomass combustion, etc. The break down of methane in the atmosphere takes place through chemical reactions (by means of OH radicals). The lifetime of CH_4 in atmosphere is circa 12 years. In comparison with the pre-industrial period, CH_4concentration in atmosphere increased by circa 143 percent (Table 1-3). The annual accumulation rate of CH_4 in atmosphere is 40 and 60 Mt, or approximately 10 percent of total global CH_4 emissions (Thompson et al., 1992). Approximately half of annual global methane emissions are generated from anthropogenic activities. To stabilize methane concentrations at their current level, it is necessary to reduce these emissions by circa 8 percent (IPCC, 1996).

It has been stated that circa 1/3 of the atmospheric N_2O is of anthropogenic origin, coming from use of synthetic nitrogen fertiliser, soil cultivation, animal breeding (manure management), wastewater handling, adipic acid and nitric acid production, fossil fuels combustion, waste incineration and biomass burning. The other 2/3 of the atmospheric N_2O comes from the soil and denitrification of water in anaerobic conditions. N_2O breaks down photochemically in atmosphere. It should be noted that atmospheric concentration of nitrous oxide increased by circa 18 percent compared to pre-industrial periods levels. Global annual N_2O emissions from all sources are estimated at circa 10.0-17.5 Mt (IPCC, 1996).

PFC (perfluorocarbones), HFC (hydrofluorocarbones) and SF_6 (sulphur hexafluoride) are GHG of anthropogenic origin. HFC is preponderantly used to replace ozone depleting chemical substances, but it is also emitted in the process of HCFC-22 production. PFC and SF_6 are emitted in various industrial processes, including aluminium and magnesia production, production of semiconductors, in transmission and distribution of electric power, etc. All these gases have a long lifetime in atmosphere and are characterized by a considerable infrared radiation absorption capacity, so that in the future it might have a considerable impact on the global warming.

2.1.3 Global Warming Potential

The radiative forcing[1] effect of a gas in the atmosphere is the reflection of its ability to cause atmospheric warming. Direct effects occur when the gas itself is a GHG, while indirect radiative forcing occurs when chemical transformation of the original gas produces a gas or gases that are GHGs or when a gas influences the atmospheric lifetimes of other gases. The concept of "Global Warming Potential" (GWP) has been developed to allow scientists and policy-makers to compare the ability of each GHG to trap heat in the atmosphere relative to another gas. By definition, a GWP is the time-integrated change in radiative forcing due to the instantaneous release of 1 kg of gas expressed relative to the radiative forcing from the release of 1 kg of CO_2. In other words, GWP is a relative measure of a warming effect that the emission of a radiative gas (i.e., GHG) might have on the surface of troposphere.

The GWP of a GHG takes into account both the instantaneous radiative forcing due to an incremental concentration increase and the lifetime of the gas. This report relate to the GWP for a period of 100 years recommended by the IPCC (IPCC Second Assessment Report, 1996) and adopted at the COP 3 (Table 2-2).

[1] The term 'radiative forcing' refers to the amount of heat-trapping potential for any given GHG. It is measured in units of power (watt) per unit of area (m^2)

Table 2-2: GWP for a Period of 100 Years and the Atmospheric Lifetimes

GHG	Chemical formula	Life-time	SAR	TAR	AR4
Carbon dioxide	CO_2	50-200	1	1	1
Methane	CH_4	12	21	23	25
Nitrous oxide	N_2O	120	310	296	298
Sulphur hexafluoride	SF_6	3200	23900	22200	22800
Hydrofluorocarbones (HFC)					
HFC-23	CHF_3	264	11700	12000	14800
HFC-32	CH_2F_3	5.6	650	550	675
HFC-43-10mee	$C_5H_2F_{10}$	17.1	1300	1500	1640
HFC-125	C_2HF_5	32.6	2800	3400	3500
HFC-134a	$C_2H_2F_2$ (CH_2FCF_3)	14.6	1300	1300	1430
HFC-143a	$C_2H_3F_3$ (CF_3CH_3)	48.3	3800	4300	4470
HFC-152a	C_2H4F_2 (CH_3CHF_2)	1.5	140	120	124
HFC-227ea	C_3HF_7	36.5	2900	3500	3220
HFC-236fa	$C_3H_2F_6$	209	6300	9400	9810
Perfluorocarbones (PFC)					
Perfluoromethane	CF_4	50000	6500	5700	7390
Perfluoroethane	C_2F_6	10000	9200	11900	12200
Perfluoropropa-ne	C_3F_8	2600	7000	8600	8860
Perfluorohexane	C_6F_{14}	3200	7400	9000	9300

Source: SAR – Second Assessment Report (IPCC, 1996), TAR – Third Assessment Report (IPCC, 2001) and AR4 – Fourth Assessment Report (IPCC, 2007).

2.1.4 Republic of Moldova's Contribution to Global Warming

In 1990, Republic of Moldova contributes only about 0.3 percent of total global GHG emissions. Within the 1990-2005, the total national GHG emissions (excluding LU-LUCF) decreased by 72.3 percent, from 42886.0 Gg CO_2 eq. in 1990, to 11883.5 Gg CO_2 eq. in 2005 (Table 2-3), which is much more than in some industrially developed countries, or economies in transition included in Annex to Convention (Figure 2-1).

2.2 Institutional Arrangements, Inventory Preparation

2.2.1 Institutional Arrangements for Inventory Preparation

Within the Ministry of Environment and Natural Resources (MENR), the Climate Change Office (CCO) is totally responsible for the activities related to preparation of National Communications (NCs) and Greenhouse Gas Inventories, comprising the National Inventory Reports (NIRs) and Common Reporting Framework Tables (IPCC Sectoral and Summary Report Tables).

Figure 2-2 outlines the responsibilities and arrangements for the Inventory Preparation in the Republic of Moldova.

Table 2-3: Republic of Moldova's GHG Emission Trends by Sector in 1990-2005, Gg CO_2 equivalent

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
National Total (excluding LULUCF)	**42886.02**	**16758.16**	**16771.33**	**14650.82**	**12605.12**	**10822.35**	**9839.95**	**10824.72**	**10966.56**	**11530.56**	**11680.86**	**11883.46**
National Total (including LULUCF)	41212.82	16002.16	16031.71	13325.88	11448.63	9511.40	8486.80	9436.42	9734.67	10216.65	10361.81	10502.40
1. Energy	**34520.39**	**11135.71**	**11430.27**	**9526.58**	**7938.33**	**6184.74**	**5437.82**	**6639.87**	**6738.33**	**7328.40**	**7490.74**	**7724.81**
A. Fuel Combustion Activities	33837.46	10579.72	10825.94	9028.46	7472.10	5719.66	4934.43	6139.74	6196.09	6755.07	6873.21	7070.91
1. Energy Industries	19393.29	6931.76	7057.97	5370.04	4427.55	3318.36	2653.71	3416.58	3048.93	2927.52	2944.22	2989.77
2. Manufacturing Industries and Construct.	2195.89	316.65	261.86	299.44	259.78	237.33	258.17	286.11	284.99	301.38	319.80	396.99
3. Transport	4055.61	1328.52	1298.13	1321.21	1153.33	784.87	848.27	926.43	1157.96	1451.78	1621.59	1654.52
4. Other Sectors	8037.78	1829.47	2062.55	1901.70	1538.61	1322.54	1122.76	1447.33	1639.70	1956.66	1864.60	1911.11
5. Other (other works and needs in energy)	154.90	173.32	145.42	136.07	92.83	56.56	51.51	63.29	64.52	117.73	123.00	118.52
B. Fugitive Emissions from Fuels	682.93	555.98	604.33	498.12	466.22	465.08	503.40	500.13	542.24	573.33	617.53	653.90
1. Solid Fuels	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Oil and Natural Gas	682.93	555.98	604.33	498.12	466.22	465.08	503.40	500.13	542.24	573.33	617.53	653.90
2. Industrial Processes	**1348.75**	**380.65**	**389.81**	**434.97**	**354.72**	**339.26**	**325.60**	**331.13**	**344.10**	**408.04**	**479.52**	**581.90**
A. Mineral Products	1257.91	302.72	305.55	331.59	268.58	250.96	217.93	211.17	268.05	287.28	327.90	416.84
B. Chemical Industry	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
C. Metal Production	71.20	65.98	67.21	81.43	72.14	79.96	91.22	97.15	51.56	89.01	101.77	105.29
D. Other Production	19.64	11.95	17.05	21.95	14.00	8.34	12.25	17.40	16.93	21.72	36.50	40.77
E. Production of Halocarbons and SF_6	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Consumption of Halocarbons and SF_6	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	4.21	5.41	7.56	10.02	13.35	19.00

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
3. Solvents and Other Products Use	**65.62**	**28.06**	**28.21**	**29.88**	**30.39**	**29.77**	**33.06**	**34.71**	**40.78**	**41.67**	**47.82**	**49.00**
A. Paint Application	30.18	1.94	2.14	2.96	2.99	2.93	6.74	7.68	12.43	12.49	18.79	17.98
B. Degreasing and Dry Cleaning	2.00	0.22	0.66	0.93	0.35	0.95	0.34	0.60	1.19	2.28	1.23	1.24
C. Chemical Products, Manufacture andProcessing	0.55	0.03	0.02	0.02	0.02	0.03	0.10	0.13	0.19	0.16	0.22	0.29
D. Other	32.89	25.88	25.39	25.97	27.03	25.85	25.89	26.30	26.96	26.74	27.58	29.49
4. Agriculture	**5323.92**	**3386.18**	**3046.47**	**2839.22**	**2518.31**	**2438.03**	**2312.19**	**2215.97**	**2313.91**	**2253.13**	**2210.72**	**2127.79**
A. Enteric Fermentation	1903.41	1384.63	1236.76	1077.79	982.91	961.84	903.06	872.37	912.70	894.14	843.96	792.86
B. Manure Management	1701.94	1088.95	1013.06	926.93	811.74	838.44	762.67	666.24	686.94	708.73	665.77	635.68
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	1718.57	912.60	796.65	834.50	723.66	637.75	646.46	677.36	714.27	650.27	700.99	699.25
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
5. LULUCF	**-1673.20**	**-756.00**	**-739.62**	**-1324.94**	**-1156.49**	**-1310.95**	**-1353.15**	**-1388.30**	**-1231.89**	**-1313.91**	**-1319.04**	**-1381.06**
A. Forest Land	-2197.15	-1620.79	-1705.09	-2132.20	-2027.77	-2111.13	-2140.32	-2195.22	-2134.76	-2135.76	-2183.42	-2246.20
B. Cropland	1310.45	1484.33	1543.58	1536.19	1574.69	1596.57	1612.69	1651.03	1683.34	1689.93	1691.54	1684.60
C. Grassland	-786.50	-619.54	-578.12	-728.93	-703.41	-796.38	-825.53	-844.11	-780.47	-868.08	-827.16	-819.46
D. Wetlands	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
E. Settlements	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE	IE
6. Waste	**1627.34**	**1827.57**	**1876.57**	**1820.17**	**1763.38**	**1830.55**	**1731.28**	**1603.04**	**1529.44**	**1499.32**	**1452.05**	**1399.96**
A. Solid Waste Disposal on Land	1321.13	1616.58	1670.25	1611.88	1560.89	1636.00	1536.42	1403.31	1327.01	1294.20	1254.51	1186.21
B. Wastewater Handling	306.21	210.98	206.32	208.29	202.49	194.55	194.86	199.72	202.42	205.12	197.54	213.75
C. Waste Incineration	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
International Bunkers	220.43	42.46	66.62	76.52	73.32	73.26	66.95	58.81	59.30	70.80	67.95	64.64
CO_2 emissions from biomass	210.83	645.57	615.34	322.44	409.18	373.60	367.86	353.09	389.50	359.79	296.51	295.04

Abbreviations: IE – Included Elsewhere; NE – Not Estimated; NO– Not Occurring

Thus, within the Climate Change Office (CCO) the National Inventory Team (NIT) is responsible for estimating emissions by categories of sources and removals by categories of sinks, Key Sources Analysis, Quality Assurance and Quality Control (QA & QC) and verification procedures, uncertainties assessment, documentation, reporting and archiving of data related to inventory preparation process.

Below is a brief description of functional responsibilities of the participants in the process:

The National Inventory Team Leader (NITL), a full time employee in the CCO, is responsible for the inventory preparation process coordination, including supervision of estimating emissions by individual categories of sources and removals by individual categories of sinks, KSA, uncertainty analysis interpretation, QA&QC activities coordination, documentation and archiving the data used in the inventory preparation process, synthesis of sectoral reports - serving as basis for the NIR compilation.

The national experts (hired on a contract basis) are responsible for estimating emissions by individual categories of sources and removals by individual categories of sinks at sectoral level (Energy Sector, Industrial Processes Sector, Solvents and Other Products Use Sector, Agriculture Sector, LULUCF Sector and Waste Sector). The national experts are also responsible for development components of the NIR's sectoral chapters. They are also responsible for the AD collection, application of decision trees in terms of selecting suitable assessment methods and EFs, estimating emission uncertainties by individual categories of sources, as well as for taking correction measures as a response to QA&QC activities.

The activity data (AD) needed for inventory is available in the Statistical Yearbooks (SY), Energy Balances (EBs) and other sectoral statistic publications of the National Bureau of Statistics (NBS). Additional statistical data (unpublished) may be provided at request, in conformity with provisions of the Law nr. 412 as of 09.12.2004 on 'Official Statistics', Article 9 (2), item a) and b), according to which "the official statistics authorities must disseminate statistical data to users in the amount, manner and terms specified in the statistical works programme", as well as to "to ensure access of all users to non-confidential statistic on equal conditions in terms of amount and terms of dissemination".

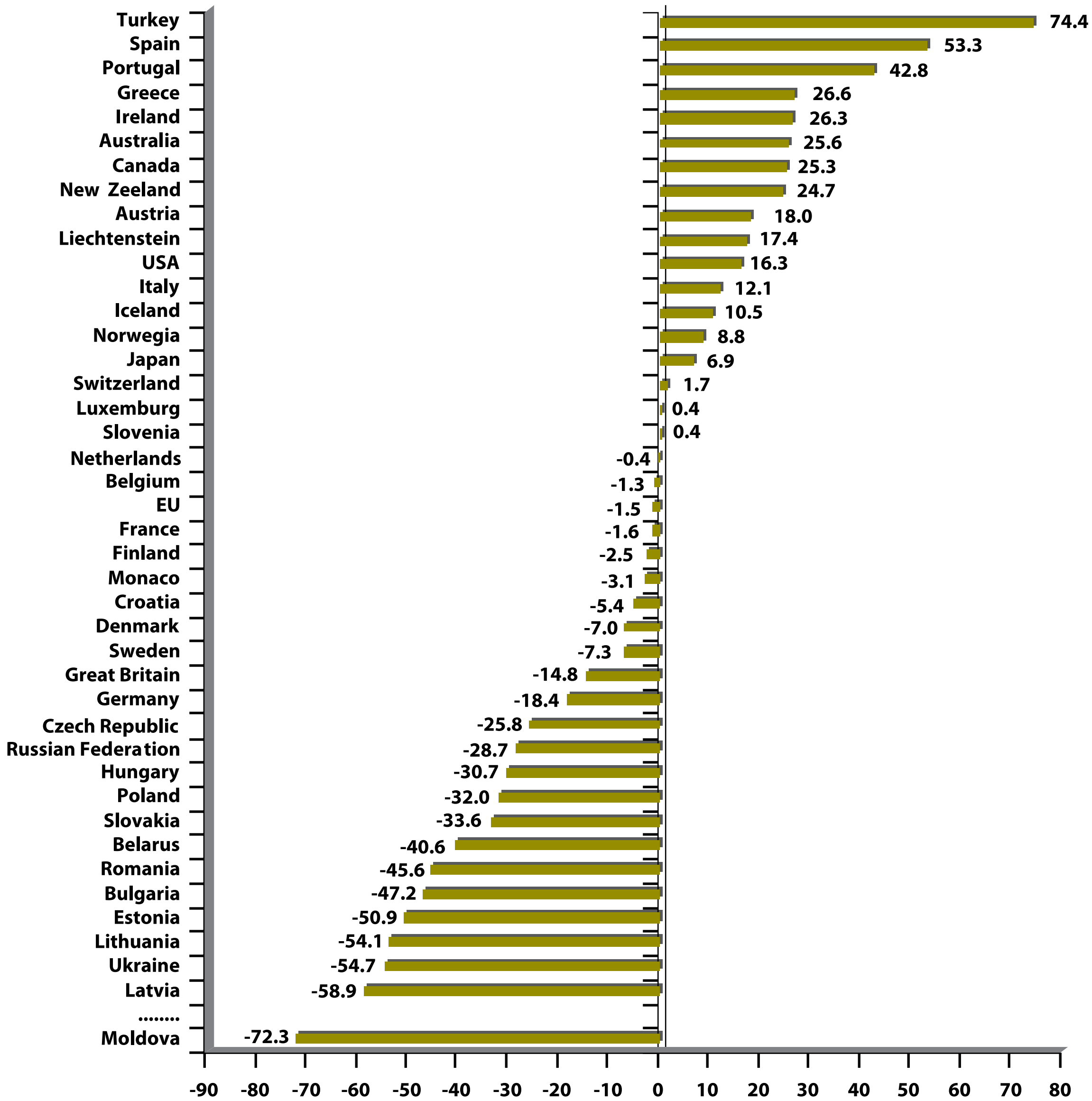


Figure 2-1: Change in Aggregate GHG Emissions for Annex I Parties and the Republic of Moldova, 1990-2005 (change relative to 1990, %) (**Source:** <http://unfccc.int/resource/docs/2007/sbi/eng/30.pdf>)

Other relevant AD are collected at request, from various partner organizations: Ministry of Transports and Roads (MTR), reorganised in 2008 into the Transport Agency, Ministry of Industry and Infrastructure (MII), reorganised in 2008 by a merger with the Ministry of Economy and Trade (MET), Ministry of Information Development (MID), Ministry of Agriculture and Food Industry (MAFI), Ministry of Defence (MD), Ministry of Health (MH), Ministry of Internal Affaire (MIA), Academy of Sciences of Moldova (ASM), Forest Agency "Moldsilva", Agroindustrial Agency "Moldova-Vin", Land Relations and Cadastre Agency (LRCA), Civil Aviation State Administration (CASA), Customs Service (CS), State Ecological Inspectorate (SEI), Ozone Office under the MENR, IPROCOM State Projections Institute, State Enterprise "Moldavian Railways", "Moldova-Gaz" J.S.C., "Lafarge-Ciment" J.S.C., etc., based on the provisions of the Law on Access to Information, adopted by the Parliament Resolution nr. 982-XIV as of 11.05.2000.

2.2.2 Process for Inventory Preparation

The Climate Change Office adopted a centralized approach to the process of preparing the national inventory comprising the National Inventory Report (NIR) and Common Reporting Framework Tables (IPCC Sectoral and Summary Report Tables) (IPCC, 1997, 2005). The National Inventory preparation process is outlined in Figure 2-3.

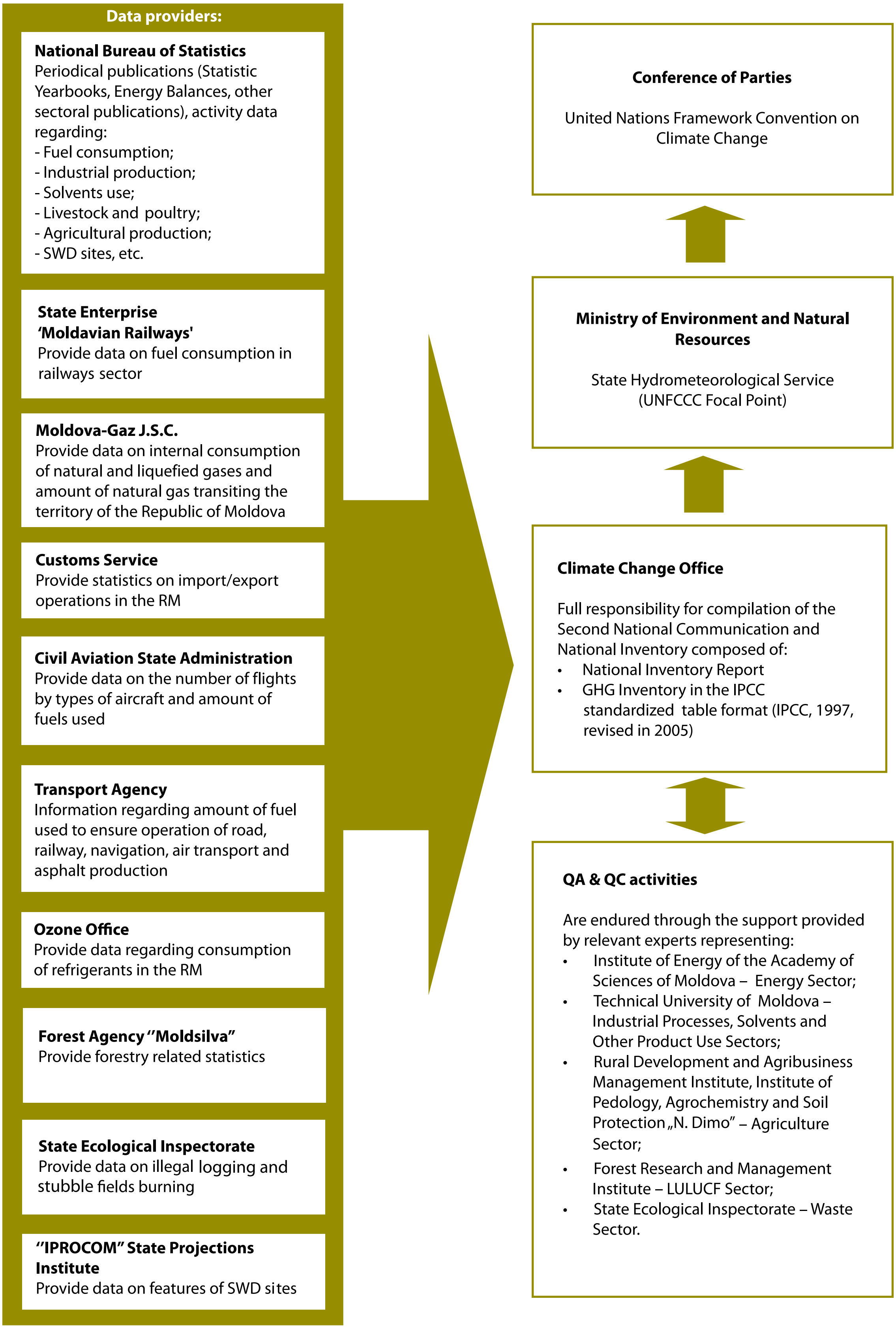


Figure 2-2: Institutional Arrangements for the Inventory Preparation

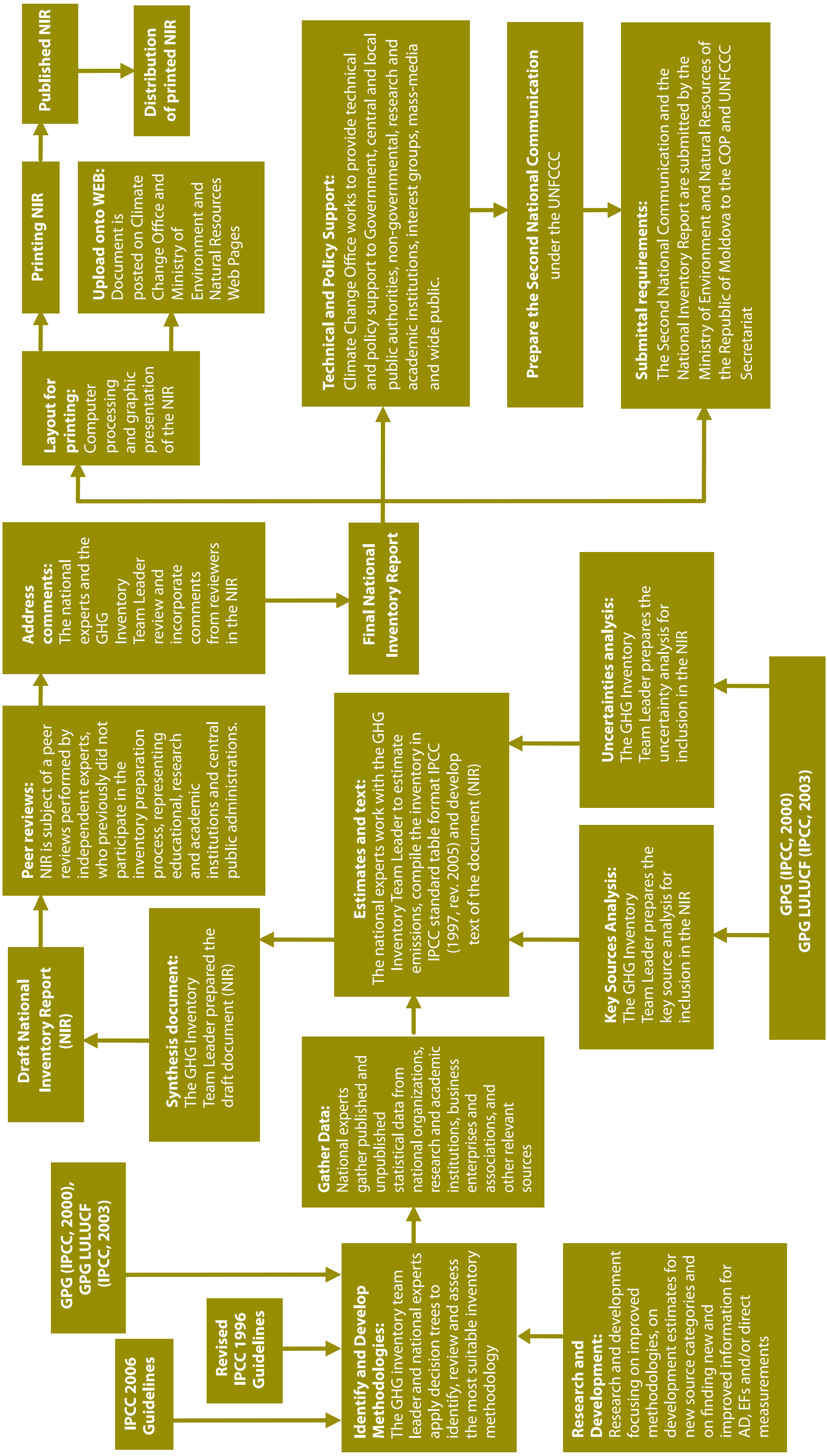


Figure 2-3: Inventory Process in the Republic of Moldova

The NITL is responsible for compiling the estimations and ensuring consistency and quality of the inventory by producing the NIR. Estimation of emissions by individual source categories and removals by individual sink categories is the responsibility of national experts who are more competent about individual features of source/sink categories.

The national experts, under direct coordination of the NITL, decide, by applying decision trees, on employing the best estimation methodology, collect AD needed for estimation. For most source categories methodologies used in the previous inventory cycle are applied. Under such circumstances it was needed to collect new AD for a more recent period under review or for the entire period under review if historical AD were amended or recalculated.

If a new source/sink category has to be assessed, or a higher Tier methodology had to be used, then the NITL and national experts would decide on which assessment methodology to use, collect most reasonable AD and EFs, calculate GHG emissions, assess uncertainties, ensured implementation of verification, QA/QC procedures acting on behalf of educational, academic institutions, ministries and subordinated institutions, central administrative authorities and/or private sector. National experts produced explanatory texts for the research on estimation of emissions by individual source categories and removals by individual sink categories, as well as provided the bibliography used.

NITL is responsible for collecting and reviewing these materials, used in drafting the NIR sectoral chapters (Chapter 3 'Energy', Chapter 4 'Industrial Processes', Chapter 5 'Solvents and Other Products Use', Chapter 6 'Agriculture', Chapter 7 'LULUCF', Chapter 8 'Waste').

The NITL was also responsible for drafting the other NIR's chapters (Chapter 1 'Introduction', Chapter 2 'Trends in National GHG Emissions', Chapter 9 'Recalculations', 'Bibliography' and 'Annexes'), as well as for the KSA, compatible with GPG (IPCC, 2000) and GPG for LULUCF Sector (IPCC, 2003) requirements.

The NIR was produced in compliance with UNFCCC reporting guidelines on annual inventories. In addition to NIR, Common Reporting Framework Tables (IPCC Sectoral and Summary Report Tables) were filled-in. NITL had the task to monitor the process of development the Common Reporting Framework Tables, to ensure the consistency of results. The national experts accomplished the uncertainties analysis, as well as verification and QA/QC activities, in close cooperation with the NITL. The QA/QC Plan produced in 2005 within the UNDP-GEF Regional Project "Capacity Building for Improving the Quality of the National GHG Inventories (Central Europe and CIS region)" complies with the GPG (IPCC, 2000) requirements. During the peer reviews (QA procedure), the draft version of the NIR was sent to a group of independent experts (who did not previously participate in the national inventory preparation). The purpose of the inventory peer reviews was to receive from relevant experts in the areas of major interest comments on quality of the work done, in particular on relevance of methodological approaches, EFs and AD used. The received comments were reviewed and estimations and explanatory notes to them were corrected.

Following the final review, after the incorporation of comments received in the process of peer reviews, the Climate Change Office prepared the final version of the National Inventory Report, which was then electronically processed, printed and published. Once published, the National Inventory Report and the Second National Communication are submitted by the MENR to the COP, in conformity with international commitments of the Republic of Moldova under the UNFCCC.

2.3 Methodological Issues

2.3.1 Methodologies and Data Source

The national inventory is structured to match the reporting requirement of the UNFCCC and is divided into six main sectors: (1) Energy, (2) Industrial Processes, (3) Solvents and Other Products Use, (4) Agriculture, (5) Land Use, Land-Use Change and Forestry and (6) Waste. Each of these sectors is further subdivided within the inventory (Table 2-4).

Emissions of direct (CO_2, CH_4, N_2O, HFC and SF_6) and indirect (NO_x, CO, NMVOC, SO_2) greenhouse gases were estimated based on methodologies contained in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1997), Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000), Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC, 2003), Atmospheric Emissions Inventory Guidebook (CORINAIR, 1996, 1999, 2005) and 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006).

In general, an emission and removals inventory can be defined as a comprehensive account of anthropogenic sources of emissions and removals by sinks and associated data from source categories within the inventory area over a specified time frame. It can be prepared "top-down", "bottom-up", or using a combination approach. The Republic of Moldova's national inventory is prepared using a "top-down" approach, providing estimates at a sectoral level of segregation without attribution to individual emitters.

Table 2-4: Summary of Methods and Emission Factors Used for Inventory Preparation Process in the Republic of Moldova

Categories by sources and sinks	CO_2		CH_4		N_2O		HFC		PFC		SF_6	
	Method	EF	Method	EF	Method	EF	Method	EF	Method	EF	Method	EF
1. Energy	T1	D, CS	T1	D	T1	D						
A. Fuel Combustion Activities	T1	D, CS	T1	D	T1	D						
1. Energy Industries	T1	D, CS	T1	D	T1	D						
2. Manufacturing Industries and Construction	T1	D, CS	T1	D	T1	D						
3. Transport	T1	D, CS	T1	D	T1	D						
4. Other Sectors	T1	D, CS	T1	D	T1	D						
5. Other (other works and needs in energy sector)	T1	D, CS	T1	D	T1	D						
B. Fugitive Emissions from Oil and Natural Gas	T1	D, CS	T1	D	T1	D						
1. Solid fuels	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE						
2. Oil and Natural Gas	T1	D, CS	T1	D	T1	D						
2. Industrial Processes	T2, T1	D, CS	T1	D	T1	D	T2, T1	D	NO,NE	NO,NE	T2, T1	D
A. Mineral Products	T2, T1	D, CS	NA	NA	NA	NA						
B. Chemical Industries	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE						
C. Metal production	T1	D	T1	D	T1	D						
D. Other production	T1	D, CS	NA	NA	NA	NA						
E. Production of halocarbons and SF_6							NO,NE	NO,NE	NO,NE	NO,NE	NO,NE	NO,NE
F. Consumption of halocarbons and SF_6							T2, T1	D	NO,NE	NO,NE	T2, T1	D
3. Solvents and Other Products Use	C	D	NA	NA	C	D						
A. Paint application	C	D	NA	NA	NA	NA						
B. Degreasing and dry cleaning	C	D	NA	NA	NA	NA						
C. Chemical Products, Manufacture and Processing	C	D	NA	NA	NA	NA						
D. Other	C	D	NA	NA	C	D						
4. Agriculture			T2, T1	D, CS	T2, T1	D, CS						
A. Enteric fermentation			T2, T1	D, CS	NA	NA						
B. Manure management			T2, T1	D, CS	T2, T1	D, CS						
C. Rice cultivation			NO	NO	NA	NA						
D. Agricultural soils			NA	NA	T1	D, CS						
E. Prescribed burning of savannas			NO	NO	NA	NA						
F. Field burning of agricultural residues			IE	IE	IE	IE						
5. LULUCF	T2, T1	D, CS	T1	D	T1	D						
A. Forest lands	T2, T1	D, CS	T1	D	T1	D						
B. Croplands	T2, T1	D, CS	T1	D	T1	D						
C. Grasslands	T2, T1	D, CS	NE	NE	NE	NE						
D. Wetlands	NE	NE	NE	NE	NE	NE						
E. Settlements	IE	IE	NE	NE	NE	NE						
6. Waste			T2, T1	D, CS	T1	D						
A. Solid Waste Disposal on Land			T2, T1	D, CS	NA	NA						
B. Wastewater Handling			T1	D, CS	T1	D						
C. Waste Incineration			NO, NE	NO, NE	NO, NE	NO, NE						
7. Other	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE						
International bunkers	T2, T1	D, CS	T1	D	T1	D						
CO_2 emissions from biomass	T1	D, CS										

Abbreviations: T1 – Tier 1 method; T2 – Tier 2 method; C – CORINAIR; CS –Country Specific; D –Default Use; IE – Included Elsewhere; NA – Not Applicable; NE –Not Estimates; NO – Not Occurring

The CCO is continuously working to improve accuracy, completeness and transparency of its inventory. Comprehensive bottom-up inventory is neither practicable nor possible at the present time, although for some sectors, estimates are derived from detailed source specific data.

To the extent possible, AD used in this report are based on officially published data: national (SY of the RM, respectively of the Administrative-Territorial Units from the Left Bank of Dniester river (ATULBD), Energy Balances (EBs), etc.) and international statistical publications (International Statistic Yearbook of Iron and Steel, UN FAO database), publications of academic, research and development institutions (Institute of Pedology, Agrochemistry and Soil Protection "N. Dimo", Institute of Ecology and Geography, Institute of Energy, Forest Research and Management Institute, etc.), AD provided by ministries and subordinated institutions (MET, MID, MAFI, MD, MH, MIA, CASA, MENR, SEI, SHS, Ozone Office) and central administrative authorities (National Bureau of Statistics, Transport Agency, Forestry Agency "Moldsilva", "Moldova-Vin" Agency, Agency for Land Relations and Cadastre, Customs Service), data obtained from enterprises and businesses associations (State Enterprise "Moldavian Railways", "Moldova-Gas" J.S.C., "Lafarge-Ciment" J.S.C.), legislation acts (*National Complex Program of Enhancing Soil Fertility in 2001-2020*, approved by the Government Resolution No. 591 as of 20.06.2000; *Complex Program for Reclamation of Degraded Lands and Enhancing Soils Fertility. Part I Reclamation of degraded lands*, approved by the Government Resolution No. 636 as of 26.05.2003 and *Complex Program for Reclamation of Degraded Lands and Enhancing Soils Fertility, Part II Enhancing Soils Fertility*, approved by the Government Resolution No. 841 as of 26.07.2004).

2.3.2 Key Categories

According to GPG (IPCC, 2000, 2003), it is *good practice* to identify *key categories*, as it helps prioritize efforts and improve the overall quality of the national inventory.

A "key category" is defined as a "*source or sink category, that is prioritized within the national inventory system because its estimate has a significant influence on a country's total inventory of direct greenhouse gases in terms of the absolute level of emissions, the trend in emissions, or both.*" By definition, key categories include those sources that have the greatest contribution to the absolute level of national emissions. In addition, when an entire time series of emissions estimates is prepared, a thorough investigation of key categories must also account for the influence of trends of individual sources and sink categories.

Table 2-5 presents the key categories for the Republic of Moldova inventory based on the Tier 1 methodological approach [with LULUCF: 18 key categories by level (L) and 16 key categories by trend (T); without LULUCF: 17 key categories by level (L) and 13 key categories by trend (T)] using emissions data in this report for the 1990-2005 period.

Following the recommendations set in the GPG (IPCC, 2000, 2003), the inventory was first disaggregated by source and sink categories which further were used to identify key categories. Source categories were defined in conformity with the following guidelines: (1) IPCC categories should be used with emissions specified in CO_2 equivalent units according to standard GWP; (2) a category should be identified for each gas emitted by the sources, since the methods, emission factors, and related uncertainties differ for each gas; (3) source categories that use the same emission factors based on common assumptions should be aggregated before analysis.

Key categories were identified from two perspectives: the first analysis the emission contribution that each category makes to the national total (with and without LULUCF); and the second perspective analysis the trend of emission contributions from each category to identify where the greatest absolute changes (either increases or reductions) have taken place over a given time (with and without LULUCF categories). The percent contributions to both level levels and trends in emissions are calculated and sorted from greatest to least. A cumulative total is calculated for both approaches. IPCC has determined that a cumulative contribution threshold of 95% for both level and trend assessments is a reasonable approximation of 90% uncertainty for the Tier 1 method of determining key categories (IPCC, 2000). The 95% cumulative contribution threshold has been used in this analysis to define an upper boundary for the key category identification. Therefore, when source and/or sink contributions are sorted in decreasing order of importance, those that contribute to 95% of the cumulative total are considered quantitatively to be key.

The Key Sources Analysis (KSA) was carried out using the Key Source Estimation Tool developed by the United States Environment Protection Agency (US EPA).

2.3.3 Quality Assurance and Quality Control

As per recommendations of the GPG (IPCC, 2000), national inventories have to be transparent, consistent, comparable, complete, accurate, well documented, assessed for uncertainties, subject to verification and QA/QC.

Good Practice Guidance (IPCC, 2000) defines the QA/QC terms as follows:

- *Quality Control* (QC) is a system of routine technical activities to measure and control the quality of the inventory as it is being developed. A basic QC system

Table 2-5: Summary Overview of the Republic of Moldova's Key Source Categories (1990-2005) Based on Tier 1 Approach

IPCC classification	Key Categories by Sources and Sinks	Gas	Tier 1 approach				2005 emissions / removals, Gg CO_2 eq.
			with LULUCF		without LULUCF		
			L	T	L	T	
1A	Stationary Fuel Combustion – Natural Gas	CO_2	X	X	X	X	4441.8224
5A	Forest Lands	CO_2	X	X			-2246.2332
5B	Croplands	CO_2	X	X			1684.2815
1A3b	Road Transportation	CO_2	X	X	X	X	1459.4096
6A	Solid Waste Disposal on Land	CH_4	X	X	X	X	1186.2060
5C	Grasslands	CO_2	X	X			-819.4560
4A	Enteric Fermentation	CH_4	X	X	X	X	792.8592
1B2	Fugitive Emissions from Oil and Natural Gas	CH_4	X	X	X	X	652.0090
4D	Direct Emissions from Agricultural Soils	N_2O	X	X	X	X	560.1846
4B	Direct Emissions from Manure Management	N_2O	X	X	X	X	469.1675
1A	Stationary Fuel Combustion – Coal	CO_2	X	X	X	X	450.0661
2A1	Cement Production	CO_2	X	X	X	X	373.2628
7	CO_2 Emissions from Biomass	CO_2	X	X	X	X	295.0374
1A	Stationary Fuel Combustion – Oil	CO_2	X	X	X	X	231.9371
1A4c	Mobile Fuel Combustion: Agriculture/ Forestry/Fishing	CO_2	X	X	X	X	177.6497
4D	Indirect Emissions from Agricultural Soils	N_2O	X	X	X		139.0628
6B	Wastewater Handling	CH_4	X		X		121.0136
1A3c	Railways	CO_2	X		X		115.1175
1A5	Mobile Fuel Combustion: Other Works and Needs in Energy Sector	CO_2			X	X	107.9239
4B	Indirect Emissions from Manure Management	N_2O			X		95.9399
Sub-total Without LULUCF							11668.6691
Total Emissions Without LULUCF							11883.4583
Percent of Total Without LULUCF							98.2%
Sub-total With LULUCF							10287.2613
Total Emissions With LULUCF							10502.3958
Percent of Total With LULUCF							98.0%

Abbreviations: L – Level Assessment; T – Trend Assessment.

should provide routine and consistent checks to ensure data integrity, correctness, and completeness; identify and address errors and omissions; and document and archive inventory material and record all QC activities;

- *Quality Assurance* (QA) comprises a planned system of review procedures conducted by personnel not directly involved in the inventory compilation and development process.

As a part of continuous efforts to develop a transparent and reliable inventory, within the 2003-2005 under the UNDP-GEF Regional Project "Capacity Building for Improving the Quality of Greenhouse Gases National Inventories (Central Europe and CIS region)", Republic of Moldova developed a Quality Assurance and Quality Control Plan and the Procedures Manual for Quality Assurance and Quality Control.

The key attributes of the Quality Assurance and Quality Control Plan include detailed Tier 1 (general procedures) and Tier 2 (source-specific) procedures (Figure 2-4) and standard verification and quality control forms and checklists (see also the Annex 6 of the NIR), that serve to standardize the process of implementing quality assurance and quality control activities meant to ensure the quality of the national inventory; peer review carried out by experts not directly involved in the national inventory development process; data quality check, as well as the documentation and archiving of all materials used in inventory preparation process.

It is well known that inventory development implies huge amounts of information that has to be gathered, handled and stored. The process sustainability is ensured through a good management and archiving of materials used along the inventory process.

In the Republic of Moldova, the National Inventory Team has a sufficiently transparent documentation allowing to fully reproducing the GHG emissions estimates. A standard system for documenting and archiving numeric and qualitative information, in compliance with the Revised 1996 IPCC Guidelines (IPCC, 1997) and GPG (IPCC, 2000) recommendations was used.

The activity data sources were documented by inserting references to these into the inventory document text. Estimation methods & emission factors sources and their selection justification are documented in the corresponding chapters of the NIR. Recalculations made are documented and argued both in Sectoral (3-8) Chapters, as well as in the Chapter 9 'Recalculations and Improvements' of the NIR.

Individual source categories related documentation include: (1) list of personnel responsible for estimates and individual responsibilities as per Terms of Reference; (2) reference sources for the activity data used; (3); justification of emission factors estimation methods selection; (4) samples of GHG emissions estimation process (in Excel format); (5) uncertainties analysis results by individual source categories; (6) annexes; (7) references.

Materials used in the inventory development process were archived both electronically and on hard copies. As the entity responsible for the national inventory development, the CCO holds all documentation used for its compilation.

Summing up, one can assert that transparency and credibility of a national inventory are ensured through: (1) the ability to demonstrate, through appropriate documentation, transparency of inventory development process; (2) further improvements of the inventory process and its basic products; and (3) ensuring that the inventory process employed consistent approaches allowing to obtain comparable results for all source categories. It is obvious that in comparison with the previous inventory cycles, by continuous integration of QA/QC activities, the Republic of Moldova ensured a better quality inventory.

2.3.4 Recalculations

The National GHG Inventory Team revised and recalculated GHG emissions and CO_2 removals for each calendar year covered by the First National GHG Inventory for the period from 1990 through 1998, a component part of the FNC of the RM under the UNFCCC (2000).

These activities were carried out during the on-going process of improving the quality of the National GHG Inventory (inclusive, by taking into account the updated activity data, using new methodological approaches, emission factors, implementing new methodological guidelines and correcting the identified errors).

Under current inventory cycle, improvements were made in all sectors (use of higher tier methodologies, revision of previously used methodological approaches and emission factors, activity data, inclusion of new emission sources, etc.), entailing the need to make recalculations of national GHG emissions for the time period from 1990 through 1998, reflected in the Chapter 2 'National GHG Inventory' of the FNC of the RM under the UNFCCC.

In comparison with the results reported under the FNC (2000), the changes made during the development of the current inventory, resulted in increased values of national direct GHG emissions in the time period from 1990 through 1998, with a variation from a minimum of 18.7 percent in 1998, to a maximum of 34.5 percent in 1995 (Table 2-6).

Table 2-6: Recalculations of Direct GHG Emissions for the 1990-1998 time series included in the FNC of the RM under the UNFCCC, Gg CO_2 equivalent

	1990	1991	1992	1993	1994	1995	1996	1997	1998
FNC	33272.6	30141.6	23538.7	17777.1	15358.8	12455.1	12861.2	11604.9	10620.6
SNC	42886.0	38175.5	28376.2	22760.9	19847.6	16758.2	16771.3	14650.8	12605.1
Difference, %	28.9	26.7	20.6	28.0	29.2	34.5	30.4	26.2	18.7

Abbreviations: FNC – First National Communication; SNC – Second National Communication.

2.3.5 Inventory Uncertainty

Uncertainty estimates are an essential element of a complete and transparent emissions inventory. Uncertainty information is not intended to dispute the validity of inventory estimates, but to help prioritize efforts to improve the accuracy of future inventories and guide future decisions on methodological choice. While the Republic of Moldova's Inventory calculates its emission estimates with the highest possible accuracy, uncertainties are associated to a varying degree with the development of emission estimates for any inventory. Some of current estimates, such as those for CO_2 emissions from energy-related activities and cement processing, are considered to have minimal uncertainty associated with them. For some other categories of emissions, however, a lack of data or an incomplete understanding of how emissions are generated increases the uncertainty surrounding the estimates presented. Despite these uncertainties, the

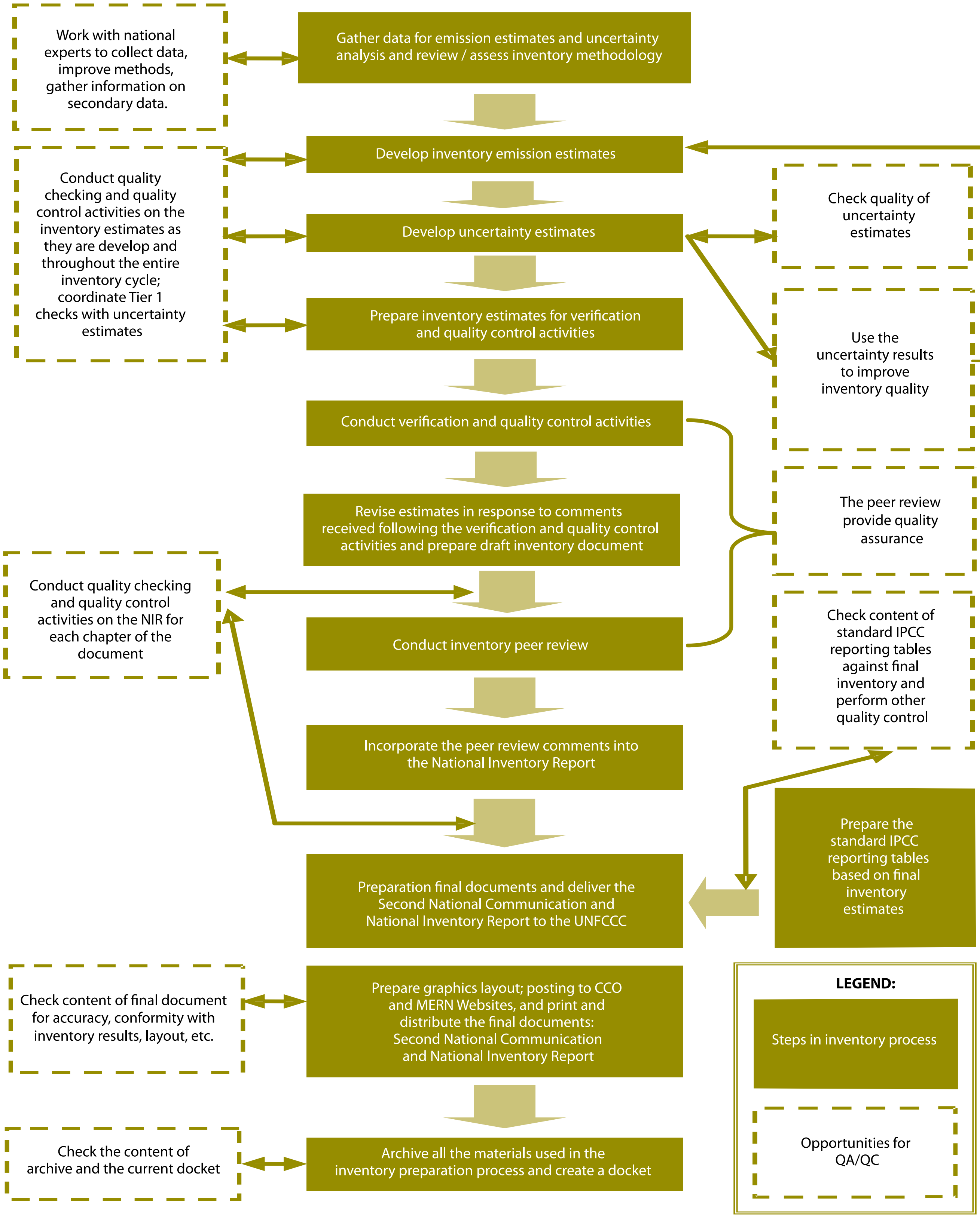


Figure 2-4: The Role of QA/QC Activities in the Inventory Preparing Process

UNFCCC reporting guidelines follow the recommendation in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and require that countries provide single point estimates of uncertainty for each gas and emission or removal source category. Within the discussion of each emission source, specific factors affecting the uncertainty associated with the estimates are discussed.

Additional research in the following areas could help reduce uncertainty in the Republic of Moldova's Inventory:

- *Incorporating excluded emission sources.* Quantitative estimates for some of the sources and sinks of GHG emissions are not available at this time. In particular, emissions from a number of categories in Industrial Processes Sector and Land Use, Land-Use Changes and Forestry Sector are not included in the inventory because data are incomplete.
- *Improving the accuracy of emission factors.* Further research is needed in some cases to improve the accuracy of emission factors used to calculate emissions from a variety of sources. For example, the accuracy of current emission factors applied to CH_4 from oil and natural gas, emissions of CO_2 from solvents and other products use, indirect N_2O emissions from waste management and indirect N_2O emissions from agricultural soils is highly uncertain.
- *Collecting detailed activity data.* Although methodologies exist for estimating emissions for some sources, problems arise in obtaining activity data at a level of detail in which aggregate emission factor can be applied. For example, the ability to estimate emissions of F-gases from Industrial Processes Sector is limited due to lack of activity data regarding national F-gases consumption or average equipment leak rates.

The overall inventory uncertainty was estimated using a Tier 1 methodological approach (IPCC, 2000). An estimate of the overall quantitative uncertainty, ±16.0 percent level uncertainty and ±3.9 percent trend uncertainty, are shown below in Table 2-7 (see also the Annex 7 of the current NIR that includes more information on the uncertainty analysis performed for selected source categories).

Table 2-7: Estimated Overall National Inventory Quantitative Uncertainty, %

Indicator	CO_2	CH_4	N_2O	Total
Level Uncertainty	±14.1	±48.6	±22.0	±16.0
Trend Uncertainty	±3.3	±17.6	±5.3	±3.9

Emissions evaluated under the Republic of Moldova's GHG Inventory reflect current best estimates; in some cases, however, estimates are based on approximate methodologies, assumptions, and incomplete data. As new information become available in the future, the Republic of Moldova will continue to improve and revise its emission estimates.

2.3.6 Completeness Assessment

The National Inventory, for the most part, is a complete inventory of direct and indirect GHGs required under the UNFCCC (CO_2, CH_4, N_2O, HFCs, SF_6; no PFCs emissions have not been registered so far in the RM; CO, NO_x, NMVOC and SO_2).

Despite the effort to cover all existent sources and sinks, the inventory still has some gaps, most being determined by lack of activity data needed to estimate certain emissions and removals, such as: emissions of CO_2 from the 2A3 'Lime and Dolomite Use'; emissions of F-gases (HFC, PFC andSF_6) from 2F2 'Foam Blowing', 2F3 'Fire Extinguishes', 2F5 'Solvents' and 2F6 'Other Applications With ODS'; CO_2 emissions and removals from 5D 'Wetlands'; and GHG emissions from 6C 'Waste Incineration' (in particular, from medical waste).

As part of the improvement plan, efforts are continuously being made to identify and assess relevant new sources and sinks for which cost-effective estimation methods are available. Further details on the completeness of the inventory can be found in the current National Inventory Report: 1990-2005.

2.4 Reporting Greenhouse Gas Emissions

2.4.1 Direct Greenhouse Gases Emissions

Between 1990 and 2005, the evolution of total direct greenhouse gas emissions expressed in CO_2 equivalent, revealed a decreasing trend in the Republic of Moldova, reducing by circa 72.3 percent: from 42,886.0 Gg CO_2 equivalent in 1990 to 11,883.5 Gg CO_2 equivalent in 2005 (Figure 2-5).

The most significant emissions reductions have been registered under the following source categories: 1A1 'Energy Industries' (-84.6 percent), 1A2 'Manufacturing Industries and Constructions' (-81.9 percent), 1A4 'Other Sectors' (-76.2 percent), 2A 'Mineral Products' (-66.9 percent), 4B 'Manure Management' (-62.6 percent), 4D 'Agricultural Soils' (-59.3 percent), 1A3 'Transport' (-59.2 percent), 4A 'Enteric Fermentation' (-58.3 percent) etc. Between 2004 and 2005 total emissions increased in the Republic of Moldova by circa 3.1 percent, in particular due to increased emissions from the source categories 2F 'Consumption of HFCs and SF_6' (+42.3 percent), 2A 'Mineral Products' (+27.1 percent), 1A2 'Manufacturing Industries and Constructions' (+24.1 percent), 2D2 'Other Products' (+11.7 percent), 6B 'Wastewater Handling' (+8.2 percent), 1B2 'Fugitive Emissions From Oil and Natural Gas' (+5.9 percent), 2C1 'Steel Production'

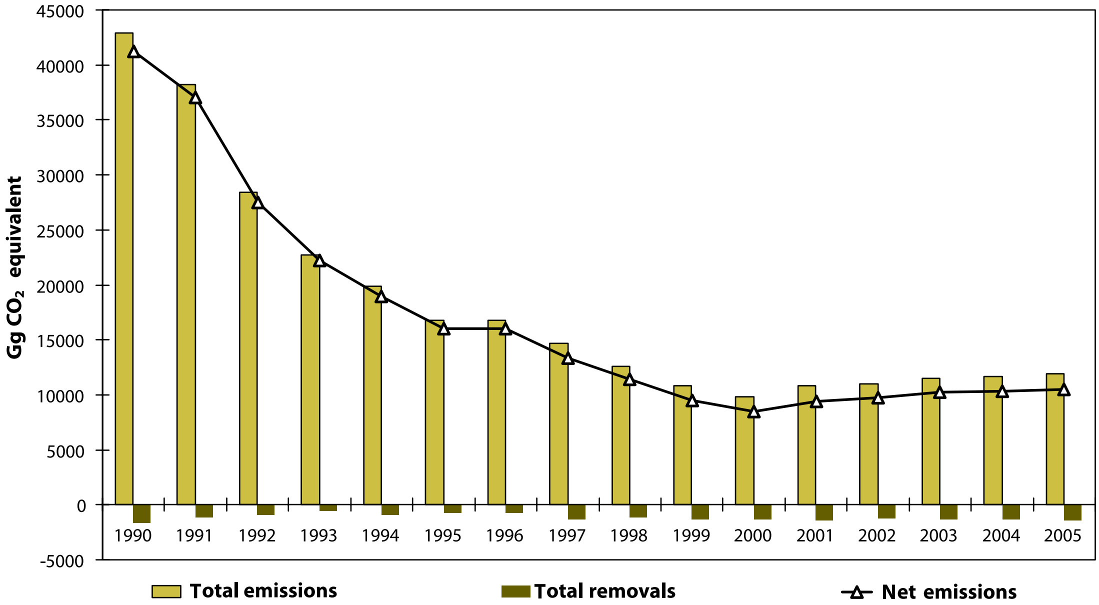


Figure 2-5: Greenhouse Gas Emission and Sink Trends in the Republic of Moldova, 1990-2005

(+3.5 percent), 3A-D 'Solvents and Other Products Use' (+2.5 percent), etc.

In the time series from 1990 through 2005, the total CO_2 emissions (without LULUCF) decreased by circa 78.2 percent: from 34,765.3 Gg in 1990, to 7,576.6 Gg in 2005. Reduction of CO_2 emissions is even more significant, if contribution of LULUCF Sector is considered, circa 81.3 percent: from 33,080.8 Gg in 1990, to 6,195.2 Gg in 2005 (Table 2-8).

Table 2-8: Greenhouse Gas Emission Trends in the Republic of Moldova's in Gg CO_2 eq., 1990-2005

	1990	1991	1992	1993	1994	1995	1996	1997
CO_2 (without LULUCF)	34765.28	30343.62	21197.71	16317.45	13704.76	10852.00	11092.66	9380.50
CO_2 (with LULUCF)	33088.79	29184.86	20279.14	15772.25	12829.33	10093.24	10350.88	8051.67
CH_4 (without LULUCF)	4766.08	4571.88	4416.79	4057.75	4026.04	3920.22	3875.33	3507.32
CH_4 (with LULUCF)	4768.39	4573.85	4418.62	4060.43	4027.81	3922.22	3876.88	3510.13
N_2O (without LULUCF)	3354.66	3259.97	2761.74	2385.69	2116.82	1985.93	1803.34	1763.00
N_2O (with LULUCF)	3355.64	3260.75	2762.45	2386.76	2117.53	1986.70	1803.94	1764.08
HFCs	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
SF_6	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO
Total (without LULUCF)	42886.02	38175.48	28376.24	22760.89	19847.63	16758.16	16771.33	14650.82
Total (with LULUCF)	41212.82	37019.46	27460.21	22219.44	18974.66	16002.16	16031.71	13325.88
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
CO_2 (without LULUCF)	7759.55	6008.48	5206.70	6415.19	6484.98	7086.39	7283.96	7576.58
CO_2 (with LULUCF)	6599.56	4694.30	3852.41	5025.16	5252.71	5772.36	5964.54	6195.17
CH_4 (without LULUCF)	3292.29	3347.72	3209.71	3026.60	3031.39	3025.00	2961.96	2883.82
CH_4 (with LULUCF)	3294.80	3350.04	3210.53	3027.81	3031.65	3025.07	2962.18	2884.06
N_2O (without LULUCF)	1553.28	1466.15	1419.33	1377.52	1442.63	1409.15	1421.59	1404.06
N_2O (with LULUCF)	1554.27	1467.06	1419.65	1378.04	1442.75	1409.20	1421.75	1404.16
HFCs	NE, NO	NE, NO	4.21	5.41	7.56	10.02	13.07	18.72
SF_6	NE, NO	NE, NO	NE, NO	NE, NO	NE, NO	0.01	0.28	0.28
Total (without LULUCF)	12605.12	10822.35	9839.95	10824.72	10966.56	11530.56	11680.85	11883.46
Total (with LULUCF)	11448.63	9511.40	8486.80	9436.42	9734.67	10216.65	10361.81	10502.40

Abbreviations: NE – 'Not Estimated'; NO – 'Not Occurring'.

Emissions of CH_4 (without LULUCF) have decreased by circa 39.5 percent: from 4,766.1 Gg CO_2 eq. in 1990, to 2,883.8 Gg CO_2 eq. in 2005, while emissions of N_2O (without LULUCF) decreased by circa 58.1 percent: from 3,354.7 Gg CO_2 eq. in 1990, to 1,404.1 Gg CO_2 eq. in 2005. Halocarbons emissions (in particular HFCs, as no PFCs emissions have been registered so far in the Republic of Moldova) and sulphur hexafluoride (SF_6) emissions commenced in 2000, considered as a reference year for F-gases in the Republic of Moldova. Evolution of these emissions denotes a steady trend towards increase, though their share in the total national emissions structure is insignificant for now.

CO_2 continue to contribute most to the total national direct greenhouse gas emissions in the Republic of Moldova. Figure 2-6 shows the variation of the share of direct GHG emissions by gas in the structure of total national emissions in 1990 and 2005.

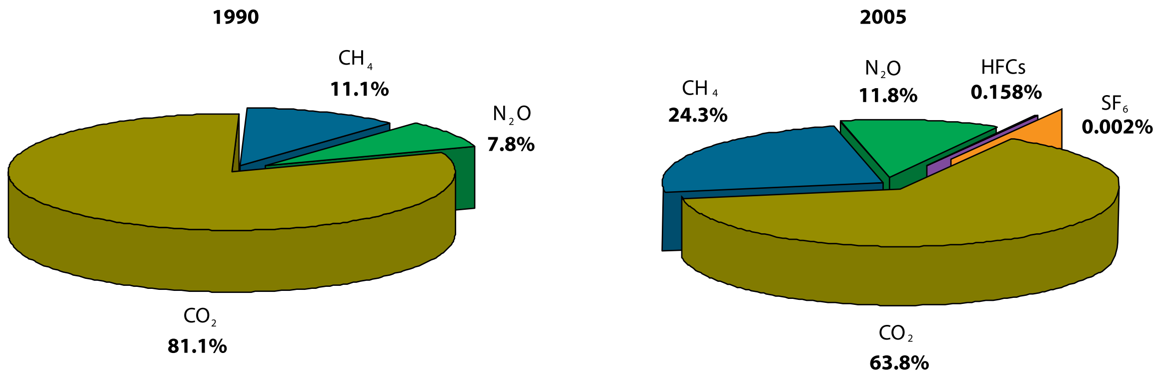


Figure 2-6: Republic of Moldova's GHG Emissions by Gas, 1990 and 2005

In 2005, source categories of CO_2 having the biggest share in the total dioxide of carbon emissions in the Republic of Moldova were: 1A1 'Energy Industries' (2986.57 Gg or 39.4 percent of the total), 1A3b 'Road Transport' (1459.41 Gg or 19.3 percent of the total), 1A4b 'Residential Sector' (1327.44 Gg or 17.5 percent of the total), 1A2 'Manufacturing Industries and Constructions' (396.38 Gg or 5.2 percent of the total), 2A1 'Cement Production' (373.26 Gg or 4.9 percent of the total) and 1A4a 'Institutional and Commercial Sectors' (361.52 Gg or 4.8 percent of the total) (Figure 2-7).

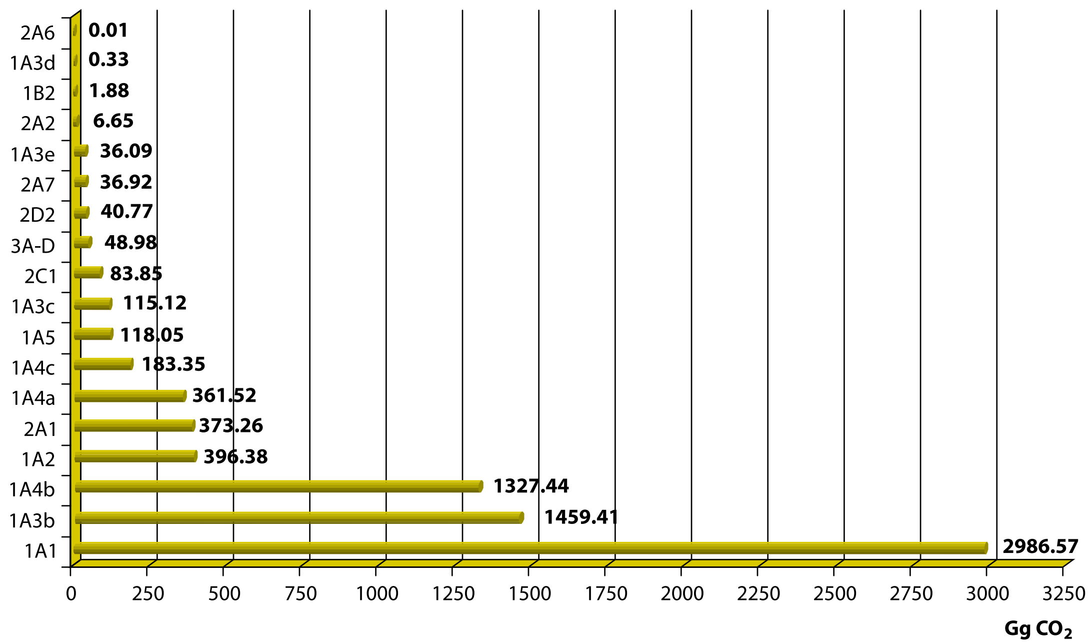


Figure 2-7: 2005 Source Categories of CO_2 in the Republic of Moldova

In 2005, the source categories of CH_4 having the biggest share in the total methane emissions in the Republic of Moldova were: 6A 'Solid Waste Disposal on Land' (1,186.21 Gg CO_2 eq. or 41.1 percent of the total), 4A 'Enteric Fermentation' (792.86 Gg CO_2 eq. or 27.5 percent of the total), 1B2 'Fugitive Emissions From Oil and Natural Gas' (652.01 Gg CO_2 eq. or 22.6 percent of the total) and 6B 'Wastewater Handling' (121.01 Gg CO_2 eq. or 4.2 percent of the total) (Figure 2-8).

In 2005, the source categories of N_2O having the biggest share in the total nitrous oxide emissions in the Republic of Moldova were: 4D 'Agricultural Soils' (699.25 Gg CO_2 eq. or 49.8 percent of the total), 4B 'Manure Management' (565.11 Gg CO_2 eq. or 40.2 percent of the total), 6B 'Wastewater Handling' (92,74 Gg CO_2 eq. or 6.6 percent of the total) and 1A3 Transport (36.07 Gg CO_2 eq. or 2.6 percent of the total) (Figure 2-9).

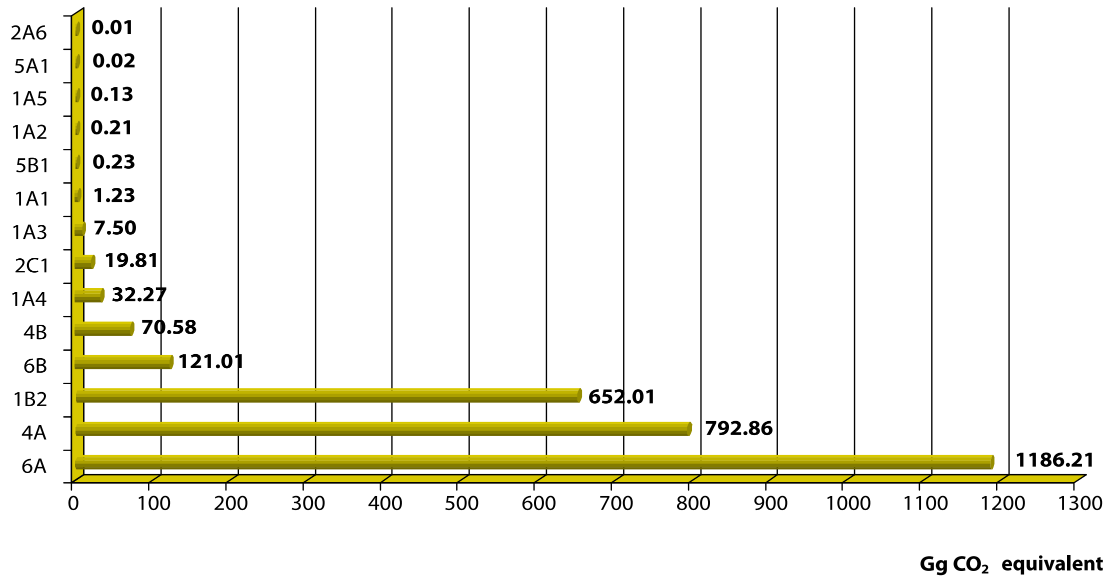


Figure 2-8: 2005 Source Categories of CH_4 in the Republic of Moldova

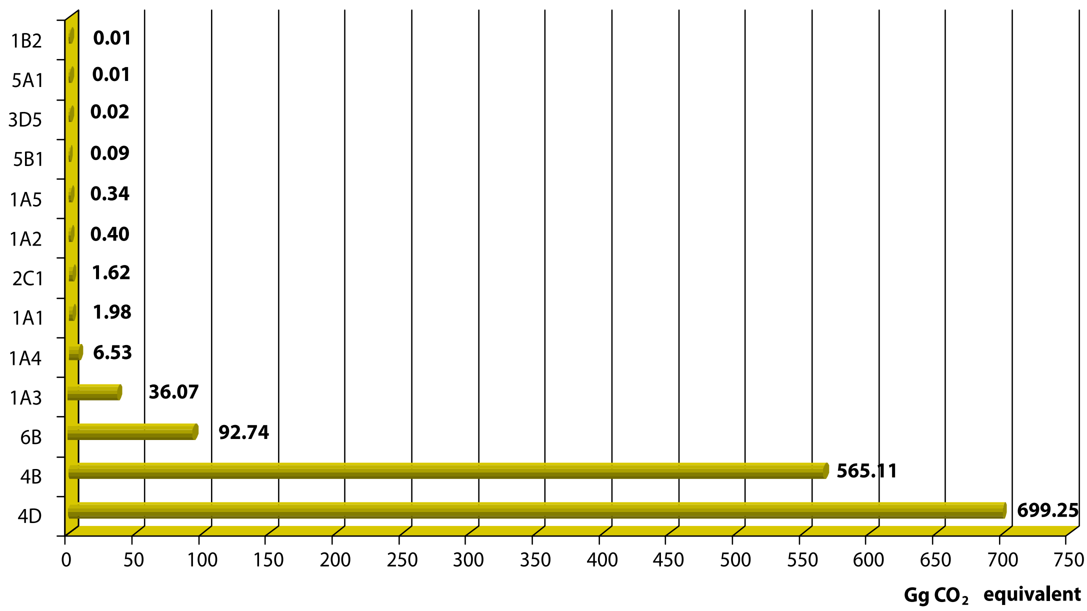


Figure 2-9: 2005 Source Categories of N_2O in the Republic of Moldova

According to the UNFCCC Reporting Guidelines, emissions estimates are grouped into six large IPCC categories: Energy Sector, Industrial Processes Sector, Solvents and Other Products Use Sector, Agriculture Sector, Land Use, Land-Use Change and Forestry Sector and Waste Sector.

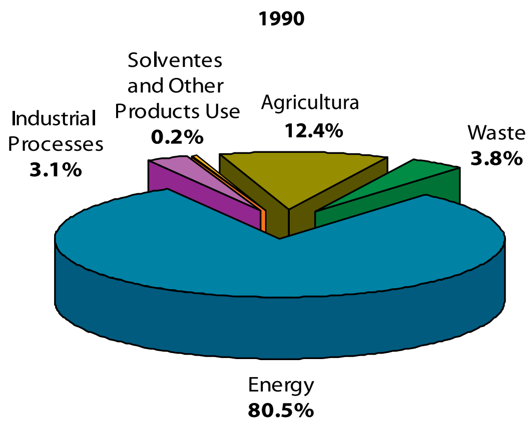
Interpretation of GHG emissions inventory results under Land Use, Land-Use Change and Forestry Sector is somewhat different from other sectors: positive figures indicate that this sector is a net source, while negative figures state that the sector is a net source of removals.

In the time series 1990 through 2005, total direct emissions and removals in the Republic of Moldova tended to decrease, so emissions under Energy Sector decreased by circa 77.6 percent (but increased by 3.1 percent in 2004), Industrial Processes Sector – by circa 56.9 percent (a significant increase by 21.3 percent, against the level of year 2004), Solvents and Other Products Use Sector – by circa 25.3 percent (a 2.5 percent increase against the level of year 2004), Agriculture Sector – by 60.0 percent (decrease by 3.8 percent against the level of year 2004), Land Use, Land-Use Change and Forestry Sector – by 17.5 percent (a 4.7 percent increase against the level of year 2004), Waste Sector – by 14.0 percent (decrease by 3.6 percent against the level of year 2004) (Table 2-9).

Table 2-9: Greenhouse Gas Emission and Sink Trends in the Republic of Moldova by Sector in Gg CO_2 eq., 1990-2005

	1990	1991	1992	1993	1994	1995	1996	1997
1. Energy	34520.39	30220.38	21384.24	16475.22	13975.19	11135.71	11430.27	9526.58
2. IP	1348.75	1103.55	575.77	516.87	382.14	380.65	389.81	434.97
3. SOPU	65.62	59.68	46.88	37.07	31.29	28.06	28.21	29.88
4. Agriculture	5323.92	5035.34	4494.45	3839.78	3599.75	3386.18	3046.47	2839.22
5. LULUCF	-1673.20	-1156.02	-916.03	-541.45	-872.97	-756.00	-739.62	-1324.94
6. Waste	1627.34	1756.53	1874.89	1891.95	1859.26	1827.57	1876.57	1820.17
	1998	1999	2000	2001	2002	2003	2004	2005
1. Energy	7938.33	6184.74	5437.82	6639.87	6738.33	7328.40	7490.74	7724.81
2. IP	354.72	339.26	325.60	331.13	344.10	408.04	479.52	581.90
3. SOPU	30.39	29.77	33.06	34.71	40.78	41.67	47.82	49.00
4. Agriculture	2518.31	2438.03	2312.19	2215.97	2313.91	2253.13	2210.72	2127.79
5. LULUCF	-1156.49	-1310.95	-1353.15	-1388.30	-1231.89	-1313.91	-1319.04	-1381.06
6. Waste	1763.38	1830.55	1731.28	1603.04	1529.44	1499.32	1452.05	1399.96

Energy Sector is the most important source of national direct GHG emissions (without LULUCF), its share varying from 80.5 percent to 65.0 percent over the time series from 1990 through 2005. Other relevant sources are represented by Agriculture Sector (having a share of 12.4 percent in 1990 and respectively 17.9 percent in 2005), Waste Sector (3.8 percent in 1990 and respectively 11.8 percent in 2005), and Industrial Processes Sector (3.1 percent in 1990 and respectively 4.9 percent in 2005) (Figure 2-10).



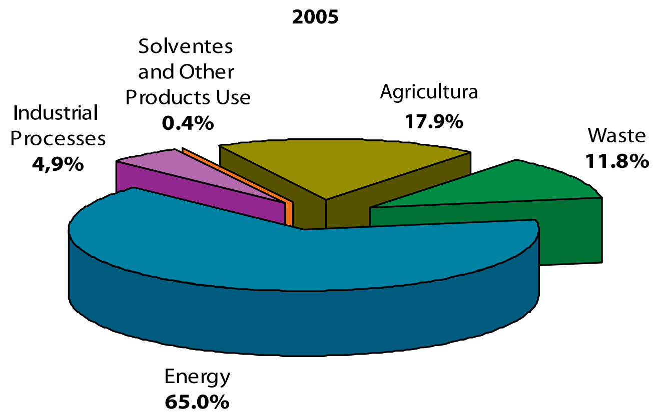


Figure 2-10: Sectoral Breakdown of the Republic of Moldova's GHG Emissions in 1990 and 2005

Energy Sector

Energy-relate d activities are by far the largest source of GHG emissions in the Republic of Moldova. The Energy Sector includes emissions of all GHGs from fuel combustion for the primary purpose of delivering energy. Emissions in this sector are classified as either fuel combustion (91.5 percent of total emissions per sector in 2005) or fugitive releases (8.5 percent of total emissions per sector in 2005). Fugitive emissions are defined as intentional or unintentional releases of GHGs from the production, processing, transmission, storage, and delivery of fossil fuels.

Table 2-10: GHG Emissions from Energy Sector by IPCC Sub-Sectors in the Republic of Moldova for selected years

Source Categories	1990	1995	2000	2004	2005
	Gg CO_2 eq				
1. Energy	34520.3934	11135.7054	5437.8217	7490.7434	7724.8084
A. Fuel Combustion	33837.4613	10579.7236	4934.4264	6873.2101	7070.9133
A.1. Energy Industries	19393.2858	6931.7635	2653.7086	2944.2215	2989.7745
A.2. Manufacturing industries and constructions	2195.8930	316.6535	258.1721	319.8028	396.9942
A.3. Transport	4055.6062	1328.5183	848.2701	1621.5871	1654.5168
A.4. Other Sectors	8037.7787	1829.4654	1122.7638	1864.5957	1911.1082
A.5. Other	154.8976	173.3229	51.5118	123.0030	118.5196
B. Fugitive Emissions	682.9320	555.9818	503.3952	617.5333	653.8950
B.2. Fugitive Emissions from Oil and Natural Gas	682.9320	555.9818	503.3952	617.5333	653.8950

Overall, fuel combustion and fugitive emissions accounted for 65 per cent of total Republic of Moldova's GHG emissions in 2005. Between 1990 and 2005, total GHG emissions from Energy Sector decreased by circa 77.6 percent: from 34520.39 Gg CO_2 eq. in 1990 to la 7724.81 Gg CO_2 eq. in 2005 (Table 2-10).

The 1A1 'Energy Industries' grouped in the Energy Sector, contribute more than any other category to the Republic of Moldova's emissions, accounting for circa 38.7 percent of the total per sector in 2005 (56.2 percent in 1990). Other relevant categories are represented by 1A4 'Other Sectors', accounting for 24.7 percent of the total per sector in 2005 (23.3 percent in 1990), 1A3 'Transport', accounting for circa 21.4 percent of the total in 2005 (11.7 percent in 1990) and 1B2 'Fugitive Emissions' accounting for 8.5 percent of the total in 2005 (2.0 percent in 1990) (Figure 2-11).

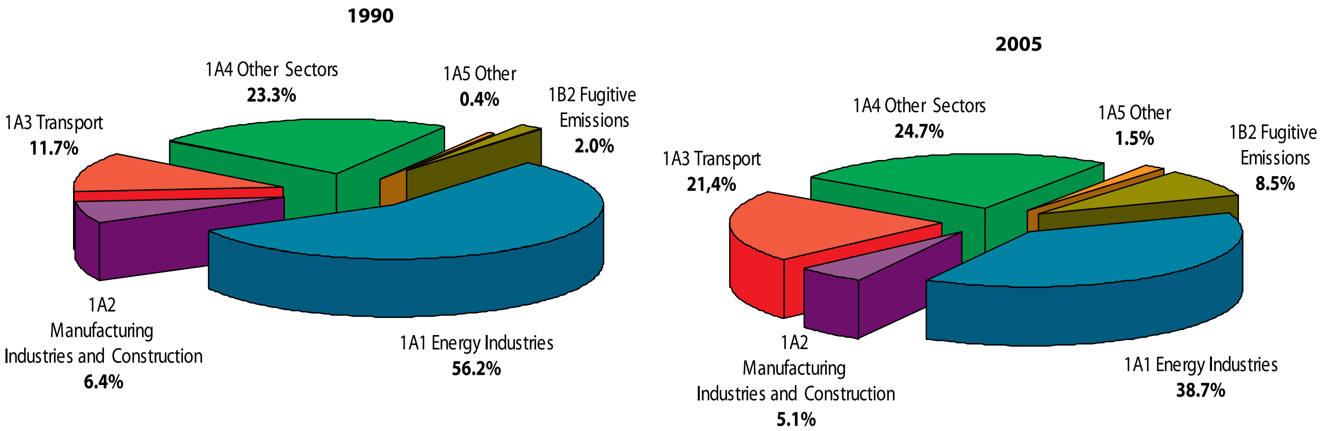


Figure 2-11: Energy Sector Greenhouse Gas Sources in the Republic of Moldova in 1990 and 2005

Fuel Combustion

Between 1990 and 2005, fuel combustion-related emissions decreased by 79.1 percent: from 3,3837.5 Gg CO_2 eq. in 1990, to 7,070.9 Gg CO_2 eq. in 2005 (Table 2-3). Fuel combustion emissions are divided into the following IPCC sub-sectors: 1A1 'Energy Industries', 1A2 'Manufacturing Industries and Constructions', 1A3 'Transport' (1A3a 'Aviation', 1A3b 'Roads', 1A3c 'Railways', 1A3d 'Navigation', 1A3e 'Pipelines'), 1A4 'Other Sectors' (1A4a 'Institutional and Commercial', 1A4b 'Residential' and 1A4c 'Agriculture/Forestry/Fishing') and 1A5 'Other' (other works and needs in energy sector, including military transport).

Energy Industries (2005 GHG emissions, 2,989.77 Gg CO_2 eq.)

The 'Energy Industries' sub-sector accounts for the largest portion of Republic of Moldova's fuel combustion emissions (38.7 percent of the total in 2005, 56.2 percent in 1990). Emissions included in this sub-sector are from stationary sources producing and processing energy (inclusive public electricity and heat production). Between 1990 and 2005, GHG emissions originated from 1A1 'Energy Industries' decreased by 84.6 percent: from 19,393.29 Gg CO_2 eq. in 1990, to 2,989.77 Gg CO_2 eq. in 2005. However, between 2004 and 2005, the respective emissions increased by 1.5 percent (Table 2-10).

In 1990, 35.1 percent from the total carbon dioxide emissions within 1A1 'Energy Industries' originated from liquid fuel combustion, 33.1 percent from solid fuel combustion and 31.8 percent from gaseous fuel combustion (Table 2-11).

Table 2-11: CO_2 emissions from 1A1 'Energy Industries' in the Republic of Moldova for selected years, Gg

	1990	1995	2000	2004	2005
Solid fuels combustion	6394.4000	2183.1189	1.1820	14.6774	12.3896
Liquid fuels combustion	6785.7400	1067.4143	143.2291	62.2841	59.2146
Gaseous fuels combustion	6152.6300	3663.0845	2506.4509	2863.9835	2914.9673
Total CO_2 emissions from fuel combustion	19332.7700	6913.6176	2650.8620	2940.9450	2986.5715

By 2005 the share of natural gas in the structure of CO_2 emissions from 1A1 'Energy Industries' reached 97.6 percent of the total, the share of other types of fuels decreasing more than significantly: 2.0 percent – liquid fuels (i.e., Residual Fuel Oil, Diesel Oil, LNG, Kerosene) and as little as 0.4 percent - solid fuels (Anthracite, Bituminous Coal, Lignite, Coking Coal).

The reduction of CO_2 emissions between 1990 and 2005 is most frequently associated with a drastic drop in solid fuel consumption for electricity production, in particular at Moldovan Thermal Power Plant in Dnestrovsc (MTPP), which since 1999 does not use coal. The main fuel currently used in the Republic of Moldova for electricity production is natural gases, which has less GHG intensity (emissions per unit electricity) of all fuels (i.e., coal, residual fuel oil).

Manufacturing Industries and Construction (2005 GHG emissions, 396.99 Gg CO_2 eq.)

Emissions from 'Manufacturing Industries and Construction' sub-sector include the combustion of fossil fuels by the iron and steel, non-ferrous metals, chemicals, cement, construction, mining and all manufacturing industries. Overall, this sub-sector was responsible for 5.1 per cent of Energy Sector's total GHG emissions for 2005 (6.4 percent in 1990). Between 1990 through 2005 emissions from this source category decreased by circa 81.9 percent: from 2,195.89 Gg CO_2 eq. in 1990, to 396.99 Gg CO_2 eq. in 2005. However, between 2004 and 2005 respective emissions increased by circa 24.1 percent (Table 2-10).

In 1990, 67.9 percent from the total carbon dioxide emissions within 1A2 'Manufacturing Industries and Construction' originated from stationary liquid fuel combustion, 22.7 percent from gaseous fuel combustion and 9.4 percent from solid fuel combustion (Table 2-12). By 2005, the share of natural gas in the structure of CO_2 emissions covered by the source category 1A2 'Manufacturing Industries and Construction' reached 86.3 percent of the total, the share of other types of fuel decreasing significantly: the share of solid fuels (Anthracite, Coking Coal, Bituminous Coal, Lignite) – 5.0 percent and the share of liquid fuels (Residual Fuel Oil, Diesel Oil, Gasoline, Liquefied Petroleum Gases) – 8.7 percent. The reduction of CO_2 emissions between 1990 and 2005 is most frequently associated with considerable reduction in liquid fuel consumption (residual fuel oil and diesel oil) and solid fuel (anthracite and coking coal). Between 1990 and 2005, there have been also changes in the emissions produced by the various categories within the 'Manufacturing Industries and Construction' sub-sector. This can be attributed to product demands, fuel switching, and changes in manufacturing operations.

Table 2-12: CO_2 Emissions from 1A2 'Manufacturing Industries and Construction' in the Republic of Moldova for selected years, Gg

	1990	1995	2000	2004	2005
Solid fuels combustion	204.6881	45.8130	19.9224	17.6240	19.9660
Liquid fuels combustion	1486.3593	97.1065	34.5368	37.6063	34.4961
Gaseous fuels combustion	497.6811	172.8587	203.2514	264.0369	341.9183
Total CO_2 emissions from fuel combustion	2188.7285	315.7781	257.7106	319.2672	396.3804

Transport (2005 GHG emissions, 1,654.52 Gg CO_2 eq.)

Transport is a large and diverse sub-sector, accounting for 21.4 percent of the total sectoral GHG emission in 2005 (11.7 percent in 1990). This sub-sector includes emissions from fuel combustion for the transport of passengers and freight in the following sub-categories: road transportation, railways, navigation and other (pipeline transportation, which includes combustion emissions primarily from natural gas transport).

From 1990 to 2005, GHG emissions from 1.A.3 'Transport', decreased by circa 59.2 percent: from 4,055.61 Gg CO_2 eq. in 1990, to 1,654.52 Gg CO_2 eq. in 2005. However, between 2004 and 2005, respective emissions increased by 2.0 percent (Table 2-13).

In 1990, 84.8 percent of total GHG emissions originated from 1A3 'Transport' sub-sector resulted from 1A3b 'Road transport', 12.5 percent from 1A3c 'Railways', 2.2 percent from 1A3e 'Pipeline Transportation' and only 0.5 percent from 1A3d 'Navigation' (Figure 2-12).

Table 2-13: GHG Emissions from the Transport Sub-sector by Category in the Republic of Moldova for selected years

Source categories	1990	1995	2000	2004	2005
	Gg CO_2 eq				
1A3 Transport	4055.6062	1328.5183	848.2701	1621.5871	1654.5168
1A3b Road Transportation	3438.2863	1083.0985	734.6764	1457.2197	1489.0584
1A3c Railways	507.0418	161.6583	82.9941	126.0804	129.0329
1A3d Navigation	19.0998	0.1815	0.2069	0.2961	0.3343
1A3e Pipeline Transportation	91.1782	83.5800	30.3927	37.9909	36.0914

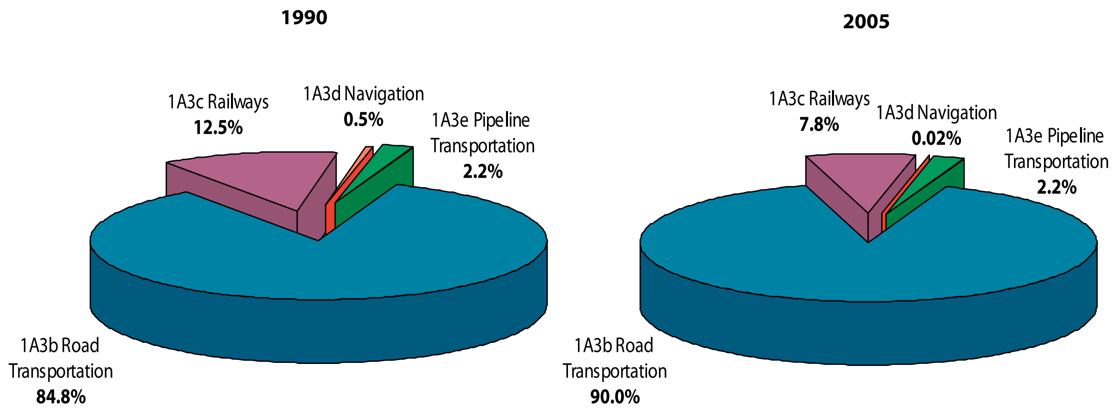


Figure 2-12: Transport Sub-sector Greenhouse Gas Sources in the Republic of Moldova in 1990 and 2005

By 2005, the share of 1A3b 'Road Transportation' reached 90.0 percent of the total sub-sectoral GHG emissions, the share of 1A3c 'Railways' and 1A3d 'Navigation' reducing to circa 7.8 percent and respectively 0.02 percent of the total, while the share of the source category 1A3e 'Pipeline Transportation' remained unchanged, circa 2.2 percent of the total.

Other Sectors (2005 GHG emissions, 1,911.11 Gg CO_2 eq.)

The 'Other Sectors' sub-sector comprises fuel combustion emissions from the residential, institutional and commercial categories, as well as stationary fuel combustion from the agriculture (inclusive for transportation needs), forestry and fishing categories. Overall, this sub-sector accounted for 24.7 percent of the total sectoral GHG emission in 2005 (23.3 percent in 1990) and exhibited a decrease of 76.2 percent between 1990 and 2005: from 8,037.78 Gg CO_2 eq. in 1990, to 1,911.11 Gg CO_2 eq. in 2005. However, between 2004 and 2005, respective emissions increased by 2.5 percent (Table 2-14).

In 1990, 57.9 percent of total GHG emissions originated from 1A4 'Other Sectors' sub-sector resulted from 1A4b 'Residential', 24.3 percent from 1A4c 'Agricultural / Forestry / Fishing', and 17.7 percent from 1A4a 'Institutional and Commercial'. By 2005, the share of 1A4b and 1A4a in the structure of total GHG emissions originated from 1A4 'Other Sectors' reached 71.2 percent and respectively 19.1 percent of the total, while the share of 1A4c decreased up to 9.6 percent of the total (Figure 2-13).

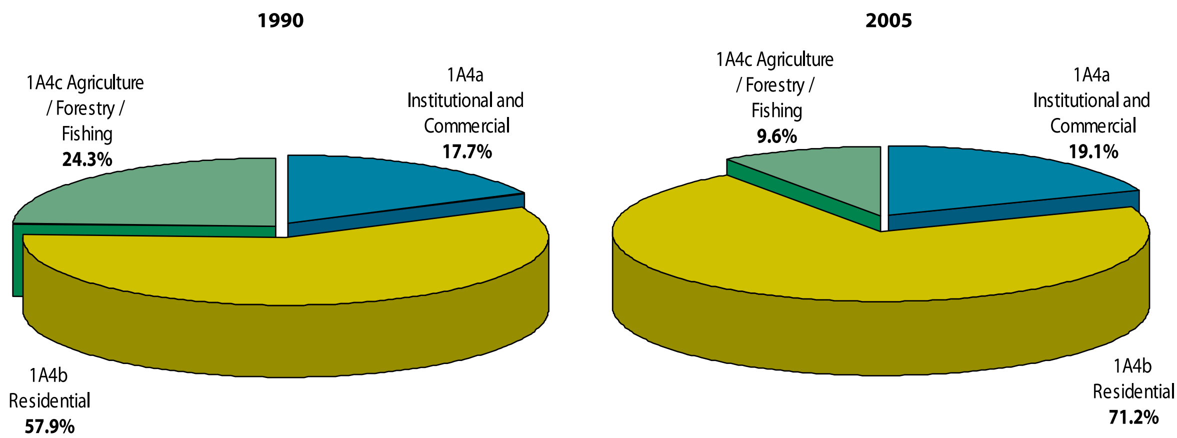


Figure 2-13: 'Other Sectors' Sub-sector Greenhouse Gas Sources in the Republic of Moldova in 1990 and 2005

Commercial and Institutional (2005 GHG emissions, 365.32 Gg CO_2 eq.)

Emissions covered by this sub-sector preponderantly result from the stationary combustion of fuels used for heating the commercial and institutional premises. Overall, the 1.A4.a 'Institutional and Commercial' category accounted for 4.7 percent of the total sectoral GHG emission in 2005 (4.1 percent in 1990) and exhibited a decrease of 74.3 percent: from 1,424.07 Gg CO_2 eq. in 1990, to 365.32 Gg CO_2 eq. in 2005. Between 2004 and 2005, respective emissions decreased by 7.6 percent (Table 2-14).

In 1990, 81.1 percent of CO_2 emissions originated from 1A4a 'Institutional and Commercial' resulted from solid fuels combustion, 13.2 percent from liquid fuels combustion and 5.6 percent from gaseous fuels combustion (Table 2-15).

Table 2-14: GHG Emissions from 'Other Sectors' Sub-sector by Category in the Republic of Moldova for selected years

Source categories	1990	1995	2000	2004	2005
	Gg CO_2 eq				
1A4 Other sectors	8037.7787	1829.4654	1122.7639	1864.5957	1911.1082
1A4a Institutional/Commercial	1424.0685	395.0255	212.3073	395.2562	365.3157
1A4b Residential	4657.3239	712.4244	666.0628	1252.3923	1361.4120
1A4c Agriculture/Forestry/Fishing	1956.3862	722.0155	244.3937	216.9473	184.3805

Table 2-15: CO_2 Emissions from 1A4a 'Institutional and Commercial' Source Category in the Republic of Moldova for selected years, Gg

	1990	1995	2000	2004	2005
Solid Fuels Combustion	1146.0452	331.2165	150.8716	251.2682	211.0987
Liquid Fuels Combustion	186.6671	27.8673	28.9304	12.5625	6.0556
Gaseous Fuels Combustion	79.7809	32.2923	30.3927	127.2696	144.3655
Total CO_2 Emissions from Fuel Combustion	1412.4933	391.3760	210.1948	391.1004	361.5198

By 2005, the share of solid and liquid fuels in the structure of total CO_2 emissions originated from the category 1A4a 'Institutional and Commercial' decreased up to 58.4 percent, respectively 1.7 percent of the total, while the share of natural gases increased up to 39.9 percent of the total. The reduction of CO_2 emissions between 1990 and 2005 is most frequently associated with a drastic drop in liquid and solid fuel consumption, as well as with the fuel switching, from more to less GHG intensity fuels (the share of solid and liquid fuels decreased significantly, while the share of natural gases increased).

Residential (2005 GHG emissions, 1,361.41Gg CO_2 eq.)

Emissions covered by this sub-sector preponderantly result from the combustion of fuels to heat residential buildings. Overall, the 1.A4.b 'Residential' source category accounted for 17.6 percent of the total sectoral GHG emission in 2005 (13.5 percent in 1990) and exhibited a decrease of 70.8 percent: from 4,657.32 Gg CO_2 eq. in 1990, to 1,361.41 Gg CO_2 eq. in 2005. Between 2004 and 2005, respective emissions increased by 8.7 percent (Table 2-14).

In 1990, 78.0 percent of CO_2 emissions originated from 1A4b 'Residential' source category resulted from solid fuels combustion, 10.9 percent from liquid fuels combustion and 11.1 percent from gaseous fuels combustion (Table 2-16). By 2005, the share of solid and liquid fuels in the structure of total CO_2 emissions originated from the 1A4b 'Residential' decreased up to 15.4 percent, respectively 10.0 percent of the total, while the share of natural gases increased up to 74.7 percent of the total.

The reduction of CO_2 emissions between 1990 and 2005 is most frequently associated with a drastic drop in liquid and solid fuel consumption, as well as with the fuel switching, from more to less GHG intensity fuels (the share of solid and liquid fuels decreased significantly, while the share of natural gases increased more than significantly, by circa 7 times).

Table 2-16: CO_2 Emissions from 1A4b 'Residential' Source Category in the Republic of Moldova for selected years, Gg

	1990	1995	2000	2004	2005
Solid Fuels Combustion	3437.1256	181.7013	125.5597	176.4252	204.0864
Liquid Fuels Combustion	482.3247	34.8582	87.5968	135.0756	132.1707
Gaseous Fuels Combustion	488.1833	440.6947	419.1538	909.5026	991.1831
Total CO_2 Emissions from Fuel Combustion	4407.6336	657.2541	632.3103	1221.0034	1327.4402

Agriculture, Forestry and Fishing (2005 GHG emissions, 184.38 Gg CO_2 eq.)

Emissions covered by this sub-sector preponderantly result from the combustion of fuel for heating of premises, greenhouses, water pumping for irrigation, etc., as well as from mobile combustion for operating agricultural machinery. Overall, the 1.A4.c 'Agriculture / Forestry / Fishing' category accounted for 2.4 percent of the total sectoral GHG emission in 2005 (5.7 percent in 1990) and exhibited a decrease of 90.6 percent: from 1,956.39 Gg CO_2 eq. in 1990, to 184.38 Gg CO_2 eq. in 2005. Between 2004 and 2005, respective emissions decreased by 15.0 percent (Table 2-14).

In 1990, 91.6 percent of CO_2 emissions originated from 1A4c 'Agriculture/Forestry/ Fishing' source category resulted from mobile liquid fuel combustion, 5.5 percent from stationary liquid fuel combustion, 2.7 percent from solid fuel combustion and 0.2 percent from gaseous fuel combustion. In 2005, no CO_2 emissions were registered from solid fuels combustion and stationary combustion of liquid fuels. The share of CO_2 emissions resulted from mobile liquid fuel combustion increased up to 96.9 percent, the rest of 3.1 percent, respectively from the natural gases (Table 2-17). The reduction of CO_2 emissions between 1990 and 2005 is most frequently associated with a drastic drop in total fuel consumption, as well as with the fuel switching, from more to less GHG intensity fuels, in particular of liquid fuel consumption (Residual Fuel Oil, LNG, Diesel Oil, Kerosene).

Table 2-17: CO_2 Emissions from 1A4c 'Agriculture/Forestry/ Fishing' Source Category in the Republic of Moldova for selected years, Gg

	1990	1995	2000	2004	2005
Solid Fuel Combustion	53.0345	8.5207	0.0000	0.0000	0.0000
Stationary Liquid Fuel Combustion	106.6372	3.1508	12.6032	0.0000	0.0000
Mobile Liquid Fuel Combustion	1778.8921	696.2703	220.9502	202.4670	177.6497
Gaseous Fuel Combustion	3.7991	9.4977	9.4977	13.2968	5.6986
Total CO_2 Emissions from Fuel Combustion	1942.3629	717.4395	243.0511	215.7638	183.3484

Other (2005 GHG emissions,118.52 Gg CO_2 eq.)

Emissions from 'Other' sub-sector include the combustion of fossil fuels for other works and needs in energy sector, inclusive the military transport. Overall, this sub-sector was responsible for 0.4 per cent of Energy Sector's total GHG emissions for 2005 (1.0 percent in 1990). Between 1990 through 2005 emissions from this source category decreased by 23.5 percent: from 154.90 Gg CO_2 eq. in 1990, to 118.52 Gg CO_2 eq. in 2005. Between 2004 and 2005 respective emissions decreased by 3.6 percent (Table 2-10).

In 1990, 52.6 percent from the total CO_2 emissions within 1A5 'Other' originated from liquid fuel combustion, 29.6 percent from solid fuel combustion and 18.2 percent from gaseous fuel combustion (Table 2-18). By 2005, the share of liquid fuels (Residual Fuel Oil, Diesel Oil, Gasoline, Kerosene, Liquefied Gases, Other Oil Products) in the structure of CO_2 emissions covered by the source category 1A5 'Other' reached 91.4 percent of the total, the share of other types of fuel decreasing significantly: the share of solid fuels (Anthracite, Bituminous Coal, Lignite) accounted for as much as 2.1 percent only and 6.4 percent the share of natural gases. The reduction of CO_2 emissions between 1990 and 2005 is most frequently associated with considerable reduction in liquid fuel consumption (Residual Fuel Oil and Diesel Oil) and solid fuel (Anthracite and Coking Coal). The reduction of CO_2 emissions between 1990 and 2005 is most frequently associated with a drastic drop in total fuel consumption (Anthracite, Coking Coal and Natural Gases).

Table 2-18: CO_2 emissions from 1A5 'Other' Sub-sector in the RM for selected years, Gg

	1990	1995	2000	2004	2005
Solid Fuels Combustion	45.1353	24.4293	9.6757	4.9321	2.5255
Liquid Fuels Combustion	81.0989	145.9833	41.5776	111.9394	107.9239
Gaseous Fuels Combustion	28.0373	2.2605	0.0000	5.6986	7.5982
Total CO_2 Emissions from Fuel Combustion	154.2715	172.6731	51.2533	122.5701	118.0475

Fugitive Emissions from Oil and Natural Gases (2005 GHG emissions, 653.90 Gg CO_2 eq.)

As stated above, fugitive emissions from fossil fuels are the intentional or unintentional releases of GHGs from the production, processing, transmission, storage, and deliver of fossil fuels.

In the Republic of Moldova fugitive emissions originated basically from activities related to the oil and natural gas industry. Overall, the category 1.B.2 'Fugitive Emissions from Oil and Natural Gases' was responsible for 8.5 per cent of Energy Sector's total GHG emissions for 2005 (2.0 percent in 1990). Between 1990 through 2005 emissions from this source category decreased by 4.3 percent: from 682.93 Gg CO_2 eq. in 1990, to 653.90 Gg CO_2 eq. in 2005 (Table 2-10, Figure 2-14).

International Bunkers: Aviation (2005 GHG emissions, 64.64 Gg CO_2 eq.)

Between the 1990 and 2005, GHG emissions covered from the 'International Bunkers: Aviation' (Memo Items) decreased by 70.7 percent: from 220.43 Gg CO_2 eq. in 1990 to 64.64 Gg CO_2 eq. in 2005 (Figure 2-15).

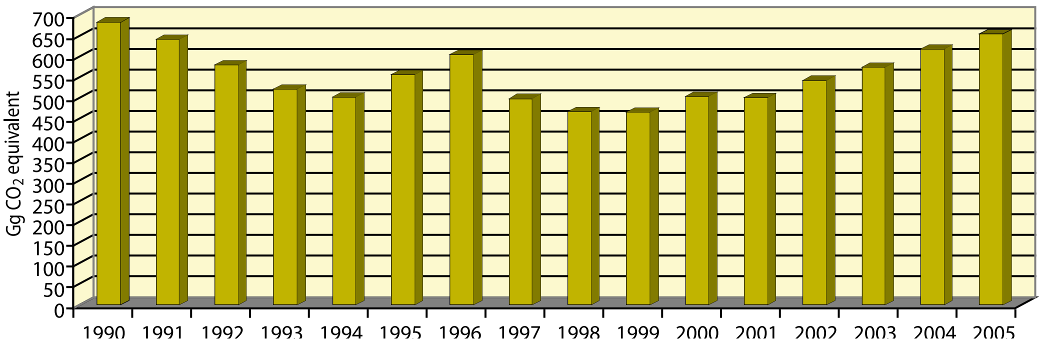


Figure 2-14: GHG Emissions from 1B2 Source Category in the RM, 1990-2005

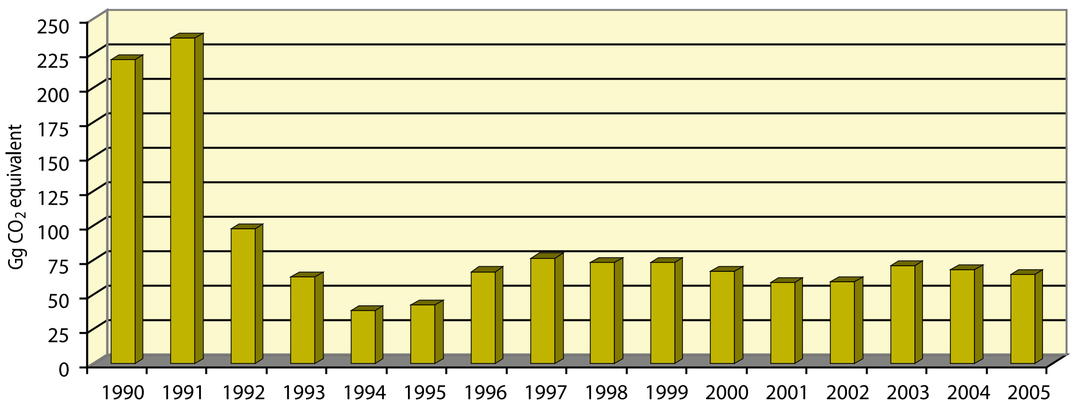


Figure 2-15: Direct GHG Emissions from 'International Bunkers' (Aviation) in the Republic of Moldova, 1990-2005

CO_2 emissions from the 'International Bunkers: Aviation' (Memo Items) decreased by 70.6 percent: from 217.37 Gg in 1990 to 63.96 Gg in 2005; CH_4 emissions: by 97.7 percent: from 0.90 Gg in the baseline year to 0.02 Gg in 2005, while N_2O emissions: by 69.4 percent: from 2.16 Gg in 1990 to 0.66 Gg in 2005 (Table 2-19).

Table 2-19: Greenhouse Gas Emissions from 'International Bunkers' (Aviation) in the Republic of Moldova, 1990-2005

Source categories	1990	1995	2000	2004	2005
	Gg CO_2 eq				
Memo Items: International Aviation	220.4264	42.4613	66.9503	67.9534	64.6384
CO_2 emissions	217.3668	41.9185	66.1989	67.2294	63.9592
CH_4 emissions	0.9036	0.1267	0.0851	0.0375	0.0203
N_2O emissions	2.1560	0.4161	0.6663	0.6865	0.6589

CO_2 Emissions from Biomass (2005 GHG emissions, 295.04 Gg)

Under Memo Items there are also monitories the CO_2 emissions from biomass. In conformity with recommendations provided in the Revised 1996 IPCC Guidelines (IPCC, 1997), GHG emissions from biomass were estimated under each individual source category of the Energy Sector: non-CO_2 emissions was reported under the respective source categories, while CO_2 emissions were reported separately, under 'Memo Items', being not included into the national totals.

Between 1990 and 2005, the CO_2 emissions from Biomass (Memo Items) in the Republic of Moldova showed a raising trend, increasing by circa 39.9 percent: from 210,83 Gg in 1990 up to 295.04 Gg in 2005 (Figure 2-16).

Comparison of Sectoral and Reference Approaches

In conformity with recommendations provided in the GPG (IPCC, 2000), CO_2 emissions, calculated by using two distinct approaches: reference method and sectoral method, were compared. Below is presented the difference between CO_2 emission estimates c alculated by using "top down" (reference) approach and "bottom up" (sectoral) approach (Table 2-20). It has been stated that total national CO_2 emissions calculated based on "bottom up" (sectoral) approach have higher values than the values calculated by using a "top down" (reference) approach, the differences varying from a minimum of 0.28 percent in 1994 and maximum of 1.35 percent in 2000. These differences result from activity data on liquid fuels consumption, in particular from the amount of kerosene used in aviation international transport.

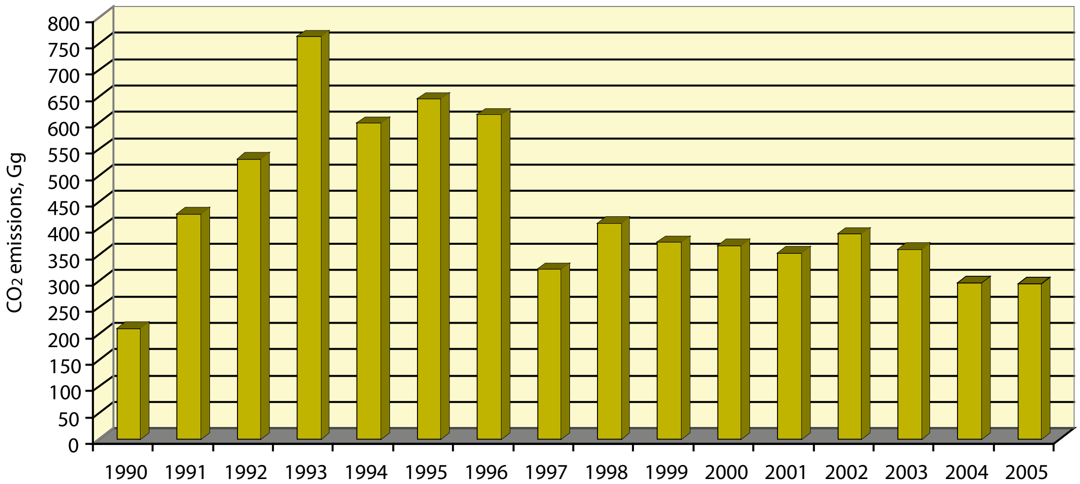


Figure 2-16: CO_2 Emissions from Biomass (Memo Items) in the Republic of Moldova, 1990-2005

Table 2-20: Comparison of CO_2 Emissions Estimated by Using Sectoral and Reference Approaches in the Republic of Moldova

	1990	1991	1992	1993	1994	1995	1996	1997
Reference Approach, Gg	33153.09	28964.68	20492.67	15714.89	13266.94	10415.33	10623.45	8857.12
Sectoral Approach, Gg	33364.92	29192.48	20586.87	15775.64	13303.94	10456.35	10687.89	8931.13
Differences, %	0.64	0.79	0.46	0.39	0.28	0.39	0.61	0.84
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Reference Approach, Gg	7317.16	5583.79	4805.08	6016.58	6059.83	6595.29	6723.10	6921.70
Sectoral Approach, Gg	7388.07	5654.72	4869.83	6073.53	6117.16	6663.78	6788.91	6984.26
Differences, %	0.97	1.27	1.35	0.95	0.95	1.04	0.98	0.90

Industrial Processes Sector

The Industrial Processes Sector includes GHG emissions that are direct by-products of processes, including mineral production, chemical industry, metal production, food and beverage production and consumption of halocarbons and SF_6. In 2005 GHG emissions from the Industrial Processes Sector accounted for 4.9 percent of the total national GHG emissions (3.1 percent in 1990).

Between 1990 and 2005, total sectoral GHG emissions decreased by 56.9 percent: from 1,348.75 Gg CO_2 eq. in 1990, to 581.90 Gg CO_2 eq. in 2005 (Table 2-21, Figure 2-17). However, between 2004 and 2005, respective emissions increased by 21.3 percent, in particular as a result of cement production growth.

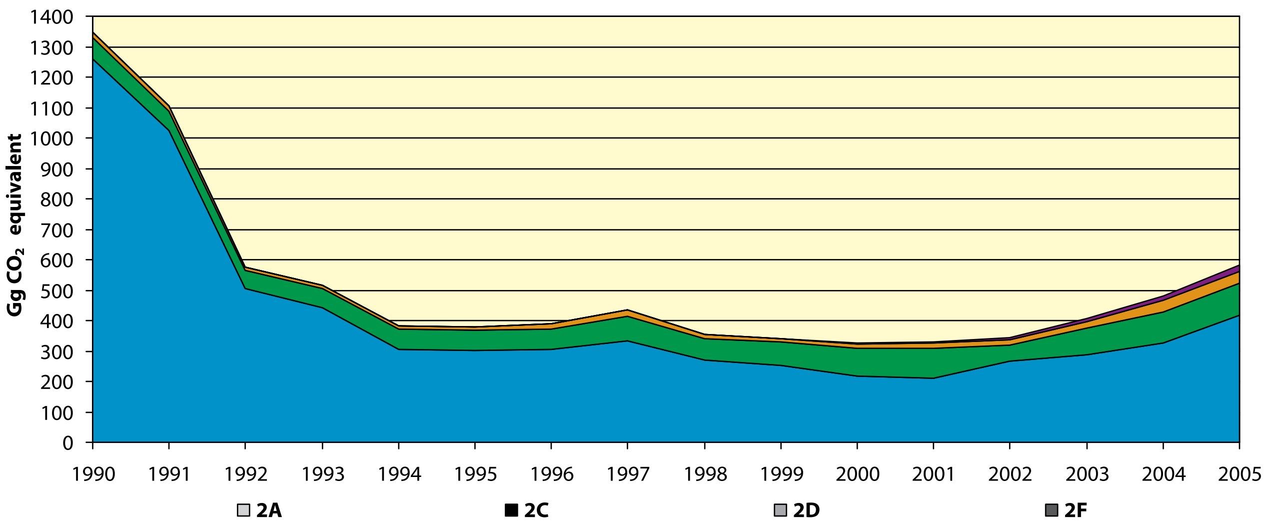


Figure 2-17: GHG Emissions from Industrial Processes by Category in the Republic of Moldova, 1990-2005

Table 2-21: GHG Emissions from Industrial Processes by Category for selected years, Gg CO_2 eq

Source Categories	1990	1995	2000	2004	2005
2. Industrial Pro-cesses	1348.7472	380.6453	325.6035	479.5229	581.9002
A. Mineral Pro-ducts	1257.9118	302.7174	217.9316	327.9019	416.8448
1. Cement Pro-duction	988.2518	252.3529	175.5925	288.9106	373.2628
2. Lime Producti-on	149.2228	28.3399	11.0292	2.2643	6.6467
6. Asphalt Pro-duction	0.3156	0.0957	0.0084	0.0114	0.0168
7a. Glass Production	59.4234	8.1300	19.3617	19.0404	20.8035
7b. Mineral Wool Production	8.0816	0.5721	0.0848	0.0000	0.0000
7c. Bricks Pro-duction	52.6166	13.2268	11.8549	17.6752	16.1150
C. Metal Produ-ction	71.1959	65.9755	91.2183	101.7723	105.2857
1. Steel Producti-on	71.1959	65.9755	91.2183	101.7723	105.2857
D. Other	19.6395	11.9524	12.2455	36.4980	40.7669
2. Food and Drink	19.6395	11.9524	12.2455	36.4980	40.7669
F. Consumption of Halocarbons and SF_6	0.0000	0.0000	4.2080	13.3506	19.0028
1. Refrigeration and Air Conditio-ning Equipment	0.0000	0.0000	4.2080	13.0716	18.7185
4. Aerosols	0.0000	0.0000	0.0000	0.0007	0.0004
8. Electrical Equipment	0.0000	0.0000	0.0000	0.2782	0.2839

The largest source of emission in 2005 was category 2A 'Mineral Products' (Cement, Lime, Asphalt, Glass, Bricks, Mineral Wool), accounting for 71.6 percent of the total sectoral GHG emissions in 2005 (93.3 percent in 1990) (Figure 2-18).

Other relevant sources in 2005 were represented by 2C 'Metal Production' (Iron and Steel) accounting for 18.1 percent from the total (5.3 percent in 1990), 2D 'Other Production' (Food and Drink) - 7.0 percent from the total (1.5 percent in 1990) and 2F 'Consumption of HFCs and SF_6' (Refrigeration and Air Conditioning Equipment, Aerosols, Electric Equipment) - 3.3 percent of the total sectoral GHG emissions.

In 1990, 78.6 percent from the GHG emissions originated from the largest source of emissions within the Industrial Processes Sector, which is the Category 2A 'Mineral Products' resulted from 2A1 'Cement Production', 11.9 percent from 2A2 'Lime Production', 4.7 percent from 2A7a 'Glass Production', 4.2 percent from 2A7c 'Brick Production', 0.6 percent from 2A7b 'Mineral Wool Production' and 0.03 percent from 2A6 'Asphalt Production'. By 2005, the share of 2A1 'Cement Production' and 2A7a 'Glass Production' somewhat increased, while the share of other sources under this category decreased significantly (Figure 2-19).

Solvents and Other Products Use Sector

In the RM Solvents and Other Products Use Sector is a modest source and includes emissions of non-methane volatile organic compounds (NMVOC), also considered as a CO_2 emissions source - as the majority of solvents are obtained from fossil fuels, as well as N_2O emissions from use of N_2O for anaesthesia. In 2005, the respective sector accounted for as little as circa 0.4 percent of the total national GHG emissions (0.2 percent in 1990).

Between 1990 and 2005, the total GHG emissions covered by this sector decreased by 25.3 percent: from 65.62 Gg

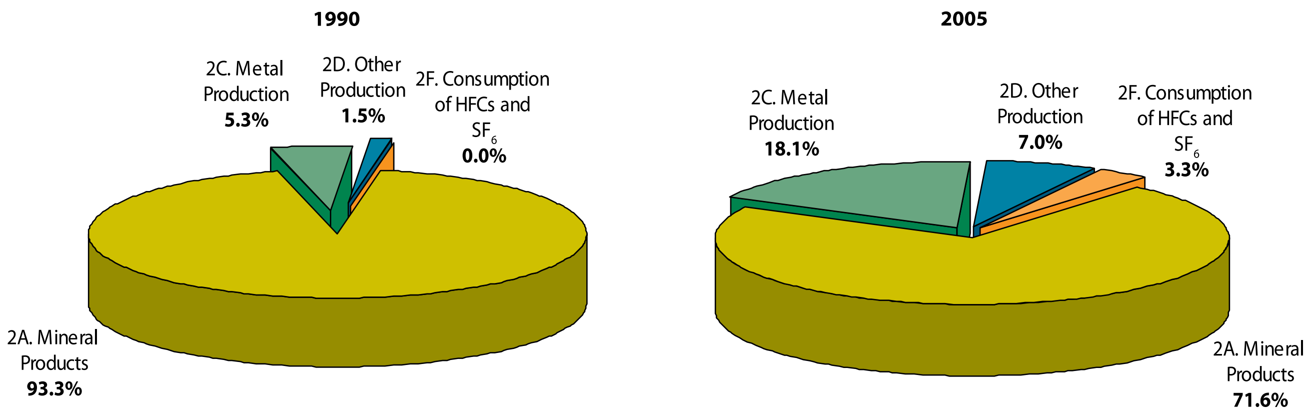


Figure 2-18: Breakdown of Industrial Processes' GHG Emissions by Category in the Republic of Moldova in 1990 and 2005

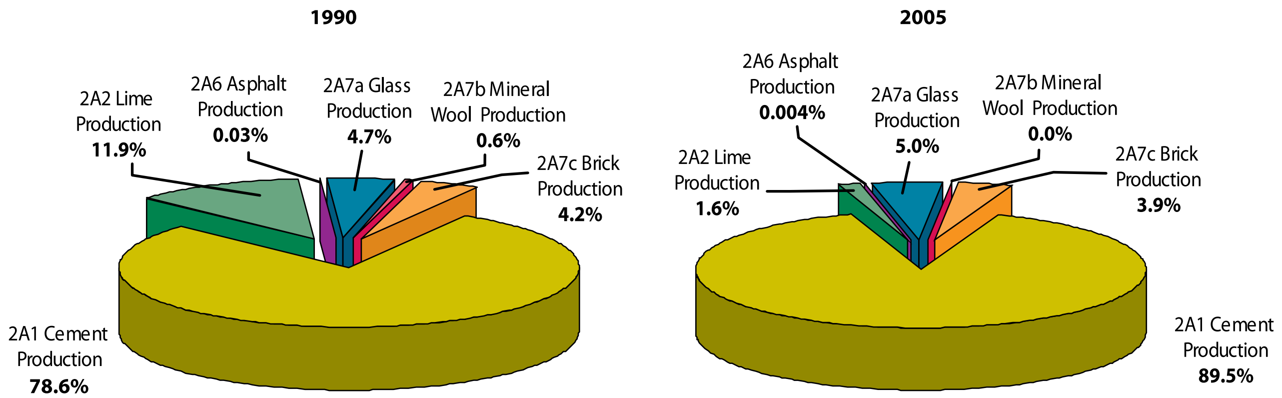


Figure 2-19: Breakdown of the Category 2A 'Mineral Production' GHG Emissions by Source in the Republic of Moldova in 1990 and 2005

CO_2 eq. in 1990, to 49.00 Gg CO_2 eq. in 2005 (Table 2-22). However, between 2004 and 2005, respective emissions increased in the RM by 2.5 percent, in particular as a result of increased use of household products.

The largest source of emission in 2005 was 3D 'Other', accounting for 60.2 percent of the total per sector at the level of 2005 (50.1 percent in 1990). Other relevant source categories are represented by 3A 'Paint Application' accounting for 36.7 percent of the total sectoral GHG emissions in 2005 (46.0 percent in 1990), 3B 'Degreasing and Dry Cleaning' - 2.5 percent of the total sectoral emissions (3.0 percent in 1990) and 3C 'Chemical Products, Manufacture and Processing' - 0.6 percent of the total sectoral emissions (0.8 percent in 1990) (Figure 2-20).

In 2005, 78.9 percent from the GHG emissions originated from the largest source of emissions within the Solvents and Other Product Use Sector, which is the Category 3D 'Other', resulted from 3D4 'Households Products' (74.4 percent in 1990), 13.5 percent from 3D1 'Adhesive Use' (17.9 percent in 1990), 6.4 percent from 3D3 'Seed Oil Extraction and Seed Drying' (6.0 percent in 1990), 1.2 percent from 3D2 'Graphic Arts' (Ink) (1.6 percent in 1990) and 0.1 percent from 3D5 'Use of N_2O for Anaesthesia' (0.1 percent in 1990) (Figure 2-21).

Table 2-22: GHG Emissions from Solvents and Other Products Use by Category for selected years, Gg CO_2 eq

Source Categories	1990	1995	2000	2004	2005
3. Solvents and Other Products Use	65.6245	28.0645	33.0638	47.8176	49.0022
3.A Paint Application	30.1849	1.9381	6.7433	18.7906	17.9812
3.B Degreasing and Dry Cleaning	1.9978	0.2212	0.3363	1.2258	1.2401
3.C Chemical Products, Manufacture and Processing	0.5470	0.0281	0.0960	0.2163	0.2931
3.D Other	32.8948	25.8773	25.8882	27.5849	29.4878
3.D.1 Adhesives Use	5.8905	0.9343	1.5481	3.4019	3.9807
3.D.2 Graphic Arts (Ink)	0.5408	0.0563	0.0866	0.2371	0.3428
3.D.3 Seed Oil Extraction and Seed Drying	1.9745	0.4946	0.2207	1.8399	1.8791
3.D.4 Household Products	24.4686	24.3917	24.0192	22.0905	23.2664
3.D.5 Use of N_2O for Anaesthesia	0.0205	0.0003	0.0136	0.0155	0.0189

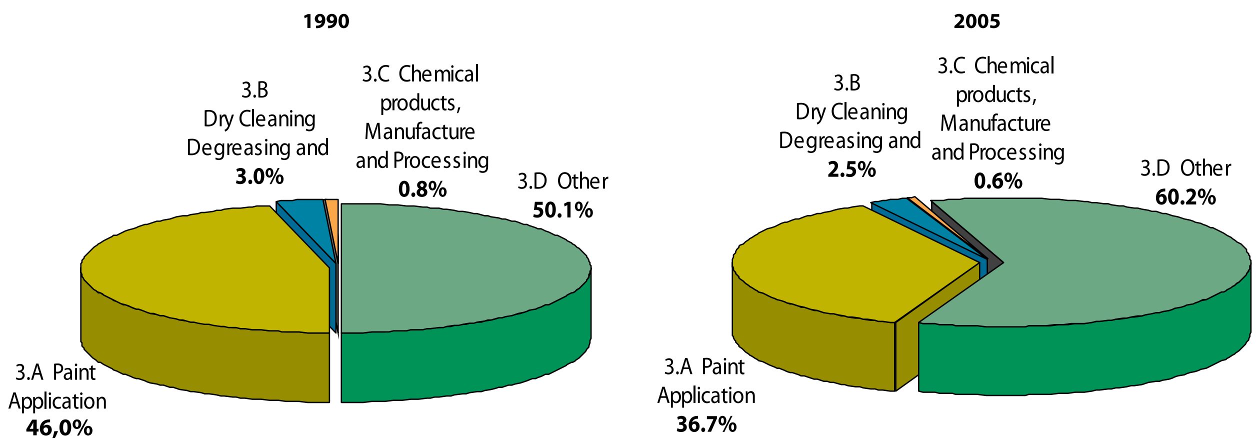


Figure 2-20: Breakdown of Solvents and Other Products Use GHG Emissions by Category in the Republic of Moldova in 1990 and 2005

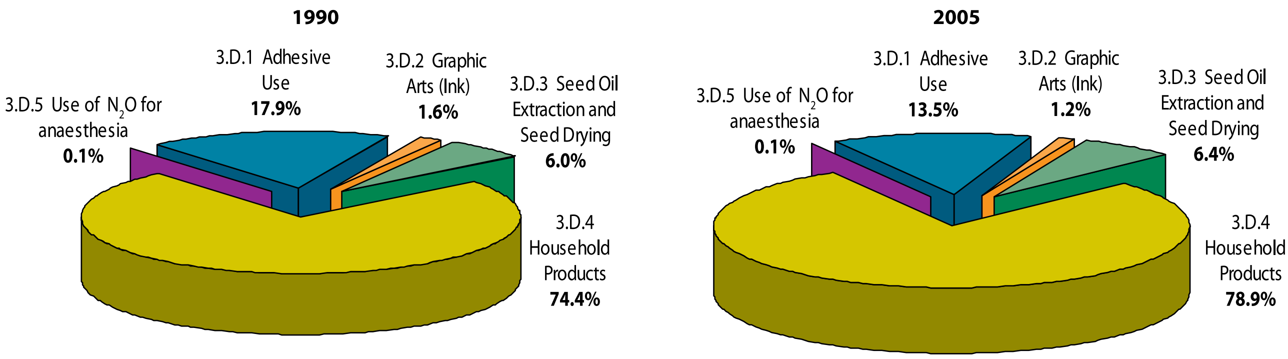


Figure 2-21: Breakdown of the Category 3D 'Other' GHG Emissions by Source in the Republic of Moldova in 1990 and 2005

Agriculture Sector

The processes that produce GHG emissions in the Agriculture Sector are enteric fermentation by domestic animals, manure management, fertilizer application and crop production (direct, indirect soil emissions and animal manure on pastures).

Emissions in this sector were analysed based upon the following two main categories: (1) livestock emissions consist of enteric fermentation from domestic animals (i.e., digestive processes that release CH_4) and manure management (with release CH_4 and N_2O); (2) agriculture soils consist of direct N_2O emissions from synthetic nitrogen fertilizers, animal manure applied to cropland, crop residue decomposition, tillage practices, indirect N_2O emissions from volatilization and leaching of fertilizer, manure and crop residue nitrogen, and N_2O emission from manure on pasture, range and paddock.

In 2005, Agriculture Sector accounted for circa 17.9 percent of the total national GHG emissions (12.4 percent in 1990). Between 1990 and 2005 total GHG emissions originated from this sector decreased by circa 60.0 percent: from 5,323.92 Gg CO_2 eq. in 1990, to 2,127.79 Gg CO_2 eq. in 2005 (Figure 2-22, Table 2-23), in particular, due to a sharp drop in such indicators as: domestic livestock and poultry population, amounts of synthetic nitrogen and organic fertilizers applied to soils, amounts of agricultural crop residues returned to soils, carbon losses from mineral soils and change of tillage practices.

Between 2004 and 2005, direct greenhouse gas emissions covered by Sector 4 Agriculture decreased by circa 3.8 percent.

Table 2-23: GHG Emissions from Agriculture Sector by Category for selected years, Gg CO_2 eq

Source Categories	1990	1995	2000	2004	2005
4. Agriculture	5323.92	3386.18	2214.74	2210.72	2127.79
A. Enteric Fermentation	1903.41	1384.63	903.06	843.96	792.86
B. Manure Management	1701.94	1088.95	665.22	665.77	635.68
D. Agricultural soils	1718.57	912.60	646.46	700.99	699.25

The largest source of emission in 2005 was category 4A 'Enteric Fermentation', accounting for circa 37.3 percent of the total per sector (35.8 percent in 1990) (Figure 2-23). Other relevant sources are represented by Categories 4D 'Agricultural Soils', accounting for 32.9 percent of the total (32.3 percent in 1990) and 4B 'Manure Management', accounting for 29.9 percent of the total (32.0 percent in 1990).

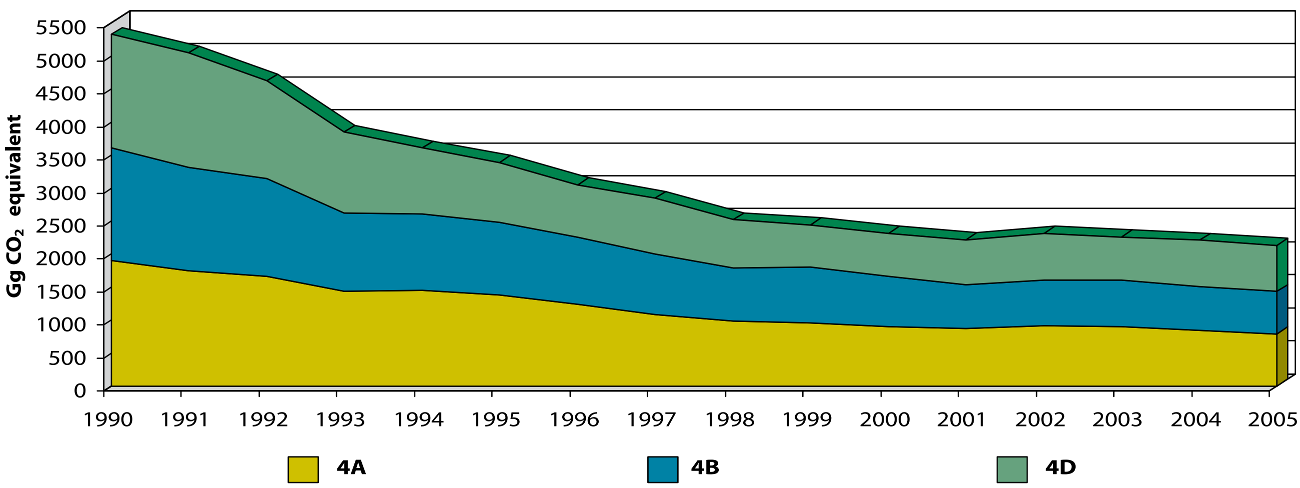


Figure 2-22: GHG emissions from Agriculture in the Republic of Moldova, 1990-2005

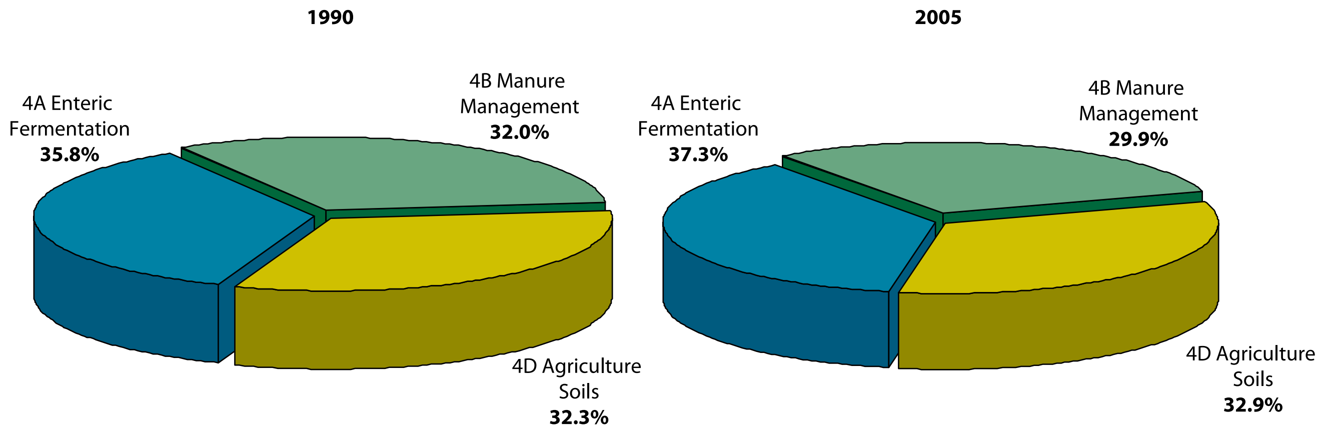


Figure 2-23: Breakdown of Agriculture GHG Emissions by Category in the Republic of Moldova in 1990 and 2005

As the RM does not cultivate rice and there are no savannas, no GHG emissions origin from the Categories 4C 'Cultivation of Rice' and 4E 'Prescribed Burning of Savannas'. GHG emissions originated from the Category 4F 'Field Burning of Agricultural Residues' were reported under LULUCF Sector (Category 5B 'Cropland').

Land Use, Land-Use Change and Forestry Sector

Land Use, Land-Use Change and Forestry Sector reports GHG fluxes between the atmosphere and Republic of Moldova's managed lands, as well as those associated with land-use changes.

In the Republic of Moldova, LULUCF Sector is a source of net carbon sinks. Between the 1990 and 2005, net sinks of CO_2 tended towards lower values, decreasing by circa 17.5 percent: from -1,673.2 Gg in 1990, to -1,381.1 Gg in 2005 (Figure 2-24), due to changes in forest management (authorized increased amounts of harvested wood, substantial increase of illegal logging, increased conversion of forestlands into croplands, etc.), as well as gradual increase of CO_2 emissions from croplands due to smaller amounts of organic fertilizers and smaller amounts of agricultural residues returned to soils, and as a consequence, a significant decrease of basic crops yields by circa 2-3 times.

However, between 2004 and 2005, net CO_2 sinks from LULUCF increased by 4.7 percent, in particular due to extension of forest vegetation areas (Table 2-24).

Table 2-24: CO_2 Emissions and Sinks in LULUCF by Category for selected years, Gg CO_2

Source Categories	1990	1995	2000	2004	2005
5. LULUCF	-1673.1984	-755.9972	-1353.1508	-1319.0407	-1381.0626
A. Forest Land	-2197.1526	-1620.7880	-2140.3153	-2183.4198	-2246.2034
B. Cropland	1310.4542	1484.3328	1612.6925	1691.5351	1684.5968
C. Grassland	-786.5000	-619.5420	-825.5280	-827.1560	-819.4560

The largest source of carbon removal under LULUCF is forest vegetation (5A 'Forest Land') accounting for 69 percent of the total. Another relevant source is grasslands (5C 'Grassland'), accounting for 24 percent of the total. Contribution of perennial plantations (5B 'Cropland') is as small as 7 percent of the total, in particular due to gradual reduction of respective areas.

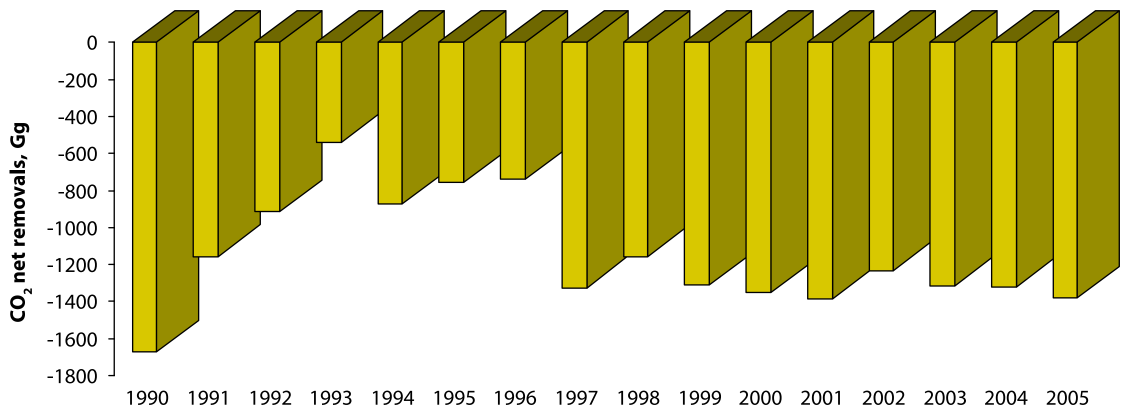


Figure 2-24: CO_2 net removals in Land Use, Land-Use Change and Forestry, 1990-2005

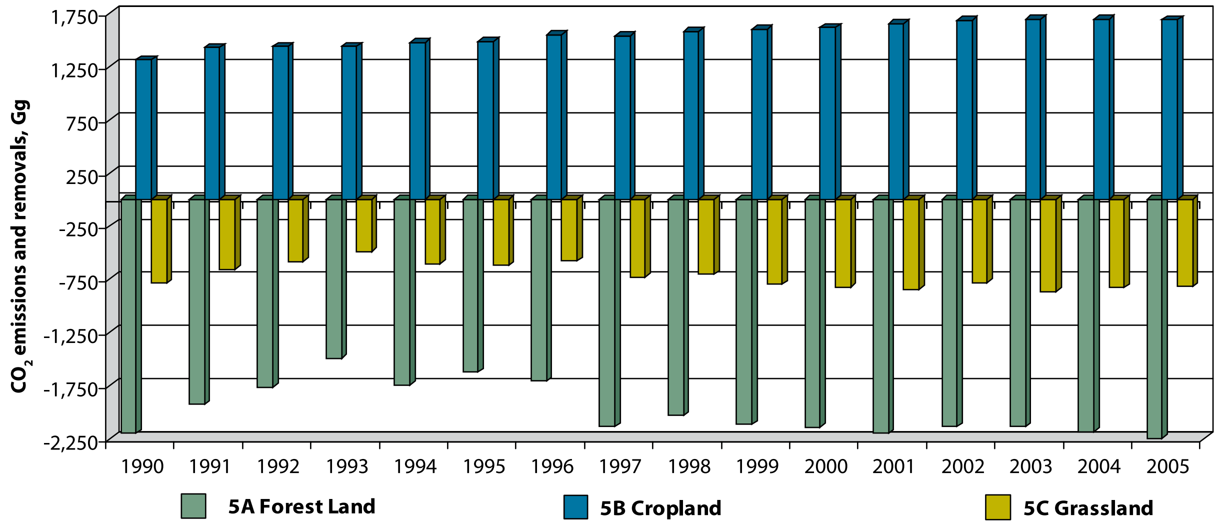


Figure 2-25: Selected Emissions and Removals in LULUCF in the RM, 1990-2005

Between 1995 and 2005, contribution of forest ecosystems (5A 'Forest Land') to the GHG removals under LULUCF is continuously increasing (Figure 2-25), in particular, due to extension of forest vegetation areas (Figure 2-26).

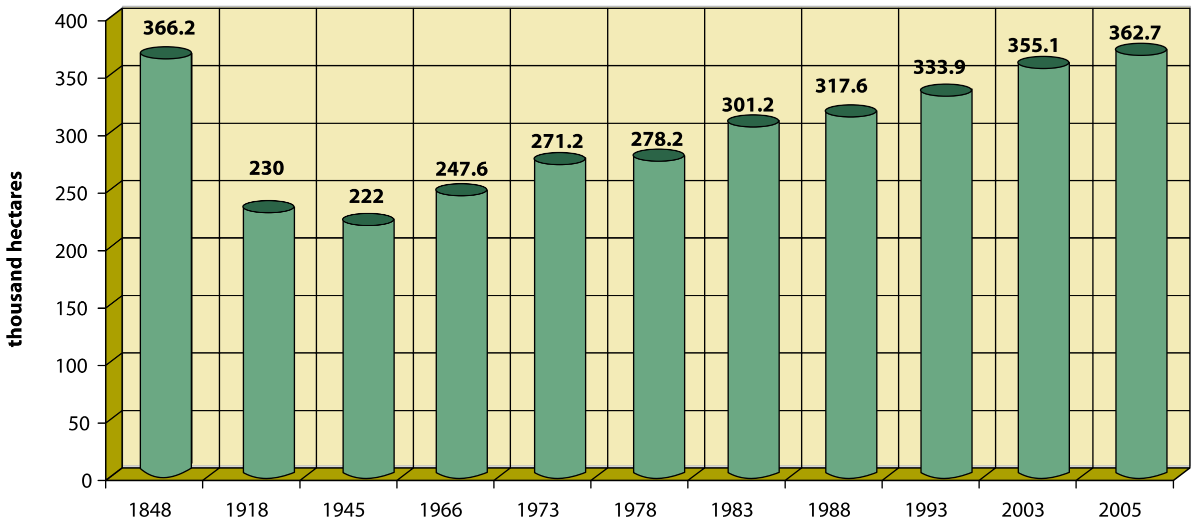


Figure 2-26: Evolution of Areas Covered with Forests in Moldova, 1848-2005

LULUCF is also a source of non-CO_2 (CH_4 and N_2O) direct GHG emissions, resulting from wood fires (5A 'Forest Land') and field burning of agriculture residues (5B 'Cropland'). Between 1990 and 2005, non-CO_2 direct GHG emissions tended to lower values, decreasing by circa 89.5 percent: from 3.29 Gg CO_2 eq. in 1990 to 0.35 Gg CO_2 eq. in 2005 (Figure 2-27).

Between 2004 and 2005, non-CO_2 emissions from LULUCF increased by 4.7 times. The evolution of these emissions was determined both by the inefficiency of forestlands protection measures against wood fires and combating illegal burning of stubble fields, and by evolution of climate conditions over the respective period in the RM.

Waste Sector

Waste Sector is an important source of GHG emissions in the Republic of Moldova: CH_4 emissions from 'Solid Waste Disposal on Land' (Category 6A) and 'Wastewater Handling' (Category 6B), as well as N_2O emissions from 'Human Sewage' (Category 6B).

In 2005, Waste Sector accounted for 11.8 percent of the total national direct GHG emissions (3.8 percent in 1990). In the time series 1990 through 2005, total GHG emissions from this sector decreased by 14.0 percent: from 1,627.34 Gg CO_2 eq. in 1990, to 1,399.96 Gg CO_2 eq. in 2005 (Figure 2-28). Between 2004 and 2005, GHG emissions from Waste Sector decreased by 3.6 percent (Table 2-25).

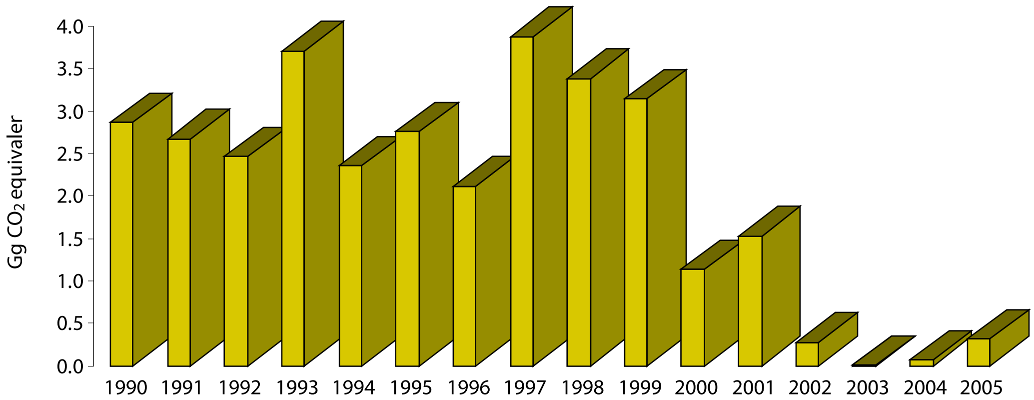


Figure 2-27: Direct GHG (Non-CO_2) Emissions under LULUCF Sector Resulting from Vegetation Fires within the 1990-2005 time series, Gg CO_2 equivalent

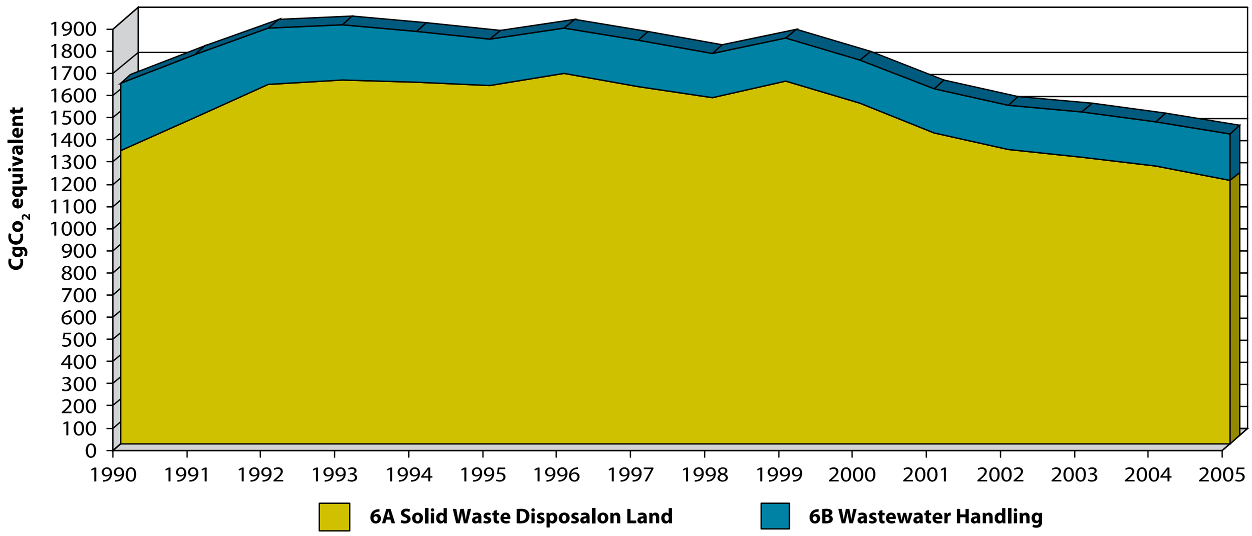


Figure 2-28: National Waste Sector GHG Emission Trends, 1990-2005

Table 2-25: GHG Emissions from Waste Sector by Category for selected years, Gg CO_2 eq

SOURCE CATEGORIES	1990	1995	2000	2004	2005
6. Waste	1627.3364	1827.5652	1731.2751	1452.0512	1399.9575
A. Solid Waste Disposal on Land	1321.1268	1616.5821	1536.4167	1254.5064	1186.2060
B. Wastewater Handling	306.2096	210.9831	194.8584	197.5448	213.7515

Reduction of GHG emissions from by Waste Sector is explained, in particular by the economic decline that occurred during the period under review, by a significant drop in the wellbeing of population, and respectively, capacity to generate waste (Table 2-26).

In 2005 the largest source of GHG emissions within the Waste Sector was Category 6A 'Solid Waste Disposal on Land', accounting for circa 84.7 percent of the total per sector (81.2 percent in 1990) (Figure 2-29).

Table 2-26: Per Capita GHG Emission Trend for Waste in the RM, 1990-2005

	1990	1991	1992	1993	1994	1995	1996	1997
MSW, kg/capita/day	0.85	0.86	0.85	0.48	0.46	0.43	0.44	0.42
Total Waste, kg/capita/day	1.28	1.30	1.30	0.84	0.80	0.76	0.78	0.74
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
MSW, kg/capita/day	0.42	0.40	0.38	0.37	0.38	0.38	0.43	0.42
Total Waste, kg/capita/day	0.75	0.71	0.72	0.70	0.72	0.72	0.80	0.79

Note: the indicators in the table were developed based on data on the amount of MSD and industrial waste eliminated at the SWDS in the RM between 1990 and 2005 (please see Chapter 8 'Waste Sector').

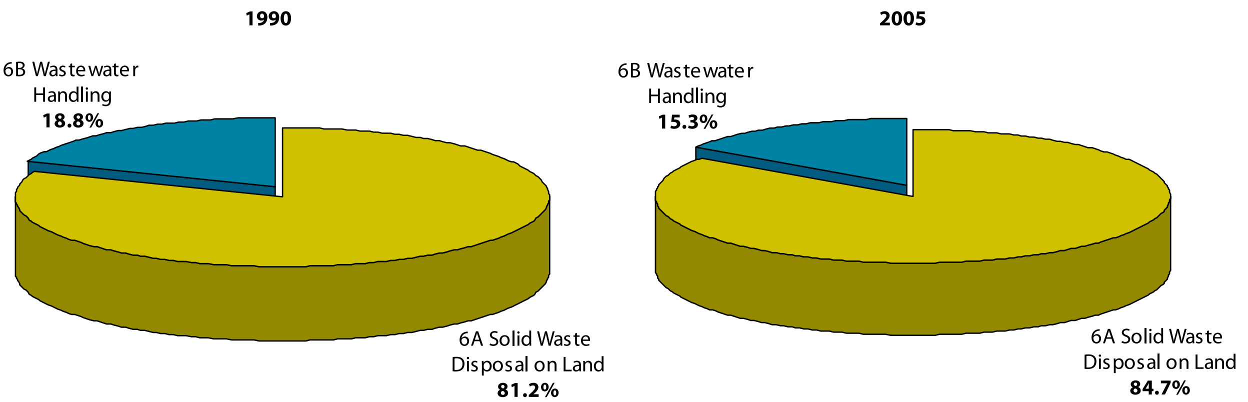


Figure 2-29: Breakdown of Waste GHG Emissions by Category in the Republic of Moldova in 1990 and 2005

During the period under review per capita GHG emissions from Waste Sector decreased by 9.5 percent, from 373 kg CO_2 eq. per capita in 1990, to 338 kg CO_2 eq. per capita in 2005 (Figure 2-30).

2.4.2 Ozone and Aerosol Precursors Emissions

The reporting requirements of the UNFCCC request that information be provided on indirect greenhouse gases, which include carbon monoxide (CO), nitrogen oxides (NO_x), non-methane volatile organic compounds (NMVOC) and sulphur dioxide (SO_2). These gases do not have a direct global warming effect, but indirectly affect terrestrial radiation absorption by influencing the formation and destruction of tropospheric and stratospheric ozone, or, in the case of SO_2, by affecting the absorption characteristics of the atmosphere. Additionally, some of these gases may react with other chemical compounds in the atmosphere to form compounds that are greenhouse gases. These gases are produced when carbon-containing fuels are combusted incompletely (CO); are created by lightning, fires, fossil fuel combustion, and in the stratosphere (NO_x); emitted from transportation, industrial processes and consumption of organic solvents (NMVOC); emitted from coal combustion for power generation and the metals industry (SO_2).

In 1990-2005, NO_x emissions decreased by 77.1 percent: from 137.74 Gg in 1990 to 31.58 Gg in 2005; CO emissions decreased by 73.1 percent: from 429.05 Gg in 1990, to 115.22 Gg in 2005; NMVOC emissions decreased by 59.0 percent: from 103.12 Gg in 1990 to 42.25 Gg in 2005, while SO_2 emissions deceased by 96.0 percent: from 294.97 Gg in 1990, to 11.79 Gg in 2005 (Table 2-27).

In 2005, the source categories of NO_x having the biggest share in the total nitrogen oxides emissions in the Republic of Moldova were: 1A3 'Transport' (16.08 Gg or 50.9 percent of the total), 1A1 'Energy Industries' (8.00 Gg or 15.3 percent of the total), 1A2 'Manufacturing Industries and Constructions' (4.83 Gg or 3.4 percent of the total) and 2A 'Mineral Products' (0.97 Gg or 3.1 percent of the total) (Figure 2-31).

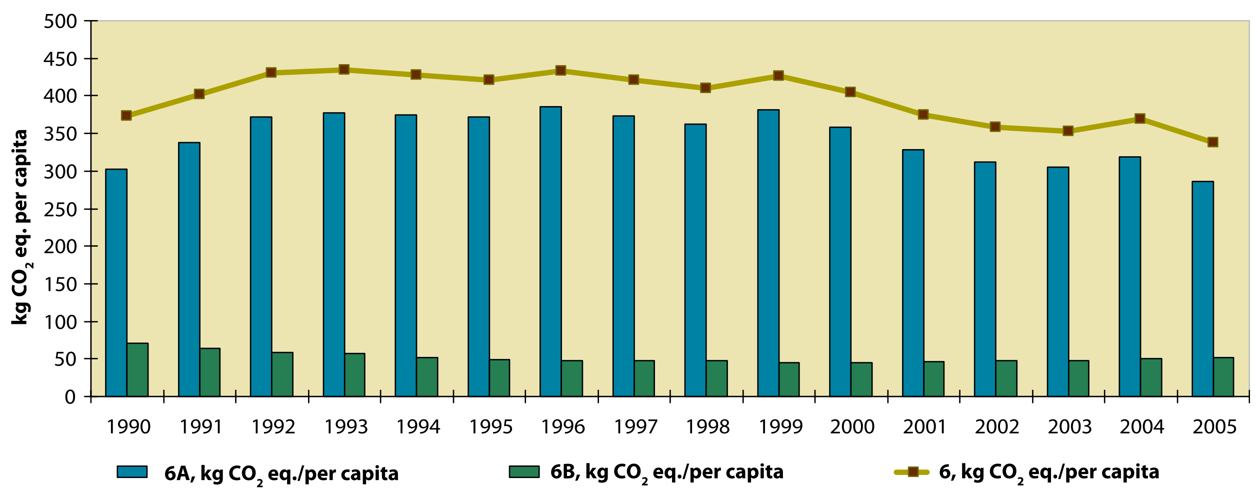


Figure 2-30: Per Capita GHG Emissions Trend for Waste, 1990-2005

Table 2-27: Ozone and Aerosol Precursors Emission Trends in the RM in 1990-2005, Gg

	1990	1991	1992	1993	1994	1995	1996	1997
NO_x	137.7408	119.3428	80.2690	63.4771	54.0902	47.1408	44.4726	39.9567
CO	429.0537	371.6038	190.4780	155.4473	141.2932	139.2113	136.9144	131.5095
NMVOC	103.1150	90.6729	54.1789	44.0071	39.3583	39.8312	38.6704	38.0953
SO_2	294.9678	256.2761	170.1090	145.6472	102.5218	60.8743	58.8716	33.8937
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
NO_x	32.8847	23.7914	22.0042	25.3798	27.1859	29.9830	31.1675	31.5802
CO	116.0268	79.5244	75.5600	78.9760	95.1302	110.2302	112.6899	115.2218
NMVOC	34.4315	25.6009	26.7160	28.2556	33.9985	36.9111	40.9736	42.2495
SO_2	26.9145	13.9877	9.8661	9.4254	10.4569	12.9969	11.1841	11.7886

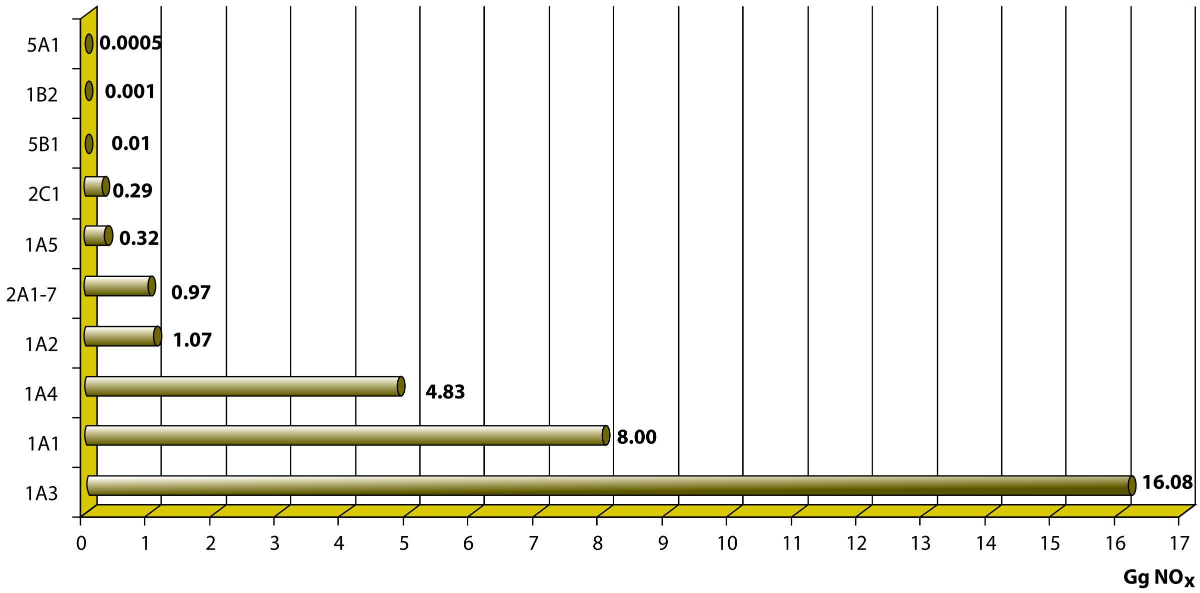


Figure 2-31: 2005 Source Categories of NO_x in the Republic of Moldova

The source categories of CO having the biggest share in the total carbon monoxide emissions in the Republic of Moldova in 2005 were: 1A3 'Transport' (87.32 Gg or 75.8 percent of the total), 1A4 'Other Sectors' (24.36 Gg or 21.1 percent of the total), 2C1 'Steel Production' (1.47 Gg or 1.3 percent of the total) and 1A1 'Energy Industries' (1.19 Gg or 1.0 percent of the total) (Figure 2-32).

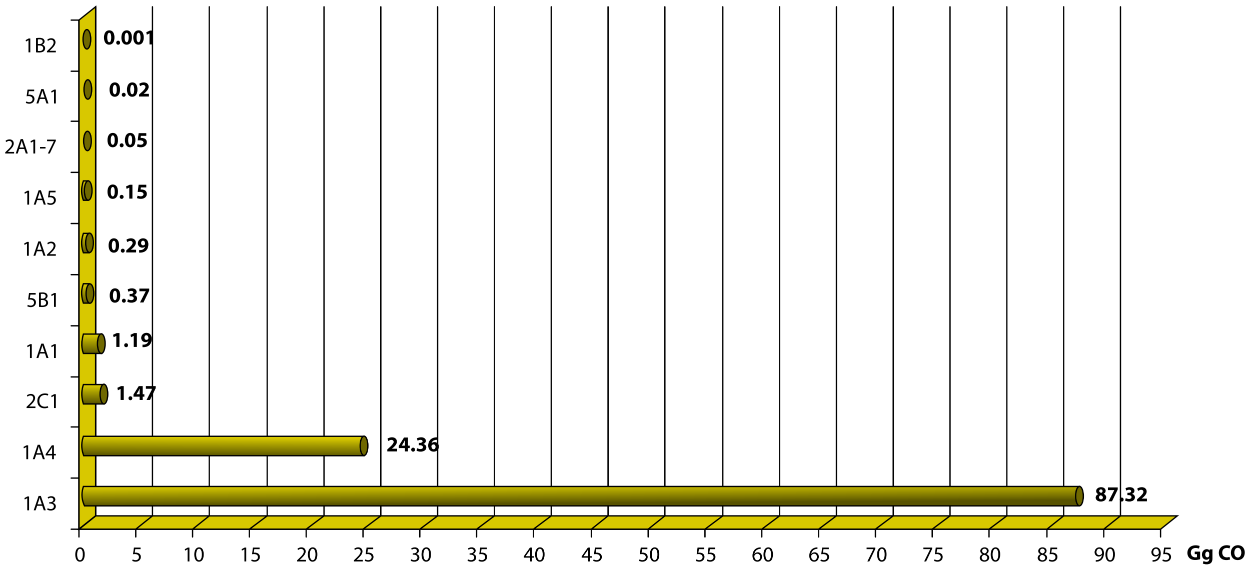


Figure 2-32: 2005 Source Categories of CO in the Republic of Moldova

In 2005, the source categories of NMVOC having the biggest share in the total non-methane volatile organic compounds emissions in the Republic of Moldova were: 1A3 'Transport' (16.49 Gg or 39.0 percent of the total), 3A-D 'Solvents and Other Products Use' (15.72 Gg or 37.2 percent of the total), 2D2 'Other Production' (foods and beverages) (4.46 Gg or 10.6 percent of the total), 1A4 'Other Sectors' (2.93 Gg or 6.9 percent of the total), 1B2 'Fugitive Emissions From Oil and Natural Gas' (1.18 Gg or 2.8 percent of the total) and 2A 'Mineral Products' (1.04 Gg or 2.5 percent of the total) (Figure 2-33).

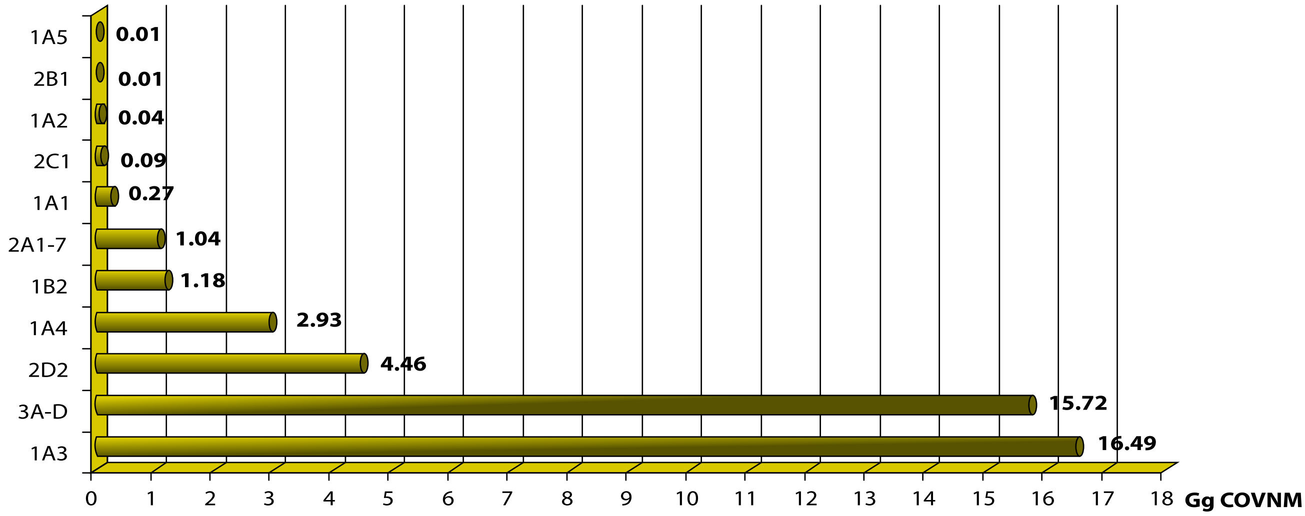


Figure 2-33: 2005 Source Categories of NMVOC in the Republic of Moldova

The source categories of SO_2 having the biggest share in the total sulphur dioxide emissions in the RM in 2005 were: 1A4 'Other Sectors' (6.14 Gg or 52.1 percent of the total), 1A3 'Transport' (2.15 Gg or 18.2 percent of the total), 1A5 'Other' (Other Needs and Works in Energy Sector) (1.17 Gg or 9.9 percent of the total), 1A1 'Energy Industries' (1.16 Gg or 9.8 percent of the total), 2A 'Mineral Products' (0.57 Gg or 4.8 percent of the total), 1A2 'Manufacturing Industries and Constructions' (0.46 Gg or 3.9 percent of the total) and 2C1 'Steel Production' (0.14 Gg or 1.2 percent of the total) (Figure 2-34).

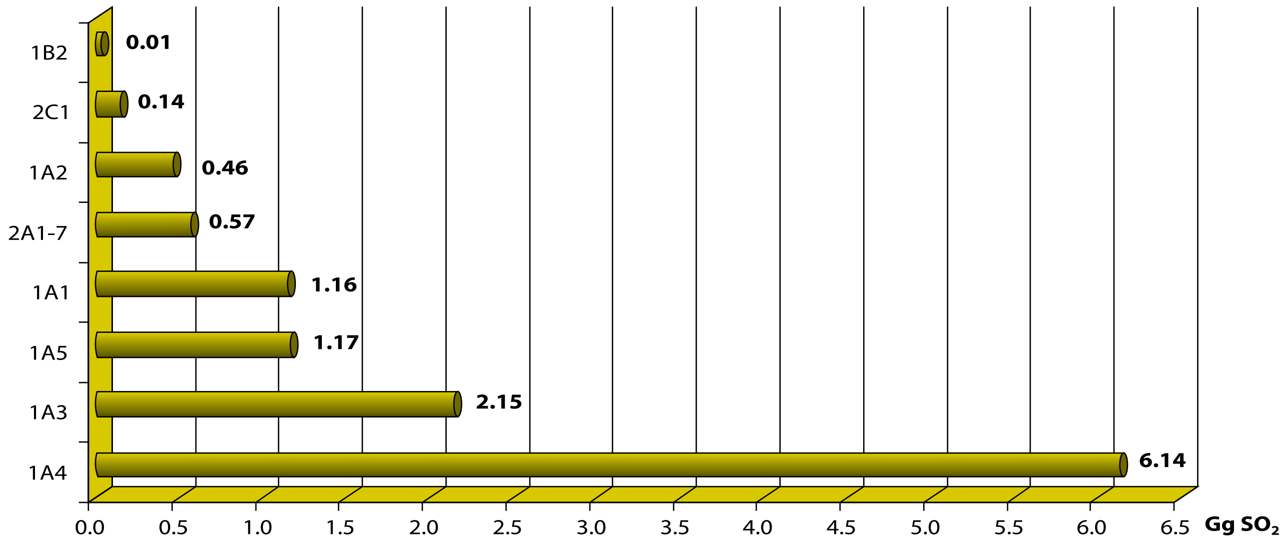
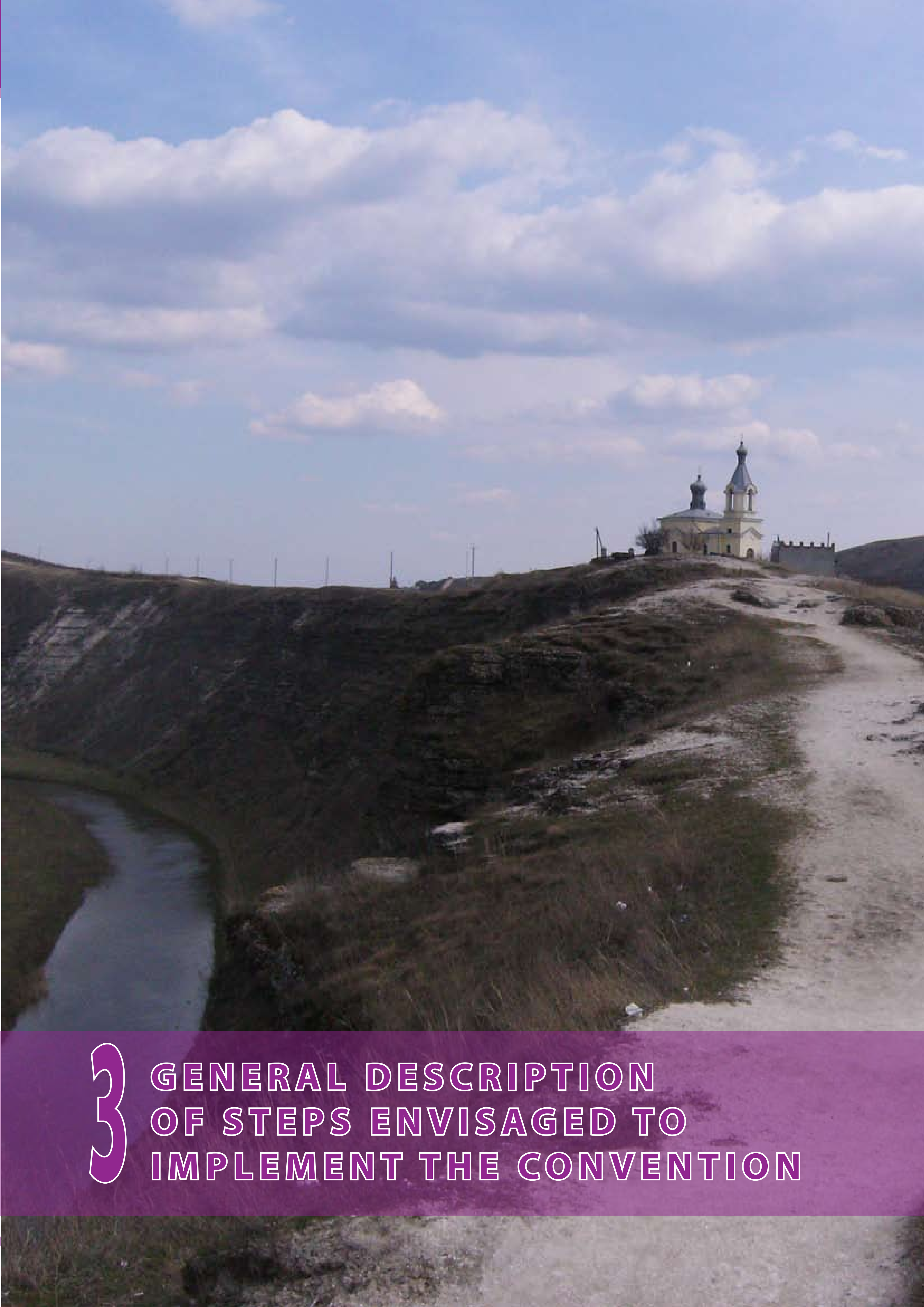


Figure 2-34: 2005 Source Categories of SO_2 in the Republic of Moldova



3 GENERAL DESCRIPTION OF STEPS ENVISAGED TO IMPLEMENT THE CONVENTION

3. GENERAL DESCRIPTION OF STEPS ENVISAGED TO IMPLEMENT THE CONVENTION

3.1 Republic of Moldova's Commitments under UNFCCC

The Republic of Moldova joined the United Nations Framework Convention on Climate Change on March 16, 1995 (Parliament Resolution No. 404-XIII as of 27.04.1995).

The overall objective of the UNFCCC is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change.

Aiming at accomplishing this target the Parties to the Convention undertook commitments in four important areas.

3.1.1 Inventory and Mitigation of GHG Emissions

To meet its inventory and mitigation of GHG emissions commitments (Art.4, p.1, par. a, b, c, d; Art. 12, p.1 and 4) the Republic of Moldova shall:

- Develop, periodically update, publish national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases;
- Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases, and measures to facilitate adequate adaptation to climate change;
- Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;
- Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases, in particular forests.

3.1.2 Adaptation to Climate Changes

To meet its climate change adaptation commitments (Art. 4 p. 1 al. e, f) the Republic of Moldova shall:

- Develop and elaborate national water resources and agriculture management programs aiming at protection and rehabilitation of areas affected by drought and desertification, as well as floods;
- Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment.

3.1.3 Promoting Research and Systematic Observations

Promote research and systematic observations (Art. 4 p. 1 al. g, h; Art. 5) to:

- Encourage scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system;
- Support international and intergovernmental efforts to strengthen systematic observation and national scientific and technical research capacities and capabilities;
- Encourage the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies.

3.1.4 Education, Training and Public Awareness Building

Promote education, training and build public awareness (Art. 4, p.1, al. i; Art. 6, al. a, b) to:

- Encourage and facilitate development and implementation of national educational, training and public awareness programs on climate change and its effect;
- Public access to information on climate change and its effects;
- Public participation in addressing climate change and its effects and developing adequate responses;
- Training of scientific, technical and managerial personnel;

- The development and exchange of educational and public awareness material on climate change and its effects;
- The development and implementation of education and training programmes.

3.1.5 General Issues on Parties' Commitments under UNFCCC

It should be noted that UNFCCC takes into account the environmental impact caused by certain industrialized countries, as well as the economic vulnerability of developing countries and their incapacity to face the disasters entailed by the consequences of the climate change. Also, differences between countries, their economies structures and their resource bases, the need to maintain a strong and sustainable economic growth, available technologies and other individual circumstances were taken into account, as well as the need to adequately and justly contribute to the global effort to achieve this target.

On the above mentioned ground the Parties to Convention are divided into two main groups: Annex I countries and non-Annex I countries (Republic of Moldova is a non-Annex I Party). Annex I comprises 41 industrialized states which has generated climate change to the greatest extent.

Kyoto Protocol, signed at the Conference of the Parties in 1997, sets the priority areas and recommends priority actions to the Parties to UNFCCC, defines economic and organizational instruments to be used by each Party – individually or in association – to meet the Convention's targets. Kyoto Protocol provides three economic mechanisms to reduce GHG emissions: Joint Implementation; Emission Trading and Clean Development Mechanism.

By ratifying the Kyoto Protocol the industrialized Parties commit themselves to reduce the emissions of six the most harmful GHG with at least five percent against 1990 levels over the five-year period 2008-2012. Individual quantified emission limitations or reduction commitments are specified in Annex B to the Protocol. In order to meet the target set forth in the Protocol, the Annex I Parties have to implement a series of policies stipulated in the Protocol designed to facilitate adaptation to climate change effects and contribute to sustainable development.

Each of the developing countries (non-Annex I Parties) may commit itself to contribute, to the extent possible, to global efforts to minimize the anthropogenic impact on the global climate. The Annex I countries shall provide financial resources to cover the agreed costs incurred by non-Annex I Parties to meet their commitments which rest on them under the Convention. In this process the Annex I Parties support the development of clean technologies and capacity building in developing countries, Parties to Convention.

Though the Republic of Moldova became part to the Kyoto Protocol in 2003 (the Law of the RM No. 29-XV as of 13.02.2003), however, the RM did not commit to meet other targets than those common for all other Parties under the UNFCCC.

It should be noted that in conformity with Art. 2 of the Law No. 29-XV as of 13.02.2003, the total responsibility for meeting the targets of the Protocol is vested upon the Ministry of Environment and Natural Resources. Through the Government Resolution No. 1574 as of December 26, 2003 there we approved the nominal composition and the Regulation of the National Commission for implementation of UNFCCC commitments, as well as the mechanisms and provisions of Kyoto Protocol (by now, the RM is eligible to promote activities only in the frame of Clean Development Mechanism of the Kyoto Protocol). The Commission holds the attributions and prerogatives of Designated National Authority (DNA) in this field.

3.2 National Priorities for Meeting Convention Objectives

The national priorities for meeting Convention objectives in the Republic of Moldova were identified based on the Party's commitments under the UNFCCC.

3.2.1 Strengthening National Policies on Climate Change

Until now the Republic of Moldova has not developed a separate national policy document dedicated to UNFCCC implementation. The following actions in this sense can be regarded as national priorities:

- Development of the National Action Plan on Adaptation to Climate Change;
- Development of the National Strategy on GHG Emissions Mitigation.

3.2.2 Assessing Vulnerability and Adaptations Measures to Climate Change

The state of natural ecosystems, agriculture and public health to a great extent is dependant on the climate change impact. The risk factors which determine the degree of vulnerability of ecosystems and public health are: soil humidity deficiency, uneven distribution of precipitations, frequent floods, high temperatures, in particular in early summer and late spring.

The priorities in adaptation to new climate conditions, identified by assessing the vulnerability of ecosystems and risk factors, were defined as follows:

- For natural ecosystems: extension of natural areas; carry out observations aimed at assessing the species and ecosystems stability under the new climate change conditions; develop and implement forests and other green areas extension programs, efficient forest management; restoration of wetlands;
- For water resources: water protect against pollution and depletion caused by anthropogenic activities; prevent the water destructive effects; identify areas exposed to floods and undertake flood prevention measures; consolidation of hydro-technical constructions for flood protection;
- For agro-ecosystems: implement sustainable soil management procedures, including agricultural lands and pastures; ensure socio-economic conditions to provide for profitable farming; identification of species, hybrids and technologies adapted to new climate conditions; elaboration and implementation of hydro- and agro-technical complex systems of accumulation and efficiently utilization of atmospheric precipitations; implement of agricultural systems contributing to reduction of soil erosion and degradation;
- In public health: improving and strengthening the public health monitoring system; moving the polluting facilities away from labour and recreation zones.

3.2.3 Strengthening the National Inventory System

The national priorities in this field are:

- Institutional framework strengthening regarding the periodical elaboration of the National Greenhouse Gas Inventory;
- Improving the quality of the National Greenhouse Gas Inventory by using new, higher tier methodologies, developing country specific methodologies for key categories, developing national emission factors for key categories, thorough implementation of quality control, quality assurance and verification procedures, assessing inventory uncertainties using a higher tier approach, adjusting the statistical data collecting system to the Convention's requirements, etc.

3.2.4 Mitigation of GHG Emissions and Increase in Carbon Removals

The priorities in terms of GHG emissions abatement and increase in carbon removals by are the following:

Energy Sector:

- Promotion of the policies and measures aimed at GHG emissions abatement in all links of the energy chain (generation, transportation and consumption); and large-scale implementation of new energy-efficient technologies;
- Enhancing energy efficiency in all sectors of the national economy, including the residential sector;
- Introduction of local fuels, secondary energy resources, renewable energy sources (in particular, biomass, wind and solar energy) and energy-containing industrial or domestic waste in the energy balance;
- Use of low GHG emission fuels (comprehensive gasification of the Republic of Moldova);
- Compliance with the European norms and standards to prevent environment pollution;
- Development of a National Program to liberalize the energy market and create conditions for investments attraction to the Energy Sector.

Transport Sector:

- Use of economic levers and taxation mechanisms to incentivize the modernization of the vehicle fleet and rolling stock;
- Rehabilitation and reconstruction of highways and railway lines;
- Optimization of the urban and inter-urban transport networks; optimization of passenger and freight transportations, including traffic bypasses to detour densely populated areas (construction of detour roads to bypass towns and cities; introduction of restrictions on traffic in the central part of the town/city, etc.);
- Promotion of public transports via facilitation of their use and development of the public transport networks in the Republic of Moldova's major cities and towns;
- Large-scale use of electric transports, including the extension of the urban and inter-urban electric transport networks;
- Increase in the portion of motor vehicles running on LNG and LPG;
- Introduction of motor vehicles running on hydrogen and bio-fuels or using other modern technologies applicable in transport sector;
- Imposing limitations on the operation life of the motor vehicles imported to the Republic of Moldova (down from 7 to 5 years for passenger cars and down from 10 to 7 years for trucks and buses);
- Implementing mandatory official check-ups of all motor vehicles and trailers.

Industrial Processes Sector:

- Good equipment maintenance and use of modern techniques and manufacturing processes for the purposes of resource and energy conservation and waste reduction;
- Adequate accounting for the consumption of primary materials and energy, efficient production management;
- Use of effective management systems and reduction of production losses, inclusively by using recycled materials;
- Recovery of fugitive emissions;
- Improvement and amendment of the legislation to bring it in compliance with the European energy efficiency standards and emission thresholds (admissible emission threshold values);
- Implementation of the initiatives regarding differentiated approach to application of taxes depending on energy efficiency and emission reductions;
- Conclusion of agreements regarding voluntary reduction of emissions at Moldovan industrial enterprises;
- Implementation of an aggressive technology and innovation transfer policy and clean technology commercial demonstrations, including in industrial and innovation parks.

Agriculture Sector and Food Processing Industry:

- Use of renewable sources of energy (solar and wind energy, biomass) as a means to reduce the consumption of traditional types of fuels;
- Employment of modern technologies with reduced energy consumption;
- Larger scale utilization of the processing industry and agricultural wastes.

Land Use, Land-Use Change and Forestry Sector:

- Regulated and continuous application of measures to protect forests from pests and diseases;
- Planting of new forests in the protection areas along water basins and expansion of the green protection strips along main passageways;
- Planting of new forests in the areas with degraded soil;
- Consolidation of the infrastructure to produce seeds and planting stock of the local plant varieties.

Waste Management:

- Waste utilization;
- Reduction of waste generation sources;
- Renunciation of the primary materials containing toxic substances;
- Use of organic waste and biogas generated from waste to produce energy.

3.2.5 Clean Development Mechanism of the Kyoto Protocol

As a non-Annex I Party under the Kyoto Protocol, the Republic of Moldova is eligible to participate only under the Clean Development Mechanism. The priorities of the Republic of Moldova deriving from the CDM are as following:

- Develop and implement a National Program on applying the Clean Development Mechanism under the Kyoto Protocol;
- Implementation of projects, financed by Annex I Parties, aiming at GHG emissions abatement and carbon removing under the Clean Development Mechanism of the Kyoto Protocol.

3.2.6 Transfer of the Environment-Friendly Technologies

The national priorities in this field are as following:

- To encourage the transfer of the technologies, practices and procedures that allow to control, reduce or prevent GHG emissions in all national economy sectors, including the energy sector, transport sector, manufacturing industry, agriculture, forestry and waste management sectors;
- To develop and approve a National Program on use of environment-friendly technologies;
- To establish a database on environment-friendly technologies;
- To support scientific, technological, socio-economic research, systematic observations, etc., through which the causes, effects, climate change proportions, as well as the economic and social consequences of diverse response strategies can be addressed.

3.2.7 Developing the Research and Observations System

The national priorities in this field are as following:

- Development of scientific researches in the field of climate change and improvement of the national system of systemic observations;

- Providing with modern equipment and consolidating the logistical support in order to improve the quality of operative monitoring regarding the fulfilment of Moldova's commitments under the UNFCCC.

3.2.8 Public Awareness Raising and Ecological Education

The national priorities in public awareness raising and ecological education are as follows:

- Improvement of the public access to environmental information and capacity building for public participation in decision-making;
- Ecologization of subjects and activities in the preschool, primary, gymnasium and secondary-school education by introducing in the National Curriculum of the subjects and topics on environment protection, including aspects related to UNFCCC implementation;
- Development and inclusion of the important subjects in educational programs, actualization of university and post-graduate programs with aspects related to the UNFCCC implementation;
- Propagation of the UNFCCC provisions and objectives, ecological culture and sustainable co-existence with the nature; publication of information materials with environmental thematic;
- Organization of TV and radio broadcasting cycles dedicated to UNFCCC and publication of thematic articles in mass media referring to the implementation of the Convention.

3.2.9 International Cooperation and Negotiation Process

The national priorities in this field are as follows:

- Promote the information on the opportunities to access international funds for the promotion and implementation the Projects focused on climate change area;
- Drawing up financial assistance with the purpose of improving the knowledge and abilities of the staff working in the environmental institutions (managers and specialists at various levels) concerning the negotiation with strategic investors and collaboration with regional and international environmental agencies.

3.3 Sectoral Policies and Programs Envisaged to Implement the Convention

3.3.1 Energy Sector

A. Improvement of the Legislative and Regulatory Framework

Sustainable development in the power sector and its alignment to the European standards is possible only where an adequate legislative and regulatory framework is in existence.

Republic of Moldova's policy and strategy for the power grid operation and development is reflected in the following principal documents: the Law No. 1525-XIII as of 19.02.1998 on Energy Sector, the Law No. 136-XIV as of 17.09.1998 on Gas, the Law No. 137-XIV as of 17.09.1998 on Electric Energy, the Law No. 1136-XIV as of 13.07.2000 on Energy Conservation, the Law No. 160-XVI as of 12.07.2007 on Renewable Energy, the National Strategy of the Republic of Moldova on Energy for the period until year 2020 (adopted through the Government Resolution No. 958 as of 21.08.2007), the Economic Growth and Poverty Reduction Strategy (2004-2006), the National Development Strategy for the years 2008-2011 (approved through the Law No. 295-XVI as of 21.12.2007) as well as in the second-tier legislation approved by the National Agency for Energy Regulation (ANRE) (Tariff Setting Methodology, Regulations for the Electric Power Market, Metering Code, etc.).

Although it can be stated that the legislative and regulatory framework for the energy sector has been already well developed, however it needs further development and improvement in conformity with the current requirements aimed at the implementation of the fundamental energy sector objectives in the Republic of Moldova - adequate energy security; high energy efficiency; minimum energy price thresholds obtained in competition; and minimized negative environmental impact. The legislation should be further harmonized adequately with the Energy Community Treaty and *Acquis Communautaire* in the area of energy.

In that context it is required to discontinue cross-subsidizing of the electricity and heat tariffs as soon as possible, including subsidies in the form of differentiated tariffs; to favour renewable energy generation; to focus on the diversification of energy resources in the energy balance, including the imported ones; to incentivize and regulate improved energy efficiency, etc.

It should be noted that during 2000-2006, notwithstanding the existence of certain relatively good applicable regulations, the achievement of the defined goals was facing certain difficulties created mainly due to the lack of the adequate institutional framework. For example, the National Agency for Energy Conservation was operating with insufficient capacity, thus forcing the duly empowered authorities to dissolve it and to establish instead the Agency for Energy Efficiency.

It is required to improve the independence and competence levels of the National Agency for Energy Regulation and to vest it with the authority to approve all Tier II regulations, to calculate and approve tariffs for heat generated in a centralized way in Moldova's urban centres, etc. The power grid development strategy must be amended by adding the Government-approved energy sector development plans for the next 4-5 years, which are as yet lacking, etc.

B. Meeting the Demand for Electric Power

According to the *Energy Strategy of the Republic of Moldova for the period until 2020*, the nation's energy security is expected to be achieved in two ways – by increasing the capacity for interconnection with the neighbour countries, and constructing local generation facilities operating on the imported fuel and renewable energy produced in the Republic of Moldova.

In terms of energy security, priority should be given to the construction of own co-generation plants, but due to substantial investments required for the construction of such plants and the lack of local fossil fuel the prices for the electric power generated locally by the facilities constructed in Moldova will be higher than those for the imported power. That is why, considering relatively low payment capacity of the Moldovan consumers, the priority has been given during the preceding and current periods to the extension of the capacity for interconnection with the neighbouring countries.

Under such a scheme, the refusal to import from a certain country results in imports from some other country, but evidently at a higher price. The difference is the payment for energy security. Thus, the development of the local energy sources will be resumed depending on the payment capacity of the consumers, fluctuations of the fossil fuel prices, electric power tariffs in the neighbouring countries and available generation capacities in the region. The above factors were of such nature that the development of the local energy sources had to be minimized in the last few years.

Till currently, the Moldovan Government has issued 5 directives permitting the investors to construct unregulated power plants. Three of them have been already abrogated because the investors have found the Moldovan market not attractive. The other two decisions were issued in 2004: "ITERA" was granted the right to construct a 450 MW condensing power plant in the village of Burlaceni (in the South of Moldova); and EFC "RW-DC ENERGY INVESTMENT" – the right to construct another power plant with similar capacity in Balti (in the North of Moldova).

Notwithstanding the above, such power plants will not shape a competitive electric energy market in Moldova in the short term and they will be able to contribute to the improvement of the nation's energy security. Their impact will be felt probably only after 7-10 years when the configuration of the regional power system is assumedly modified as result of the intent of Moldova and Ukraine to accede the Union for the Coordination of Transmission of Electricity (UCTE). Thus the principal measures to solve the problems of energy security and competition at the electricity market remain those of commissioning the capacities of interconnection power lines between Moldova, Ukraine and Romania.

The interconnection power lines to the Western countries are currently very low-capacity (three 110 kV lines and one 400 kV line Isaccea (Romania) – Vulcanesti (Moldova), whereas the interconnection capacity with the East is rather high (seven 330 kV lines and fourteen 110 kV lines – all of them with Ukraine).

To increase the electric power import capacity, the construction was started in 2007 of an interconnection line to Romania (the 110 kV line Falciu – Gotesti). The Memorandum has been negotiated between State Enterprise "Moldelectrica" (Moldova) and State Enterprise "Transelectrica" (Romania) on the construction of the 400 kV line Balti – Suceava.

The Chisinau and Straseni 330 kV transformer stations have been rehabilitated and modernized under Energy Project II funded by the World Bank.

A considerable increase in the electricity consumption has been registered during the recent years (in 2005: by 4.4%; in 2006: by 11%; in 2007: by 6%). If this electricity demand pattern persists in the next few years, the risk remains of an electric energy crisis. That threat requires the development of emergency measures for the short term (1-3 years), as provided for in the *Moldova's Energy Strategy for the period till 2020*, including first of all:

- Rehabilitation of the existing domestic 110 kV power transmission lines and construction of new domestic 110 kV power transmission lines to have more possibilities to import electricity from Romania via 400 kV interconnection line Isaccea (Romania) – Vulcanesti (Moldova);
- Consolidation of the existing 110 kV interconnection lines with Romania;

- Construction of new 110 kV interconnection lines with Romania: Falciu – Gotesti (Cantemir), Mitoc – Burlaceni (Cahul), Tutora – Ungheni (the second circuit);
- Creation of conditions for the MTPP in Dnestrovsk (ATULBD) to operate at maximum capacity (the higher is the load of the power plant, the more is the capacity to import the electricity from Ukraine);
- Cost-benefit analysis to identify possibilities for the increase of the domestic generation capacities (rehabilitation and modernization of CHP-2 in Chisinau, increasing its capacity up to 440 MW; CHP-1 in Chisinau – up to 90 MW and CHP-North in Balti – up to 100 MW);
- Survey of the energy consumption growth and trends to identify and implement the measures to manage energy demand in order to prevent the significant load growth during the peak load hours on the load curve, including a most effective measure – the implementation of a motivated tariff policy (with differentiated tariffs as well as multi-zone tariffs); the current policy based on the uniform consumed power pricing does not provide any incentives to reduce loads during the peak hours;
- Introduction of differentiated and multi-zone tariffs.

The concept for the mid-term development of interconnection lines (for the next 4-6 years) is based on the goal to consolidate the Republic of Moldova's capacity to transport electricity along the route East-West as well as North-South.

In this context the best solutions to increase the transmission capacity along the route East–West will be the construction of:

- 400 kV interconnection power transmission lines Balti–Suceava and Straseni–Iasi;
- 330 kV interconnection power transmission lines Ribnitsa–Balti and Ribnitsa– Straseni.

That is the least cost-intensive solution which allows connection to a higher capacity node as compared to the others and ensures much higher capacity for energy exchange between Ukraine and Moldova. However, the 330 kV lines Ribnitsa–Balti and Ribnitsa–Straseni cannot be treated as yet as viable (as Ribnitsa is located in ATULBD). Therefore the above solution is currently suspended.

Regards the North-South route, the current plans provide for:

- Construction of a 400 kV power transmission line Dnestrovsk (Ukraine)–Balti (Moldova)–Suceava (Romania); the above three Parties are expected to sign a Memorandum of Intent to the effect, and EBRD has agreed to support the necessary surveys with the possibility of subsequent funding fore the power line construction; in 2007 the Ministry of Industry and Infrastructure implemented the construction project of the 400 kV line Dnestrovsk (Ukraine)–Balti (Moldova);
- Rehabilitation of the 330/110/10 kV station in Balti;
- Rehabilitation of the 330/110/10 kV station in Straseni;
- Rehabilitation of the 330/110/10 kV station in Chisinau;
- The scheduled 330 kV line Balti–Straseni and Straseni–Chisinau will be constructed if the generation capacity increases in the Chisinau Node.

It should be mentioned that the strategy to satisfy the demand with electricity imports from Ukraine is justified also with the actions of this neighbour country in the power sector. In conformity with Ukraine's high voltage transmission network development plans, all those lines enter the geographic region where Moldova is located. According to the Ukrainian plan, in the next 3-5 years the Western part of the country's power system will have excess generation capacity - in particular due to the increased generation at nuclear power plants in Khmelnitsk and Rovno. Ukraine expects to complete the construction of the Pumped Storage Power Plant in Dnestrovsk (PSPP Dnestrovsk) for 2450 MW. To be able to transport the electricity from PSPP Dnestrovsk, it is expected to construct in the next 5-6 years the 330 kV double circuit line HPP Dnestrovsk – PSPP Dnestrovsk and the 330 kV line Bar–PSPP Dnestrovsk. Another electric circuit will be constructed for the 330 kV line Adjalic–Usatovo in the South of Ukraine in 2007. The above development of the Ukrainian grid will increase the transmission capacity along the North-South route up to 1,000 MW.

C. Satisfaction of the Demand for Natural Gas

According to the *Republic of Moldova's Energy Strategy for the period till 2020*, natural gas can be supplied to Moldova from two directions:

- From the gas-main pipeline Ananyev–Chernovtsy–Bogorodceni, Ribnitsa–Chisinau and its Oliscani–Saharna branch, with interconnection to the international main lines Progress, Soyuz, Urengoi–Pomary–Uzhgorod and the natural underground storage in Bogorodceni;
- From the gas-main pipeline Odessa–Chisinau with interconnection to the international transit lines Razdelnaya–Izmail, Shebelinka–Dnepropetrovsk–Krivoi Rog–Izmail and Ananyev–Tiraspol–Izmail.

With the commissioning of the gas line Tocuz–Cainari–Mereni in summer of 2007, an additional possibility appeared for the gas supply to ensure the nation's gas supply security.

The settlements not connected to the lines of the gas supply system will use liquid gas the market of which has been de-regulated. Liquid Petroleum Gas (LPG) is imported from Ukraine, Russia, Romania, Kazakhstan and Belarus by private businesses that have an extensive LPG distribution network and storage facilities with the capacity of 4,450 tonnes.

The gas sector development has been determined by the *National Gasification Program of Moldova till 2010* and the *National Program "Moldovan Village" (2005-2015)*. The implementation of the above programs has led to an increase in the number of gasified villages from 175 villages in 2000 up to 787 in 2007 when the gasification level reached 52%. It is expected to complete the gasification of all Moldova before the end of 2009.

To implement the measures provided for in the *National Gasification Program of Moldova till 2010* it is scheduled to commission 186 km of main gas pipelines, 365 km of high pressure branch lines, 6,265 km of gas lines connecting the rural areas, 20 distribution stations and 7 gas compressor stations. A possibility will be examined during the extension of the distribution station network to install closed type turbo-installations in order to generate electricity via use of the high pressure gas coming from the main high pressure lines. Total investments in the complete gasification of Moldova will make about 2 billion lei (EUR 120 million).

D. Meeting the Demand for Liquid and Solid Fuels

The Republic of Moldova's demand for liquid and solid fuel is satisfied practically in full with imports, excepting small amounts of natural gas extracted in the South of Moldova in the vicinity of Valeni village as well as wood and waste wood produced in the forestry and agriculture.

According to the Republic of Moldova's Energy Balance, the total annual fuel consumption made in the last few years about 550 thousand tonnes of petroleum products (in 2005: 546 thousand tonnes; in 2006: 532 thousand tonnes; in 2007: 554 thousand tonnes). Moldova's storage capacity for petroleum products and in particular diesel oil and gasoline is about 600 thousand tonnes.

To improve the nation's energy independence, a possibility should be examined to construct a petroleum refinery in the northern part of the country (with Otaci, Soroca or Rezina as viable location options) and to complete the construction of the oil terminal in Giurgiulesti with the auxiliary infrastructure and phased increase of its operational capacity. Two ways of access to petroleum sources will be a complete solution to the problem of ensuring the supply of petroleum products. The implementation of the above Projects is possible as a joint effort at the international level as well as via cooperation between the local stakeholders and the specialized international organizations within the framework of programs such as INOGATE with the involvement of the international financial agencies (EBRD, World Bank and IMF).

To diversify the energy resources, coals can be examined as an alternative to the natural gas if the use of clean coal burning technologies is ensured and if this business turns out to be viable in economic terms. An acceptable supply option would be the imports of coal from Ukraine, Romania or Poland, i.e. the countries close to Moldova.

E. Use of the Renewable Energy Sources

According to the *Republic of Moldova's Energy Strategy for the period till 2020*, the portion of renewable energy in the nation's total energy balance should reach 6 percent in 2010 and as much as 20 percent in 2020. If the above targets are achieved, it will contribute to the annual reduction rate of GHG emissions by about 167-210 Gg of CO_2 equivalent.

Moldova has already accumulated certain experience in the sphere of using renewable energy. Several pilot projects have been implemented in connection with the use of renewable energy, including:

- The project to construct a power plant in Colonita village in 2005 with technical assistance from the Netherlands, which was based on the consumption of biogas obtained from manure coming from a cattle breeding farm (the generator capacity is 100 kW, which is sufficient to cover the farm's in-house needs in electricity);
- In February 2006–April 2007 heat plants burning baled straw were installed in 6 rural schools (installed capacity: 600 kW in Chiscareni village, Singerei District, 300 kW in Antonesti village, Stefan Voda District, 147 kW in Taraclia village, Causeni District, 153 kW in Viisoara village, Glodeni district, 140 kW in Viisoara village, Edinet district and 190 kW in Boghenii Noi village, Ungheni district) under the GEF/WB Project "Renewable Energy from Agricultural Waste";
- In 2006-2007, several solar batteries were installed with the support of the World Bank for heating and hot water supply in certain Moldovan hotel complexes;
- In 2007 a heat pump was installed to supply heat and warm water to a residential house with the area of 100 m^2 in Chisinau;
- The construction of a mini-HPP with the capacity of 1.2 MW is scheduled for 2009-2010 on the river Reut next to Trebujeni village (Orhei district) with loan funding from the Government of Poland.

Law No. 160-XVI of 12.07.2007 on Renewable Energy promotes larger scale use of solar and wind energy, biomass, energy of rivers, heat pumps, etc. Tier II legislation should be developed and approved in that context, and it is expected that a part of it will be promoted in 2008-2009 period by the National Agency for Energy Regulation.

F. Promotion of the Energy Conservation Activities

In 2003, the *National Energy Conservation Program for the years 2003-2010* was approved through the Government Resolution No. 1078 of 05.09.2003, in order to achieve considerable reductions in energy consumption via promotion of certain obligatory activities and to encourage consumers to use the energy resources efficiently. The Program has identified 2 priority directions for achievement of the above objectives. First, an impact is made on the role of the state in energy conservation. Second, the responsibility of consumers is stated for compliance with the international energy consumption standards.

The priority actions under the Program are focused on the development and implementation of energy-efficient technologies; improved heat insulation of buildings; rehabilitation of the transmission and distribution networks; implementation of automated electric activators; use of renewable energy; training to all consumer categories; implementation of short-term pilot projects, etc.

As of now, a number of energy efficiency projects have been implemented and/or are ongoing. They include Energy Project II funded by the World Bank, with the objective to improve the availability, quality and efficiency of the heating system in the public buildings selected by their priority. Under the respective Project, 28 heat plants have been already built with state-of-the-art equipment and in compliance with the European standards; 190 efficient heat plants have been built in the rural areas with the support of the central and local public authorities.

To support energy conservation activities, the US Agency for International Development (USAID) offered funding in 2002-2003, including the funding through the *Alliance to Save Energy* created in 2001 to promote energy efficiency at municipal level. The objective of the Alliance was: (i) to develop and implement energy efficiency policy and to identify the existing barriers for its successful adoption; (ii) to strengthen the local counterpart capacity at the regional and municipal level; (iii) to develop and implement energy efficiency projects in Moldova; (iv) to disseminate good experience of other countries in better energy management; (v) to implement a demonstration project showing that small investments in energy efficiency can reduce the costs, improve comfort and bring other associated benefits.

Certain technical assistance projects in the sphere of energy efficiency are currently in the pipeline to be launched with the financial support from the Swedish International Development and Cooperation Agency (SIDA). They include:

- Rehabilitation and extension of CHP-1 and CHP-2 in Chisinau and CHP-North in Balti;
- Implementation of certain energy efficiency projects at the Mother and Child Health Centre in Chisinau and Pulmonology Centre for children in Tirnova village;
- Institutional capacity building assistance for the new created Energy Efficiency Agency, etc.

3.3.2 Transport Sector

The strategic direction in the transport sector is focused on improved traffic security and reduction of its environmental impact via legislative consolidation, improving of the transport system efficiency via rehabilitation of the land transport infrastructure and implementation of the techniques and technologies to reduce fuel consumption.

A. Consolidation of the Legislative and Regulatory Framework

In 1999–2008 Moldova signed the principal European Conventions and agreements on Road, Rail and Maritime Transport. The legislation developed and approved included: Road Transports Code (1999), Rail Transports Code (2003), Commercial Maritime Navigation Code (1999), Concept for the Development of Maritime Transport (2008), Law on Civil Aviation (1997); Laws and Regulations on transportation of hazardous goods, a number of Government Resolutions setting the rules for technical testing of vehicles. The above legislation has taken to a considerable extent the European norms laid down in directives and regulations.

By Law No. 154 of 21.07.2005, the Parliament has approved amendments to the Customs Code which prohibit the imports of passenger cars and minibuses which have been in operation for more than 7 years and trucks and buses which have been in operation for more than 10 years. The above measures lead to the expansion of the vehicle fleet with new vehicles and discontinued operation of old vehicles that do not comply with the national standards. In the recent years Moldova's vehicle fleet has been growing owing to the addition of new vehicles which are less pollutant.

B. Rehabilitation and Development of the Road Transport Infrastructure

The Road Transport Infrastructure Strategy for 2008-2017 was approved through the Government Resolution No. 85 of 01.02.2008; it had been developed after thorough analysis of the current situation in the road, rail and urban transport sectors and coordinated comprehensively with General Action Plan of the Government and the National Development Strategy for 2008-2011 (approved by Law No. 295-

XVI of 21.12.2007) which is a continuation of the Economic Growth and Poverty Reduction Strategy (2004-2006).

The above Strategy describes the current situation in the sector and lays down the Objectives as well as the required actions and measures to approach and solve the existing problems in line with the strategic directions set by the Government, including those in the Action Plan Republic of Moldova – European Union, via implementation of the Funding Agreement (Project to Support the Road Program) between the Republic of Moldova and the International Development Association.

The principal objective for the transports sector is to offer the nation an efficient system which would satisfy the need of its citizens in mobility and facilitate domestic and international trade with account of the role that the Republic of Moldova may have as a bridge between the EU and the CIS countries.

The implementation of the above Project will have an important positive impact on public health and safety, reducing the number of accidents and air pollution levels as result of keeping the traffic speed on particular sections of the rehabilitated road more constant. The development of any new infrastructure construction project involves the evaluation of the environmental impact (including public consultations).

The Strategy is focused on 3 priority directions: (i) infrastructure rehabilitation; (ii) institutional framework; and (iii) infrastructure development. Short-term and mid-term actions have been scheduled along each of the priority directions.

The road infrastructure rehabilitation plan includes:

- A rehabilitation program covering the entire national and local road network;
- Urgent repair and maintenance works on the roads "in poor condition" prior to the launch of the rehabilitation work;
- Running maintenance (normal and periodical) of all rehabilitated roads, understood as adding a new coat of asphalt or surface treatment at least once in 8 years.

After the rehabilitation of the existent road network the possibility will be examined to make new mid-term investments in roads. It should be mentioned that the road network size is satisfactory, considering the Republic of Moldova's area and population, and only a slight extension would be necessary. The principal transportation routs are also covered properly, and the road investment needs can be classified along the following directions:

- Improvements in the quality of the existing roads;
- Improvement of access to the strategic importance areas (Giurgiulesti Port);
- Ensuring all settlements access to the public road network; and
- Construction of bypass roads to detour settlements.

The rail transport modernization is also a basic pre-requisite to provide quality service in the railway sector to customers at affordable prices, to support long-distance international commercial operations and to supply fuel and raw materials with the objective to improve the nation's economic efficiency and make comprehensive use of the benefits offered by Moldova's geographical location. The restructuring of the railway sector must go in parallel and be supported with the rehabilitation of the existent railway network and adequate funding.

The urban transport infrastructure is facing problems similar to those faced by the road infrastructure in the Republic of Moldova: rehabilitation and sustainable funding of road maintenance. The decision-making in this sphere falls within the authority of the municipalities. The basic strategic goals for the urban transports include:

- Operation of public transports with the costs affordable for users and the public budget;
- Improved service quality;
- Optimised street network and transport infrastructure;
- Improved transport system efficiency;
- Minimization of the negative environmental impact;
- Optimization of the urban public transport management; and
- Optimization of the urban public transport network.

The total costs of the actions covered by the Strategy are assessed at 40.1 billion MDL (USD 3.2 billion). The period of time necessary to implement those actions depends on the funds available in the coming years. The funding necessary to cover the project development and other costs can be attracted partially from external donors and agencies (as loan funding and grants), the State Budget and the Road Transport Fund. Technical assistance is expected to be covered mainly by grants or soft loans from the international financial agencies. Furthermore, it will be necessary to mobilize the important local funding. The Road Transport Fund is expected to be the main source of such local funding additional to the allocations from the state budget.

Key performance indicators characterizing the deliverables of implementing the above Strategy include: increased freight and passenger transport flows; increased traffic speed in the rehabilitated networks; reduced running vehicle maintenance costs, including reduced fuel consumption; a decreasing road accident curve, etc.

C. Identification and Implementation of the Logistics and Technology Measures to Reduce Emissions

The following technologies have been developed and partially implemented to improve the service level in the road transport sector and the road traffic security and to minimize the environmental impact:

a) Mandatory Official Checkups of all Vehicles and Trailers

In conformity with EC Directive 96/96 of 1996 (binding for Moldova as well), which lays down technical requirements for vehicles and their trailers as well as their testing methodology, the Government Resolution No. 1047 as of 08.11.1999 was approved in the Republic of Moldova, which provides for the implementation of technical check-up and inspection of all vehicles for compliance with the national norms and standards for road traffic security and environment protection, identification of wanted vehicles and their units, compliance with the fiscal and insurance legislation on the part of their owners and establishment of a database for the National Register of Vehicles.

The Transports Agency (the former Ministry of Transport and Roads) has taken the appropriate measures to implement the obligatory official check-ups at large scale. Official check-ups are performed by duly authorised companies operating in that sphere. There are currently 20 authorized technical check-up stations in the Republic of Moldova: 10 in Chisinau and one in each of the following towns: Balti, Edinet, Orhei, Hincesti, Comrat, Causeni, Soldanesti, Ceadir-Lunga, Criuleni and Cahul. Furthermore, similar technical check-up stations are currently at design and/or construction stage in 18 other settlements, including the towns of Bender and Tiraspol.

It should be mentioned that the implementation of obligatory official check-ups has contributed to the reduction in the number of road accidents (2006: 12 percent reduction against the 2002 level), and withdrawal from operation of the vehicles which are not in compliance with the technical and environmental requirements.

b) Certification of all Vehicles and Trailers

In conformity with the European Agreement concerning the International Carriage of Dangerous Goods by Road (commonly known as ADR) and the requirements of the European Conference of Ministers of Transport (ECMT), the Transport Agency (the former Ministry of Transport and Roads) has accredited 8 stations to perform certification of vehicles and trailers. The large-scale implementation of the European Agreement (ADR) has become possible after the approval of the Government Resolution No. 672 as of 28.05.2002, contributing to the reduction of the environment pollution and decrease in the number of road accidents. Until recently, such services had been delivered only in the neighbouring countries at much higher prices.

c) Authorization of Re-Equipment, Repair and Technical Service Stations

Currently above 90 percent of the vehicles transporting passengers have been re-equipped from proceeds of the commercial passenger transportation. In that context 2 stations have been authorized to perform in the re-equipment of passenger vehicles, which became possible after the approval of the Government Resolution No. 415 as of 08.04.2003. The objective of authorising the businesses to provide vehicle and trailer repair, technical maintenance and re-equipment services in the specialized conditions offered by the manufacturer is the improved quality of the provided services, road traffic security and environment protection. It is also important to re-equip the vehicles for a switch from a gasoline-powered to LNG-powered engine, thus contributing to the reduction of the GHG emissions. The authorization of vehicle re-equipment stations is currently under way.

d) Staff Training and Re-Training in Road Transport

A network of the Staff Training and Re-Training Centres has been created already in road transports, including a database on drivers employed in the national and international freight and passenger road transports with the goal, among others, to improve their professional performance and responsibility as well as road traffic security. It is expected to establish a similar database on truck drivers employed in international transports. There are currently 11 accredited and licensed Staff Training and Re-Training Centres in road transports (all of them located in Chisinau). It is necessary to establish additionally about 20 such Centres in Moldova to implement the Government Resolutions No. 1047 as of 08.11.1999, No. 672 as of 28.05.2002 and No. 854 as of 05.08.2006. The Staff Training and Re-Training Centres train the road transport personnel in conformity with European Directives in the international carriage of goods and passengers by road.

e) Product and Service Conformity Evaluation in Transport

Product and service conformity evaluation in road transport is performed under the Law no. 186-XV as of 24.04.2003 to ensure the national security, prevent fraud, protect consumer rights, life, heredity, health and property and to protect the environment.

The imports to the Republic of Moldova of vehicles and spare parts not in compliance with the applicable standards lead to higher environment pollution and increase in the number of road accidents.

At the same time, the accession of the Republic of Moldova to the WTO and the Law No. 866–XIV as of 10.03.2000 on technical barriers to trade (TBT) provide for the implementation of mandatory certification for spare parts and components that may impact traffic security and the environment. Activities are currently underway to establish the vehicle certification system. There are currently three Certification Authorities (CA's) in operation that perform certification of the products and services in road transports.

f) Implementation of the European Agreement Concerning the Work of Crews of Vehicles Engaged in International Road Transport (AETR)

In conformity with the drivers' hours rules under AETR to which the Republic of Moldova is part, the Government Resolution No.1039 as of 06.09.2006 has been adopted on the approval of the Action Plan to redress the situation with the road transport security until 2009, which provides for use of tachographs in the buses and trucks engaged in national and international road transport and is intended to contribute to the reduction in the number of road accidents and air pollution.

The implementation of the above technologies in road transports will contribute to:

- Decrease in the number of road accidents;
- Improved service quality;
- Imports of vehicles with lower wear;
- Possibility for the Moldovan transport businesses to enter the European market;
- Lower environment pollution, including GHG emissions.

D) Modernization of the vehicle fleet for urban transports

Under the Action Plan for the development of urban transport in Chisinau, the fleet of trolley-buses and buses has been modernized substantially during the last few years via purchase of new vehicles. Thus, in 2001-2005 the Chisinau Electric Transports Administration (CETA) procured 34 new trolley-buses, including 30 Škoda trolley-buses (CETA's trolley-bus fleet requires continuous renovation, because only 14 percent of the 328 trolley-buses operated by CETA as at the end of 2005 were younger than 10 years, and the majority of the fleet was accounted for by ZiU-9 and ZiU-10 makes). Furthermore, 20 new MANN Lion's Classic buses were procured in 2006, and 14 new Hyunday Super Aero City buses were procured in 2008; the latter buses are characterized with lower fuel consumption in compliance with Euro-3 requirements (the municipal bus fleet requires continuous renovation, because only 52 percent of the 190 buses operated as at the end of 2005 were younger than 10 years, and the majority of the fleet was accounted for by Icarus-280, Icarus-263, Icarus-260, LiAZ-5256 and LiAZ-5205 makes). Renovation of the municipal public transports fleet will contribute substantially to the improved environment and the municipal public transports service quality.

3.3.3 Industry Sector

A. Manufacturing Industry Development Policies and Strategies in the Environmental Context

According to the Concept Paper on the Environmental Policy of the Republic of Moldova, the environment protection requirements must be integrated in the sectoral policies. The environmental priorities in the industry sector include: reduction of energy consumption through promotion of energy efficiency and energy conservation policies; promotion of cleaner production through use of clean technologies; creation of incentives for the enterprises to reduce the amount of waste they generate and recycle the waste to use it as secondary raw material; modernization and use of collection and treatment plants for toxic substances.

During the transition period more than 30 documents (policies, strategies and programs) have been developed and implemented addressing industry development in the context of national economy sustainable development. Some of them are described below:

- The National Waste Management Program (2000), that provides for the improvement of the legislative framework by implementing the tools to incentivize waste recycling and use of secondary raw materials (e.g., to provide profit tax exemptions for waste collection and submission for recycling; it has been proposed to grant further tax exemptions and preferential loans for the enterprises using waste as raw materials, etc.);
- The National Action Plan "Environment for Health" (2001) laying down the requirements to the manufacturing industry in respect of atmospheric air protection and waste management. That plan has also provided for the development of certain national and territorial programs to reduce the emissions of principal pollutants in the atmosphere;
- The National Environmental Security Program (2003) stating the principal problems connected with the manufacturing industry – persistent organic pollutants (POP's) and hazardous industrial processes regulated by the Law on Industrial Security of the Hazardous Industrial Facilities (2000);
- The Program for the implementation of ISO 9000 Quality Management Systems (QMS) was launched in 2004 and resulted in QMS implementation and certification at 25 enterprises, whereas the QMS design us currently underway in 35 other industrial enterprises;

- The Program on Implementation of new Technologies in Manufacturing Industry (2004) that provides for stronger cooperation between research institutes and enterprises in the sphere of innovation, creation of industrial parks and research/production associations;
- Manufacturing Industry Policy in the context of Moldova's integration in the EU based on the Republic of Moldova – EU Action Plan, the political document signed by the European Union and the Republic of Moldova, which lays down the strategic goals and priorities in the relationships between the parties for 2005-2007;
- The short-term development strategy for the manufacturing industry until 2006, developed as an integral part of the Economic Growth and Poverty Reduction Strategy (2004-2006). The Strategy was extended to 2004-2008 and harmonized with the political objectives for the manufacturing industry in the context of the Republic of Moldova's integration in the EU. The strategy has become the basis for the production of development programs for individual industrial sectors;
- The Energy Efficiency Improvement Program in the manufacturing industry (for 2004-2008) that integrates the energy conservation targets in the policies for individual sectors.

It should be noted that the environmental issues in the industry sector are regulated by a number of laws, such as: the Law on Entrepreneurship and Enterprises (1992), the Law on Standardization (1995), the Law on Certification (1999), the Law on Licensing of Certain Activities (2001), the Law on Industrial Security of the Hazardous Industrial Facilities (2000), the Law on Technical Regulations (2006), etc.

B. Promotion of the Energy Conservation Policies

The problem of reducing specific energy consumption in the industry sector is a priority. The *National Energy Conservation Program for 2003-2010* approved through the Government Resolution No. 1078 of 05.09.2003 sets the priority action areas and is targeted at energy efficiency improvement at the manufacturing industry enterprises through reduction of energy consumption by about two-three percent annually. Targeting at substitution of approximately 5 percent of the total energy supplied to the manufacturing industry by 2010, that document anticipates furthermore the development of sectoral programs on energy efficiency (e.g., *Energy Efficiency Improvement Program for the Manufacturing Industry for 2004–2008;* its objective was to achieve the savings of 10 percent of the annual energy consumption at the manufacturing industry enterprises).

Although the above mentioned programs are setting general objectives and specific targets, no appropriate economic mechanisms have been developed as yet to incentivize the implementation of the recommended measures. Neither energy payment system nor the pollution tax calculation mechanisms create any real incentives to improve energy efficiency or to use renewable energy.

The possible actions to reduce GHG emissions in the industry sector would be: rehabilitation of the manufacturing capacities in industrial enterprises; implementation of new clean technologies and production systems, energy conservation measures; implementation of the research products in the area of reducing raw material and energy consumption; switch to cleaner fuel (e.g. in 1997-1998 there was a massive switch from coals and petroleum products to natural gas, leading to significant reduction in the pollutant emissions in the atmosphere, including those of GHG emissions).

Modernization and re-equipment of obsolete production capacities in the Republic of Moldova's manufacturing industry will allow replace the equipment with high specific energy consumption with different, more efficient equipment; however that option is very investment-intensive. A similar situation can be found also in connection with the implementation of clean technologies and reduced energy consumption. Good results can be achieved in the short- and medium-term in energy conservation. In the long term, with progress of the manufacturing capacity utilization process, good results in emissions reduction will be achieved owing to re-equipment and implementation of new production technologies.

C. Promotion of Cleaner Production and Energy Efficiency

In cooperation with the Norwegian partners – the Norwegian Energy Efficiency Group (NEEG) and the Norwegian Society of Charted Engineers (NIF) - the Cleaner Production and Energy Efficient Centre established as an NGO in 1999 implemented in 2000-2005 certain number of projects at industrial enterprises in Chisinau, Balti, Tiraspol, Bender and Comrat, including: "Agroconservit" Cannery, "Avicolo-Roso" Poultry Farm, Cahul Bread-Baking Plant, CHP-1 in Chisinau, Yeast Factory in Chisinau, "Floare Carpet" Factory, "Guvaier" Jewelry Plant, "Lapte" Dairy Factory, "Macon" Building Materials Plant, "Mezon" Plant, Leather Factory "Piele", "Tutun" Tobacco Factory, etc.

Those surveys have identified about 300 Projects (A, B and C Rating), of which *A - Rated Projects* dealing with purely organizational issues and not involving any supplementary costs accounted for 57 percent; *B - Rated Projects* requiring minimum costs accounted for 23 percent; and *C - Rated Projects* needing major investments accounted for 20 percent of the total. Of the 197 projects that have been implemented, 79 percent were *A - Rated*; 15 percent were *B - Rated* and 6 percent were *C - Rated*. Training has been delivered to about 100 engineers representing 37 Moldovan companies. The annual savings accomplished owing to the implementation of the above mentioned projects made about USD 1,535 thousand, of which: 11,480,425 kWh of electricity; 2,595,589 m^3 of water; 3,710 Gcal of heat; 451,660 m^3 of natural gas; 5,600 tonnes of raw materials; 348 tonnes of emission reductions.

A program has been completed within the framework of such cooperation to set up an Environmental Management System: six Moldovan companies have established own Environmental Management Systems for the first time in Moldova, and 2 companies applied for ISO 14001 certificate. A training program has been delivered to the managers and engineers on energy audits of buildings (under the demonstration projects, energy efficiency measures have been identified for 6 buildings, making it possible to save about USD 44.7 thousand annually). Trainings, round table discussions, conferences, lectures on the subject have been delivered in the education and health care institutions.

Under the TACIS Project "Cleaner Production in Moldova, Georgia and Kazahstan" implemented in 2003-2006 capacity building activities were carried out in Cleaner Production and Energy Efficiency Centres in the participant countries; demonstration projects were implemented at the enterprises, raising the awareness of the key decision-makers in public institutions and promoting cleaner production and energy efficiency at industrial enterprises.

In the Republic of Moldova demonstration projects were implemented at "Avicola-Roso" J.S.C. in Chisinau, dairy factory "Lactis" in Riscani and Building Materials Company "Macon" in Chisinau. The projects implementation resulted in economic benefits of about USD 340 thousand, obtained by those 3 enterprises, including the benefit from reduction of electricity and heat consumption, polluting emissions, water and raw materials consumption.

3.3.4 Agriculture Sector

A. Adjustment and Consolidation of the Legislative and Regulatory Framework

By ratifying the UNFCCC, the Republic of Moldova has made certain commitments, fulfilment of which will contribute significantly to the UNFCCC implementation. One of those commitments provides for harmonization of the national legislative and regulatory framework with the UNFCCC provisions.

The legislative and regulatory framework in agriculture with direct or indirect impact on the UNFCCC implementation in the Republic of Moldova comprises several laws adopted within 1991-2005 time series, including: the Land Code (1991), the Water Code (1993), the Forest Code (1997), the Law on Environment Protection (1993), the Law on Grapes and Wine (1993), the Law on Veterinary Activities (1993), the Law on Selection and Reproduction in Animal Breeding (1995), the Law on Horticulture (1996), the Law on Protection of Plant Varieties (1996, 2008), the Law on Natural Resources (1997), the Law on Production and Domestic Waste (1997), the Law on Environment Pollution Payments (1999), the Law on Plant Protection (1999), the Law on Animal Breeding (1999), the Law on Nuts (1999), the Law on Tobacco and Tobacco Products (2001), the Law on Foodstuffs (2004), the Law on Subsidies to Reduce the Production Risks in Agriculture (2004), the Law on Phytosanitary Products and Fertilizers (2004), etc.

To ensure sustainable development and to honour the obligations taken internationally under the environmental Conventions, the Republic of Moldova has adopted a number of Strategies and National Programs, such as: the National Sustainable Development Strategy "Moldova-21" (2000), the Integrated Program on Degraded Soils Reclamation (2003), the National Action Program to Combat Desertification (2000), the National Integrated Soil Fertility Enhancement Program (2000), the Program on Use of New Areas and Soil Fertility Enhancement for 2003-2010 (2003), The Program on Use of New Areas and Soil Fertility Enhancement - Part II: Soil Fertility Enhancement (2004) and National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015 (2008). The implementation of the adopted strategies and programs could contribute significantly to higher quality protection of soils and reduction of GHG emissions generated in agriculture sector. The bottleneck is the lack of adequate funding for the scheduled activities.

To apply the Law on Environment Pollution (1999) and the Law on Environment Protection (1993), the Government of the Republic of Moldova has approved Provisional Regulations on the assessment of the environmental damage, which contain new soil protection regulations. More important in terms of the GHG emissions reduction in agriculture are the regulations permitting to assess the damage and apply economic penalties for burning of crop residues on land and for the continuing reduction of humus levels in soil. Furthermore, the regulations deserve appreciation as the first attempt to apply the above laws. However, they require serious improvements to increase their application efficiency.

Significant positive changes in this area can be achieved by adopting the Law on Soil, covering all land exploitation and protection aspects. The legislative framework in this sphere needs a qualitative review – primarily in view of the mechanisms allowing apply the developed laws.

It is important to harmonize the laws and regulations already developed or under development with the relevant

EU legislation, as provided for in the National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015. Thus, the Action Plan of the Strategy provides for the development of several new draft laws (implementation term: 2008-2009) to strengthen the legislative and regulatory framework in agriculture:

- The draft Law on Agricultural Activities (the Law on Agriculture);
- The draft Law on Consolidation of Agricultural Land;
- The draft Law on Low-Productivity Land;
- The draft Law on Agricultural Cadastre;
- The draft Law on Plant Protection and Phytosanitary Quarantine.

It is expected that harmonization of the national legislative and regulatory framework and development programs for the sector with the relevant EC legislation, including the strategic EU Guidelines, will lead to lowering of risks in agriculture, better adjustment of the sector to the impact of climate change and reduction of the GHG emissions in agriculture.

B. Revival of the Animal Breeding Sector

Animal breeding accounts for about 2/3 of the total GHG emissions in agriculture (including methane emissions from enteric fermentation, as well as methane and nitrous oxide emissions from manure management). The reduction by about 65 percent of the methane emissions in 1990-2005 has been caused in particular by numeric reduction of livestock population. The numeric reduction went in parallel with lower productivity, which led to higher GHG emissions per production unit.

The major economic crisis affecting the animal breeding sector in the Republic of Moldova has not been overcome; on the contrary, it has aggravated due to the severe drought in 2007. Currently the animal breeding sector features low productivity livestock. It must be noted here that the domestic production satisfies only about 30-40 percent of the domestic demand for animal products.

The animal breeding policies and measures with direct or indirect impact on the UNFCCC implementation in the Republic of Moldova are based on the National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015, which provides for:

- Implementation of the National Cattle-Breeding Program for 2006-2015;
- Implementation and Fulfilment of the National Pig-Breeding Program for 2003-2010;
- Implementation of the Program to Revive and Improve Poultry Breeding for 2002-2010;
- Implementation of the Apiculture Development Program for 2006-2015;
- Restoration of the high productivity livestock and support in the establishment of modern dairy and meat farms based on advanced technologies;
- Maintenance and improvement of the gene pool of pedigree animals (selection, reproduction, animal breeding and health);
- Incentives for introduction of modern equipment and rehabilitation of small and medium-sized animal breeding farms in the rural areas outside villages;
- Establishment of an integrated and stable agricultural system within each agricultural soil/climate zone by integrating the vegetable crop production with animal breeding;
- Ensuring the national food security.

The achievement of strategic targets through development and implementation of sectoral, regional and other programs will be accompanied with qualitative changes in animal breeding sub-sector. Thus, the modernization of animal breeding technologies will lead to the reduction in specific feed consumption, minimization of CH_4 and N_2O emissions from manure as result of applying sustainable manure management practices and use of methane recovery technologies (biogas production). Even if the achievement of strategic targets will contribute to the development of a growth pattern in total GHG emissions from animal breeding, in particular due to higher livestock and poultry farming, it is expected that GHG emissions registered per animal will reduce owing to the qualitative changes in breeding technologies.

C. Sustainable Development in Agribusiness

The Action Plan for the implementation of the National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015 provides for certain actions to promptly replace the current traditional farming with the agriculture based on the sustainable practices of exploiting the fertility of agricultural soils. The programs which should be developed and implemented will include most certainly the measures to conserve carbon in soils because it is the foundation for sustainable agriculture:

- Implementation of the Program to Prevent Soil Erosion and Manage Low Productivity Areas (implementation term: 2008-2015);
- Implementation of the Agricultural Land Consolidation Program (implementation term: 2008-2015);

- Improved agricultural land management; implementation of pilot projects (implementation term: 2008-2011);
- Comprehensive soil evaluation and identification of the available resources, priorities, limitations and risks (implementation term: 2008-2011);
- Development and implementation of the projects to create green protection strips (implementation term: 2008-2015);
- Creation and implementation of an integrated system for soil fertility increase and reproduction (implementation term: 2009-2011);
- Review of the National Horticulture Development Program (implementation term: 2009);
- Production of the Technical Crops Development Program (implementation term: 2009);
- Development of the Vegetable Production Program (implementation term: 2009);
- Production of the Grain Crops Development Program (implementation term: 2008-2009);
- Implementation of the Tobacco Sector Development Program in 2003-2010 (implementation term: annually);
- Implementation of the National Program for the Development of Nut Production until 2020 (implementation term: annually).

Optimized agricultural crops structure plays a significant role in that respect. The current structure with excessive tillage, in particular for sunflowers, and a very low portion of perennial and annual grass leads to soil carbon losses through CO_2 emissions, water erosion and run off, thus contributing to soil degradation and increased GHG concentrations in the atmospheric air. An optimized crop rotation will have a higher portion of legumes which enrich soil with nitrogen, producing a positive impact in terms of reducing GHG emissions from the crop sector.

A considerable driver for the enrichment of agricultural land with carbon and thus for its improved productivity is the reduction of fallow land, reclamation of degraded soils, use of sustainable fertilizer introduction practices through application of manure and crop residues to soil. The other sustainable agriculture components are also efficient in this sense, such as: forestry practices, integrated crop growing practices and green fertilizers.

Another very important pre-requisite for the switch to sustainable agriculture is the reduction of tillage. Traditional crop production practised currently on all arable land leads to decomposition of the organic matter in soil and thus to quicker carbon dioxide accumulation in the atmospheric air. Integrated application of the sustainable agricultural practices will ensure improved soil fertility, higher productivity in vegetable production and animal breeding and considerable reduction of GHG emissions in agriculture.

3.3.5 Forestry Sector

A. Improvement of the Legislative and Regulatory Framework

The problems of sustainable forest management can be solved successfully only through promotion of the forestry policy adequate for the new conditions. It is necessary to shape a new attitude to forestry, to implement the provisions of the international environment conventions to which the Republic of Moldova is a part, to organize rational use of the forestry products within the context of ensuring the continuity of forests as structure and function - in line with the growth conditions and contribution to maintenance of the multifunctional potential of the forests.

The forestry policy of the Republic of Moldova focuses on biodiversity conservation at all levels, training of staff in the forestry sector, harmonization of the legislative framework and international cooperation. The legislative framework underlying the state policy in the forestry sector is comprised of: Law No. 1515-XII as of 16.06.1993 on Environment Protection (1993), Forest Code (Parliament Resolution No. 887-XII as of 26.06.1996), the Law on Reclamation of Degraded Land via Planting of new Forests (Parliament Resolution No. 1041-XIV as of 15.06.2000), Sustainable Development Strategy for the Forestry Sector (Parliament Resolution No. 350-XV as of 12.07.2001), National Strategy and Action Plan on Biodiversity Conservation (the Parliament Resolution No. 112-XV as of 27.04.2001), Government Resolution No. 636 as of 26.05.2003 on Approval of the Program for Land Use and Soil Fertility Improvement (2003), Government Resolution No. 737 as of 17.06.2003 on Approval of the State Program for Reclamation and Planting of new Forests on the Land Available for Forestry for 2003-2020, Government Resolution No. 739 as of 17.06.2003 on the Implementation of the Sustainable Development Strategy for the National Forestry Sector, other Laws and Government Resolutions applicable directly or indirectly to the above sector. The successful implementation of these documents will contribute to the achievement of new qualitative and quantitative targets in the forestry sector, thus increasing its input in the solution of the ecological and social-economic problems facing the nation.

B. Consolidation of the Bio-Productivity and Eco-Productivity Capacities of the Existing Forests

The consolidation of the eco-protective and bio-productive potential existing forests requires the prevention of their further degradation as well as conservation, regeneration and reconstruction of the forest ecosystems by switching from the grove mode to the 'Codru' (forest) mode, broader application of mass regenerating treatments and prompt replacement of the low productivity plantations, which do not comply with the stationary conditions. In 1997-2005 the respective work was performed on the area of about 33 thousand hectares (Table 3-1).

Table 3-1: Forest areas covered with ecological regeneration and reconstruction activities

Years	Forest regeneration, ha - inclusive:			Ecological reconstruction, ha
	Total	Plantation of forest cultures	Supporting natural regeneration	
1997	5040	1011	4029	0
1998	3989	1152	2837	0
1999	3065	1030	2035	169
2000	3309	816	2493	74
2001	2809	953	1856	77
2002	3643	1219	2424	455
2003	3050	998	2052	375
2004	3171	977	2194	393
2005	2944	981	1963	381

C. Forest Conservation

The contribution of the forestry sector to the national economy takes the form of the forest products (wood and non-wood) supplied as finished or semi-finished products/raw materials as well as services. Around 300-400 thousand m^3 of fuel wood are gathered annually on the average (Table 3-2) as result of the annual forest maintenance and the work to ensure plantation continuity in the forest resources managed by the Forestry Agency "Moldsilva", including wood for burning which accounts for about 85 percent. Raw wood is harvested in the forests managed by the Forestry Agency "Moldsilva" during the cutting of secondary products (evolution treatments; cleaning; thinning; cleaning cuttings, including selective sanitation treatments), cutting of principal products (regeneration, conservation, clean sanitation cuttings) and ecological reconstruction. For instance, only within 1997-2005 period there were gathered and distributed about 10,300 t of non-wood forest products, including 2,910 t of the forest fruits and berries, 410 t of medicinal plants, 69,906 t of agricultural and animal products and about 300 thousand Christmas trees as well as seedlings of decorative species and of fruit bearing trees.

D. Improving the Efficiency of the Forest Security and Protection Measures

The Forestry Agency "Moldsilva" is taking measures to improve the security of the forest resources, to reduce illegal timber-cutting (illegal logging) and the number of other infringements against the forest legislation. In that context, in 1997–2005 the employees of the Forestry Agency "Moldsilva" performed 13,644 raids resulting, among other things, in the production of 30,320 infringement reports on illegal logging and confiscation of 49 thousand m^3 of fuel wood.

The worst situation has been registered in the forests and other forest-type plantations managed by the local authorities, where – due to the needs of the local residents in fuel wood for heating and cooking, in building materials, etc. - the illegal logging totalled about 104 thousand m^3 in 1997-2005 (Figure 3-1).

Table 3-2: Trends in Fuel Wood Harvest in the RM, 1990-2005

Year	Commercial timber, thousand m^3	Fuel wood gathering, thousand m^3	Illegal fuel wood logging, thousand m^3	Total fuel wood harvested, thousand m^3
1990	39.4	184.2	0.6	184.8
1991	27.0	260.7	140.8	401.5
1992	27.4	314.7	213.4	528.1
1993	31.5	402.6	328.1	730.7
1994	39.8	347.4	210.7	558.1
1995	68.5	420.1	205.7	625.8
1996	51.7	402.5	187.4	589.9
1997	52.7	280.2	21.4	301.6
1998	38.0	332.4	64.2	396.6
1999	38.8	326.1	22.0	348.1
2000	39.7	330.5	7.5	338.0
2001	37.3	308.1	6.0	314.1
2002	50.4	337.3	5.4	342.7
2003	47.0	372.8	5.9	378.7
2004	43.5	372.3	4.4	376.7
2005	39.0	352.2	4.2	356.4

Source: Statistical Records/Reports of "Moldsilva" State Forestry Agency and State Ecological Inspectorate for the 1990-2005 time series; D. Galupa, I. Talmaci, L. Spitoc, Study for the Republic of Moldova "Ensuring sustainability of forests and livelihoods through improving governance and control of illegal logging". Chisinau, 2005, 116 pages

In the above mentioned period, the average illegal felling per 1,000 hectares of forests/forest-type plantations managed by the Forestry Agency "Moldsilva" there were about 12 m^3, whereas that indicator was about 30 m^3 or 2.4-fold of the above in the forests managed by the local authorities. It should be noted furthermore that a part of illegal logging, in particular those in the forests managed by the local authorities, remains undetected and therefore is not registered. Starting in 1999, the situation has been coming back to normal, showing a definite decrease in the amounts of illegal logging, including those in the forests of the local authorities.

E. Scientific Support

Scientific research plays an important role for the sustainable development of the national forestry sector. Fundamental and applied research is performed to solve the ur-

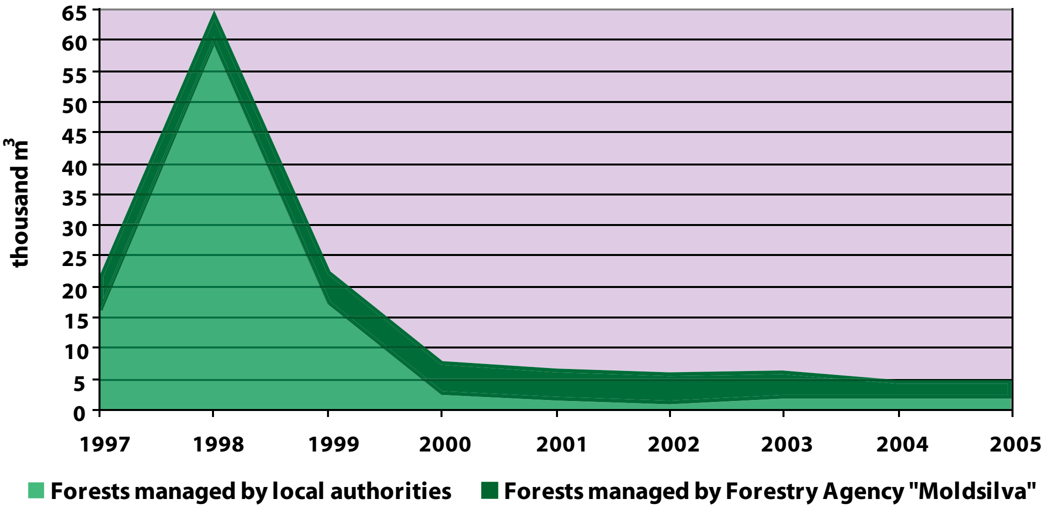


Figure 3-1: The amount of illegal felling in forests and other forest-type plantations

gent problems faced by the forestry-profile researchers. Applied research is focused on the development of clean and environmentally friendly forest management technologies allowing restoration of the forest productivity, structure and functions in compliance with their stationary potential, ensuring improved forest resistance to the external negative impacts. The Forestry Research and Management Institute have performed certain activities in that context, including:

- Research in the particulars of natural regeneration in plantations hit by natural calamities (e.g., the frost happened in November 2000);
- Research in the state and productivity of plantations depending on the nature and intensity of applied forest management treatments;
- Research in the flora biodiversity in state-protected natural preserves forming part of the national protected wildlife areas;
- Selection and characteristics of the valuable pubescent oak plantations;
- Research in the useful life of oak trees;
- Study in the current state of seed production with recommended measures to redress the situation;
- Development of recommendations and regulations on seed production and gene pool conservation, ecological restoration of plantations, etc.

F. Expansion of the Forest Areas

In the context of implementing the national programs and strategies in the sector within the 1999-2005 period, efforts were made in Moldova to expand the areas under forests, by adding 30,119 hectares of degraded agricultural land new to the national forest reserve. To ensure forest restoration and expansion of the areas under forest-type plantations within the 1999-2005 time series, the forestry facilities produced about 280 million seedlings.

To ensure constant ecological balance and more pronounced impact on the local climate and hydrology, to establish ecological corridors connecting forest areas and to improve the productivity of agricultural land, it is expected to plant forests on about 128 thousand hectares of land by 2020 (Figure 3-2), about 5 thousand hectares of plantations with quick-growing species and about 5 thousand hectares of green zones in urban and rural settlements.

G. Moldova Soil Conservation Project

One of the principal components in the package of actions to expand the areas under forests is the "Moldova Soil Conservation" Project implemented by the Forestry Agency "Moldsilva" under the Clean Development Mechanism of the Kyoto Protocol. In the frame of respective project there were planted forests on 20.3 thousand hectares of land suffering from advanced degradation processes. The net CO_2 removals owing to the increased biomass will be 3.5 million tonnes (during the first 20 years), including 1.9 million tonnes already contracted by the World Bank Prototype Carbon Fund and BioCarbon Fund for 2004-2017. The transaction value is about USD 7 million, which will cover about 37 percent of the total investment needs for the implementation of the Project, and the remainder amount will be funded by the Forestry Agency "Moldsilva".

H. Improving the Quality of Grasslands and Expansion of Grasslands

Grassland are an important sink category. This category accounts for about 24 percent of the total carbon removals achieved within the Land Use, Land-Use Change and

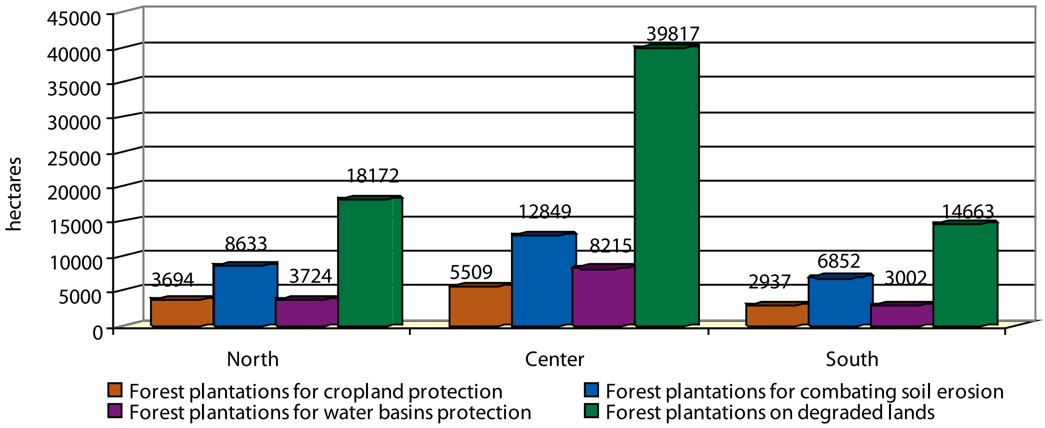


Figure 3-2: The areas scheduled for planting of new forests in the Republic of Moldova in 2003-2020, by geographic zone and category of forest vegetation

Forestry (LULUCF) sector. At the same time the share of grassland in the national land pool structure is about 11 percent. Thus, according to the General Land Cadastre, as at 01.01.2005 the grassland accounted for 373.5 thousand hectares (of which 33.4 thousand hectares in public property of the state; 336.9 thousand hectares in public property of the territorial-administrative units; and 3.2 thousand hectares in private property).

The contribution of grasslands to carbon removals can be increased additionally by enhancing their productivity, because currently most of them are in deplorable state. Thus, according to the available survey data, the productivity of grassland situated on slopes is 0.4-1.2 tons of constant mass per hectare, and in valleys – 2.0-4.2 tons of constant mass per hectare. The breakdown is as follows: valleys - 15.3 percent (2.3 tons of constant mass per hectare in a year); eroded soil - 31.7 percent (0.6 tons of constant mass per hectare in a year); slopes - 53 percent (1.2 tons of constant mass per hectare in a year). The average weighted annual growth for the total existing pastures is 1.2 tons of constant mass per hectare in a year. The potential to increase the pasture productivity is about 300 percent.

I. Community Forests Development Project

To encourage the communities participating in the "Soil conservation" project, the Government of Japan has provided a Community Forests Development Grant totalling USD 919,900 managed by the Forestry Agency "Moldsilva". The main objective of the grant is to contribute to ensuring the sustainability of forest planting activities in the Republic of Moldova, improved well-being of the population in rural areas via better management of community forests and pastures. Furthermore, the project is significant because most of the funds are allocated to specific realistic target actions. The grant is targeted at public forests (forests, field protection strips, green areas, other forest-type plantations) and pastures owned by local communities.

The project covers 50 participating communities. The scheduled activities are expected to produce a positive impact on the respective community forests and pastures, contributing substantially to the improvement of their general state, better management capacity, environmental and economic benefits which can be appreciated by the rural residents. Work has been performed already to improve (using a number of methods) about 2,000 hectares of community pastures.

3.3.6 Waste Sector

A. Improvement of the Legislative and Regulatory Framework

The current national legislation on environment protection is comprised of about 35 laws and 50 regulations, instructions, Government Resolutions, etc., regulating the corporate environment protection activities locally and internationally. When the national environmental legislation was under development, the legislators generally took into account the provisions of the international environment conventions.

The legal aspects of the environment protection, including waste management in the context of the climate change issues and efforts to reduce the environmental impact, including that produced by the GHG emissions, are reflected only in part.

- The Law No. 1347-XIII as of 09.10.1997 on Industrial and Domestic Waste, according to the Law No. 515-XII as of 16.06.1993 on the Environment Protection, industrial and domestic waste management should be focused on waste reduction and maximum recycling with their subsequent return in economic circulation to prevent the environment pollution;
- The Law No. 1422-XIII as of 17.12.1997 on Atmospheric Air Protection is focused to keep the air clean and

to improve its quality, to prevent and reduce the negative impact of physical, chemical, biological, radioactive and other pollutants on the atmospheric air with harmful effect for the population and/or environment;

- The Law No. 1540-XIII as of 25.02.1998 on Environment Pollution Payments aims to establish an economic system under which any environmental damage is not feasible; to implement clean technologies and to take other measures reducing the pollutant emissions (discharge) in the environment and the amounts of production waste; incentivize the efforts targeted at improvement of the environment quality.

The national legislation is implemented by applying regulations, programs and guidelines (instructions) approved by Government Resolutions, ministerial orders, sanitary norms and standards, including:

- Government Resolution No. 606 as of 28.06.2000 on the National Industrial and Domestic Waste Management Program;
- Government Resolution No. 276 as of 20.03.2000 on Regulated Collection, Procurement and Marketing of Secondary Resources;
- Government Resolution No. 637 as of 27.05.2003 on Control over Cross-Border Transportation and Disposal of Waste;
- Order of the Ministry of Environment and Natural Resources No. 233 as of 10.11.2003 on the implementation of Government Resolution No. 637 as of 27.05.2003 approving the Guidelines on Notification and Guidelines on Filling of the B/L form;
- Government Resolution No. 1155 as of 20.10.2004 on the approval of the National Strategy to Reduce and Dispose of Persistent Organic Pollutants (POP's) and the National Plan for the Implementation of the Stockholm Convention;
- Order of the Department of Statistical Analysis and Sociology No. 46 as of 04.06.1999 on the approval of the Guidelines on the Production of Statistical Report "Toxic Waste Production, Disposal and Neutralization", Form 1: 'Toxic Waste';
- Order No. 06.6.3.11 as of 1.02.1995 of the Ministry of Health on the approval of the Sanitary Regulations on Storage, Neutralization, On- and Underground Disposal of Toxic Substances and Residues;
- Standard STAS 25150-82. Sewage System: Terms and Definitions;
- Standard SR 13330:1996. Sanitation in Residential Settlements. Vocabulary;
- Standard SR 13350:1996. Sanitation in Residential Settlements. Urban and Rural Waste. Classification;
- Standard SR 13351:1996. Sanitation in Residential Settlements. Urban and Rural Waste. General Guidelines on Separate Collection;
- Standard SR 13343:1996. Sanitation in Residential Settlements. Urban Waste. General Guidelines on Designs for Controlled Disposal;
- Standard SR 13388:1997. Sanitation in Residential Settlements. Urban Waste. Guidelines on Location of Controlled Dumps.

As regards the development of waste management standards, the situation is precarious because there are no specialized Moldovan institutions in that sphere. In most cases the standards developed in other countries (Romania or Russian Federation) are declared national, although they are not always in compliance with the other national legislation. Although certain general aspects connected with the classification, the need to regulate waste disposal, etc., should be covered by the Institute of Ecology and Geography, and other areas by economy sector – by the institutions in the relevant sectors, the current waste management regulations are still incomplete, and the above standards have no reference to monitoring and reduction of GHG emissions.

The National Industrial and Domestic Waste Management Program (Government Resolution No. 606 as of 28.06.2000) have been designed to develop and implement certain industrial and domestic waste management efforts according to "the polluting party pays" principle.

The principal objectives of the above National Program were: to use and neutralize the existing waste; to minimize waste generation; to discontinue the use of raw materials containing toxic substances; to reduce waste volumes and toxicity prior to waste disposal; to implement separate collection of different types of domestic waste; to improve the legislative framework.

No success has been achieved in the development and application of economically efficient mechanisms to incentivize the businesses operating in the waste management sector. The main reason for the failure to achieve the targets was the lack of funding for the program or any adequate support on the part of the involved ministries and local public authorities.

The concept of hygiene for residential settlements in the Republic of Moldova provides for the direction and instantiation of the hygiene and sanitation policies for residential settlements, improvement of their hygiene, capacity diversification and consolidation in the public sanitation service, increased responsibility of the local public administration in that sphere.

The objectives for the emergence and operation of the public sanitation services are:

- Improved the living conditions of the population by means of higher service quality and efficiency;
- Improved quality of life of the population through facilitation of local economic development – mainly using the market economy levers and establishing a modern municipal structure which would underlie economic development and facilitate the attraction of profitable investments for the local authorities;
- Sustainable development of the above services;
- Environment protection.

We can conclude from the above that the environmental legislation of the Republic of Moldova regulates the aspect of reducing GHG emissions only along general lines. There are no clearly defined stipulations regarding equipping the solid municipal waste disposal sites with biogas recovery systems. The introduction of efficient waste management technologies and separate collection of the solid municipal waste with its subsequent procession would contribute significantly to the reduction of the GHG emissions. The Republic of Moldova is striving to become an EU member country, but considerable efforts are required in waste management to achieve compliance with the legal, organizational and technical standards in the EU. Amendments to the legislation should be developed to contain provisions on the promotion of efforts to reduce GHG emissions from the waste management sector.

B. Waste Minimization and Recycling

With account of the objectives under the National Waste Management Program, the Local Public Authorities must provide conditions for separate collection of the recyclable components in the solid municipal waste. In that context, special solid waste platforms with separate containers for the collection of recyclable components (paper, glass, PET) are constructed currently under Projects supported by the European Union and the National Environmental Fund in the Republic of Moldova's cities, towns and regional centres. The Local Public Authorities are trying to involve both companies and broad public in the implementation of the scheme for separate domestic waste collection in order to reduce the volumes of landfilled waste and to promote adequate recycling of separate components. The enterprises operating in the recuperation of recyclable components do not submit reports to the statistics offices regarding the amounts of collected and recovered waste, and therefore such data is not available at present. From the above one can conclude that the Republic of Moldova currently has a significant reserve for more pro-active promotion of separate waste collection and implementation of the optimized waste management methods.

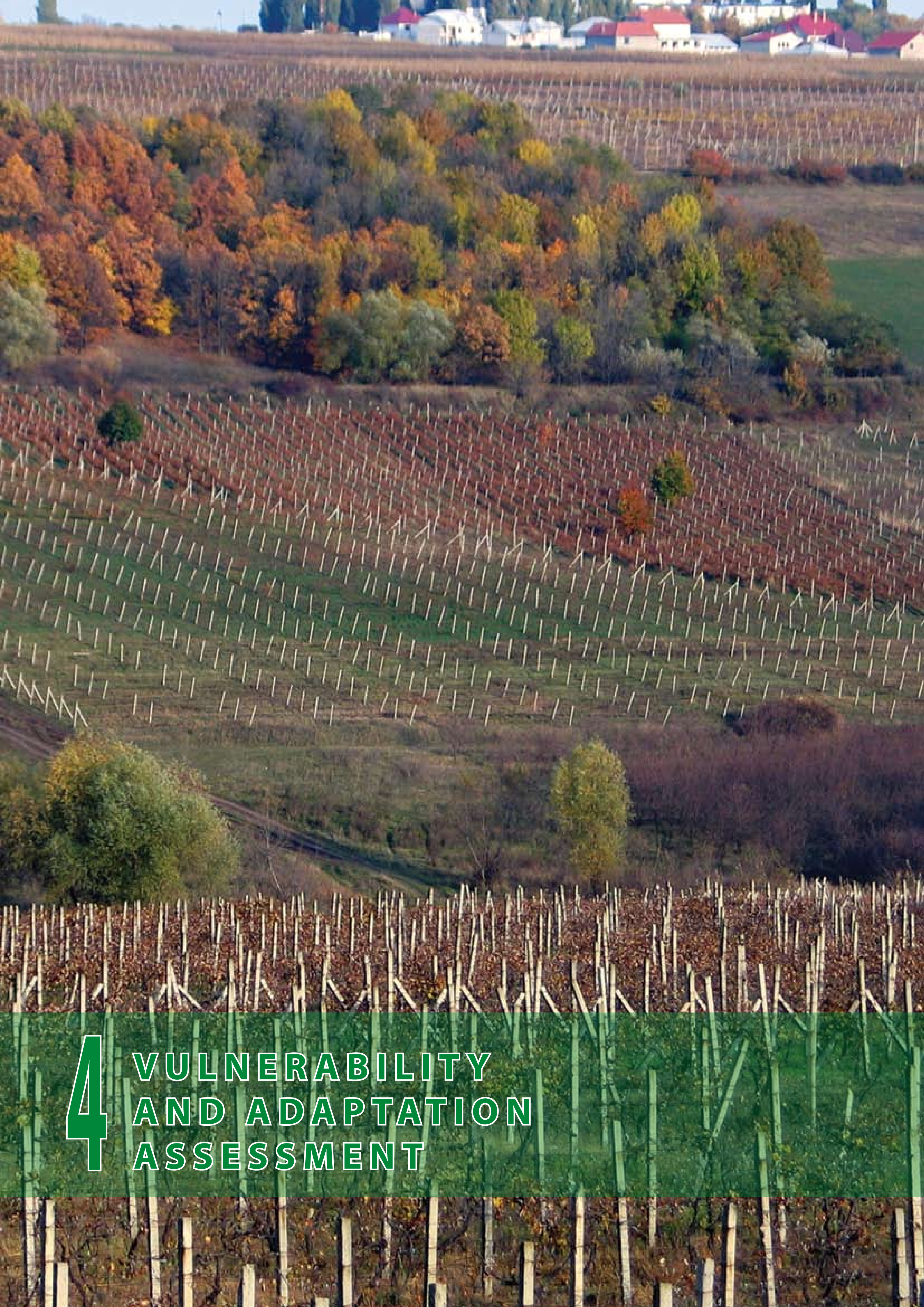
C. Centralized Waste Disposal

The model project portfolio for the "Standard Technological Scheme of Solid Municipal Waste Disposal Sites" was developed by the State Design Institute "IPROCOM" and approved through the Order of the Minister of Environment and Territory Development No. 67 as of 02.05.2001.

The portfolio presents technological and technical solutions for the construction of solid domestic waste disposal sites for settlements with the population of 3.0-5.0, 10.0-15.0 thousand and 20.0-30.0 thousand inhabitants, which have been developed in conformity with the requirements of the applicable laws and regulations on construction and protection of the environment and human health.

The key indicators calculated for the purposes of designing domestic solid waste disposal sites to be operated for 20 years include: disposal site area and dimensions, the dimensions of the underground foundation, actual landfilling capacity of the domestic solid waste dump site, the number of machinery and equipment units required to operate the dump site, the number of employees operating it.

The landfill capacity is calculated in conformity with the annual per capita MSW accumulation rate, based on the data used to estimate the CH_4 emissions originated from source category 6A "Solid Waste Disposal on Land' by using the IPCC Guidelines (IPCC, 1997, 2000). It should be mentioned that the design solutions are in the nature of recommendations and they must be adapted to the geology and climate of the settlement where the landfill construction is scheduled to take place.



4 VULNERABILITY AND ADAPTATION ASSESSMENT

4. VULNERABILITY AND ADAPTATION ASSESSMENT

4.1 Climate Change Scenarios

4.1.1 Identification of the Most Appropriate Climatic Models

The possible climate development scenarios for the Republic of Moldova were identified on the basis of the calculations under seven general atmospheric circulation models - HadCM2, ECHAM4, CGCM1, GFDL-R15, CSIRO-Mk2, NCAR-DOE and CCSR. IS92a scenario served as the basis for the determination of the greenhouse gas emissions development patterns. To identify the climatic models yielding the most accurate projections of the key future climate indicators in the Republic of Moldova within the framework of the study on the climate change phenomenon, a comparison was performed between the monthly temperature averages and the daily precipitation averages – as calculated using the above climatic models – and the similar values actually registered in the Republic of Moldova during 1961-1990 time series. The actual climatic values registered during the above period at five meteorological stations were used as reference data (the stations located in Briceni, Balti, Chisinau, Tiraspol and Cahul have been chosen to achieve the uniform coverage of the Republic of Moldova's whole territory). The assessments helped identify three general atmospheric circulation models (ECHAM4, HadCM2, CSIRO-Mk2) that yielded the results closest to the similar climatic values actually observed in the Republic of Moldova during 1961-1990 time series (Table 4-1).

Therefore it was concluded that only three of the above models would be the most appropriate to use in order to arrive at the projections for the future development of the climatic indicators in the RM, which would be characteristic for the climate changes for the period until the year of 2100. Those were: ECHAM4, HadCM2 and CSIRO-Mk2. All the subsequent projections were performed using the climatic scenarios generated under those three models to assess the climate change impact on the various sectors and systems.

4.1.2 Description of Possible Climatic Scenarios for the Republic of Moldova for the period till 2100

a) Air Temperature

As stated above, three climatic models – ECHAM4, HadCM2 and CSIRO-Mk2 – were selected to identify the climatic scenarios for the Republic of Moldova during 2010-2100 time series with the aim to describe the climate change phenomenon under the current UNFCCC concept. The development patterns of the monthly temperature averages have shown some clearly pronounced changes under all three applied models. The negative temperature averages for the winter months may become a thing of the past already in the late 60s of the 21st century. In a similar way, all the climatic models used have yielded the results showing a more significant growth of the monthly temperature aver-

Table 4-1: The Temperature and Precipitation Values as Generated According to the General Atmospheric Circulation Models and the Actual Values Observed in 1961–1990

Period	Actual climatic value, 1961-1990	Climatic values for 1961-1990 period, calculated according to the general atmospheric circulation model				
		ECHAM4	CGCM1	CSIRO Mk2	HadCM2	GFDL R15
Temperature (^0C)						
January	-3.62	-3.47	-1.12	-1.72	-3.46	-5.02
July	20.39	22.10	21.65	20.80	19.87	19.94
Precipitations (mm/day)						
January	1.13	2.32	1.72	1.62	2.29	1.67
July	2.32	1.70	3.51	2.64	2.82	2.04
Deviation, the average as calculated according to the general atmospheric circulation model - less the actual average observed in the RM during 1961-1990						
Temperature (^0C)						
January	NA	0.15	2.50	1.90	0.16	1.40
July	NA	1.71	1.26	0.41	0.52	0.45
Precipitations (mm/day)						
January	NA	1.19	0.59	0.49	1.16	0.54
July	NA	0.62	1.19	0.32	0.50	0.28

ages for the winter months as compared to that for the summer months. The assessment of the possible impact of the climate change on the average season lengths has produced the following results for each of the seasons, assuming that: winter is the period with the daily temperature averages below 0°C; spring is the period with the temperatures above 0°C and below 15°C; summer is the period with the temperatures above 15°C; and autumn is the period with the temperatures below 15°C and above 0°C. The projected heat resource development patterns have demonstrated that the annual air temperature averages will register an increase of 1.7-1.9°C by the end of 2039. During 2070-2099 the air temperature averages will grow considerably in spring and summer – not only in winter. Thus, the temperature averages for July - the warmest month of the year – may grow by 3.6-5.3°C (Table 4-2). The annual air temperature averages may grow by 4.0-5.0°C by the end of this century as compared to the temperature levels in the reference period (1961-1990).

The generated results (Figure 4-1) have shown that the number of days typical of the winter season would decrease in the Central zone by 39 days (HadCM2), by 70 days (CSIRO-Mk2) and by 87 days (ECHAM) by 2070 and by 85 days – under all the applied models - by 2100, as compared to the climate during the reference period (1961-1990).

The days typical of the winter period will disappear to all practical purposes in the Central and Southern zone of the Republic of Moldova by 2100. In the North the number of the days typical for the winter period will decrease at least by half and reach 50-52 days as compared to the 105 days registered for the climate during the reference period (1961-1990). The resultant effect will be a higher number of the days typical of autumn, spring and summer. Thus, summer will be 25-40 days longer in the Central and Southern zone of the Republic of Moldova and at least 35-53 days longer in the Northern zone.

b) Precipitations

Different from the air temperature change pattern for the next 100 years (which has been forecasted to register a continuous growth under all the applied climatic models and for the total length of the period under review) the projected precipitation levels have fluctuated depending on the season as well as the particular climatic model applied to make the forecast. The analyzed scenarios (Table 4-3) have shown that the annual precipitations will grow by 107.71 mm under the HadCM2 and by 51.81 mm under the CSIRO-Mk2, but decreasing by 48.61 mm under the ECHAM4 model by the year of 2100. The development pattern of the precipitation levels has yielded considerable differences throughout the year. Thus, the growth will be more pronounced during the winter months (December-February) and in spring (March-May) under the scenarios, which have yielded the growing pattern of the annual precipitation averages. All the applied climatic models have yielded the reduced monthly precipitation averages for summer (August) and autumn (September-November) already during 2010-2039.

Table 4-2: Development of the Monthly Average Air Temperatures in the Republic of Moldova for 2010-2099 periods According to ECHAM4, HadCM2 and CSIROMk2 Models

Climate Model	Annual average	Months of the year											
		I	II	II	IV	V	VI	VII	VIII	IX	X	XI	XII
The monthly average air temperature (°C) calculated according the selected models ECHAM4, HadCM2 and CSIROMk2													
2010-2039													
CSIROMk2	11.41	-1.39	-0.18	5.50	12.75	17.22	20.76	22.24	21.80	18.56	10.97	6.94	1.79
HadCM2	11.30	-0.23	-0.55	2.97	11.15	17.63	20.13	22.83	23.76	18.25	12.55	6.25	1.04
ECHAM4	11.52	-1.50	0.78	5.42	11.95	17.19	20.68	22.85	22.91	18.73	11.18	6.38	1.63
2040-2069													
CSIROMk2	12.36	-0.18	1.18	6.43	13.37	18.13	21.81	23.31	23.17	19.05	13.03	6.95	2.04
HadCM2	12.43	-1.40	0.04	4.31	11.93	19.23	22.38	24.19	24.46	19.80	14.09	7.19	3.01
ECHAM4	12.53	1.24	3.88	6.76	13.22	18.18	21.43	23.75	24.13	19.25	12.68	8.05	3.14
2070-2099													
CSIROMk2	13.63	1.97	2.78	6.16	14.97	18.91	22.76	24.52	24.20	20.39	13.51	9.31	4.13
HadCM2	13.77	2.66	2.01	4.93	11.95	20.31	24.12	25.6	25.25	21.01	14.19	9.72	3.48
ECHAM4	14.77	1.91	5.01	9.17	15.10	19.87	23.66	26.19	26.08	21.92	14.63	9.54	4.21
The monthly average air temperature (°C) actually observed in the Republic of Moldova during 1961-1990 time series													
Reference	9.62	-3.20	-1.72	2.82	10.26	16.08	19.39	20.86	20.51	16.23	10.15	4.38	-0.31

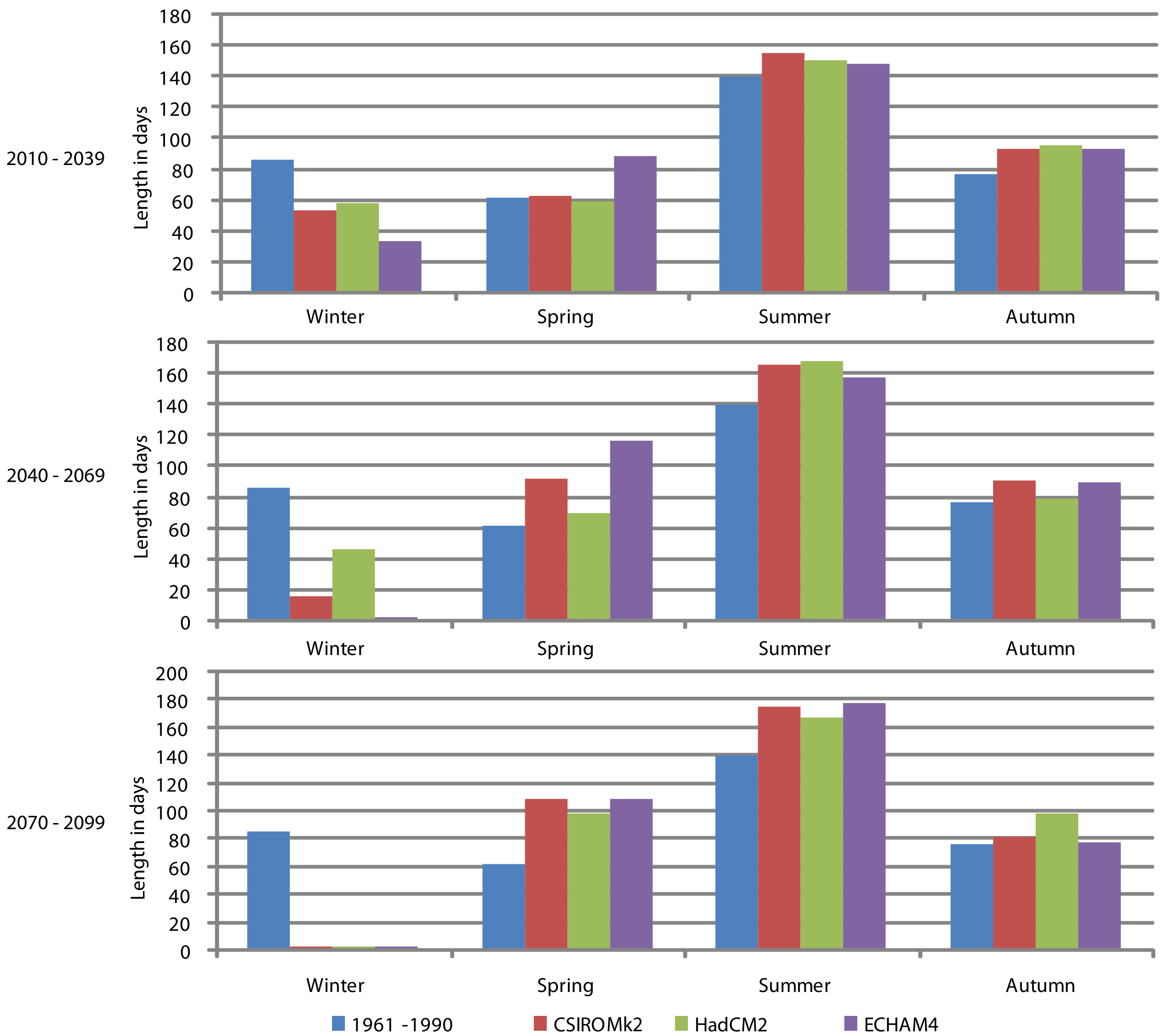


Figure 4-1: The Development of the Season Lengths during the 2010-2100 time series for the Central Zone of the Republic of Moldova

Table 4-3: Development of the Average Monthly Precipitations in the Republic of Moldova for 2010-2099 Periods According to ECHAM4-Mk2, HadCM2 and CSIRO-Mk2 Models

Climate Model	Annual average	Months of the year											
		I	II	II	IV	V	VI	VII	VIII	IX	X	XI	XII
The average monthly precipitations (mm) calculated according the selected models ECHAM4, HadCM2 and CSIROMk2													
2010-2039													
CSIROMk2	600.36	51.99	43.91	41.59	51.57	61.73	82.97	71.81	40.62	38.57	25.42	37.60	52.59
HadCM2	545.63	37.73	41.67	37.56	45.06	44.37	74.27	69.33	43.41	43.07	27.28	44.80	37.09
ECHAM4	511.67	32.77	36.07	29.50	41.07	46.85	71.87	69.64	45.58	45.77	23.25	31.60	37.71
2040-2069													
CSIROMk2	602.15	54.78	46.99	34.15	51.27	59.87	80.87	73.05	44.65	41.57	24.80	38.50	51.66
HadCM2	590.86	52.30	43.07	37.56	47.07	51.50	79.37	71.19	42.79	46.07	24.49	46.90	48.56
ECHAM4	517.09	37.11	35.79	50.27	41.07	52.12	75.17	65.92	41.24	39.86	15.87	16.60	46.08
2070-2099													
CSIROMk2	599.98	55.71	48.11	45.93	47.97	60.49	84.17	59.41	41.24	37.67	28.83	38.80	51.66
HadCM2	655.88	54.16	43.77	42.83	44.67	50.88	80.57	73.67	46.20	47.57	27.90	51.40	53.21
ECHAM4	499.56	43.00	40.27	38.49	38.97	45.61	64.97	51.66	34.73	45.44	20.77	27.10	48.56
The average monthly precipitations (mm) observed in the Republic of Moldova during 1961-1990 time series													
Reference	548.17	39.90	38.03	34.77	42.27	50.57	76.07	69.33	45.27	46.37	26.97	40.30	38.33

c) Level of Supply with Heat and Humidity

The indicator characterizing the level of insurance with heat were assumed to mean the length of the periods with the average daily air temperatures above 0°C, 5°C, 10°C and 15°C and their cumulated temperature. The respective values were modeled for the Republic of Moldova's 3 zones (North, Centre and South) for the next 100 years, using this approach as well as the actual data registered in the Republic of Moldova (to arrive at the deviations between the actual daily temperature averages and the above values during the reference period of 1961-1990) and CSIRO-Mk2, HadCM2 and ECHAM4 models.

In the Table 4-4 are presented the length of the periods with the average daily temperatures above 0°C, 5°C, 10°C and 15°C for Republic of Moldova's Central zone. The length of the period with the average daily temperatures above 5°C was 230 days, varying within the range of 220 days in the North and 235 days in the South of the Republic of Moldova for the reference period (1961-1990).

The results yielded under the climatic models show that the length of the period with the average daily temperatures above 5°C would be longer in the future on the total territory of the Republic of Moldova (e.g., by the year 2099 in the Central zone of the Republic of Moldova such periods will be 29-67 days longer) (Table 4-5).

The length of the period with such temperatures determines the duration of the vegetation period for the majority of the cultivated crops and wild species in the Republic of Moldova. An increased length of such period will result in longer vegetation periods for such species. It has been demonstrated that the periods with the average daily temperatures above 5°C, 10°C and 15°C would also become significantly longer.

Table 4-4: Length of the Periods with the Average Daily Temperature above 0°C, 5°C, 10°C and 15°C the Central Zone of the Republic of Moldova during the 1961-1990 period

Average Daily air temperatures above	The date when the average daily air temperatures exceeds 0°C, 5°C, 10°C and 15°C		Number of days with the average air temperatures above 0°C, 5°C, 10°C and 15°C
	Spring	Autumn	
0°C	6.03	0.12	279
5°C	26.03	11.11	230
10°C	20.04	16.10	179
15°C	9.05	23.09	137

The respective cumulated temperatures determine the specific spreading areas for diverse species of plants, animals and insects, which may impact on the Republic of Moldova's economic, social and environmental situation. Therefore the sum of annual air temperatures was calculated for the periods with the average daily temperatures above 0°C, 5°C, 10°C and 15°C. The obtained results show that a pronounced pattern of the significant sum of air temperatures growth will persist during the next 100 years for the days with the temperatures above 0°C, 5°C, 10°C and 15°C.

Table 4-5: Development of the Growth Pattern in the Average Daily Air Temperature above 0°C, 5°C, 10°C and 15°C and the Length of the Periods with the Average Daily Air Temperatures above those values for the Central Zone of the Republic of Moldova

Average daily air t°C above	Climatic Models								
	CSIROMk2			HadCM2			ECHAM4		
	The date when the average daily air temperatures exceeds 0°C, 5°C, 10°C and 15°C		Deviation (±) as compared to 1961-1990	The date when the average daily air temperatures exceeds 0°C, 5°C, 10°C and 15°C		Deviation (±) as compared to 1961-1990	The date when the average daily air temperatures exceeds 0°C, 5°C, 10°C and 15°C		Deviation (±) as compared to 1961-1990
	Spring	Autumn		Spring	Autumn		Spring	Autumn	
2010-2039									
0°C	25.02	02.01	+30	06.03	07.01	+28	05.02	02.01	+52
5°C	17.03	26.11	+24	26.03	25.11	+14	17.03	25.11	+23
10°C	30.03	19.10	+23	06.04	25.10	+23	04.04	20.10	+20
15°C	29.04	30.09	+17	05.05	02.10	+14	05.05	30.09	+12
2040-2069									
0°C	24.01	07.01	+70	20.02	03.01	+28	N/A	N/A	+86
5°C	16.03	26.11	+25	21.03	01.12	+25	09.03	01.12	+37
10°C	29.03	26.10	+32	04.04	31.10	+31	27.03	26.10	+34
15°C	28.04	10.10	+28	01.05	15.10	+26	28.04	02.10	+21
2070-2099									
0°C	N/A	N/A	+86	N/A	N/A	+86	N/A	N/A	+86
5°C	16.03	07.12	+36	17.03	01.12	+29	18.02	08.12	+67
10°C	29.03	07.11	+23	04.04	13.11	+44	21.03	12.11	+55
15°C	21.04	12.10	+37	01.05	15.10	+31	21.04	15.10	+43

Note: NA - Not Applicable, as during the whole calendar year the average air temperature will exceeds 0°C, so the deviation (±) as compared to 1961-1990 period (*279 days with average air temperature exceeding 0°C*) will constitute 86 days (365 - 279 = 86 days).

For the majority of the cultivated plant species in the Republic of Moldova the biologically active air temperatures mean the sum of air temperatures values above 10°C. Already by 2039 the sum of biologically active temperatures above 10°C will grow by 429 and 479°C and make 3174 and 3224°C in the North of the Republic of Moldova under HadCM2 and CSIRO-Mk2 models; the respective values would constitute 381°C and 3126°C respectively under the ECHAM4 model. By the year of 2099 the sum of biologically active temperatures above 10°C will be within the range of 3763-4175°C in the North of the Republic of Moldova and as high as 4379-4715°C and 4472-4861°C respectively in the Central and in the Southern zone (Table 4-6).

Table 4-6: Projections of Changes in the Amounts of Active and/or Effective Air Temperatures above 10°C for the Three Time Periods According to the CSIRO-Mk2, HadCM2 and ECHAM4 Models in Comparison with the Reference Period (1961-1990)

Region	CSIRO-Mk2				HadCM2				ECHAM4			
	ΣT_{AC}>10°C	(+/-) to 1961-1990	ΣT_{EF}>10°C	(+/-) to 1961-1990	ΣT_{AC}>10°C	(+/-) to 1961-1990	ΣT_{EF}>10°C	(+/-) to 1961-1990	ΣT_{AC}>10°C	(+/-) to 1961-1990	ΣT_{EF}>10°C	(+/-) to 1961-1990
2010-2039												
North	3224	+479	1294	+269	3174	+429	1354	+329	3126	+381	1336	+311
Centre	3719	+554	1679	+304	3758	+593	1728	+353	3712	+547	1713	+338
South	3788	+566	1708	+306	3798	+376	1758	+356	3824	+602	1744	+342
2040-2069												
North	3504	+759	1494	+469	3507	+762	1627	+602	3513	+768	1523	+498
Centre	4025	+860	1904	+529	4134	+969	2024	+649	4066	+901	1926	+551
South	4121	+899	1931	+529	4207	+985	2057	+655	4234	+1012	1964	+562
2070-2099												
North	3763	+1018	1714	+689	3837	+1092	1817	+792	4117	+1372	1967	+942
Centre	4379	+1214	2139	+764	4523	+1358	2233	+858	4715	+1550	2406	+1031
South	4472	+1250	2172	+770	4564	+1342	2274	+872	4861	+1639	2451	+1049

Note: The observed mean annual sum of active and effective temperatures for the reference period (1961-1990) was as following: ΣT_{AC}>10°C - North (2745°C); Centre (3165°C); South (3222°C). ΣT_{EF}>10°C - North (1025°C); Centre (1375°C); South (1402°C)

Ivanov's aridity coefficient (K) (Ivanov, 1962) was used to perform a more ample analysis of the temperature/humidity ratio development. K = P/E, where P is the sum of precipitation values (mm) and E is the evaporation-transpiration rate. That indicator allows assessing the development of the climate aridity rate throughout the year or during certain periods which are crucial for certain crops or species.

The aridity rate was assessed using the following assessment scale: K ≤ 0.05 – hyper-arid climate; K = (0.05-0.20) – arid climate; K = (0.21-0.50) – semi-arid climate; K = (0.51 – 0.65) – dry-sub-humid climate; and K ≥ 0.65 – sub-humid and humid climate.

According to the above classification, most of the Republic of Moldova's territory is characterized currently with dry or sub-humid climate (0.50≥K≤0.65). Certain areas in the South-East have semi-arid climate (K≥0.48), and the Northern zone and the areas with altitudes above 350-400 meters above sea level have sub-humid and humid climate (K≥0.65).

The conclusions made after the analysis of the obtained results have shown that the climate aridization process may accelerate considerably on the territory of the Republic of Moldova in the future.

Thus, already in the early 2039 that process would intensify noticeably as compared to the period of 1961-1990 (Figure 4-2). That phenomenon will be more pronounced during June to October.

By 2100 the climate aridization will be felt during the total plant vegetation period (April to October); it will be much more pronounced and may result in the values characteristic of the semi-arid climate (K = 0.21-0.50). All the climatic models applied for the assessment purposes have demonstrated that the aridity would be higher as compared to 1961-1990, and in August those levels can achieve even the values characteristic of the arid climate (K = 0.05-0.20).

An assessment of the hydro-thermal coefficient (HTC) was performed to identify the climate change patterns during

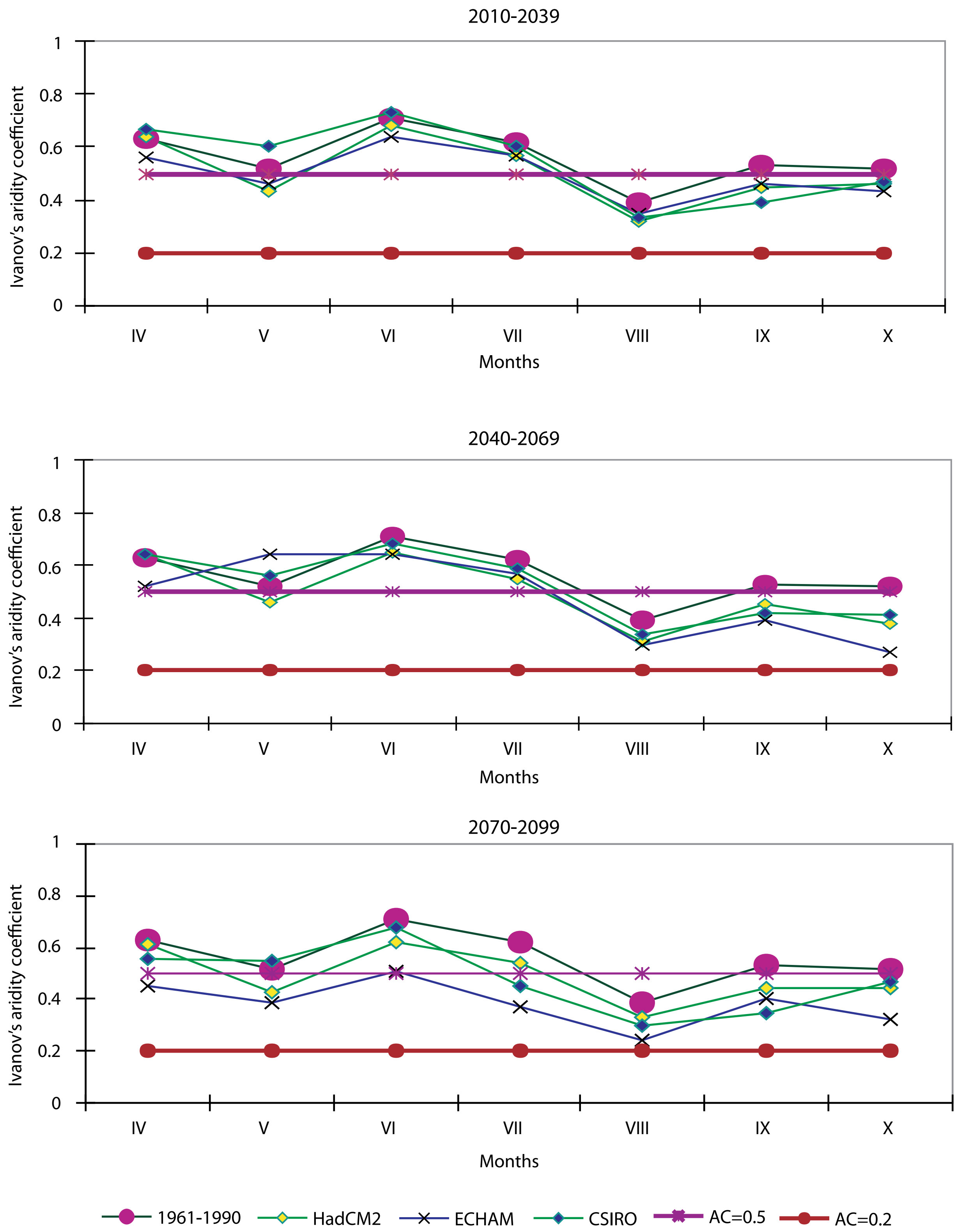


Figure 4-2: The Aridity Coefficient (AC) Development Pattern for the Central Zone of the Republic of Moldova for 2010-2099 Periods According to the ECHAM4, HadCM2 and CSIRO-Mk2 Models, as Compared to the Reference Period Climate (1961-1990).

the plant vegetation period. HTC is a relative empirical index, which reflects the humidity rate and which is calculated as the ratio between the sum precipitation level (R) expressed in millimeters for the period with the average daily air temperatures above 10°C and the sum of daily average temperatures above 10°C (∑ T) for the same period of time divided by 10, i.e.: HTC = R/0.1 $\sum T_{>10oC}$, when the value of that index is 1.0 it means that the amount of the precipitations is equal to the amount of the evaporated moisture.

In the Republic of Moldova's the current climatic conditions HTC ranges from 1.2 in the North to 0.7 in the South-East of the country, i.e. registers the values characteristic of the moderately dry climate in the former case and of the dry climate in the latter case. The assessment of that index has shown that the insufficiency of moisture would become more pronounced in the future as compared to the climate of the reference period (Table 4-7).

The principal climatic reference values, as mentioned in the above, characteristic to the reference period (1961-1990), obtained from the records of five meteorological stations which ensure an even coverage of the Republic of Moldova's territory, were extrapolated for the whole territory of the Republic of Moldova with the resolution of 600 x 600 m. Then, based on the patterns obtained for the reference period, similar climatic indicators were calculated for the following periods: 2010-2039, 2040-2069 and 2070-2099 applying the general atmospheric circulation climatic models CSIRO-Mk2, HadCM2 and ECHAM4.

By 2100 the growing evaporation rates caused by higher temperatures will result in the increase of 12.7–33.3 percent in soil humidity deficit as compared to the reference period of 1961–1990 (Table 4-8).

Table 4-8: Projected HTC Indices Development for the Vegetation Period in the Central Zone of the Republic of Moldova for 2010-2099 Periods According to the ECHAM4, HadCM2 and CSIRO-Mk2 Models, as Compared to the Reference Period (1961-1990), %

Period	Climatic models, deviation (in %) as compared to the reference period climate		
	CSIROMk2	HadCM2	ECHAM4
2010 - 2039	7.8	10.8	12.7
2040 - 2069	11.8	13.7	15.7
2070 - 2099	12.7	14.7	33.3

The deliverable was the database covering the whole territory of the Republic of Moldova, which was superimposed on the country's digital map. At the same time the above database was amended to include the requirements of the various agricultural crop varieties and hybrids as well as those of certain pathogens - causative agents of the various agricultural crop diseases - and of certain pests in respect of the climatic conditions under review.

The deliverable was a computer model making it possible to generate digital maps for the period of 2010-2100 presented in graphics according to the respective climatic values found under the general atmospheric circulation climatic models CSIRO-Mk2, HadCM2 and ECHAM4 in line with the country relief to reflect the following aspects:

Table 4-7: Development of the HTC Indices for the Central Zone of the Republic of Moldova for 2010-2099 Periods According to the ECHAM4, HadCM2 and CSIRO-Mk2 Models, as Compared to the Reference Period (1961-1990)

Climate Model	Months of the year							
	IV	V	VI	VII	VIII	IX	X	IV- X
The average monthly HTC indices calculated according the models ECHAM4, HadCM2 and CSIRO-Mk2								
2010-2039								
CSIRO-Mk2	1.35	1.16	1.33	1.04	0.60	0.69	0.43	0.94
HadCM2	1.31	0.81	1.24	0.98	0.59	0.79	0.68	0.91
ECHAM4	1.15	0.88	1.16	0.98	0.64	0.81	0.60	0.89
2040-2069								
CSIRO-Mk2	1.24	1.03	1.20	0.98	0.60	0.70	0.51	0.90
HadCM2	1.29	0.86	1.18	0.95	0.56	0.78	0.56	0.88
ECHAM4	1.04	1.31	1.17	0.90	0.55	0.69	0.38	0.86
2070-2099								
CSIRO-Mk2	1.03	1.00	1.19	0.78	0.53	0.60	0.67	0.83
HadCM2	1.25	0.81	1.11	0.93	0.59	0.75	0.63	0.87
ECHAM4	0.86	0.74	0.92	0.64	0.43	0.69	0.46	0.68
The average HTC indices observed in the Republic of Moldova during 1961-1990 time series								
Reference	0.89	1.15	1.31	1.02	0.90	0.99	0.85	1.02

Note: In the table it is provided the characterization of humidity conditions during the plant vegetation period using the Selyaninov hydro-thermal coefficient (HTC) for the reference period and the possible changes of HTC coefficient for different selected models within the 2010-2099 time series, where HTC> 1 - sufficient humidity; HTC ≤ 0.7 - drought conditions; HTC = 0.6 - medium drought; HTC ≤ 0.5 - strong drought.

- The population range of the homologated cultivated plant varieties and hybrids, wild flora species as well as the diseases or pests of the cultivated plants or wild flora species – depending on their requirements in respect of the cumulated biological active temperatures;
- The above climatic values calculated for any point on the Republic of Moldova's territory based on its geographic longitude and latitude.

The BioClass computer model was used for the respective assessment. Figure 4-3 shows as an example of development the specific spreading area for "Moldova" grape variety under HadCM2 model for the period of 2010-2099 as compared to the climatic values for the reference period of 1961-1991.

That variety requires for grape ripening the cumulated active temperatures above 10°C in the range of 3000-3100°C. During the 1961-1990 time series (Figure 4-3a) the conditions favorable for the production of that variety existed only in some Southern areas and in certain very limited areas in the Centre and the Western part of Moldova. By 2100 the conditions favorable for the production of that variety will exist on almost the whole territory of the Republic of Moldova (Figure 4-3d).

The BioClass computer model is able to generate maps - similar to this example for "Moldova" grape variety – showing the optimum conditions, which would determine the potential specific spreading area for any other variety or hybrid cultivated or expected to be cultivated in the Republic of Moldova, or for any wild flora species, any pest or pathogen causing plant damage or disease for any point in time during the period of 2010-2100.

4.2 Approaches Used for Vulnerability and Adaptation Assessment

Within the context of respective assessments, the system vulnerability shall mean the inter-dependence of the nature, extent and variation of the climatic indicators affecting the system and its capacity to become adapted to such conditions.

The absolute values and the duration of the exposure to the climatic conditions determine the extent of their potential impact on the system; and the system's ability to respond to that impact determines its adaptability. In the systems where such relationships involve biological components (e.g. artificial cenoses of the agricultural plants in agriculture, flora and fauna in natural ecosystems, people in human settlements, etc.) the capacity to get adapted is determined by the biological, social and economic mechanisms of the individual agents as well as the system as a whole.

The range and intensity of the factors determining the threat of the potential impact for the system were determined as the risks causing vulnerability. The assessment of the potential impact of the climate change upon the Republic of Moldova's principal economic sectors was performed in two stages: (1) the first stage comprised the identification of the risks and the system vulnerability rates depending on the actual climatic conditions; and 2) the second stage involved the identification of the risks and the vulnerability rate under new climatic conditions generated by the climate change; (2) the second step was to assess the impact and identify opportunities to adapt to new climate conditions determined by climate change.

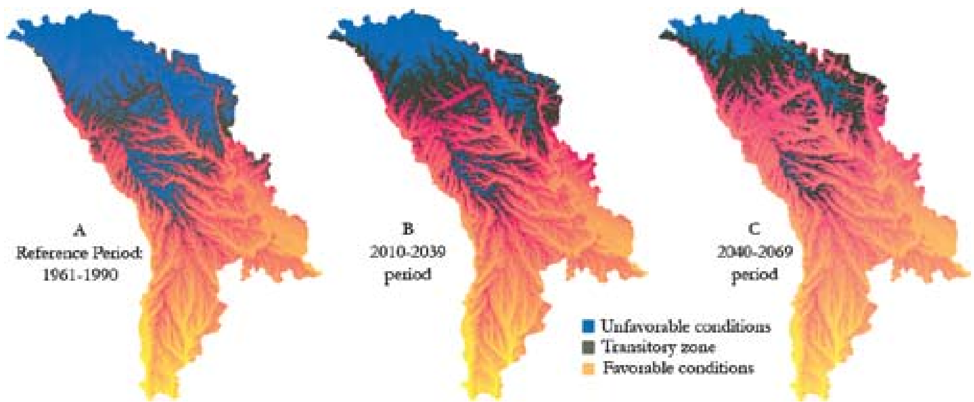


Figure 4-3: Distribution of the Potential Specific Spreading Area for "Moldova" Grape Variety According to the Climate Conditions during the Reference Period (1961-1991) and to the Climatic Conditions Generated under HadCM2 model for 2010-2099 and Depending on the Requirements of that Variety Regarding the Cumulated Biological Active Temperatures above 10°C, as Calculated Using BioClass Software

4.3 Risks Factors Conditioning Vulnerability

4.3.1 Agricultural Ecosystems

As of 2008, 156 plant species represented by 1,263 varieties, hybrids and clones were registered and approved for cultivation in the agriculture sector of the Republic of Moldova. As compared to the data presented in the Republic of Moldova's First National Communication under the UNFCCC (2000) for the year of 1998, the current number of the species approved for cultivation has increased by 82 species and the number of the varieties, hybrids and clones – by 752. As few as six species account currently for above 50 percent of total agricultural land area (2,506,200 hectares) of the Republic of Moldova. These species are: corn (*Zea mays L.*) with 18.6 percent; wheat (*Triticum aestivum L.*) with 12.3 percent; sunflower (*Helianthus annuus*) with 6.3 percent; barley (*Hordeum vulgare L.*) with 5.1 percent; and soy (*Glycine max (L.) Merrill*) with 2.0 percent. The trend to increase the number of such species and in particular the number of their varieties, hybrids and clones is a positive pattern; but the relatively low number of the actually cultivated species is just another potential risk for the actual agrocenosis in the Republic of Moldova's agriculture sector.

4.3.2 Natural Ecosystems

a) Forestry Ecosystems

As of January 1, 2008 forestry ecosystems were represented by forestland and other forestry vegetation, which covered 456.2 thousand hectares, what accounted for 13.5 percent of the land resources of the Republic of Moldova. The forestry resources of the Republic of Moldova comprise the resources of the forestry fund and forest vegetation on the lands not belonging to the forestry fund (84.1 percent) owned by the state, the rest belonging to the Local Public Authorities (15.7 percent) and private owners (0.2 percent). The ecosystems within the limits of the forestry fund are characterized by a wide diversity comprising 28 types of ecosystems and a series of biogeocenotic sub-types (by productivity). These types of ecosystems include the following principle types of forests: oak woods, durmast woods, beech woods, water meadows and mixed varieties woods. The forestry ecosystems include 123 associations, of which over 25 phytocenotic taxons are regarded as standard phytocenosis. Currently there are no forestry ecosystems not affected by human impact, expressed by destroyed biotopes, unregulated defalcation of biologic resources or inappropriate ecosystem management. The ecosystems of the small and relatively small forest vegetation bodies are affected structurally and functionally to a larger extent, as their biotopes are usually degraded and to a large extent occupied by arborescent (*Acer negundo*), scrubby (*Sambucus*) and herbaceous (*Urticaceae, Lamiaceae, Apiaceae, Brasicaceae*) invasive species. The national forestry fund also includes rare types of ecosystems, such as beech woods and petrofite ecosystems of oak and durmast woods, unique in terms of biodiversity.

The woods are predominantly composed of deciduous species (97.8 percent), including Quercus spp. (oak species) – 143.8 thousand ha (39.6 percent), Fraxinus spp. (ash trees species) – 16.6 thousand ha (4.6 percent), Carpinus spp. (hornbeam species) – 9.4 thousand ha (2,6 percent), Robinia spp. (acacia species) – 131.0 thousand ha (36.1 percent), Populus spp. (poplar species) – 5.7 thousand ha (1.6 percent) etc., resinous species (mainly Pinus spp.) being present in proportion of as little as 2.1 percent (Figure 4-4).

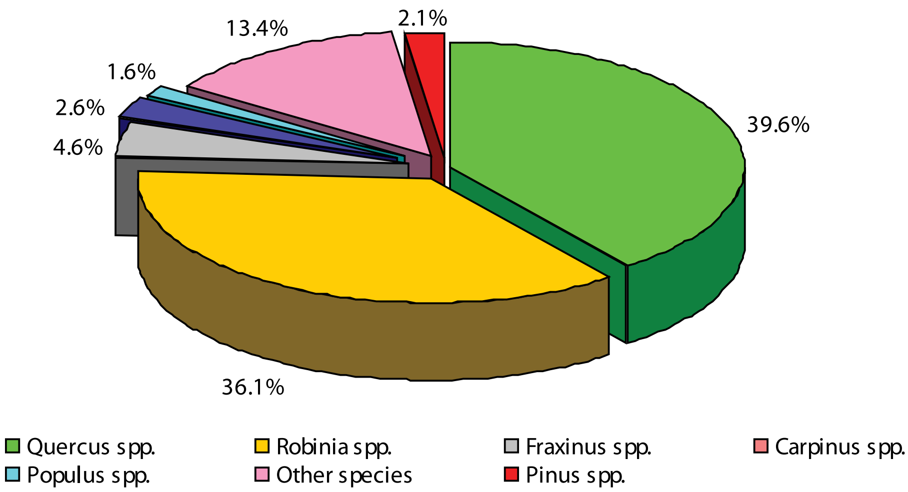


Figure 4-4: Structure of Forests by Species in the Republic of Moldova

The standing stock of oak species is the most valuable woods in the national forestry fund. Of the total surface of such woods 27 percent originate from seeds and 73 percent – from offshoots. The big share of oak species originating from offshoots is one of the consequences of the grove mode management of these species over centuries. Such a distribution has an impact on the oak species productivity, of which 43 percent are of high productivity and 57 percent of low productivity. Circa one third of the standing stock forming the forestry fund represent artificially introduced species which do not fit into the natural ecosystems of the Republic of Moldova.

So, in the past years the area occupied by woods grew concurrently with a considerable growth of the share of acacia and resinous species. The total surface occupied by oak species though increased by circa 20 thousand ha, their share in the total structure of woods dropped by 14.3 percent. The forestry ecosystems are populated by circa 860 species of plants which account for 43 percent of the total spontaneous floral biodiversity of the Republic of Moldova.

Of all species of vertebrate an invertebrate animals, circa 60 percent can be frequently found in forestry biotic communities. It is also significant that more than 50 percent of all vegetal and animal species included in the Red Book of the Republic of Moldova make part of forestry biotopes. Giving the overall characteristics of the forestry vegetation, it is necessary to mention the big share of acacia and other introduced species (38.7 percent). The existent circa 5 thousand wood bodies (with a surface from 5 ha to 15 thousand ha) are unevenly dispersed, with practically no interconnection forest corridors which are of major importance both for the viability of the forestry fund, as well as for the biologic diversity, soils and waters protection. Formation of forestry ecosystems and associations depend on climate, geomorphologic, pedologic, and other conditions. Most vegetal associations include durmast standing stock - 52 associations, English oak (Quercus robur) woods - 26 associations, and pubescent oak (Quercus pubescens) woods - 6 vegetal associations (Postolache, 1995).

The fauna of forestry biotic communities comprises 116 species of animals included in the Red Book of the Republic of Moldova. The number of endangered species is much bigger, in particular, among invertebrates. The basic feature of many endangered vertebrate species, of carnivorous, birds and mammals in the first place, is dependence on massive trees (with hollows, semi-dry) eliminated in the process of sanitation treatments and cuttings, etc. Many species of endangered insects depend on the existence of sufficient amount of dead wood mass which is intensively eliminated during the woods sanitation treatments. Survival of such species can be assured by thorough observance of technical norms in terms of wild fauna protection in the process of woods sanitation works and forest use. These aspects, determined by the current state of things in the forestry ecosystems can serve as potential risk factors in the climate change context (Table 4-9).

b) Land Resources

The available land in the Republic of Moldova as of 1.01.2008 was 3,384.6 thousand hectares. The agricultural land area is 2,506.2 thousand hectares, or 74.0 percent of the Republic of Moldova's total available land.

The arable land area is 1,821.7 thousand hectares, or 53.8 percent of the total available land. We selected the principal risks connected with the land quality as the indicators reflecting soil degradation rate (Table 4-10).

Generally the soil degradation is determined as the persisting natural or anthropogenic processes, which have a negative impact on the soil, decreasing its fertility (productivity) and the quality of the yielded products. Furthermore, additional costs are required to eliminate the consequences of such processes and to restore the initial productivity levels of the affected soils. The principal factors affecting currently the soil quality in the Republic of Moldova and presenting the potential risks in view of the climate changes include: (i) erosion (caused by the surface water as well as underground water); (ii) land slides; (iii) drift soil silting; (iv) primary and

Table 4-9: Features and Impact of the Principal Risk Factors which Determine the Vulnerability of Forestry Ecosystems

Risc Factors	Nature of Damage
Low level of afforestation of the country's territory.	Low potential to maintain constant ecological balance.
High dispersion and uneven distribution of the forest bodies.	Reduced interconnection capacity between forestry cenozes determined by insufficient communication networks. Spatial isolation and reduced spectrum of the ecosystem's components variability.
Vegetative origin from offshoots of the 2-4 generation of circa 60 percent of trees in the forests (in durmast this share reaches circa 90 percent).	Impact with more serious consequences for biotic and abiotic factors.
Low level of fructification which does not assure sexual regeneration of oak species.	Reduced spectrum of genetic variability of forest populations which in their turn determine the low resistance of the latter to unfavourable biotic and abiotic factors.
Highly degraded standing stock and standing stock of introduced species which compete with indigenous species.	Acute competition between indigenous species and introduced species with gradual elimination of indigenous species and invasion of the introduced species.
Extended areas with accelerated and high rate of drying. High risks of diseases and pests.	Degradation determined by damage caused by diseases and pests.

Table 4-10: The Nature and Impact of the Key Risks which Determine Currently the Vulnerability of the Land Resources in the Republic of Moldova

Risk Factors	Nature of damage	Total affected area, thousand hectares	Annual damage, million MDL
Surface erosion caused by water	Loss of 21 million ton of the humus soil annually Decline in soil productivity, decreased yields	705.4	2,058
Subsurface erosion caused by water	Complete soil destruction (180 hectares annually)	7.7	83
Complete soil destruction by land slides	Complete soil destruction (200 hectares annually)	13.8	93
Soil silting in valleys with sediments poor in chernozems	Decline in soil productivity, decreased yields	50.9	10
Primary soil compaction	Decline in soil productivity, decreased yields	17.8	9
Secondary arable soil compaction	Decline in soil productivity, decreased yields	1,281.9	385
Deep tillage and use of uprooted soil	Decline in soil productivity, decreased yields	176.0	35
Soil salinization	Decline in soil productivity, decreased yields	107.5	43
Soil degradation caused by irrigation	Decline in soil productivity, decreased yields	13.0	12
Loss of humus in arable un-eroded soils	Decline in soil productivity, decreased yields	854.9	256
Other degradation types	Decline in soil productivity, decreased yields		77
TOTAL			**3,061**

Note: The calculations were made assuming the USD to MDL exchange rate of: USD 1 = MDL 12.5

secondary soil compaction; (v) deep tillage of soil; (vi) loss of the humus layer on un-eroded arable soils; (vii) salinization; (viii) degradation due to non-compliance with the irrigation techniques; (ix) biological degradation; and (x) degradation caused by certain social-economical aspects of the economy in transit.

c) Water Resources

The water resources of the Republic of Moldova are represented by surface waters and sub-surface waters. The surface waters are still and moving waters the surface of which is in contact with the atmosphere. In the Republic of Moldova surface waters are represented by hydrographical basins of the Dniester and Pruth rivers (Figure 4-5) which are trans-border water sources, inland rivers and natural and man-made reservoirs.

The biggest surface water source is the Dniester River having a total annual water debit of circa 10.7 km^3. The second biggest river is Pruth, with an average annual debit of circa 2.9 km^3, and all other inland rivers flowing on the territory of the country an average annual debit of circa 1.22 km^3. The hydrographical basin of the Dniester River with its tributaries occupies circa 67 percent of the country's territory, and of the Pruth River - circa 24 percent. The hydrographical grid of the Republic of Moldova is represented by circa 3,621 water beds having a total length of approximately 16,000 km and an average density of 0.48 km/km^2 in the northern part of the country, up to 0.12 km/km^2 in the southern part. In addition to the above, the national hydrographical grid also includes 3,500 lakes. Taking into account the proportional division of the water resources common with Ukraine and Romania, the surface water resources of the Republic of Moldova are circa 4.6 km^3/year.

The sub-surface waters are waters under the surface of the ground in the saturation zone and in direct contact with the soil or subsoil. In their turn, the ground waters fall into

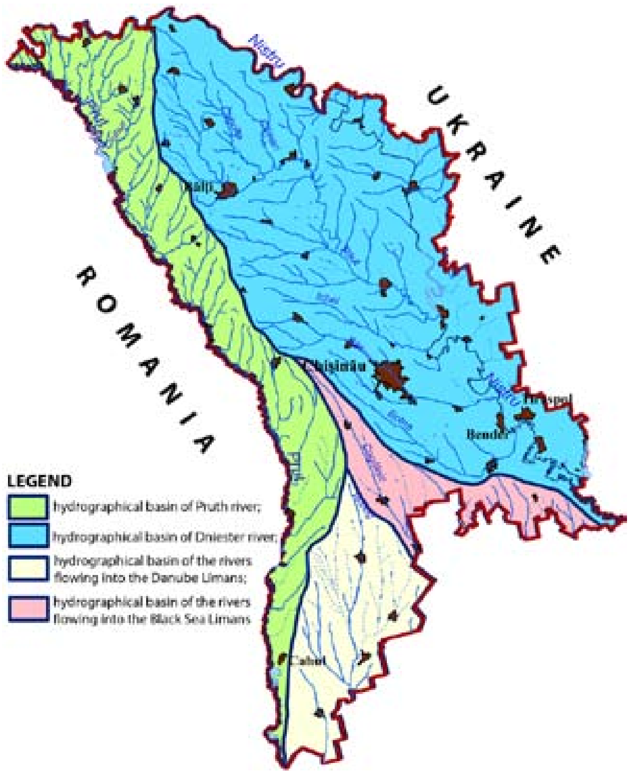


Figure 4-5: Hydrographical Basins on the Territory of the Republic of Moldova

two categories – phreatic and deep seated ground waters. Phreatic waters are waters from the first impervious layer on the surface of the earth, at an average depth of circa 30 meters, feeding all common springs and wells. Deep seated ground waters are waters from deeper layers and are in contact with the sub-soil. The sub-surface waters grid includes circa 112 thousand of springs and wells (public and private) and more than 3,000 functional artesian wells. Sub-surface waters are the main source of potable water supply in the Republic of Moldova, for 100 percent of rural population and 30 percent of the urban population, or 65 percent of the total population of the country. The remaining 35 percent of the population use surface waters as a source of potable water, including 32 percent from the Dniester River, 2.8 percent from the Pruth River and 0.2 percent from other surface waters.

The principal factors affecting the water sources in the Republic of Moldova refer to quality, uneven distribution by seasons and territory of the country, non-uniform and insufficient distribution grids (Table 4-11). In conformity with hydro-chemical indicators, the waters of the Dniester and Pruth rivers are considered to be clean and moderately polluted. The waters of small rivers are highly polluted.

The share of samples non-compliant with the required sanitary-chemical norms collected from the centralized sub-surface sources account for more than 50 percent and more than 80 percent in case of samples collected from the phreatic waters wells. Circa 44 percent of the population in the country does not have access to safe drinking water sources. At present all towns and municipalities and over 65 percent of rural settlements have centralized drinking water supply systems. Only 50 percent of this type of systems is in satisfactory technical condition. The rest needs capital repairs or rather reconstruction.

The possibility to use water resources for irrigation depends on their condition and quality. The waters of the Dniester and Pruth rivers are of suitable quality to be used for such purposes. As a rule, the waters of inland rivers and reservoirs are polluted, its mineralization exceeds 1 gram/liter and it can be used for technological purposes only. Of the sub-surface water reserves only 50 percent comply with water quality requirements. So, for irrigation purposes the waters of Transborder Rivers can be used, in the first place.

The waters of the inland rivers and lakes can be used for irrigation only after improving the quality of the water to exclude salinization and alkalinization of soils. Wide use of water resources for irrigation purposes is limited due to a high weariness degree of the irrigation systems and their scarcity.

4.3.3 Agriculture Sector

Agricultural sector plays a central role in the country's economy. Lately the contribution of the agricultural sector in the GDP ranged between 14.5 – 22.4 percent (2001-2006). The principal production means of the agricultural sector in the Republic of Moldova are preponderantly privately owned agricultural lands, which by January 1, 2009 accounted for 1,984,550 thousand hectare.

The destination of this category of lands is production of agricultural commodities. The share of privately owned agricultural lands is 85 percent. The main economic actors involved in agricultural activities on privately owned land are: (i) agricultural cooperatives; (ii) joint stock companies; (iii) limited liability companies; (iv) peasant farms; and (v) individual farming of land by land owners.

As of January 1, 2009 the numeric composition of such entities was as follows: agricultural cooperatives – 283, joint stock companies – 81, limited liability companies - 1423, peasant farms (family farms) – 380935 (including peasant farms (family farms) with an area up to 1 ha – 151617, from 1 ha to la 5 ha – 223526, from 5 ha to 10 ha – 4320, from 10 ha to 50 ha – 1126, from 50 ha to 100 ha – 143, over 100 ha – 203), and individual farming of land by land owners –

Table 4-11: The Features and Impact of the Principal Risk Factors Defining Vulnerability in Terms of Water Supply in the Republic of Moldova

Risk Factors	Nature of Damage
Low quality of the drinking water and uneven distribution across the territory of the country.	Higher total and specific morbidity of the population.
High degree of technical and moral depreciation of the centralized water supply systems.	Higher total and specific morbidity of the population determined by: drinking water quality non-compliant with hygienic norms; scarce quantity or lack of drinking water. sources
High dependence on the seasonal amount and distribution of atmospheric precipitations.	High risk of drinking water shortage and impairing food safety.
Insufficient water resources for irrigation determined by inadequate quality, uneven territorial distribution and lack of distribution grids.	High risk of extensive damage due to droughts and potential impairing the country's food safety.
Lack, or unsatisfactory condition of the water protective zones.	Higher level of pollution of water resources, higher clogging of accumulation reservoirs and low capacity to regulate the debit; substantial increase of mineralization and content of pollutants in the surface waters, in particular during droughts.

765921. The remaining 15 percent of agricultural lands are managed by the state or Local Public Authorities (LPA).

More than half of population (59.0 percent) lives in rural areas, and circa 40.7 percent of the total employed population are employed in agriculture. Lately, the number of employees in agricultural sector definitely tends to decrease. There are three agropedoclimatic zones on the territory of the Republic of Moldova - Northern, Central and Southern. In the Northern zone the sum of active temperatures (T>10°C) is 2750-2850°C, the median annual values of precipitations range within 550-630 mm, while droughts occur once in ten years. In the Southern zone the sum of active temperatures (T>10°C) is 3100-3350°C, the median annual values of precipitations range within 450-550 mm with a droughts frequency of 3-4 times in 10 years.

The main factors currently affecting the agricultural sector relate to two general aspects – the sector's vulnerability to the climate factors and excessive orientation towards some unstable markets (Table 4-12). On the other hand, these two circumstances are the result of some structural deficiencies currently existing in agribusiness.

4.3.4 Human Health

The average life expectancy in the Republic of Moldova demonstrates similar trends as in the neighboring countries and some Eastern European countries. At present the decline of this indicator has been stopped and its average value for 2007 was 65.0 years for men and 72.6 years for women. The situation on the evolution of the number of patients registered with primary diagnosis per 1000 inhabitants is positive and stable since 2000. So, in the past three years this indicator dropped from 366.7 to 325.9 persons.

The most frequent types of diseases for the primary diagnosis per 1000 inhabitants for 2007 are: (i) respiratory diseases (99.6 cases), (ii) of pregnancy, child birth and postnatal complications (40.4 cases), (iii) traumas, intoxications and other consequences of external causes (38.1 cases), (iv) infectious and parasitic diseases (29.3 cases), (v) skin and hypoderm diseases (23.4 cases). Other diseases which currently account for a relatively big share are digestive system and blood circulation diseases.

The most important causes of lethal events in the Republic of Moldova are blood circulation diseases, trauma and intoxications, malignant tumours. The digestive system diseases are also an important cause of deaths in the country. In 2006, 66.0 percent of the total number of deaths among active adults was caused by blood circulation diseases, respiratory system diseases, as well as malignant tumours. This proportion is the same in most age categories of the active population in the country.

The most frequent types of diseases at children (aged 0-17 years) in 2007 were respiratory system diseases (45 percent), infectious and parasitic diseases (13.2 percent), traumas, intoxications and other consequences of external causes (8.9 percent), skin and subcutaneous diseases (8 percent), as well as nervous system and sensory organs (7 percent).

The ratio of morbidity by the main types of diseases features the same values in the time period 2003-2007. Under the circumstances of the Republic of Moldova the blood circulation diseases and the infectious diseases are most of all related to climate indicators values (Table 4-13). During the past years the number of persons with the blood circulation diseases as a primary diagnosis tended to slightly decrease, reaching 19.7 persons per 1000 inhabitants in 2007. Infectious diseases also featured a slightly decreasing trend starting 2000. The number of doctors per 10000 inhabitants in 2000-2007 was fluctuating, reaching to 35.6 doctors in 2007.

Table 4-12: Features of the Current Risk Factors in the Agriculture Sector of the Republic of Moldova

Risk Factors	Nature of Damage
Relatively low productivity and quality in comparison with other countries in the region.	Reduced profitability of agricultural activities and adaptation capacities to new climate conditions.
High dependence of the productivity and quality of agricultural vegetal and animal products on environmental conditions.	Reduced profitability of agricultural activities and adaptation capacities to new climate conditions. Potential threat for the country's food security.
Slow and unstable growth in the past seven years (2000-2006) of the Gross Agricultural Product (GAP) of less than 10 percent.	Reduced investments in the agricultural sector and maintaining obsolete technologies.
High frequency of extreme natural phenomena and exceptional situations in agricultural sector (heavy rains, hail, freezing, floods, droughts).	Reduced or damaged crops, food security threat at regional or national level.
Old age of vineyards and orchards	Reduced productivity and investment capacity in these areas.
Obsolete infrastructure of irrigation systems.	Reduced productivity, investment capacity and food security.
Preponderance of low value crops and low level of processing of the final products.	Reduced investment capacity for upgrading.
Excessive fragmentation of privately owned agricultural lands.	Low capacity to use modern technologies, low crops and investment capacities.
Poor relation of the current agricultural practices with the concept of sustainable development of the agricultural sector.	Extension of the negative effect of such practices on soil fertility and environment.

Table 4-13: Features of the Principal Risk Factors for Human Health Related to the Quality of Environmental Factors

Risk Factors	Nature of the Damage
Increasing air temperature	Heart attack, severe circulatory diseases (e.g., hypertensive disease, Ischemia, myocardial infarction) and respiratory diseases (e.g., pneumonia). Also, potential spread of malaria due to growing mosquito population and increasing number of vector-borne diseases spreading Lyme disease tumour.
Polluted air basin	Increased frequency of respiratory diseases (e.g., bronchial asthma) due to higher concentrations of ground level ozone in urban areas and changes in pollen distribution related to climate change.
Polluted drinking water	Frequent cases of diarrhea, dysentery, salmonellas, typhoid fever. Increasing number of digestive system sicknesses (e.g., gastric ulcer, cholecystitis malfunctions), as well as urinary-genital system (e.g., urinary lithiasis) and bone articulations (e.g., arthritis, polyarthritis).
Floods	Drowning, injuries, diarrhea diseases, vector-borne diseases and circulatory illnesses. Also, damage to infrastructure for health care and water and sanitation.
Generally low level of knowledge in health protection	Insufficient implementation of preventive measures for infectious diseases. High probability for acute diseases to culminate to chronic phase.

4.4. Impact and Opportunities to Adapt to New Climate Conditions

These assessments were made in conformity with the climate change concept which takes into account the aspects of the potential impact and the climate change mitigation opportunities (Figure 4-6).

In terms of methodology two approaches were used. The first approach is about using well formalized new climate change impact assessment methods and instruments (computation methods, software, etc), while the second was based on the expert analysis.

Also it has been taken into account that current assessment should elaborate and complement the results obtained in this area and described in the Republic of Moldova's First National Communication under the UNFCCC. This chapter features only the most important results obtained by applying strictly formalized climate change impact assessment models.

The Action Plans on the adaptation needs of the most important sectors to the new climate conditions determined by climate change and the costs are presented in Annexes 2.5 – 2.6 and 2-8.

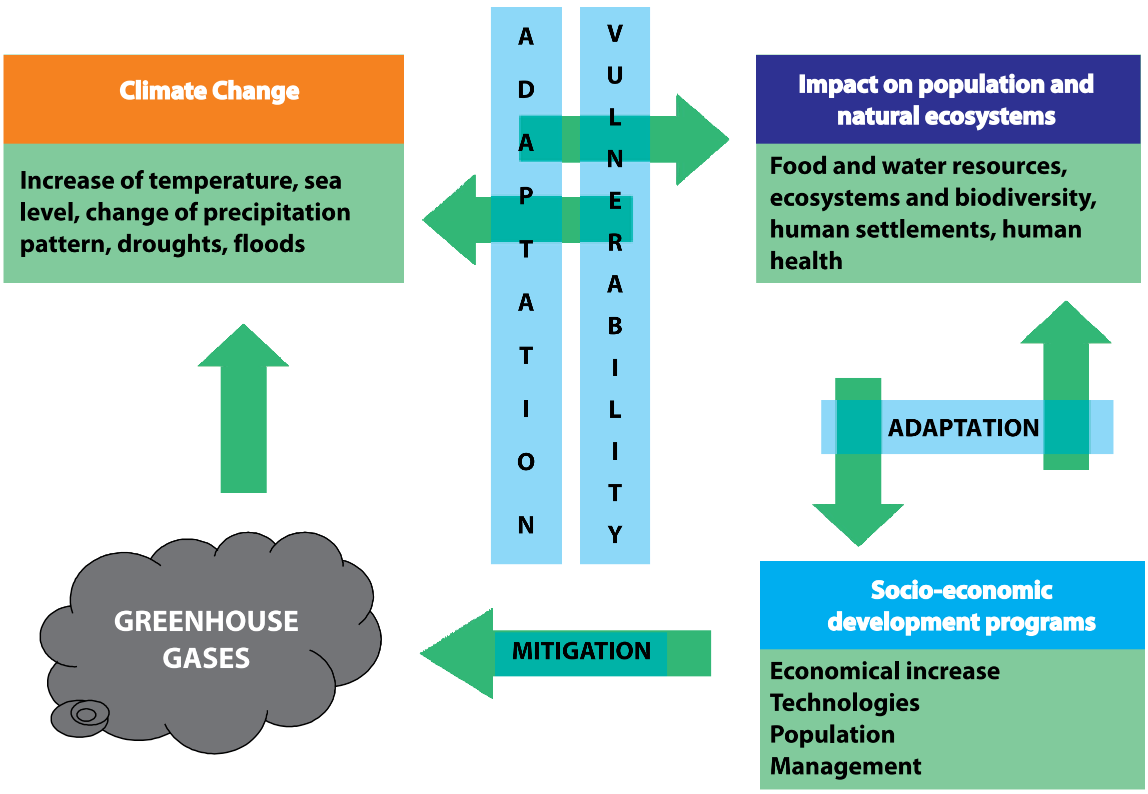


Figure 4-6: The Concept on Estimating the Vulnerability to and New Climate Conditions Adaptation Needs

4.4.1 Potential Impact of Climate Change

a) Forest Ecosystems

Natural forests in the Republic of Moldova are a well preserved component of the landscape which however greatly depends on climate factors. Current mesophilic beech, durmast and oak forests preponderantly depend on two climate factors – temperature and amount of precipitation.

The impact of the future climate change on the forest ecosystems was estimated based on the following approach:

- case study based on evolution in time of the phytosanitary condition of forests;
- case study based on evolution in time of the introduced species, acacia groves and ash trees monocultures ;
- case study based on climate conditions of year 2007;
- mathematic simulation of the forestry fund stability and forestry productivity under climate change conditions.

Case Study Based on Evolution in Time of the Phytosanitary Condition of Forests

Keeping account of the current phytosanitary condition, bio-ecological peculiarities of forests in the Republic of Moldova, the forthcoming climate change, calculated versus CSIRO-Mk2, HadCM2 and ECHAM4 models, the following trends were revealed.

Climate prospections made by applying CSIRO-Mk2 and HadCM2 models. Within 2010-2039 periods the phytosanitary condition will change significantly. Unfavorable changes will occur in the forests in the Northern part of the country where high level trees drying area will expand by circa 15-25% by the end of this period. In between 2040-2069 the change of the phytosanitary condition determined by the trees drying level in the Northern part of the country will strongly aggravate expanding towards South and South-East. Significant changes under this aspect will take place in between 2070-2099. In the Northern part the forests will dry out intensely. The forests in the Balti steppe incorporating exclusively artificial stands will be subjected to particularly serious mass drying out and it is quite likely that current species of forest trees may completely disappear. The same may also occur with the forest species in the Southern and Central parts of the country, in particular in the Eastern part of the Central zone. Because in the South the stands mostly originate from the shoots of multiple generations, they will also be subjected to the serious phenomena of mass drying out. Intensive forests drying out area in the Central part of the country will expand by more than 25%, covering practically the entire Eastern and South Eastern areas of Codrii. In conformity with the climate scenario developed by applying the ECHAM4 model, the current ecosystems drying out phenomenon will be much stronger. So, in conformity with this climate scenario, by the end of this century climate aridization in the Northern part of the country will entail particularly serious drying effects with possible gradual disappearance of forests. The same situation may occur in the South where the oak groves from offshoots will become less consistent being unable to dominate the stand, unless not regenerated in due time from seeds.

Case Study Based on Evolution in Time of the Introduced Species, Acacia Groves and Ash Trees Monocultures

Of the current forest ecosystems, the future climate change can mostly affect introduced forest species and ash trees monocultures. Such ecosystems were set up preponderantly on degraded lands. In most cases, being regenerated from offshoots, they have a fasciculated radicelar system which is more superficially rooted compared to trees grown from seeds. Due to aforestation technologies used in the past, at the age of 40-50 years, the oak species become pure even though initially were conceived as mixed species. In such conditions a protective shadow sub-level is strictly necessary and ecologically useful. If such protection is missing, the unfavorable effect of the herbage covering becomes stronger while the trees stems suffer from solar radiation. In the context of the forthcoming changes, if climate changes in conformity with climate scenarios CSIRO-Mk2 and HadCM2, by the end of this century, and in conformity with ECHAM4 scenario – already in the middle of this century – these species may find themselves in improper development conditions which may entail substantial decrease of volume growth, occurrence of important diseases and pests hotbeds and result in a mass drying out of these trees. Such situation may be prevented only through complex and costly works of ecologic reconstruction aimed at introducing sub-level species to prevent the above mentioned situation.

Case Study Based on Climate Conditions of Year 2007

This case study was accomplished in the scientific reserve „Codrii". The reserve is situated in the Central part of the country (Lozova village, Straseni district) and has a total area of 17,475.8 ha (720 ha – strictly protected zone, 4,455.8 ha – buffer zone and 12,300 ha –transitory zone). It contains a body of mesophilic forest of Central European type having the oldest statute of a protected area in the Republic of Moldova. The forests of the reserve are well studied floristically and include 991 species of vascular plants, 60 species of rare plants and 24 species included in the Red Book, publication of 2001. From the typological point of view these forests contain beech trees stands, durmast stands with beech, durmast stands with linden and ash trees, durmast stands with hornbeam, oak stands with hornbeam, poplar stands and willow stands.

The climate conditions of year 2007 in the „Codrii" scientific reserve were different from those observed earlier and featured annual average temperatures higher by +2.1°C (the multiannual average is +9.1°C) and the amount of precipitation by 85.7 mm higher than the multiannual average of 475 mm. Climate conditions were determined by a rather prolonged highly arid period (Figure 4-7).

Such climate conditions are similar to annual average temperatures identified by applying CSIRO-Mk2, HadCM2, ECHAM4 climate models to the geographical habitat of the Republic of Moldova for 2070'. For these reasons, the climate conditions of year 2007 can serve as a projection of future climate change and their impact may be interpreted as a potential model to assess the impact of future climate element son the forest ecosystems.

The results of this assessment showed that mesophilic trees, bushes and herbs of the beech, durmast and ash trees forests bloomed abundantly, while fructification was scarce or even absent. The trees shed their leaves early (May – June), or the leaves dried and stayed on the head for a long time. Thickness growth of the oak and ash trees stems in 2007 accounted for as little as 50% of the previous year and compared to the multiannual average of the past 10 years. The most affected were the forest-forming trees – ash trees, oak trees, and acacia, and among those co-dominants – hornbeam, red linden, sycamore maple, common maple, elm trees shed their leaves early (1.5 months earlier) as compared to previous years. The summer herbs species started vegetation in April and dried out in May-June without blooming and bearing fruit. So, climate conditions of year 2007 as a hypothetic model demonstrated a rather strong potential impact of the future climate change. As a consequence, these changes can lead to the decrease of mesophilic forests areas (beech trees stands, durmast trees stands and oak trees stands) in favor of thermophilic forests of durmast with wig trees and of xerofile pastures.

Mathematic Simulation of Forest Ecosystems Evolution Based on Climate Change

To assess the impact on forests the JABOWA III (Botkin, D.B., 1993; Botkin, D.B., Woodby, D.A., Bergengren, J.C., 1999) dynamic model describing the evolution of species composition and productivity depending on local conditions, species features and climate elements, was used. Each such study has been made on selected basic areas for which annual growth is determined for each separate specimen, adding new emerging specimen and eliminating died out specimen. The model uses three sub-models: GROW – providing data about annual growth for each specimen; BIRTH – indicating the possibility of appearing new specimen and, KILL – forecasting the specimen likely to die out. These data served as basis for developing baseline scenario forest ecosystems. The assessment has been made for the Northern part of the Republic of Moldova – with forests preponderantly formed of pedunculate oaks, acacia, ash trees, sycamore maple; Central zone - pedunculate oaks, durmasts, acacia, ash trees, beech trees, hornbeam, linden, and Southern zone - acacia, pedunculate oaks, ash trees. The assessment indices were: (i) dynamics of biomass accumulation by forest species, (ii) characteristics and evolution of species in time, and (iii) composition and productivity of groves.

The assessment of the impact of climate change on forest ecosystems has been made based on two approaches. The

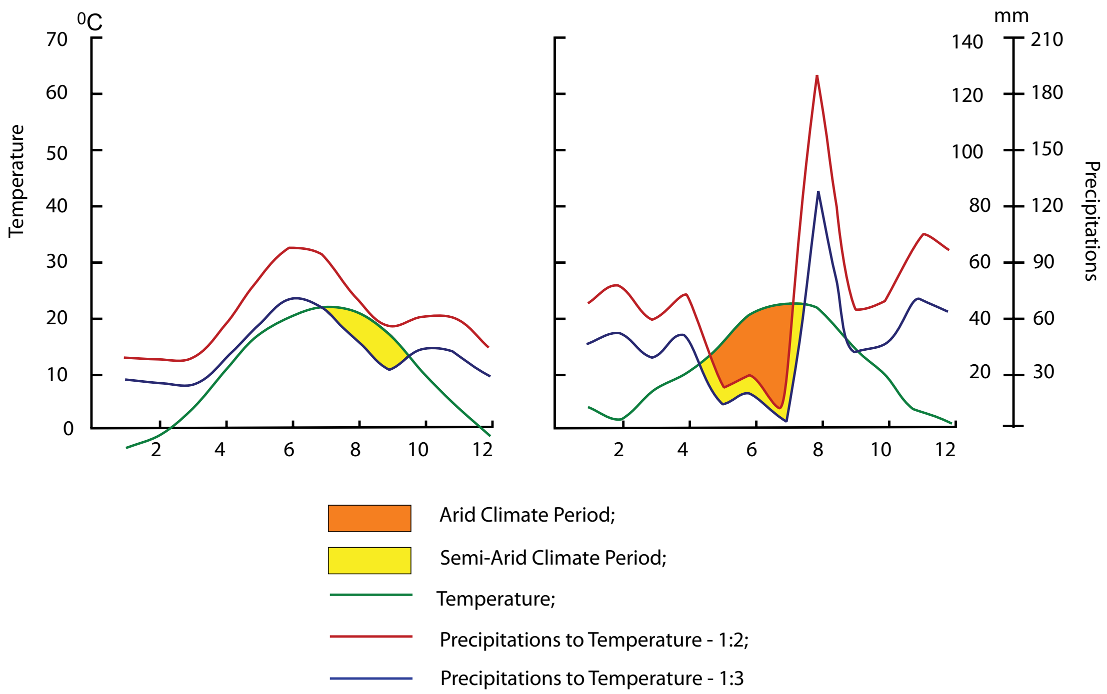


Figure 4-7: Gaussen-Walter Climate Diagram for the Climate Factors in 2007 in the "Codrii" Scientific Reserve

first approach was at the species level, while the second – on the level of ecosystem. The altitude of ecosystems, which in the Republic of Moldova is 150, 200, 300 and 400 meters above sea level, was also taken into account. The following trends were identified for the main species of trees (beech, durmast, hornbeam, ash tree, linden tree, sycamore maple, oak, pubescent oak and acacia) which currently account for the major share in the forests of the Republic of Moldova.

The beech tree may respond negatively by decreasing total production. The differences towards the scenario that does not take into account climate change will become significant starting year 2040 and increase (up to 50%) by the end of production cycle. The beech tree as a species in the Republic of Moldova will continue to be a part of sustainable forest structures; however, these will have a less expanded habitat.

The durmast is apparently not affected by the new climate conditions featuring an increase of biomass accumulation by circa 20% versus the baseline scenario that does not take into account the future climate change trends (Figure 4-8). In the last quarter of production cycle new climate conditions are still quite favorable for the total biomass production which by year 2100 may be affected only by the decreased growth rate determined by biological characteristics of the given species. The hornbeam, as an important mix species both on the hilly areas, as well as in the plain, features a decreased total production in the second half of the production cycle (after 2050), so that by the end of the century it will be significantly affected by the reduced total production determined by drying at the species level . The hornbeam is a structural element providing stability, at least for a short and medium term, to forest ecosystems they belong to.

The ash tree is also an important mix species and a generator of a complex forest structure, apparently not affected by new environment conditions of the first third of the production cycle, later featuring decreased biomass accumulation. The ash tree will become an important structural element of the ecosystemic stands, though a substantial decline may occur in this species by the end of this century (Figure 4-9).

Summarizing this assessment the following has been stated. The difference between biomass accumulations scenarios increase with the age of the trees. Among the mix species the hornbeam and the ash tree may be the most vulnerable species in the new climate conditions determined by climate change. In the first half of the production cycle, starting 2010 the ash tree may feature a 20-40% decrease in biomass growth, while in the second half both species may feature much less growth than under the baseline scenario which does not account for climate change.

The significant decrease of the trees population in both species, by decline and drying out, also contributes to the decrease of the total output. Foul lime tree features active growth in the first years, benefits from favorable conditions generated by environmental change, and will have a sharp decline in total biomass around 2030. The durmast–beech stands zone is highly sensitive under new environmental conditions characterized by fewer precipitation and higher average temperatures. The sycamore maple tree and foul lime tree, unlike the ash tree, may accumulate significantly more biomass under new environmental conditions. The ash tree may have an output by 30-40% smaller than normal along the entire production cycle. The sycamore maple tree and foul lime may accumulate significantly more, on average over 30% more than normal, but only in the first part of the production cycle (approximately until 2040), followed by a decrease in total biomass under environmental change, due to reduced population as a result of species decline. The durmast may respond positively to the new environmental conditions, by accumulating 10-20 % more biomass. At lower altitudes, in the open, the pedunculate oak may accumulate more biomass under normal environmental conditions in the first part of

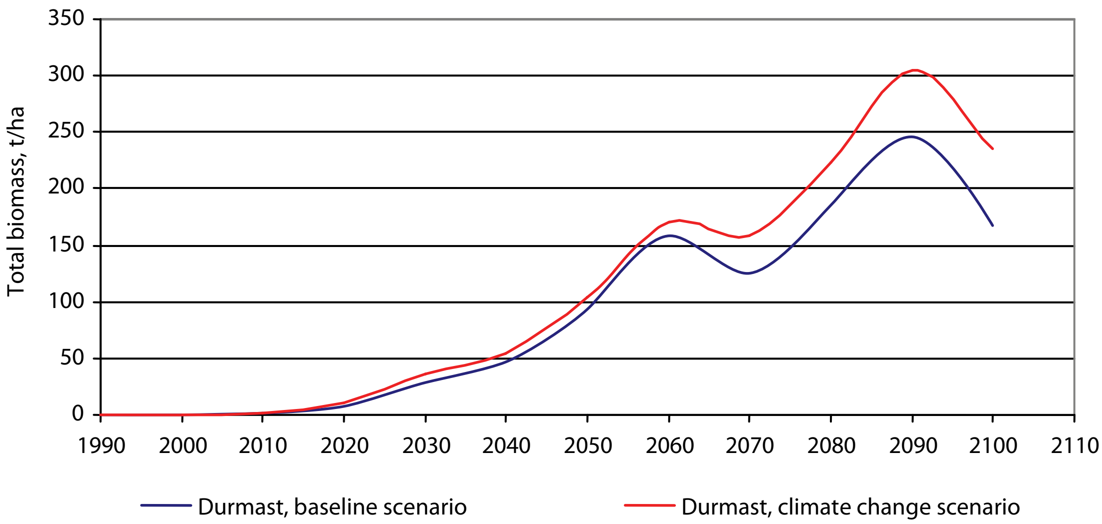


Figure 4-8: Climate Change Impact on the Durmast Biomass Accumulation Rate (*Quercus petraea*), Altitude 300 Meters

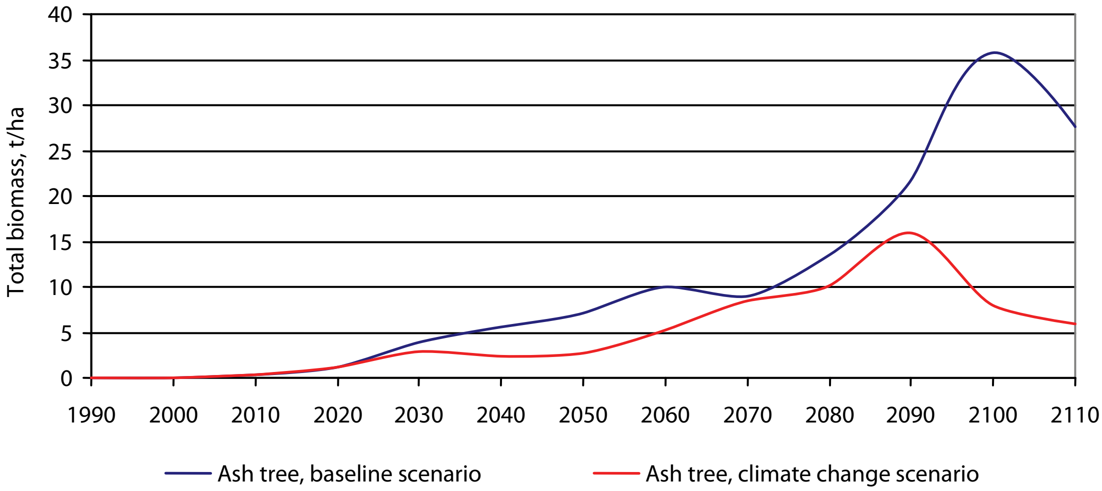


Figure 4-9: Climate Change Impact on the Biomass Accumulation Rate in Ash Trees, Altitude 400 Meters

production cycle. Of the mix species, the hornbeam may be seriously affected, and to a wider extent than the ash tree.

b) Agriculture Sector

Assessment of Climate Change Impact on the Main Crops Productivity

The assessment of the climate change impact on agricultural sector was made based on the assumption that this sector development implies the structure and share of the main crops similar to the current one. Climate scenarios were derived from average air temperatures and amount of precipitation calculated for the conditions of the Republic of Moldova until 2100 year based on global atmosphere circulation scenarios CSIRO-Mk2, HadCM2 and ECHAM4.

The impact of the amount of precipitation and temperature on winter wheat, grain maize, sunflower and sugar beet productivity was assessed by using regression analysis. The respective analysis was made in several steps: the first one was to identify the trends in the crops productivity over the 1961-1990 time series; the second step was to identify multiple regression equations, with the highest level of statistical significance, linking the crops productivity variability with the average monthly temperature and precipitations values during the plants vegetation period (Figure 4-10); while the third step was to assess the impact of future changes in the temperature and precipitation patterns on the productivity of main crops without undertaken any adaptation measures.

The analysis was made with the help of the *Statgaphics Plus and Microsoft Office Excel* software. Climate indicators were selected in conformity with the step by step regression principles taking into account their contribution to the crops productivity.

The obtained results reveal that the influence of the climate factors on the variability level of the productivity of the main agricultural crops in the Republic of Moldova over the 1961-1990 periods was differentiated.

Analysis of the data presented in the table below shows that the influence of climatic conditions on yield of winter wheat in the 1961-1990 years was statistically significant at 95% level of significance ($p \leq 0.05$). Coefficient of determination R^2 shows that the combined effect of precipitation and temperature determined about 36.68% of the variability of the annual average productivity of the winter wheat. The dependence of the variability of winter wheat productivity from the individual factors of temperature and precipitation was weaker, being respectively 21.17% and 22.36% (Table 4-14).

Analysis of the relationship of grain maize productivity on climate conditions during vegetation period revealed a statistic significance only of one factor - for temperature, whereas the effect of the other investigated factors - precipitation, as well as the combined effect of precipitation and temperature was not statistically significant ($p = 0.21$ and 0.16 respectively). Variability of grain maize productivity in the years 1961-1990 only 14.05% was determined by the influence of average air temperature.

The productivity of sunflower in the assessed period by 36.68% was due to the combined effect of precipitation and air temperature during the vegetation period ($p = 0.007$). Influence of individual factors - the temperature was not statistically significant, while the precipitation determined the variability in the productivity of sunflower during the respective period by 24.81%.

Based on the values of the coefficient of determination R^2, the climatic conditions have had a significant influence on the productivity of sugar beet in the 1961-1990 periods. Precipitation and air temperature during the vegetation period determined by 56.64% the average variability of sugar beet productivity ($p \leq 0.01$). Dependence of the sugar beet

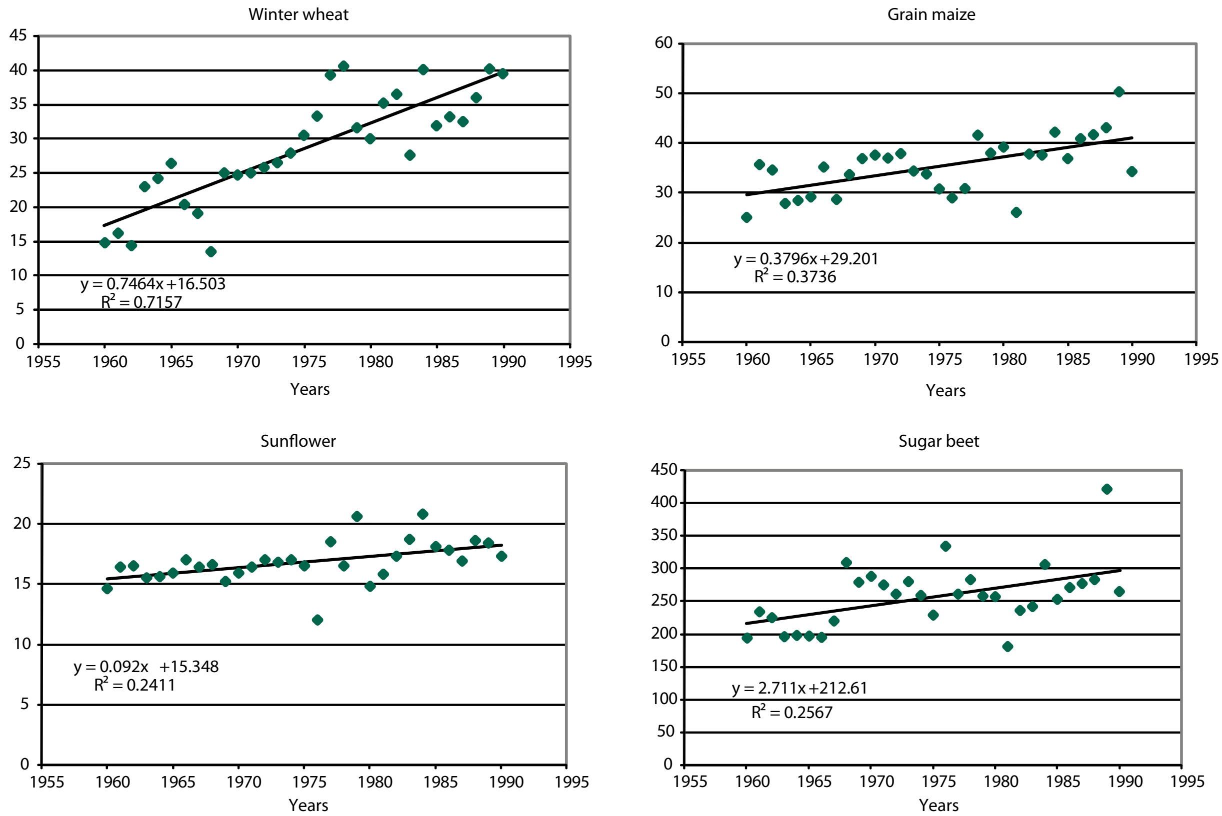


Figure 4-10: Productivity Variability Trends for the Main Crops in the Republic of Moldova over the 1961-1990 period, quintals/ha

Table 4-14: Vulnerability of the Winter Wheat, Grain Maize, Sunflower and Sugar Beet Productivity Variability on Temperature and Precipitation Values during Vegetation Period

Regression equation		p – value	R^2, %
Winter wheat			
Temperature, ^{0}C	$Y = 73.3808 – 1.500957*T_{IV} – 1.4831*T_{VI}$	0.0454	21.17
Precipitation, mm	$Y = 21.8681 + 0.0435407*P_{IX} +0 .129612*P_{IV}$	0.0372	22.36
Temperature and Precipitation	$Y = 81.7588 + 0.155162*P_{IV} - 0.0849153*P_{V} - 1.79527*T_{IX} - 1.5799*T_{V}$	0.0221	36.77
Grain maize			
Temperature, ^{0}C	$Y = 65.7333 – 1.55294*T_{VI}$	0.0415	14.05
Precipitation, mm	$Y = 31.1413+0.438927*P_{V}+ 0.0296567*P_{VI}$	0.2140	10.79
Temperature and Precipitation	$Y = 75.1443 + 0.0451559*P_{V} +0.0247782*P_{VIII} - 1.23132*T_{VI} - 0.913533*T_{VII}$	0.1625	22.25
Sunflower			
Temperature, ^{0}C	$Y = 16.346 + 0.247965*T_{V} -0.342373*T_{VII} + 0.18037*T_{VIII}$	0.2070	15.80
Precipitation, mm	$Y = 15.9413 + 0.0182566*P_{V} + 0.0127256*P_{VI} - 0.0207462 P_{VIII}$	0.0562	24.81
Temperature and Precipitation	$Y = 15.126 + 0.0327041*P_{V} + 0.542005*T_{V} - 0.412514*T_{VII}$	0.0071	36.68
Sugar beet			
Temperature, ^{0}C	$Y = 503.96 +8.20337T_{IV} -16.7739*T_{VI}$	0.0136	24.90
Precipitation, mm	$Y = 214.465+ 0.489122*P_{VI}+ 0.463568*P_{VII}$	0.0298	22.92
Temperature and Precipitation	$Y = 658.917 – 0.379317*P_{VI} + 0.530199*P_{VIII} + 0.44367*P_{IX} + 8.85346*T_{IV} - 16.4073*T_{VI} - 8.90278*T_{VII}$	0.0007	56.64

Note: Y - productivity, quintal/ha; T - average monthly air temperature, 0C; P - average monthly precipitations, mm; with Roman numerals are noted the corresponding months of vegetation period: since April (IV) to September (IX).

productivity, separately from air temperature and precipitation was less pronounced, the coefficient of determination R^2 being 24.90% and 22.92% respectively.

In conformity with the trends identified for the baseline period (1961-1990) several scenarios of the expected climate change impact on the productivity of the main agricultural crops in the Republic of Moldova were assessed without undertaken adaptation measures (Figure 4-11).

The analysis of the obtained results revealed that due to the impact of the main climate indicators (temperature and precipitation), productivity of the winter wheat by year 2039 may decrease from 14.28% (HadCM2 model) to 17.79% (ECHAM4 model). In comparison with the baseline period, by 2069 year the crop productivity may decrease, in dependence of the assessed model, from 23.35% (CSIRO-Mk2 model) to 33.99 % (HadCM2 model). The maximum values of productivity decrease may be reached by 2099. So, due to changes in values of main climate indicators – precipitation and temperature - the productivity of winter wheat may decrease from 38.13% (CSIRO-Mk2 model) to 53.59% (ECHAM4 model).

The sharp decline in the productivity of winter wheat can be explained by a shift of vegetation phases in a more unfavorable period due to temperature increase. The vegetation period of winter wheat (starting with temperatures higher than 5°C in spring), according to CSIRO-Mk2, HadCM2 and ECHAM4 models will start in the Republic of Moldova by 2040' earlier by 15 days. By the 2099 year the vegetation period of winter wheat will start earlier: in the North by 1.0-1.5 months, while in the Center and South by 1.5-2.5 months.

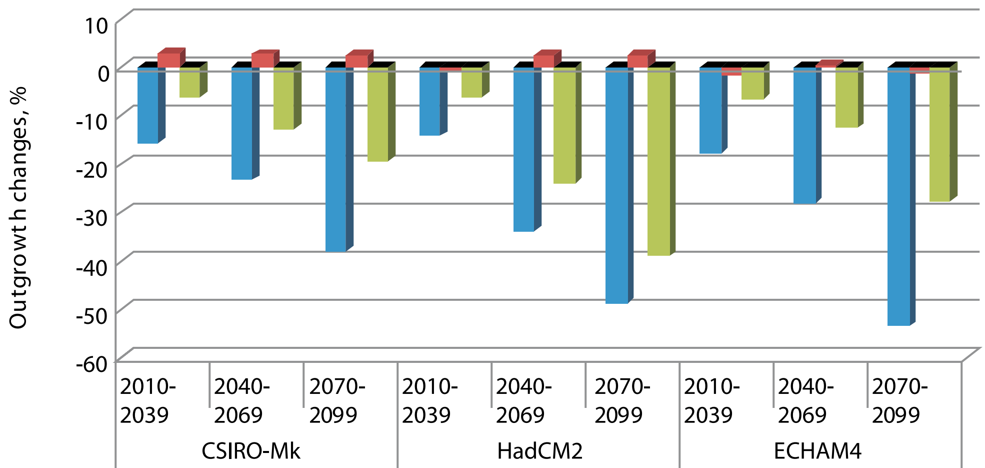
By use of the index 'sum of effective temperatures' there were calculated for winter wheat, according to CSIRO-Mk2, HadCM2 and ECHAM4 models, the average initiating date of main development phases in the spring-summer season.

Analysis of the data presented in the table below, revealed that by 2039 output in the tiller initiating phase at winter wheat may have shifted in average from 2 days (HadCM2 model) up to 11 days (CSIRO-Mk2 model) (Table 4-15). By 2069 the shift in the respective phenological phase will account from 7 days (HadCM2 model) up to 15 days (CSIRO-Mk2 model), while by 2099 year according to the ECHAM4 model the tiller initiating phase will start at the end of March, that is by 24 days early the onset of respective phase in the 1961-1990 period.

Table 4-15: Projections on Shifting the Period of Initiation of Phenological Phases in Winter Wheat in the Central Part of the Republic of Moldova Depending on the Sum of Effective Temperatures

Models	Sum of effective temperatures necessary to initiate the phenological phase			
	125°C Tiller initiating	455°C Jointing	685°C Kernel in milk	945°C Kernel in dough
Average initiation date, period 1961-1990				
Reference	24.04	26.05	12.06	29.06
Average initiation date, period 2010-2039				
CSIRO-Mk2	13.04	17.05	03.06	20.06
HadCM2	22.04	22.05	07.06	25.06
ECHAM4	15.04	19.04	04.06	21.06
Average initiation date, period 2040-2069				
CSIRO-Mk2	09.04	13.05	29.05	15.06
HadCM2	17.04	17.05	01.06	17.06
ECHAM4	09.04	13.05	29.05	15.06
Average initiation date, period 2070-2099				
CSIRO-Mk2	08.04	09.05	25.05	10.06
HadCM2	16.04	16.05	30.05	13.06
ECHAM4	31.03	02.05	18.05	03.06

According to the projections, by 2039 year the phenological phase of jointing may come for winter wheat earlier from 4 days (HadCM2 model), up to 9 days (CSIRO-Mk2



	CSIRO-Mk 2010-2039	CSIRO-Mk 2040-2069	CSIRO-Mk 2070-2099	HadCM2 2010-2039	HadCM2 2040-2069	HadCM2 2070-2099	ECHAM4 2010-2039	ECHAM4 2040-2069	ECHAM4 2070-2099
Winter wheat	-15,59	-23,35	-38,13	-14,28	-33,99	-48,88	-17,79	-28,16	-53,59
Sunflower	2,87	2,82	2,49	-0,63	2,58	2,48	-1,61	0,4	-1,41
Sugar beet	-6,12	-12,76	-19,4	-6,19	-23,84	-39,04	-6,58	-12,54	-27,63

Figure 4-11: Vulnerability of the Winter Wheat, Sunflower and Sugar Beet Productivity on the New Climate Conditions, in % compared to the 1961-1990 period

model). According to the assessment performed the humidity conditions in this period will be close to optimal (HTC = 1.15-1.35).

However, by 2069 year the phenological phase of jointing may shift in average by 11 - 13 days, while by 2099 year this shift can already draw from 10 days (HadCM2 model) up to 24 days (ECHAM4 model). Humidity conditions for this period would be sufficient only in accordance with the CSIRO-Mk2 model (HTC = 1.00-1.03), while according the other two models (HadCM2 and ECHAM4) there will be recorded insufficient humidity conditions (HTC = 0.81-0.74), thus the critical period for jointing at winter wheat will take place in dry conditions, which will impact a sharp decrease in the productivity.

For technical crops such as sunflower, which is relatively drought-resistant, there are projected more favorable climate conditions during the growing season than for winter wheat (Figure 4-11). In comparison with the reference period, by 2039 year a slight decrease in productivity, from 0.63% (HadCM2 model) to 1.61% (ECHAM4 model), is projected for sunflower. While, according to CSIRO-Mk2 model it is possible even a small increase in the productivity, by 2.87% compared with the average recorded productivity of sunflower in the reference period. By 2069 year it is also projected a slight increase in the sunflower productivity, by 2.58% (HadCM2 model), respectively by 2.82% (CSIRO-Mk2 model). By 2099, based on the assessment of combined influence of temperature and precipitation, at sunflower there will persisted the increasing trend in productivity, from 2.48% (HadCM2 model) to 2.49% (CSIRO-Mk2 model). A slight decrease in the productivity, by 1.41% relative to the base period, will be registered according to the ECNAM4 model (Figure 4-11).

For sugar beet by 2039 year, when assessing the combined effect of temperature and humidity during the growing season, it is expected a decrease in productivity by 6.12% - 6.58% under the all climatic models assessed. By 2069 year, there will persisting the decreasing trend in productivity due to climate change. The most severe decrease in productivity (by 23.84%) is predicted under the HadCM2 model. While under the ECHAM4 and CSIRO-Mk2 models the prognosis is more favorable, it is predicted a decrease of productivity by 12.54% and 12.76% respectively. In 2099 year, the most severe productivity reduction for sugar beet will be observed according to HadCM2 model - by 39.04% and ECHAM4 model - by 27.63%, while for CSIRO-Mk2 model the forecast is more favorable – a decrease by 19.40% (Figure 4-11).

The assessment performed allow concluded that the negative effect of warming process, according to CSIRO-Mk2, HadCM2 and ECHAM4 models will not be offset by increase of precipitations. In these circumstances, without undertaken any adaptation measures it can be expected by 2099 a significant drop in the productivity for winter wheat (from 38.13% to 53.59%) and sugar beet (from 19.40 to 39.04%), a medium drop in the productivity for grain maize (from 20.07 to 29.77%), and a slight reduction in the productivity at sunflower (by 1.41%).

Climate Change and the Impact of the Agricultural Soil Management Systems Change

In partnership with the TACIS Regional Project "*Sustainable Integrated Land Use of the Eurasian Steppe*" implemented in the Republic of Moldova within the 2007-2009 period, a case study was carried out on assessing the potential to reduce the greenhouse gas emissions from the agricultural soils in the steppe zone of the Republic of Moldova by promoting alternative agricultural technologies focused on enhancing the carbon accumulation and storing process in these types of soils.

For this purpose, it was improved the greenhouse gas emissions evaluation methodology used while compiling the Republic of Moldova's First National Communication under the UNFCCC.

A long term polygon was set up, where research was initiated in 2008-2009 and will continue in the following 5 years. The need to undertake such studies is determined by the fact that currently the annual loses of humus from agricultural soils in the Republic of Moldova amount to 0.7-0.8 t/ha and this process is increasingly growing by circa 0.02% per year. At national level, humus losses from the entire surface of agricultural soils annually generate circa 1.8-2.0 million tones of CO_2 emissions. The main reason for this situation is the technologies currently used in the agricultural sector of the country.

Three scenarios were developed to identify the opportunities to reduce greenhouse gas emissions by increasing the amount of organic matter in soil: the baseline and two alternative scenarios (optimal and intermediary). The baseline scenario implies keeping the current soils management system on agricultural lands in the steppe zone (*outdated soil management technologies – e.g., shortage by 45-50% of root and on ground crops residue left to compensate the carbon loss, low level of organic fertilizers use, the intensive use of tined tillage for inter-row processing of soil, increasing the decomposition of organic staff in soil, etc.; as well as limited crop rotation possibilities - during the last decade the basic crop rotation was: (1) pea been + annual plants; (2) winter wheat; (3) sun flower; (4) winter barley + winter wheat, and (5) grain maize*) entailing medium annual losses of circa 1.48 t/ha of humus, which is equivalent to approximately 0.86 t/ha of carbon.

The consequences of such soil management system on agricultural lands in the steppe zone lead to: (i) increased CO_2 emissions from the soil due to intensification of humus mineralization processes; (ii) reduced amount of humus in soil with a risk of losing black earth as a separate type of soil; (iii) affected soil structure and strong settling of the arable soil layer; (iv) development of desertification processes in some steppe zones of the Republic of Moldova; (v) low productivity of agricultural crops, etc.

To change this situation (baseline scenario) there should be implemented alternative agricultural soil management practices (alternative scenarios), inclusive with application of technologies entailing reduction of CO_2 emissions from soil and enhancing soil fertility.

The following advanced agricultural technologies would be used in the Republic of Moldova under the two alternative agricultural soil management scenarios:

- More rational combination of classical plough with technologies of minimal soil use;
- The application of trench agriculture (in-line plough) on hillsides, which consists of ploughing the land across the hillside, observing the entire complex of agro-technical measures in order to minimize the soil erosion;
- Pulverization and tillage of secondary agricultural production in the shape of vegetable residue;
- Implementation of diverse forms of crop rotation with significant share of multi-annual plants, up to 20-30% (e.g., option of crop rotation with multi-annual plants: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat; (4) sunflower; (5) winter barley + winter wheat; (6) grain maize);
- Sowing and plantation of green crops (e.g., option of crop rotation with multi-annual plants and green crops: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat + winter vetch on the green fertilizer; (4) sun flower; (5) winter barley + winter wheat + winter vetch on green fertilizer; (6) grain maize);
- Wider and more rational use of mineral fertilizers (e.g., option of crop rotation with multi-annual plants and mineral fertilizers: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat + 150 kg of ammonium nitrate; (4) sunflower + 100 kg of ammonium nitrate; (5) winter barley + winter wheat + 100 kg of ammonium nitrate; (6) grain maize + 100 kg of ammonium nitrate);
- Wider use of organic fertilizers (e.g., option of crop rotation with multi-annual plants and manure - 60 tons of fire-fanged manure under plough on each field: (1) alfalfa + ryegrass; (2) pea bean + annual plants; (3) winter wheat; (4) sunflower; (5) winter barley + winter wheat; (6) grain maize).

The techniques of soil cracking and soil moling are supposed to be used for better implementation of anti-erosional technology. The seed bank is supposed to be established in order to improve the soil through the use of multi-annual crops and "green" (natural) fertilizers. The implementation of minimal tillage will be concomitantly associated with execution of several operations. The livestock sectors needs to be reviewed, thus creating a concordance between livestock and agricultural sector, in order to use the manure. The mineral fertilizers are supposed to be used in moderated doses as supplement to others. The ploughed fields difficult to traverse and with degraded soil will be sowed with multi-annual crops and will be used for hay-mowing. Big importance will be paid to the use of internal resources (solar and terrestrial energy, bacteria retaining nitrogen and living in soil, breeding species and hybrids resistant to diseases, drought and extreme temperatures, sustainable use of water for irrigation, reduction of purchased resources).

The range of measures planned to be undertaken in conformity with two alternative scenarios, based on the assessments made in a farm situated in the southern part of the Republic of Moldova (Tartaul de Salcie village, Cahul district) reveal that these measures may ensure a reduction in humus losses from 1.48 t/ha (baseline scenario) to 0.29 t/ha (intermediary scenario) and 0.22 t/ha (optimal scenario). These measures may lead to an annual reduction of CO_2 emissions from agricultural soils by 2.54 t/ha under the intermediary scenario (from 3.15 t CO_2/ha/year to 0.62 t CO_2/ha/year), and by 3.62 t CO_2/ha under the optimal scenario (from 3.15 t CO_2/ha/year to -0.46 t CO_2/ha/year) (Table 4-16).

At the national level the application of the proposed agricultural technologies in the frame of two alternative scenarios may lead to an annual reduction of greenhouse gas emissions by circa 144.5 thousand tones CO_2 under the intermediary scenario, if these measures are implemented at least on 10% of arable lands located in the steppe zone (what makes circa 57 thousand hectare), and by circa 722.6 thousand tones CO_2 under the optimal scenario, if these measures are implemented at least on 50% of arable lands located in the steppe zone (what makes circa 285 thousand hectare). Along the reduction of greenhouse gas emissions the alternative agricultural practices will also have a beneficial impact on the process of agricultural sector adaptation to new climate conditions.

4.4.2 Opportunities to Adapt to New Climate Conditions

The opportunities to adapt to new climate conditions determined by climate change as well as the estimated adaptation costs, there were included into the 'Sectoral Action Plans on Adaptation to Climate Change', presented further more in details in the Annexes 2.5 – 2.6 and 2-8.

Table 4-16: Carbon Balance in the Agricultural Soils of the Steppe Zone in the Republic of Moldova (Tartaul de Salcie village, Cahul district)

Crops	Area, ha	Basic output, tones	Carbon stock changes in soil, t			Carbon balance		CO_2 emissions	
			introduced into soil with agricultural residues returned to soil and organic fertilizer	extracted from soil through humus mineralization	extracted from soil through pluvial erosion	t	t/ha	t	t/ha
Baseline scenario									
Winter wheat	210.0	588.0	23.7	-149.5	-3.65	-129.5	-0.62	475.1	2.26
Winter barley	37.0	125.8	4.1	-37.9	-0.64	-34.4	-0.93	126.1	3.41
Oats	2.0	6.8	0.3	-2.0	-0.03	-1.8	-0.90	6.6	3.30
Grain Maize	50.0	190.0	7.2	-70.6	-2.61	-66.0	-1.32	242.2	4.84
Sunflower	130.0	234.0	8.7	-153.6	-6.79	-151.7	-1.17	556.7	4.28
Pees	20.0	42.0	1.6	-5.4	-0.70	-4.5	-0.22	16.5	0.82
Annual herbs	1.0	3.0	0.3	0.8	0.00	1.1	1.14	-4.2	-4.19
Perennial herbs	0.0	0.0	0.0	0.0	0.00	0.0	0.00	0.0	0.00
TOTAL	**450.0**	**1189.6**	**45.9**	**-418.1**	**-14.43**	**-386.6**	**-0.86**	**1419.0**	**3.15**
Intermediary scenario									
Winter wheat	200.0	720.0	77.0	-165.4	-3.48	-91.9	-0.46	337.3	1.69
Winter barley	20.0	72.0	6.8	-17.1	-0.35	-10.7	-0.53	39.1	1.96
Oats	5.0	18.0	1.9	-4.3	-0.09	-2.5	-0.49	9.0	1.81
Grain Maize	50.0	210.0	7.9	-57.6	-2.61	-23.3	-0.47	85.4	1.71
Sunflower	80.0	160.0	7.6	-79.2	-4.18	-41.0	-0.51	150.3	1.88
Pees	15.0	33.0	2.2	-1.7	-0.52	-0.1	0.00	0.2	0.01
Annual herbs	10.0	30.0	3.1	9.4	0.00	12.5	1.25	-45.7	-4.57
Perennial herbs	70.0	350.0	40.7	40.5	0.00	81.1	1.16	-297.7	-4.25
TOTAL	**450.0**	**1593.0**	**147.1**	**-275.4**	**-11.22**	**-75.8**	**-0.17**	**278.0**	**0.62**
Optimal scenario									
Winter wheat	200.0	800.0	125.4	-161.2	-2.32	-38.1	-0.19	140.0	0.70
Winter barley	20.0	76.0	9.5	-17.8	-0.23	-8.6	-0.43	31.5	1.57
Oats	5.0	19.0	2.6	-4.5	-0.06	-1.9	-0.38	7.0	1.39
Grain Maize	50.0	250.0	9.5	-64.3	-1.74	-10.2	-0.20	37.5	0.75
Sunflower	80.0	176.0	12.0	-79.7	-2.78	-18.2	-0.23	66.9	0.84
Pees	15.0	34.5	3.2	-1.7	-0.52	1.0	0.07	-3.8	-0.25
Annual herbs	10.0	50.0	5.1	15.2	0.00	20.3	2.03	-74.6	-7.46
Perennial herbs	70.0	490.0	56.9	55.7	0.00	112.7	1.61	-413.4	-5.91
TOTAL	**450.0**	**1895.5**	**224.3**	**-258.2**	**-7.66**	**57.0**	**0.13**	**-209.1**	**-0.46**

a) Forest Ecosystems

With reference to the forest ecosystems, the most relevant adaptation measures to new climate conditions are associated with the following:

I) Revision of Sector Policies:

- Revision of the Forestry Sector Sustainable Development Strategy and of the Action Plan in the Context of Adjustment to New Social-Economic Realities;
- Development of Local Programs on the Use, Conservation And Development of Natural Resources (forests, other types of forest vegetation, grasslands), establishing community level ecological networks taking into account the geographical, pedoecological features, the relief, etc., including in the context of prevention/mitigation of natural hazards;
- Development of Plans on Planting Forest Vegetation on Lands Managed by Other Entities than the Forestry Agency "Moldsilva" (70 thousand ha);
- Development and implementation of projects aimed at planting protection forestry strips: for agricultural lands protection – on 12.1 thousand ha; antierosional

– on 28.3 thousand ha; for waters protection – on 14.9 thousand ha.

II) Applying a single forestry regime in managing the forestry resources and for est vegetation, regardless the ownership:

- Implementing forestry landscaping on the entire territory covered by forestry resources and forest vegetation managed by local public administrations, accounting for all forestry resources;
- Development of a National Landscaping System, taking into account the concrete conditions of the Republic of Moldova;
- Strengthening of community forests to improve their condition, guarding, protection, regeneration and use, as well as to assure their wider specific poly -functionality.

III) Conservation and quantitative and qualitative development of forests and other types of vegetation:

- Expanding the areas covered by forests by 7.5 thousand ha annually (prospectively, up to 20 percent of the country's territory) on the account of degraded lands, private owners' lands, etc.;
- Expansion of grasslands areas by 3.9 thousand ha annually (prospectively, up to 22 percent of the country's territory) on the account of agricultural lands affected by erosion, slopes higher than 7^0 etc.;
- Development and implementation of the national program of ecological reconstruction of the standing stock which does not correspond to stationary conditions, providing for reconstruction of circa 1.9 thousand ha annually;
- Planting of 20 thousand ha energy forests to satisfy the needs of population in fuel wood for heating, cooking, etc.;
- Carrying out surveys to assess the real consumption of wood products, including from illegal logging, development and submitting periodic reports (2009 and 2013) on consumption of wood products.

IV) Revision of the Legal Framework:

- Development of the new version of the Forestry Code (to include some new chapters such as: communal and private sector in forestry; forestry taxes, including taxes for activities leading to fragmentation of the forestry fund through roads construction, marking out electric lines, gas pipelines cross-cutting forests, etc.);
- Development of a new version of the Environment Protection Law;
- Hardening the provisions of the Code of Administrative Contraventions and Penal Code regarding protection of forests against destructive actions.

V) Revision of Regulatory Framework:

- Revision and development of a new important components of the forestry regulatory basis, as integral parts of the forestry regime, focusing on the following areas: maintenance and conservation of forestry stations; conservation of forestry genetic resources; ecological reconstruction of forests; certification of forests, forest products and management systems;
- Development of a new version of the Regulation on the manner of keeping the state record of the forestry resources and the state forestry cadastre;
- Development of a new version of the Regulation on classification of forests by groups, sub-groups and functional categories;
- Revision of the regulatory framework pertaining to development of an appropriate financial mechanism in conservation and development of forestry resources, by imposing mandatory allocations from some extra-budgetary funds (ecological, roads, etc.) and taxes (ecological tax on import of oil products, for landscaping , etc.) needed for expansion of lands covered with forestry vegetation , etc.;
- Development and approval of the Regulation on the principles and way of funding the priority forestry activities, on the state's contribution to the priority forestry activities (landscaping, research, regeneration and expansion, guarding and protection of forests);
- Development and approval of the Regulation on environmental valences and payment for their beneficiaries (agricultural land owners, treatment facilities, etc.), as well as establishing an economic infrastructure and a wood products market;
- Development and approval of the Regulation on implementation and assuring functionality of the principles of participatory management of public forest resources;
- Development and approval of a Regulation on a wide promotion of forestry-pastoral and agricultural-forestry practices: to unify the efforts of the forestry and animal breeding /pastoral sectors, mitigate social conflicts, etc.;
- Approval and implementation by mayors of local regulations pertaining to forest vegetation and grasslands management, including signing agreements between the animal breeders and mayors of contracts for grazing of animals on communal grasslands, which will specify the obligations of the parties in terms of grasslands maintenance.

VI) Improvement of the Institutional Framework:

- Adequate adjusting of the new conditions of the central forestry authorities structure, with effects on the capacities to co-work and cooperate with other central authorities, local public administrations of all levels and local communities;

- Establishing by the Forest Research and Management Institute of an agency vested with functions to provide advisory and accounting services to public and private owners of forests and forest vegetation;
- Establishing of regional/local structures (self-financing, in the first place) responsible for organization /management of forests and forest vegetation owned by local public authorities and private owners (communal and inter-communal wood farms), as well as provision of the primary technical and logistical support;
- Primary equipping of the Forestry Agency "Moldsilva" and its territorial structures with modern information technologies;
- Procuring of licensed software for developing mapping materials, data bases for the forestry sector, accounting and economic reports, etc.

VII) Intensification of international cooperation and investment climate improvement:

- Signing and assuring implementation of international collaboration and technical-scientific and production cooperation Agreements in the forestry sector;
- Launching of technical assistance projects in the forestry sector, including with the financial support of the international bodies (Global Environment Facility, World Bank, EU, etc.).

VIII) Organization of training, education and professional development activities:

- Modernization of the forestry educational institutions, including equipping them with modern equipment and technical facilities;
- Organization of training / re-training programs of forestry professionals in information technologies;
- Development and implementation of training programs for owners (the staff involved in management, guarding and protection, in the first place) of communal and private forests and other types of forest vegetation;
- Publishing of training and information materials on forestry sector;
- Strengthening the communication capacity of the state forestry bodies in view of setting up a sustainable social partnership with local communities through local public authorities.

IX) Mobilization of the scientific potential and encouragement for implementation of innovation in practice:

- Development of methodologies/technologies on assuring adaptability of forest ecosystems to climate change;
- Description of the natural forest ecosystems in view of adequate execution of forestry works and assessing the vulnerability degree;
- Development of the general information system for the forestry sector of the Republic of Moldova;
- Development softwares for forests inventory and forests cadastre development.

b) Agriculture Sector

With reference to the agriculture sector, the most adequate adaptation measures to new climate conditions are associated with the following:

I) Land Consolidation and Improving the Agricultural Lands Management:

- Implementation of the Program to Combat Soil Erosion and Use of Low Productive Lands;
- Implementation of the New Lands Use and Soil Fertility Enhancement Program;
- Development and Implementation of Integral Soil Fertility Enhancement and Reproduction System;
- Implementation of the Agricultural Lands Consolidation Program;
- Optimization of the Land Resources.

II) Plant Growing Sector:

- Updating of the National Horticulture Development Program;
- Elaboration of Commercial Crops Development Program;
- Elaboration of the Vegetables Development Program;
- Elaboration of the Grain Crops Development Program;
- Implementation of the Program on Tobacco Development Sector in 2003-2010;
- Implementation of the National Nuts Crops Development Program until year 2020;
- Organization and Carrying Out of the First General Agricultural Census;
- Increasing of the Capacities of the Small and Medium Rural Enterprises to Process High Value Added Agricultural Products.

III) Animal Breeding Sector:

- Implementation of the National Cattle Breeding Program in 2006-2015;
- Implementation of the National Swine Breeding Program in 2003-2010;
- Implementation of the Poultry Sector Improvement Program in the period 2002-2010;
- Maintenance and Improvement of Breeding Animals Genetic Pool (Selection, Reproduction, Breeding and Animal Health);

- Incentivizing Equipment and Re-Equipment of Small and Medium Animal Breeding Farms Outside the Settlements;
- Development of Machinery Services Provision System for Production and Preparation of Fodder.

IV) Irrigation Sector:

- Rehabilitation of Irrigation Systems;
- Construction of New Irrigation Systems.

V) Revision of the Legal Framework of Agricultural Sector:

- Development and approval of the Law on Agricultural Activities (Law on Agriculture);
- Development and approval of the Law on Agricultural Lands Consolidation;
- Development and approval of the Law on Low Productive Lands;
- Development and approval of the Law on Agricultural Cadastre;
- Development and approval of the Law on Setting Up the Risk Fund to Finance Investment Projects;
- Development and approval of the Law on Plant Protection and Phytosanitary Quarantine.

VI) Revision of the Regulatory Framework of the Agricultural Sector:

- Development and approval of the Government Resolution on Re-Organization and Optimization of Scientific and Innovation Activities of the Agricultural Research Institutes;
- Development of the Regulation on the ways to implement the Agricultural Cadastre;
- Development of the Regulation on establishing technologies transfer mechanisms and commercialization of the research-innovation activity results in the agriculture sector and food processing industry;
- Development of the Regulation on the Use of Financial Resources from the Agricultural Producers Subsidies Fund;
- Continuation of Harmonization of the National Legislation with the EU Standards and Norms Pertaining to Agricultural and Food Products;
- Optimization of the legislative and executive veterinary basis in conformity with the EU standards and norms;
- Development and implementation of the national standards management system in conformity with the European Union requirements.

VII) Revision of the Institutional Framework in Agricultural Sector:

- Development of the new regulation and organizational structure of the Ministry of Agriculture and Food Industry based on the results of the functional review made by the Department for Policy Coordination and proposals of the Agricultural Policies Project;
- Setting up of the Payment and Intervention Agency in view of enhancing efficiency of the public funds use for the purpose of agricultural sector development;
- Setting up of the Phyto–Sanitary Agency;
- Setting up of Sanitary – Veterinary and Food Safety Agency;
- Setting up of a General Agricultural Inspectorate;
- Setting up of a State enterprise vested with functions to monitor the lands consolidation process, provide information services to land owners, companies, consider and comment on lands consolidation projects to be developed by private structures, other enterprises, education of the participants in the lands consolidation process;
- Development of the system of machinery services provision by establishing technological machines stations to provide machinery services to farmers;
- Development of marketing infrastructure in agricultural sector.

VIII) Intensification of international cooperation and investment climate improvement:

- Providing the Ministry of Agriculture and Food Industry with the best practices of comparative analysis of results in agricultural and food industry sector, with models of documents needed to carry out feasibility studies on modernization, re-equipment and development of enterprises in agribusiness;
- Signing and assuring implementation of international collaboration and technical-scientific cooperation agreements in agricultural sector;
- Launching of investment projects in the priority areas of the agricultural and food industry sector, including from external funding sources (USAID, World Bank, European Investment Bank, European Bank for Reconstruction and Development, EU, etc.).

IX) Organization of training, education and professional development activities:

- Modernization of higher and secondary special agricultural education;
- Development of the continuous and advanced training system for professionals in the agricultural and food industry sector and education of rural population;
- Improvement of initial training programs in conformity with the European standards for intensive farming activities.

X) Mobilization of the scientific potential and encouragement of implementing innovation in practice:

- Optimization of scientific research activities in the agricultural sector be delimitation of agricultural property and lands, separation of scientific activity from production activity and sales, as well as establishing contract–based relations with production;
- Correlation of sector related science and innovation priority development directions with branch policies, targeting of financial resources, scientific potential to accelerate the process of development new plant varieties and animal breeds, competitive hybrids for intensive agriculture;
- Development of a pilot scientific-technological park of intensive agriculture in Chisinau and of the scientific-technological park of ecological agriculture in Balti;
- Development, within the relevant research institutes, of innovation and technology transfer structures;
- Development and implementation of the Action Plan to reform the Agricultural Research System.

c) Human Health

With reference to the human health, the most adequate adaptation measures to new climate conditions are associated with the following:

I) Strengthen the Human Health Sector Policies:

- Implement the State Program on Developing the Emergency Heath Care Services and ensure funding of the planned actions. Develop adaptation and emergency care measures in case of extreme climate events;
- Strengthen the transmissible illnesses control (*including the climate related illnesses: bacillary dysentery, scarlet fever, salmonellas infections, typhoid fever and paratyphoid fever, diphtheria, cholera, measles, viral hepatitis, epidemic parotiditis, flu and acute respiratory infections, malaria, ascariasis, tuberculosis, etc.*), in view of enhancing the efficiency of interventions in the transmissible illnesses control, inclusively by expanding and consolidation of monitoring and evaluation system by developing an interventional epidemiologic surveillance information system for infectious and parasitic diseases;
- Strengthen the public health by reducing the burden of non-contagious illnesses *(including the climate related illnesses, such as circulatory system diseases: hypertension, atherosclerosis, ischemic cardiopathy, myocardial infarction, heart failure, miocarditis, etc. and respiratory illnesses: asthma, bronchitis, pneumonia, etc.),* inclusively by developing the Strategy on non-contagious diseases control and socio-hygienic monitoring and enhancing behavioral and environmental risk factors control;
- Develop primary health care and community health care, home and palliative care in view of expanding access of population to quality health services, inclusively by increasing the allocations for the primary health care from the health by up to 30%;
- Strengthen the health services for mother and child to reduce infantile and maternal mortality, inclusively through:
  - Set up and provide equipment for three regional pediatric resuscitation and intensive care units and develop a referral system which would provide for assisted transportation for infants needing resuscitation and intensive care, as well as assure full coverage with vaccines in conformity with the National Immunization Program ;
  - Strengthening of 10 level I pre-natal care centers, 3 level II centers and one level III centre, along with the requirement to register newborns starting with the weight of 500 grams and pregnancy term of 22 weeks;
  - Assure full coverage with vaccines in conformity with the National Immunization Program;
  - Research regarding the gap between the life expectancy at birth in men and women and further develop some programs to reduce the gap.

II) Strengthen the Legal, Regulatory and Institutional Frameworks:

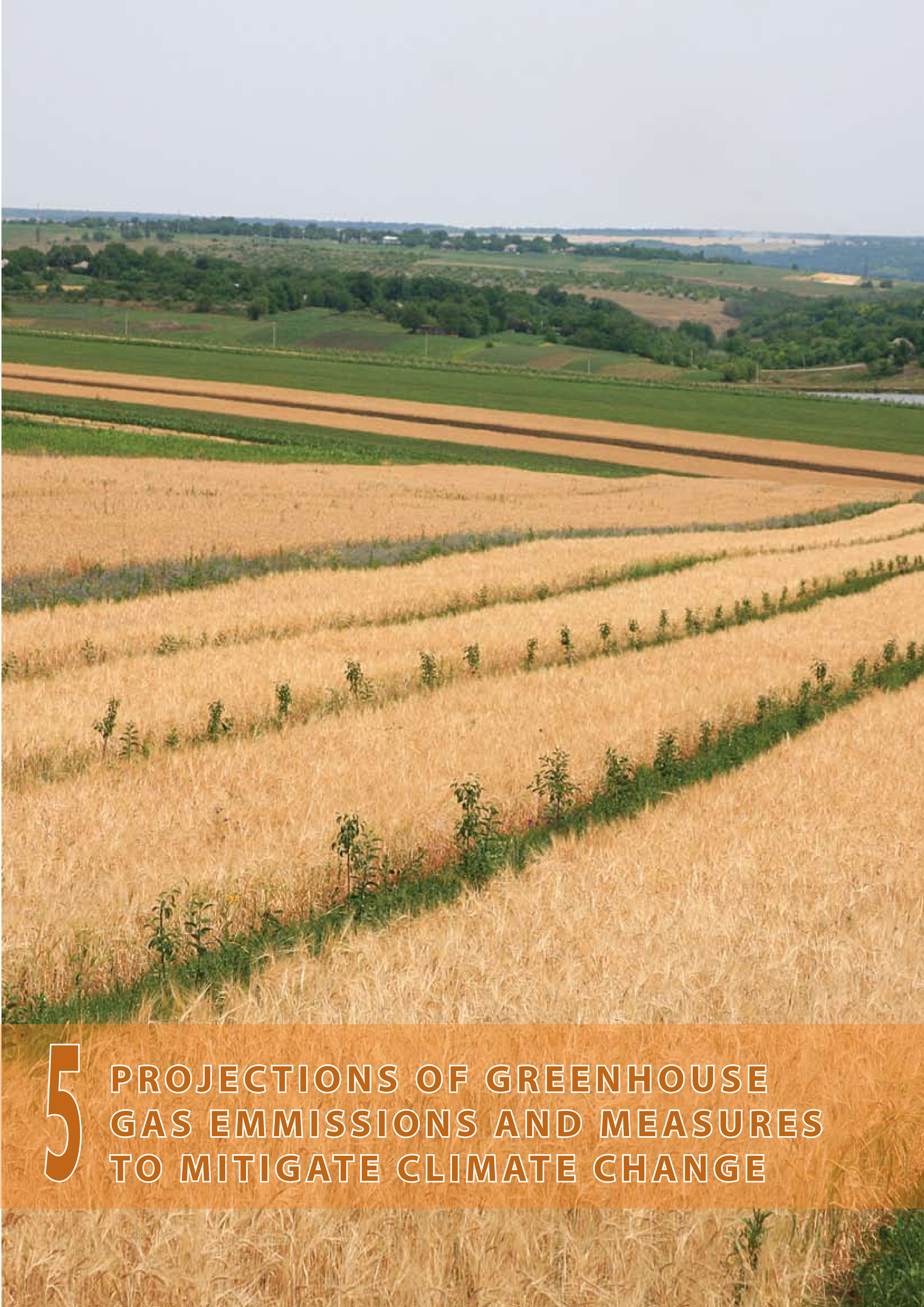
- Implement the EU and WHO legislation on public health adaptation to climate change;
- Develop a regulatory framework on provision of community health services, home and palliative care;
- Assure appropriate staffing of health care facilities, in particular in rural areas, inclusively through:
  - Continuous implementation of the mechanism providing benefits to young medical graduates assigned to their jobs after graduation;
  - Implementing the mechanism of competitive selection of doctors and pharmacists in public health care.
- Develop and implement of the health care quality management system to enhance the quality of health services, inclusively through:
  - Development and dissemination of protocols, guidelines along the different health care levels;
  - Improving the accreditation system in health care;
  - Development of institutional mechanisms for non-judiciary settlement of the patients' claims.

III) Intensification of International Cooperation and Investment Climate Improvement:

- Strengthen the international cooperation and improve the investments attraction by upgrading the resource basis of the public health care facilities and continue the restructuring of the hospital infrastructure, provide modern and cost-efficient equipment, implement new treatment technologies and other measures to provide for the ability of the public health to adapt to climate change, inclusively through:
  - Improving the quality of the primary health care by rehabilitating the inventory basis, inclusively by providing new equipment to health centers in rural areas;
  - Enhancing the quality of the health care services provided by family doctors by ensuring transportation to health centers and family doctors offices in rural areas;
  - Enhancing the quality of treatment in hospitals of patients with tuberculosis by rehabilitation of hospital buildings and providing medical equipment to tuberculosis hospitals;
  - Improving the quality of the secondary health care by rehabilitation and equipping the pilot regional hospitals;
  - Improving the quality of the emergency health care by providing state of the art equipment in particular to operation rooms, resuscitation and intensive care units and imagistic sections of the public health care facilities;
  - Enhancing the health care assessment capacities by a phased acquisition of software and information equipment for the Integrated Medical Information System.
- Assure international cooperation and investments attraction to enhance secondary and tertiary health care efficiency by modernization, developing centers of excellence and of a more efficient hospital care model, inclusively through:
  - Carrying out a feasibility study for the Republican Clinical Hospital and setting up a Diabetes Center;
  - Developing a Hospital Restructuring Master Plan;
  - Setting up a Center of Excellence on the basis of the Republican Clinical Hospital and its rehabilitation;
  - Carrying out a feasibility study for the Balti Municipal Clinical Hospital;
  - Setting up a Center of Excellence on the basis of the Balti Municipal Clinical Hospital.

IV) Organization of Training, Education and Professional Development Activities:

- University and post-university training in public health adaptation to climate change;
- Improving the policies on staff training in medical and pharmaceutical education in view of enhancing the management of professional training in public health human resources, optimizing the costs and improving the quality of health care services, inclusively through:
  - Development of the Human Resources Strategy in public health care system;
  - Improving the students enrollment criteria for medical and pharmaceutical educational institutions;
  - Phased implementation and improving of distance learning (medical and pharmaceutical education).
- Improving the quality of medical staff training by modernization of the resource basis of the medical educational institutions;
- Training of primary health care managers;
- Planning and research on assessing vulnerability and adaptation of public health to climate change;
- Carry out periodic surveys on public health and impact of the environment (including climate change) on human health.



5 PROJECTIONS OF GREENHOUSE GAS EMMISSIONS AND MEASURES TO MITIGATE CLIMATE CHANGE

5. PROJECTIONS OF GREENHOUSE GAS EMISSIONS AND MEASURES TO MITIGATE CLIMATE CHANGE

5.1 Medium Term Projections on Social-Economic Development

The medium term forecast on GHG emissions has been made on the basis of a series of strategic documents of the Republic of Moldova, such as: National Development Strategy for 2008-2011 (approved through the Law No. 295-XVI as of 21.12.2007), Energy Strategy of the Republic of Moldova until 2020 (adopted through the Government Resolution No. 958 as of 21.08.2007), Strategy for the Terrestrial Transport Infrastructure Development for 2008-2017 (approved through the Government Resolution No. 85 as of 01.02.2008), Industry Development Strategy up to 2015 (approved through the Government Resolution No. 1149 as of 05.10.2006), Agriculture and Food Industry Development Strategy for 2006-2015 (approved through the Government Resolution No. 1199 as of 17.10.2006), National Agribusiness Sustainable Development Strategy for 2008-2015 (approved through the Government Resolution No. 282 as of 11.03.2008), the National Program "Moldovan Village" (2005-2015), as well as based on updated data of the Ministry of Economy and Trade, and other ministries, central administrative authorities and research and development institutions.

Te main macroeconomic indicators for the base line scenario of the social-economic development of the Republic of Moldova used to estimate the greenhouse gas emission projections are set forth in Table 5-1.

Table 5-1: The Progress of the Main Macroeconomic Indicators for the Base Line Scenario of the Social-Economic Development of the RM until the Year of 2030

	1990	1995	2000	2005	2010	2015	2020	2025	2030
GDP in real terms, MDL billion	13.0	6.5	16.0	37.6	77.5	118.2	161.1	211.7	267.2
% versus the preceding year	97.6	98.6	102.1	107.5	106.4	105.0	104.2	103.5	103.3
% versus 1990	100.0	39.4	34.8	49.4	64.2	78.5	96.7	118.1	139.6
Trade balance, USD million	-0.2	-95	-305	-1201	-5000	-5761	-6834	-7541	-8092
Industry, MDL billion	11.5	4.3	8.2	20.8	32.7	45.9	62.7	84.6	110.9
% versus the preceding year	-	96.1	107.7	106.7	107.5	106.0	106.0	105.0	105.0
% versus 1990	100.0	45.0	34.1	57.3	70.2	95.2	127.5	167.4	213.6
Agriculture, MDL billion	6.1	4.2	8.3	12.7	16.9	23.8	27.6	32.3	38.0
% versus the preceding year	-	101.9	96.7	100.8	102.0	103.0	102.0	103.0	103.0
% versus 1990	100.0	64.5	49.5	57.3	63.1	73.2	84.0	98.3	113.9
Structure of GDP, %	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Gross Added Value	99.0	88.6	87.5	84.0	82.7	84.1	85.0	86.1	87.0
Goods - Total	76.1	54.3	41.7	32.2	24.4	22.1	20.6	19.0	18.0
Agriculture	41.7	29.3	25.4	16.4	8.8	9.1	7.6	6.4	5.5
Industry	34.4	25.0	16.3	15.8	15.6	13.0	13.0	12.7	12.5
Services - Total	27.0	36.6	48.2	53.8	61.0	63.7	66.0	68.5	70.3
Wholesale and Retail Sales	7.1	8.0	12.5	10.4	12.7	11.1	11.4	11.2	10.6
Transport and Communications	4.8	5.1	9.5	12.2	12.4	12.8	13.1	12.7	12.2
Constructions	9.0	3.5	2.7	3.3	5.6	4.8	4.4	4.0	3.7
Financial Activities	3.6	3.7	5.3	4.6	6.4	5.1	5.3	5.5	5.8
Other Sectors	2.5	16.3	18.2	23.2	23.8	29.9	31.8	35.2	38.0
Dealers Services	-4.1	-2.2	-2.4	-2.0	-2.6	-1.6	-1.5	-1.4	-1.4
Net Product and Import Taxes	1.0	11.4	12.5	16.0	17.3	15.9	15.0	13.9	13.0

5.2 Methodological Approaches for Mitigation Assessment

Article 4.1 and 12.1, of the Convention commits Parties to develop national programmes and measures that will result in the mitigation of human-induced climate change. Such measures may either reduce the increase in greenhouse emissions (abatement) or increase terrestrial storage of carbon (sequestration).

Although Moldova is not required to take on emission reduction commitments, undertaken climate change mitigation and assessment could provide ancillary benefits for sustainable development, such as particulate pollution reduction, increase in technological efficiency and effectiveness, improvements in the security and availability of power supply, reduction in road congestion when a shift from private to public transport takes place, and increase in employment resulting from mitigation projects.

Undertaken mitigation evaluation initiatives might also facilitate the implementation of mitigation projects, strengthening of institutional and human capacity building and the prioritization and evaluation of social, economic and environmental programmes.

The mitigation assessments performed in the Republic of Moldova entail the generation of information on the national analysis of the potential costs and impacts of the various technologies and practices to mitigate climate change.

The information provided in the respective chapter is relevant for the sustainable development of the Republic of Moldova and is useful for policy makers, providing support for formulation and prioritization of mitigation action plans at the sectoral level.

There are several methods and models that may be useful in mitigation assessment, ranging from a broad description of main developing trends and statistics to formalized modelling at sector and macro-economic levels. General information on the approaches used to conduct mitigation analysis (top-down and bottom-up), as well as on the variety of tools/models and methods used to asses the mitigation in the Republic of Moldova is provided in the Table 5-2.

5.3 Medium Term Projections of Direct Greenhouse Gas Emissions and Abatement Measures by Sector

5.3.1 Energy Sector

Under the Energy Sector, direct greenhouse gas emission projections and abatement measures were identified sepa-

Table 5-2: Tools/Models and Methods Used to Assess the Mitigation in the RM

Sectors	Technical Resources Available	Tools / Models and Methods Used	Notes
Energy	MESSAGE MARKAL ENPEP-BALANCE LEAP RETScren	Energy and Power Evaluation Program (ENPEP) Wien Automatic System Planning (WASP) Model, Model for Analysis of the Energy Demand (MAED) and IMPACTS Model of the ENPEP software pack Long-range Energy Alternatives Planning system (LEAP) Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997)	1) Within the electric power sub-sector (for the electric power generation sources situated on the right bank of the Dniester river), the mitigation potential was assessed using the ENPEP software pack; 2) Within the thermal power and transport sub-sectors the mitigation potential was assessed by using the LEAP model; 3) In the case with MTPP located in Dnestrovsk, on the left bank of the Dniester, the mitigation potential was estimated by using Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997).
Industry	LEAP	Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997) CO_2 FIX V2.0 Model developed by the European Forestry Institute under the CASFOR Project	Under the Industrial Processes, Agriculture, Land Use, Land-Use Change and Forestry Sectors, the mitigation potential was assessed by using Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), by taken into account as well the GPG Guidance (IPCC 2000) and GPG for LULUCF and country specific emission factors.
Agriculture	STAIR		
LULUCF	COPATH		
Waste	LEAP	INFRAS (Swiss Company) Tool for calculating CH_4 emissions from Solid Waste Disposal Sites following the First Order Decay Method Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997)	Under the Waste Sector the mitigation potential was assessed by using the INFRAS Tool for calculating CH_4 emissions from Solid Waste Disposal Sites following the First Order Decay Method (Tier 2). The mitigation potential of methane and nitrous oxide emissions from wastewater handling was assessed by using the Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), by taken into account as well the GPG Guidance (IPCC 2000) and country specific emission factors.

rately for Stationary Combustion (Electrical and Thermal Power Sectors), Mobile Combustion (Transport Sector) and Fugitive Emissions From Oil and Natural Gas Operations (Gas and Oil Products Supply Sector).

I. Stationary Combustion

I.A Electrical Power Sector (Right Bank of the Dniester River)

In the Republic of Moldova the Electric Power Sector is an important generator of greenhouse gas emissions. It should be noted that the total installed capacity of electric power plants in the country is circa 2950 MW, with 84 percent of this capacity belonging to the Moldovan Thermal Power Plant (MTPP) in Dnestrovsk on the left bank of the Dniester river (not controlled by the authorities of the Republic of Moldova). To cover the consumption curve, starting the 1995 the deficit of installed power on the right bank of the Dniester river is compensated by supplies of electrical power from the MTPP and by imported electric power, preponderantly from Ukraine. The existent uncertainties associated with the attempts to settle the Transnistrian conflict on a political level, require a more comprehensive prospecting of the development scenarios for the electric power sources on the right bank of the Dniester river, to identify the best options in terms of energy safety assurance.

The ecological criterion for selecting the best option did not enjoy any preference under this assessment, being treated equally along with other selection criteria, such as the economic or technical criteria. As a rule, the main target of the assessment of such type is to identify the most cost effective solution, while the ecological criterion is represented by the requirement to keep within the established Admissible Emission Thresholds (AET). In other words, the economic criteria encompass both ecological and technical, safety and social costs. However, if the sources development options (scenarios) imply keeping within the AET anyway, it is obvious that priority should be given to the scenarios featuring lower levels of greenhouse gases emissions. The objective of this assessment was to evaluate the sectors scenarios from the perspective of identifying an option assuring maximal GHG emissions abatement.

I.A.1 Mitigation Scenarios

The assessment covered six Electrical Power Sources Development Scenarios (Right Bank of Dniester River). First, the Baseline Scenario (BLS) was identified, to be used as a reference for other alternative scenarios. Then, it was necessary to find a solution that would best suit the current conditions of the country's economic development. Within this assessment the respective scenario was called High Alternative Scenario (HAS) and was specified as a mixed electric power sources development option, having an intermediary position between the source development scenario implying almost exclusive reliance on own sources to cover the demand (import representing as little as circa 5-7 percent of the needed energy), and the scenario implying almost exclusive reliance on import to cover the demand (import reaching 85-90 percent). The share of import in the HAS scenario is circa 50 percent. Further, it was necessary to identify a solution matching the HAS, which, however, would require less investments, thus loosing in electric power generation effectiveness. Such a scenario was called Medium Realistic Scenario (MRS). Besides these three options, other three scenarios were considered (A, B and C), stipulated in the Energy Strategy of the Republic of Moldova until the year of 2020 (adopted through the Government Resolution No. 958 as of 21.08.2007) (Table 5-3).

Table 5-3: Electrical Power Sources Development Scenarios in the Republic of Moldova

Scenarios	Characteristics of scenarios
BLS (Baseline Scenario)	BLS Scenario serves as a benchmark for comparison with all other scenarios. It implies a partial improvement of the cost-effectiveness of the local power plants CHP-1, CHP-2, CHP-North, without building new power plants, except setting into operation the Combined Heat and Power Plant in Ocnita (CHPO), which is to become operational in 2009. Increased demands shall be covered from import.
HAS (High Alternative Scenario)	HAS Scenario represents a mixed option combining the option to cover the demand exclusively from own sources of energy, and the option to cover the demand exclusively from import.
MRS (Medium Realistic Scenario)	MRS is an intermediary option between the BLS and HAS. It implies setting into operation less costly power plants (with the same capacity and in the same timeline as in the HAS), but with a lower efficiency, approximately 42%. This scenario is quite realistic, as it suits putting into operation of gas turbine installation groups, replacing the combined cycle type units.
Scenario A (from the Energy Strategy of the RM)	Scenario A implies maintaining the existent capacities of the local power plants during the entire period of assessment, and concomitantly building mini-CPH with distributed generation, with a total installed capacity of 179 MW by 2020.
Scenario B (from the Energy Strategy of the RM)	Scenario B implies maintaining the existent capacities of the local power plants during the entire period of assessment, building mini-CPH with distributed generation, with a total installed capacity of 179 MW by 2020, and extension of CHP-1, CHP-2 and CHP-North with 296 MW installed capacity by 2020.
Scenario C (from the Energy Strategy of the RM)	Scenario C implies maintaining the existent capacities of the plants during the entire period of assessment, building mini-CPH with distributed generation with a total installed capacity of 179 MW by 2020, and a more intensive extension of CHP-1, CHP-2 and CHP-North by 2020.

I.A.2 Results of the Technical-Economical Evaluation

The Energy and Power Evaluation Program (ENPEP), developed by the International Agency for Atomic Energy (IAAE) was used as an assessment tool for the Electrical Power Sector of the Republic of Moldova (MTPP was assessed separately). It allows carry out a wide range of calculations required to assess the abatement potential in the complex context of rehabilitation, upgrading and construction of new power plants. The Wien Automatic System Planning (WASP) model, which is an integral part of the ENPEP, allows select in an optimal way the power generation sources which need to be build or upgraded over the proposed period of time. The results of this assessment can be automatically transferred into the IMPACTS model of the ENPEP, designed to estimate the pollutant emissions of the power plants selected under the WASP model.

The estimates were based on the forecast of the long-term electricity demand which was done starting from the following considerations: the economic growth rate, including the Gross Domestic Product growth rate; the trend in electricity consumption in the past years; reduced energy losses in the transportation and distribution, including decreased unaccounted energy consumption; increasingly growing load factor of the system as a result of a more efficient energy consumption and increased demand for energy in summer due to extensive use of air conditioners; use in the nearest future of zone and binomial tariffs, all focused on countervailing consumption load curve.

The forecast of the load curve was developed as a result of analysis of the load curves of the electrical power system of the Republic of Moldova in the past years (except the administrative-territorial units on the left bank of the Dniester river) and other parameters allowing to increase the load factor (Table 5-4).

The assessment took into account the technical-economic features of the current energy system, as well as the fact that power reserve will fall into the limits of 10-40 percent; the updating rate will be 10 percent annually; the cassation plans for the existing power plants will be accomplished and new interconnection lines with the energy systems of the neighbouring countries will be put into operation. The assessment covered the period of time from 2005 through 2033. The projections regarding the evolution of fuel prices, in particular for natural gas, are in conformity with the principles set forth in the Contract for natural gas supply from the Russian Federation to the Republic of Moldova.

The import of electricity was set at 5-7 percent level under the scenario providing for covering the energy demand from own sources; at 50 percent level under the HAS scenario, and for the option implying only import, this level is set by the WASP model as a result of implementing the BLS. In this case the import level exceeds 70-80 percent, increasing by the end of the proposed period of time. Three estimates were made for a range of imported electricity price values: 4, 5, 6 and 7 cents/kWh.

Table 5-4: The Forecast of the Electricity Load in the Republic of Moldova (Right Bank of the Dniester River)

Year	Maximal Power, MW	Minimal Power, MW	Energy Demand, mil. kWh	Increase of Energy Demand, %	Load Factor, %
2005	751	233	3464		52.7
2006	776	241	3661	5.7	53.9
2007	793	240	3771	3.0	54.3
2008	812	249	3925	4.1	55.2
2009	832	255	4086	4.1	56.1
2010	853	263	4254	4.1	56.9
2011	871	267	4424	4.0	58.0
2012	889	272	4597	3.9	59.0
2013	915	276	4771	3.8	59.5
2014	945	283	4948	3.7	59.8
2015	975	288	5126	3.6	60.0
2016	1006	297	5310	3.6	60.3
2017	1040	305	5502	3.6	60.4
2018	1062	317	5700	3.6	61.3
2019	1098	324	5899	3.5	61.3
2020	1140	334	6106	3.5	61.1
2021	1177	344	6319	3.5	61.3
2022	1212	348	6541	3.5	61.6
2023	1241	362	6763	3.4	62.2
2024	1276	374	6979	3.2	62.4
2025	1310	385	7189	3.0	62.7
2026	1342	394	7368	2.5	62.7
2027	1372	410	7538	2.3	62.7
2028	1405	421	7711	2.3	62.7
2029	1436	429	7889	2.3	62.7
2030	1472	435	8070	2.3	62.6
2031	1505	440	8252	2.3	62.6
2032	1540	449	8445	2.3	62.6
2033	1575	458	8640	2.3	62.6

The assessment focused on modern electric power generation plants considered to employ state-of-the-art technologies in this field. All the above-mentioned scenarios include the estimated results in terms of the total discounted costs, the energy demand structure covered by such costs, the investments needed to implement the scenarios, the costs needed to be incurred over the period covered by the assessment for purchasing of fuel.

This information is provided in Table 5-5, as well as in Figures 5-1, 5-2, 5-3. The analysis of the information above allows to conclude that from the economical point of view HAS is the most costly scenario, however, it provides for the highest degree of energy security. On the other side, the lowest total discounted costs, and the smallest investments are implied under the BLS scenario, however, it provides for a lower energy security (energy import in the total demand reaching 83 percent by 2033).

Table 5-5: The Structure of Energy Produced and Consumed under the Scenarios of Electrical Power Source Development in the RM (Right Bank of the Dniester River)

Indicator	Scenario	MU	2007	2010	2015	2020	2025	2033
Maximal Power Demand		MW	793	853	975	1140	1310	1575
Consumed Energy		GWh	3771	4254	5126	6106	7189	8640
Imported Energy	HAS	GWh	2771	3238	2980	2583	3603	3986
		% of the total	73	76	58	42	50	46
	BLS	GWh	2771	3501	4315	5020	6102	7553
		% of the total	73	82	84	82	85	87
	MRS	GWh	2771	3238	2754	2392	3446	4171
		% of the total	73	76	54	39	48	48
	A	GWh	2771	3030	3869	4258	5341	6793
		% of the total	73	71	75	70	74	79
	B	GWh	2771	3030	3477	3866	4652	6103
		% of the total	73	71	68	63	65	71
	C	GWh	2771	2882	3220	2606	3664	5107
		% of the total	73	68	63	43	51	59
Energy produced from natural gas consumption	HAS	GWh	925	940	2065	3448	3510	4577
		% of the total	25	22	40	56	49	53
	BLS	GWh	925	678	736	1012	1012	1012
		% of the total	25	16	14	17	14	12
	MRS	GWh	925	940	2263	3606	3635	4361
		% of the total	25	22	44	59	51	50
	A	GWh	925	1148	1181	1772	1772	1773
		% of the total	25	27	23	29	25	21
	B	GWh	925	1148	1541	2132	2428	2428
		% of the total	25	27	30	35	34	28
	C	GWh	925	1297	1831	3425	3451	3458
		% of the total	25	30	36	56	48	40

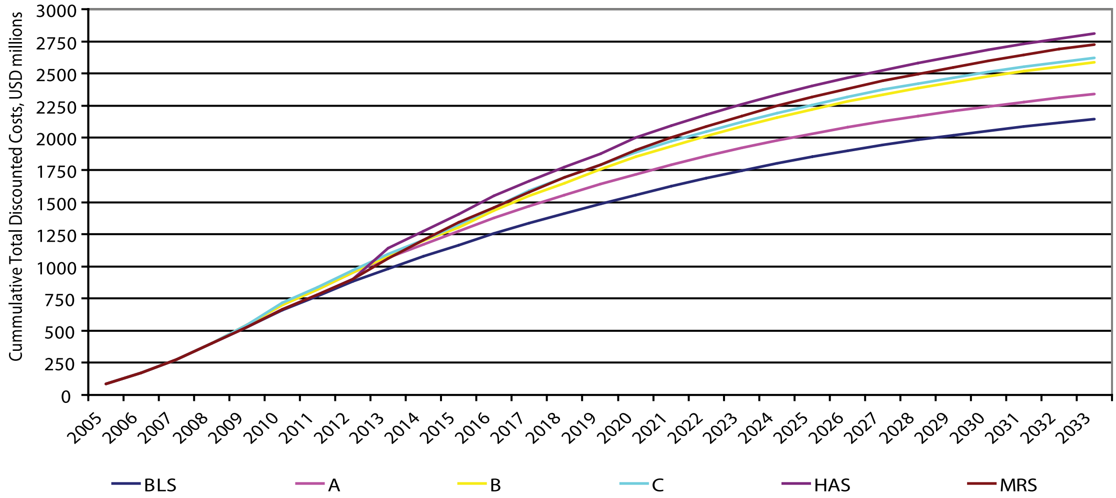


Figure 5-1: Cumulative Total Discounted Costs (in USD millions), 2005-2033

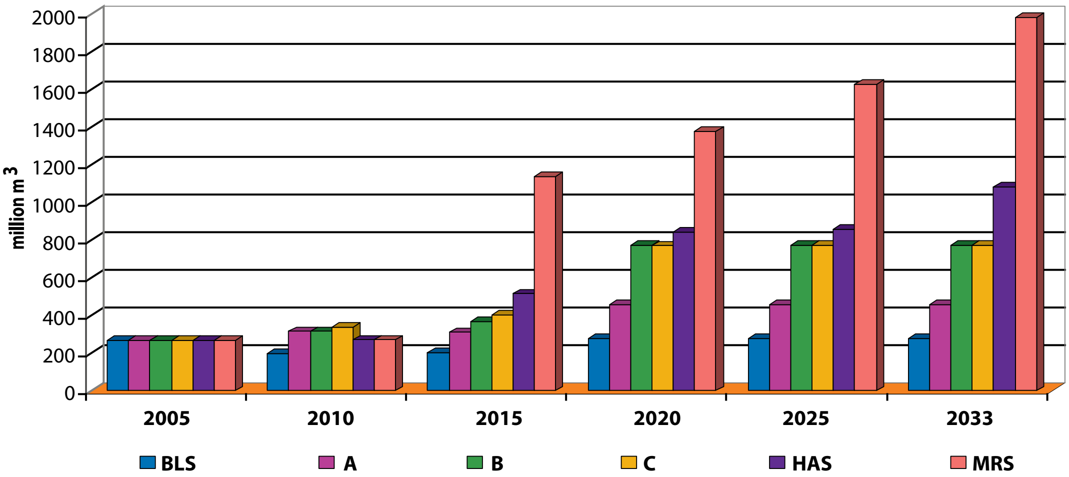


Figure 5-2: Natural Gas Consumption (in million m³), 2005-2033

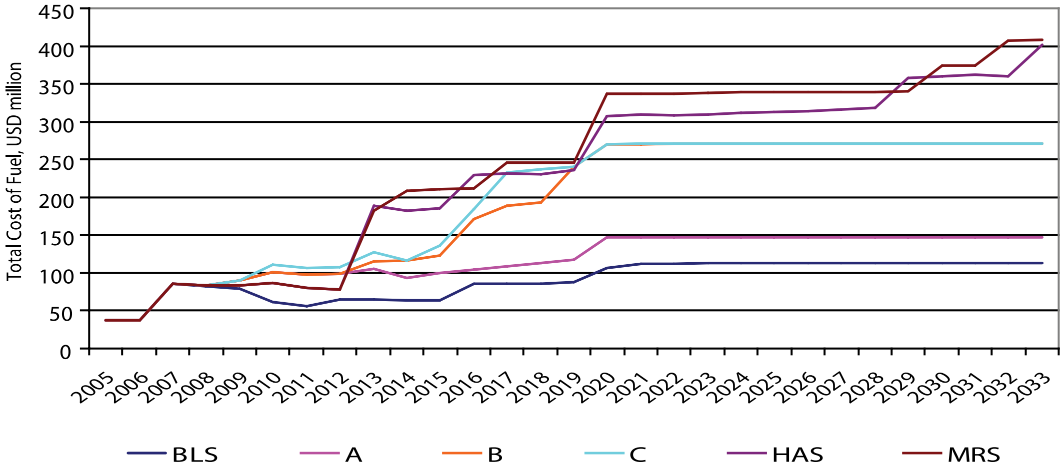


Figure 5-3: Total Cost (in USD millions) of Fuels Used to Produce Electricity

The following aspects can be distinguished from the information presented above: the higher is the efficiency of rehabilitations and new groups, the larger are the investments.

I.A.3 Assessment of the Abatement Potential

After having examined the six scenarios of the electrical power source development from the economical and energy security point of view, the same scenarios were assessed from the GHG emissions point of view. Using the estimations made for the six scenarios through applying the IMPACTS model, the GHG emissions, expressed in CO_2 eq., were estimated by using the methodological approaches and emission factors available in the IPCC Guidelines (1997, 2000). Figure 5-4 presents the GHG emission projections over the proposed assessment period. Except for some years, the minimal level of emissions can be noted under the BLS, while the maximal level – under the MRS. This, however, does not mean that the BLS is the best in terms of the GHG emissions prospective, because the share of energy imports needed to cover the demand under this scenario is quite high, what, in fact, is true for all scenarios. Emissions from imported energy are not accounted on the territory of the country but attributed to the exporting country.

Under these circumstances, in order to identify the most reasonable solution regarding abatement potential, it is necessary to compare the Specific Emissions Values (SEV) per kWh of energy produced by the local power plants (Figure 5-5).

Figure 5-5 shows that the best scenario in terms of GHG emissions abatement perspective, is the HAS. This scenario is also the most reasonable from the energy security perspective, but it is the most costly. The BLS implies the least costs, but it is also the least advantageous in terms of GHG emissions abatement, and the country's energy security. Other scenarios have intermediary positions.

As it has been mentioned above, comparing absolute values of emissions in different scenarios does not allow determine the difference in GHG emissions mitigation levels (R_{GHG}) under different scenarios due to the difference in the amount of energy produced by the local power plants. For this reason it has been decided that GHG emissions mitigation potential under the alternative versus baseline scenarios shall be determined using the following formula:

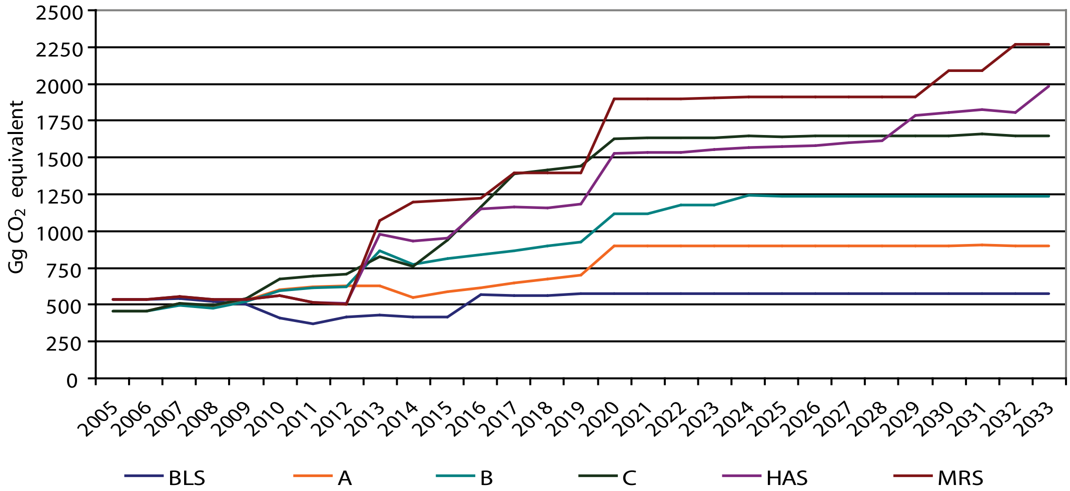


Figure 5-4: GHG Emission Projections (in Gg CO_2 eq.) under the Electrical Power Source Development Scenarios in the RM (Right Bank of the Dniester River), 2005-2033

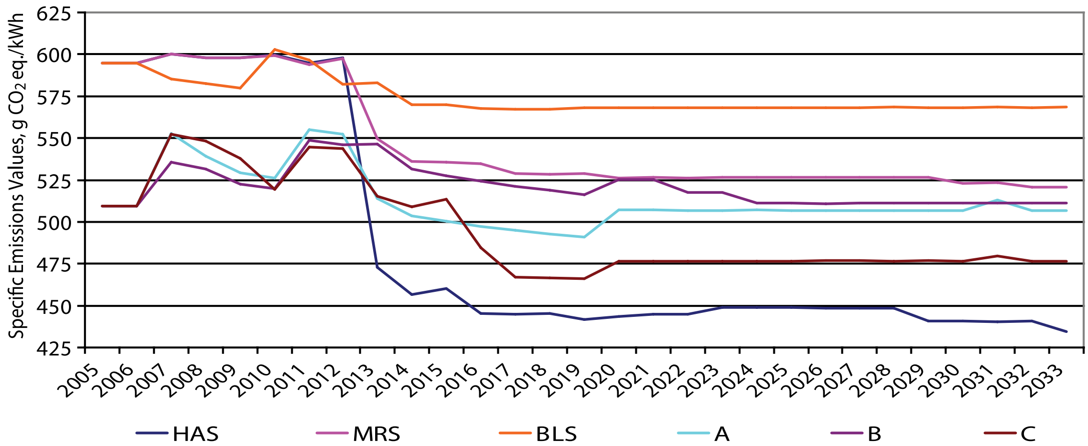


Figure 5-5: Specific Emissions Values (in g CO2 eq./kWh) for the Electricity Produced by the Local Power Plants in the RM (Right Bank of the Dniester River), 2005-2033

$R_{GHG} = (SEV_{BLS} - SEV_x) \bullet E_{px}$,

Where,

SEV_{SLB} = specific emission values for the baseline scenario;

SEV_x = specific emission values for the *x* scenario;

E_{px} = energy produced by local power plants under the *x* scenario.

The SEV_{BLS}, SEV_x, E_{px} values, as wells as the R_{GHG} calculation results are provided below (Table 5-6). One can see that the most significant GHG mitigation is implied under the HAS – 8.3 Tg CO_2 eq., followed by Scenario C – 6.2 Tg CO_2 eq., MRS – 2.7 Tg CO_2 eq., scenario B – 2.6 Tg CO_2 eq., and scenario A – 2.4 Tg CO_2 eq.

In tackling the issue of abatement potential the case of the Republic of Moldova is a special one. Under the traditional concept, the abatement potential is estimated by comparing the amount of greenhouse gas emissions (in CO_2 eq.) under the alternative scenario to the amount of greenhouse gas emissions (in CO_2 eq.) under the base line scenario. Given the fact that currently the Republic of Moldova imports quite a significant amount of electricity (circa 70% of the total demand) and the policy of massive electricity import is not likely to change in the future, as emphasised in the Energy Strategy of the Republic of Moldova until the year of 2020, and electricity import, in conformity with the methodological approaches used under the UNFCCC, does not mean CO_2 emissions in the importing country, the electrical power sources development scenarios used in current assessment (including the BLS), can not be compared to each other by the amount of GHG emissions, because the amount of electricity produced in the country is different in different scenarios. This leads to the fact that the BLS used in current assessment shows the smallest amount of GHG emissions, which is against the common judgement. In other words, it is expected that this scenario implies the biggest, and not the lowest amount of GHG emissions, given the fact that it implies a lower rated energy generation capacity than in other scenarios under consideration.

Table 5-6: Abatement Potential Estimated under the Six Power Sector Development Scenarios in the Republic of Moldova (Right Bank of the Dniester River)

Parameters	Measure Units	Scenarios					
		HAS	MRS	BLS	A	B	C
Total Discounted Costs (TDC)	USD mil.	2811	2727	2143	2338	2585	2620
Total Investments (Non-Discounted) (TI)	USD mil.	797	422	268	457	686	686
Total Energy Produced by Local Power Plants within the 2005-2033 time series	GWh	76387	76824	26893	41699	52521	73196
Amount of Natural Gas Consumed	mil. m^3	1083	1981	282	457	774	774
Amount of Residual Fuel Oil Consumed	thous. tons	616	616	616	616	616	616
Cost of Fuel (Non-Discounted)	USD mil.	6708	7074	2622	3431	5576	5730
GHG Emissions (Emission Volumes) (EV)	Tg CO_2 eq.	35.1	41.0	15.4	21.3	27.3	35.5
Index: EV/ TI	kg/ USD	44.1	97.2	57.6	46.7	39.7	51.7
Index: EV / TDC	kg/ USD	12.5	15.0	7.2	9.1	10.5	13.5
Specific Emission Values (SEV)	g CO_2 eq/kWh	460.1	533.6	569.1	510.8	518.7	484.8
Difference: D = SEV_{BLS} - SEVx	g CO_2 eq/kWh	109.1	35.5	0.0	58.3	50.4	84.4
Abatement Potential for the Electrical Power Sector in the RM (Right Bank of Dniester)	Tg CO_2 eq.	8.3	2.7	0.0	2.4	2.6	6.2

To overcome this situation, it was proposed that under the proposed energy sources development scenarios to estimate the abatement potential by applying a specific abatement index, based on the amount of direct GHG emissions per 1 kWh produced by local electrical power generation plants.

Under this approach, the amount of electrical power produced by the local power plants of each of scenarios seems to be the same as the amount of energy produced under the baseline scenario, chosen for comparison.

This approach allowed obtains the following mitigation potential values for the proposed scenarios, in comparison with the baseline scenario: HAS – GHG reductions by 8.3 Tg CO_2 eq.; C Scenario – GHG reductions by 6.2 Tg CO_2 eq.; MRS – GHG reductions by 2.7 Tg CO_2 eq.; B Scenario – GHG reductions by 2.6 Tg CO_2 eq.; A Scenario – GHG reductions by 2.4 Tg CO_2 eq.

It should be mentioned that A, B, C scenarios imply putting into operation co-generation power plants of a significant installed capacity (179 MW), which is unlikely to be implemented due to a long term lack of the thermal load during the year, what requires very careful consideration for these scenarios.

From the point of view of the level of emissions per one USD, HAS is preferable to other electrical power sources development scenarios in the Republic of Moldova, provided the low likelihood of availability of an adequate thermal load in the country that could justify electrical power plants with distributed co-generation, is taken into account.

If such load existed, in view of building a total capacity of 179 MW, then according to the „lowest emissions per 1 USD" criterion preference would be given to *Scenario B* of the Energy Strategy of the Republic of Moldova until the year of 2020. So, *Scenario B* accumulates 39.7 kg CO_2/USD, while HAS – 44.1 kg CO_2/USD, the least advantageous being MRS with 97.2 kg CO_2/USD.

HAS is preferable both by „mitigation potential" criterion, and "the least GHG emissions per 1 USD invested" criterion. It is also the most attractive from the energy security perspective, but not from the perspective of the price of the produced electric energy. For example, if the average price of the imported electric power is 50 USD/MWh, then the average up discounted electrical power generation price for the entire period of the assessment under the HAS would be 69.2 USD/MWh, and under the MRS – 63.9 USD/MWh.

Also, promoting any of the electrical power sources development scenarios in the Republic of Moldova has to take into account the population's capacity to pay a higher tariff for the supplied electric power.

I.A.4 Identified Constraints for Implementation Mitigation Measures in the Electrical Power Sector (Right Bank of the Dniester River)

The assessment showed that due to (i) poor payment capacity of the consumers in the Republic of Moldova; (ii) a relatively high investment risk in the country, as well as lack of interest to build electric power stations on a free electrical power production market, (iii) availability of electrical power generation sources (Ukraine, MTPP) at a much lower price than the one from a newly built plant, the investors' interest in construction of new plants in the Republic of Moldova (Right Bank of the Dniester River) is rather limited. Another major impediment is the problem of tariffs that need to be urgently solved, because the current tariffs do not stimulate the attraction of investments in energy production.

The tariffs for the electrical power need to be urgently adjusted to the real production costs (including depreciation of investments as if made for a new a plant). Thus the electrical power generation market could become attractive for investors, while construction of new plans and rehabilitation and upgrading of the old ones would add to the energy security of the country. In fact at least six projects for construction of electrical power generation plants were announced and even initiated in diverse regions of the Republic of Moldova in the past seven years. None of these projects has been implemented. One of the factors that blocked the projects implementation was the low tariffs, because some investors, as a project implementation precondition, required that the Government has to commit to buy the produced electrical power at a price that had to be set from the very start, that would include all production costs plus the possibility to pay back the investment within 7-10 years.

All the above said imply that the amount of the GHG emissions from the Electrical Power Sector of the Republic of Moldova (Right Bank of the Dniester River) will be determined, for at least five year period, by the currently existing electric power sources, and at a level not higher than in present. At the same time, taking into account that the share of import in the covering of electrical power demand is quite big (circa 70% of the total), the country needs to develop alternative sources development scenarios, that would lessen this dependence, and in a more favourable market conditions, would allow their gradual implementation.

As the assessment showed, the best scenario, from the mitigation potential perspective, is the HAS, followed by the C Scenario, MRS, B Scenario and A Scenario (from the Energy Strategy of the Republic of Moldova until the year of 2020). Other aspects (economical, energy security of the country, technical and others) will be also taken into account while choosing the scenario to be implemented.

The multitude of scenarios and existence of certain constraints confers a more general character to the „Action Plan on GHG Emissions Mitigation in Electrical and Thermal Power Sector for the period 2009-2013" (see Annex 2-1), and does not make it more specifically oriented towards a certain scenario. However, it shows quite certain the need and possibility to rehabilitate and upgrade the existing power plants.

I.B. Electrical Power Sector (Left Bank of the Dniester River)

There is only one Thermal Power Plant in the Energy System of the Republic of Moldova, located in Dnestrovsk town (ATULBD). By the end of 2003, the separatist administration (ATULBD) sold the Moldovan TPP (MTPP) to a Russian-Belgian Company *Saint Guidon Invest NV* for USD 29.5 millions. In March 2005, the affiliated company of the *Inter RAO EES*, and namely *RAO Nordic Oy* (Finland) bought 51 percent of the MTPP shares at USD 50 millions from the *Saint Guidon Invest NV*, and later in August the remaining 49 percent at USD 35 milions. In November 2005, *RAO Nordic Oy* sold 49 percent of the shares for USD 39.2 millions to *Freecom Trading Ltd.* (Cyprus). Finally, in July 2008, *Inter RAO EES* bought 100% of the shares of *Freecom Trading Ltd.* from the Hungarian *EMFESZ* for a total amount of USD 163 millions, thus acquiring 100 percent of shares of the MTPP.

The MTPP has an installed capacity of 2520 MW, and has eight energy condensation units with an electric power of 200 MW each on coal (set into operation in 1964-1971 with only five energy groups currently operational), two energy condensation units with an electric power of 210 MW each on residual fuel oil and natural gases (set into operation in 1973 and 1974, both operational), and two energy groups operation in a mixed gas-steam cycle on natural gas, with an installed power of 245 MW each (set into operation in 1980, both operational).

The technological processes employed at the MTPP are based on the classic cycle of the condensed steam turbines and imply fossil fuel combustion for electric power production, while thermal power production is just a secondary process. In conformity with the specific fuel consumption, the energy units of the MTPP of 200-210 MW (380-440 g c.e./kWh) are less efficient than the analogous plants in the world (e.g., the condensing energy units manufactured by Siemens, with an installed power of 450 MW, has a specific fuel consumption of as little as 254 g c.e./kWh).

It should be noted that employment of a combined cycle of the gas-steam turbine installation (GSTI) type, in comparison with the regular condensation units, assure a circa 20 percent fuel economy in the total fuel consumed for the unit, and can be rapidly put into operation at the maximal load time. The rated capacity of the gas-steam type plant used at the MTPP is 24.8 per cent, which is much less than the 42 percent in the modern gas turbines.

The electricity production at the MTPP has decreased by five times during 1990-2005 time series (Table 5-7). Respectively, the MTPP's efficiency in the past years also dropped considerably. If in 1970-1980 the average specific fuel consumption was less than 340 g c.e./kWh, then further, in particular in 1990-1997, this indicator varied between 370-470 g c.e./kWh. Following the conservation in 1999 of energy condensation units on coal and use of only energy condensation units on residual fuel oil and natural gas, and of the two energy units working in a mixed gas-steam cycle on natural gases, the specific fuel consumption has reduced to circa 360 g c.e./kWh in the past years.

Table 5-7: Energy Efficiency and Electricity Production at the MTPP, 1990-2005

	1990	1991	1992	1993	1994	1995	1996	1997
Fuel consumption, TJ	148508	132885	116170	94682	89948	60702	63170	45113
Fuel consumption, thou. t.c.e.	5067.9	4534.7	3964.3	3231.0	3069.5	2071.5	2155.7	1539.5
Electricity production, mil. kWh	13569.0	11222.0	9468.0	8626.0	6835.7	4746.9	4560.4	3628.5
Specific consumption, g.c.e./kWh	373.5	404.1	418.7	374.6	449.0	436.4	472.7	424.3
	1998	1999	2000	2001	2002	2003	2004	2005
Fuel consumption, TJ	34726	28388	26020	35553	31076	29503	30532	28529
Fuel consumption, thou. t.c.e.	1185.0	968.7	887.9	1213.2	1060.5	1006.8	1041.9	973.6
Electricity production, mil. kWh	3369.4	2687.5	2463.3	3365.8	2942.0	2793.1	2890.5	2700.9
Specific consumption, g.c.e./kWh	351.7	360.5	360.5	360.5	360.5	360.5	360.5	360.5

After the increase of the price of natural gas supplied by Russian Federation from 80 USD to 110 USD on 01.01.2006, and from 110 USD to 160 USD on 01.07.2006[2], the MTPP changed its tariff policy, increasing the price for the supplied electricity from 3.05 US ¢ to 4.08 US ¢. Under the circumstances, starting November 2005 the Republic of Moldova stopped buying electricity from the MTPP, switching over to a cheaper option to buy from Ukraine, at a price which varied in November 2005 – June 2007 between 2.5-2.8 US ¢ for 1 kWh (as per the contract dated 20.05.2006 between the Moldovan Company „ENERGOCOM" and the Ukrainian Company „UCRINTERENERGO", the average buying price for the electric power from Ukraine starting 01.07.2006 had to be no less than 3,1 US ¢ for 1 kWh, with further monthly increase with 0.1 US ¢ until it reaches the average sales price on the internal market of Ukraine[3]). Under the circumstances when there is no demand for load, during the period from 09.11.2005 until 11.01.2007 the MTPP employed only one energy unit with a mixed gas-steam cycle on natural gases.

To be noted that, the annual electricity consumption of the residential sector of the administrative-territorial units on the left bank of the Dniester River is circa 350 million kWh, another circa 1.4 billion kWh is the annual consumption of the Combined Metal Works in Ribnita (ATULBD). Over the period of time from 1995 to 2006, the annual production of electricity on the left bank of the Dniester River (MTPP in Dnestrovsk and HPP in Dubasari) varied between 1.7-5.0 billion kWh, of which circa 40-60 percent was supplied to the Republic of Moldova and/or exported to southern regions of Ukraine (Table 5-8).

In January-March 2007, the MTPP exported circa 211 million kWh of electricity in Belarus and Russian Federation, however, due to fact that Ukraine introducing increased fees for transit of electricity on its territory, export was re-oriented towards Romania. In July –December 2007, the MTPP exported circa 554 million kWh at an average price of 5.0 Euro ¢. Circa 900 million kWh of electricity were contracted and supplied to Romania in 2008.

In 2009 it is planned to increase supply of electricity to Romania by three times and with this in view, a scheme to exclude several energy units of the MTPP from the energy system of the Republic of Moldova and connecting them to the energy system of Romania, is being currently implemented (Moldovan and Romanian energy systems are in different synchronisation zones; integral synchronization of the MTPP to the energy system of Romania requires a change of the plant generator rotation frequency). Energy export will be done through the interconnection electric lines of 110 kV and 400 kV of the MTPP (ATULBD) – Vulcanesti (Moldova), and Vulcanesti (Moldova) – Isaccea (Romania). Implementation of this scheme will allow to increase the deliveries of electricity to Romania (a component part of the zone 2 of the Union for Coordination of the Electricity Transport (UCET), on the territory of which it will be created by prior coordination with the UCET administration, a passive energy island – a delimited load node with no sources of generation, to which the MTPP will supply electricity through a radial connection system) up to 400 MW or 290 million kWh per month (circa 3.5 billion kWh per year).

The Russian Company *Inter RAO EES*' Strategy for year 2010 is to ensure conditions for the plant to operate at a capacity of at least 1,500 MW, assuring export of energy towards the Balkan countries exceeding 6.0 billion kWh per year. Aiming at implementation of the MTPP rehabilitation and upgrading plans, the Russian company intends to invest circa 160.8 million USD in the next five years, so as to make possible to increase in the long run electricity exports up to 10 billion kWh per year.

[2]The average annual sales price of natural gas in 2007 was 172 USD/1000 m^3, and in 2008 respectively, circa 238 USD/1000 m^3, including: 190.86 USD/1000 m^3 in the I quarter of the year, 216.6 USD/1000 m^3 in the II quarter, 253.0 USD/1000 m^3 in the III quarter, and 287.6 USD/1000 m^3 in the IV quarter.

[3]It should be noted that in conformity with recently concluded agreements between the Governments of the Republic of Moldova and Ukraine in May 2008 in Kiev, the average price for the electric power supplied from Ukraine starting 01.06.2008 was increased to 4.4 US ¢ for one kWh, with further increase to 7.5 US ¢ for one kWh by 01.07.2009. The price proposed to the Republic of Moldova by the MTPP in 2008 was 5.5 US ¢ for one kWh, however with no guarantees to ensure long term supplies at a stable price, in particular reasoning from the increasingly growing selling prices for natural gas supplied by the Russian Federation.

Table 5-8: Electricity Production on the territory of Administrative-Territorial Units on the Left Bank of the Dniester River, 1995-2006

	1995	1996	1997	1998	1999	2000
Electricity production, mil. kWh, including at:	4986.6	4839.8	3923.5	3593.4	2973.1	2720.0
HPP Dubasari, mil. kWh	239.7	279.4	295.0	224.0	285.6	256.7
MTPP in Dnestrovsk, mil. kWh	4746.9	4560.4	3628.5	3369.4	2687.5	2463.3
Electricity imported in ATULBD, mil. kWh	0.0	0.0	0.0	0.0	2.8	0.0
Electricity consumption in ATULBD, mil. kWh	2878.0	2589.4	2363.6	1928.8	2098.4	2100.0
Electricity exported from ATULBD, mil. kWh	2108.6	2250.4	1559.9	1664.6	877.5	620.0
	2001	2002	2003	2004	2005	2006
Electricity production, mil. kWh, including at:	3649.9	3228.5	3016.1	3156.6	2995.9	1674.8
HPP Dubasari, mil. kWh	284.1	286.5	223.0	266.1	295.0	275.0
MTPP in Dnestrovsk, mil. kWh	3365.8	2942.0	2793.1	2890.5	2700.9	1399.8
Electricity imported in ATULBD, mil. kWh	0.0	285.4	921.3	812.0	659.2	275.8
Electricity consumption in ATULBD, mil. kWh	2183.1	1899.2	2111.6	2124.3	2107.9	1898.9
Electricity exported from ATULBD, mil. kWh	1466.8	1614.7	1825.8	1844.3	1547.2	51.7

I.B.1 GHG Emissions Mitigation Scenarios

Based on the company's development strategy recently announced by the Russian Company *Inter RAO EES*, and plans to modernize and rehabilitate the MTPP in Dnestrovsk, three scenarios of the plant development until the year of 2030 were developed and assessed.

Baseline Scenario (BLS) – is an option allowing to moderately increasing electricity production at the MTPP: up to 5.2 billion kWh per year, by 2010; to 6.2 billion kWh per year, by 2015; to 7.2 billion kWh per year, by 2020; to 8.4 billion kWh per year by 2025, and up to 10.8 billion kWh per year by 2030. By 2030, it is planned to make operational 9 of the 12 energy groups of the MTPP (including the energy units 11 and 12 of 250 MW each, on natural gas, energy units 9 and 10 of 210 MW each, on residual fuel oil and natural gas, and five energy units on coal). By 2030, the main fuel consumed by the MTPP will be coal (51.3 percent of the total consumption) and natural gas (40.4 percent of the total), to a less extent – residual fuel oil (8.3 percent of the total). The BLS does not imply major investments in rehabilitation and modernization of the plant, so the specific fuel consumption would vary between 390.4 g.c.c /kWh and 383.8 g.c.c / kWh in the 2010-2030 time series.

High Alternative Scenario (HAS) – is an option allowing to significantly increase production of electricity at the MTPP: to 6.0 billion kWh per year by 2010, to 7.0 billion kWh per year by 2015, to 8.0 billion kWh per year by 2020, to 10.0 billion kWh per year by 2025, and up to 13.5 billion kWh per year by 2030. Starting 2020, all 12 energy groups of the MTPP will become operational. The main fuel consumed by the MTPP will be natural gas (50.4 percent of the total consumption), coal (26.3 percent of the total), and to a less extent residual fuel oil (23.3 percent of the total). HAS implies major investments in the plant rehabilitation and modernization, construction of new interconnection lines with the neighbouring countries energy systems, allowing to increase exports towards the Balkan countries, as well as to apply new effective GHG emissions abatement measures, and to use fuels with lower GHG emissions intensity (preponderantly natural gas and residual fuel oil, to a less extent coal), increase the primary energy resources conversion efficiency, increase the productive capacity of the energy groups (in particular, of the currently used gas-steam installations, from the current rated efficiency of circa 24.8 percent, to a minimum efficiency of 39 percent). Implementation of these measures would allow ensure the specific fuel consumption at generation, varying over the time period from 2010 to 2030, from 329.8 g.c.c/kWh to 305.6 g.c.c/kWh.

Intermediary Alternative Scenario (IAS) – is an option which is in the middle between the Baseline Scenario and the High Alternative Scenario, and allows to increase electricity production at the MTPP as follows: up to 5.6 billion kWh per year by 2010, to 6.6 billion kWh per year by 2015, to 7.6 billion kWh per year by 2020, to 9.2 billion kWh per year by 2025, and up to 12.2 billion kWh per year by 2030. By year 2030 it is expected to have operational 10 energy groups. The main fuels consumed by the MTPP will be natural gas (47.5 percent of the total consumption), coal (40.9 percent of the total), and to a less extent residual fuel oil (11.6 percent of the total). AIS implies moderate investments in the plant rehabilitation and modernization, construction of new interconnection lines with the neighbouring countries energy systems, as well as the opportunity to apply a minimum set of GHG emissions abatement measures, to use fuels with lower GHG emissions intensity, increase the primary energy resources conversion efficiency, increase the productive capacity of the energy groups (in particular, of the currently used gas-steam installations, from the current rated efficiency of circa 24.8 percent, to a minimum efficiency of 33 percent). Implementation of these measures would allow ensure the specific fuel consumption at generation, varying over the time period from 2010 to 2030, from 358.9 g.c.c./kWh to 339.1 g.c.c./kWh.

I.B.2 Results of the Technical-Economical Evaluation

The projections regarding electricity production at the MTPP, as well as the dynamics of total and specific energy consumptions at power generation for the three scenarios (BLS, HAS and IAS) are presented in Table 5-9. Under the BLS, the electricity production by the year of 2030 will increase by 300 percent versus the reference year 2005, under the High Alternative Scenario – by 400 percent, and under the Intermediary Alternative Scenario – by 352 percent.

Table 5-9: Projections regarding energy efficiency and electric power production at the MTPP under the scenarios considered covering the period of time from 2005 to 2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Total fuel consumption, TJ	28529	59497	70832	81531	94876	121475
Electricity production, million kWh	2701	5200	6200	7200	8400	10800
Specific fuel consumption, g.c.c. /kWh	360.5	390.4	389.9	386.4	385.4	383.8
High Alternative Scenario (HAS)						
Total fuel consumption, TJ	28529	57988	67938	77766	93944	120888
Electricity production, million kWh	2701	6000	7000	8000	10000	13500
Specific fuel consumption, g.c.c. /kWh	360.5	330.8	330.2	329.7	320.6	305.6
Intermediary Alternative Scenario (IAS)						
Total fuel consumption, TJ	28529	58889	69436	79518	94220	121240
Electricity production, million kWh	2701	5600	6600	7600	9200	12200
Specific fuel consumption, g.c.c. /kWh	360.5	359.9	358.0	357.0	349.5	339.1

Relative to the BLS, the planned rehabilitation and modernization of the plant, as well as the activities aimed to enhance the primary energy resources conversion efficiency and increase the productive capacity of the energy units, will allow, in case of the IAS, to reduce the specific fuel consumption at electric power generation to circa 11.6 percent by year 2030, and in case of the HAS, the projected reduction of specific fuel consumption will be even more vivid, of circa 20.4 percent.

I.B.3 Assessment of the Abatement Potential

GHG emissions were estimated by using the Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), and the results of the technical-economical evaluations, inclusive on the electricity production and fuel consumption at the MTPP for the period from 2005 to 2030, under the scenarios for consideration. The estimation methodologies and emission factors were taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006).

Table 5-10 shows the evolution of the GHG emissions from combustion of fossil fuels used to produce electricity at the MTPP (ATULBD) during the period from 2005 to 2030. As compared to the GHG emissions level reported for 2005, it is expected that by 2030 the direct GHG emissions will grow by circa 491 percent under the BLS, by 439 percent under the HAS, and by 464 percent under the IAS, inclusive as a result of significant increase of electricity production, which is expected to occur, as well as due to exports, in particular, to the Balkan countries (Romania, Bulgaria, Turkey). A significant increase of the total direct GHG emissions will also occur due to an increased share of fuels with higher content of carbon[4] in the structure of total fuel consumption at the MTPP.

Relative to the BLS, implementation of the planned mitigation measures will allow to reduce total direct GHG emissions from combustion of fossil fuels used to produce electricity at the MTPP by circa 8.8 percent under the HAS by the year of 2030, and respectively by circa 4.5 percent under the IAS (Figure 5-6).

The expected reduction is even more evident, if the specific emissions values implied under the proposed scenarios for the entire assessment time series are taken into consideration. So, in comparison with the BLS (876.2 g CO_2/kWh), the specific emissions values will drop by the year of 2030 by 15.4 percent under IAS (to 741.1 g CO_2/kWh), and by 27.0 percent under the HAS (to 639.3 g CO_2/kWh)[5].

[4]Average global emissions from electricity production from fossil fuels are as follows: coal – 978 g CO_2/kWh, residual fuel oil – 891 g CO_2/kWh, natural gas (combined cycle) – 427 g CO_2/kWh (Source: Révue Générale Nucléare, jan.-fev., 2000).

[5] For comparison purposes below are the specific emissions values features by the some countries in 2000: Great Britain – 527 g CO_2/kWh, Czech Republic – 561 g CO_2/kWh, Cyprus - 845 g CO_2/kWh, Estonia – 697 g CO_2/kWh, Germany – 496 g CO_2/kWh, Greece – 814 g CO_2/kWh, Ireland – 639 g CO_2/kWh, Italy - 504 g CO_2/kWh, Netherlands – 468 g CO_2/kWh, Poland – 672 g CO_2/kWh, Portugal – 539 g CO_2/kWh, USA – 606 g CO_2/kWh.

Table 5-10: Direct GHG Emissions from Combustion of Fossil Fuels Used to Produce Electricity at the MTPP under the Considered Scenarios, 2005-2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Total CO_2 emissions, Gg	1600.5	3998.9	4971.4	5883.7	7011.7	9428.1
Specific emission factor, g CO_2/kWh	592.6	769.0	801.8	817.2	834.7	873.0
Total direct GHG emissions, Gg CO_2 eq.	1602.0	4009.5	4986.2	5902.5	7035.3	9463.5
Specific emission factor, g CO_2 eq./kWh	593.1	771.0	804.2	819.8	837.5	876.2
High Alternative Scenario (HAS)						
Total CO_2 emissions, Gg	1600.5	3522.1	4263.7	5035.3	6324.5	8604.6
Specific emission factor, g CO_2/kWh	592.6	587.0	609.1	629.4	632.5	637.4
Total direct GHG emissions, Gg CO_2 eq.	1602.0	3527.8	4271.8	5046.3	6340.4	8630.2
Specific emission factor, g CO_2 eq./kWh	593.1	588.0	610.3	630.8	634.0	639.3
Intermediary Alternative Scenario (IAS)						
Total CO_2 emissions, Gg	1600.5	3741.8	4605.0	5400.7	6619.6	9010.7
Specific emission factor, g CO_2/kWh	592.6	668.2	697.7	710.6	719.5	738.6
Total direct GHG emissions, Gg CO_2 eq.	1602.0	3749.6	4616.3	5415.0	6639.0	9041.3
Specific emission factor, g CO_2 eq./kWh	593.1	669.6	699.4	712.5	721.6	741.1

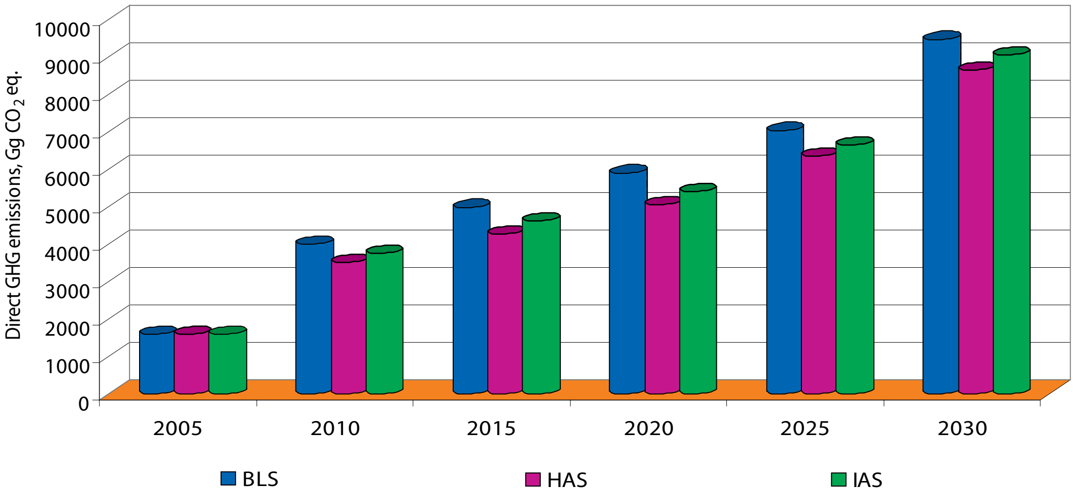


Figure 5-6: Direct GHG Emissions from Combustion of Fossil Fuels Used to Produce Electricity at the MTPP under the Considered Scenarios, 2005-2030

I.B.4 Identified Constraints for Implementation Mitigation Measures in the Electrical Power Sector (Left Bank of the Dniester River)

The assessment showed that due to (i) poor payment capacity of the consumers in the region (including in the ATULBD and the Republic of Moldova); (ii) political instability – as a result of the unresolved Transnistrian conflict and the afferent investments risks; (iii) availability of electric energy generation sources (Ukraine, Russian Federation) at a much lower price than from the MTPP, and (iv) a limited opportunity for electricity exports towards the Balkan countries (currently only 3 electric lines of 110 kV and one of 400 kV can be used to assure interconnection with the West), the electricity generation capacity at the MTPP could be limited.

Implementation of effective GHG mitigation measures such as: (a) increase the production capacity of the energy units; (b) increase the primary energy resources conversion efficiency at generation and transportation; (c) reduce costs and losses of energy in electric transport networks (including through rehabilitation and upgrading of existent systems to technically and scientifically more advanced level, as well as through streamlining and optimization of networks as a whole); (d) use of less GHG intensity fuels (natural gas and residual fuel oil rather than coal), etc. could be hampered by lack of major investments in the plant rehabilitation and modernization, and construction of new lines of interconnection with the energy systems of the neighbouring countries, what will impede implementation of the objective to increase electricity and generation and export capacities towards the Balkan countries.

In the context above, it should be noted that in June 2006 applications of the Republic of Moldova and Ukraine of accession to the Union for Coordination of the Electricity Transport (UCET) were accepted (the energy systems of these two countries work in parallel). Accession to UCET in fact means integration into the European Energy System. The advantages of accession to the European Energy System for the Republic of Moldova are: enhanced energy security of the country, bringing the local electric lines in line with the European standards, attracting foreign investments, etc. However, this is a long term process. The Ukrainian partners, for example, have initially announced that Ukraine, and respectively, the Republic of Moldova could integrate in the UCET in two-three years. This would require, as initially specified by them investments of circa Euro 2 billion. For the time being the Republic of Moldova did not estimate its separate costs for this process.

The *Energy Strategy of the Republic of Moldova until the year of 2020*, aligned to the European Union energy objectives, indicates year 2012 as a year for accession to the UCET. To achieve this target the country has to carry out a series of actions and make investments, in particular, in development of interconnections with the energy systems of the neighbouring countries. It will require investments of at least Euro 190 million that have to be attracted from private sources and external financing. Without all this the intention to integrate in the European Energy System will remain as a good idea only.

It is true that attempts are being made to attract funds from the international financial bodies, which however, trail. Active participation in the projects promoted by the European Commission could develop prerequisites for allocation of the funds so badly needed by this sector. For example, participation to the Energy Communion Treaty means that the country will take part in the development of the biggest energy market in the world. The Treaty provides, for the first time in history, for an integrated energy market legal framework. Besides, the Treaty allows put into motion circa USD 30 billion earmarked for the investments into the Electric Power Sector infrastructure, in view of meeting the EU targets by 2015. This money represents a support provided already by the World Bank and the European Bank for Reconstruction and Development.

I.C Thermal Power Sector

In the Republic of Moldova, the Thermal Power Sector is a significant generator of greenhouse gas emissions, what requires careful consideration of eventual mitigation measures. The main consumers of thermal power are residential sector (for heating, hot water and cooking), industry and agriculture sectors. The primary sources of energy used to produce thermal power are natural gas, oil products (residual fuel oil, oven fuel), coal, electricity, fuel wood, agricultural residues, solar energy and other energy sources.

I.C.1 GHG Emissions Mitigation Scenarios

Three scenarios of the Thermal Power Sector development for a period of time until the year of 2030 have been considered based on the macroeconomic indicators of the Republic of Moldova.

Baseline Scenario (BLS) – is an option implying a gradual decrease of the population number in the country until year of 2020 (by 0.5 percent annually), with a slight increase by the end of the assessment period. The GDP will grow by 6-7% annually at the beginning of the assessment period, and by 5-6% annually in the end. Consumption of energy was estimated based on the forecasts of the Ministry of Economy and Trade, extrapolation of data provided in the Statistical Yearbooks for 2000-2005, with consideration of trends revealed for those years. During the assessment period energy intensity will decrease from 1.23 kg c.e./USD in the reference year 2005, to 0.60 kg c.e./USD in 2030. Legislative and normative acts which became effective recently, technology and technique development trends in this field were also taken into account.

High Alternative Scenario (HAS) – was formulated based on the preceding scenario, but was supplemented with effective GHG emissions mitigation measures: decrease of thermal power consumption for heating by increasing thermal resistance of the buildings under construction and old ones; temperature control inside the buildings depending on the working hours; use of local controlled heating by radiation in big premises (sports grounds, entertainment halls, industrial shops and market houses) programmed for working hours; use of heating pumps, co-generation, solar energy and biomass, both in residential sector, as well as in the industrial and agricultural sectors.

Intermediary Alternative Scenario (IAS) – formulated by the same principles as the High Alternative Scenario, however, with a vision of continuous reduction of the population number, in conformity with the current trend.

I.C.2. Results of the Technical-Economical Evaluation

Evolution of total energy consumption, as well as the consumption distribution by primary sources for the three scenarios considered in the assessment is represented below (Table 5-11, Figure 5-7).

Table 5-11: Primary Resources for Thermal Power Production, under the Considered Scenarios for the period from 2005 to 2030, PJ

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Total Consumption	**57.33**	**60.29**	**65.66**	**71.15**	**75.85**	**81.03**
Natural gases	39.64	41.40	44.92	48.82	51.64	54.52
Liquefied Petroleum Gases	1.87	2.03	2.18	2.53	2.85	3.17
Oil Products	1.12	0.94	0.91	0.85	0.85	0.81
Coal	5.49	5.81	6.51	7.03	7.52	8.01
Fuel Wood and Agricultural Residues	8.49	9.07	9.76	10.29	10.94	11.66
Electricity	0.64	0.83	1.04	1.21	1.53	2.22
Solar Energy	0.10	0.19	0.31	0.42	0.54	0.69
High Alternative Scenario (HAS)						
Total Consumption	**57.33**	**57.68**	**62.09**	**66.19**	**69.93**	**74.48**
Natural gases	39.64	39.21	40.60	41.78	42.51	42.71
Liquefied Petroleum Gases	1.87	1.80	2.21	2.29	2.65	3.41
Oil Products	1.12	1.03	1.02	0.99	1.11	1.32
Coal	5.49	4.12	4.41	5.04	5.43	5.90
Fuel Wood and Agricultural Residues	8.49	9.90	11.42	13.04	14.66	16.88
Electricity	0.64	1.11	1.39	1.58	1.89	2.18
Solar Energy	0.10	0.90	1.63	2.45	3.19	3.85
Intermediary Alternative Scenario (IAS)						
Total Consumption	**57.33**	**56.50**	**60.82**	**65.23**	**68.72**	**72.61**
Natural gases	39.64	39.54	42.21	45.13	46.89	48.62
Liquefied Petroleum Gases	1.87	2.03	2.18	2.53	2.85	3.17
Oil Products	1.12	3.64	4.06	4.38	4.67	4.80
Coal	5.49	1.31	1.37	1.40	1.47	1.67
Fuel Wood and Agricultural Residues	8.49	9.04	9.71	10.23	10.85	11.55
Electricity	0.64	0.79	0.97	1.11	1.40	2.05
Solar Energy	0.10	0.19	0.32	0.43	0.56	0.71

In comparison with the reference year (2005), the total thermal power consumption will increase by the year of 2030, by 41.3 percent under the BLS, by 29.9 percent under the HAS, and by 26.7 percent under the IAS.

Also, Figure 5-8 graphically presents distribution of consumption by primary sources of energy in the 2005 and 2030 years. Three of the most important types of fuel are: natural gases, fuel wood and agricultural residues and coal. It is expected that the share of natural gases and coal will significantly decrease, while the share of fuel wood and agricultural residues will essentially increase. Share of renewable sources of energy (solar energy, heating pumps, biogas), under the HAS will amount to 5 percent of the total thermal power consumption.

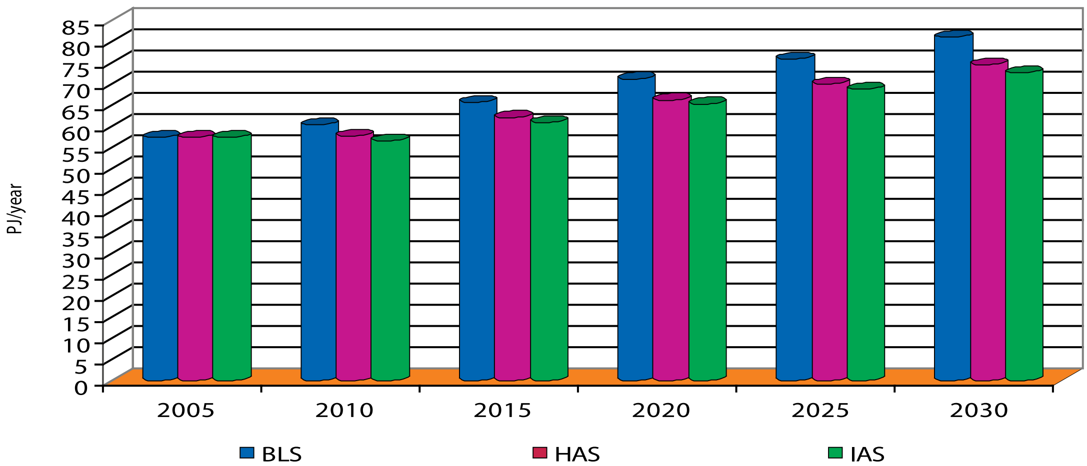


Figure 5-7: Thermal Power Consumption Increase under the Considered Scenarios

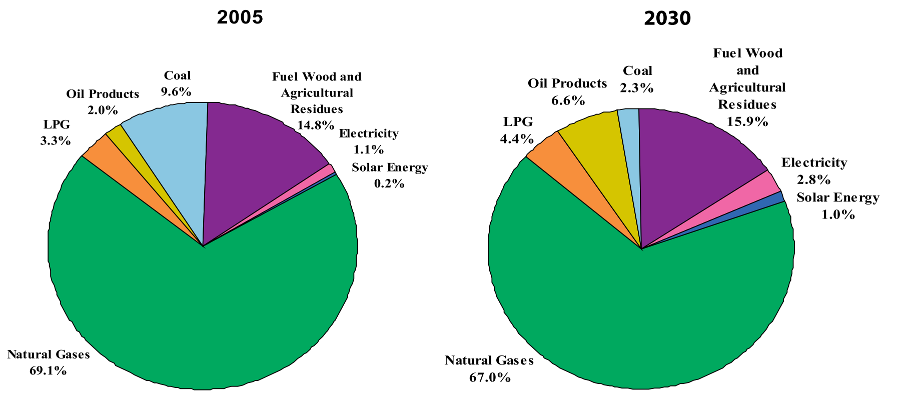


Figure 5-8: Share of different types of fuel in the total thermal power consumption structure in 2005 and 2030 under the High Alternative Scenario, % of the total

Figure 5-9 shows the estimates of fuel consumption by types of consumers, with din residential sector currently accounting for 80.3 percent of the total consumption of thermal power, industry accounting for 19.0 percent and agriculture for 0.7 percent.

During the assessment period, the consumption of thermal energy will grow for all types of consumers, however, to a different extent. So, in the residential sector it will increase, depending on the scenario, by circa 8.0-26.3 percent, while in industry and agriculture sectors, it will increase by two – three times. Energy consumed for heating of buildings, cooking the meals and water heating in households will vary, depending on the scenario, between 68.5 and 71.7 percent of the total (Table 5-12).

I.C.3 Assessment of the Abatement Potential

The abatement potential was estimated using the Long-range Energy Alternatives Planning System (LEAP) Software and the results of the technical-economical evaluations, inclusive activity data on thermal power consumption by types of primary sources. The emission factors used were taken from the IPCC Guidelines (IPCC, 1997, 2000). The obtained results are presented in Table 5-13.

Table 5-12: Thermal Power Consumption Structure by Types of Consumers under the Considered Scenarios for the period from 2005 to 2030, PJ

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Residential	46.0	47.3	50.7	53.9	56.0	58.1
Industry	10.9	12.5	14.4	16.5	19.0	21.8
Agriculture	0.4	0.5	0.6	0.7	0.9	1.1
Total	57.3	60.3	65.7	71.1	75.9	81.0
High Alternative Scenario (HAS)						
Residential	46.0	44.9	47.6	49.8	51.3	53.2
Industry	10.9	12.3	13.9	15.7	17.9	20.4
Agriculture	0.4	0.5	0.6	0.7	0.7	0.9
Total	57.3	57.7	62.1	66.2	69.9	74.5
Intermediary Alternative Scenario (IAS)						
Residential	46.0	43.5	45.8	48.0	48.8	49.7
Industry	10.9	12.5	14.4	16.5	19.0	21.8
Agriculture	0.4	0.5	0.6	0.7	0.9	1.1
Total	57.3	56.5	60.8	65.2	68.7	72.6

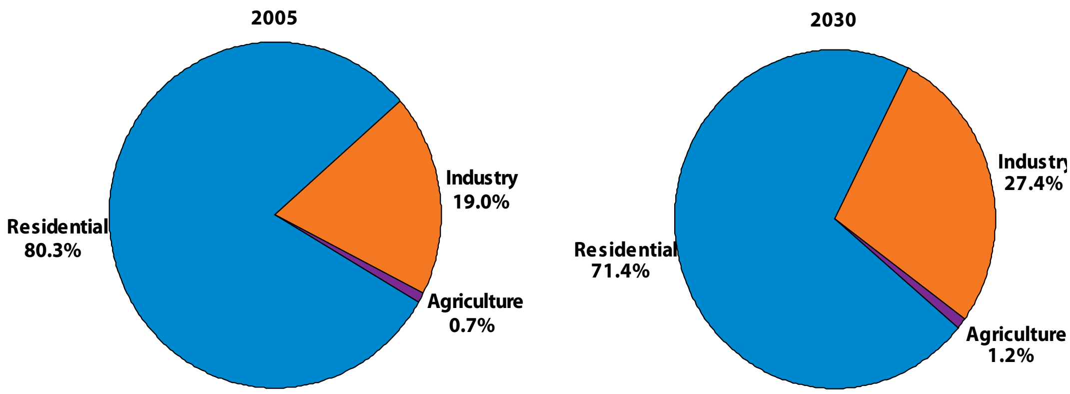


Figure 5-9: Breakdown of Different Types of Consumers in the Total Thermal Power Consumption Structure, % of the total

Table 5-13: GHG emissions from thermal power production under the assessed scenarios for the time period from 2005 to 2030, Gg CO_2 equivalent

Anii	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Natural Gases	2238.61	2337.90	2536.79	2757.40	2916.50	3079.04
LPG	122.32	132.68	142.46	165.49	186.49	207.22
Oil Products	82.24	68.99	66.84	62.52	62.52	59.44
Coal	464.19	491.18	550.39	593.98	635.85	677.21
Fuel Wood and Agricultural Residues	371.94	397.37	427.58	450.80	479.28	510.82
Electricity	136.91	177.56	222.45	258.80	327.25	474.86
Total GHG Emissions	3416.20	3605.68	3946.51	4288.99	4607.89	5008.59
Net GHG emissions	2907.35	3030.75	3296.48	3579.39	3801.36	4022.91
High Alternative Scenario (HAS)						
Natural Gases	2238.61	2214.40	2292.92	2359.70	2400.95	2412.00
LPG	122.32	117.71	144.48	149.66	173.26	223.00
Oil Products	82.24	75.77	74.84	72.69	81.62	97.02
Coal	464.19	348.27	372.79	426.04	458.99	498.80
Fuel Wood and Agricultural Residues	371.94	433.72	500.30	571.28	642.23	739.40
Electricity	136.91	237.39	297.30	337.95	404.25	466.30
Total GHG Emissions	3416.20	3427.26	3682.62	3917.33	4161.30	4436.52
Net GHG emissions	2907.35	2756.14	2885.02	3008.09	3114.81	3230.82
Intermediary Alternative Scenario (IAS)						
Natural Gases	2238.61	2232.94	2383.73	2549.10	2648.23	2745.86
LPG	122.32	132.68	142.46	165.48	186.49	207.22
Oil Products	82.24	267.65	298.45	321.86	343.42	352.97
Coal	464.19	110.72	115.92	117.91	124.35	165.96
Fuel Wood and Agricultural Residues	371.94	396.04	425.41	448.19	475.35	506.00
Electricity	136.91	168.94	207.44	237.39	299.45	438.44
Total GHG Emissions	3416.20	3308.97	3573.41	3839.93	4077.29	4416.44
Net GHG emissions	2907.35	2743.99	2940.57	3154.35	3302.49	3472.00

Figure 5-10 features the trends in GHG emissions from production of thermal energy in the Republic of Moldova under the considered scenarios for the assessment period (2005-2030). To be noted that the net GHG emissions do not include emissions from electricity production (the respective emissions were considered under the electrical power sector), as well as the CO_2 emissions from fuel wood and agricultural residues combustion (following the Revised 1996 IPCC Guidelines for the National Greenhouse Gas Inventories recommendations (IPCC, 1997), respective emissions are not included in the total national emissions, being reported for information under the 'Memo Items').

Relative to the reference year 2005, the net emissions will increase by 38.4 percent under the BLS, by 19.4 percent under the IAS, and by 11.1 percent under the HAS. Relative to the BLS, implementation of abatement measures allows, under the IAS to reduce GHG emissions by 13.7 percent by the year of 2030 (thermal consumption in the respective period will reduce by circa 10.1 percent); under the HAS, the implementation of abatement measures will allow to reduce GHG emissions relative to the BLS by circa 19.7 percent by the year of 2030 (thermal consumption in the respective period will reduce by circa 8.1 percent).

I.C.4 Cost of Mitigation Measures in the Thermal Power Sector

The performed assessment allowed the identification of the investments needed to implement mitigation measures within the Thermal Power Sector of the Republic of Moldova within the time period from 2010 to 2030.

The total costs of mitigation measures needed to be implemented was estimated at USD 3 billions: circa 36.4 percent of this amount will be needed to implement the projects on use of installations for direct conversion of solar energy; other 27.5 percent from this amount are earmarked for implementation of activities aiming at thermal power production from biomass combustion (of which: 17.4 percent of the total amount will be needed for biogas production installations and 10.1 percent for solid biomass processing installations); circa 7.0 percent of the total investments will be needed to implement the projects on use of heat pumps; approximately 1.3 percent for using co-generation installations and circa 0.3 percent for buildings insulation works (Table 5-14).

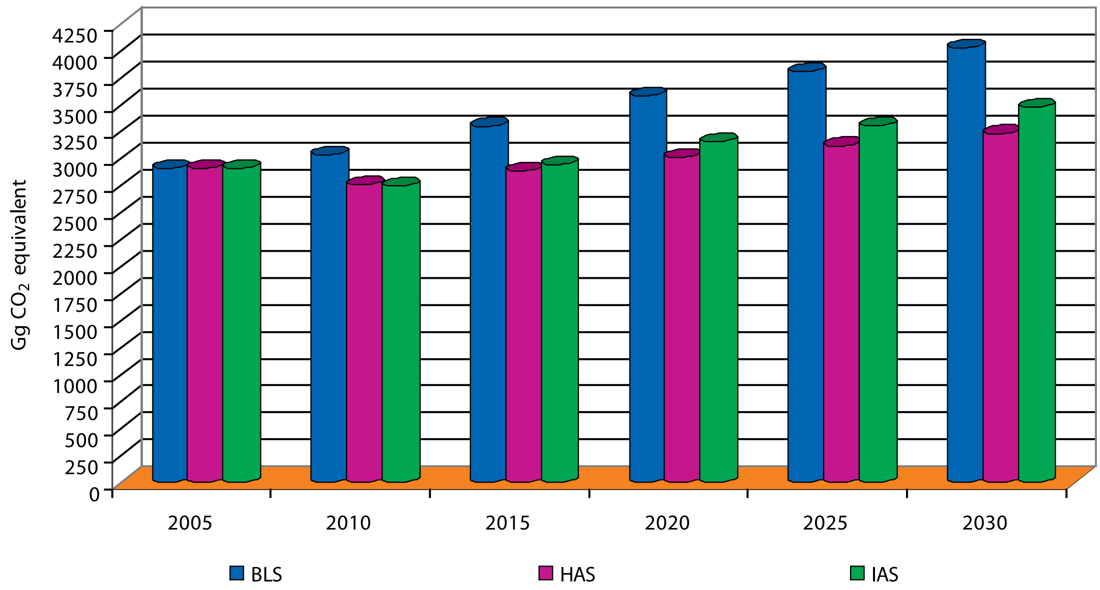


Figure 5-10: Net GHG Emissions from the Thermal Power Sector under the Considered Scenarios, 2005-2030

Table 5-14: Cost of Mitigation Measures (Investments Needed) in the Thermal Power Sector of the Republic of Moldova, USD million

		2010	2015	2020	2025	2030	Total
Buildings Insulation		1.0	1.6	0.7	2.7	1.7	7.6
Heat Pumps		18.6	32.6	32.6	55.7	66.8	206.3
Co-generation Installations		10.8	7.1	6.9	6.7	6.7	38.2
Installations for Direct Conversion of Solar Energy		185.6	200.7	187.3	162.6	343.2	1079.3
Biomass	Biogas	107.0	89.3	124.0	138.9	516.5	516.5
	Other Solid Biomass	32.4	47.6	80.0	130.4	300.2	300,2
	Sub-total	139.4	136.9	204.0	269.3	816.7	816.7
Total Investments Needed		350.1	520.6	501.3	635.6	957.0	2964.6

The efficiency of investments to be made for abatement measures within the Thermal Power Sector, can be considered by using the index of specific cost of the GHG emissions reduction (Table 5-15).

Table 5-15: Average Specific Emissions from the Thermal Power Sector of the Republic of Moldova, characteristic to the 2005-2030 period

Thermal Power Sector			Specific Emissions Values, Gg CO_2 eq./PJ		
Residential Sector	Urban buildings	Heating	66.3	66.9	66.7
		Hot water	68.1		
		Cooking	65.8		
	Rural buildings	Heating	17.4	25.4	25.4
		Hot water	66.6		
		Cooking	25.4		
Industry			69.7		
Agriculture			56.0		

The high cost of some abatement measures, in particular for rural buildings insulation works, is explained by the specific smaller insulation effect in a rural 1-2 storeys building, in comparison with an urban 5-20 storeys building. The relatively higher cost of the thermal power produced by heat pumps and as a result of co-generation is explained by the low annual use factor of the installed capacities of such installations. Another reason for the big costs variation are the different values for specific emissions values by consumption sectors (66.7 Gg CO_2 eq./PJ for urban buildings, 25.4 Gg CO_2 eq./PJ for rural buildings, 69.7 Gg CO_2 eq./PJ in the industrial sector, and 56.0 Gg CO_2 eq./PJ in agricultural sector) (Table 5-16).

In rural area, featuring a significant consumption of biomass and moderate specific GHG emissions, the abatement measures will have a smaller effect on the net GHG emissions. For the rural area the investments costs is bigger practically for all types of the proposed abatement measures, in particular, for the most costly, like heat pumps and biogas production installations. Larger specific investments for use of solar energy in agriculture is explained by the shorter lifetime of such installations (greenhouses, dryers) comparatively to solar water heaters (circa 15 years, versus 20 years). To be noted that use of biogas is the most costly measure, however, it should be taken into account that this measure minimises CH_4 and N_2O emissions from manure management.

Table 5-16: Investments Efficiency of Mitigation Measures within the Thermal Power Sector of the Republic of Moldova

Measures	Sector	Costs, USD /t GHG reduced
Buildings Insulation	Urban buildings	3.6
	Rural buildings	16.9
Use of Heat Pumps	Urban buildings	51.4
	Rural buildings	198.0
	Industrial sector	25.3
	Agriculture sector	31.5
Co-Generation Installations Use	Buildings	3.7
	Technological	1.9
Solar Energy Direct Conversion Installations Use	Urban buildings	9.1
	Rural buildings	9.3
	Industrial sector	8.9
	Agriculture sector	18.3
Solid Biomass Use	Urban buildings	12.0
	Rural buildings	6.5
Biogas Use	Urban buildings	149.9
	Rural buildings	393.7
	Industry sector	143.5
	Agriculture sector	178.6

I.C.5 Identified Constraints for Implementation Mitigation Measures in the Thermal Power Sector

a) Revision of Sector Policies

Starting from the fact that the Thermal Power Sector annually consumes circa 40 per cent of the total amount of energy resources consumed at the national level, the fuel consumption reduction potential, also meaning the GHG emissions abatement potential in this sector, is significant.

General measures on fuel consumption reduction and GHG emissions abatement include: continuous development of the sector legal framework; strengthening of the institutional sector framework; providing conditions to attract investments in the Thermal Power Sector; developing the State Program on Energy Market Liberalization; developing the draft Government Resolution on Divesting the Enterprises from the Thermal Power Sector; speeding up the re-organization of heat supply networks through de-monopolization and privatization; use of fuels with less GHG emissions intensity – total gasification of the country; elimination of discrepancies between the existing prices for energy resources for a more efficient use of the latter; stimulating competition on the market between energy products suppliers, including oil products and coal suppliers; diversification of sources and ways of energy resources import.

Diversification of sources and ways of energy resources import is the main factor in assuring the country's energy security, and at the same time provides favourable conditions for energy conservation and choosing fuels with less greenhouse gas emissions intensity. It should be noted that construction of the Giurgiulesti port designed for this purpose, was delayed over a number of years, inclusively as a result of unfavourable investment situation in the country, high level of corruption, resistance opposed by neighbouring countries (Ukraine and Romania), which have ports in close proximity (Reni, Ismail, Galati), etc. Among other barriers on the way of energy sources diversification are incomplete de-monopolization of the fuel supply complex and excessive reliance of the country on natural gas.

Technical measures aiming at mitigation of GHG emissions from heat supply sector, include: energy efficiency enhancing activities – energy conservation in all segments of the thermal power sector: production, transportation and consumption, as well as implementation of new energy efficient technologies; reconstruction of thermal power networks implementing advanced technologies, such as placing of pre-insulated pipes connected underground with no channel and, if possible, with no compensator, with a minimum number of wells; developing thermal power networks protection regulations; using local fuels, secondary energy resources, renewable energy sources (in particular biomass and solar energy), as well as industrial or domestic energy waste to produce heat.

The heat supply problem is one of the most complicated in the Republic of Moldova. Urban settlements have centralized heating systems, which in most cases are irrationally designed with reference both to heat sources, and network configuration. Co-generation sources exist only in big municipalities - Chisinau and Balti, however these are equipped with out-dated equipment, besides, they do not cover the urban areas completely. Thermal power plants were designed to use imported costly fuel, while local fuels were totally ignored. In most cases the thermal power plants were placed far away from the consumers load centre, what contributed to huge heat losses and excessive consumption of energy during transportation. Poor execution during construction, irresponsible operation and mismanagement caps it all. At present these flaws are enhanced by payment incapacity of a considerable part of consumers, politization of the problem due to its social aspect, economic interests of the companies installing autonomous heating systems, incompetence of decision makers, unfavourable investment climate in the country, etc. Such circumstances make the heat supply sector unattractive for investors and privatization attempts to fail. Financial penury does not provide for rehabilitation and streamlining of the heat supply system on the state's account. The impossibility to align tariffs to the actually incurred costs makes it difficult to rehabilitate and modernise the system on the account of the respective enterprises.

It should be noted that under current economic conditions financing of measures that do not entail material benefits in short term, is very difficult. However, as practice shows, the problem can be solved (the '*Extra-budgetary Fund for financ-*

ing activities aimed at establishing the normative framework for construction' was set up by the Ministry of Construction and Territorial Development; another way is being more insistent in seeking assistance from the European Community funds in this field, etc.).

b) Legal Framework Revision

Adoption of the legal framework on energy sector has been long delayed (the Law No. 1525-XIII as of 19.02.1998 on Energy, the Law No. 1136-XIV as of 13.07.2000 on Energy Conservation, the draft Law on Thermal Power is still under Parliament's consideration, incoming No. 4356 as of December 25, 2003, see Parliament Resolution No. 44-XV as of 26.02.2004 on the draft Law on Thermal Power).

The current legal framework on energy sector has a purely economic nature, being however targeted towards energy saving, contributes to lowering fuel consumption, and indirectly, to GHG emissions abatement.

These laws are focused on assuring adequate political, organizational and economic conditions for efficient use of energy resources during extraction, production, processing, storing, transportation, distribution and consumption, while limiting the monopolist activity and enhancing competition in energy sector.

The energy sector development conditions and measures to promote environment protection are stipulated in the Law No. 63-XIV as of December 23, 1998 regarding the Concept of divesting enterprises in the electric and thermal power sector, the Law No. 1103-XIV as of 30.06.2000 on Protecting Competition, the Law No. 982-XIV as of 11.05.2000 on Access to Information, etc. However, some measures stipulated in these laws pertaining to the thermal power sector received no attention in the regulatory and normative acts: support from the state, central and local public authorities to private initiatives in the Thermal Power Sector; regulation of monopolist activities and enhancing competition in the Thermal Power Sector; inviolability of investments made in the thermal power system; non-interference of central and local public authorities in the economic activity of thermal power production, transportation, distribution and supplying enterprises, except for cases expressly stated in current legislation; diversification of thermal power production sources and forms of ownership in the thermal power sector, etc.

In the heat supply sector, diversification of sources, if any at all, is made on the account of implementing autonomous heating systems based on the individual building or apartment thermal boilers. This trend is a positive step in comparison with the centralized systems which existed until present based on district or central thermal plants, however, still it is not in line with the modern trends of co-generation and tri-generation sources.

Co-generation systems on the basis of the CHPs with a mixed gas-steam cycle, with the electrical power of 50-500 MW, and thermal power in the same limit, and mini CHPs with gas turbines or piston engines, with electrical power ranging from 50 kW and 10 MW and thermal power of circa 2 times higher, allow for a 20-40 percent fuel savings in comparison to the separate production mode in the most performing modern systems. Tri-generation installations, which in addition to electric and thermal power, provide for production of cold for air conditioning and potable water cooling systems, offer a better product and save fuel.

The impediments on the way of co-generation implementation are the following: poor knowledge of the advantages by the decision makers; a relatively high cost of the respective equipment; financial penury in the country; unfavourable investment climate; access to a relatively cheap electric power market of Ukraine and Russian Federation, where the cost for fuel is incomparable lower than the local one; inadequate tariffs for thermal power; interference of central and local authorities in the economic activity of the energy enterprises; a strong lobby for the enterprises importing autonomous heating systems.

Interference of authorities in the economic activity of the energy enterprises poses a serious problem. Taking into account the current economic crisis and poverty, as well as the low culture of the political class, it is hardly possible to try to avoid this interference.

Regarding the competition in the Thermal Power Sector, it is necessary to mention that under current situation with inadequate tariffs for heat (these are far from covering the actual thermal power production costs), such competition is non-existent. It is difficult to overcome this situation, however, there are solutions and the process has already started. If the current prices for electricity (circa 5-7 US ¢ / kWh) and thermal power (circa 5 USD/GJ) in case of a big CHP (which works for the transportation and distribution networks, where the tariffs for energy increase by two times on the account of costs, losses, taxes, etc.) are inadmissible, then for an autonomous mini-CHP such prices are more than favourable. It should be noted that the current draft *Law on the Thermal Power* provides for diverse facilities for co-generation installations, which have to be more aggressively supported at the government level. The possible measures of financial nature that could later be reflected in sector legislation, are: (i) setting up the Energy Sector Development Fund; (ii) providing fiscal facilities to commercial banks and investment funds in the event of their participation to financing energy and environment protection focused projects; providing fiscal facilities and credits to companies which on their own account upgrade technologies aiming at reducing consumption of natural resources and environment protection, etc.

c) Revision of the Normative Framework

In the energy sector in general, and the thermal power sector in particular, initially the normative framework had been developed with the contribution of the Ministry of Energy, Ministry of Industry and Infrastructure, and more recently, after the National Agency of Energy Regulation (ANRE) has been established, with its contribution, too. The ANRE developed the Methodology for calculation, application and approval of tariffs for heat supply services (Apr. ANRE No. 147 as of 25.08.2004). However, excessive politization of the problem of tariffs for heat impedes the appropriate application of this methodology, in particularly in Chisinau municipality. The Ministry of Environment and Territorial Development issued the Order No. 423 as of 25.10.2000 introducing new specific norms for buildings providing for a minimum admissible value of the global resistance of partition-walls was raised from 0.66-1.18 m^2 K/W to 2.5-2.7 m^2 K/W, starting January 1, 1999. However, taking into account the long term of life of the buildings, and the fact that two thirds of the buildings were built after 1970, in order to save energy for heating in the short and medium term run it is necessary to improve the insulation of old buildings, in particular of those built in the '70-90 of the past century (over 50 percent of the existent housing stock). Also, it is necessary to develop standards regarding the limit of energy consumed to produce one unit of output in all branches of industry, for home appliances, etc.

II. Mobile Combustion

II.A Transport Sector

In 2007, energy resources consumption in the transport sector accounted for circa 25.7 percent of the total national energy consumption. This sector represent a significant source of GHG emissions.

The total energy consumption structure under the transport sector in 2007 can be broken down as follows: Diesel Oil accounted for circa 55.6 percent of the total, Gasoline – for 38.7 percent, jet fuel – for 2.7 percent, LPG – for 1.3 percent and LNG, respectively for circa 0.7 percent of the total. Diesel oil and Gasoline is preponderantly used in road transport, to a less extent LPG and LNG; Diesel Oil is preponderantly used in railway and navigation transport, while air transport mostly uses jet fuel (it should be noted that GHG emissions generated by the international bunkers are not included in the total national GHG emissions, but are reported under „Memo Items").

In 2007, circa 92 percent of the total energy consumption in the transport sector were used for road transportation; 5 percent - for railway transport, 2.4 percent - for air transportation, and as little as circa 0.02 percent for navigation.

II.A.1 GHG Emissions Mitigation Scenarios

Three long-term (until the year of 2030) scenarios for the Transport Sector development have been considered based on the macroeconomic indicators of the RM.

Baseline Scenario (*BLS*) – is an option implying gradual increase of the number of road and urban transport units, relative to the past years, a proportionate increase of cargo transport relative to the GDP growth. Relevant measures will also be taken to maintain the terrestrial and navigation transport infrastructure.

High Alternative Scenario (HAS) – was formulated based on the preceding scenario, supplemented with effective measures aimed to reduce fuel consumption and GHG emissions abatement, including: (a) optimize the cargo and passenger traffic; (b) rehabilitate and re-build roads and railways, implement measures stipulated in the *Strategy on the terrestrial transport infrastructure for years 2008-2017*, approved through the Government Resolution No. 85 as of 01.02.2008; (c) implement mandatory technical testing of all road vehicles and trails, in conformity with the Law No. 131-XVI as of 07.06.2007 on Road Traffic Safety ; (d) limit the effective life of the road vehicles at import (from 7 to 5 years for cars and from 10 to 7 for trucks and buses); (e) increase the share of road vehicles using LNG and LPG as fuel; (f) use of road vehicles operating on hydrogen and bio-fuel, other state-of-the-art technologies in transport sector; (g) develop public transport networks in the main cities of the country; (h) extend electric urban and interurban transport networks, etc.

Intermediary Alternative Scenario (IAS) – implies partial implementation of the National Transport System rehabilitation measures, specified in the High Alternative Scenario, assuming that economic impediments may occur on the way.

II.A.2 Fuel Consumption Forecast for the Transport Sector

Fuel consumption estimates for the assessment period were obtained by extrapolating the available statistical data for 2000-2006, taking into account the projections on the GDP and cargo and passenger growth rate.

Below are the projections on the dynamics of the number of road transport units in 2005-2030 (Figure 5-11, Table 5-17).

Relative to the BLS, the HAS implies a decrease in number of transport units by withdrawing old vehicles with high fuel consumption. Under the IAS, intermediate values of the two preceding scenarios were accepted. Under the BLS, the projections for 2005-2030 indicate an increase in number of road transport units by 127.1 percent, under the HAS – an increase by 60.7 percent, and under the IAS – an increase by 93.9 percent.

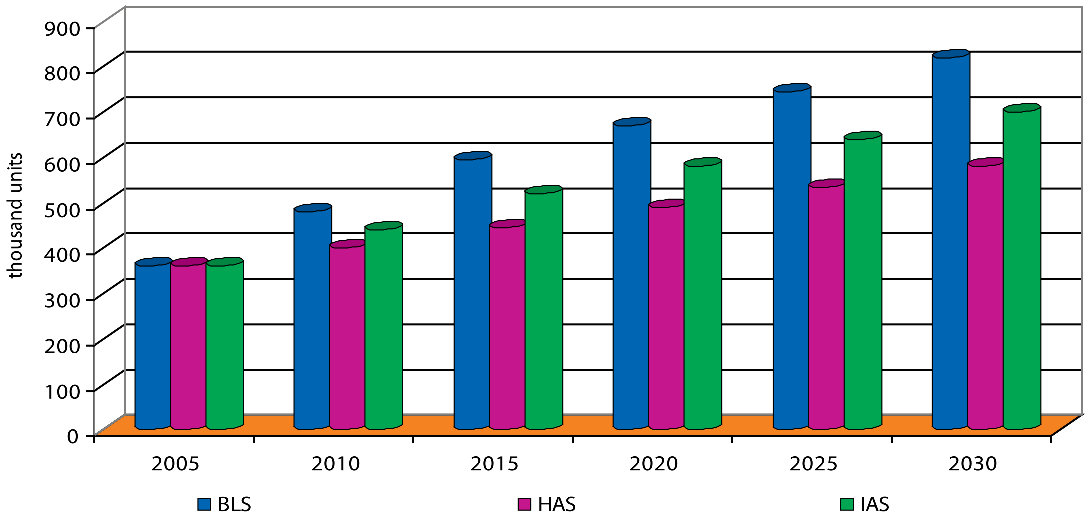


Figure 5-11: Road Transport Units Number under the Scenarios Considered for the Transport Sector within the 2005-2030 time series

Table 5-17: Dynamics of the Road Transport Units Number under the Scenarios Considered for the Transport Sector within the 2005-2030 time series, thousand units

Scenarios	2005	2010	2015	2020	2025	2030
BLS	361	480	595	670	745	820
HAS	361	400	445	490	535	580
IAS	361	440	520	580	640	700

The traffic demand will be covered due to a more efficient use of transport units and better logistics. The total length of the railways will not change essentially, however it is expected that passenger traffic will grow by circa 23 percent and the freight traffic will increase twofold through the use of railway transport.

Table 5-18: Fuel Consumption under the Scenarios Considered for the Transport Sector within the 2005-2030 time series, PJ

Scenarios	2005	2010	2015	2020	2025	2030
BLS	22.0	28.3	38.6	46.6	53.4	58.7
HAS	22.0	25.5	30.9	37.0	43.1	53.1
IAS	22.0	27.5	35.0	42.5	50.3	54.1

The dynamics of total fuel consumption in the transport sector is presented in the Table 5-18 and Figure 5-12. Thus, under the BLS the consumption of energy resources in 2005-2030 is expected to increase by circa 167.3 percent, under the HAS it will increase by 141.5 percent , while under the IAS – by 146.2 percent.

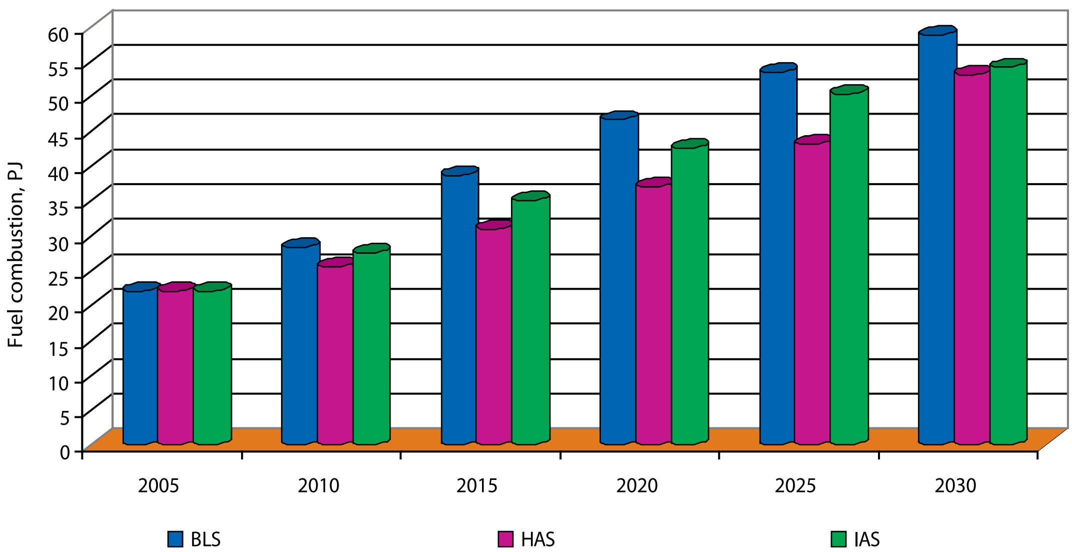


Figure 5-12: Fuel Consumption under the Scenarios Considered for the Transport Sector within the 2005-2030 time series, PJ

Table 5-19 features information regarding the structure of total fuel consumption (disaggregated by types of fuel) in the transport sector within the 2005-2030 time series.

Under the BLS, one can notice that relative to 2005, the share of Diesel Oil by 2030 will increase by circa 4.5 percent; while the share of other types of fuel in the total fuel consumption structure in transport sector will decrease (the share of gasoline will decrease by 2.2 percent; the share of LNG - by 2.0 percent, and of the LPG - by 0.1 percent).

Under the HAS, one can notice that relative to 2005 the share of Diesel Oil will decrease by circa 11.8 percent by 2030; the share of gasoline will decrease by circa 4.2 percent; the share of LNG will decrease by 1.3 percent, while the share of LPG will increase by 0.8 percent, and the percent hat is more than significant, the share of hydrogen and bio-fuel will grow (Figure 5-13). The trends revealed under the HAS, to a larger or smaller extent, are common for IAS as well.

II.A.3 Assessment of the Abatement Potential

The abatement potential was estimated using the Long-range Energy Alternatives Planning System (LEAP) Software and the results of the technical-economical evaluations, inclusive activity data on fuel consumption by types of fuel. The emission factors used were taken from the IPCC Guidelines (IPCC, 1997, 2000).

It should be noted that the total GHG emissions from transport sector do not include emissions from hydrogen and bio-fuel combustion (regarded as renewable sources), respectively, the GHG emissions from combustion of fuel used in international bunkers (following the Revised 1996 IPCC Guidelines for the National Greenhouse Gas Inventories recommendations (IPCC, 1997), respective emissions are not included in the total national emissions, being reported under the 'Memo Items').

Table 5-20 shows the dynamics of net GHG emissions from the transport sector in the RM under the scenarios considered for the assessment period.

Table 5-19: Fuel Consumption Disaggregated by Types of Fuel, under the Scenarios Considered for the Transport Sector within the 2005-2030 time series, PJ

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Diesel Oil	11.8	16.8	23.5	28.1	31.5	34.1
Gasoline	9.0	10.3	13.7	17.0	20.2	22.7
LNG	1.0	1.1	1.1	1.3	1.3	1.5
LPG	0.2	0.3	0.3	0.3	0.4	0.5
Hydrogen and Bio-fuel	0.0	0.0	0.0	0.0	0.0	0.0
Total Fuel Consumption	22.0	28.3	38.6	46.6	53.4	58.7
High Alternative Scenario (HAS)						
Diesel Oil	11.8	13.0	15.9	18.1	20.0	22.2
Gasoline	9.0	10.9	13.0	15.2	17.1	19.5
LNG	1.0	1.2	1.4	1.5	1.7	1.7
LPG	0.2	0.4	0.6	0.8	0.9	0.9
Hydrogen and Bio-fuel	0.0	0.0	0.0	1.5	3.5	8.8
Total Fuel Consumption	22.0	25.5	30.9	37.0	43.1	53.1
Intermediary Alternative Scenario (IAS)						
Diesel Oil	11.8	15.3	19.7	23.9	25.8	28.2
Gasoline	9.0	10.7	13.3	17.1	20.3	20.0
LNG	1.0	1.2	1.4	1.5	1.7	1.7
LPG	0.2	0.4	0.6	0.8	0.9	0.8
Hydrogen and Bio-fuel	0.0	0.0	0.0	0.1	1.7	3.4
Total Fuel Consumption	22.0	27.5	35.0	42.5	50.3	54.1

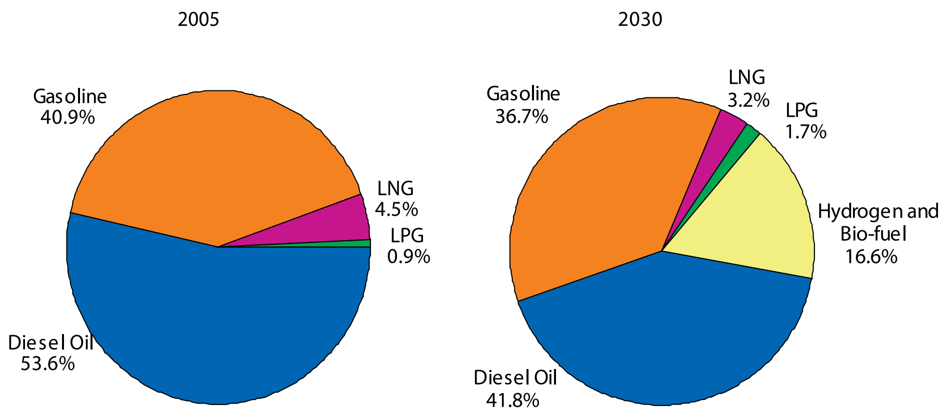


Figure 5-13: The Breakdown of Different Types of Fuel in the Total Fuel Consumption within the Transport Sector in 2005 and 2030 years (HAS), % of the total

Table 5-20: GHG Emissions from Fuel Combustion in the Transport Sector under the Scenarios Considered for the 2005-2030 time series, Gg CO_2 equivalent

Scenarios	2005	2010	2015	2020	2025	2030
BLS	1610.9	2074.5	2843.9	3441.0	3945.2	4323.0
HAS	1610.9	1904.1	2231.3	2569.3	2865.2	3203.0
IAS	1610.9	1993.3	2534.9	3075.7	3521.7	3686.1

Compared to the level of GHG emissions reported in 2005, it is expected that by the year of 2030 GHG emissions from the transport sector will increase: by circa 168.4 percent under the BLS, by 98.8 percent under the HAS and by 128.8 percent under the IAS. Relative to BLS, implementation of the planned mitigation measures by the year of 2030 will allow to reduce GHG emissions from the transport sector of the RM, by 25.9 percent under the HAS, respectively by circa 14.7 percent under the IAS (Figure 5-14).

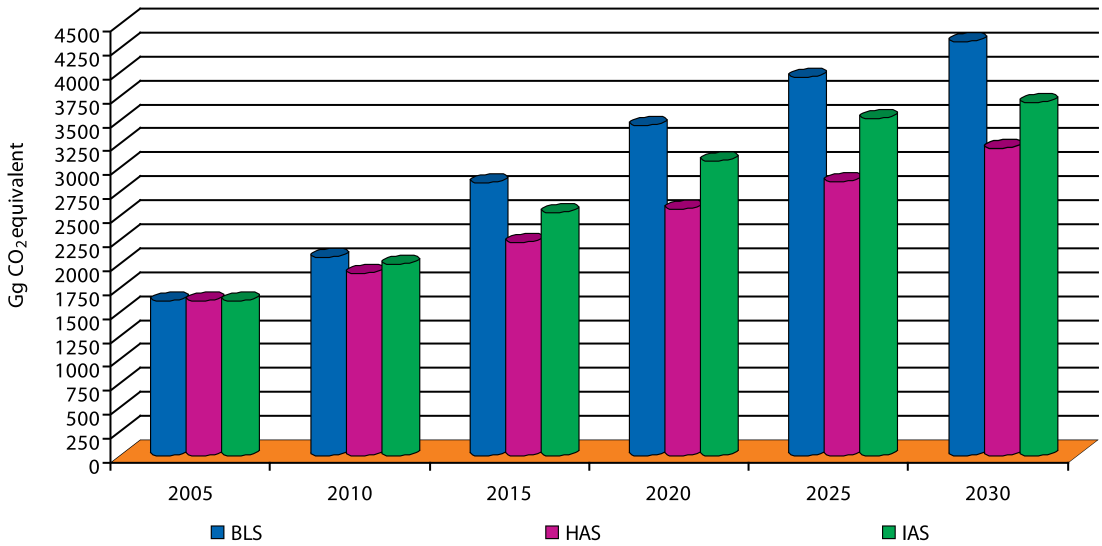


Figure 5-14: GHG Emissions from the Transport Sector under the Scenarios Considered for the 2005-2030 time series, Gg CO_2 equivalent

II.A.4 Identified Constraints for Implementation Mitigation Measures in the Transport Sector

The most effective GHG emissions abatement measures in the transport sector include:

- applying economic and fiscal measures to stimulate renewal of the vehicles pool, rolling stock, navigation and maritime fleet;
- rehabilitation and reconstruction of roads and railways, re-arranging internal navigation ways and improving the operation parameters of the hydraulic engineering installations;
- optimization of urban and interurban transport networks, freight and passenger traffic, including by deviation of the traffic from the densely populated areas (construction of circuit roads around the towns, imposing circulation restrictions in the central parts of the towns, etc.);
- facilitation of the public transport use and development of public transport networks in the main towns of the country;
- large scale use of electric transport, including by extending urban and interurban electric transport networks;
- increasing the share of road vehicles using LPG and LNG as fuel;
- use of road vehicles operating on hydrogen and bio-fuel, other state-of-the-art technologies applicable in transport sector;
- limiting the effective life of the road vehicles at import (from 7 to 5 years for passenger vehicles and from 10 to 7 years for trucks and buses).

There are however, a number of gaps and constraints on the way of effective implementation of the respective measures (Table 5-21).

Existence of multiple gaps and constrains posing impediments for the implementation of any transport sector development scenario turns the the „Action Plan on GHG Emissions Mitigation in Transport Sector for the period 2009-2013" (see Annex 2-2), into a more general paper, which is not focused on any particular sector development scenario. However, the need to implement the measures implied in the HAS (renewal of the vehicles park, rehabilitation and re-construction of motor ways and railways, optimization of urban and interurban transport networks, optimization of cargo and passenger traffic, development of public transport networks, use of the electric transport on a large scale, increase the share of road vehicles using LNG, LPG and bio-fuel, etc.) stand out more vividly.

Table 5-21: Gaps and Constraints on the Way of Effective Implementation of Abatement Measures in the Transport Sector of the Republic of Moldova

Gaps	Constraints
Road transportation	
- Very poor condition of a considerable part of roads network; - Considerable arrears in maintenance works, uncertainties about current financing and maintenance of roads; - Commercial vehicles pool non-compliant with the European quality and safety standards; - Unorganised public transport system, poor quality of services, poor administration in view of developing a consistent and integrated transport structure.	- National economy is unable to assure adequate rehabilitation of the roads network; - Underdevelopment of agriculture hampers the development of transport services; - Delayed foreign investments in the transport sector of the Republic of Moldova (transport companies, logistics, etc.)
Railway transport	
- The major part of the national railways infrastructure is in poor technical; - The major part of the railways infrastructure does not allow to get up the projected speed, even for the cargo trains; - The unsatisfactory condition of the rolling stock; - Mandatory public services unpaid by the authorities what entails delays in the infrastructure rehabilitation or rolling stock maintenance, or investments.	- Delayed implementation of infrastructure priority projects (infrastructure and rolling stock); - Geopolitical division of the country impeding the long term development of the railway network, in particular for transit related activities; - Delayed implementation of modern technologies and improvement of the technical condition of the railway infrastructure.
Naval transportation	
- Poor economic-financial condition of companies managing the fleet and the ports; - Obsolete condition of the floating craft; - Lack of the new and modern floating craft; - Lack of freight handling floating craft in ports; - Lack of logistical networks comprising transportation, storing and selling components; - Low level of co-working with the other types of transport, insufficient use of intermodal transport, thus lacking the naval transport of a substantial amount of goods.	- Underdeveloped market for cargo and passenger transportation services; - Poor financing for maintaining internal navigable water-ways in conformity with navigation safety requirements and adequate operation of hydraulic engineering installations; - Lack of investments in organizations providing navigation transport related services, which allow upgrade the fixed assets; - Caduceus normative regulation, and harmonization of the existent normative framework to European standards.
Urban Transport	
- Financial scarcity: bankrupt public companies lack of resources that can be invested into roads maintenance, etc. - Lack of interest / funds in transport sector administration; - Poor condition of the entire infrastructure, the major part of which requiring capital repairs.	- The fact that under the existing difficult conditions public transport still operates, is a hindrance on the way of any change; - The investment plans for the infrastructure focus on resources and not the needs to create a stable framework at sector level; - Existence of other urgent needs of the country that can draw away the available financial resources.

III. Fugitive Emissions from Oil and Natural Gas Operations

III.A Natural Gas and Oil Supply Sector

Natural Gas and Oil Supply Sector is a relevant source of fugitive greenhouse gas emissions (in principal, methane, carbon dioxide and nitrous oxide). Such emissions are generated by the oil and natural gases distribution systems, except for those energy resources that are used as fuel. Distribution systems include the entire infrastructure needed to produce, collect, process, refine and distribute oil products and natural gas. Oil and natural gas systems comprise all infrastructure required to produce, collect, process or refine and deliver natural gas and petroleum products to final consumers market. The system begins at the well head, or oil and gas source, and ends at the final sales point to the consumer. The sources of fugitive emissions on oil and natural gas systems include equipment leaks, evaporation and flashing losses; venting, flaring and accidental releases (e.g., pipeline dig-ins, well blow-outs and spills, etc.).

It should be noted that natural gas has been used in the RM since 1966, being 100 percent imported from Russian Federation through the gas pipeline system. The main operator on the natural gas market in the country is the Moldovan-Russian Joint Venture "MOLDOVAGAZ".

The infrastructure of the natural gas sector currently includes: high and medium pressure main gas pipelines (circa 593.6 km), high and medium pressure connection gas pipelines – circa 714 km, medium and low pressure gas distribution pipelines – circa 12465 km, 5 transported gas compression and metering stations and 65 gas distribution stations (of which 9 were put into operation in 2005-2007).

Two main gas pipelines systems cross the territory of the Republic of Moldova: in the North: the Ananiev – Cernauti – Bogorodciani natural gas pipeline (transit capacity circa 8.7 billion m^3/yr); in the South: Sebelinka – Dneproppetrovsk – Krivoi Rog – Ismail and Razdelnaia – Ismail gas pipeline (total transit capacity of circa 15.8 billion m^3/yr) and Ananiev– Tiraspol– Ismail gas pipeline (transit capacity of circa 20.0 billion m^3/yr).

The total capacity of the gas transit system towards the Balkans is circa 43 billion m^3/yr, however, it is currently used at a capacity of only circa 25 billion m^3/year. Connection gas pipelines and gas distribution stations situated on the territory of the RM allow deliver 9 billion m^3/year to the consumers in the RM, while real consumption at present is around 3.0 billion m^3/yr.

The RM has its own natural gas and oil resources, however quite modest. The natural gas reserves are concentrated in the settlement Victorovca, Cantemir district (the estimated amount is circa 1 billion m^3), while oil reserves are in Valeni, Cahul district (the estimated amount is circa 2-3 million tones).

On July 6, 1995 the Government of the Republic of Moldova has entered into a concession agreement with an American Company "Redeco" LTD to research and exploit natural gas and oil resources in the Republic of Moldova. The works started in 1997, at 8 oil wells (currently only 6 wells at circa 600 m depth are in use), however, with no tangible results.

The amount of gas captured from the reserves at Victorovca was 3000 m^3 per day; or circa 1 million m^3 per year. The amount of oil extracted in Valeni, was also insignificant (i.e., 10 tonnes in 2002, 600 tonnes in 2003). It should be noted that since 2003, the "Redeco" LTD business was joined by Moldovan Company "AS Petrol", which by 2004 managed to increase extraction up to 14 thousand tonnes of petrol per year (according to information provided by the Institute of Ecology and Geography of the ASM (2004), the specific density of the oil extracted in Valeni being 941 kg/m^3). The extracted petrol is refined at Comrat Refinery which has a capacity of 30 thousand tonnes, and was set into exploitation on July 15, 2005.

By the end of 2006, Moldovan Company "Valiexchimp" J.S.C. became the main partner of "Redeco" LTD Group. By the end of the year of 2007, "Valiexchimp" J.S.C. founded a joint venture with an Irish Company Island Oil&Gaz plc, starting together a joint investment program in oil and natural gas extraction and refining, estimated at 12 million Euro, including 44 oil wells drilling on the oil fields in Valeni and Victorovca, construction of 9 km of gas pipelines to connect the oil fields in Victorovca to "MOLDOVAGAZ" J.S.C. network, and upgrading the oil refinery in Comrat, to make it possible to initiate production of bitumen and asphalt for road construction..

It should be noted that the Government accepted "Redeco" LTD's leasing concession to "Valiexchimp" J.S.C. on all rights and obligations under the Concession Agreement for development and exploitation of oil and natural gas reserves in the Republic of Moldova as of July 6, 1995.

Liquefied gases are used in the RM starting 1946, and are currently sold to settlements not connected to gas networks (specific density of liquefied petroleum gases is 584 kg/m^3). Liquefied gas is refined and supplied to consumers through filling stations having a total storing capacity of circa 6.9 thousand m^3.

The projections regarding greenhouse gases fugitive emissions from the natural gas and oil supply sector were made based on methodological approaches set forth in the 2006 IPCC Guidelines (IPCC, 2006).

III.A.1 GHG Emissions Mitigation Scenarios

Three oil and natural gas supply sector development scenarios up to the year of 2030 were developed and considered under the current assessment.

Base Line Scenario (BLS) – is an option implying: an increase of the amount of natural gas pipelined through the Republic of Moldova towards the Balkan countries by 2.0 percent annually over the period from 2011 to 2030; an increase of the amount of natural gas imported in the Republic of Moldova by 3.5 percent annually over the period from 2011 to 2030; decrease of technological losses by 3 percent annually over the period from 2011 to 2030; increase of oil and natural gas production by 5% annually over the period from 2011 to 2030; increase of liquefied natural gas consumption by 5 percent annually over the period from 2011 to 2030; increase of the length of the natural gas distribution network by 5 percent annually over the period from 2011 to 2030. Evolution of macroeconomic indicators was estimated based on projections made by the Ministry of Economy and Trade. Legislation acts that recently came into force (National Gasification Program of the Republic of Moldova up to the year of 2010, National Program "Moldovan Village" (2005-2015), Energy Strategy of the Republic of Moldova until the year of 2020 and National Development Strategy for 2008-2011) was also taken into account, as well as techniques and technologies development trends in natural gas and oil supply sector.

High Alternative Scenario (HAS) – is an option admitting an increase of the amount of natural gas pipelined through the Republic of Moldova towards the Balkan countries by 3.0 percent annually over the period from 2011 to 2030; an increase of the amount of natural gas imported in the Republic of Moldova by 5.0 percent annually over the period from 2011 to 2030; decrease of technological losses by 5 percent annually over the period from 2011 to 2030; increase of oil and natural gas production by 7.5 percent annually over the period from 2011 to 2030; increase of liquefied natural gas consumption by 7.5 percent annually over the period from 2011 to 2030; increase of the length of the natural gas distribution network by 7.5 percent annually over the period from 2011 to 2030. This scenario also implies implementation of efficient measures to abate GHG emissions from this sector. The activities stipulated in the National Gasification Program of the Republic of Moldova up to the year of 2010, National Program "Moldovan Village" (2005-2015), Energy

Strategy of the Republic of Moldova until the year of 2020 and National Development Strategy for 2008-2011) was also taken into consideration.

Intermediary Alternative Scenario (IAS) – is an option admitting an increase of the amount of natural gas pipelined through the Republic of Moldova towards the Balkan countries by 2.5 percent annually over the period from 2011 to 2030; an increase of the amount of natural gas imported in the Republic of Moldova by 4.0 percent annually over the period from 2011 to 2030; decrease of technological losses by 4 percent annually over the period from 2011 to 2030; increase of oil and natural gas production by 6.5 percent annually over the period from 2011 to 2030; increase of liquefied natural gas consumption by 6.5 percent annually over the period from 2011 to 2030; increase of the length of the natural gas distribution network by 6.5 percent annually over the period from 2011 to 2030. This scenario also implies implementation of the same measures to abate GHG emissions as in the high alternative scenario, however to a more limited extent.

III.A.2 Results of the Technical-Economical Evaluation

The projections regarding putting into operation of the main gas pipelines and distribution systems in the Republic of Moldova over the period from 2005 to 2030 are presented in Table 5-22.

Table 5-22: Putting into Operation of the Main Gas Pipelines and Distribution Systems under the Scenarios Considered, 2005-2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Length of main pipelines, km	1308	1373	1442	1514	1590	1670
Length of distribution network, km	12465	20075	25621	32700	41734	53265
High Alternative Scenario (HAS)						
Length of main pipelines, km	1308	1406	1511	1624	1746	1877
Length of distribution network, km	12465	25072	35993	51673	74184	106500
Intermediary Alternative Scenario (IAS)						
Length of main pipelines, km	1308	1393	1497	1609	1730	1859
Length of distribution network, km	12465	22462	30775	42165	57770	79149

The projections regarding oil and natural gas production in the Republic of Moldova in 2005-2030 is presented in Table 5-23.

The projections regarding the amount of natural gas pipelined through the Republic of Moldova towards the Balkan countries, amounts natural gas of imported and sold in the Republic of Moldova, as well as projections regarding the extent of technological losses at transportation and distribution of natural gas over the period of time from 2005 to 2030 are presented in Table 5-24.

Table 5-23: Oil and Natural Gas Production in the Republic of Moldova under the Scenarios Considered, 2005-2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Extracted oil, thousand tonnes	15.0	19.1	24.4	31.2	39.8	50.8
Extracted natural gas, mil. m^3	1.1	1.4	1.8	2.3	2.9	3.7
High Alternative Scenario (HAS)						
Extracted oil, thousand tonnes	15.0	21.5	30.9	44.4	63.7	91.5
Extracted natural gas, mil. m^3	1.1	1.8	2.8	4.6	7.4	11.9
Intermediary Alternative Scenario (IAS)						
Extracted oil, thousand tonnes	15.0	20.6	28.2	38.6	52.9	72.4
Extracted natural gas, mil. m^3	1.1	1.6	2.3	3.2	4.7	6.7

Table 5-24: Activity Data on Transportation and Distribution of Natural Gas in the Republic of Moldova under the Scenarios Considered, 2005-2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Pipelined natural gas, billion m^3	25.0	28.3	31.3	34.5	38.1	42.1
Imported natural gas, billion m^3	2.8	3.3	4.0	4.7	5.6	6.7
Technological losses at transportation and distribution, mil. m^3	103.0	88.0	76.0	65.0	56.0	48.0
High Alternative Scenario (HAS)						
Pipelined natural gas, billion m^3	25.0	29.7	34.4	39.9	46.3	53.7
Imported natural gas, billion m^3	2.8	3.6	4.6	5.9	7.5	9.5
Technological losses at transportation and distribution, mil. m^3	103.0	80.0	62.0	48.0	37.0	29.0
Intermediary Alternative Scenario (IAS)						
Pipelined natural gas, billion m^3	25.0	29.0	32.8	37.1	42.0	47.5
Imported natural gas, billion m^3	2.8	3.4	4.2	5.1	6.2	7.5
Technological losses at transportation and distribution, mil. m^3	103.0	84.0	68.0	56.0	46.0	37.0

The baseline economic indicators at sector level were generated based on macroeconomic indicators identified on the basis of projections made by the MET, as well as based on long term development sustainable development policies in oil and natural gas supply sector, stipulated in the National Gasification Program of the Republic of Moldova up to year of 2010, National Program "Moldovan Village" (2005-2015), Energy Strategy of the Republic of Moldova until the year of 2020 and National Development Strategy for 2008-2011 period.

III.A.3 Assessment of the Abatement Potential

GHG emissions were estimated by using the Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), and the results of the technical-economical evaluations at the sectoral level for the period from 2005 to 2030, under the considered scenarios. The estimation methodologies and emission factors were taken from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006).

Table 5-25 presents the dynamics of fugitive direct greenhouse gas emissions from oil and natural gases operations in the Republic of Moldova for the 2005-2030 time series.

Table 5-25: Fugitive Direct GHG emissions from Oil and Natural Gas Operations under the Scenarios Considered for 2005-2030 time series, Gg CO_2 equivalent

Scenarios	2005	2010	2015	2020	2025	2030
BLS	653.9	748.7	789.7	945.4	1063.8	1198.4
HAS	653.9	674.5	711.7	839.7	890.9	996.8
IAS	653.9	716.3	755.5	872.0	1007.8	1101.5

Relative to the level of GHG emissions reported in 2005, it is expected that fugitive direct GHG emissions from oil and natural gases operations in the Republic of Moldova will increase by 2030: by 83.3 percent under the BLS, by 52.4 percent under the HAS and by 68.4 percent under the IAS.

Relative to the BLS, implementation of the planned abatement measures by the year of 2030 will allow to reduce GHG emissions from oil and natural gas operations in the RM by circa 16.8 percent under HAS, respectively by circa 8.1 percent under IAS (Figure 5-15).

III.A.4 Abatement Measures in Oil and Natural Gas Supply Sector

The most effective measures to mitigate fugitive direct GHG emissions from oil and natural gas operations include:

- maintenance in good condition of the main gas pipelines and gas distribution networks;
- replacement of corrosive pipelines made of cast iron and steel by pipelines made of non-corrosive materials, what will allow to reduce methane leakage from distribution systems;
- use of the most advanced technologies at compression and distribution systems, for example: adjustable valve with a minimum impact on fugitive emissions, thus replacing or eliminating current ventilation equipment and fugitive emissions;
- putting into practice good management systems and operational procedures to reduce ventilation;
- implementing management practices aimed at detecting leakage and technological losses;
- implementing electronic monitoring programs, including with a view to regulate the distribution systems operating at higher pressure than required;
- implementing programs on more efficient implementation of measures aimed at reducing technological losses and fugitive emissions;

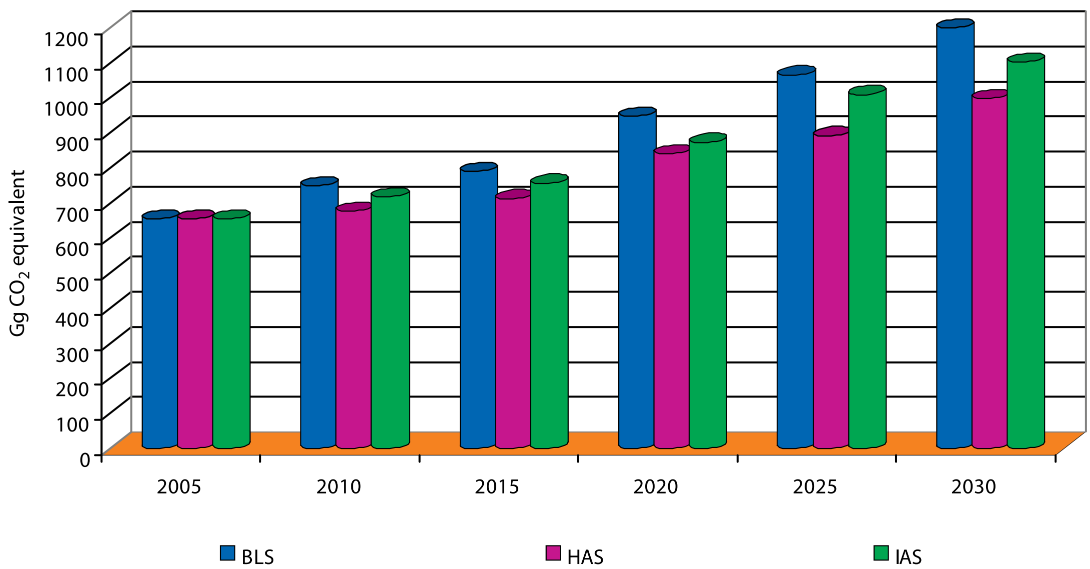


Figure 5-15: Fugitive Direct GHG emissions from Oil and Natural Gas Operations under the Scenarios Considered for 2005-2030 time series, Gg CO_2 equivalent

- flaring of methane at well-sites (in conformity with the GWP for a period of 100 years, 1 kg of CH_4 emitted in the atmosphere equals 21 kg CO_2, while flaring of 1 kg CH_4 produces only 2.75 kg CO_2);
- re-injecting fugitive emissions from oil extraction back into the oil fields.

Lack of an adequate financing could create major impediments on the way of implementing any of gas and oil products supply sector development scenarios, what makes the „Action Plan on Fugitive GHG Emissions Mitigation in Gas and Oil Products Supply Sector for the period 2009-2013" (Annex 2-3) a more general paper which is not focused on any particular sector development scenario.

5.3.2 Industrial Processes Sector

Industrial Processes Sector includes direct greenhouse gas emissions from non-energy industrial activities[6].

Within this sector, the most relevant sources of greenhouse gas emissions are cement, lime, asphalt, glass, bricks, steel, food and drinks production and consumption of halocarbons and sulphur hexafluoride incorporated in refrigeration and air conditioning equipment, fire extinguishes, aerosols, blown foams, electric equipment, etc.

The projections regarding GHG emissions from this sector were made based on methodological approaches set forth in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1997), Good Practice Guidance (IPCC, 2000), Atmospheric Emissions Inventory Guidebook (CORINAIR, 1996, 1999) and IPCC 2006 Guidelines for National Greenhouse Gas Inventories (IPCC, 2006).

A. GHG Emissions Mitigation Scenarios

Three Industrial Processes Sector development scenarios for the period up to the year of 2030 were developed based on the macroeconomic indicators of the Republic of Moldova.

Base Line Scenario (BLS) – is an option implying growth of the industrial sector by 5 percent annually up to 2015, by 4.5 percent annually over the period from 2016 to 2024, and by 4.0 percent annually over the period from 2025 to 2030. Evolution of macroeconomic indicators was determined based on projections made by the Ministry of Economy and Trade, extrapolation of data from the Statistical Yearbooks for 2000-2005, taking into account the trends of those years. Legislative and normative acts that have recently came into effect; techniques and technologies development trends in the Industry Sector were also taken into consideration.

High Alternative Scenario (HAS) – is an option implying growth of the industrial sector by 6 percent annually up to 2015, by 5.5 percent annually over the period from 2016 to 2024, and by 5.0 percent annually over the period from 2025 to 2030. This scenario also implies putting into use of more efficient measures to mitigate GHG emissions from this sector, including: maintenance in good condition of equipment and use of modern and efficient manufacturing technologies, accounting the consumption of raw materials and more efficient management, putting into practice efficient management systems and reducing production losses, use of recycled raw material, recovery of fugitive emissions, etc. Activities stipulated in the National Development Strategy for 2008-2011 (approved by the Law No. 295-XVI as of 21.12.2007), Industry Development Strategy for a period up to 2015 (approved through the Government Resolution No.1149 as of 05.10.2006) and recent plans of the Government to rehabilitate, renovate and put into operation new plants (including a new cement plant), were also taken into account. It should be noted that in conformity with the respective scenario, over the period under review the energy intensity in the industry sector is expected to reduce by two times, from 1,200 g.c.e./USD of the GDP in 2005, to 600 g.c.e./USD of the GDP in 2030.

Intermediary Alternative Scenario (IAS) – is an option implying growth of the industrial sector by 5.5 percent annually up to 2015, by 5.0 percent annually over the period from 2016 to 2024, and by 4.5 percent annually over the period from 2025 to 2030. This scenario also implies implementation of the same measures to abate GHG emissions as in the high alternative scenario, however to a more limited extent.

B. Projections on Industrial Production

The projections on industrial production with the biggest impact on the direct greenhouse gas emissions originated from the Industrial Processes under the three scenarios is presented in Table 5-26.

The activity data on industrial production were generated on the basis of macroeconomic indicators determined on the basis of projections made by the Ministry of Economy and Trade, extrapolation of data from the Statistical Yearbooks for 2000-2005,taking into account the trends of those years; also based on the policies for sustainable development of the Industry Sector, stipulated in the National Development Strategy for 2008-2011 (approved through the Law No. 295-XVI as of 21.12.2007), Industry Development Strategy for a period up to 2015 (approved through the Government Resolution No.1149 as of 05.10.2006), as well as Government plans to rehabilitate, renovate and put into operation new plants, in particular enterprises producing non-ferrous mineral products (cement, bricks, lime, gypsum, bond plaster, prefabricated elements for cement, reinforced concrete and glass constructions), road industry enterprises (asphalt, bitumen, gravel,) and food and beverages producing enterprises.

[6]GHG emissions from fossil fuel combustion in industrial processes were estimated under the Energy Sector.

Table 5-26: The Industrial Production with a Major Impact on Direct GHG Emissions in the Republic of Moldova under the Scenarios Considered, 2005-2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Clinker , thousand tonnes	678.7	770.2	983.0	1207.4	1462.0	1736.4
Lime, thousand tonnes	9.1	11.5	14.7	18.1	21.9	26.0
Asphalt, thousand tonnes	65.0	82.3	105.1	129.1	156.3	185.6
Glass equiv. 0.7 l, mil. bottles	136.5	172.9	220.6	271.0	328.2	389.8
Glass jars equiv. 0.5 l, mil. pieces	353.1	447.2	570.8	701.1	848.9	1008.2
Bricks, mil. pieces	69.2	87.6	111.9	137.4	166.4	197.6
Steel, thousand tonnes	1048.2	1215.1	1408.6	1633.0	1893.1	2194.6
Wine, mil.dal	36.7	40.6	44.8	49.4	54.6	60.3
Sparkling wine, mil.dal	1.1	1.2	1.4	1.5	1.7	1.8
Beer, mil.dal	7.8	8.6	9.5	10.5	11.6	12.8
High Alternative Scenario (HAS)						
Clinker , thousand tonnes	678.7	847.6	1188.8	1667.4	2338.6	3129.5
Lime, thousand tonnes	9.1	12.7	17.8	25.0	35.0	46.8
Asphalt, thousand tonnes	65.0	90.6	127.1	178.2	250.0	334.5
Glass equiv. 0.7 l, mil. bottles	136.5	190.3	266.8	374.3	524.9	702.5
Glass jars equiv. 0.5 l, mil. pieces	353.1	492.2	690.3	968.2	1357.9	1817.2
Bricks, mil. pieces	69.2	96.5	135.3	189.7	266.1	356.1
Steel, thousand tonnes	1048.2	1337.7	1707.3	2179.0	2781.1	3549.4
Wine, mil.dal	36.7	44.7	54.4	66.1	80.5	97.9
Sparkling wine, mil.dal	1.1	1.4	1.7	2.0	2.4	3.0
Beer, mil.dal	7.8	9.5	11.5	14.0	17.0	20.7
Intermediary Alternative Scenario (IAS)						
Clinker , thousand tonnes	678.7	808.7	1082.2	1448.2	1938.0	2415.2
Lime, thousand tonnes	9.1	12.1	16.2	21.7	29.0	36.1
Asphalt, thousand tonnes	65.0	86.4	115.7	154.8	207.2	258.2
Glass equiv. 0.7 l, mil. bottles	136.5	181.5	242.9	325.1	435.0	542.1
Glass jars equiv. 0.5 l, mil. pieces	353.1	469.6	628.4	840.9	1125.3	1402.4
Bricks, mil. pieces	69.2	92.0	123.2	164.8	220.5	274.8
Steel, thousand tonnes	1048.2	1275.2	1551.5	1887.7	2296.6	2794.2
Wine, mil.dal	36.7	42.6	49.4	57.2	66.3	76.9
Sparkling wine, mil.dal	1.1	1.3	1.5	1.7	2.0	2.3
Beer, mil.dal	7.8	9.0	10.5	12.1	14.0	16.3

C. Assessment of the Abatement Potential

GHG emissions were estimated by using the Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), and the results of the technical-economical evaluations at the sectoral level for the period from 2005 to 2030, under the considered scenarios. Estimation methodologies and emission factors were used from the Revised IPCC 1996 Guidelines for National GHG Inventories (IPCC, 1997), Good Practice Guidance (IPCC, 2000), Atmospheric Emissions Inventory Guidebook (CORINAIR, 1996, 1999) and the IPCC 2006 Guidelines for National GHG Inventories (IPCC, 2006). Estimates of the direct GHG emissions from the emission source categories covered by Industrial Processes Sector are presented below (Table 5-27).

Figure 5-16 presents the dynamics of direct GHG emissions from the emission source categories covered by Industrial Processes Sector under the scenarios considered for 2005-2030 time series. Relative to the GHG emissions reported in 2005, it is expected that by 2030, direct GHG emissions from this sector will increase: by 318 percent under the BLS, by 254 percent under the HAS, and by 284 percent under the IAS. Relative to the BLS, implementation by the year of 2030 of the planned mitigation measures will allow to reduce GHG emissions from Industrial Processes Sector, by 15.3 percent under HAS, respectively, by 8.2 percent under the IAS.

Evolution of industrial production, consumption of halocarbons and SF_6, as well as implementation of GHG emissions mitigation measures will influence redistribution of shares of different source categories in the overall structure of the total GHG emissions from the Industrial Processes Sector (Table 5-27, Figure 5-17).

So, if in the reference year of 2005, 64.2 percent of the total GHG emissions in this sector were generated from cement/clinker production, 18.1 percent from steel production, 7.0 percent - from food and drinks, 3.6 percent - from glass production, 3.3 percent - from halocarbons and SF_6 consumption, 2.8 percent - from bricks production and 1.1 percent - from lime production, then by 2030 under all three scenarios, depending on in which extent the mitigation measures will be implemented, the situation described above will change significantly, in particular due to a considerable increase of the share of F-gases (HFC, PFC and SF_6) in the structure of total GHG emissions from this sector.

D. Identified Constraints for Implementation Mitigation Measures in the Industrial Processes **Sector**

The most effective abatement measures in the Industrial Processes Sector include:

- maintenance in good condition of the equipment and employment of modern technological processes in view of rational use of natural resources and energy, and reducing production wastes;

- accounting the consumption of the raw materials and energy, efficient management of production process;
- employment of efficient management systems and reducing production losses, inclusively by use of recycled materials;
- fugitive emissions recovery;
- improving and supplementing the legal framework with the European efficiency and emissions standard (Admissible Emissions Limits);
- implementing the initiatives on differentiated application of taxes for energy efficiency and emissions reduction;
- entering into voluntary agreements on reducing emissions from the industrial enterprises in the country;
- pursuing aggressive policies on transfer of environmental sounds technologies and commercial demonstration of clean technologies within the industrial and innovation parks, etc.

The main constraints for the effective implementation of the abatement measures in Industrial Processes Sector are:

- a high degree of moral and physical obsolescent of equipment at industrial enterprises in the country and limited possibilities of the state to financially support the industrial enterprises restructuring process;
- underdevelopment of industry infrastructure and lack of real progress in attracting direct foreign investments in industry sector;
- low development rates of the science intensive and technologically advanced branches and scarcity of resources allowing to pursue an aggressive policy on transfer of technologies and innovation;
- poor quality of production and insufficient implementation of quality management systems in conformity with the international standards;
- instability of legislation, in particular in fiscal and budget areas;
- increasing deficit of qualified technical engineering and working staff in industry and a deep gap between the training of the professional technical staff and real needs of the industry sector.

The multitude of impediments hampering the implementation of any industrial sector development scenario makes the „Action Plan on GHG Emissions Mitigation in Industrial Processes Sector for the period 2009-2013" (Annex 2-4) a more general paper, not focused on any specific scenario. However, the need to make major investments in industrial enterprises restructuring, adequate development of industrial infrastructure, implement modern quality management systems and pursue aggressive policy on transfer of environmental sounds technologies and innovations stand out more vividly.

Table 5-27: Direct GHG Emissions from the Industrial Processes Sector under the Scenarios Considered, 2005-2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Clinker, Gg CO_2	373.3	472.7	603.4	751.9	932.5	1134.5
Lime, Gg CO_2	6.6	8.6	10.9	13.6	16.9	20.6
Asphalt, Gg CO_2 eq	0.02	0.02	0.03	0.03	0.04	0.05
Glass, Gg CO_2	20.8	29.3	37.4	45.9	55.6	66.0
Bricks, Gg CO_2	16.1	27.2	34.7	42.7	51.7	61.4
Steel, Gg CO_2 eq.	105.3	122.1	141.5	164.0	190.2	220.4
Food and Drinks, Gg CO_2	40.8	45.0	49.7	54.9	60.6	66.9
Consumption of Halocarbons and SF_6, Gg CO_2 eq	19.0	52.9	106.1	213.1	428.3	860.9
Total Emissions from Industrial Processes, Gg CO_2 eq	581.9	757.8	983.8	1286.2	1735.7	2430.8
High Alternative Scenario (HAS)						
Clinker, Gg CO_2	373.3	466.4	592.9	742.3	923.1	1110.4
Lime, Gg CO_2	6.6	8.5	10.6	13.1	16.6	18.6
Asphalt, Gg CO_2 eq	0.02	0.02	0.03	0.03	0.04	0.05
Glass, Gg CO_2	20.8	22.6	26.2	31.7	44.4	59.5
Bricks, Gg CO_2	16.1	21.2	29.7	39.7	49.1	58.1
Steel, Gg CO_2 eq.	105.3	115.0	129.7	149.3	179.3	207.4
Food and Drinks, Gg CO_2	40.8	41.0	47.4	54.0	59.8	62.9
Consumption of Halocarbons and SF_6, Gg CO_2 eq	19.0	52.0	76.4	146.8	282.2	542.6
Total Emissions from Industrial Processes, Gg CO_2 eq	581.9	726.6	909.3	1176.9	1554.6	2059.5
Intermediary Alternative Scenario (IAS)						
Clinker, Gg CO_2	373.3	471.6	598.7	749.1	926.8	1121.8
Lime, Gg CO_2	6.6	8.5	10.7	13.4	16.8	19.5
Asphalt, Gg CO_2 eq	0.02	0.02	0.03	0.03	0.04	0.05
Glass, Gg CO_2	20.8	26.1	28.8	38.5	51.6	64.3
Bricks, Gg CO_2	16.1	22.8	30.6	40.9	50.7	59.2
Steel, Gg CO_2 eq.	105.3	118.8	135.3	154.8	183.5	214.8
Food and Drinks, Gg CO_2	40.8	42.1	48.3	54.3	60.4	64.7
Consumption of Halocarbons and SF_6, Gg CO_2 eq	19.0	52.4	85.4	164.2	322.3	687.8
Total Emissions from Industrial Processes, Gg CO_2 eq	581.9	742.5	937.8	1215.3	1612.0	2232.1

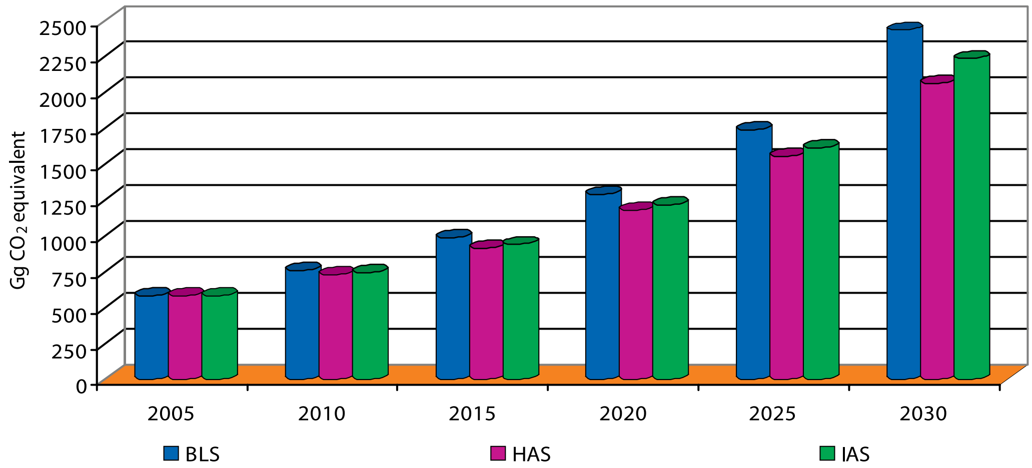


Figure 5-16: Direct GHG Emissions from Industrial Processes Sector under the Scenarios Considered for 2005-2030 time series, Gg CO_2 equivalent

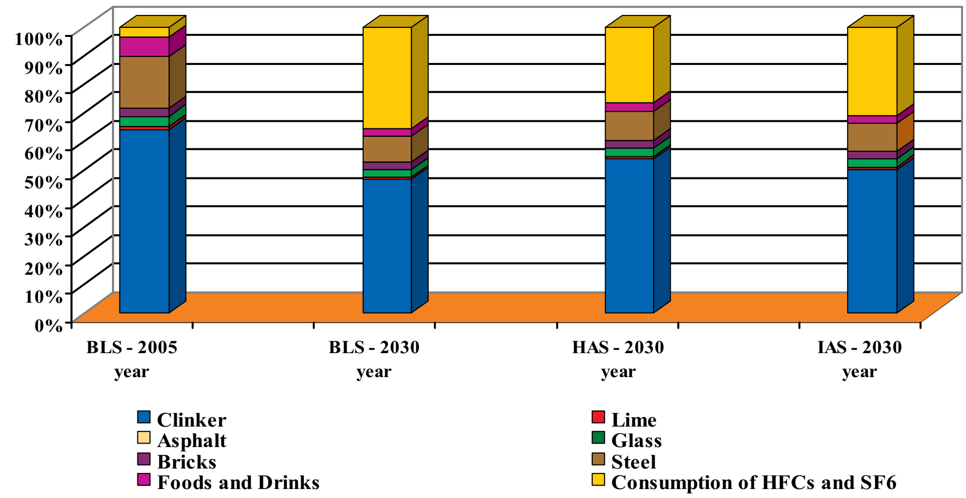


Figure 5-17: Breakdown of Different Source Categories in the Overall Structure of the Total GHG Emissions from the Industrial Processes Sector under the Scenarios Considered for 2005 and 2030 years

5.3.3 Agriculture Sector

Agriculture Sector covers methane emissions generated by Animal Breeding, in particular from 'Enteric Fermentation' and 'Manure Management' source categories, as well as nitrous oxide emissions from 'Manure Management' and 'Agricultural Soils' source categories.

As within the RM it is not cultivated rice and there are no savannas, no GHG emissions from 'Rice Cultivation' and 'Prescribed Burning of Savannas' source categories were reported. Also, in conformity with recommendations set forth in the Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC, 2003), CO_2 emissions from the soils were considered under the Land Use, Land-Use and Change Sector's 'Cropland' source and sink category.

Projections regarding the greenhouse gas emissions from Agriculture Sector were made based on methodological approaches stated in the Revised 1996 IPCC Guidelines for National GHG Inventories (IPCC, 1997), Good Practice Guidance (IPCC, 2000) and the 2006 IPCC Guidelines for National GHG Inventories (IPCC, 2006).

A. GHG Emissions Mitigation Scenarios

Based on macroeconomic indicators of the Republic of Moldova three agriculture development scenarios were developed for the period of time up to year of 2030.

Baseline Scenario (BLS) – is an option implying growth of agricultural sector by circa 2 percent annually up to 2015 and by 3 percent annually in 2016-2030. The evolution of macroeconomic indicators was estimated based on projections made by the Ministry of Economy and Trade. A series of strategic documents of the Republic of Moldova, such as the Agriculture and Food Industry Development Strategy for 2006-2015 (approved through the Government resolution No. 1199 as of 17.10.2006), the National Development

Strategy for 2008-2011 (approved through the Law No. 295-XVI as of 21.12.2007) and the National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015 (approved through the Government Resolution No. 282 as of 11.03.2008), were also taken into consideration.

High Alternative Scenario (HAS) – is an option implying growth of agricultural sector by 3 percent annually up to 2015, and by 4 percent annually up to 2016-2030. Also, this scenario implies employment of effective measures to mitigate GHG emissions, including: gradual replacement of currently used breeds of livestock and poultry with higher productivity breeds (this will allow, for example, to raise the productivity of dairy cows from 2500 to 4500 kg of milk per year from one cow, what will ensure reducing the total population of diary cows by circa 100 thousand cows by 2030 without exposing the population to the under-supply of diary products), quality improvement of the forage supply reserve in livestock breeding sub-sector, use of sustainable manure management systems, implementing sustainable soil management practices, improving the crops range, implementing complex measures to combat soil degradation, improving soil fertilization techniques, using all organic matter sources to enrich soils with carbon, etc. Activities stipulated in the Agriculture and Food Industry Sector Development Strategies recently approved by the Government of the RM, were also taken into consideration.

Intermediary Alternative Scenario (IAS) – is an option implying growth of agricultural sector by circa 2.5 percent annually up to 2015 and by 3.5 percent annually in 2016-2030. This scenario also implies implementation of the same measures to abate GHG emissions as in the high alternative scenario, however to a more limited extent.

B. Projected Economic Indicators for Agriculture Sector

The projected economic indicators in Agriculture Sector (livestock breeding and crop production) having a direct impact on the greenhouse gas emissions originated from this sector, developed under the three considered scenarios, are provided in Table 5-28. The activity data on the evolution of the total number of livestock and poultry were generated based on projections made for the Agriculture and Food Industry Development Strategy for 2006-2015, the National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015, as well as based on livestock breeding sustainable development policies stipulated in the National Development Strategy for 2008-2011, which provide for maintaining and improvement of the breeding animals genetic pool, gradual replacement of currently used breeds of livestock and poultry with higher productivity breeds, quality improvement of the forage supply reserve in livestock breeding sub-sector, use of sustainable manure management systems, etc.

Table 5-28: Total Population of Livestock and Poultry for 2005-2030 periods, 1000 heads

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Cattle	360	440	500	580	720	800
Dairy cows	249	260	280	300	320	360
Other cattle	111	180	220	280	400	440
Sheep and goats	960	1000	1080	1140	1200	1280
sheep	838	880	965	1030	1100	1200
goats	121	120	115	110	100	80
Horses	76	80	80	80	80	80
Asses and mules	2	2	2	2	2	2
Swine	422	530	600	900	1200	1500
Rabbits	239	280	300	350	380	420
Poultry	17884	22500	24500	25500	26500	27500
High Alternative Scenario (HAS)						
Cattle	360	420	460	520	660	720
Dairy cows	249	200	220	220	240	260
Other cattle	111	220	240	300	420	460
Sheep and goats	960	980	1040	1100	1160	1200
sheep	838	870	940	1010	1080	1140
goats	121	110	100	90	80	60
Horses	76	76	76	76	76	76
Asses and mules	2	2	2	2	2	2
Swine	422	500	570	800	1000	1200
Rabbits	239	260	280	320	360	400
Poultry	17884	21500	22500	23500	25500	26500
Intermediary Alternative Scenario (IAS)						
Cattle	360	430	480	560	700	760
Dairy cows	249	230	250	270	290	310
Other cattle	111	200	230	290	410	450
Sheep and goats	960	990	1060	1120	1180	1240
sheep	838	875	950	1020	1090	1170
goats	121	115	110	100	90	70
Horses	76	78	78	78	78	78
Asses and mules	2	2	2	2	2	2
Swine	422	510	580	850	1100	1300
Rabbits	239	270	290	340	370	410
Poultry	17884	22000	23500	24500	26000	27000

The activity data on the areas sown with crops (Table 5-29) and crop production (Table 5-30) were generated based on projections made for the Agriculture and Food Industry Development Strategy for 2006-2015, the National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015, as well as based on crop production sustainable development policies, which in all three scenarios imply crop range improvement, inclusively through crop rotation optimization by extending the share of perennial and annual crops, extending areas cultivated with fodder crops and reducing the areas cultivated with sun flower, etc.

Table 5-29: Projections on the Crop Sown Areas in the Republic of Moldova within the 2005-2030 time series, thousand ha

	2005	2010	2015	2020	2025	2030
Winter Wheat	428.0	270.0	280.0	280.0	280.0	280.0
Barley	133.5	165.0	175.0	175.0	175.0	175.0
Grain Maize	461.0	470.0	450.0	420.0	400.0	360.0
Leguminous Crops	42.7	60.0	65.0	70.0	75.0	80.0
Sunflower	291.0	220.0	180.0	160.0	150.0	145.0
Soy Beans	36.2	40.0	45.0	50.0	55.0	60.0
Sugar Beets	34.4	40.0	45.0	50.0	55.0	60.0
Tobacco	4.7	6.0	8.0	10.0	12.0	15.0
Potatoes	36.6	42.0	45.0	47.0	50.0	55.0
Legumes	38.5	60.0	62.0	65.0	70.0	80.0
Melons and Gourds	7.1	11.0	12.0	12.0	12.0	12.0
Forage Crops	0.4	6.0	8.0	16.0	18.0	20.0
Maize for Silo and Green Fodder	72.8	100.0	115.0	135.0	138.0	148.0

Under the developed scenarios the optimised crop range will allow to produce the needed amount of grain to assure food security of population, fodder security of livestock, industrial and leguminous crops sufficient to meet the needs of the processing industry and population. At the same time, the improved crop range will allow to use soil protective crop rotation patterns, thus contributing to the stabilization of humus balance in soil and soil fertility conservation.

Table l 5-30: Projections on Crop Production in the Republic of Moldova within the 2005-2030 time series, quintal/ha

	2005	2010	2015	2020	2025	2030
Winter Wheat	26.7	35.0	36.0	37.0	38.0	40.0
Barley	19.0	25.0	27.0	29.0	32.0	36.0
Grain Maize	26.9	30.0	35.0	40.0	45.0	50.0
Leguminous Crops	15.7	16.0	16.5	17.0	17.5	18.0
Sunflower	11.5	12.0	15.0	20.0	22.0	25.0
Soy Beans	18.1	19.0	19.5	20.0	20.5	21.0
Sugar Beets	283.7	340.0	365.0	385.0	400.0	420.0
Tobacco	13.2	18.5	19.0	19.5	20.0	20.5
Potatoes	131.2	135.0	145.0	155.0	165.0	175.0
Legumes	109.7	115.0	125.0	135.0	145.0	155.0
Melons and Gourds	68.9	70.0	75.0	80.0	85.0	90.0
Forage Crops	282.2	300.0	350.0	375.0	420.0	460.0
Maize for Silo and Green Fodder	111.5	150.0	170.0	190.0	210.0	230.0

The projections regarding use of nitrogen fertilisers in the RM in 2005-2030 (Table 5-31) were generated based on provisions contained in the Action Plan to the National Complex on Soil Fertility Enhancement Program for 2001-2020 (approved through the Government Resolution No. 591 as of 20.06.2000), as well as in the Complex Program on Rehabilitation of Degraded Lands and Soil Fertility Enhancement, Part II 'Soil Fertility Enhancement' (approved through the Government resolution No. 841 as of 26.07.2004).

Table 5-31: Projections on Use of Nitrogen Fertilisers in the Republic of Moldova within the 2005-2030 time series, thousand tonnes of active substances (a.s.)

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Chemical fertilizer (F_{SN})	16.1	39.7	58.6	81.7	100.0	110.0
Organic fertilizer (F_{ON})	0.3	5.6	19.6	33.6	44.8	58.8
High Alternative Scenario (HAS)						
Chemical fertilizer (F_{SN})	16.1	59.4	79.7	99.9	115.0	120.0
Organic fertilizer (F_{ON})	0.3	16.8	33.6	44.8	50.4	64.4
Intermediary Alternative Scenario (IAS)						
Chemical fertilizer (F_{SN})	16.1	48.9	69.9	90.4	105.0	115.0
Organic fertilizer (F_{ON})	0.3	11.2	28.0	42.0	47.6	61.6

The projections regarding the amount of urine and dung nitrogen deposited by grazing animals, as well as the amount of nitrogen in crop residues returned to soil in the RM in 2005-2030 (Table 5-32) were generated based on projections made for the Agriculture and Food Industry Development Strategy for 2006-2015, the National Agribusiness Sustainable Development Strategy of the Republic of Moldova for 2008-2015, as well as based on livestock breeding and crop production sustainable development policies.

Table 5-32: Projections on the amount of Urine and Dung Nitrogen Deposited by Grazing Animals and the Amount of Nitrogen in Crop Residues Returned to Soil in the republic of Moldova within 2005-2030 time series, thousand tonnes of active substances

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Urine and Dung (F_{PRP})	12.1	12.9	13.5	13.6	13.6	13.6
Crop Residues (F_{CR})	25.6	31.7	37.2	43.8	48.3	54.3
High Alternative Scenario (HAS)						
Urine and Dung (F_{PRP})	12.1	12.3	13.2	14.2	16.5	17.5
Crop Residues (F_{CR})	25.6	36.7	42.6	49.7	54.6	61.1
Intermediary Alternative Scenario (IAS)						
Urine and Dung (F_{PRP})	12.1	12.7	13.6	15.0	17.2	18.3
Crop Residues (F_{CR})	25.6	35.0	40.7	47.6	52.4	58.8

The projections on the amount of nitrogen mineralized due to loss of soil carbon as a result of land-use or soil management practices change (Table 5-33) were generated based on the assessment and interpretation of long term experiments carried out by Moldovan researchers (Zagorcea, 1990; Ungureanu et al., 1997; Andries, 1999; Banaru, 2001).

Table 5-33: Projections on the Amount of Nitrogen Mineralized due to Loss of Soil Carbon as a Result of Land-Use or Soil Management Practices Change in the Republic of Moldova within the 2005-2030 time series

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Arable Lands, thousand hectares	1833.2	1830.0	1825.0	1820.0	1815.0	1810.0
Nitrogen Mineralized as a Result of Loss of Soil Carbon (F_{SOM}), kt a.s.	54.8	54.7	54.5	54.4	54.2	54.1
High Alternative Scenario (HAS)						
Arable Lands, thousand hectares	1833.2	1815.0	1795.0	1785.0	1765.0	1735.0
Nitrogen Mineralized as a Result of Loss of Soil Carbon (F_{SOM}), kt a.s.	54.8	54.2	53.6	53.3	52.8	51.9
Intermediary Alternative Scenario (IAS)						
Arable Lands, thousand hectares	1833.2	1820.0	1815.0	1800.0	1785.0	1765.0
Nitrogen Mineralized as a Result of Loss of Soil Carbon (F_{SOM}), kt a.s.	54.8	54.4	54.2	53.8	53.3	52.8

C. Assessment of the Abatement Potential

GHG emissions were estimated by using the Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), and the results of the technical-economical evaluations at the sectoral level for the period from 2005 to 2030, under the considered scenarios. Estimation methodologies and emission factors were used from the Revised IPCC 1996 Guidelines for National GHG Inventories (IPCC, 1997), Good Practice Guidance (IPCC, 2000) and the IPCC 2006 Guidelines for National GHG Inventories (IPCC, 2006).

Aggregated direct GHG emission estimates and disaggregated direct GHG emission estimates originated from the sources categories covered by the Agriculture Sector are presented in Tables 5-34 and 5-35, respectively.

Table 5-34: Aggregated Direct GHG Emissions from Agriculture Sector under the Scenarios Considered for the 2005-2030 time series

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
CH_4 Emissions from Agriculture Sector, Gg CO_2 eq.	863.4	1106.7	1290.9	1463.1	1712.9	1911.1
N_2O Emissions from Agriculture Sector, Gg CO_2 eq.	1264.4	1547.0	1866.8	2264.9	2624.3	2929.7
Total Emissions from Agriculture Sector, Gg CO_2 eq.	2127.8	2653.7	3157.8	3728.0	4337.2	4840.9
High Alternative Scenario (HAS)						
CH_4 Emissions from Agriculture Sector, Gg CO_2 eq.	863.4	906.8	988.4	1086.4	1294.6	1409.3
N_2O Emissions from Agriculture Sector, Gg CO_2 eq.	1264.4	1697.0	2007.3	2318.3	2576.9	2778.0
Total Emissions from Agriculture Sector, Gg CO_2 eq.	2127.8	2603.8	2995.7	3404.7	3871.5	4187.4
Intermediary Alternative Scenario (IAS)						
CH_4 Emissions from Agriculture Sector, Gg CO_2 eq.	863.4	1017.8	1117.6	1269.8	1488.2	1610.6
N_2O Emissions from Agriculture Sector, Gg CO_2 eq.	1264.4	1618.6	1959.7	2324.2	2594.7	2847.6
Total Emissions from Agriculture Sector, Gg CO_2 eq.	2127.8	2636.4	3077.3	3594.0	4082.9	4458.2

Table 5-35: Disaggregated Direct GHG Emissions from Agriculture Sector under the Scenarios Considered for 2005-2030 time series

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
CH_4 from Enteric Fermentation, Gg CO_2 eq.	792.9	967.1	1135.4	1275.1	1485.1	1648.8
CH_4 from Manure Management, Gg CO_2 eq.	70.6	139.6	155.5	187.9	227.8	262.3
Direct N_2O from Manure Management, Gg CO_2 eq.	469.2	507.7	558.8	648.9	760.1	852.7
Indirect N_2O from Manure Management, Gg CO_2 eq.	95.9	106.6	119.1	142.7	172.2	188.9
Direct N_2O from Agricultural Soils, Gg CO_2 eq.	560.2	737.1	927.2	1138.7	1300.7	1445.4
Indirect N_2O from Agricultural Soils, Gg CO_2 eq.	139.1	195.7	261.8	334.6	391.3	442.8
High Alternative Scenario (HAS)						
CH_4 from Enteric Fermentation, Gg CO_2 eq.	792.9	796.6	867.2	944.4	1124.2	1218.0
CH_4 from Manure Management, Gg CO_2 eq.	70.6	110.2	121.2	142.0	170.4	191.3
Direct N_2O from Manure Management, Gg CO_2 eq.	469.2	451.8	468.5	508.5	565.0	582.7
Indirect N_2O from Manure Management, Gg CO_2 eq.	95.9	86.2	92.0	103.2	118.6	127.7
Direct N_2O from Agricultural Soils, Gg CO_2 eq.	560.2	905.1	1118.4	1313.3	1455.2	1584.3
Indirect N_2O from Agricultural Soils, Gg CO_2 eq.	139.1	254.0	328.5	393.3	438.1	483.4

	2005	2010	2015	2020	2025	2030
Intermediary Alternative Scenario (IAS)						
CH_4 from Enteric Fermentation, Gg CO_2 eq.	792.9	893.4	980.0	1103.3	1287.7	1387.7
CH_4 from Manure Management, Gg CO_2 eq.	70.6	124.4	137.6	166.5	200.5	222.8
Direct N_2O from Manure Management, Gg CO_2 eq.	469.2	479.0	516.0	580.7	648.6	680.6
Indirect N_2O from Manure Management, Gg CO_2 eq.	95.9	92.5	101.3	118.2	138.3	151.2
Direct N_2O from Agricultural Soils, Gg CO_2 eq.	560.2	822.2	1041.4	1252.9	1391.5	1546.1
Indirect N_2O from Agricultural Soils, Gg CO_2 eq.	139.1	224.8	301.0	372.4	416.3	469.8

Figure 5-18 shows the dynamics of direct GHG emissions from Agriculture Sector under the scenarios considered for the 2005-2030 time series. Relative to the level of GHG emissions reported in 2005, it is expected that by the year of 2030, the direct GHG emissions from this sector will increase by 154.9 percent under the BLS, by 247.5 percent under the HAS and by 204.8 percent under IAS. Relative to the BLS, implementation of the planned abatement measures, by the year of 2030 will allow to reduce GHG emissions from Agriculture Sector by circa 653.5 Gg or 13.5 percent under the HAS, and by 382.7 Gg or 7.9 percent under IAS.

Efficient application of abatement measures will also influence redistribution of the greenhouse gases in the structure of total GHG emissions from Agriculture Sector. So, if in the reference year of 2005, 40.6 percent of total GHG emissions in this sector were represented by methane emissions from enteric fermentation and manure management; 59.4 percent by nitrous oxide emissions from manure management and agricultural soils, then by the year of 2030, depending on how efficiently the GHG emissions abatement measures will be applied, the situation will change significantly under all three scenarios, in particular as a result of the increased share of nitrous oxide emissions in the structure of total emissions from this sector (up to 60.5 percent of the total under the BLS, up to 63.9 percent of the total under the IAS and respectively, up to 66.3 percent under the HAS).

D. Identified Constraints for Implementation Mitigation Measures in the Agriculture Sector

The most effective mitigation measures from Agriculture Sector include:

- gradual replacement of breeds of livestock and poultry currently used in the Republic of Moldova with higher productivity breeds;
- quality improvement of the forage supply reserve by reducing the specific forage consumption in livestock breeding sector;
- use of sustainable manure management systems;
- improving the crops range, including through optimization of crop rotation, increasing the share of perennial and annual crops, extending the areas sown with forage crops and reducing the areas planted with sunflower;
- improving soil fertilization techniques, correct application of industrial fertilisers, using all organic matter sources to enrich soils with carbon and achieving a balanced content of humus and nutrients in soil;
- implementing sustainable soil management practices, combating soil degradation through diverse complex measures, including anti-erosion measures, etc.

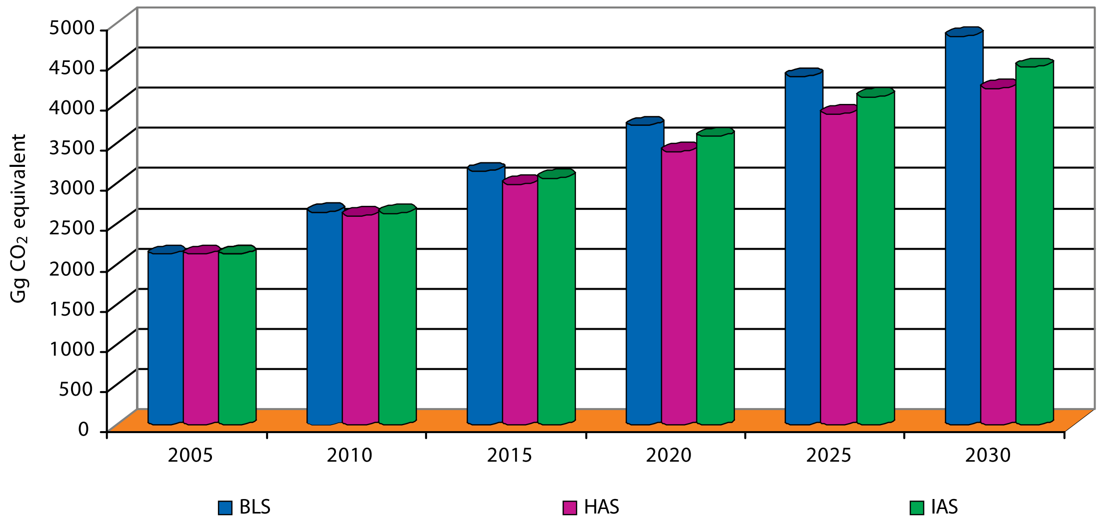


Figure 5-18: Direct GHG Emissions from Agriculture Sector under the Scenarios Considered for the 2005-2030 time series, Gg CO_2 equivalent

The above mentioned measures represent a part of a set of measures meant to ensure modern development of agriculture allowing to achieve similar economic indicators to those of the economically developed countries. At the same time, there is a number of gaps and constraints for the effective implementation of the GHG emissions mitigation measures in Agriculture Sector, including:

- the yield per hectare is relatively low in comparison with other countries in the region vary greatly from year to year what shows non-existence of risk mitigation mechanisms in the sector (soil erosion, land slides, droughts, heavy rainfall, hail, freezing, floods, etc.). In conditions of non-existence of a National Cross-Sector Risk Control and Impact Mitigation Strategy this situation will continue to persist;
- current production structure reflects the subsistence nature of agriculture in the Republic of Moldova – crop production sector is dominated by low value crops, while production of high value crops has dropped, inclusively as a result of ageing of vineyards and orchards, moral and physical depreciation of the irrigation systems, lack of modern market infrastructure (storing facilities, collection facilities, in field cooling equipment, packaging depots, etc.), relatively high costs of production and permanent financial scarcity;
- currently low efficiency in agriculture derives from the weak connections with external markets and low competitiveness of local agricultural products – the situation will remain unchanged if a vertical coordination is not achieved by establishing strong connections with the other links of the whole value chain – retailers, processors, exporters, other intermediaries, eliminating at the same time the existent deficiencies pertaining to the interfacing markets. On the other hand, the slow progress of transition from the system based on the GOST standards to the international standards also delays penetration of Moldovan products on the high value markets;
- the share of agriculture in the fixed capital investments is low and is continuously decreasing – foreign investors will continue to avoid Moldovan agriculture if the business climate will not improve, inclusively if the restriction on ownership of agricultural lands by foreign businesses persists;
- other impediments in the sustainable development of the sector pertain to excessive fragmentation of circa 50 percent of privately owned agricultural lands, what has a negative impact on the sector's economic performance; exodus of population abroad entails depopulation of villages, thus posing the labour force deficit issue; the financing of the sector research institutes is scarce and the inventory basis for experiments is obsolete.

The multitude of impediments hampering implementation of any scenario makes the „Action Plan on GHG Emissions Mitigation in Agriculture Sector for the period 2009-2013" (Annex 2-5) a more general paper, not focused on any specific scenario. However, the need for significant investments in the sector, implementation of measures aimed at combating soil erosion and turning account of low productivity lands, measures to enhance soil fertility, sustainable soil management practices, rehabilitation and construction of new irrigation systems, improving the genetic pool of breeding animals, equipping and technological upgrading of feeding lots and poultry farms, quality improvement of the forage supply reserve, etc. stands out more vividly.

5.3.4. Land Use, Land-Use Change and Forestry Sector

In the Republic of Moldova, the Land Use, Land-Use Change and Forestry Sector currently covers CO_2 emissions and removals from the following source and sink categories: 'Forest Land', 'Cropland' and 'Grassland'. It should be noted that CO_2 emissions and removals from the 'Settlements' category are currently included under the 'Cropland' category.

Projections regarding CO_2 emissions and removals from the Land Use, Land-Use Change and Forestry Sector were made based on methodological approaches set forth in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1997), Good Practice Guidance for Land Use, Land Use Change and Forestry (IPCC, 2003) and 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 2006). At the same time, to estimate CO_2 emissions reduction by forest vegetation, the CO_2 FIX V2.0 model developed by the European Forestry Institute under the CASFOR project, was also considered.

A. GHG Emissions Mitigation Scenarios

Three scenarios regarding the development of the Land Use, Land-Use Change and Forestry Sector up to the year of 2030 were developed and assessed based on the National Forestry Sector Sustainable Development Strategies and Programs (Strategy for Sustainable Development of the Forestry Sector, adopted through the Parliament Resolution No. 350-XV as of 12.07.2001; the National Strategy and Action Plan on Biologic Diversity Conservation, adopted through the Parliament Resolution No. 112-XV as of 27.04.2001; New Lands Use and Enhancing Soil Fertility Program, adopted through the Government Resolution No. 636 as of May 25, 2003; State Program on Regeneration and Afforestation of Lands Belonging to the Forestry Fund in 2003-2020, adopted through the Government Resolution No. 737 as of June 17, 2003), as well as based on the overall international and national trends regarding the need to continuously improve quality and quantity indicators of forests and other types of forest vegetation.

Baseline Scenario (BLS) – is an option implying an increase of the CO_2 removal capacities in conformity with the activities stipulated in national sector legislation and Forestry Sector Sustainable Development Strategies and Programs. This refers, in the first place, to growth of areas covered with forests (2005-2030), from 362.7 thousand ha to 485.3 thousand ha (by 33.8 percent); areas covered with other types of forest vegetation, from 49.3 thousand ha to 113.7 thousand ha or by 130.6 percent. It is also implied that areas covered by vineyards will increase from 155.5 thousand ha to 170.5 thousand ha (by 9.6 percent); orchards, from 142.3 thousand ha to 174.1 thousand ha (by 22.3 percent). It is expected that areas covered with grasslands will increase from 373.5 thousand ha to 471.0 thousand ha (by 26.1percent). In the period from 2005 to 2030 the fuel wood harvesting will increase from 395.4 thousand m^3, to 1,029.5 thousand m^3 (by 160.4 percent), meaning that the current plantations utilization degree will increase from 1,285.7 thousand m^3 to 1,806.2 thousand m^3 (by 40.5 percent). It is implied that the above mentioned wood mass harvesting will not affect the general condition and functionality of the woods because the cutting of main products will be followed by activities aimed at regeneration of plantations, while clean sanitation cuttings will aim at improving the condition, productivity and functionality of forests. Even in case of achieving the planned indicator for the degree of using current increments of 75 percent, it is planned to continue to accumulate the standing wood mass.

High Alternative Scenario (HAS) – implies an increase, relative to the Base Line Scenario, of annual indicators regarding expansion of areas covered by different types of forest vegetation, perennial plantations and grasslands by circa 20 percent, starting the year 2008. The respective increase will be achieved on account of the following:

- speeding up expansion of areas covered by different types of forest vegetation on account of public and private lands;
- expanding the area of grasslands on the account of eroded agricultural lands (currently there are circa 800 thousand ha of agricultural lands affected by erosion, including circa 100 thousand ha of highly eroded lands);
- keeping the indicators regarding wood mass harvesting from sanitation treatments at the current level compliant with provisions of effective legislation;
- decreasing the amount of wood mass from illegal logging;
- in conformity with some models of climate evolution in the first half of the XXI century, a slight increase of woods productivity is possible (up to 10 percent), what will also result in an increased amount of removals of carbon dioxide emissions;
- significant expansion of areas covered with forest vegetation in the context of more active promotion of agricultural-forestry and forestry-pastoral practices: improving grasslands by planting groups of trees and shrubs, delimitation of external boundaries and internal plots of the grasslands by planting forest belts, etc.;
- implementing grasslands improvement / revitalization activities: increasing the current capacity of 0.6–1.2 t of constant mass per hectare up to 4-5 t of constant mass per hectare;
- implementing a new phase in expanding areas covered with forest vegetation (on account of eroded lands, planting energy plantations, etc.).

Low Alternative Scenario (LAS) – implies a decrease, relative to the BLS, of indicators referring to extension of areas covered with different types of vegetation by circa 20 percent, starting 2008, due to:

- cutting off budget allocations for afforestation activities;
- wasting of new plantations by grazing and other forestry contraventions;
- re-orientation of private farmers towards intensive agriculture;
- worsening of climate conditions;
- failure to implement mechanisms of financial-economic stimulation of the process of expanding different types of forest vegetation, perennial plantations, etc.;
- increased wood mass harvests, including as a result of illegal logging;
- essential expansion of forest stand affected by diseases and forest pests and reducing annual increments by 10-50 percent.

B. Results of the Technical-Economical Evaluation

The projections on the economical indicators reported within the Land Use, Land-Use Change and Forestry Sector, with direct impact on net carbon dioxide removals for the three scenarios considered under current assessment are presented below.

The activity data on evolution of areas covered with forest vegetation (Table 5-36) were generated based on projections included in the Forestry Sector Sustainable Development Strategy (adopted through the Parliament Resolution No. 350-XV as of 12.07.2001), The National Strategy and Action Plan on Biologic Diversity Conservation, adopted through the Parliament Resolution No. 112-XV as of 27.04.2001; New lands Use and Enhancing Soil Fertility Program, adopted through the Government Resolution No. 636 as of May 25, 2003; State Program on Regeneration and Afforestation of Lands Belonging to the Forestry Fund in 2003-2020, adopted through the Government Resolution No. 737 as of June 17, 2003), as well as based on the overall international and national trends regarding the need to continuously improve quality and quantity indicators of forests and other types of forest vegetation.

Table 5-36: Evolution of Economical Indicators in the LULUCF Sector, 2005-2030

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Forests, thou. ha	362.7	395.5	414.7	428.9	447.8	485.3
Forest vegetation not part of the forestry fund, thou. ha	49.3	54.3	78.1	97.9	113.7	113.7
Arable lands, thou. ha	1833.2	1830.0	1825.0	1820.0	1815.0	1810.0
Orchards, thou. ha	131.1	148.7	155.0	161.4	167.7	174.1
Vineyards, thou. ha	157.3	158.5	161.5	164.5	167.5	170.5
Grasslands, thou. ha	370.2	393.0	412.5	432.0	451.5	471.0
Trees on settlement lands, mil. trees	8.3	8.3	8.3	8.4	8.4	8.4
High Alternative Scenario (HAS)						
Forests, thou. ha	362.7	410.9	436.6	455.6	479.5	523.6
Forest vegetation not part of the forestry fund, thou. ha	49.3	56.4	82.2	104.0	121.7	122.7
Arable lands, thou. ha	1833.2	1815.0	1795.0	1785.0	1765.0	1735.0
Orchards, thou. ha	131.1	154.5	163.2	171.5	179.6	187.8
Vineyards, thou. ha	157.3	164.7	170.0	174.8	179.3	183.9
Grasslands, thou. ha	370.2	396.9	420.3	443.7	467.1	490.5
Trees on settlement lands, mil. trees	8.3	8.3	8.4	8.4	8.5	8.5
Low Alternative Scenario (LAS)						
Forests, thou. ha	362.7	380.2	392.8	402.2	416.1	447.0
Forest vegetation not part of the forestry fund, thou. ha	49.3	52.2	74.0	91.8	105.7	104.7
Arable lands, thou. ha	1833.2	1820.0	1815.0	1800.0	1785.0	1765.0
Orchards, thou. ha	131.1	142.9	146.8	151.3	155.8	160.4
Vineyards, thou. ha	157.3	152.4	153.0	154.2	155.7	157.1
Grasslands, thou. ha	370.2	389.1	404.7	420.3	435.9	451.5
Trees on settlement lands, mil. trees	8.3	8.3	8.3	8.3	8.3	8.3

Based on the data mentioned above, as well as based on the Government Resolution No. 1337 as of December 16, 2005 on approving the possibility to harvest the wood mass during main products cuttings in 2006-2010, and based on the alternative scenarios on evolution of areas covered with forest vegetation and international and local wood products consumption, the projections pertaining to wood mass harvesting during wood cuttings in the period up to the year of 2030, showing an increase of the degree of using current increments from 30 percent (2005), up to 75 percent (2030) (Table 5-37).

Table 5-37: Evolution of Current Increments of Wood Mass Harvested during Authorised Wood Cuttings and Illegal Logging Revealed within 2005-2030 time series

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Total volume of current increments, thousand m^3	1285.7	1403.0	1509.2	1591.7	1682.4	1806.2
Total volume of harvested wood mass, thousand m^3	395.4	631.3	679.1	955.0	1261.8	1354.6
High Alternative Scenario (HAS)						
Total volume of current increments, thousand m^3	1285.7	1414.3	1555.7	1711.3	1882.4	2070.6
Total volume of harvested wood mass, thousand m^3	395.4	707.1	855.6	1112.3	1411.8	1553.0
Low Alternative Scenario (LAS)						
Total volume of current increments, thousand m^3	1285.7	1348.6	1429.6	1492.5	1563.4	1663.8
Total volume of harvested wood mass, thousand m^3	395.4	606.9	643.3	895.5	1172.5	1247.9

C. Assessment of the Abatement Potential

Estimation of net CO_2 removals under the Land Use, Land-Use Change and Forestry Sector has been performed by using the CO_2 FIX V2.0 Model, developed by the European Forestry Institute under the CASFOR Project, as well as employing the Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), and the results of the technical-economical evaluations at the sectoral level for the period from 2005 to 2030, under the considered scenarios. Estimation methodologies and emission factors were used from the Revised IPCC 1996 Guidelines for National GHG Inventories (IPCC, 1997), Good Practice Guidance for LULUCF (IPCC, 2003) and the 2006 IPCC Guidelines for National GHG Inventories (IPCC, 2006).

The estimates regarding the amount of GHG reduced through carbon dioxide emissions removal under the LULUCF Sector are provided in Table 5-38.

Table 5-38: Net CO_2 Removals from the LULUCF Sector in the Republic of Moldova under the considered scenarios within the 2005-2030 time series, Gg

	2005	2010	2015	2020	2025	2030
BLS	-1381.4	-1415.9	-1451.3	-1487.6	-1524.8	-1562.9
HAS	-1381.4	-1557.5	-1669.0	-1785.1	-1829.8	-1875.5
LAS	-1381.4	-1274.3	-1233.6	-1190.1	-1219.8	-1250.3

Figure 5-19 shows the dynamics of CO_2 emissions removal under the Land Use, Land Use Change and Forestry sector in 2005-2030 for the assessed scenarios. Relative to the level of CO_2 emissions removal recorded in 2005, it is expected that by 2030 the amount of CO_2 emissions removed under this sector will increase by circa 13.1 percent under the BLS, and by 35.8 percent under the HAS scenario, and a decrease of CO_2 emissions removal by circa 9.5 percent is expected under the LAS. Relative to the BLS, implementation of the planned abatement measures under HAS by 2030 will allow to increase the amount of removed CO_2 emissions by circa 312.6 Gg or 20 percent.

D. Identified Constraints for Implementation Mitigation Measures in the LULUCF Sector

Current condition of forests in the Republic of Moldova requires implementation of activities focused on quality improvement and aiming at increasing the CO_2 removal capacity. The main unfunctionalities featuring the current condition of forests in the Republic of Moldova are: low degree of afforestation, evidently insufficient to maintain a constant ecological balance; low vitality and poor health of forests; high dispersion of forest bodies, which are placed unevenly, with no necessary interconnection forest strips, which have a particular importance both for the viability of the forestry fund as such, as well as for protection of biodiversity, soils, waters, etc.; about 60 percent of forests in their 2nd-4th generation have their vegetative origin from offshoots thus being much less resistant to biotic and biotic harmful factors, and circa 40 percent of the forest stand does not correspond to stationary conditions; insufficient use of the stationary forestry potential, resulting in relatively low productivity of forests, etc.; presence within the protected areas of forest stand which are degraded, derived, forest stand of introduced species having an aggressive behaviour towards aboriginal species, etc.; poor technical equipment, scarce financing, lack of a legislative and economic framework allowing to accumulate alternative funding for maintenance of species comprised by natural protected areas; uncontrolled and unmanaged leisure time spending opportunities, wide access of population in forests.

To improve the situation created in the forestry sector it is necessary to: implement the program aimed at expanding areas covered by forest vegetation; carry out a complex assessment of the current condition of forests and forecast its evolution in future, taking into account the climate change scenarios; develop and implement a national program designed to improve the condition of degraded forests and conservation of forest biodiversity; finalize the functional division of the forestry fund into zones, and establish the corresponding management systems; reduce the anthropogenic pressure on the forests; finalise the process of completing the seed pool; gradually reconstruct the forest stand which does not correspond to stationary conditions; gradually convert the *Quercus genus* standing stock from the grove to the forest status; expand the green zone of urban and rural settlements and integrate them in the national forest network; increase the input of the forestry sector to economic and social national development; design and implement the economic-financial mechanism to promote forestry policies, etc.

In this context, the most efficient measures to increase the carbon dioxide removal capacities under the LULUCF sector are:

- speeding up expansion of areas covered by forests and other types of forest vegetation on account of public and private lands;
- implementing a new phase of expanding the areas covered with forests (on the account of eroded lands and, planting energy forests, etc.);

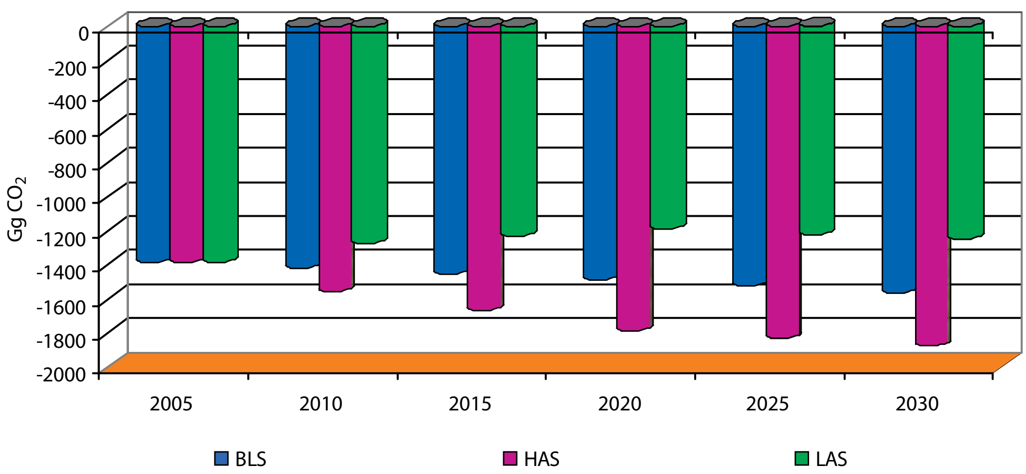


Figure 5-19: Net CO_2 Removals from the LULUCF Sector in the Republic of Moldova under the considered scenarios within the 2005-2030 time series, Gg

- keeping the indicators regarding wood mass harvesting from sanitation treatments at the current level compliant with provisions of effective legislation;
- decreasing the amount of wood mass from illegal cuttings;
- ecological reconstruction of the forest stand;
- in conformity with some models of climate evolution in the first half of the XXI century, a slight increase of woods productivity is possible (up to 10 percent), what will also result in an increased amount of removals of carbon dioxide emissions;
- significant expansion of areas covered with forest vegetation in the context of more active promotion of agricultural-forestry and forestry-pastoral practices: improving grasslands by planting groups of trees and shrubs, delimitation of external boundaries and internal plots of the grasslands by planting forest belts, etc.;
- implementing grasslands improvement / revitalization activities: increasing the current capacity of 0.6–1.2 tonnes of constant mass per hectare up to 4-5 tonnes of constant mass per hectare;
- expansion of grasslands on the account of agricultural lands affected by erosion.

The main constraints on the way to implementation of measures aimed at increasing the carbon dioxide removal capacities under the Land Use, Land-Use Change and Forestry Sector are the following:

- cutting off budget allocations for afforestation activities;
- wasting of new plantations by grazing and other forestry contraventions;
- re-orientation of private farmers towards intensive agriculture;
- worsening of climate conditions;
- failure to implement mechanisms of financial-economic stimulation of the process of expanding different types of forest vegetation, perennial plantations, etc.;
- increased wood mass harvests, including as a result of illegal logging;
- essential expansion of the forest stand affected by diseases and forest pests and reduction of annual increments by 10-50 percent.

The cost of measures focused on increasing the carbon dioxide removal capacities under the Land Use, Land-Use Change and Forestry Sector (Table 5-39) was estimated based on the data stated above. It should be noted that besides aspects related to CO_2 emissions reduction, most measures are synergistic, able to generate other multiple socio-economic and environmental benefits.

5.3.5 Waste Sector

The Waste Sector covers direct greenhouse gas (CH_4 and N_2O) emissions from domestic and industrial solid waste ('Solid Waste Deposits on Land' source category), as well as from domestic and industrial wastewater treatment ('Wastewater Handling' source category).

The projections for GHG emissions under the respective sector were made based on methodological approaches set forth in the Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000).

A. GHG Emissions Mitigation Scenarios

Three development scenarios were assessed for the Republic of Moldova' Waste Sector for the period up to the year of 2030.

Table 5-39: Costing of Measures Aimed at Increasing the CO_2 Emissions Removal Capacity under the Land Use, Land-Use Change and Forestry Sector, 2005-2030

Activities / measures	Expansion of areas, thousand ha	CO_2 removals, thousand tonnes	Investments, thousand USD	Cost, USD/t CO_2
Expansion of areas covered with forests	160.9	97,979	566,810	5.8
Expansion of areas covered with other types of forest vegetation	73.4	34,107	146,800	4.3
Ecological reconstruction of the forest stand	130.0	24,930	325,000	13.0
Planting of energy forests	20.0	16 390	60,000	3.7
Expanding the areas of vineyards	28.4	1,943	198,800	102.3
Expanding the areas of orchards	45.5	5,274	445,900	84.5
Expanding the areas of grasslands and improvement measures	117.0	56,397	79,560	1.4
Activities aimed at improving forests and other types of forest vegetation administration and management			55,055	
TOTAL		**237,020**	**1,877,955**	**7.9**

Baseline Scenario (BLS) – is an option implying an increase by circa 30 percent annually of the of municipal solid waste generation rate by the year of 2010 and by 5 percent annually between 2011 and 2030; respectively, in rural areas: by 1 percent annually by the year of 2010 and by 3 percent annually between 2011 and 2030; the industrial waste generation rate will increase by 5 percent annually by the year of 2015, by 4 percent annually between 2016 and 2024, and by 3.5 percent annually between 2025 and 2030; numerically, the country population will decrease by 1 percent annually until the year of 2020 and will grow by 1 percent annually starting year of 2021; the protein consumption per capita will increase by circa 1 percent annually between 2006 and 2009, and respectively by circa 2 percent annually between 2010 and 2030; the number of population with access to sewerage systems will increase from 68 percent of the total population at present, to circa 75 percent between 2010 and 2015, to circa 80 percent between 2016 and 2020, and respectively, up to circa 90 percent of the total number of population between 2021 and 2030; the amount of domestic and industrial wastewater treated anaerobically will amount to circa 20 percent of the total over the whole period of assessment.

High Alternative Scenario (HAS) – is an option implying the same variations of the main indicators reported under this sector, as the variations estimated for the Baseline scenario, except for: proteins consumption per capita, that will increase by circa 1.5 percent annually between 2006 and 2009, respectively by circa 2.5 percent annually over the period from 2010 to 2030; considerably more population will have access to sewerage, circa 80 percent of the total population in 2010-2015, circa 85 percent in 2016-2020, and respectively circa 95 percent in 2021-2030; the amount of domestic and industrial waste water treated anaerobically will reduce from the current 20 percent of the total, to 15 percent in 2011-2015, to 10 percent in 2016-2025, and respectively, 5 percent in 2026-2030. Additionally, this scenario implies employment of other efficient abatement measures, such as: recycling of about 20 percent of the total paper and cardboard by 2010, about 30 percent in 2011-2015, about 40 percent in 2016-2020; about 50 percent in 2021-2025; and respectively 60 percent in 2026-2030; recovery of biogas at the solid waste deposit site in Cretoaia village, Anenii-Noi district starting 2009 (the company “Biogas Inter” Ltd plans to recover circa 5 thousand tonnes of biogas annually); construction and putting into operation of a waste incinerating plant in Chişinau starting year 2011, having a maximal rated capacity of circa 660 thousand tonnes of municipal solid waste annually. Other multiple activities stipulated in the National Municipal and Industrial Waste Management Program (approved through the Government Resolution No. 606 as of 28.06.2000) and the Sanitation Concept of Settlements in the Republic of Moldova (approved through the Government Resolution No.486 as of 02.05.2007).

Intermediary Alternative Scenario (IAS) – is an option implying the same variations of the main indicators reported under this sector, as the variations estimated for the Baseline Scenario, except for: proteins consumption per capita, that will increase by circa 1.25 percent annually between 2006 and 2009, by 2.25 percent annually between 2010 and 2030; considerably more population will have access to sewerage, reaching 80 percent in 2010-2015, 85 percent in 2016-2020, and circa 95 percent of the total population in 2021-2030; the amount of domestic and industrial waste water treated anaerobically will reduce from the current 20 percent of the total, to 17.5 percent in 2011-2015, to 15 percent in 2016-2025, and respectively to 10 percent in 2026-2030. It is planned to apply abatement measures designed under the high alternative scenario, with one exception – this scenario does not provide for construction of a waste incineration plant in Chisinau.

B. Results of the Technical-Economical Evaluation

The projections regarding the evolution of some indicators specific for the Waste Sector with an impact on direct greenhouse gas emissions under the three considered scenarios are presented below.

Table 5-40 features the projections on morphological composition of the municipal solid wastes in the Republic of Moldova, underlying the estimated country specific values of the degradable organic carbon fraction (DOC) for 2005-2030.

Table 5-40: Projections on Morphological Composition of the Municipal Solid Wastes in the Republic of Moldova between 2005 and 2030, %

Waste Type	Waste Stream	2005	2010	2015	2020	2025	2030
Recyclable waste	Paper, cardboard	7.0	5.8	3.3	2.6	2.1	1.6
	Glass	7.1	5.9	3.4	2.6	2.1	1.6
	Plastics	12.1	10.1	5.8	4.5	3.6	2.8
	Metals and non-metals	4.0	3.3	1.9	1.5	1.2	0.9
Organic waste	Edible wastes	56.1	56.7	57.2	57.8	58.4	59.0
	Leaves, grass and branches	1.7	1.8	1.9	2.0	2.1	2.2
	Textile	4.7	3.9	2.2	1.7	1.4	1.1
Construction waste	Wood	1.8	1.7	1.6	1.5	1.4	1.3
	Other waste, including construction and debris	4.4	9.8	21.8	25.0	27.0	28.9
Other waste	Footwear	1.1	1.0	0.9	0.8	0.7	0.6
	Total	100.0	100.0	100.0	100.0	100.0	100.0

The country specific values of the degradable organic carbon (DOC) fraction and dissimilated degradable organic carbon fraction (DOC_f) (Table 5-41) were calculated by using the “MSW Learning Tool” developed by the University of Florida (1996) based on the results of laboratory tests made by Dr. Morton Barlay (1987, 1997), and Chandler’s, Van Soest researches (1980).

Table 5-41: Degradable Organic Carbon (DOC) and Dissimilated Degradable Organic Carbon (DOC_f) Values Used to Estimate Methane Emissions from the Solid Waste Disposal on Land in the Republic of Moldova, 2005-2030

	2005	2010	2015	2020	2025	2030
DOCf	0.585	0.592	0.607	0.612	0.616	0.621
DOC	0.146	0.138	0.119	0.114	0.111	0.108

Projections on municipal solid waste disposal on managed landfills (i.e., Chisinau), unmanaged solid waste disposal sites (i.e., urban settlements on the right and left banks of the Dniester river), as well as projections regarding industrial waste disposal on land used in the Baseline Scenario are presented in the Table 5-42.

Undertaking abatement measures will induce reduction of amounts of Municipal Solid Waste Disposal on Land, in principal on account of recyclable waste recovery (paper, cardboard, glass, metal and plastics) under the IAS; while under the HAS, both on the account of recyclable waste recovery, as well as on the account of renunciation of the practice to dispose on land the generated municipal solid waste – all MSW generated in urban areas are expected to be incinerated (by 2011 it is planned to put into operation a waste incineration plant in Chisinau, with an initial processing capacity of circa 660 thousand tonnes annually; in future similar plants but with smaller capacity are planned to be set into operation in other large urban settlements of the country).

Table 5-42: Projections on the Amount of Solid Waste Disposal on Land under the Baseline Scenario in the Republic of Moldova in 2005-2030 time series, thousand tonnes

	2005	2010	2015	2020	2025	2030
Managed Waste Disposal on Land	314.2	364.2	464.9	593.3	757.2	966.4
Unmanaged Waste Disposal on Sites	328.2	528.6	674.6	861.0	1098.9	1402.5
Industrial Waste Disposed at Landfills	556.4	710.2	906.4	1102.8	1335.2	1585.8
Total Solid Waste Disposal on Land	1198.8	1603.0	2045.9	2557.1	3191.3	3954.7

Projections on the total amount of organic matter contained in industrial wastewater (TOW_{ind}) and in domestic wastewater (TOW_{dom}), used to estimate methane emissions from wastewater treatment are given in Table 5-43.

Table 5-43: Projections on the Total Organic Wastewater in the Republic of Moldova under the Considered Scenarios for the 2005-2030 time series

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
TOW_{ind}, t BOD_5	10270297.5	13107791.3	16729232.4	20353669.1	24644296.0	29269692.9
TOW_{dom}, t BOD_5	49756276.8	54128782.1	53244204.1	56077382.8	62943289.8	62508314.9
High Alternative Scenario (HAS)						
TOW_{ind}, t BOD_5	10270297.5	14744340.2	20010469.1	26778521.6	35162746.5	44877565.1
TOW_{dom}, t BOD_5	49756276.8	57610251.5	56432825.3	58723427.9	64915252.1	63650702.7
Intermediary Alternative Scenario (IAS)						
TOW_{ind}, t BOD_5	10270297.5	13743974.8	18047957.2	23587958.3	30246861.0	37693091.9
TOW_{dom}, t BOD_5	49756276.8	57776979.1	56759910.6	59255188.4	65734566.4	64848114.9

Projections on consumption of proteins per capita, used to estimate N_2O emissions from human sewage are provided in Table 5-44.

C. Assessment of the Abatement Potential

GHG emissions from the Waste Sector were estimated by using the INFRAS Tool for calculating CH4 emission from solid waste disposal sites, provided to national experts under the UNDP-GEF Regional Project "Capacity Building to Improving the Quality of Greenhouse Gas Inventories (Europe/CIS countries)", as well as the Software for the Workbook of the Revised 1996 IPCC Guidelines (IPCC, 1997), and the results of the technical-economical evaluations at the sectoral level for the period from 2005 to 2030, under the considered scenarios. Estimation methodologies and emission factors were used from the Revised 1996 IPCC Guidelines for National GHG Inventories (IPCC, 1997) and

Table 5-44: Projections on Consumption of Proteins per Capita, in the Republic of Moldova under the Considered Scenarios for the 2005-2030 time series

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Proteins, g/person/day	78.6	83.4	92.1	101.7	112.3	124.0
Proteins, kg/person /year	28.7	30.4	33.6	37.1	41.0	45.2
High Alternative Scenario (HAS)						
Proteins, g/person/day	78.6	85.5	96.7	109.5	123.8	140.1
Proteins, kg/person /year	28.7	31.2	35.3	39.9	45.2	51.1
Intermediary Alternative Scenario (IAS)						
Proteins, g/person/day	78.6	84.5	94.4	105.5	117.9	131.8
Proteins, kg/person /year	28.7	30.8	34.4	38.5	43.0	48.1

Good Practice Guidance (IPCC, 2000). Country specific emission factors were also used. Estimates of direct GHG emissions generated from the source categories covered by the Waste Sector are given in the Table 5-45.

Figure 5-23 features the dynamics of direct GHG emissions generated from the Waste Sector under the scenarios considered for the Republic of Moldova for the time period 2005-2030.

Compared to the level of GHG emissions reported in 2005, an increase of direct GHG emissions generated from this sector in the Republic of Moldova is expected by the year of 2030: by 143 percent under the BLS, by 63 percent under the HAS, and by 86.7 percent under the IAS.

Relative to the Baseline Scenario, implementation of the planned abatement measures by the year of 2030 will allow to reduce GHG emissions generated from the Waste Sector in the Republic of Moldova by 32.9 percent under the High Alternative Scenario, respectively by 23.1 percent under the Intermediary Alternative Scenario.

Under alternative scenarios, implementation of the abatement measures will have an impact upon the re-distribution of shares of different source categories in the structure of total GHG emissions from the Waste Sector.

Thus, if in 2005 circa 84.7 percent of total GHG emissions were generated from the source category 6.A 'Solid Waste Disposal on Land', and the rest of 15.3 percent from the source category 6.B 'Wastewater Handling', then by 2030 the share of different source categories in the structure of total GHG emissions generated from the Waste Sector will change significantly, in particular under the HAS, 65.2 percent of the total GHG emissions will be generated by the source category 6.A 'Solid Waste Disposal on Land', 10.0 percent from the source category 6.B 'Wastewater Handling' and the rest of 24.8 percent from the source category 6.C 'Waste Incineration'.

D. Identified Constraints for Implementation Mitigation Measures in the Waste Sector

Waste management practices have a potential impact on environment through soil, water contamination, harmful emissions, including GHG emissions, if waste is not managed adequately.

Along with successful accomplishments achieved by highly industrialised countries in recycling waste, a good deal of waste continues to be landfilled, thus increasing the amount of waste generated per capita. The situation is particularly precarious in developing countries, inclusively in the Republic of Moldova, which has poor recyclable waste recovery systems, and depositing capacities are below the acceptable level from the environment protection perspective.

Under such circumstances, the need to undertake a comprehensive analysis of the legal, institutional and normative

Table 5-45 Direct GHG Emissions from Waste Sector in the Republic of Moldova under the scenarios considered for the 2005-2030 time series

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
6.A CH_4 Emissions from SWDS, Gg CO_2 eq.	1186.2	1306.8	1588.3	1972.9	2463.7	3072.2
6.B CH_4 Emissions from Wastewater Handling, Gg CO_2 eq.	121.0	135.9	141.1	154.1	176.6	185.0
6.B N_2O Emissions from Wastewater Handling, Gg CO_2 eq.	92.7	97.6	107.3	117.8	130.4	144.7
6.C CO_2 Emissions from Waste Incineration, Gg CO_2 eq.	0.0	0.0	0.0	0.0	0.0	0.0
6.C N_2O Emissions from Waste Incineration, Gg CO_2 eq.	0.0	0.0	0.0	0.0	0.0	0.0
6. Total GHG Emissions from Waste Sector, Gg CO_2 eq.	1400.0	1540.4	1836.6	2244.8	2770.6	3401.9
High Alternative Scenario (HAS)						
6.A CH_4 Emissions from SWDS, Gg CO_2 eq.	1186.2	1045.6	987.2	1081.6	1261.2	1487.8
6.B CH_4 Emissions from Wastewater Handling, Gg CO_2 eq.	121.0	135.5	122.8	117.0	113.5	65.0
6.B N_2O Emissions from Wastewater Handling, Gg CO_2 eq.	92.7	100.1	112.7	126.8	143.8	163.5
6.C CO_2 Emissions from Waste Incineration, Gg CO_2 eq.	0.0	0.0	251.3	320.8	409.4	522.5
6.C N_2O Emissions from Waste Incineration, Gg CO_2 eq.	0.0	0.0	21.0	26.8	34.2	43.6
6. Total GHG Emissions from Waste Sector, Gg CO_2 eq.	1400.0	1281.1	1495.0	1672.9	1962.0	2282.3
Intermediary Alternative Scenario (IAS)						
6.A CH_4 Emissions from SWDS, Gg CO_2 eq.	1186.2	1188.0	1391.5	1611.1	1927.6	2344.3
6.B CH_4 Emissions from Wastewater Handling, Gg CO_2 eq.	121.0	135.7	136.1	133.1	124.2	116.3
6.B N_2O Emissions from Wastewater Handling, Gg CO_2 eq.	92.7	98.9	109.9	122.3	137.0	153.8
6.C CO_2 Emissions from Waste Incineration, Gg CO_2 eq.	0.0	0.0	0.0	0.0	0.0	0.0
6.C N_2O Emissions from Waste Incineration, Gg CO_2 eq.	0.0	0.0	0.0	0.0	0.0	0.0
6. Total GHG Emissions from Waste Sector, Gg CO_2 eq.	1400.0	1422.6	1637.5	1866.5	2188.7	2614.4

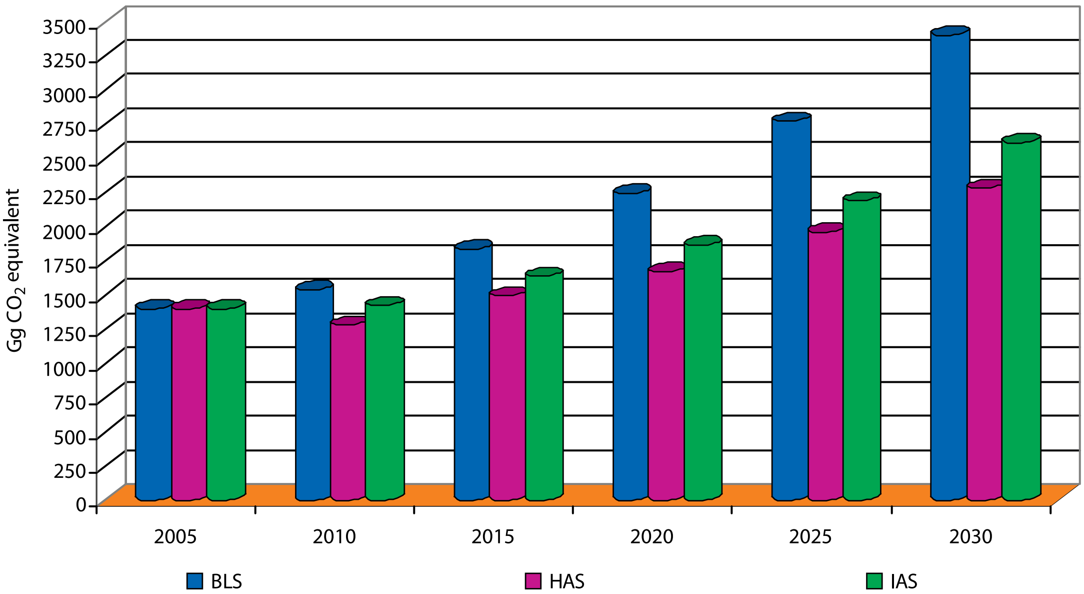


Figure 5-20: Dynamics of direct GHG emissions generated from Waste sector under the assessed scenarios for the time period 2005-2030, Gg CO_2 equivalent

framework in view of developing relevant recommendations regarding harmonization of national sector legislation to the *Acquis Communautaire,* is rather acute and topical.

For example, transposition of the *Directive 99/31/EC on the landfill of waste* (regulates construction, operation and landfill recovery and implies application of measures, procedures and guidelines on prevention or reduction of negative effects on the environment from the depositing waste on land) into national legislation will require development of new approaches in planning sanitation services and construction of municipal solid waste disposal sites.

Based on international practices, it would be reasonable to built a few centralized landfills in the Republic of Moldova, each for circa 300–500 thousand population, thus assuring operation of 8-14 managed landfills run in conformity with the European environment protection requirements.

Another major sector specific problem is the problem of handling wastewater and sludge generated from the wastewater treatment process. In the Republic of Moldova industrial and domestic wastewaters (after generation industrial wastewaters are discharged into the domestic wastewater sewage system, thus being treated together with the domestic wastewaters) are treated by classical aerobic method (mechanic and biological), however, due to improper operation of the existent treatment facilities, a portion of wastewater (circa 20 percent of the total) is treated anaerobically, thus contributing to generation of methane emissions. Another relevant source of methane emissions is the sludge removed from wastewater which is treated aerobically and anaerobically, and applied onto land. It should be noted that in the time period from 1990 to 1999, domestic wastewater treatment systems were managed by "Apa-Canal" facility. Further these systems were divested to local public authorities, which were not ready to take over management of these systems, as they lacked the infrastructure and the financial resources needed to ensure proper operation. Under such circumstances the treatment facilities fell into disrepair and most of them are out of operation.

At present domestic wastewater are treated in most urban settlements of the RM, but only partially. It should be mentioned that in most rural settlements sewage systems are also deteriorated.

In urban areas, where wastewater treatment facilities are operational, sludge is treated by placing it on sludge platforms. Starting from the point that project capacities of all existent treatment facilities, as a rule, are bigger (by circa 2-10 times, and in some places even more) than the amount of actually generated wastewaters, all such facilities have spare space for sludge depositing. Only in big cities, such as Chisinau, Balti and Cahul, due to lack of sludge treatment technologies, sludge is deposited in layers thicker than 50 cm, what generates anaerobic processes and induces methane emissions. Under these circumstances, it is deemed necessary to change the wastewater treatment management practices currently used in the Republic of Moldova, a measure that has to be accompanied by increasing the population coverage with centralised sewage systems and reconstruction of wastewater treatment facilities in the country. Water supply and sewage sector management has to focus on proper use of aerobic treatment of wastewater and anaerobic treatment of sludge technologies allowing to capture methane emissions.

In the context of the above said, the most effective abatement measures for the GHG emissions generated from the Waste Sector could include the following:

- recovery of recyclable materials (objectives: recovery of paper and cardboard in proportion up to 20 percent of the total by 2010, in proportion up to 30 percent by 2015, in proportion up to 40 percent by 2020; in proportion up to 50 percent by 2025 and in proportion up to 60 percent by 2030);
- biogas recovery at the domestic solid waste deposits sites (in 2009 the company "Biogas Inter" Ltd has already initiated methane recovery at the Cretoaia landfill, Anenii-Noi district; objective: recovery of circa 3-5 thousand tonnes of biogas annually over the period of time up to year 2018);
- construction and putting into operation of a waste incinerating plant in Chişinau starting year of 2011, having a maximal rated capacity of circa 660 thousand tonnes of municipal solid waste annually;
- reconstruction of wastewater treatment facilities in the country and proper management of the water supply and sewage sector focused on employment of aerobic treatment of wastewater and anaerobic treatment of sludge technologies allowing to capture methane emissions.

It should be mentioned that these are just a few of the possible abatement measures for the Waste Sector. Implementation of these measures lies within the competence of the local public authorities, in particular of the Chisinau municipal, because the most important reductions will be possible to achieve due to methane recovery at the landfill in Cretoaia village, Anenii-Noi district, assembling and putting into operation of installations for the anaerobic treatment of sludge at the wastewater treatment plant in Chisinau and changing the practice of waste disposal by building a waste incinerator in Chisinau by 2011. Regarding separate collection of recyclable waste, in particular, of paper and cardboard, this will persist in future, as cardboard manufacturing operation requires significant supplies of secondary raw materials.

The multitude of impediments hampering the implementation of any abatement scenario under the Waste Sector makes the „Action Plan on GHG Emissions Mitigation in Waste Sector for the period 2009-2013" (Annex 2-7) a more general paper not focused on any specific abatement scenario. However, there is a higher certainty about the need for major investments in reconstruction of wastewater treatment facilities in the country, construction of a waste incineration plant in Chisinau and implementation of modern municipal solid waste management systems in the Republic of Moldova.

5.4 Medium Term Projections of Direct Greenhouse Gas Emissions at the National Level

Further are presented projections for the three considered scenarios of the direct greenhouse gas emissions at the national level in the Republic of Moldova for the 2005-2030 time series. It should be noted that the BLS, as a rule, does not provide for abatement measures, while the alternative scenarios (HAS and IAS) have taken into account the policies and measures designed to mitigate the greenhouse gas emissions, included in the Sectoral Action Plans on greenhouse gas emissions abatement, in conformity with the Party's commitments under the UNFCCC and Kyoto Protocol (Annex 2).

Thus, the Table 5-46 features the results of the projections of direct greenhouse gas emissions by sector (except Solvents and Other Products Use Sector, contribution of which was deemed to be insignificant - less than 0.5 percent of the national total GHG emissions, being not taken into account) in the Republic of Moldova under the scenarios considered for the 2005-2030 time series.

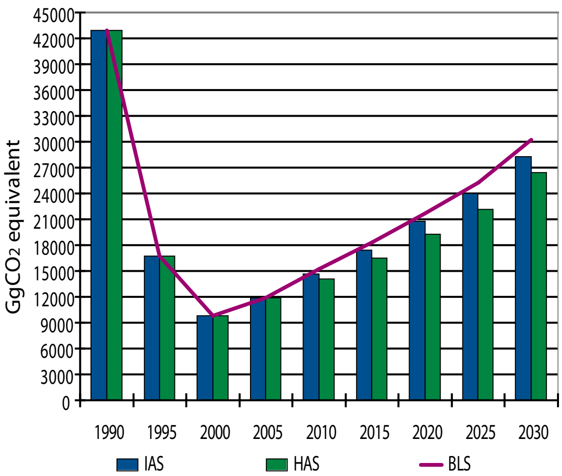
In comparison with the level of total national greenhouse gas emissions (without LULUCF) reported in 2005, by the year of 2030 it is expected that total direct GHG emissions will increase by 155.7 percent under the BLS, by 123.0 percent under the HAS, and by 138.7 percent under the IAS.

Relative to the BLS, implementation of the planned abatement measures, in particular of the ones specified in the individual Sector Action Plans on greenhouse gases emissions abatement, in conformity with the Party's Commitments under the UNFCCC and Kyoto Protocol, by the year of 2030, will allow to reduce the total national greenhouse gas emissions (without LULUCF), by 12.8 percent under the HAS and by 6.6 percent under the IAS; and respectively, the net national greenhouse gas emissions (with LULUCF) by 14.5 percent under the HAS and by 5.9 percent under the IAS (Figure 5-21).

Implementation of the planned abatement measures will produce and impact on the re-distribution of the share of different sectors in the structure of total and net national greenhouse emissions. So, if in 2005 circa 65.3 percent of the national direct GHG emissions were generated from the Energy Sector, 18.0 percent from Agriculture Sector, 11.8 percent from the Waste Sector, and the rest of 4.9 percent from Industrial Processes Sector, by year 2030 the share of these sectors in the structure of total national GHG emissions will change essentially, in particular under the alternative scenarios, which will feature an increase of the share of the Energy and Industrial Processes Sectors and a decrease of the share of the Waste and Agriculture Sectors (Table 5-47).

Table 5-46: Projections of Greenhouse Gas Emissions and Sinks in the RM by sector under the Scenarios Considered for the 2005-2030 time series, Gg CO_2 equivalent

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Energy	7724.8	10271.9	12335.3	14442.8	16420.1	19582.2
Industrial Processes	581.9	757.8	983.8	1286.2	1735.7	2430.8
Agriculture	2127.8	2653.7	3157.8	3728.0	4337.2	4840.9
LULUCF	-1381.4	-1415.9	-1451.3	-1487.6	-1524.8	-1562.9
Waste	1400.0	1540.4	1836.6	2244.8	2770.6	3401.9
Total (With LULUCF)	10453.1	13807.9	16862.2	20214.2	23738.8	28692.8
Total (Without LULUCF)	11834.5	15223.8	18313.5	21701.8	25263.7	30255.8
High Alternative Scenario (HAS)						
Energy	7724.8	9425.8	11049.6	12991.9	14785.1	17865.6
Industrial Processes	581.9	726.6	909.3	1176.9	1554.6	2059.5
Agriculture	2127.8	2603.8	2995.7	3404.7	3871.5	4187.4
LULUCF	-1381.4	-1557.5	-1669.0	-1785.1	-1829.8	-1875.5
Waste	1400.0	1281.1	1495.0	1672.9	1962.0	2282.3
Total (With LULUCF)	10453.1	12479.8	14780.5	17461.2	20343.4	24519.3
Total (Without LULUCF)	11834.5	14037.4	16449.6	19246.3	22173.2	26394.8
Intermediary Alternative Scenario (IAS)						
Energy	7724.8	9875.9	11786.7	14147.2	16114.4	18946.9
Industrial Processes	581.9	742.5	937.8	1215.3	1612.0	2232.1
Agriculture	2127.8	2636.4	3077.3	3594.0	4082.9	4458.2
LULUCF	-1381.4	-1274.3	-1233.6	-1190.1	-1219.8	-1250.3
Waste	1400.0	1422.6	1637.5	1866.5	2188.7	2614.4
Total (With LULUCF)	10453.1	13403.1	16205.8	19632.9	22778.1	27001.2
Total (Without LULUCF)	11834.5	14677.4	17439.4	20823.0	23998.0	28251.6



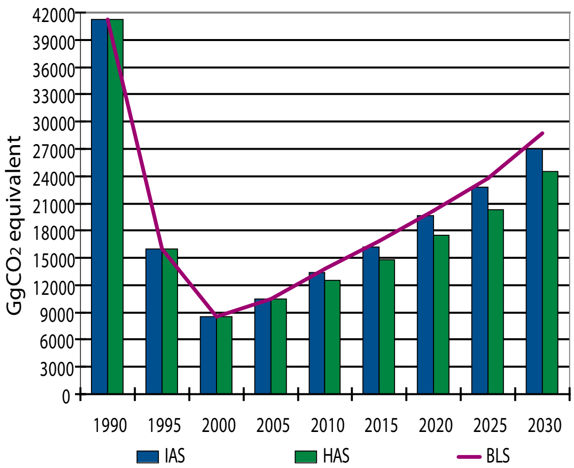


Figure 5-21: Projections of Total (left figure) and Net (right figure) Greenhouse Gas Emissions in the RM under the Scenarios Considered for the 1990-2030 time series

Table 5-47: Breakdown of the Republic of Moldova's Greenhouse Gas Emissions by Sector under the Considered Scenarios for the 2005 to 2030 time series, %

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
Energy	65.3	67.5	67.4	66.6	65.0	64.7
Industrial Processes	4.9	5.0	5.4	5.9	6.9	8.0
Agriculture	18.0	17.4	17.2	17.2	17.2	16.0
LULUCF	-11.7	-9.3	-7.9	-6.9	-6.0	-5.2
Waste	11.8	10.1	10.0	10.3	11.0	11.2
Total (With LULUCF)	88.3	90.7	92.1	93.1	94.0	94.8
Total (Without LULUCF)	100.0	100.0	100.0	100.0	100.0	100.0
High Alternative Scenario (HAS)						
Energy	65.3	67.1	67.2	67.5	66.7	67.7
Industrial Processes	4.9	5.2	5.5	6.1	7.0	7.8
Agriculture	18.0	18.5	18.2	17.7	17.5	15.9
LULUCF	-11.7	-11.1	-10.1	-9.3	-8.3	-7.1
Waste	11.8	9.1	9.1	8.7	8.8	8.6
Total (With LULUCF)	88.3	88.9	89.9	90.7	91.7	92.9
Total (Without LULUCF)	100.0	100.0	100.0	100.0	100.0	100.0
Intermediary Alternative Scenario (IAS)						
Energy	65.3	67.3	67.6	67.9	67.1	67.1
Industrial Processes	4.9	5.1	5.4	5.8	6.7	7.9
Agriculture	18.0	18.0	17.6	17.3	17.0	15.8
LULUCF	-11.7	-8.7	-7.1	-5.7	-5.1	-4.4
Waste	11.8	9.7	9.4	9.0	9.1	9.3
Total (With LULUCF)	88.3	91.3	92.9	94.3	94.9	95.6
Total (Without LULUCF)	100.0	100.0	100.0	100.0	100.0	100.0

Thus, under the HAS the distribution of sectors in the structure of national direct GHG emissions will be as follows: Energy – 67.7 percent, Industrial Processes – 7.8 percent, Agricultural – 15.9 percent and Waste – 8.6 percent; while under the IAS, respectively: Energy – 67.1 percent, Industrial Processes – 7.9 percent, Agricultural – 15.8 percent and Waste – 9.3 percent (Figure 5-22).

It is expected that over the 2005-2030 time series, CO_2 emissions (without LULUCF) will increase by 161.5 percent under the BLS, by 147.4 percent under the HAS, and by 153.4 under the IAS; CH_4 emissions (without LULUCF) will increase by 125.1 percent under the BLS, by 42.5 percent under the HAS, and by 84.9 percent under the IAS; N_2O emissions (without LULUCF) will increase by 129.2 percent under the BLS, by 122.0 percent under the HAS, and by 124.6 percent under the IAS, respectively, emissions of F-gases will increase by 4431 percent under the BLS, by 2756 percent under the HAS, and by 3520 percent under the IAS (Table 5-48).

Implementation of the planned abatement measures will also produce and impact on the re-distribution of the share of different gases in the structure of total national GHG emissions (Table 5-49).

So, if in the year of 2005, the carbon dioxide emissions accounted for circa 63.8 percent of the national GHG emissions, methane emissions - for 24.3 percent, nitrous oxide emissions - for 11.8 percent, and F-gases - for the rest of 0.2 percent; then by the year of 2030 the share of different greenhouse gases in the structure of national GHG emissions will change significantly, in particular, as a result of the increased share of carbon dioxide and F-gases, respectively, on the account of the smaller share of methane and nitrous oxide emissions (Figure 5-23).

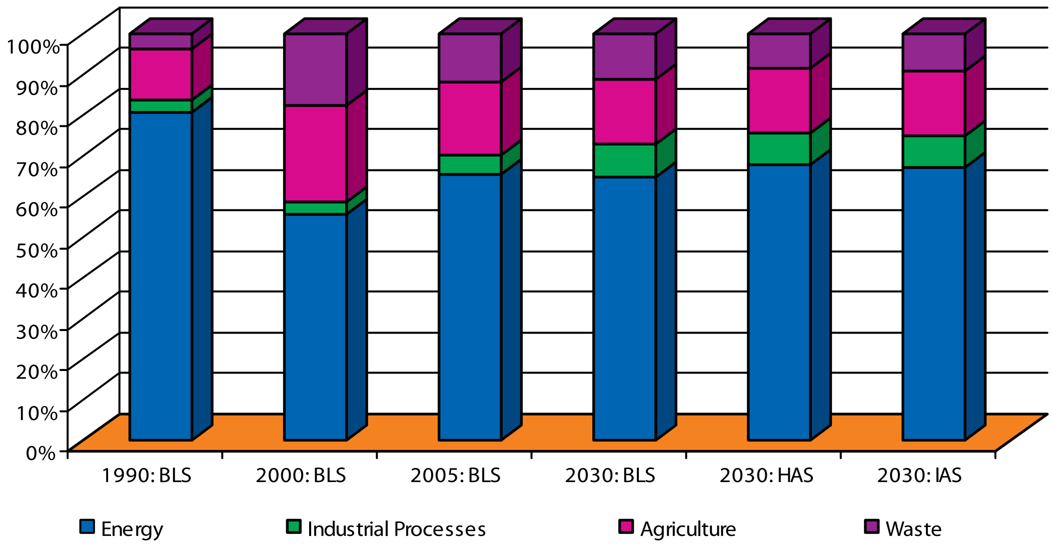


Figure 5-22: Breakdown of the Republic of Moldova's Greenhouse Gas Emissions by Sector under the Considered Scenarios for the 1990 to 2030 time series, %

Table 5-48: Projections of Greenhouse Gas Emissions and Sinks in the RM by Gas under the Scenarios Considered for the 2005-2030 time series, Gg CO_2 equivalent

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
CO_2 emissions	7527.6	10078.5	12240.6	14358.4	16424.7	19683.5
CH_4 emissions	2883.8	3380.7	3903.7	4640.6	5532.4	6492.8
N_2O emissions	1404.1	1711.7	2063.0	2489.8	2878.2	3218.5
Emissions of F-gases	19.0	52.9	106.1	213.1	428.3	860.9
Total GHG emissions	11834.5	15223.8	18313.5	21701.8	25263.7	30255.8
High Alternative Scenario (HAS)						
CO_2 emissions	7527.6	9269.2	11243.4	13279.6	15326.4	18625.5
CH_4 emissions	2883.8	2851.4	2908.3	3250.3	3696.9	4109.6
N_2O emissions	1404.1	1864.6	2221.5	2569.6	2867.6	3117.1
Emissions of F-gases	19.0	52.0	76.4	146.8	282.2	542.6
Total GHG emission	11834.5	14037.4	16449.6	19246.3	22173.2	26394.8
Intermediary Alternative Scenario (IAS)						
CO_2 emissions	7527.6	9686.2	11689.5	14076.0	16113.2	19077.7
CH_4 emissions	2883.8	3148.7	3502.5	4020.4	4695.3	5332.6
N_2O emissions	1404.1	1790.1	2161.9	2562.4	2867.2	3153.4
Emissions of F-gases	19.0	52.4	85.4	164.2	322.3	687.8
Total GHG emissions	11834.5	14677.4	17439.4	20823.0	23998.0	28251.6

Table 5-49: Breakdown of the Republic of Moldova's Greenhouse Gas Emissions by Gas under the Considered Scenarios for the 2005 to 2030 time series, %

	2005	2010	2015	2020	2025	2030
Baseline Scenario (BLS)						
CO_2 emissions	63.8	66.2	66.8	66.2	65.0	65.1
CH_4 emissions	24.3	22.2	21.3	21.4	21.9	21.5
N_2O emissions	11.8	11.2	11.3	11.5	11.4	10.6
F-gases emissions	0.2	0.3	0.6	1.0	1.7	2.8
Total GHG emissions	100.0	100.0	100.0	100.0	100.0	100.0
High Alternative Scenario (HAS)						
CO_2 emissions	63.8	66.0	68.4	69.0	69.1	70.6
CH_4 emissions	24.3	20.3	17.7	16.9	16.7	15.6
N_2O emissions	11.8	13.3	13.5	13.4	12.9	11.8
F-gases emissions	0.2	0.4	0.5	0.8	1.3	2.1
Total GHG emissions	100.0	100.0	100.0	100.0	100.0	100.0
Intermediary Alternative Scenario (IAS)						
CO_2 emissions	63.8	66.0	67.0	67.6	67.1	67.5
CH_4 emissions	24.3	21.5	20.1	19.3	19.6	18.9
N_2O emissions	11.8	12.2	12.4	12.3	11.9	11.2
F-gases emissions	0.2	0.4	0.5	0.8	1.3	2.4
Total GHG emissions	100.0	100.0	100.0	100.0	100.0	100.0

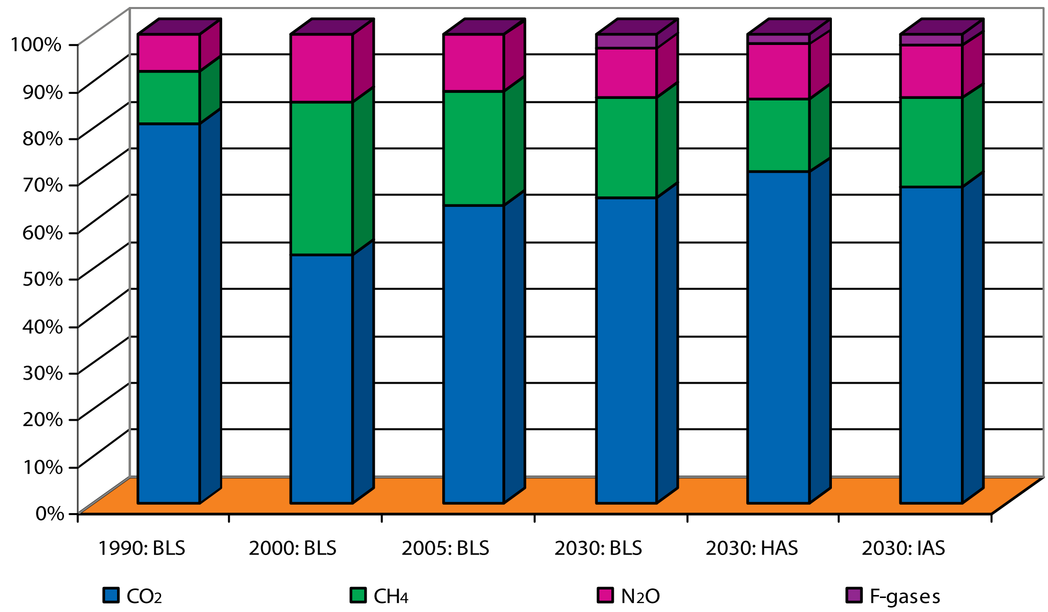


Figure 5-23: Breakdown of the Republic of Moldova's Greenhouse Gas Emissions by Gas under the Considered Scenarios for the 1990 to 2030 time series, %

6 OTHER INFORMATION

6. OTHER INFORMATION

This chapter provides for the provision of other information considered relevant to the achievement of the objectives of the Convention. This information include description of the development and research programs on climate change; innovation and transfer of environment-friendly technologies; description of the national system for systematic observation; description of the networks and archives of the data on climate change; implementation of the education and professional development programs; public awareness raising on climate change and public access to information; involvement of the public in discussions on climate change, as well as development and implementation of relevant measures to face it; capacity building opportunities for the adequate implementation of the Convention in the Republic of Moldova, etc.

6.1 Research, Development, Innovation and Technology Transfer Sector

Research, development, innovation and technology transfer (RDITT) is a sector of major importance in most of the developed economies. Further, an analysis is provided in terms of the progress made by the Republic of Moldova in the RDITT sector, reported in the last few years. This section shows the sector's performance and the essential problems revealed in this sense, as well as suggested actions to trigger the creative potential existing in this sector in the Republic of Moldova.

6.1.1 Organizational Pattern of the RDITT Sector in the Republic of Moldova

The development of the RDITT sector can follow one of the several patterns. In the Western pattern, the Academies of Science are honorary institutions, which are few in number and which perform mainly fundamental research. The science is transferred mainly to the universities, which receive funding from the state budget based on the research quality and performance indicators demonstrated by each institution.

In the UK universities, the research is funded according to the so-called dual support system, under which individual Research Councils provide grants for specific research projects and programmes, while the Funding Councils, supported by the Department for Education and Skills and the devolved Departments of Education, provide block grant funding to support the research infrastructure and enable institutions to undertake ground-breaking research of their choosing. In Germany, in addition to the grants allocated from the budget of the Federal Ministry of Education and Research, the universities can obtain grants under targeted research funding projects from other Federal or Land level Ministries, from the German Research Foundation, from other private foundations, associations, societies or companies and from the European Union. The Soviet and post-Soviet pattern is based on the concentration of the science management levers in the Academies of Science, whereas the universities are playing a minor role. The science is funded almost in total from the public procurement funds allocated to finance the research on specific orders and under governmental programmes.

Moldova's research, development, innovation and technology transfer sector has certain specific features of its own. A turning point was the year 2004, when the legislative framework for the RDITT sector underwent certain significant changes. The approval of the *Code on Science and Innovation* (through the Parliament Resolution No. 259 as of 21.07.2005), followed by a number of other laws and development strategy papers, gave the Academy of Sciences of Moldova (ASM) the full powers to implement the governmental policy in the sphere of science and innovation. That policy was implemented within the framework of the first *Partnership Agreement between the Government and the Academy of Sciences of Moldova (for the period of 2005-2008)*. ASM was vested with the powers to administrate the RDITT sector, including the power to manage the public funds allocated to that sector from the budget. The Supreme Council for Science and Technology Development (SCSTD), as the executive governance body of the ASM, distributes the budget allocations, acting upon the above *Partnership Agreement,* among six strategic activity directions in science and innovation identified for 2006-2010 and approved through the Parliament Resolution No.160 as of 21.07.2005.

Although the above reorganization has made possible the financial revival of the research institutions, it should not be viewed as a long-term development pattern for the RDITT sector, because it has restricted the autonomy of the public institutions with research profile, which have become directly subordinated to ASM.

The Partnership Agreement between the Government and the Academy of Sciences of Moldova (for the period of 2005-2008), as approved through the Government Resolution No. 80 of 28.01.2005, says that *"the distribution of the budget allocations and funding (co-funding) of the science and innovation activities from the public budget shall take place based on the fundamental research programmes for the strategic directions, which may be implemented by the duly accredited organizations with any ownership type or legal status, to ensure the development of science, sustainable economy, improvement of the well-being and life quality as well as development of a favourable environment for the absorption of innovations".* The requirement that an institution must be formally accredited to be able to get public funding allocated to the RDITT sector was new for the Republic of Moldova. The above requires compliance with certain criteria (*Article 99 "Accreditation Requirements" of the Code on Science and Innovation of the Republic of Moldova*), which can be hardly fulfilled by the private sector organizations.

The statutory accreditation was granted to the majority of the 43 Moldovan organizations operating in the sphere of science and innovation, funded from the state budget and assessed during 2005-2007, including 2/3 of the above, which were accredited in 2006; 31 of the accredited organizations are R&D institutions and 11 – higher education establishments (universities). The list of the accredited organizations includes one scientific museum and one private entity (*Free International University of Moldova*). No other institution with private capital had contacted the National Certification and Accreditation Committee (NCAC) before the end of 2007, seeking information on the procedures, or applied for the initiation of the accreditation procedure. Although certain reorganized institutions funded from the state budget were granted a grace period of 3 years to obtain the status of an accredited institution through the Government Resolution No. 1326 as of 14.12.2005 on the measures to optimize the science and innovation infrastructure, 7 of 24 have not yet been appraised. Thus, although the accreditation has introduced certain internal subordination structure and given the right to enjoy certain exemptions and facilities (*including VAT exemptions on the imported services and goods and income tax exemptions previously not applying to the institutions funded from the state budget*), it has not yielded any other impressive results in terms of the research quality and competitiveness and it is clear that it has since transformed in the purely bureaucratic procedure.

The sector's infrastructure has underwent major transformations, as only 38 legal entities remained in existence in 2006 out of the total of 101 research entities operating in 2005. But the remaining entities had the same number of staff and were administrating the assets of the dissolved units. The managerial skills of the management of the research entities has hardly improved and therefore the above process can hardly qualify as true restructuring in the sector.

At least one laboratory of excellence has been established in each of the organizations operating in the sphere of science and innovation in the recent years. That is a step forward, but in most cases the laboratories have been equipped with rehabilitated old equipment and much less so – owing to the investments in new and efficient equipment (on the force of the statutory requirement to channel at least 20 percent of the budget allocations for the purchase of scientific equipment).

The public institutions in the RDITT sector are still very reserved in their relationships with the private sector. In very rare cases the solutions with significant economic impact are coming from the public institutions in the RDITT sector in answer to the problems raised by the industry. The allocations from the budget to the RDITT sector are used in full by the institutions funded from the state budget, and the private sector has minimum involvement. Even where the latter is trying to implement innovative projects, the access to public funding is conditioned by the accreditation procedure, which imposes major economic strain.

Although the salaries of those employed in the RDITT sector have grown approximately 4-fold after 2004 (*the average monthly salary was MDL 584 in 2004 and MDL 2485 in 2007*), they are still very low in the RDITT sector institutions as compared to the other sectors. The remuneration is relatively high in case of the research workers entitled to allocations as holders of a scientific degree or based on the length of the employment record. The salary offered to young researchers is not sufficiently attractive to incentivize one to dedicate oneself totally to the research activities and to prevent them from looking for other sources of income.

Doctorate and post-doctorate training in Moldova has been coordinated since 2004 by a special unit within the ASM called the *Centre of University and Post-University Training and Professional Improvement*. Different from the university training (*Cycle I*) and MS/MA training (*Cycle II*), the doctorate training is not considered Cycle III of the university training and therefore it is not coordinated by the Ministry of Education and Youth. Although the allocations for staff training are growing with every year, the reform in the doctorate training is very slow. Young people show little interest in the exact sciences, which is evidenced with the lack of any competition to start the respective doctorate candidacy courses. Although the Government has reduced considerably the number of the doctorate scholarships offered from the state budget (in 2007 - 290; in 2006 - 291; in 2005 - 388; in 2004 - 535) on the suggestion of ASM, the number of unclaimed scholarships has been growing during the last two years (in 2006 - 20 unclaimed scholarships; in 2007 - 31 unclaimed scholarships). To re-allocate the unclaimed scholarships (21 scholarships offered and only 17 claimed in chemistry and biology; 1 scholarship claimed in each of exact sciences, agriculture and geology), the ASM had to take additional doctorate candidates in liberal arts in 2007 (41 candidates taken ultimately as opposed to 34 candidacy scholarships budgeted initially). The above signals the need to ask many questions because currently the economy of the Republic of Moldova seems to be in much higher need of skilled labour in the sphere of exact sciences and agriculture.

Some time ago the ASM has initiated the establishment of the Academic Lyceum and Academic University intended to become elite pre-university educational establishments. Those projects are very cost-intensive, in particular if viewed against the background of the general insufficient funding of science, and totally contrary to the intent declared by the ASM to 'become closer' to the university and pre-university training levels. Rather than ensure the opening up of the RDITT sector to innovative ideas, the above initiatives may result in even higher encapsulation of that sector, contributing to the development of the closed cycle staff training in the research sphere. The international experience has demonstrated that the efficiency of such institutions is not long-lived in the case of budget funding, and any projects of that type are an unjustifiable luxury for the RDITT sector in the Republic of Moldova.

The last few years have shown more and more clearly the tendency on the part of the ASM to monopolize and control the innovation and technology transfer sector. The pressure to adopt secondary legislation framework pertaining to the innovation and technology transfer sector was coming from the ASM and their suggestions were hardly ever coordinated with the private sector and universities. A number of laws and regulations on RDITT have been adopted since 2004, including: the *Law on Science and Technology Parks and Innovation Incubators;* the *Law on Recoverable Energy Sources;* the *Industrial Development Strategy for the period until 2015; the National Agribusiness Sustainable Development Strategy (2008-2015)*; *the National Strategy on Innovation for the period until 2008-2011*. The enforcement of the ASM's positions in real economy (and in particular the refusal to cooperate with the other parties involved in the innovation process) is slowing down considerably the development of innovations in the private sector and the use of the existing innovations in the economy.

6.1.2 Republic of Moldova's Potential in RDITT Sector

The Republic of Moldova has sufficient scientific capacities represented by approximately 800 doctor habilitatus and about 5600 doctor of sciences. To maintain a similar capacity level for 30 years, it would be necessary to train annually at least 27 doctor habilitatus and 172 doctors of sciences. The recent years have witnessed growth in the number of the doctor degrees awarded and a decrease in the number of the doctor habilitatus degrees awarded (Table 6-1).

The number of foreign nationals awarded academic degrees in the Republic of Moldova, although registering certain fluctuations, has been definitely on the decline during the last 3 years, which pattern is even more prominent if we consider the range of diplomas and graduation certificates acknowledged and given equal status in the Republic of Moldova.

Certain growth has been registered in the number of persons awarded academic degrees in the following areas: medicine, economy, law, pedagogy, political sciences. To ensure the nation's balanced and sustainable development, it is required however to achieve growth in the number of persons awarded academic degrees in the area of technology, agriculture, veterinary medicine, pharmaceutics, informatics, food technique, electronics, light industry, psychology, etc. Alarmingly low is the number of theses defended in architecture, geography, agricultural science, veterinary medicine. The areas registering a dramatic increase in the number of the defended doctor theses (as compared to the number of the research staff working in the respective area) show typically a much lower thesis quality than in the areas with stable development patterns.

Although the total number of R&D staff grew slightly in 2007 versus the preceding year, the middle-term pattern shows a decrease in the number of the research workers (Table 6-2). More than a half (56.2 percent) of those employed in the above sector in 2007 were accounted for the personnel of research institutes; 35.3 percent - by the university staff, and the remainder – by the staff of the design engineering and construction design offices as well as design and project design companies operating in construction. A very slight growing pattern has been registered in the number of staff who is doing research in parallel with teaching activities.

Table 6-1: Awards of academic degrees and academic/academic-didactic titles by the NCAC in 1993–2007

Academic Degree / Academic Title / Academic Didactic Title	1993-2000	2001	2002	2003	2004	2005	2006	2007	Total
Doctor habilitatus (including foreigners)	190 (7)	27 (3)	25 (1)	18	26 (1)	23 (1)	24	18	362 (13)
Doctor of science (including foreigners)	1008 (120)	231 (36)	164 (30)	208 (24)	147 (23)	175 (43)	201 (36)	228 (32)	2476 (340)
University Professors	215	22	16	17	16	11	19	17	343
Research Professors	-	-	-	-	7	4	6	3	22
University Lecturers	762	63	86	109	97	76	124	102	1489
Research Lecturers (Superior Scientific Researches)	316	24	37	34	20	15	34	30	521
Diplomas and Graduation Certificates Acknowledged	669	49	26	47	29	35	32	16	903

Source: Report on the Activities of the National Certification and Accreditation Committee (NCAC) in 2007

Table 6-2: Employees of the R&D Sector in 2003-2007'

	2003	2004	2005	2006	2007
Total R&D employees	6858	6696	6678	6299	6522
Full time employees (no part-time work), of which:	5005	4797	4672	4505	4587
Scientific Researchers	2737	2725	2583	2507	2592
Technicians	403	354	334	362	417
Auxiliary Staff	936	880	880	952	919
Other	929	838	875	684	659
Personnel doing researches in parallel with teaching	1853	1899	2006	1794	1935

Source: NBS, Information Note on the R&D Activities in 2007

Although a higher number of persons had teaching activities in parallel with researches in 2007 as compared to the preceding year, their total is lower than the maximum registered in 2005. Thus, the problem of young skilled labour remains very acute. Notwithstanding a slight decrease observed in the staff turnover rates in the R&D sector, the average age of the research worker was approaching 50 in 2007.

The extensive brain drain demonstrates the desire of the Moldavians to be employed in the economies where intellectual labour is remunerated higher. The Republic of Moldova is in the 119th position in the global brain drain ranking with the score 2.1 (*World Economic Forum (2006): Global Competitiveness Report, Page. 488*). The above low ranking shows that talented Moldavians tend to '*normally*' leave the country in order to pursue opportunities in other countries to turn their intellect to value. For example, Estonia ranks 37 (scoring 3.9), Slovenia – 41 (3.9), Russia – 52 (3.5), Latvia – 63 (3.2), Ukraine – 87 (2.6), Romania – 114 (2.2), Bulgaria – 121 (2.0).

6.1.3 Republic of Moldova's Performances in RDITT Sector

In 1991-2000 the funding of the RDITT sector from the state budget was decreasing almost throughout the period, registering a growing pattern afterwards (Figure 6-1). According to the official statistics, the 2008 funding has achieved the level of 0.7 percent of GDP. In 2005 the Republic of Moldova rated fourth among the CIS countries after its level of funding the RDITT sector (the ranking was topped by Russia followed by Ukraine, Belarus, Moldova, Azerbaijan, Armenia, Kazakhstan, etc.). In 2007 the RDITT sector funding (0.7 percent of the GDP) was one third of the average for the EU-27 (1.84 percent of the GDP).

The international experience has demonstrated that where RDITT funding remained below 1 percent of the GDP for 5-7 years, the decline could be observed in the nation's scientific-technical capacity, resulting in lower competitiveness of its economy. The amounts allocated from the state budget to the RDITT sector during the last few years were used for the most part for institutional funding (72.5 percent in 2007). Capital investments (13.3 percent) were more than three-fold of the investments in staff training (4.2 percent). In 2007 extra-budgetary RDITT funding (international grants; proceeds received as fees for the provided services and payments under commercial contracts) remained at a very low level – approximately similar to that of 2004 (in 2004 - MDL 16.4 million; in 2007 - MDL 15.3 million, according to the ASM data).

The NBS data show a more significant contribution of private businesses to the R&D funding, which grew to MDL 50.5 million (17.3 percent). Scientific production is an important country development indicator. In the recent years the indicators reflecting the ASM's performance have been mostly growing in quantity and showing hardly any improvements in quality (Table 6-3).

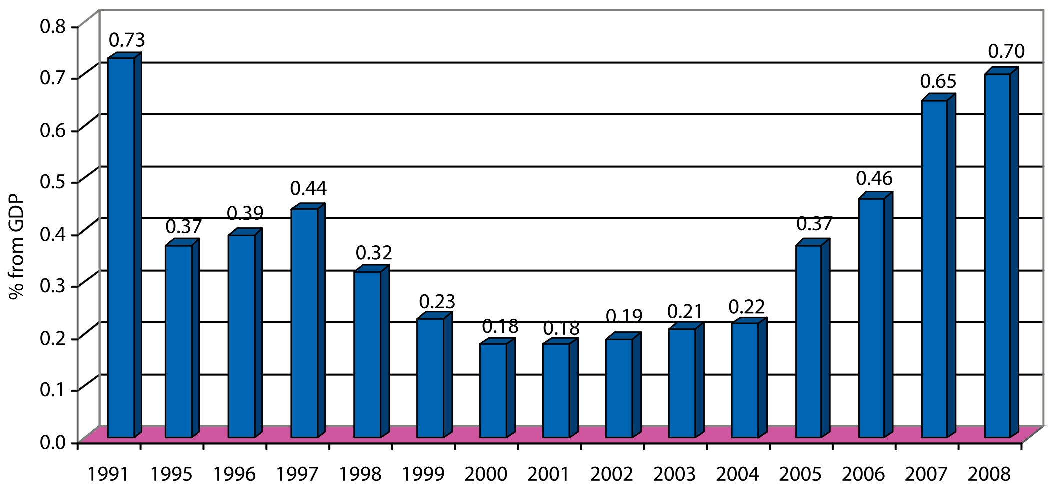


Figure 6-1: Funding of the RDITT Sector in the RM, 1991-2008 (in per cent of GDP)

Table 6-3: Indicators on the Activity of the Academy of Sciences of Moldova

		2001[1]	2002[1]	2003[1]	2004[1]	2005[2]	2006[3]	2007[3]
Number of Projects, total		212	243	267	236	818	523	629
Institutional						555	315	310
Fundamental						45	124	122
Applied							191	188
State Programmes							12	
Projects under State Programmes						45	66	109
Independent Projects						218		36
Technology Transfer						8	24	43
Grants from FCFFR, FCUFR							49	49
International Grants (including INTAS)		40	64	86	56		69	82
Allocations for Research, MDL million (including allocations for ASM)		34.5 (13.9)	43.9 (17.5)	56.1 (25.0)	(27.1)	124.7	178.8	206.0
Scientific Researches	total number	984	965	966	952		2945	3100
	average age						48.9	48.2
Doctors Habilitatus	total number	162	169	176	180	586	392	420
	average age						63.0	63.3
Doctors of Sciences	total number	576	560	554	540	2260	1310	1300
	average age						51.5	51.5
Research workers aged under 35							680	875
Post graduate students		243	278	278	302	16000	541	516
Publications, total		2215	2358	2682	2428	8700	5056	6385
Monographs (topical collections, dictionaries, manuals, etc.)		130	143	139	143	141	103	144
Articles	total	1223	1541	1615	1618	5644	2473	2400
	in national journals			1019	1073	4133	1688	1608
	in international journals	437		596	545	1511	785	792
Theses	total	992	817	1067	810	2950		
	at national conferences			536	256	1284		
	at international conferences	540		531	554	1666	1626	1647
Patents for invention		31	34	42	51	158	169	186
Doctor of science theses defended in the reporting year		27	24	25	8	175	193	88
Doctor habilitatus theses defended in the reporting year		3	8	11	6	23	24	10
Editing of journals (numbers)		27	50	38	33	63	51	59
Scientific events organized, total							192	128
Scientific events organized, at national level							123	75
Scientific events organized, at international level							69	53
Participation at scientific events							2137	
Participation at exhibitions and fairs							110	
Medals received at exhibitions and fairs		34	38	49	40	140	173	202
Articles in journals reported per scientific research unit		1.24	1.60	1.67	1.70		0.84	0.78
Articles in journals reported per MDL hundred thousand of allocations for research		8.80	8.81	6.46	5.97	4.53	1.38	1.17
Doctor theses defended per MDL hundred thousand of allocations for research		0.19	0.14	0.10	0.03	0.14	0.12	0.05
Number of researches aged under 35 in the total number of researchers							23.0	28.1
Reported allocations for equipment as per cent of the total allocated funds, %		0.1	0.0	0.5	2.3	7.1	5.3	8.8

Source: Academy of Science of Moldova, Annual Performance Report; [1]ASM data, partial funding from the allocations to fundamental science; [2]Total for the RDITT Sector; [3]Data of the institutions funded from the budget line 'Science' managed by Academy of Science of Moldova.

At the same time the relative indicators (the last five lines in the above table) show a pattern towards aggravation, which fact allows concluding that the research infrastructure of the Republic of Moldova is very weak and not prepared to use efficiently the budget allocations channelled into the RDITT sector.

Although the Moldovan publications are growing in number, including those produced jointly with co-authors from abroad, and their number has almost tripled since 2002, the significance of such publications is decreasing. The above is evidenced with the data appearing on SCImago Journal & Country Rank internet portal[7], which data show a considerable decrease at a steady rate in the number of papers cited (in 2003 - 63.0 percent of all papers cited; in 2004 - 53.6 percent; in 2005 - 36.7 percent; in 2006 - 10.8 percent). According to the same source, Republic of Moldova's ranks below other countries of the region (Romania, Ukraine, Georgia, Armenia, Belarus) after its H-index, that quantifies both the actual scientific productivity and the apparent scientific impact of the country's scientists based on the set of their most cited papers and the number of citations that they have received in publications outside their country of origin.

6.1.4 Technology Transfer and Innovation in the Republic of Moldova

In the new-type thinking, the environmental sound technologies are those contributing to the preservation of the environment and conservation of natural resources rather than economic growth. The objective of the current sustainable development policy is gradual transit to the pollution-reducing technologies and the environmental impact of the integrated non-polluting technologies.

The modern environmental sound technologies include: integrated technologies, which make possible to prevent that could have occurred during the production process, new materials, production processes with reduced resource and energy consumption, as well as environmental know-how. In general, there are multiple options for the technology transfer in the Republic of Moldova, such as:

- direct procurements of the plant and equipment and production lines (e.g., for agribusiness sector, building materials industry, trade and household);
- direct investments in the case of implementing new appropriate technologies in new industrial facilities under construction (e.g., petrochemical terminal in Giurgiulesti), rehabilitation (e.g., the cement plant of 'Lafarge-Ciment' in Rezina), facility modernization (e.g., 'Marr Sugar Moldova' sugar mills in Glodeni and Cupcini and 'Suedzucker-Moldova' sugar factories in Drochia, Falesti and Alexandreni), etc.;
- sale of turn-key enterprises (e.g., the factory of 'Efes-Vitanta Moldova Brewery');
- establishment of joint ventures whose business is not focused mainly round imports of goods and leasing operations (e.g. the manufacturing plant of 'Topaz-Salut');
- leasing and franchising;
- sub-contracting, co-production agreements, joint scientific research and engineering activities, etc.;
- trade in know-how, commercial secrets, manufacturing experience, technical documentation;
- trade in patents and licenses in respect of any patented or registered industrial property (excepting trade marks);
- secondments for engineering and scientific personnel; hosting of scientific-technological conferences, trade fairs and exhibitions;
- training and education, business visits, Governmental assistance programs, etc.

Within the framework of the technology transfer assessment, we must state that the current situation in the Republic of Moldova regarding the use of modern environmental-sound technologies in the sectors relevant to the UNFCCC can be hardly considered satisfactory: the nation has a limited capacity to implement efficiently the diverse technology options and services available at the market.

As yet the technology transfer related activities in the Republic of Moldova are mainly formalistic in character. The majority of Moldovan enterprises do not seem to have even started to understand yet what the contemporary competitiveness components should be; and the above applies both to the investments in the technology development and innovation (the 2005 statistics shows a very low portion of Moldovan enterprises holding internationally acknowledged quality certificates (6.9 percent as opposed for the region's average of 12.6 percent and the global average of 13.9 percent) and very low financial transparency; only about 14 percent of the Moldovan enterprises make use of the external audit of their financial statements whereas the region's average is 46.6 percent and the global average is 51.9 percent; the above indicators reflect the current level of preparedness on the part of Moldovan enterprises to attract and absorb foreign investments; Moldovan enterprises were quite inadequate as regards the use of licensed technologies; no national statistics reflecting the situation in that areas available, and the data of the international surveys conducted on Moldovan enterprises show that not a single local

[7] <http://www.scimagojr.com/index.php>

company is using any licensed technologies obtained from a foreign company (the average for the region is 13.15 percent and the global average is 12.22 percent); it is very unlikely that the situation has registered any rapid progress in that respect since 2005).

A number of laws and regulations were discussed and approved in the sphere of technology transfer in the last two years. During the same period, the ASM initiated the establishment of the Agency for Innovation and Technology Transfer (AITT), a scientific-technological park ("Academica") and an innovation incubator ("Inovatorul"). It should be noted that private businesses have been hardly involved in the development of the technology transfer infrastructure and regulations for the operation of the above institutions. The state budget funds have been allocated for the technology transfer programs since 2005, and the amounts of such allocations have been growing with every year (in 2007 - MDL 9.0 million; in 2006 - MDL 3.0 million; in 2005 - MDL 1.6 million), thus making possible to increase the total number of the funded technology transfer projects.

It should be noted that the technology transfer projects to be funded are approved by the Supreme Council for Science and Technology Development (SCSTD) whereas their actual funding and monitoring is performed by the Agency for Innovation and Technology Transfer (AITT). Although one of the prerequisites entitling to apply for the participation in such tenders is the requirement that at least 40 percent of the project funding be co-sourced from the private sector, even the institutions accredited by the NCAC may be among the applicants. In 2006 the respective tender had to be held repeatedly due to the low number of participants. Unfortunately the funds allocated to support the technology transfer projects are used for practical testing of certain scientific developments rather than for the development and subsequent production of pre-competitive goods and services (pre-competitive research is the activity aiming to transform the results of the applied research in the designs, charts or documentation for new products, processes or services – but solely where they are intended for sale or use and where they include the manufacture of an experimental model or the first prototype which cannot be used for commercial purposes; pre-competitive research does not include periodic or routine changes to the products, product lines, manufacturing processes, services or other activities already in existence – even where such modifications represent improvements; the competitive research is on the contrary the activity aiming to transform the results of the pre-competitive research in products, processes and services which respond directly to the market demand; it includes system engineering, technology engineering and design; ultimately, the technology development concept provides for precompetitive research as well as competitive research to be viewed together and understood to contain the technology transfer component and turn the invention to value, which is the procedure to develop, apply and transfer the research results in the economy and society and which has as its goal the introduction and materialization of new products, processes and services as well as the improvement of the existing ones).

Although round 89 technology transfer projects were funded from the state budget in 2005-2007 (in 2005 - 8 projects; in 2006 - 27 projects; in 2007 - 54 projects), not a single report has been produced by the organizations managing the respective state budget allocations, that would present the information regarding continuation of the respective projects or the economic benefits achieved as result of their implementation.

The inventions, which are ultimately encouraging the industrial R&D activities, play a separate role as the basic component for the acceleration of the economic development. The international surveys show that approximately 80 percent of all Utility Patent (i.e. invention patent) Applications (UPA) are filed without priority date (according to WIPO Patent Report, Statistics on Worldwide Patent Activities 2007), whereas the UPA number with a reference to the priority date is negligibly low in Moldova. A good basic indicator of the innovation activities is the per capita UPA number, although other protection methods (such as protection via know-how or commercial secret) have gained recently in popularity. The UPA number per million population is 89.64 in Moldova (or 47.98 per USD billion of GDP); 75.10 (12.34) in Ukraine; 33.72 (4.20) in Bulgaria; 48.70 (4.01) in Latvia; 17.10 (1.24) in Estonia; 19.91 (1.54) in Lithuania).

In the Republic of Moldova, enterprises and organizations with private capital accounted for only 4 percent of all UPAs submitted in the last two years. In the last two years the number of UPAs submitted by individuals (who have the highest economic motivation to have their invention registered) remained on the same level, but the percentage accounted by them has diminished due to the increasing number of the applications filed by the research institutions funded from the state budget (above 90 percent of the total UPAs filed in 2007). A high UPA number in Moldova can be explained with low costs of registering an invention at the national office level and considerable exemptions offered to certain categories of applicants, which enables them to apply for utility patents for the inventions that are hardly of any significant market value. The exemptions are granted also for the fees to maintain the utility patent valid. Thus, the number of issued patents is growing steadily (the total of 2726 patents had been issued prior to 01.01.2008), the number of valid patents tends to decrease (in 2007 - 1032 patents; in 2006 - 1215 patents; in 2005 - 1115 patents). In 2000-2006 the State Agency for Intellectual Property registered the rights transfer contracts (which are not subject to obligatory registration) in respect of only 6 inventions;

furthermore, the Moldovan applicants have filed a very low number of applications to protect their inventions on the territory of other states (not a single attempt of that kind has been made by any research institution funded from the state budget).

A survey on the capitalization of intangible assets in financial statements by industry, ownership type and intellectual property type during 1999-2005 has demonstrated that the portion accounted for by the intangible assets in the total long-term assets in Moldova has been extremely low (in 2000 - 1.0 percent; in 2001- 1.1 percent; in 2002 - 1.2 percent; in 2003 - 1.0 percent; in 2004 - 1.0 percent; in 2005 - 0.9 percent) (Badar, Cravcenco, 2006). The intangible assets growth rate is below the average growth rate for all types of long-term assets.

6.1.5 Innovation Policy in the Republic of Moldova

A comparison of the Moldovan and Romanian laws in the research and innovations related areas reveals certain major differences in the innovation policy approaches (*RDITT sector funding had been relatively stable in Romania till 2003 (round 0.40 percent of the GDP), and a growth pattern has been registered ever since (0.55 percent of the GDP); the private sector contribution has been significant and it accounted for approximately 50 percent of the total RDITT sector funding in 2005 (in 1999 - 50.2 percent; in 2003 - 45.4 percent); the DFI volume grew rapidly in 2004 (by 54 percent), with the highest portion of the DFI channelled in the manufacturing industry; the governmental funding for the mid-term, as budgeted in 2005, was 0.38 percent of the GDP for 2006, 0.56 percent of the GDP for 2007, 0.75 percent of the GDP for 2008 and 0.93 percent of the GDP for 2009*).

Thus, Article 20 *("Innovation")* of Code on Science and Innovation of the Republic of Moldova's defines "*innovation*" as "*application of the final, new or improved results of certain activities in the sphere of scientific research and technology transfer – with such results being materialized in the form of knowledge, product, service, new or improved competitive processes used in practical activities and/or sold at the market*".

Article 6 of Ordinance No. 8 of the Government of Romania as of 31.01.1997 on the incentives for R&D and innovation defines the term "*innovation*" as follows: "*innovation – as a product - shall mean a new function or functionality improvement or extension of a particular product, process or service in any sphere, which could or can satisfy market demand or which could or can generate new market demand*"; "*innovation – as a process - shall mean the activity enabling the emergence of the innovation as a product, which is based on individual, social or corporate creative and dynamic behaviour; the innovation as a process shall include R&D*".

Thus, in the Republic of Moldova the innovation activities are still viewed narrowly and tied up very closely to scientific research. The key underlying stipulation of the Moldovan legislation fundamental for the research sector and in particular for innovation activities is the following: "*the distribution of the allocations from the state budget and funding (co-funding) of the activities in the sphere of science and innovation from the state budget shall be performed within the framework of the programmes based on the strategic directions, etc. and shall be implemented by duly accredited organizations with any ownership type or legal status to ensure the development of science, sustainable economy, growth of the well-being and life quality and creation of the environment favourable for the absorption of innovations*".

This stipulation has practically blocked direct access to the public funds allocated to innovation for the small and medium-sized businesses (SME business), and the administration of such public funds allocated to innovation has been monopolized by ASM.

The legislative framework on the eligibility for residency in a scientific-technological park or an innovation incubator (the *Law on Scientific-Technological Parks and Innovation Incubators* approved through the Parliament Resolution No. 138 as of 21.07.2007) provides for the requirements very hard to comply with for a private business, such as: the status of a resident may be granted solely upon state registration of the innovation and technology transfer project; the resident must "*practice only innovation and technology transfer, implementation and promotion of progressive technologies*". Furthermore, the above law sets the requirement which is totally contrary to the mission of the innovation incubators: "*the residents of the innovation incubator must practice innovation and technology transfer and/or scientific research connected therewith, and it must have an innovation business plan covering the period of 2-5 years*".

It is not clear how a business should prove its compliance with the above criteria; and it is even less clear why it should be necessary to have a proven track record in the RDITT sector in order to be able to engage in innovation activities.

Neither the draft *National Strategy in the Sphere of Innovation for 2008-2011* has any important stipulations regarding the support of the private sector innovation initiatives.

For comparison, a similar Romanian strategy (*Romanian Strategy for R&D and Innovation for the years 2007– 2013*) emphasizes that the centre for innovation support offers co-funding of the pre-competitive research projects initiated by businesses and in particular the projects which involve collaboration with the universities and research institutions.

The strategy has been developed since then in more detail, and the innovation component has been singled out into a separate programme, structured in much detail and very well substantiated (*the Decision of the President of the National Scientific Research Authority of Romania 9188 as of 5 June 2007. Annex. The National R&D and Innovation Plan II, 2007–2013, Programme 5, Innovation, Information Package*).

So, the Republic of Moldova still plans for the future to treat innovations solely as result of scientific research, thus distancing the innovations indirectly more and more from the industry and economy.

The legislation of the Republic of Moldova sets the criteria entitling to apply for support, which cannot be complied with quite often by an innovation initiative at the incipient stage, although the purpose of the innovation incubators and similar institutions is in particular to "give life" to the innovation initiatives and to "bring them up" till they reach the stage enabling their independent development. The prejudiced approach in the treatment of applicants for funding from the state budget, which can be felt also in the terms and conditions for participation in the tenders for technology transfer projects held by the Agency for Innovation and Technology Transfer (AITT), is reflected in the low number of applicants and the necessity to hold such tenders repeatedly.

6.2 Systematic Observations and Information Sharing

The ecological monitoring is a basic component in the environment management system. The environment is monitored in Moldova by a number of organizations, the most important of which are: Ministry of Environment and Natural Resources, Ministry of Health, Ministry of Agriculture and Food Industry, Academy of Sciences of Moldova, Forestry Agency "Moldsilva", Department of Emergency Situations within the Ministry of Internal Affairs, etc.

6.2.1 National Observation System and Environmental Monitoring Network

a) Monitoring the Quality of Atmospheric Air and Background Radioactivity Levels

In the Republic of Moldova, a grid of 18 stations of the State Hydrometeorological Service ensures monitoring of the quality of atmospheric air and background radioactivity levels (Figure 6-2), and air samples are taken according to the programme 3 times daily (at 07:00, 13:00 and 19:00) to be tested for the following basic parameters: concentrations of solid suspensions, SO_2, CO, NO_2, soluble sulphates, NO, HCOH, C_6H_5OH in Moldova's 5 industrial centres (6 stations in Chisinau, 2 stations in Balti, 4 stations in Bender, 3 stations in Tiraspol and 2 stations in Ribnita).

Real time monitoring was started on 01.04.2007 to ensure the efficient atmospheric air quality monitoring – an automated control station was established in the community of Mateuti (Rezina district). The station is monitoring 17 parameters in the automated mode, including the concentrations of 12 atmospheric pollutants (nitrogen oxides NO, NO_2, NO_x; sulphur dioxide SO_2; hydrogen sulphide (H_2S), ammonia (NH_3), carbon monoxide (CO), total aromatic hydrocarbons (ΣCH), ground level ozone (O_3), total solid suspensions as well as the 10 μm fraction particulate matter (PM10), total gamma radiation exposure debit) and 5 meteorological parameters (air temperature and humidity, atmospheric pressure, wind direction and velocity). That is the only station in the Eastern Europe that performs continuous automated on-line monitoring of 12 atmospheric pollutants, thus completing the national and international monitoring network.

To implement the 1979 Geneva Convention on Long-Range Transborder Air Pollution (Geneva, November 13, 1979), the transborder air pollution monitoring station in Leova was re-established and provided with modern equipment in 2007, and the atmospheric air quality monitoring started there according to EMEP Programme (European Monitoring and Evaluation Programme, or Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe), Level I (inorganic compounds in precipitations: SO_4^-, NO_3^-, NH_4^+, H^+(pH), Na^+, K^+, Ca^{++}, Mg^{++}, Cl^-; inorganic compounds in the atmospheric air: SO_2, SO_4^-, NO_3^-, HNO_3, NH_4^+, NH_3 (NO_3, NH_4), HCl, Na^+, K^+, Ca^{++}, Mg^{++}; NO_2; ground level ozone O_3; PM10; coarse fraction particulate matter: NH_3, NH_4^+, HCl, HNO_3, NO_3^-) and Level II (persistent organic pollutants and heavy metals in precipitations). The national grid of 8 meteorological stations was launched in 1992 to monitor the chemical composition of atmospheric precipitations after 6 indicators: SO_2^-, Cl^-, HCO_3^-, Ca_2^+, Mg_2^+, NH_4^+ and to determine the chemical activity levels of the hydrogen ions in solution (pH).

Systematic monitoring of the background γ-radiation exposure dose levels has been performed since 1978 to evaluate background radioactivity levels, with daily observations twice a day (at 07:00 and 20:00) performed at 18 meteorological stations (7 stations in the northern part of the Republic of Moldova, 7 stations in the central part and 4 stations in the south) throughout the country (Figure 6-2).

Starting 2007, the State Hydrometeorology Service has been cooperating with the International Atomic Energy Agency (IAEA) under the IAEA/WMO GNIP Programme (Global

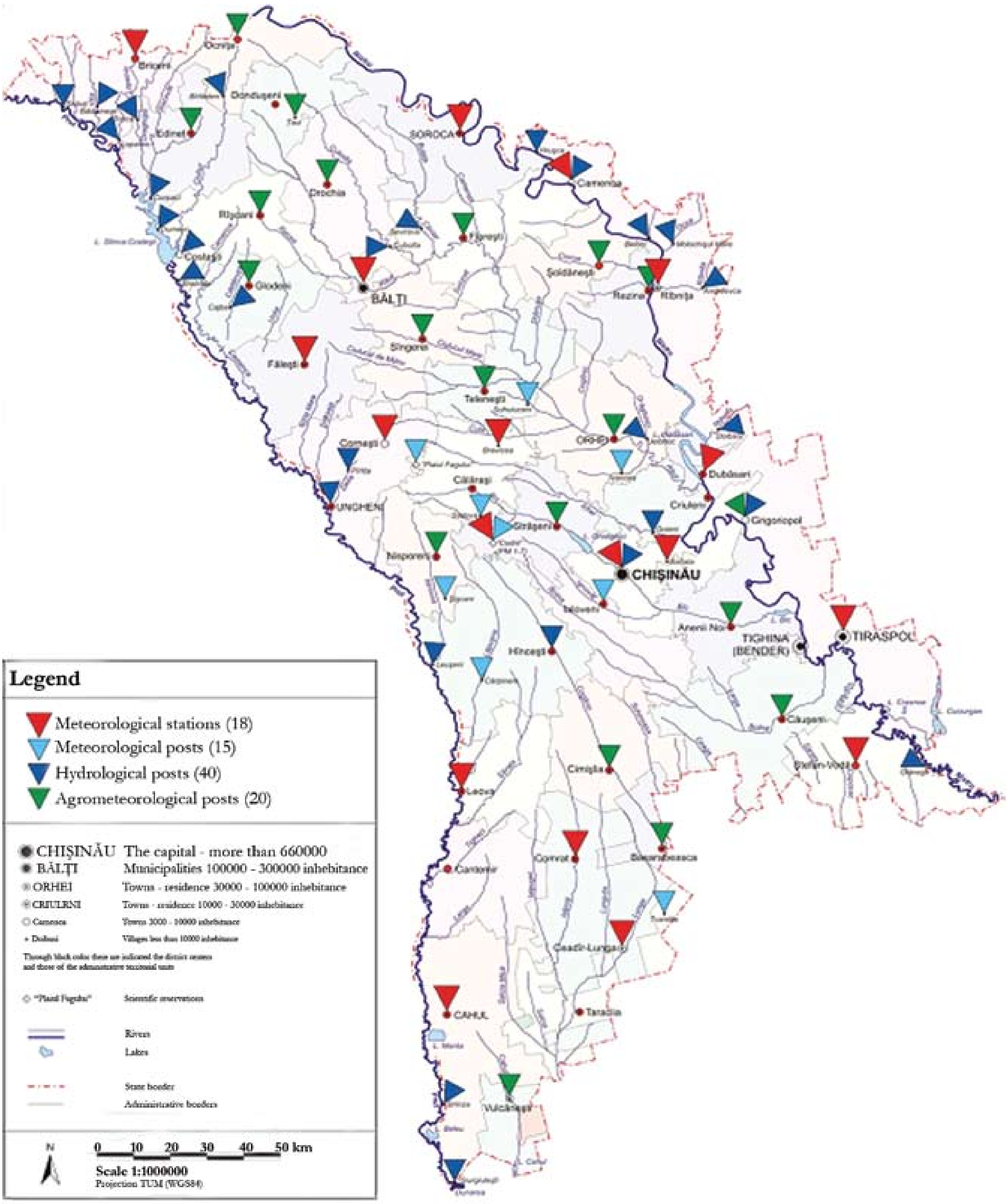


Figure 6-2: The Grid of Meteorological Observation Stations in the Republic of Moldova

Network of Isotopes in Precipitation) to monitor the concentrations of hydrogen and oxygen isotopes and in particular of the stable Oxygen-18 and Deuterium (Hydrogen-2) isotopes as well the radioactive isotope Tritium (Hydrogen-3) in the precipitations.

It should be noted that the National Scientific-Practical Centre for Preventive Medicine (NSPCPM) with a network of the Territorial Preventive Medicine Centres of the Ministry of Health has its own specialized grid for permanent air quality monitoring in 12 urban settlements and in particular in residential areas and indoors.

Furthermore, the State Ecological Inspectorate has its own grid for specific and fluctuating survey of pollutant emissions from permanent stationary and mobile sources of pollution – as provided for in the Environment Pollution Monitoring Programme and the necessity to have operational monitoring. The network of surveys covers approximately 170 pollution sources in Chisinau and 470 enterprises and social facilities in other towns and regions of the Republic of Moldova.

b) Surface Water Quality Monitoring

The State Hydrometeorological Service (SHS) has been performing systematic surface water quality surveys based on 52 observation points located at 17 large and small rivers, 6 water storage basins, 3 natural lakes and 1 coastal lake, testing 49 hydro-chemical indicators and concentrations in 5 groups of hydro-biologic elements.

Under the bilateral agreement between the Republic of Moldova and Romania, SHS monitors the Pruth water quality based on 7 observation points established as agreed by the both parties and surveys 39 hydro-chemical indicators and concentrations in 3 groups of hydro-biologic elements.

The International Commission for the Protection of the Danube River (ICPDR) performs its monitoring based on 3 stations established within the Transnational Monitoring Network after 52 hydro-chemical quality parameters and 5 groups of hydro-biologic elements as well as monitoring of water sediments from the Transnational Monitoring Network after 21 quality indicators.

Under the bilateral agreement between the Republic of Moldova and Ukraine, the information is shared by the parties regarding the quality of water in the rivers Pruth and Dniester as observed at the stations located at the border.

The SHS monitoring laboratories participate quarterly in the external international laboratory control programme (Qualco Danube) with Vituki Water Institute (Hungary), which enables them to improve the competitiveness and veracity of their tests.

Under the NATO Project "*Real-Time Monitoring and Decision Support System for International Rivers: Application to the Dniester and Pruth rivers*", SHS has received 4 automated surface water quality control stations, which are located at the entrance of the Dniester and Pruth international rivers to Moldova's territory (Naslavcea and Sirauti villages) and at their exit from the Republic of Moldova (Tudora and Valea Mare villages).

Owing to the expanded cooperation and involvement in the international projects, it has become possible to complete and equip the laboratories in the monitoring system with modern testing equipment and lab-ware, and the professionals performing the respective tests have received advanced training in the relevant specialized European institutions. The progress achieved in the initiation of the process to introduce and comply with the international requirements and standards has made possible the evaluation, certification and accreditation of the human and technical capacities according to the European quality standards.

The Moldovan Geology Agency "AGeoM" is in charge of managing the network for ground water monitoring. The current number of the wells drilled for observation purposes totals 186 (36 less than in 1998) located on 33 fields. The necessity is felt to expand the network to be able to monitor of the water-bearing layers under the filtration plants of sugar factories and the water-bearing layers affected by the discharge from major cattle-breeding farms.

The National Scientific-Practical Centre for Preventive Medicine (NSPCPM) with a network of the Territorial Preventive Medicine Centres of the Ministry of Health has its specialized networks for permanent quality monitoring of the drinking water taken from 3550 wells in the rural area and 11 surface water storage basins.

In addition, the State Ecological Inspectorate takes samples of water, including residual water in the vicinity of industrial facilities as well as permanent stationary and mobile pollution sources - as provided for in the Environment Pollution Monitoring Programme and the necessity to have operational monitoring.

c) Soil Quality Monitoring

The State Hydrometeorological Service (SHS) has been performing systematic soil quality surveys based on the national grid of observation plots in 12 farms in 12 districs of the Republic of Moldova, where soil samples are collected from 60 fields with the total area of approximately 35,000 ha – in spring prior to planting/sowing of agricultural crops and in autumn after the harvest is over.

In all those 12 observation plots located strategically to ensure the representation of all Moldova's territory and cover all main soil types and sub-types, soil samples are tested for a number of parameters (heavy metals, pesticides, biphenyl polychlorates (BPC's), agrochemical indicators, etc.). The amounts of fertilizers to be introduced in soil are calculated for various agricultural crops based on the findings of the tests for the diverse agrochemical indicators.

In addition comprehensive testing is performed in respect of water deposits and soil in the vicinity of pesticide storage facilities; evaluation is performed of the pollution levels of the BPC-contaminated areas around power network substations.

An important aspect of the soil quality monitoring is the comparison with unpolluted areas and determination of the background concentrations of pesticides and heavy metals in the Codrii nature reserve (Straseni District), Balti steppe and Bugeac steppe.

The Republic of Moldova is a signatory Party to the Stockholm Convention on Persistent Organic Pollutants (POPs) and is fully aware of the necessity to implement the provisions of the above Convention on its territory within the framework of the national monitoring system, and therefore certain activities are under implementation to comply with the international requirements (determination of the residue concentrations of chlorine-containing organic pesticides in soil in the vicinity of the warehouses where the expired pesticides had been stored, surveys of soil pollution with BPC in the vicinity of the power network equipment and stations; surveys of the concentrations of chlorine-containing organic pesticides and BPC's (biphenyl polychlorates) in the deposits in Moldova's water basins and rivers).

To ensure the authenticity of the obtained data, the laboratories participate in the external laboratory quality control program with Hungary (for concentrations of chlorine-containing organic pesticides, heavy metals, nitrogen and phosphorus concentrations in all forms in water sediments), with Monaco (for concentrations of chlorine-containing organic pesticides and BPC) and in the national quality control programs for all concentrations covered with monitoring.

A particular attention is given to the familiarization with and implementation of the international approaches used by the Environment Protection Agency to determine POP concentrations to improve the monitoring system and to bring it in compliance with the international requirements; and the European experience is promoted within NHS to initiate the implementation of the QC system and to improve the national-level quality control.

In addition, the National Scientific-Practical Centre for Preventive Medicine (NSPCPM) with a network of the Territorial Preventive Medicine Centres of the Ministry of Health has its specialized grid for permanent soil quality monitoring in recreation areas, in settlements and in the areas round drinking water wells.

The institutions subordinated to the Ministry of Agriculture and Food Industry (MAFI) have their own network to monitor the quality of soil and agricultural products. The operation of that network is ensured by Institute of Pedology, Agrochemistry and Soil Protection "N. Dimo", National Centre of Applied Soil Science, National Water Management Concern "Apele Moldovei", National Institute of Grapes and Wine and other institutions in conformity with the scheduled research work and activity plans, on the orders from MAFI, MENR, other governmental institutions and enterprises.

d) Monitoring the State of Natural Ecosystems

The ASM institutes (the Zoology Institute, the Botanical Garden (Institute), the Institute of Ecology and Geography, etc.) have their permanent and fluctuating grids of observation plots to monitor the state of natural ecosystems, but the research and monitoring is performed in conformity with the research schedules and action plans, including orders and requests from the Government of the Republic of Moldova, other public institutions.

In addition the Forestry Agency "Moldsilva" manages the national forest monitoring grid which covers 700 areas selected for observation purposes out of the total areas under forests in Moldova. The grid density is 2 by 2 km or one observation plot per 400 hectares. Furthermore, there is a grid of 12 observation plots with the density of 16 by 16 km or one plot per 25,600 hectares. The data are collected from the latter grid in conformity with the Guidelines for the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP-Forests) operating under the UNECE Convention on Long-Range Transborder Air Pollution.

e) Integrated Environmental Monitoring and Information Management

The SHS's Centre for Integrated Ecological Monitoring and Information Management (CIEMIM) is the authority in charge of storage, generalization, statistical analysis and evaluation of the data on the quality of the environmental components, which has been obtained as result of laboratory tests and from the stations of the SHS monitoring network.

CIEMIM acquaints systematically the ministries, departments, duly authorized institutions, decision-makers, population, etc. with the information regarding the environment pollution levels in the Republic of Moldova.

CIEMIM has created and is managing a database on the environmental situation in the Republic of Moldova, which the relevant authorities need for the purposes of decision-making and determination of the environmental management strategies at all management levels. The database is upgraded systematically with the current primary information on the air, surface water and soil pollution levels, and the results obtained in the data processing software application are used subsequently to produce monthly bulletins on the cases of high and extremely high pollution of the environment components, information bulletins and other periodically updated information summaries needed by the beneficiaries.

To disseminate the most veritable and objective information, the Department of Monitoring published several Yearbooks, including: hydro-chemical quality of surface water; hydro-biological quality of surface water; quality of atmospheric air; soil quality; and radiological situation in the environment components.

6.2.2 Data Collection and Information Transfer Systems

Certain actions have been taken in the recent years to improve the environmental information system via consolidation of the Governmental, departmental and private information networks. The continuous improvements has been registered in MENR and its subdivisions (SHS, SEI and AGeoM) in terms of access to the environmental information, development of the geographic information system, computerized electronic networks, a system of environmental indicators, etc. The improvement of the information systems in sectors has been registered in the Ministry of Health, Ministry of Agriculture and Food Industry, National Statistical Bureau, etc. However, the cases of coordination and data sharing among the institutions monitoring different environmental quality aspects have remained sporadic and are more often than not the product of personal initiative rather than a viable operational system. It must be noted that efforts have been made during the last decade to integrate the environmental data and information stored in the diverse institutions, by data sharing is still lacking altogether.

Statistics is collected currently on 17 environmental areas and aspects. But the important databases (e.g. on polluting emission and discharge levels; water consumption; ground water quality; the state of forests and environment in general) are administrated using obsolete software applications and often not accessible for the decision-makers and broad public. The necessity is evident to establish a single centre which would ensure the integration of the ecological information flows and contribute to the improvement of inter-departmental liaison in terms of collection and management of the environmental data.

A somewhat better situation has been registered in the administration of the system used to collect and transfer hydro-meteorological information, because its operation in the Republic of Moldova is ensured by the SHS's telecommunication network. The SHS's Telecommunication Centre ensures: data transfer based on the information commuting principle; translation of the communication formats and codes for different data transfer channels and networks; establishment of databases; production of weather reports; user control and guidance in the information transfer network.

Four systems based on different technologies have been created within the SHS telecommunication network for the purposes of collection, procession and transfer of information: common use telegraph (TG-OP); web-based technology; digital channels and satellite communication systems. RETIM 2000 receiving station – new generation satellite router - is allocated for receiving of the meteorological data transmitted by Meteo-France's RETIM 2000 central system. As compared to its predecessor (RETIM 88), this receiver has much higher capacity and efficiency (up to 2 MB per second) and the data is transferred from the satellite to the public in DVB standard. The receiver hardware platform is composed of high efficiency chassis and IP/DVB card receiving the data from the satellite. The receiver software platform includes: the operating system for public access and special software. The main functions of the receiver are: selective receiving of the data transmitted by Meteo-France; re-transmission of the data to user terminals; consideration of the configuration messages transmitted by Meteo-France central system; updating of the activity logs, statistics and information regarding the current status of the receiver; receiving new versions of the special software and system configuration after Meteo-France central system. The automated information system "Meteocentre" monitors the time status of the users (weather forecasting organizations, administrative authorities, etc.) according to certain observation points depending on the serviced area. The automated information system (AIS) has been designed to: collect data from the survey networks on land; process, control and analyse the received data; transmit the received information to the users; update the archive files; present and print in hard copy the meteorological data transmitted from the meteorology stations on land. The system is intended to operate 24 hours a day. Owing to that non-stop receiving of information from the observation points, the automated information system offers the possibility to observe in real time mode the changes in main time parameters as well as unfavourable or dangerous natural phenomena. Collection of the operating and regime status information from the observation points according to an optimized model for each particular region is performed using certain communication sources. The system can be used to collect operating and regime status information from the stations and points not equipped with automatic meters and based on the Automated Information and Measurements System "POGODA". The system allows furthermore obtaining information: from the additional network of meteorological posts with MAWS automated stations; and from the hydrology posts with automated water level gauges and communication sources.

6.2.3 Databases Development, Maintenance and Update

Within the State Hydrometeorological Service, the Automation Centre is responsible for the development and maintenance of the systems for database programming, maintenance and update, collection of meteorological information from observation points and stations, data control and creation of archive files, procession of tables of annual averages, support and storage of all hydro-meteorological information groups, including the information on the pollution levels in the environment components, and maintenance of the National Hydrometeorological Bank of Data.

That centre employs a team of professionals in its *Group for Technical Maintenance and Programming Systems,* which is responsible for the development of the software for automated procession of the meteorological, hydrological, actinometrical and agricultural-meteorological information as well as the data on the water, air and soil pollution levels; furthermore, the professionals in the *Group for Technical Maintenance and Programming Systems* are responsible for the input in the computer of the coded written information on the findings of the meteorological observations, arriving monthly from all observation points and stations of the national observation grid and for the procession of that information using the software PERSONA MIS MIP, ACTIN, DAVL and generation of the tables with the results.

The Automation Centre maintains the software (programming systems) acquired or obtained via World Meteorological Organization (WMO), such as: CLICOM – the system for procession of the climatic information; GISMETEO – integrated software for receipt and visualization of the actual and forecast weather maps received via communication channel with the Regional Data Centre in Moscow; PERSONA MIS MIP – the system for procession of the meteorological information at observation stations and points; METEO-CELL – integrated software for receipt and visualization of the information from MPL-5 meteorological radar; Briefing Terminals with WIND software to visualize actual and forecast weather maps and the information received via satellite as well as via direct channels from Romania; POGODA – the system for programming of the automated meteorological stations; and other integrated software for the state-of-the-art analytical equipment used by the State Hydrometeorology Service.

It should be noted that all the information input in the computer is printed in hard copy and stored on data carriers, backed-up and filed in the archive of the State Hydro-Meteorological Bank of Data established in October 1957. The information on files of the above Bank of Data is the intellectual property of the Republic of Moldova. The List of the documents on the environmental situation to be filed with the National Bank of Data (RD52, 19-143-87) was developed and approved in 1987 and adjusted in 1998. That document provides main guidance for the archive staff on determination of the information storage terms in the National Hydrometeorological Bank of Data. The data in the Bank are used as hydro-meteorological evidence to substantiate the design, construction and operation of the diverse social and industrial facilities, generation of the long-term development strategies for the national economy, applied and fundamental scientific research, for the purposes of hydro meteorological information sharing within WMO and to fulfil the obligations under the international Conventions and Agreements to which the Republic of Moldova is a Part.

6.3 Information on Education, Training and Public Awareness

6.3.1 Public Participation in the Decision-Making Process and Access to Information

The legal framework regulating the access to information is ensured by the Constitution of the Republic of Moldova adopted on 29.07.1994. Article 34 (1, 2, 3, 4) of the Constitution says that "*the right of a person to have access to any kind of information of public interest shall not be curtailed*" and that "*public authorities, pursuant to their assigned competence, shall be compelled to ensure that citizens are correctly informed both on public affairs and issues of personal interest*", and "*the public, state and private mass-media means shall be bound to provide the correct information to the public opinion*". Furthermore, the same article says that the right of access to information may not prejudice either the measures of citizens' protection or the national security. Article 37 (2, 3) states that the state shall guarantee to anyone the right of free access and dissemination of the truthful information related to the environment state, living and working conditions, and the quality of food products and household appliances, and that the concealment or forgery of the information regarding the factors detrimental to human health shall be prohibited by law.

Public involvement in the development and adoption of decisions in environmental matters is regulated by a number of the environment laws, such as: Article 3(d), Article 30 of the *Law on the environment protection* adopted through the Parliament Resolution No. 1515-XII as of 16.06.1993; Articles 10, 11, 12, 13, 14 of the *Law on ecological expertise and evaluation of the environmental impact* adopted through the Parliament Resolution No.851 as of 29.05.1996; Article 27 of the *Law on the principles of urbanism and territory development* adopted through the Parliament Resolution No. 835 as of 17.05.1996; Article 20 (3), 29 (4) of the *Law on green areas of the urban and rural settlements* adopted through the Parliament Resolution No. 591-XIV as of 23.09.1999.

The legal framework for public participation in the decision-making on environmental issues has been improved after the ratification of the Convention on Access to Information**,** Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998) through the Parliament Resolution No. 346-XIV as of 07.04.1999. To fulfil the obligations regarding the implementation of the above Convention, the Republic of Moldova developed the *Regulation for education of the public on the development and adoption of decisions in environmental matters*, which was approved by the Government Resolution No.72 as of 25 January 2000. According to the above Regulation, public participation in the development and adoption of decisions in environmental matters is a social act through which the citizens are ensured the right of access to the decision-making, to expression of their opinions regarding the adoption and implementation of the draft legislation and project documentation regarding the objectives and intended economic activities influencing or able to influence the environmental situation. According to the above Regulation, the Central Environmental Authority (CEA) is fully responsible for the procedures of public involvement in the development of legislation and regulations (draft laws, national programs, regulations, etc.). The local public administration and environmental authorities (LPA's) are fully responsible for the involvement of the public in the decision-making in the issues of economic activities, construction or reconstruction projects, etc. with the local-level environmental impact. Depending on the scope of such economic activities, the local authorities should organize local referendums, public opinion surveys and polls, etc., using the methods and techniques specified in the regulation. According to the regulation, the costs of such public consultations should be covered by the individuals or legal entities interested in the intended economic activities. In the case of consultations under the national programmes, the costs may be funded from the National Ecological Fund (NEF).

One more law relevant for the above sphere is the *Law on Access to Information* adopted through the Parliament Resolution No. 982-XIV as of 11.05.2000 (Box 6.1). A number of the environment protection laws contain provisions regarding public access to information. Thus, Article 16 (f) of the *Law on the fund of the natural areas protected by the state* adopted through the Parliament Resolution No. 1538-XIII as of 25.02.1998 says that NGO's have the right to obtain information on environmental matters. Article 8 (1) of the *Law on protection of atmospheric air*, adopted through the Parliamentary Resolution No. 1422-XIII as of 17.12.1997, says that "social organisms may request and obtain the necessary information regarding the state of atmospheric air".

Article 29 (3) of the *Law on natural resources* adopted through the Parliament Resolution No. 1102-XIII as of 06.02.1997 says that "the Government, the local public administration authorities, the public authority duly empowered to manage natural resources and to protect the environment, and businesses shall present to the public in due course true and accessible information about the activities pertaining to the use of natural resources and environment protection issues".

Article 23 of the *Forest Code* adopted through the Parliament Resolution no. 887 as of 21.06.1996 says that the citizens and social organisms have the right to obtain from the public forestry management and environment protection authorities the information on the situation of the forest and hunting resources, planned and implemented measures for their conservation and use.

According to the *Regulation on the Ministry of Environment and Natural Resources* adopted through the Government Resolution No. 573 as of June 13, 2005, one of the special duties entrusted to that ministry is to inform the population permanently about the environmental situation and use of the natural resources in Moldova, to ensure public access to information and public participation in the decision-making in environmental matters in conformity with the applicable laws (<www.mediu.gov.md>). Furthermore, the MENR is responsible for: involvement of the media, NGO's and public in its actions in the relevant spheres of its operations; informing of the broad public of the environmental situation and use of the natural resources in the country; ensuring the public access to information and its participation in the decision-making in environmental matters. In the MENR, the Department of analysis, monitoring and policy evaluation is in charge of the above sphere. Thus, one of the principal strategic environmental objectives of that department is to raise the environmental awareness of the population, to simplify public access to the environmental information and participation of the public in the decision-making in the issues of the natural resource management.

In October 2000, the Environmental Information Centre (EIC) was established in the Republic of Moldova with funding from the Danish Environment Protection Agency (DEPA) under the Project "Assistance to Moldova in the implementation of the Aarhus Convention". The project had the following goals: to build the ministerial capacity in the management of the environmental information and its dis-

Box 6.1: Provisions of the Law on Access to Information

Article 1 of the above Law regulates: the interaction between the providers of information and individuals and/or legal entities during the exercise of their constitutional right to access information; the principles, conditions, ways and order of accessing official information held by the providers of the information; issues regarding the access to private information (personal data) and its protection during the accessing period; the rights of applicants during the process of obtaining information, including private information; the obligations of information providers to ensure access to official information; methods of safeguarding the right to information.

Article 4 (1) stipulates that "Under this law, any person has the right to seek, obtain and disseminate official information".

According to Article 6 (1) "the official information is defined as all information held and administered by information providers, which has been developed, selected, processed, systematized and/or adopted by official bodies or persons, or that is presented to them in conformity with the law by other subjects". That Article provides for publication of the documents containing information in compliance with the law.

Article 7 covers the situations of limited access to official information is.

The rights of the parties requesting information are covered in Article 10, and Article 11 deals with the obligations of the information providers.

According to Article 13 (1), the means of accessing information are: listening to the information that can be presented verbally; examining the document on the institution's premises; releasing a copy of the requested document or information; releasing a copy of the document's or information's translation into a language different from the original one, for an additional fee; sending by mail (including e-mail) the copy of the document or information (or parts thereof), a copy of the document's or information's translation into another language, upon the applicant's request, for a corresponding fee.

Article 13 (2) says that excerpts from registers, documents, information (or parts thereof) may be made available to the applicant, upon the applicant's request, in a reasonable and acceptable form.

Article 16 of the Law covers the time limits in which requests on accessing information are to be carried, and in particular: Information and documents requested will be presented to the applicant as soon as they become available, but not later than 15 working days from the day, on which the request to access information has been registered; The manager of the public institution may extend by 5 working days the term, in which the information and documents are supplied, if: (1) a very large amount of information has been requested, and it requires selection; (2) additional consultations are necessary in order to carry out the request. The requesting party will be informed about any extension of the term and the reasons for that, five days before the initial term expires.

Furthermore, the Law covers the situations in which access to information may be denied, fees for providing official information, general provisions on protection of the right to information and contesting the information providers' actions judicially.

semination pro-actively and on requests (via establishment of the Environmental Information Library and Centre); to assist the ministry in its efforts to provide the authorities and the public with higher volumes of information in electronic format.

EIC has the following functions: satisfaction of the demand for environmental information with public officers and broad public and pro-active dissemination of the environmental information; creation of electronic databases which would satisfy the need of the decision-makers and environmental professionals on the one hand and be accessible in terms of providing the information to the broad public on the other hand; management of the MENR's Environmental Library. The *Inventory of Environmental Information* was developed to inform the prospective users about the principal sources of the environmental information obtained from the various Moldovan public institutions; it can be accessed at the EIC web site (<www.cim.moldova.md>).

6.3.2 Education and Training of the Population

Ecological education (including the education on climate changes) takes place in the educational establishments of Moldova along 3 directions: as part of the obligatory hours; as optional hours and as part of the out-of-school activities. Ecological education is present at all stages of the education process: pre-school, primary, gymnasium, lyceum, professional, university and post-graduate (post-university).

A. Obligatory Training Hours

Ecological Education and Training of the Children of Pre-School Age

Pre-school education (for children aged 5-7) is based on such activities as: "Acquainting the children with the nature", "Education through labour". Learning those subjects, the children get general idea about the role played by the diversity of plants and animals and about their environmental needs. In addition the teacher's objective is to promote the idea of the environment protection and to encourage the children to protect nature. Learning the subject "Health education", pre-school children extend their knowledge of healthy lifestyle (day regimen, healthy nutrition, hygiene of breathing, etc.) and its dependence on the environmental situation.

Education in Primary Schools

In primary school, the basic principles of ecological responsibility are taught to children aged 7-11 as part of "Science" curriculum in forms II-IV, 2 hours a week. The general objectives of "Science" as school discipline are: familiarization with the basic notions of nature and its diversity; protection of nature through rational use of the natural resources and conservation of biodiversity; creating of the environmental awareness; learning of the basic relationships among the components 'wildlife' – 'lifeless nature' – 'human society'. The teaching of the above discipline is allocated a certain number of hours in the curriculum and supported with textbooks for schoolchildren and a guidebook for teachers.

Education in Gymnasiums

The general objectives for the gymnasium education cycle (forms V-IX) are: development of scientifically based awareness of the complexity of the nature and interdependence of its components; knowledge and understanding of the relationships 'structure – function', 'organism – environment'; development of a correct attitude to the nature and environment, personal and social health. The studies of nature as the environment for human existence and activities are continued in form V; they are covered with the same discipline "Science" and the ecological problems are examined in more detail in the module "Nature – Human Being – Environment". The issues which include environmental protection are examined also in forms VI-IX as part of some other disciplines, such as: geography, biology, chemistry and physics.

Education in Lyceums

During the lyceum education course (forms X-XII) the students are given an idea of the role of nature in human society and its functions, and nature protection is considered an integral component of human culture. A scientific worldview of nature is shaped at that age of the total information about the environment. Ecological training is integrated also in general disciplines, including geography (forms X-XII), general biology (form XII) and physics (forms X-XI). It should be noted that the discipline "Geography of the surrounding world" (form XII) teaches the students such modules as: components and structure of the geographic environment; environment relationship types; evolution of the environment; diversity of space and environment types; environment protection and conservation; fundamental environmental problems; sustainable development of the geographic environment. The respective discipline covers also topics such as: natural environment; environmental monitoring; geographic environment components; geographic environment structure; relationship types in the geographic environment; environment evolution; space diversity of the environment; environmental impact of human activities; natural degradation of the environment and the sources of environment pollution; local, regional and global environment protection (of air, water, flora, fauna, soil, human health); environment conservation; conservation of natural systems and human heritage; fundamental environmental problems: ecology, climate changes, desertification, demography, food security, energy security and availability of natural resources, etc.; natural and anthropogenic hazards; sustainable environmental development.

B. Optional Training

The education plan for primary schools, gymnasiums and lyceums suggests a number of optional disciplines: ecological education, human ecology, man and his environment for primary schools and gymnasiums; environment protection for lyceums. For the future, the Ministry of Education and Youth expects to develop and adjust the curriculum and teacher guidelines also for the optional disciplines. The textbook "Ecology and Environment Protection" has been published already and used in the optional hours.

C. Out-of-School Work

The Ministry of Education and Youth has been organizing an ecology hour in the beginning of each new school-year jointly with the Ministry of Environment and Natural Resources. In March-April all educational establishments participate in the voluntary landscape gardening program "A tree to continue" intended to create more green areas in Moldova. The Ministry of Education and Youth holds topical competitions jointly with the relevant social organisms. Biology, Chemistry, Geography and Ecology Olympiads are held annually (housed by lyceums as well as in out-of-school work sections); summer schools are organized for the lyceum students (as field seminars and lectures in the open air).

NGO's and in particular youth organizations are playing more and more important role in the environmental education and promotion of the universal environment protection values. Such organizations can be found throughout RM, but their emergence has been made possible owing to the enthusiasm of students and teachers on the one hand and the funding available under certain international projects on the other hand.

Education in Professional Schools

There is a network of professional schools and industrial schools in Moldova, educating and training skilled workers for agriculture, forestry and floriculture. The training course for such professions includes many ecological aspects.

Pre-University Education

The national network of the vocational educational establishments includes, in particular: Ecological College in Chisinau (training junior environmental engineers), Industrial and Construction College in Chisinau (training junior water management and water protection engineers), Forestry College in Balti (training junior forestry engineers) and Multi-profile Vocational School in Cuhuresti (training foresters).

University Education

University training on environment research, protection and management is delivered in the following universities:

- State University of Moldova (SUM): faculties of biology and pedology (ecology and environment protection), chemistry faculty (industrial and ecological chemistry), law faculty (environmental legislation), physics faculty (meteorology and hydrology);
- Technical University of Moldova (TUM): faculty of urbanism and architecture, department "Ecotechology, Environmental Management and Water Engineering" (training professional construction engineers, speciality "Water Management and Protection" in construction as well as water supply and sewage systems; engineers-managers, speciality "Engineering and Management in Environment Protection" in operation of the environment protection systems);
- State University of Tiraspol (SUT) (located in Chisinau): faculty of biology and chemistry (biology and chemistry, biology and ecology, biology and sanology, chemistry and biology, chemistry and physics), faculty of geography (geography and biology, geography and tourism, geography and informatics), faculty of physics, mathematics and information technology (mathematics and physics, physics and informatics, physics and astronomy);
- State Agricultural University of Moldova (SAUM): faculty of agronomy (agronomy/ecological agriculture, tourism, ecology/environmental inspection), faculty of horticulture (plant protection, forestry and management of public green areas), faculty of land cadastre and law (territory layout, environment engineering).

Most of the above universities (e.g. SUM, TUM and SAUM) offer an environment protection course to students of the ecological profile faculties as well as those of other faculties. The emergence and promotion of such training courses has become possible owing to the involvement of the university teaching staff in diverse international research projects and in particular as result of the extension and experience sharing activities, including the efforts on the part of European universities. It should be noted in the above context that the emergence of the university training courses on environment protection and energy conservation is in addition to the scope of the CPA and LPA Strategies and Action Plans. However, very poor collaboration should be mentioned between the teaching staff on the one part and the decision-makers in the relevant ministries and departments as regards the development, adjustment or introduction of new training courses/subjects provided for in certain laws. Furthermore it is necessary to add the subject "Objectives of the international environmental Conventions and their implementation in the Republic of Moldova" to all the environment protection courses offered by the universities.

Post-University Education

Post-university (post-graduate) ecological education is offered by the relevant institutions in the Republic of Moldova and abroad. In the RM they include: ASM with its relevant research institutes (Institute of Ecology and Geography, Botanic Institute, Institute of Zoology, Institute of Microbiology, Institute of Chemistry, etc.) and the state universities mentioned above (SUM, TUM, SUT and SAUM). Thus, for example, post-graduate training for MS or DS degree is offered in the Republic of Moldova by SAUM and the Botanical Garden (Institute) in forestry and plant protection; by TUM in energy conservation and renewable energy sources; by SUM, SUT, SAUM, TUM and ASM (Institute of Ecology and Geography and Chemistry Institute) in environment protection and natural resource conservation; the above post-graduate educational establishments have specialized scientific councils for the respective areas.

Post-graduates willing to continue their training in environment protection and natural resource conservation have an option to join a post-graduate course abroad under the bilateral collaboration treaties between the Government of the Republic of Moldova and the Governments of other countries; young Moldovan post-graduates may apply for specialized scholarships to be trained in the universities of Romania, Ukraine, Russia, Bulgaria, Turkey, Poland, Greece and some other countries.

Professional Training

Professional training courses in environment protection are offered systematically, depending on the exact field of activity, in the specialized training centres by the relevant ministries, including:

- Academy of Public Administration (APA) – for the professionals employed in CPA and LPA authorities;
- National Professional Development Institute for Teaching Staff (NPDITS) – for the teaching staff employed in gymnasiums and lyceums;
- Centre of Forestry Technologies and Design (CFTD) – for the forestry sector professionals;
- State University of Medicine and Pharmaceutics 'N. Testimiteanu" – for the professionals employed in the hygiene and epidemiology centres;
- National Centre of Veterinary Diagnostics (NCVD) by MAFI – for the professionals employed in veterinary laboratories, etc.

Professional development courses (programmes) are offered also by the state universities. Such courses are usually offered sporadically, depending on the number of the received applications or under certain international projects, such as those funded by TACIS. The above category includes also a number of events, such as: seminars, workshops, scientific conferences and round table discussions organized by the research staff of ASM, TUM, SUM and NGO's under certain international projects. The majority of such events are sporadic in character, often showing the lack of continuity or collaboration with the relevant ministries.

In addition, the Central Environmental Authority (CEA) and its subdivisions – State Ecological Inspectorate (SEI), State Hydrometeorological Service (SHS), Biodiversity, Ozone, Sustainable POP's Management, Climate Change Offices and Carbon Funding Unit, acting in cooperation with international agencies (TACIS, World Bank, Soros Foundation, USAID, UNDP, UNEP), hosted training courses and workshops in the various environment protection areas, such as: biodiversity conservation; access to environmental information and participation of the public in decision-making on environmental matters; Accident Emergency Warning System (AEWS) in the Danube Basin; protection of hydrographical basins of the Prut tributaries; certification of the environmental management systems and products/processes with negative impact on the environment; sustainable development in the areas of the Pruth hydrographical basin; implementation of the renewable energy sources as the means to reduce GHG emissions; improved monitoring over imports/exports of chlorofluorocarbon (CFC) and CFC-containing equipment; training of trainers and refrigeration sector technicians, etc.

6.3.3 Raising Public Awareness

In the Republic of Moldova, the public is informed continuously about the quality and situation of the environment components in printed media (press) and on TV and radio (audio-visual methods). In addition, round table discussions, public hearings, conferences are organized to consult the opinion of the civil society on the draft laws and regulations developed by CEA.

Furthermore, the public is informed continuously about the activities of MENR and its subdivisions on TV and radio (audio-visual methods). Collaboration agreements have been concluded for the purpose with the state TV and radio company "TELERADIO-MOLDOVA". The resultant products include radio programme "Ecoterra" (appearing weekly), TV-shows "Terra vita" (appearing once in a fortnight) and "Vreau sa stiu" appearing weekly). In addition, ecological news and releases on the environmental matters appear in some other broadcasts and shows. Similar broadcasts and shows appear in the listings of other radio (Radio Sanatatea) and TV channels (NIT, EURO-TV). It should be mentioned that the employees of MENR and its subdivisions are quite often interviewed by the radio and TV channels regarding diverse issues.

Publications important in terms of ecological education appear in the public and private sector. The most popular published media of that kind include: "Natura" monthly magazine (appearing since 1989), "Gutta" monthly ecological magazine for children (established in 1996), "Noi", "Alunelul", "Florile Dalbe" magazines, etc. In addition, there exists a number of region-level printed media on the environment protection matters – mainly with funding and support from REC Moldova. REC Moldova publications "Buletinul electronic lunar" and "Buletinul Informational" have been appearing monthly since 2001. CEA has founded and is funding "Mediul Ambiant" (Environment") periodical (appearing since 2002) and Ecological Bulletin (appearing since 2005). Furthermore, contracts have been concluded with periodicals "Moldova Suverana", "Nezavisimaia Moldova" and "Faclia", providing for publication of the relevant environmental information on regular basis. A competition for the best environmental article is announced annually for journalists on the eve of the World Environment Day (5 June) to encourage them to cover the ecological matters.

The Ministry of Environment and Natural Resources (MENR) and its subdivisions are publishing every year a number of environment protection papers including: Annual Report "Environmental Situation in Moldova", State Water Cadastre, collections of the materials presented at scientific conferences and workshops, information bulletins, other analytical and generalized materials. The National Ecological Fund (NEF) allocates grants from time to time to produce brochures and posters regarding the significant ecological dates and events; assistance is provided to publish the works of certain authors and diverse books on ecological matters, which are distributed subsequently free of charge through educational establishments and public libraries. The resent years saw the appearance of above 50 titles of books on the environment, including the series "Moldovan Fauna", "Moldovan Flora", "Geographic Environment", "Moldova's Water Resources" and „Ecological Encyclopaedia". The first 7 titles appearing in the above series were distributed free of charge to all school and university libraries.

Many important materials on environment protection have been accumulated in the library of the Environmental Information Centre (EIC) open for the public and offering the possibility to get acquainted with many important ecological documents. Furthermore, EIC offers Internet access, supports its own web site and circulates electronic information bulletins on the CEA activities, progress of the environmental projects under implementation in the ministry, draft laws and regulations, activities of the environmental NGO's, ecological digests, etc.

To facilitate more active public involvement in the environmental decision-making, MENR and the environmental NGO's have signed the Memorandum on collaboration to unite their efforts for the solution of the regional and local level environmental problems. Furthermore, several NGO meetings were organized jointly with REC Moldova (there are currently about 400 officially registered environmental NGO's in the Republic of Moldova) to cover the current ecological issues, including: the environment and the role of social organisms in the ecological education; participation of the NGO's and broad public in decision making; green heritage of Moldova, etc. Till now, 4 national NGO forums on the environment have been held in Moldova to discuss the development of the environmental NGO sector in conformity with the national and international requirements. It should be mentioned that the NGO representatives have taken an active part at diverse seminars, round table discussions, conferences, workgroup meetings and other events organized by CEA. Their representatives are also active in the Administration Councils of the National Ecological Fund and Local Ecological Funds, in working groups for the implementation of the environmental Conventions to which the Republic of Moldova is Part.

NGO's are performing a broad range of practical and extension activities. Many NGO's have received grants from the National Ecological Fund and Local Ecological Funds for the implementation of diverse ecological extension, information and public education projects; production of information (booklets, leaflets and magazines) and teaching materials (guidelines, manuals); organization of ecological seminars and conferences; establishment of environmental information centres; creation, placement and support of the extension web sites promoting and sharing the accumulated experience; organization of competitions, Olympiads and other events for children and teenagers, etc.

The NGO's receiving NEF support have contributed to the activities to revive forests; reclaim land; eliminate junk yards and dumps; reclaim, clean and improve water basins, water springs; etc. It should be noted however that in many cases the NGO activities depend totally on the external funding.

Starting in 2001, the International Exhibition Centre "MoldExpo" and CEA have been holding joint annual ecological exhibitions attracting participants from other countries and enjoying a pronounced interest of the broad public.

All educational establishments in Moldova are holding quarterly the ecological hours with the participation of experts from MENR and its subdivisions. Those events are organized jointly with the Ministry of Education and Youth. Traditionally primary and secondary level schools are holding ecological competitions with diverse topics.

6.4 International and Regional Cooperation

6.4.1 Legal Framework for the International and Regional Cooperation

The Republic of Moldova's Foreign Policy Concept Paper (1995) is the nation's principal document identifying its priorities in the international cooperation. Fulfilment of the obligations assumed by Moldova is a basic principle covered by the Concept. According to it, Moldova's foreign policy is oriented at bilateral and multilateral cooperation. Moldova considers the G8 states its important strategic partners, and cooperation with the United Nations Organization and other international or regional agencies - its essential activity.

The Republic of Moldova's Environmental Policy Concept (2001) is focused on:

- political orientation to European integration with focus on the harmonization of the national legislation with the EU Directives;
- signing of bilateral collaboration protocols with Ukraine, Belarus, Russia and EU countries;
- signing and ratification of certain regional agreements, such as Convention on Cooperation for Protection and Sustainable Use of the Danube River;
- international collaboration to attract foreign investments in the sphere of environment protection.

The transborder cooperation concept for 2004-2006 has been developed to continue the dialogue with the neighbouring countries as well as international and European agencies. The Parliament Resolution "On the development of transborder cooperation within the framework of the

European regions" (2003) has established a Committee for transborder cooperation, which is responsible for:

- establishing of the transborder cooperation mechanisms within the framework of the European regions as a basic element for the European integration process;
- harmonization of the national legislation and regulations on transboundary cooperation with the European standards; and
- development of an implementation system for the conventions and agreements to which the Republic of Moldova is part.

The laws on accession of the Republic of Moldova to such conventions or protocols form an integral part of the nation's legislation. The Republic of Moldova signs international treaties based on the two main legislation acts: the Law on International Agreements (1999) and the Regulation on the Procedures for Concluding International Agreements (2001).

The authority playing the key role in the conclusion of environmental agreements or accession to the environmental conventions by the Republic of Moldova is the Ministry of Environment and Natural Resources. To implement the provisions of the Concept for the integration of the Republic of Moldova in the European Union, Action Plan European Union – Republic of Moldova was signed in February 2005, according to which the country has to consolidate its multilateral relationships with the EU. The above Plan covers, among other things, the sustainable development aspects and provides for the measures which should be taken to integrate the environmental aspects in the policies for the diverse sectors of economy, and in particular in the manufacturing industry, power sector, transports, regional development and agriculture. Furthermore, the Plan provides for the measures to consolidate the administrative authorities in the sphere of ecology and to establish the procedures for access to the environmental information. In addition the above document includes the issues relating to the implementation of the Aarhus Convention on Access to Information, participation of the public in the decision-making and access to justice in the environmental matters, evaluation of the environmental impact and ecological training.

6.4.2 Political Framework for the International and Regional Cooperation

The UN ECE representatives have evaluated the environmental situation in the Republic of Moldova and the results of the CEA activities in that sphere as well as the current and future priority problems. As result, the Second Environmental Performance Review (EPR) of the Republic of Moldova was presented at the 10th Session of the Committee on Environmental Policy in Geneva in October 2005. In July 2006 Moldova also held an EPR Launch Conference.

The above Review includes specific recommendations regarding the achievement of the environmental performance and solution of the existing problems, which would contribute to the promotion of the country's positive image internationally and its ability to attract technical assistance and investments for the implementation of the environment protection actions.

To ensure the fulfilment of EPR Recommendations, CEA has developed and presented to the ministries and other institutions for coordination the draft Government Resolution "On the approval of the Second EPR Recommendations for 2007-2010".

In 2006 the Republic of Moldova took over the presidency in the International Commission for the Protection of the Danube River (ICPDR) from Hungary. Certain activities were organized during its Presidency with the objective to implement the Danube Convention, the most important of them being:

- On 27 February – 1 March 2006, an international conference on the Conservation and Sustainable Development of the Danube Delta in Odessa, Ukraine, under the aegis of UNESCO and ICPDR. The Conference was organized on the initiative of the Governments of Ukraine, Moldova and Romania with support from: UNESCO, International Commission for the Protection of the Danube River (ICPDR), Secretariat of the Ramsar Convention, European Council, UNDP/GEF Danube Regional Project, WWF and European Commission. The Conference Participants have established the necessity to set up a team of experts to work under the aegis of ICPDR and to be in charge of the production and implementation of a management plan for the total Danube Delta Region based on the EU Water Framework Directive. It was proposed furthermore to create a transborder Biosphere Reserve under the auspices of the UNESCO 'Man and the Biosphere Program'. For Moldova that proposal meant the creation of a Biosphere Reserve based on the Upper Pruth Scientific Reserve, which would afterwards form part of the Transborder Danube Delta Biosphere Reserve.
- International Environmental NGO and Private Sector Forum on the implementation of the EU Water Framework Directive. That Forum became the first event organized for the dialogue between the public sector and NGO's concerning water protection and balanced management.
- In parallel to the above Forum, under the umbrella of the UNDP/GEF Danube Regional Project and the Ministry of Environment and Natural Resources organized a

seminar on 11-12 October 2006 on the implementation of the EU Water Framework Directive in Moldova.

- The 2006 Danube Day Celebrations were held across the border. Moldova has launched the initiative to celebrate the Danube Day across the border and to transform the Danube Day into the Danube Week. That event has allowed attracting the interest of thousands of people on the both banks of the Pruth to the problems of the Danube and its tributaries; developing a joint action plan to solve the problems of the river's protection and sustainable development. Also within the framework of the above celebrations, an expedition was launched along the Pruth by the State Hydrometeorological Service jointly with MENR with the goal to perform tests and measurements of certain water parameter, to raise public awareness of the environmental problems, to reduce and prevent the negative impact on the water ecosystems.
- Moldova submitted to GEF a funding proposal for the project "Development of the Management Plan for the Pruth Basin", which was supported by the neighbouring countries Romania and Ukraine. The goal of that project is collaboration for monitoring and protection of the Pruth hydrographical basin.

At the final meeting to hand over the Presidency in ICPDR from Moldova in December 2006, this country received high acclaim on the part of the signatory countries to the Danube Convention. It was mentioned that Moldova's Presidency Plan for ICPDR had been fulfilled successfully.

In 2007 the Republic of Moldova was elected to the Executive Board of the Global Environment Facility (GEF), which represents the interests of 12 countries – Albania, Bulgaria, Bosnia and Herzegovina, Croatia, Georgia, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Ukraine. Moldova suggested and argument the need to implement two national Biodiversity and Climate Change projects in that context at the GEF Meeting in June 2007. Furthermore, it argument the necessity to fund the project to rehabilitate the discharge water treatment plant in Soroca. GEF approved the allocations of USD 4.5 million to fund the above projects.

Considerable support to strengthen the national environment protection policies was provided by the OECD Environment Directorate. That collaboration has developed as part of the implementation of the EECAC Environmental Strategy and is focused on: implementation of economic tools; consolidation of state control and issuance of environmental authorizations; trainings for the employees of environmental institutions and improvement of their knowledge levels; and improved efficiency of the public funding for environmental projects. Moldova has initiated the National Political Dialogue (NPD) to support the development and implementation of the EU Water Initiative (EECAC component). The goal of NPD is to build and develop the capacity to implement integrated water management (IWM) via improvement of the legislative and administrative framework. One more goal is to involve the public authorities and civil society in the achievement of the Millennium Development Goals (MGD's), International Waters Management (IWM) goals component. For that purpose, all stakeholders were identified for the IWM implementation at the national level (Ministry of Environment and Natural Resources, Ministry of Local Public Administration, Ministry of Construction and Territory Development, "Apele Moldovei" Agency and Civil Society). Action Plan was developed for NPD implementation in the Republic of Moldova (2007). The Ministry of Environment and Natural Resources is collaborating with many international agencies, which either assist to implement a number of projects in Moldova or provide the possibility to develop future environmental projects: European Economic Council (EEC), TACIS, World Bank, European Bank for Reconstruction and Development (EBRD), Global Environment Facility (GEF), United Nations Development Programme (UNDP), United Nations Environment Programme (UNEP), NATO, OSCE, UNESCO, etc.

6.4.3 Collaboration within the Framework of Global Agreements

Republic of Moldova has already acceded to 18 Conventions and 4 International Protocols in ecological sphere (Box 6.2). A separate national focal point has been designated to coordinate the implementation efforts under each international treaty.

Specialized Units (Offices) have been set up to implement the activities under certain conventions; they are not part of MENR (although some of them have been established by the MENR's Orders). In addition to the development, promotion and implementation of particular projects, the staff of such Offices have the goal to develop, promote and implement jointly with MENR the national policies and strategies in conformity with the Republic of Moldova's obligations under the international Conventions and treaties to which the Republic of Moldova is Part.

For instance, the Climate Change Office was created within the Ministry of Ecology, Construction and Territory Development through Order No. 21 of 11.02.2004. The basic objective of that Office is to implement the Republic of Moldova's commitments under the UNFCCC, ratified through the Low No. 404-XIII from 16.03.1995 and Kyoto Protocol, ratified through the Law 29-XV from 13.02.2003.

Box 6.2: International Conventions and Additional Protocols to which the Republic of Moldova is part

- Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979) ratified through the Parliamentary Resolution No. 1546-XII of 23 June 1993;
- Convention on Environmental Impact Assessment (EIA) in a Transboundary Context (Espoo, 1991) ratified through the Parliamentary Resolution No. 1546-XII as of 23 June 1993;
- Convention on the Transboundary Effects of Industrial Accidents (Helsinki, 1992) ratified through the Parliamentary Resolution No. 1546-XII as of 23 June 1993;
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Helsinki, 1992) ratified through the Parliamentary Resolution No. 1546-XII as of 23 June 1993;
- Convention on Biological Diversity (Rio de Janeiro, 1992) ratified through the Parliamentary Resolution No. 1546-XII as of 23 June 1993;
- United Nations Framework Convention on Climate Change (Rio de Janeiro, 1992) ratified through the Parliamentary Resolution No. 404-XII as of 16 March 1995;
- Convention on Long-Range Transboundary Air Pollution (Geneva, 1979) ratified through the Parliamentary Resolution No. 399-XIII as of 9 July 1995;
- Vienna Convention for the Protection of the Ozone Layer (Vienna, 1995), Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 1979) ratified through the Parliamentary Resolution No. 966-XII as of 27 July 1996;
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel, 1989) ratified through the Parliamentary Resolution No. 1599-XIII as of 10 March 1998;
- United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought (Paris, 1994) ratified through the Parliamentary Resolution No. 257-XIV as of 24 December 1998;
- Convention on Cooperation for Protection and Sustainable Use of the Danube River (Sofia, 1994) ratified through the Parliamentary Resolution No. 323-XIV as of 17 March 1999;
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998) ratified by the Parliamentary Resolution no. 346-XIV as of 7 April 1999;
- Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar, 1971) ratified by the Parliamentary Resolution no. 504-XIV as of 14 July 1999;
- Convention for the preservation of the moving wildly living animal species (Bonn, 1979) ratified through the Law No. 1244 -XIV as of 28 September 2000;
- Agreement on the Conservation of Bats in Europe and Agreement on the conservation of African-Eurasian Migratory Water-birds ratified through the Law No. 1244 -XIV as of 28 September 2000;
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (Washington, 1973) ratified through the Law No. 1246 -XIV as of 28 September 2000;
- European Landscape Convention (Florence, 2000) ratified through the Law No. 536-XV as of 12 October 2001;
- Protocol on Persistent Organic Pollutants and Protocol on Heavy Metals to the 1979 Convention on Long-Range Transboundary Air Pollution ratified through the Law No. 1018-XV as of 25.04.2002;
- Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972): Accession – through the Law No. 1113–XV as of 6 June 2002;
- Cartagena Protocol on Biosafety ratified through the Law No. 1381–XV as of 11 October 2002;
- Kyoto Protocol: accession through Law No. 29–XV of 13 February 2003;
- Convention on Persistent Organic Pollutants (Stockholm, 2001) ratified through the Law No. 40-XV as of 19 February 2004.

The main goals of the Climate Change Office include: (a) logistics support to the Government, central and local public administrations, NGO's and educational establishments in the activities implemented and promoted by the Republic of Moldova under UNFCCC and Kyoto Protocol; and (b) implementation of the Climate Change projects and programs, which provide for assessment of greenhouse gases by source and sink categories and producing the National Inventory Reports; development and implementation of mitigation projects; development and implementation of the climate change adaptation projects; evaluation of the climate change impacts on the country's biological and social-economic components; ensuring cooperation, promotion and implementation of the activities and projects under Clean Development Mechanism (CDM) of the Kyoto Protocol; implementation and facilitation of the awareness raising and information activities aimed at civil society, professionals and decision-makers on climate change issues, etc.

The Secretariat of the National Commission for the implementation and realization of UNFCCC and Kyoto Protocol mechanisms (which acts in the Republic of

Moldova as the Designated National Authority for CDM) (located on premises of the Climate Change Office) was established through the Government Resolution No. 1574 as of 26.12.2003 (Official Monitor No. 006 of 01.02.2004) and its objective is to promote at the national level the policies and strategies for the achievement of the objectives of the Clean Development Mechanism of the Kyoto Protocol.

The Carbon Financing Office was established to strengthen the institutional capacity for the implementation of the Law No. 29-XV as of 13 February 2003 on the Republic of Moldova's accession to the Kyoto Protocol and for the CDM implementation. The objectives of the Carbon Financing Office include the development, monitoring and implementation of new CDM projects. The main goals of the Carbon Financing Office are: a) production of the Monitoring Plan for the CDM projects supported by the World Bank and the European Carbon Fund – "Energy conservation and Reduction of GHG Emissions" in connection with Energy-II Project and "Public Heating Systems Burning Biomass in Rural Communities of Moldova"; b) consolidation of the institutional and human capacity under the Kyoto Protocol's Clean Development Mechanism; c) technical and financial assistance to the beneficiaries of the above projects; d) implementation evaluation and monitoring in respect of the CDM Projects and managing of the Carbon Financing Office special accounts; reporting to the Ministry of Finance, World Bank, Steering Committee and other international agencies; e) development of new CDM projects and their presentation to the National Commission for the implementation and execution of UNFCCC and Kyoto Protocol mechanisms and provisions; f) ensuring the fulfilment of the obligations under the agreements with the donors and beneficiaries; periodical field inspections, performance monitoring and evaluation; g) coordination and intensification of the project beneficiary training through organization of training coerces, seminars, workshops, conferences, web site establishment and support; h) other activities necessary for the efficient implementation of the Carbon Financing Office projects, including the development and implementation of other environmental projects.

Office for Sustainable Management of Persistent Organic Pollutants was established at the Ministry of Environment and Natural Resources under the National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants (POP's) by the Order no. 22 as of 20 March 2006. The main goals of that Office were to support the Ministry's activities and to facilitate the achievement of the implementation targets under the National Strategy on POP reduction and disposal and the National Stockholm Convention Implementation Plan approved through the Government Resolution No. 1155 as of 20 October 2004, implementation of the Republic of Moldova's obligations under the Basel Convention, Rotterdam Convention, Strategic Approach to International Chemicals Management (SAICM), other international agreements in that sphere to which the Republic of Moldova is a Part.

Biodiversity Office was established at the Ministry of Environment and Territory Development by the Order No. 334 as of 14.07.2000. The goals of that Office are connected with the implementation of the National Strategy and Action Plan for Biodiversity Conservation (approved through the Parliamentary Resolution No. 112-XV as of 27.04.2001) and fulfilment of the Republic of Moldova's obligations under the Biodiversity Convention (ratified through the Parliamentary Resolution No. 1546 as of 23.06.1993).

The Ozone Office was established by the Order of the Ministry of Environment No. 27 as of April 07, 1999 to implement the Government Resolution No. 1064 as of 11.11.1999 on the approval of the National Programme for Phased Disposal of Substances that Deplete the Ozone Layer in the Republic of Moldova. The main objective of that Office is to implement the actions connected with the fulfilment of the commitments undertaken by the Republic of Moldova under the Vienna Convention for the Protection of the Ozone Layer (Vienna, 1985) and the Montreal Protocol on Ozone Depleting Substances (Montreal, 1987) (ratified through the Parliamentary Resolution No. 966-XIII as of 24.07.1996).

6.4.4 Collaboration within the Framework of Bilateral and Multilateral Agreements

The Republic of Moldova is currently a part to 13 bilateral and multilateral agreements in this sphere. The agreements signed in the period since 2003 are as following:

- The Agreement on cooperation in environment protection between the Ministry of Environment and Natural Resources of the Republic of Moldova and the Ministry of Environment of Latvia, signed on March 17, 2006 in Riga, Latvia;
- The Joint Declaration on the Collaboration between the Ministry of Environment and Natural Resources of the Republic of Moldova and the Ministry of Environment of the Czech Republic, signed on April 21, 2006 in Chisinau, Moldova;
- The Agreement between the Government of the Republic of Moldova and the Government of Azerbaijan on cooperation in environment protection, signed on February 22, 2007 in Baku, Azerbaijan;
- The Memorandum of Understanding between the Government of the Republic of Moldova and the Government of Denmark on cooperation for the implementation of the CDM mechanism as defined in the Kyoto Protocol to the UNFCCC, signed on October 27, 2003 in Copenhagen, Denmark.

The relationships with Romania have been developing under the Collaboration Agreement between the Department of Environment Protection of the Republic of Moldova and the Ministry of Waters, Forests and Environment Protection of Romania in the sphere of environment protection and sustainable use of natural resources. Short-Term Collaboration Programs have been developed annually to implement the above Agreement.

The following documents have been developed and signed, resultant to the activities of the special Working group on Waters, Forests and Environment Protection of the Inter-Ministerial Committee:

- The Agreement between the Government of the Republic of Moldova and the Government of Romania on cooperation in the sphere of fish protection and regulation of fishing in the river Pruth and in the water-storage basin Stinca - Costesti (2003);
- The Protocol of Collaboration between the State Hydrometeorological Service of the Republic of Moldova and National Institute of Meteorology and Hydrology in Romania in the sphere of meteorology and hydrobiology (2000).

To protect the wetlands of international importance and to conserve the natural ecosystems and biodiversity in the region, a tripartite agreement has been signed between the Ministry of Environment and Territory Improvement of Moldova, Ministry of Waters, Forests and Environment Protection of Romania and Ministry of Environment and Natural Resources of Ukraine on cooperation in the region formed of the natural protected zones in the Danube Delta and Lower Pruth (Bucuresti, 2000).

Furthermore, collaboration has been initiated in the sphere of experience sharing and extension activities regarding the European integration, in the sphere of geology and other regional activities of common interest, in particular the development of the Pruth integrated management and monitoring plan; establishment of a dangerous geological processes data bank; establishment of transboundary natural preserves, etc. In that context, the Ministry of Environment and Sustainable Development of Romania has made available to MENR many EU Directives and other legislation in the Romanian translation, thus making easier the harmonization of Moldova's national legislation with the EU legislation.

In 2006 bilateral collaboration started between the Ministry of Environmental and Natural Resources of Moldova and the Ministry of Environment of the Czech Republic with signing by the two above ministries of the Joint Declaration on the Collaboration in Chisinau on April 21, 2006.

The following spheres have been identified among the main directions for the collaboration between the two countries: cooperation between the Republic of Moldova and the Czech Republic for the implementation of the Official Development Assistance (ODA) environment protection projects; possibility of joint cooperation under the programs of international agencies (United Nations Development Programme, World Bank, Global Environment Facility, etc.), experience sharing regarding accession of the Czech Republic to the European Union; harmonization of the national environmental legislation with the EU Directives; and other environment protection activities in the both states.

The Republic of Moldova and the Czech Republic have been cooperating since 1997 under the Official Development Assistance (ODA) projects. The Ministry of Environment of the Czech Republic considers the Republic of Moldova a priority partner for bilateral assistance and cooperation. Currently 5 technical assistance projects on water monitoring and protection under implementation in the Republic of Moldova are supported by the Ministry of Environment of the Czech Republic:

- "Surface water monitoring and protection from floods in the Pruth high-water bed";
- "Reduction of the negative impact on the environment and public health resultant from inefficient water management in the town of Leova";
- "Primary water source monitoring program and systematic water protection from ecological challenges";
- "Soil and ground water decontamination in Iargara";
- "Improvement of the environment situation in Moldova via application of the environmental technologies produced by joint ventures".

In the second half of 2007, UNECE Secretariat schedules to start the implementation in Moldova of the following projects with the support of the Government of the Czech Republic:

- "Support in the implementation of the Convention on Long-Range Transboundary Air Pollution in Moldova";
- "Support in the implementation of the Convention on the Transboundary Effects of Industrial Accidents in Moldova"; and
- "Development of the Waste Management Concept designed to eliminate the negative impact on drinking water in the region of Leova".

The collaboration has been initiated with the Baltic countries of Latvia, Lithuania and Estonia in connection with the general political course towards European integration and for the purpose of studying the experience of the above countries in the harmonization of their national ecological legislation and standards with the EU Directives.

The cooperation with Latvia started in the sphere of environment protection with the signing of the Agreement on cooperation in the sphere of environment protection between the Ministry of Environment and Natural Resources of the Republic of Moldov a and the Ministry of Environment of Latvia on 17 March 2006.

According to the above agreement, the cooperation in the sphere of environment protection between the Republic of Moldova and Latvia shall be implemented along the following directions:

- Strengthening of the general environment management tools, including economic tools; strengthening of the capacity and mechanisms for the implementation of the EU environmental legislation; development of projects under the EC Good Neighbourly Relations Programs;
- Protection of air, water and soil from pollution; introduction of threshold values for emissions as well as best technologies and best practice;
- Integrated water management and in particular – of transboundary waters, and the EU Water Initiative;
- Threat and hazard prevention; mitigating their impact upon human society;
- Chemicals management, including persistent organic pollutants and heavy metals;
- Biodiversity protection, including planting of new forests, expansion of wetlands and natural preserves;
- Environmental monitoring;
- Improvement of living conditions and environment protection in urban areas and other settlements;
- Systems for collection, depositing, recycling, use and disposal of the solid and liquid domestic waste and toxic industrial waste;
- Ecological education, including access to information and decision-making;
- Professional development and training of experts and public officers in the matters of environment protection and conservation of natural resources, harmonization of the national legislation with the EU legislation on the above spheres.

In 2006 Latvia implemented in Moldova a project supporting capacity building in the Ministry of Environment and Natural Resources in the sphere of environment protection. Under that project training was organized for six experts from the Republic of Moldova in the priority directions for collaboration: biodiversity conservation and waste management.

A project was launched in the beginning of 2007 to intensify and consolidate the cooperation with Latvia (Promotion of the EU integration process in the sphere of the environment protection). That project also forms part of the activities under the collaboration agreement. The project is comprised of three main components:

- “Support to the Ministry of Environment and Natural Resources in the implementation of the EU requirements regarding the evaluation of environmental impact”;
- “Support to the Ministry of Environment and Natural Resources in the implementation of the EU requirements regarding biodiversity conservation”;
- “Support to the Ministry of Environment and Natural Resources in the implementation of the EU requirements regarding waste management”.

In May 2007 a delegation from the Republic of Moldova made an official visit to Estonia with the purpose to identify the possibilities for cooperation in the sphere of environment protection and extension of Estonia’s experience in that sphere after its recent accession to the European Union.

At the meetings the Republic of Moldova’s intent was supported to initiate the collaboration with the purpose to extend the experience of Estonia gained during its European integration. In addition, the Estonian part has expressed its desire to contribute to the attraction of funding from the European Facilities to fund projects in the sphere of environment protection, water supply and sewage in the Republic of Moldova.

In July 2007 a delegation from the Ministry of the Environment and the Environment Investments Centre of Estonia made a working visit to Moldova – among other things, to discuss the proposal to sign a bilateral agreement in the near future and to establish an Environment Investments Centre in Moldova after the Estonian model.

Furthermore, Lithuania has taken steps to offer MENR assistance in the sphere of environment protection. Moldova expects to accept a group of Lithuanian experts on a working visit in the near future to discuss possible bilateral cooperation.

The Agreement between the Government of the Republic of Moldova and the Government of Azerbaijan on cooperation in the sphere of environment protection was signed on February 22, 2007 to initiate and maintain bilateral cooperation in the sphere of environment protection.

Under the above Agreement, the main areas for collaboration between the Republic of Moldova and Azerbaijan in the sphere of environment protection include:

- Management of natural preserves;
- Biodiversity protection;
- Evaluation of the environmental impact;
- Protection of the atmospheric air, including the ozone layer; prevention of the global climate change and long-range transboundary air pollution;
- Management of mineral resources, including studies, exploration and exploitation of the subsoil;
- Scientific research, environment surveys and monitoring, etc.

To implement the above Agreement, in April 2007 an group of experts from Azerbaijan visited Chisinau on a working visit, and a number of meetings were held with the Moldovan experts to discuss the issues of prospecting oil and gas in Moldova.

The agreement between the Ministry of Ecology, Construction and Territory Development of Moldova and the Polish Environment Ministry on collaboration in the sphere of environment protection and use of natural resources was signed in Chisinau on 22 October 2003.

The above agreement provides for the following main directions for the collaboration:

- Experience sharing on legislative regulation of the environment protection activities;
- Use of economic methods for state regulation of the use of natural resources;
- Methodical approach to organization of due diligence and evaluation of the environmental impact;
- State control over the use of natural resources and environment protection;
- Protection of the atmospheric air, surface and ground water, soil, rational use of the subsoil;
- Protection and restoration of the landscapes and ecosystems, development of natural preserves, etc.

In 2007 bilateral collaboration was initiated in the sphere of environment protection between the Ministry of Environment and Natural Resources of Moldova and the Ministry of Environment of the Slovak Republic. The following directions were identified as collaboration priorities: experience sharing and consultations at the level of experts in the relevant spheres, such as: harmonization of the national legislation to the EU Directives, protection of water and biodiversity, waste management and air quality monitoring.

A draft Collaboration Agreement has been developed between the Ministry of Environment and Natural Resources of Moldova and the Federal Environment Ministry of Belgium to initiate bilateral collaboration between the above two ministries. That draft agreement is currently in the pipeline for examination and approval at the relevant ministries.

To implement the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, the development of a new Collaboration Agreement between the Governments of Ukraine and the Republic of Moldova has been initiated under the project “Transboundary Collaboration and Sustainable Use of the Dniester River” with the support of OSCE and UNECE and with participation of the Ukrainian and Moldovan experts.

6.4.5 International Processes

The Central Environment Authority (CEA) is involved actively in the implementation of the European processes “Environment for Europe”; “Environment and Health” and “Ecological Strategy for Eastern Europe, Central Asia and Caucasus”.

The first Environment for Europe Conference was held in the Dobris Castle (Czechoslovakia) in 1991, establishing a set of guidelines for the Pan-European cooperation and discussing certain important issues regarding the future development of the process. In April 1993 the broad strategy contained in the Environmental Action Program for Central and Eastern Europe was endorsed at Lucerne (Switzerland), and in October 1995 the Sofia Ministerial Conference (Bulgaria) reviewed the implementation of the Environmental Action Program for Central and Eastern Europe and the further development of the Environmental Program for Europe, discussed the problem of integrating the environment protection in all sectors of the economy. The Republic of Moldova participated actively in that process by means of the development and adoption by the Parliament of the National Environment Protection Action Plan.

The Fourth Ministerial Conference was held in Aarhus (Denmark), adopting the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters as well as the Resolution on the application of the above Convention; Protocol to the Convention on Long-range Transboundary Air Pollution, on Heavy Metals and on Persistent Organic Pollutants, Declaration on Persistent Organic Pollutants, Resolution on Biological and Landscape Diversity, Policy Statement on Energy Efficiency.

To implement the above Convention, the national *Law on Environment Protection* was amended by adding a new chapter on public participation in decision-making in environmental matters. Furthermore, the Government approved a number of regulations to the effect. The *Strategy and Action Plan on Persistent Organic Pollutants* were developed and adopted by the Parliament in Moldova.

The Fifth Ministerial Conference in Kiev (Ukraine) adopted a groundbreaking *Environment Strategy for Countries of Eastern Europe, Caucasus and Central Asia* and Ministerial Declaration as well as three Protocols opened for signature: *Protocol on the Strategic Environmental Impact Evaluation, Protocol on the Register of Emissions and Transfer of Pollutants (RETP), Protocol on Civil Responsibility and Compensation of the Damage to Transboundary Waters by the Transboundary Impact of Industrial Accidents*. The Republic of Moldova has signed the above documents and is currently in the process of implementing their provisions.

The European Process started with a *European Charter on Environment and Health* adopted in 1989 (Frankfurt, Germany) at the first Ministerial Environment and Health Conference. There have been on the total three Ministerial Conferences: in Helsinki (Finland) in 1994, adopting *Environmental Health Action Plan for Europe;* and in London (UK) in 1999, adopting the *Protocol on Water and Health* and *the Charter on Transport, Environment and Health*.

In 2002 the Government of the Republic of Moldova developed and approved *National Environmental Health Action Plan*. On 23-25 June 2004 the Fourth Health and Environment Ministerial Conference was held in Budapest; it adopted many political documents, including *Children's Environment and Health Action Plan* and other important documents. Moldova is developing currently a new version of the above plan to amend it by adding the measures to improve children's health in conformity with the above European Plan.

In 2005 the Republic of Moldova joined the OSCE, NATO, UNDP, UNEP, UNECE and REC Initiative "*Environment and Security*" (ENVSEC).

Under the above initiative, a team of international experts has performed a regional evaluation of the environment and security problems in the Eastern Europe (Moldova, Ukraine, Belarus). To discuss the conclusions of that survey, consultations were held in Chisinau in May 2006 with the representatives of all ministries, institutions, NGO's, including the NGO's on the left bank of the Dniester. The consultations have revealed the most crucial environmental problems which can cause of instability in the region and become obstacles to ensuring of the ecological security. They include:

1. Insufficient availability of water treatment and sanitary systems, in particular in the rural areas;
2. Atmospheric air pollution in large cities;
3. Unauthorized waste dumps;
4. Transboundary pollution;
5. Existence in the region of the warehouses with armaments which must be destroyed because any accident may cause considerable damage to the environment.

Still another instability source is the political conflict at the Dniester, and the parties are involved in a permanent political dialogue with participation of the authorized international organizations for its solution.

OSCE/UNECE Project "*Transboundary Cooperation and Sustainable Management of the Dniester River*" is under implementation in that context. The goal of that project is to promote transboundary cooperation and integrated water management in the Dniester river basin, raise public awareness, restore the mutual confidence of the parties to the conflict, identify subsequent activities for the diagnostic survey of the Dniester river.

NATO Project "*Monitoring and Evaluation of the Degree of Heavy Metal Pollution of Water in the Pruth River as an Important Transboundary Water Source*" was implemented for a similar purpose. The project studied the degree of the Pruth river pollution with 4 heavy metals (Cd, Cu, Pb, Zn) to identify main water pollution sources. Laboratory equipment was procured under that project for 2 countries - the Republic of Moldova and Romania. Scientists from the both countries were trained in NATO laboratories to ensure adequate testing quality and sustainable water quality monitoring. The results were reported at a number of international conferences and communicated to the local public authorities.

UNEP and OSCE have provided considerable advisory assistance to MENR during the development of the draft *National Program to Ensure Environmental Security for the years 2007-2015*, which was already approved by the Government in March 2007.

Project *Transboundary Cooperation and Sustainable Management of the Dniester River* (Phase I for 2005-2006, Phase II for 2006-2007) was implemented under the auspices of OSCE, UNEP and UNECE. The implementation of the above project has contributed to the development of collaboration with the neighbouring countries and establishment of a new water management system in compliance with the international requirements.

To monitor the quality of surface water, Project: *"Real Time Monitoring and Decision Support System for the International Rivers, Application for the Dniester and Pruth Rivers"* is under implementation in Moldova with NATO support; 2 automated stations have been installed under that project to monitor the quality of surface water at the entrance of the Dniester and the Pruth international rivers to the Moldovan territory (villages of Naslavcea and Sirauti) and 2 – at their exit from Moldova (villages of Tudora and Valea Mare).

In 2002 the Republic of Moldova joined the *European Transport, Environment and Health Program.* The Program to mitigate the atmospheric air pollution from motor vehicles has been developed to reduce the negative impact on the environment and human health. Air pollution from use of motor vehicles is a problem for urban residents, which is a major preoccupation currently for the public administration authorities at the both levels. As the number of cars is growing continuously, urban traffic becomes more crowded and the life quality of the urban residents becomes subject to additional stress resulting from noise and atmospheric air pollution, etc.

The EU *'In town without my car!'* initiative started as early as 2000. The Republic of Moldova signed the Charter to access that Initiative in 2002. That action was prompted by the alarming situation due to intensive air pollution with exhausts from motor vehicles in the central parts of urban settlements. The cars concentrated mainly in cities and towns are exhausting diverse harmful substances in the air, producing a negative impact on the environment and human health. The above has caused the ecologists to look for and suggest efficient ways to mitigate the environmental impact of motor vehicles. The Initiative includes the following support measures:

- Refusal from trips to town in own car;
- Maximized use of public transports;
- Creation of pedestrian zones in cities and towns;
- Creation of the possibilities to ride a bicycle across the city/town;
- Stop the pollution of historical town centres with car exhausts, etc.

In promoting this Initiative, the Ministry is supported by both the local public administrations and NGO's, and in particular by the Ecological Movement of Moldova.

The *European Strategy "Education for Sustainable Development"* was approved at the Environment and Education Ministerial Conference held on 17-18 March 2005 in Vilnius. The Ministry of Environment and Natural Resources is currently in the process of developing the national strategy paper jointly with the Ministry of Education and Youth to include the provisions of the above European strategy.

The *Environment Strategy for Countries of Eastern Europe, Caucasus and Central Asia* was approved by the Environment for Europe Ministerial Conference in Kiev (2003). That strategy has been developed to promote the environmental policies, identify and solve common problems and contribute to ensured environmental security in the countries of Eastern Europe, Caucasus and Central Asia.

6.5 Capacity Building

6.5.1 Technical Assistance Projects

The national climate change capacity building in the Republic of Moldova is effected through implementation of technical assistance projects.

Thus, in 1998-2000, the Ministry of the Environment and Territory Development in collaboration with UNDP Moldova and with GEF funding implemented the Project "Republic of Moldova: Enabling Activities for the Preparation of the First National Communication under the United Nations Framework Climate Change Convention (UNFCCC)". The First National Communication summarized the findings of the air pollution survey performed by Moldovan scientists (complete with production of the first GHG inventory for 1990-1998), national and regional climate change patterns, the vulnerability and adaptability of the natural and artificial ecosystems to those changes, etc. The findings were used to make the climate change forecasts for the 21st century, which became the basis for the development of a set of recommendations to mitigate the negative climate change impact.

In 2000-2002 the Ministry of Ecology, Construction and Territory Development implemented in collaboration with UNDP Moldova and with GEF funding the Project "Climate Change: Enabling Activities (Phase II)", delivering the Report "Technology Needs and Development Priorities" and "Renewable Energy" Feasibility Study. Possibilities for mitigation GHG emissions were identified under that project via technology change in the most important national economy sectors – energy sector, transport sector and manufacturing industry. Furthermore, technological, economic and environmental needs were identified to implement the renewable energy sources.

In 2003-2005 the Ministry of Environment and Natural Resources implemented in collaboration with UNDP Moldova and with GEF funding the Project "Moldova: National Capacity Needs Self Assessment for Global Environmental Management", producing the Report "Environmental Management: Report on National Capacity Self-Assessment" and "Action Plan for capacity building to implement the Rio de Janeiro Conventions for 2006-2010 period". Practical activities within the framework of the national self-assessment of the capacity needs were focused upon several main goals: identification, confirmation or review of the priority activities in the spheres of biodiversity, climate change and combating land degradation; identification and presentation of capacity strengthening needs in each individual area and for all of them in the aggregate; national-level approval of the capacity strengthening measures in those 3 areas in accordance with the national strategies for environment protection, conservation of natural resources and sustainable development.

In 2003-2006 twelve Central European and CIS region countries (Albania, Armenia, Azerbaijan, Croatia, Georgia, Macedonia, Moldova, Mongolia, Slovenia, Tajikistan, Turkmenistan and Uzbekistan) implemented the UNDP-GEF Regional Project "Capacity Building for Improving the Quality of Greenhouse Gas Inventories (Europe/CIS region)". The project has initiated a regional programmatic approach developed to build capacity for improving the quality of data inputs to national greenhouse gas inventories, using the good practice guidance of the Intergovernmental Panel for Climate Change for cost-effectiveness. The project was build on the expertise gained during the preparation of the First National Communications. By strengthening institutional capacity to prepare inventories and establishing a trained, sustainable inventory team, the project has helped countries to reduce uncertainties and improve the quality of inventories for subsequent National Communications. This, in turn, allowed countries to improve national strategies for reducing greenhouse gas emissions. The project included common activities for all participating countries carried out under a regional umbrella; countries might chosen the remaining activities to carry out, based on national priorities. The approach has been built on the concept of key sources of emissions; this allows the approach to be replicated for use in other regions with only minor modifications.

In 2004-2006 the Ministry of Environment and Natural Resources implemented in collaboration with EU TACIS the Regional Project "Technical Assistance to Armenia, Azerbaijan, Georgia and Moldova in the fulfilment of their global climate change engagements". The key objectives of the Project included: capacity building in the beneficiary countries for the implementation of CDM Projects under Kyoto Protocol, including assistance in building of the institutional infrastructure to support the CDM projects and development of the portfolio of possible CDM projects; raising awareness among key decision-makers, business community and broad public of the country's obligations under UNFCCC and Kyoto Protocol and of the development opportunities driven by the activities to reduce GHG emissions within the framework of the CDM projects under Kyoto Protocol; local capacity building for the development of scenarios to mitigate GHG emissions at the national level and identification of the existing potential and available options to mitigate GHG emissions; assistance to the beneficiary countries in the development of their national GHG emissions reduction strategies and adjustment to climate changes. Within the framework of such projects the representatives of central public administration authorities and key national economy sectors have been trained in the CDM principles. Logistical support has been provided to all persons desirous to participate in such Projects; thus four CDM projects have been under implementation in Moldova by the beginning of 2009, and about ten CDM project ideas are still in the pipeline at the development and promotion stage.

In 2005-2008 the Consolidated Agricultural Projects Management Unit (CAPMU) in collaboration with the World Bank and with GEF funding implemented the Project "Renewable Energy from Agricultural Wastes". The ultimate project goal was to lay down the foundations for large-scale efficient use of biomass which should replace the imported fossil fuel and trigger the introduction and promotion of the primary agricultural waste (biomass) for generation of heat based on efficient technologies. Assistance was provided to Moldova under that project to: remove obstacles to popularization of biomass procession technologies, showing the best practice examples (11 model units have been installed and commissioned with the total capacity of 2720 kW) of using biomass-based energy systems as an alternative to fossil fuel and sustainable solution for the energy supply problem for the rural communities and agribusinesses; encourage the development of the market for baled straw and the post-project replication of the biomass production and distribution business among agricultural companies; increase in the number of public buildings (in addition to those covered by the project), which have switched to biomass-based heating systems as result of the lessons learned from the project implementation results; promotion of an awareness-raising campaign on the use of renewable energy, extension among the public and promotion of the replication strategy.

In 2005-2009 the Ministry of Environment and Natural Resources in collaboration with United Nations Environment Program (UNEP) and with GEF funding implemented the Project "Republic of Moldova: Enabling Activities for the Preparation of the Second National Communication under the United Nations Framework Climate Change Convention (UNFCCC)". This project lead to the preparation of the Second National Communication including a national inventory of anthropogenic emissions by sources and removal by sinks of all GHGs not controlled by the Montreal Protocol for the period 1990-2005, and a general description of steps envisaged to implement the Convention, inclusive the development of the National Action Plan on Adaptation to Climate Change and the National Climate Change Mitigation Strategy. This project, while addressing urgent and immediate domestic issues related to climate change, takes full consideration of the capacity buildings needs of the Republic of Moldova in various thematic areas as highlighted in Decision 2/CP.7, and hence capacity building elements will be incorporated in all proposed activities.

In 2005-2009 UNDP Moldova in partnership with the Ministry of Economy and Trade implemented the project "National Human Development Reports" (National HDR's). Such reports are the tool used by the Government of the Republic of Moldova and UNDP Moldova to identify, study and prioritize the nation's social-economic and human development needs. The national HDR's contribute to better definition of the key areas for the development policies and improvement of the liaison regarding the development priorities between the country and its donors, civil society and media. The subject of the National HDR for 2009 is "Socio-Economic Impact of Climate Change in the Republic of Moldova and Adaptation Policy Options". The production of each National HDR provides for its national presentation and large-scale dissemination of its principal conclusions and recommendations and discussions with main stakeholder groups.

In 2008 the Regional Energy Efficiency Investment Project Development for Climate Change Mitigation was started by the UNECE in twelve countries of the region (Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Kazakhstan, Moldova, Romania, Russia, Serbia, Macedonia and Ukraine) (in Moldova – in partnership with the Ministry of Environment and Natural Resources). The project lifetime is 4 years; it is focused on funding of the investments in energy efficiency activities to mitigate the climate change in twelve countries of South-Eastern and Eastern Europe and Central Asia. The Project will promote the emergence of a market to the extent in which it would be possible to identify, develop, fund and implement local sustainable projects with focus on energy efficiency and use of renewable energy sources. The specific project objectives include: identification, development, funding and implementation of the energy efficiency investment projects at energy consumer or supplier level as well as projects focusing on the use of renewable energy sources to realize the environmental, human health and institutional priorities; strengthening of the energy efficiency and renewable energy policies in the participant countries, assistance to local and central public authorities in the promotion of economic, institutional and regulatory reforms necessary to attract the investments in the energy efficiency and renewable energy projects; promotion of the opportunities for commercial banks and private businesses to invest in the energy efficiency and renewable energy projects via establishment of new public or private investment funds or financial mechanisms.

Furthermore, another regional project started in 2008 "Support for Kyoto Protocol Implementation under TACIS Program in twelve CIS countries" (Armenia, Azerbaijan, Belarus, Georgia, Moldova, Kazakhstan, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Uzbekistan, Ukraine) (in Moldova – in partnership with the Ministry of Environment and Natural Resources). The key objectives of the project are: promoting the energy efficiency activities and broader use of flexible Kyoto Protocol mechanisms; adoption of the climate change mitigation and adaptation strategies; local capacity strengthening and public awareness-raising. It is expected to achieve the project objectives through two main activities: review by key experts of certain specialized reports on the problems regarding the Convention and Kyoto Protocol in the participating countries; organization of seminars where the representatives of the countries involved in the Project implementation will be acquainted with those Reports made available afterwards for dissemination at national level.

6.5.2 CDM Projects

The national capacity to implement the UNFCCC in Moldova and to ensure the country's sustainable development is also achieved through Clean Development Mechanism (CDM) Projects under the Kyoto Protocol.

Moldova is currently implementing the following CDM Projects in partnership with the World Bank's Prototype Carbon Fund (PCF) (the fund created by a group of industrialized economies listed in Annex B to Kyoto Protocol):

- *"Moldova: Soil Conservation Project"*. That project was started in 2002 and focuses on the planting of new forests on 14,500 hectares of degraded agricultural land on 1,891 land plots scattered throughout Moldova. Such plots are located in 151 villages in 11 districts. The land which is expected to be planted with new forests is in most cases part of the available land owned by the local public authorities and cannot be reclaimed or developed. The total resultant reductions in the GHG emissions will be 3,215,296 tonnes in CO_2 equivalent, and the reduction costs will be USD 13.340 million as compared to the baseline. The Project is scheduled for 21 years. The cost per ton of reduction in CO_2 equivalent is USD 3.5. The Beneficiary under the Project is the Forestry Agency "Moldsilva".
- "*Use of Biomass as Energy Source in Rural Communities" (Projects 1 and 2*). The implementation of those projects started in the second half of 2005. Approximately 250-300 small projects focused on the improved energy efficiency in public buildings (schools, pre-schools, public offices, medical centres, etc.) are under implementation under those 2 projects. The main activities under those projects will be focused round the switch from fossil fuel to biomass burning. The expected implementation period of those two projects is 2005-2015. The total reduction of GHG emissions will make 357,768 tonnes in CO_2 equivalent, and the reduction costs will be USD

8.183 million as compared to the baseline. The cost per ton of reduction in CO_2 equivalent is USD 5.65. The Projects are scheduled for 10 years. The beneficiaries under the Projects are the local public authorities.

- „*Moldova: Energy Conservation and Reduction of GHG Emissions*". In conformity with the requirements of that project, its participants are private or public entities duly authorized by the project partners to participate in the Kyoto Protocol CDM Mechanism. Each of the 27 activities is represented by one of the beneficiaries under the Project – Ministry of Education (in case of orphanages and schools), Ministry of Health (in case of hospitals) or municipalities (in case of public buildings). The project is scheduled for 2006-2015. The total reduction of GHG emissions will make 114,469 tonnes in CO_2 equivalent.

By the beginning of 2009 the following projects have been in the pipeline at the examination stage for approval by the Designated National Authority (National Commission for implementation and realization of UNFCCC and Kyoto Protocol mechanisms and provisions):

- Project Design Document (PDD) "Biogas Recuperation in Energy Production at Tintareni Landfill". The principal activity under that project is to capture and burn the biogas produced from organic decomposition of municipal solid waste at Tintareni Waste Disposal Site (landfill). The key project components are: biogas collection system, biogas generator unit, biogas boiler unit and biogas monitoring and control equipment. The biogas collection system comprises a grid of vertical gas extraction gauges, dehydration units and transportation lines and gas domes; biogas will be used for electricity generation and the excess gas will be burnt in a boiler at 850^{0}C. Active energy is 325 kW at exit from the biogas co-generation unit, and the electricity generation voltage is 190-440V. The key components of biogas monitoring and control equipment are: gas analyser and flow-meter. The gas analyser can test up to 4 gas components simultaneously, e.g. 3 of the following IR-sensitive gases, such as: CO_2, CH_4, CO, NO, SO_2, $CHClF_2$ and O_2. The station for biogas capture and burning/use was commissioned officially and started operating as at 25 September 2008. The project is scheduled initially for 10 years (2008/2009 – 2017/2018). The average annual reduction of GHG emissions will make round 75,412 tonnes in CO_2 equivalent. The project beneficiary is the Moldovan-Italian Company 'Biogas Inter Ltd'.
- Project Idea Note (PIN) "Construction of a Co-Generation Plant with the Capacity of 31 MW at State Enterprise "Tirotex" in Tiraspol, Moldova". The principal goal of the project is the reduction of GHG emissions and more efficient use of primary energy sources in generation of electricity and heat (including: to ensure the quality and reliability of electricity supply; abandonment of obsolete equipment in the boiler section of the above enterprise; reduction of the enterprise's fuel consumption and associated costs; reduction of GHG emissions from burning of fossil fuel for power generation). State Enterprise "Tirotex" comprises: 2 textile factories, 1 finishing factory, 1 garments factory, 1 engineering plant, 1 thermal plant, 1 construction company, 1 ceramics factory, an agricultural complex and the research institute "Textiles" which is developing new environmentally friendly technologies among other things. The enterprise is a large energy consumer, which is normally imported from Ukraine. The power plants operating in the region are already more than 30 years old and they have low electricity generation efficiency. The heat for in-house needs of SE "Tirotex" is produced at the boiler section of the enterprise; however the majority of the equipment is obsolete and requires replacement. The construction of a co-generation plant will make it possible to increase the efficiency of fossil fuel consumption and reliability of the enterprise's power system and contribute to the reduction of GHG emissions from burning of fossil fuel for power generation. The total design capacity of the co-generation plant will be 31 MW for electricity and 35 Gcal per hour for hot water. The new co-generation plant will consume annually 56.563 million m^3 of natural gas and generate annually about 248 million kWh of electricity. The electricity generated by the Co-Generation Plant will be used to satisfy the in-house needs of the enterprise, and the surplus power will be supplied to "Dnestrenergo" power grid, thus replacing the power supplied by the power grid and more intensive in terms of CO_2 emissions. The intended project lifetime is 25 years (2009–2034). The average annual reduction of GHG emissions will vary between 47,640 and 54,760 tonnes in CO_2 equivalent. The cost per ton of reduction in CO_2 equivalent will make EUR 10. The project beneficiary is State Enterprise "Tirotex" in Tiraspol, Republic of Moldova.

6.5.3 Environmental Infrastructure Projects

The national capacity to implement the UNFCCC in the Republic of Moldova and to ensure the country's sustainable development is also built through the environment infrastructure projects.

In 1997-2001 the European Bank for Reconstruction and Development (ERBD) in partnership with the Government of Moldova and Municipal Council of Chisinau and with bilateral support from the Danish Environment Protection Agency (DEPA) and EU TACIS Program implemented the project "Rehabilitation of Water Supply Services in Chisinau" (total project costs were USD 26.6 million, of which the ERBD loan made USD 14.3 million) focused on the improvement of water supply service available to the population of Chisinau, including: more reliable access to water sources for consumers; uninterrupted water supply to the population; mitigation of pollution levels to the rivers Byk and Dniester; reduction of running costs; improved financial and operational performance of the Supplier – "Apa-Canal Chisinau"; reduction of the need in major extension investments and rehabilitation of the water production capacities via implementation of loss/leakage reduction programs and better company management. The EBRD loan was used for: installation of new water supply pipelines and pumps; installation of water meters and automation of the water pumping systems; procurement of the laboratory and diagnostic equipment; and procurement of water treatment plants for domestic waste water. The environmental benefits from the project comprised: annual reduction in the electricity consumption by approximately 80 million kWh, which allowed to reduce GHG emissions due to power generation in Moldova; reduction of water consumption by approximately 26 percent owing to prevented losses/leakages; improved monitoring over used water treatment and sludge deposits; improved drinking water quality control, etc.

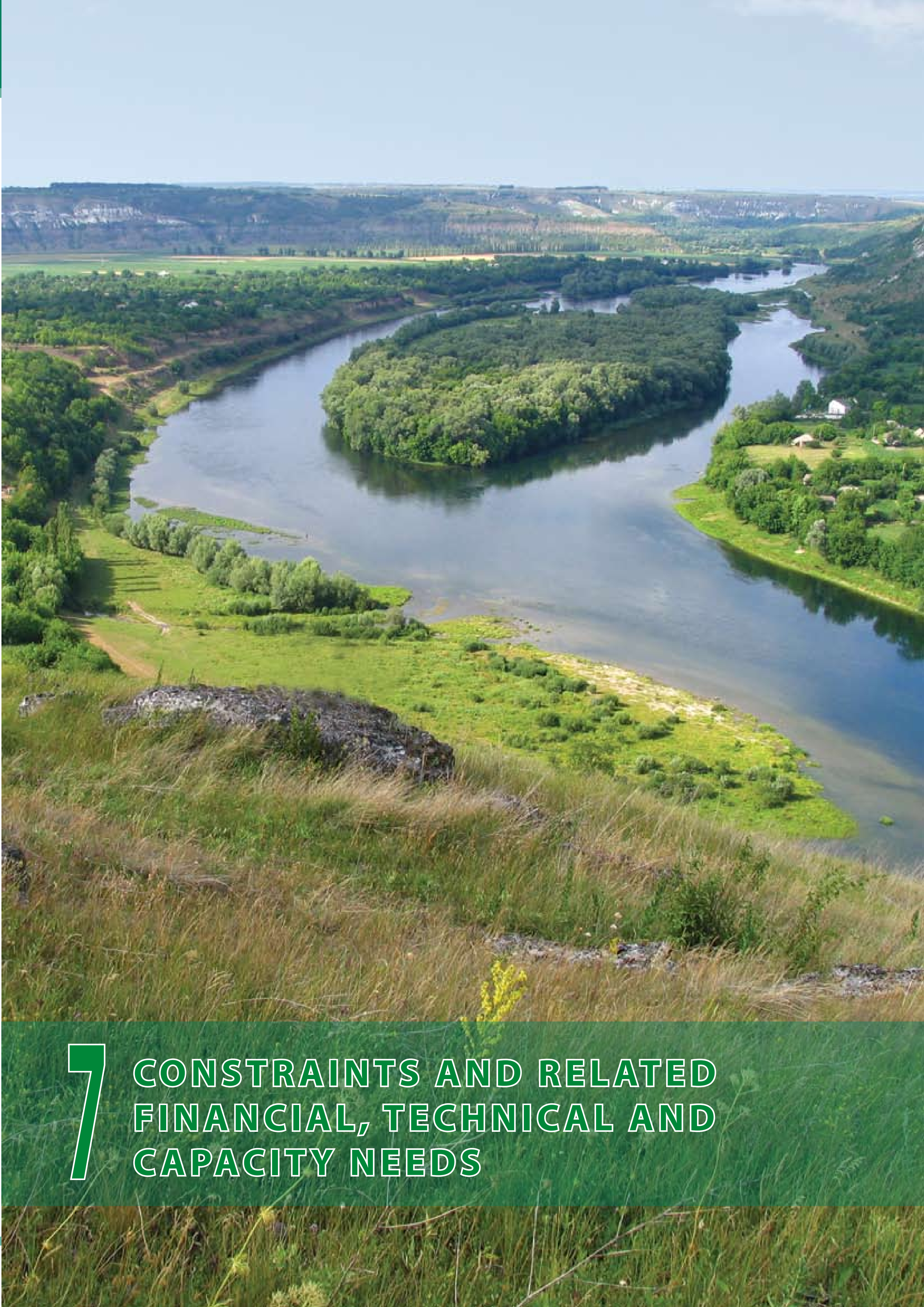
Within 2001-2003, the Danish Environment Protection Agency (DEPA) implemented a number of smaller projects focused on the rehabilitation, extension and improvement of access to drinking water for the population of a number of Moldovan settlements, including: the project of ensuring drinking water supply to Borceag village (70,080 m^3 annually) for approximately 1,700 residents (total costs: DK 2.2 million); the project of ensuring drinking water supply to Chircaiesti village (180,000 m^3 annually) for approximately 4,000 residents and reduction in the energy consumption by round 480,000 kWh annually (total costs: DK 9.4 million); the project of rehabilitation and expansion of the drinking water supply system for the town of Stauceni (50,000 m^3 annually) for approximately 2,500 residents (total costs: DK 8.7 million).

Starting in 2004, World Bank jointly with the Swedish International Development and Cooperation Agency (SIDA), IBRD/IDA and the Ministry of Economy and Commerce has been implementing Energy-II Project in Moldova (the initial loan offered for 2004–2008 was USD 35 million, and the additional funding endorsed for 2009–2012 is USD 11 million). The main objectives of the project were: to rehabilitate the energy system of the Republic of Moldova and to improve the security and safety of the power transmission system; to improve accessibility, quality and efficiency of heating systems in selected public buildings; and to offer technical assistance for power sector reform. The project results were: improved access to heating during the heating season (about 120 days in a year) for approximately 35 institutions (including schools, hospitals, kindergartens (preschools), orphanages) and 37 apartment houses. Improved access to heat was ensured to approximately 8,400 schoolchildren, approximately 1 million patients and visitors of the polyclinics and hospitals, and about 2,130 families whose apartments were connected to new heat plants during the last two heating seasons (2006/2007 and 2007/2008). The additional funding of USD 11 million approved for 2009-2012 will be used to ensure improved access to heating for about 18 public institutes and social assistance centres located in 10 administrative units (districts) of the Republic of Moldova.

Furthermore, in 2007 the World Bank Executive Board of Directors endorsed a grant of USD 4.562 million for the environment infrastructure project "Treating Soroca Municipal Wastewaters". The project is implemented by the World Bank and assists the Government of Moldova in treating Soroca's municipal wastewater. The project will improve the quality of the Dniester River that separates Moldova and Ukraine and will pioneer innovative and low-cost constructed wetlands to reduce the nutrient loads on the Dniester and the Black Sea. The project, located within the GEF International Waters Focal Area, is the latest in a series of 10 GEF/World Bank operations in the Danube/Black Sea Basin program that focuses on nutrient reduction to benefit the downstream Black Sea. The objectives of the project are to (i) improve the quality of sanitation services in Soroca; (ii) reduce the discharge of pollutants, including nutrients, from Soroca municipal sources that flow into the Dniester river and, subsequently, into the Black Sea; and (iii) demonstrate and disseminate through feasibility studies and workshops, cost-effective and affordable technologies for municipal wastewater treatment for the potential benefit of similar projects for Moldova's existing wastewater treatment plants, for towns in Moldova that have no wastewater treatment, and for the countries that drain into the Black Sea.

The Soroca municipality was selected because the Government has assigned a high priority to treating Soroca's wastewater that is presently discharged untreated into the Dniester river, which separates much of Moldova and Ukraine, and the Government wishes to honor its international commitment with Ukraine. Soroca has also improved its water supply system under the ongoing IDA financed Pilot Water Supply and Sanitation Project under which participating 'Apa-Canals' are committed to collect tariffs to cover its operations and maintenance costs.

The project consists of the following components: *Component 1-A:* Wastewater management in Soroca to finance the rehabilitation of the wastewater collection system and pressure pipelines, and the construction of the wastewater treatment facility using constructed wetlands technology; and six months of operations of the facility in order to train the 'Apa-Canal' staff to operate and maintain the facility; *Component 1-B:* Engineering Consultant and Technical Assistance to support engineering services for Wastewater Treatment Plant (WWTP) and sewer network design, procurement, supervision support, and six months of operational assistance for the WWTP; and feasibility studies for 10 towns and pre-feasibility studies for an additional 5 towns, including the replication of the constructed wetland system in the studies; *Component 2:* Dissemination and Replication of the experience from the new Soroca WWTP. Annual workshops would likely mainly have Moldovan and Ukrainian participation, and possibly wider international participation in coordination with the Istanbul Commission; *Component 3:* Institutional Strengthening to finance: the development of a communication strategy and capacity building for media campaign, and community and civil-society outreach to prepare for the necessary increase of a sewage treatment surcharge; and utility staff training for operational efficiency improvements; *Component 4:* Project Management to support management and implementation of the project by the Ministry of Construction and Territorial Development of the Republic of Moldova.



7 CONSTRAINTS AND RELATED FINANCIAL, TECHNICAL AND CAPACITY NEEDS

7. CONSTRAINTS AND RELATED FINANCIAL, TECHNICAL AND CAPACITY NEEDS

7.1 Identified Constraints and Capacity Needs

7.1.1 Greenhouse Gas Inventories

In the area of greenhouse gas inventory it is necessary to strengthen the National Inventory System, inclusive :

- by means of institutional capacities building in terms of meeting the Partry's commitments under the UNFCCC;
- periodical preparation of the National Greenhouse Gas Inventory;
- improving the quality of inventory by adopting higher tier methodological approaches (Tier 2), inclusive the country specific methodologies (Tier 3);
- development of country specific emission factors, specifically for key categories;
- enhancing quality assurance, quality control and verification activities,
- reducing the inventory uncertainties by adjusting the statistical data collection system to the UNFCCC requirements.

Also, it is necessary to consolidate the greenhouse gas emissions monitoring process at the sector level.

E*nergy Sector*

- collecting additional information pertaining to the 1A1 'Energy Industries' source category, including information on technologies used at electric and thermal power plants in the Republic of Moldova (MTPP in Dnestrovsc, CHP-1 and CHP-2 in Chisinau, CHP-North in Balti, etc.), features of heat parameters of energy groups (gas-steam turbines installations, condensing installations, turbines and steam boilers, hot water boilers, etc.), installed electric and thermal power, thermal power supply indicators, global rated capacity, electric rated capacity, total and specific fuel consumption, type of fuel, energy produced etc., allowing to adopt a higher tier methodology to replace the default methodologies (Tier 1);
- specifying / précising the activity data related to fuel consumption under the 1A4 'Other' source category (commercial / institutional, residential /agriculture/ forestry / fishing sectors on the administrative-territorial units on the left bank of the Dniester;
- closer cooperation with the national operator of natural gas 'MOLDOVAGAZ' J.S.C., in view of collecting additional information for the 1B2 'Fugitive Emissions from Oil and Natural Gas' source category, what will allow to adopt a higher tier methodology and use of country specific factors to replace the default ones;
- specifying/précising emission factors typical for types of aircraft used in the Republic of Moldova in the international air transport (landing/take off cycle and cruise cycle) under the 'Memo Items: International Aviation'.

Industrial Processes Sector

- collect activity data needed to estimate CO_2 emissions covered by the source collecting activity data needed to estimate CO_2 emissions from the 2A3 'Limestone and Dolomite Use' source category (limestone and dolomite use in sugar refinery, production of iron and steel, construction and agriculture);
- updating activity data used to estimate GHG emissions from 2B 'Chemical Industry' category;
- updating activity data used to estimate NMVOC emissions from 2D2 'Food and Drink' source category (bread, food products, alcoholic drinks, etc.);
- improving methodological approaches and emission factors used to estimate CO_2 emissions from 2D2 'Food and Drink' source category;
- updating activity data used to estimate F-gas (HFC, PFC and SF_6) emissions from the 2F 'Consumption of Halocarbons and Sulphur Hexafluorides' category.

Solvents and Other Products Use Sector

- updating activity data used to estimate GHG emissions from the 3A 'Paint Application' source category (paint production, import and export);
- updating activity data used to estimate GHG emissions from the 3B 'Degreasing and Dry Cleaning' source category (production, import and export of solvents used in degreasing and dry cleaning);
- updating activity data used to estimate GHG emissions from the 3C 'Chemical Products, Manufacture and Processing' source category (production, import and export of chemical products);
- updating activity data used to estimate GHG emissions from the 3D 'Other' source category (production, import and export of glues, inks, solvents used in oil

extraction, household cleaning products, N_2O used for anaesthesia).

Agriculture Sector

- specifying the values of parameters/factors used under the 4A 'Enteric Fermentation' source category to develop the country specific emission factors (cattle, sheep and goats), using the Tier 2 method;
- specifying the values of parameters/factors used under the 4B 'Manure Management' source category to develop the country specific emission factors (cattle and swine), using the Tier 2 method;
- collect additional information on the share of different manure management systems in the Livestock Breeding Sector of the Republic of Moldova and annual average N excretion per head of species/category *T* in the country, to be used for estimating the methane and nitrous oxide emissions under the 4B 'Manure Management' source category;
- updating activity data used to estimate direct N_2O emissions from the 4D 'Agricultural Soils' source category.

Land Use, Land-Use Change and Forestry Sector

- improving record keeping pertaining to distribution of forests by species, actual consumption of wood from the forests of the Republic of Moldova, as well as verification of country specific emission/removal factors (annual net increment in volume suitable for industrial processing, basic wood density, biomass expansion factors, etc.) under the category 5A 'Forest Land';
- improving record keeping pertaining to actual consumption of wood mass from forest belts and other types of forest vegetation, as well as verification of country specific emission/removal factors (such as: annual biomass increments, biomass harvesting during the cleaning cuttings of perennial plantations, etc.) under the source category 5B 'Cropland' (Annual Change in Carbon Stocks in Living Biomass);
- improve the country specific method (Tier 3) (Banaru, 2000) and collecting additional activity data, what will allow to calculate CO_2 emissions/removals from the 5B 'Cropland' (Annual Change in Carbon Stocks in Mineral Soils);
- updating activity data used to estimate non-CO_2 emissions from post harvest field burning of agricultural residues (stubble fields burning), including areas of stubble fields burnt annually in the Republic of Moldova;
- improving cadastral records (as a main source of activity data), by specifying land use categories to which converted croplands are transferred.

- *Waste Sector*
- environmental management restructuring in the context of the Waste List Resolution 2000/532/EC, to improve the national statistical records on waste management, in view of complying with the EU requirements and to fulfil the commitments under the international environmental treaties, ratified by the RM, and efficient reporting on consistent implementation;
- promoting a more accurate and complete statistical accounting on waste generation, contributing to improving the quality of activity data on the amount of solid household and industrial waste generated and disposed, used to estimate methane emissions from 6A 'Solid Waste Disposal on Land';
- wastewater management restructuring in the RM, in conformity with the country's commitments under the Protocol on Water and Health (London, 1999) ratified by the Republic of Moldova, as well as from the perspective of implementing the 'National Strategy on Water Supply and Sewage' (2007); meeting the provisions of the *Protocol* would mean establishment of criteria to assess the condition of the wastewater systems and for the operation of wastewater treatment plants, what will provide updated activity data used in estimation of GHG emissions from 6B 'Wastewater Handling' source category.

7.1.2 Climate Change Mitigation

It is necessary to approve and implement the National Strategy on GHG Emissions Mitigation and the relevant Action Plans by sectors:

Energy Sector

- Promotion of the policies and measures aimed at GHG emissions abatement in all links of the energy chain (generation, transportation and consumption); and large-scale implementation of new energy-efficient technologies;
- Enhancing energy efficiency in all sectors of the national economy, including the residential sector;
- Introduction of local fuels, secondary energy resources, renewable energy sources (in particular, biomass, wind and solar energy) and energy-containing industrial or domestic waste in the energy balance;
- Use of low GHG emission fuels (comprehensive gasification of the Republic of Moldova);
- Compliance with the European norms and standards to prevent environment pollution;

- Development of a National Program to liberalize the energy market and create conditions for investments attraction to the Energy Sector.

Transport Sector

- Use of economic levers and taxation mechanisms to incentivize the modernization of the vehicle fleet and rolling stock;
- Rehabilitation and reconstruction of highways and railway lines;
- Optimization of the urban and inter-urban transport networks; optimization of passenger and freight transportations, including traffic bypasses to detour densely populated areas (construction of detour roads to bypass towns and cities; introduction of restrictions on traffic in the central part of the town/city, etc.);
- Promotion of public transports via facilitation of their use and development of the public transport networks in the Republic of Moldova's major cities and towns;
- Large-scale use of electric transports, including the extension of the urban and inter-urban electric transport networks;
- Increase in the portion of motor vehicles running on LNG and LPG;
- Introduction of motor vehicles running on hydrogen and bio-fuels or using other modern technologies applicable in transport sector;
- Imposing limitations on the operation life of the motor vehicles imported to the Republic of Moldova (down from 7 to 5 years for passenger cars and down from 10 to 7 years for trucks and buses);
- Implementing mandatory official check-ups of all motor vehicles and trailers.

Industrial Processes Sector

- Good equipment maintenance and use of modern techniques and manufacturing processes for the purposes of resource and energy conservation and waste reduction;
- Adequate accounting for the consumption of primary materials and energy, efficient production management;
- Use of effective management systems and reduction of production losses, inclusively by using recycled materials;
- Recovery of fugitive emissions;
- Improvement and amendment of the legislation to bring it in compliance with the European energy efficiency standards and emission thresholds (admissible emission threshold values);
- Implementation of the initiatives regarding differentiated approach to application of taxes depending on energy efficiency and emission reductions;
- Conclusion of agreements regarding voluntary reduction of emissions at Moldovan industrial enterprises;
- Implementation of an aggressive technology and innovation transfer policy and clean technology commercial demonstrations, including in industrial and innovation parks.

Agriculture and Food Processing Industry

- Use of renewable sources of energy (solar and wind energy, biomass) as a means to reduce the consumption of traditional types of fuels;
- Employment of modern technologies with reduced energy consumption;
- Larger scale utilization of the processing industry and agricultural wastes.

Land Use, Land-Use Change and Forestry

- Regulated and continuous application of measures to protect forests from pests and diseases;
- Planting of new forests in the protection areas along water basins and expansion of the green protection strips along main passageways;
- Planting of new forests in the areas with degraded soil;
- Consolidation of the infrastructure to produce seeds and planting stock of the local plant varieties.

Waste Management

- Waste utilization;
- Reduction of waste generation sources;
- Renunciation of the primary materials containing toxic substances;
- Use of organic waste and biogas generated from waste to produce energy.

7.1.3 Vulnerability and Adaptation to Climate Change

In terms of capacity building in the vulnerability and climate change adaptation area, it is necessary to approve the National Action Plan on Adaptation to Climate Change and strengthen sector policies in view of vulnerability and adaptation, including:

- Natural Ecosystems: extension of natural areas; carry out observations aimed at assessing the species and ecosystems stability under the new climate change conditions; develop and implement forests and other green areas extension programs, efficient forest management; restoration of wetlands;

- Water Resources: water protect against pollution and depletion caused by anthropogenic activities; prevent the water destructive effects; identify areas exposed to floods and undertake flood prevention measures; consolidation of hydro-technical constructions for flood protection;
- Agro-Ecosystems: implement sustainable soil management procedures, including agricultural lands and pastures; ensure socio-economic conditions to provide for profitable farming; identification of species, hybrids and technologies adapted to new climate conditions; elaboration and implementation of hydro- and agro-technical complex systems of accumulation and efficiently utilization of atmospheric precipitations; implement of agricultural systems contributing to reduction of soil erosion and degradation;
- Public Health: improving and strengthening the public health monitoring system; moving the polluting facilities away from labour and recreation zones.

7.1.4 Research, Development, Innovation and Technology Transfer

The RDITT sector of the Republic of Moldova features a very high degree of centralization. The ASM and its subordinated institutes play a major role in this sector, the universities having a more moderate role, while private sector is practically absent. Starting 2004 the ASM has tried to restructure the sector, however, it the restructuring proved to be a perfunctory one. No wonder that the final output of the RDITT sector is preponderantly knowledge, and less of technologies and new products that could be turned into economic value. So, in order to improve the situation in the RDITT sector, it would be reasonable to adopt the following policy and capacity building measures:

- It is necessary to divide the research, development, innovation and technology transfer system into two basic components: research for knowledge fostering and transfer of technologies and innovation. Such a division should take place at all levels (management, funds allocation, policy development);
- The research component has to be further managed by the Supreme Council for Science, formed of the ASM and universities. Funding of research projects has to be provided to accredited institutions based on rigorous, but equitable and transparent conditions. At the same time it is necessary to stronger integrate the fundamental research with the university training process, moving the centre of gravity in research activities closer to the university sector.
- The technology transfer and innovation component should be managed by a Council for Innovation and Technology Transfer that would be subordinated to the Ministry of Economy and Trade. Funding of technology transfer and innovation projects shall be done on a competitive basis with universal participation conditions, the proposed projects should be evaluated by mixed expert panels (comprising representatives of the academic, university community, private sector, international experts and government officials).
- It is necessary to restructure the technological parks in true primary platforms for technology transfer, and innovation incubators into primary supporters of innovation (provision of incubation services for a limited period of time, cost of services at the inception phase should be symbolical). At the same time it is necessary to create the risk funds and "spin-off" units.
- Adapting and improving the training of staff for the RDITT sector, including the doctoral studies as the 3rd cycle of university training, development of transferable skills, initiation and implementing the "life learning" programs, establishing specialised practical training for doctoral students in production units.
- A better balancing should be achieved in reproduction of the scientific potential based on the actual economic needs (real areas), it is necessary to incentivize Moldovan researchers who gained a foothold abroad by supporting and providing modern conditions for research, and support the practice of research through co-tutoring (one of the tutors being in the Republic of Moldova, and the second - abroad).
- It is necessary to essentially improve the RDITT statistical system existent in the Republic of Moldova, to make it viable and comparable, and based on the relevant quantitative statistical indicators to reflect the situation on a national level and to be comparable with the similar international indicators.
- To recover the losses of the scientific potential that occurred over the past decade and more, it is necessary to speed up and increase the financing of the RDITT sector, attaining by 2015 a 1.5 percent share in the GDP, provided 40 percent of the RDITT sector financing shall be coming from the private sector.
- It is necessary to ensure monitoring of innovation and technology transfer projects continuity, with periodical review of tendering conditions.
- Involvement of all actors of the state (government, private sector, civil society) in the sector public policies development, as well as policies for individual areas, ensuring transparency of the process and open dialogue.

7.1.5 Systemic Observations

It is obvious that the current state of systemic observations and environmental monitoring is not sufficient to meet the requirements of the national legislation and international commitments of the Republic of Moldova. The integrated environmental monitoring system has not become operational yet in the Republic of Moldova, though its operation regulation had been adopted, and international donors financially supported its creation.

Many natural terrestrial ecosystems, as well as some important components of the biological diversity are poorly monitored. So far, no permanent observation system has been created for observing the condition of habitats and inhabiting factors.

The National Inventory System is in its incipient phase, its existence being financially supported from external sources (in principal, from the Global Environment Facilities), under the technical assistance projects.

The existent monitoring networks do not cover all important point-like sites of underground waters pollution, the diffuse pollution of surface waters is not performed and there is no any point of background water conditions monitoring.

There are no programs involving inter-calibration and mutual control between the laboratories, so, quality assurance and quality control of the results is still an issue.

Also, there is no any national program on the joint inter-calibration exercises and training and the majority of professionals from the laboratories do not participate in national and international analytical comparative studies.

Coordination and sharing of data between the institutions monitoring different aspects of the quality of the environment remain sporadic and are rather a result of some individual initiatives than a result of a viable system operation. Over the past decade efforts to integrate data and environmental information stockpiled in different institutions have been made, however, in general data sharing is still deficient.

Often environmental data and information are collected without following a single methodological approach. Also, the data collecting timelines and data base access conditions are not clearly defined. It should be mentioned that important data bases are administered through outdated software. As a consequence access by decision makers and public at large continues to be difficult.

Lack of equipment, unavailability of highly qualified specialists, adequate software and funding hampers the development of monitoring indicators system and for the data bases.

Summarising the above said, it can be seen that development of an systematic observation and environmental monitoring system in compliance with national and international requirements implies sustained efforts and major investments, inclusively aimed at:

- collecting and adequate environmental data management (improving the process of sampling, analysis, data possessing and reporting);
- providing performing equipment and strengthening the logistical support for an adequate operation of the environmental monitoring system;
- integrating the environmental information flow and coordinating the activities looking at development and maintenance of environmental data bases, including: Animal and Vegetable Kingdom Cadastre; Stockbook of Collections of Wild Flora and Fauna Animals and Plants; Cadastre of Sites and Areas included in the Natural Areas Protected by State; Register of Urban and Rural Green Areas; Stat Cadastre of Waters; State Cadastre of Subsoil Resources Use Facilities and the State Balance of Useful Substances Reserves; Bank of Data on Soils Quality, National GHG Inventories, etc.;
- defining the rules for access to data, taking into account the aspect of confidentiality, and development of an efficient mechanism of collaboration and environmental data sharing;
- capacity building regarding on-line access to the environmental data bases;
- revising national statistics aiming at harmonization of the national information system to the international one;
- harmonizing national environmental standards with the environmental standards of the European Union;
- setting up national reference laboratories in view of ensuring data quality;
- providing continuous training and re-training programs for the staff working in this area;
- modernization of the institutional and administrative framework of environmental monitoring and improving inter-departmental cooperation.

7.1.6 Education, Training and Public Awareness

In view of building the capacity to meet the objectives of environmental objectives, incl uding the objectives related to information, environmental training and education, it is deemed necessary to accomplish the following:

- activities aimed at improving the environmental training and education at all levels of the education system;

- ecological education provided within other subjects and activities in pre-school, primary, gymnasium and lyceum education, inclusively through:
- supplementing the National Curriculum with subjects and contents on environment protection;
- supplementing the class master curriculum with environment protection objectives and contents;
- introducing a mandatory subject "Life skills" (pre-school and grades I-XII);
- developing and including relevant subjects and updating them with aspects pertaining to implementation of international conventions in the university and post-university training programs of ecologists, soil scientists, agrochemists, meteorologists, silvicultorists, biologists, economists, engineers, legal advisers, journalists, etc.;
- individual annual mastership and doctoral training at the universities in the country of specialists in the following areas: environmental planning, strategic environmental assessment, environmental management, environmental legislation and international environmental treaties, environmental economy, energy auditing and supplementing the Classifier of specialities with new specializations;
- improving the training and re-training infrastructure by developing thematic continuous training courses in areas related to environmental conventions, assigning an authority responsible for monitoring the continuous training of staff and establishing a minimum number of required advanced training hours to get access to attestation, including through:
- establishing an Advanced training and re-training centre for the environmental staff and establishing the quote of the National Environmental Fund to support its activity;
- developing environmental training modules and inserting them in the environmental staff training /re-training Curriculum, including the areas pertaining to environmental Conventions to which the RM is a part, for central and locale public administration authorities, engineers, economists, health professionals, teachers, journalists and other specialities, as well as for farmers and agribusinesses, transport and industrial companies, etc.
- training and awareness activities in environment protection issues, rational use of natural resources and accomplishment of environmental conventions provisions;
- promoting the provisions and objectives of the environmental conventions to which the RM is a part, of ecological culture and ways of sustainable cohabitation with nature, and publishing of environmental information materials as brochures, booklets, flyers, posters, etc.;
- encouraging branch enterprises and companies to print environmental information related materials on the back side of invoices, advertising materials, packaging etc. promote ecological culture and ways of sustainable cohabitation with nature;
- encouraging mass-media to widely use environmental related materials in their activity and broadcasting and advertising plans, including by organizing TV and radio program cycles dedicated to environmental conventions and publication of thematic articles regarding implementation of environmental conventions;
- more active involvement of non-governmental environment organizations in public information campaigns on the national environmental policy and accomplishment of objectives of environmental conventions to which the Republic of Moldova is a part;
- wider promotion of "success stories" in implementing environmental projects and dissemination the positive experience among the decision makers, CPA and LPA officials, as well as those who by virtue of their activity benefit the local communities;
- facilitate public access to environmental information in the context of environmental conventions, including by improving the quality of the MENR's web site;
- organization of exhibitions, seminars, conferences, thematic symposia on the issues related to accomplishment of environmental conventions provisions.

7.1.7 Regional and International Cooperation

In view of building the capacities to accomplish the environmental conventions objectives in the Republic of Moldova, including the objectives pertaining to improving regional and international cooperation, it is necessary to ensure:

- provision of multilateral support in view of building the capacities of the Central Environmental Authority of the Republic of Moldova in promoting the EU integration process in environment protection area;
- capacity building and developing mechanisms to implement the European Union environmental legislation (Directives) in the Republic of Moldova;
- integrating the environment protection policies into the individual sector policies;
- strengthening of general environment administration tools, including the economic ones;

- methodological approach to organization and carrying out the environmental impact assessment;
- establishing in the Republic of Moldova of an Environmental Investment Centre as per experience of the European Union countries and enhancing efficiency of state financing of environmental projects;
- identification of financial sources, including from the European Funds, to develop and finance environmental projects, such as:
- adaptation to climate change;
- greenhouse gases emissions abatement;
- promoting energy efficiency and renewable sources of energy;
- water supply and sewerage;
- construction of wastewater treatment plants;
- promoting new systems of collecting, depositing, recycling, use and disposal of municipal solid waste and sludge, as well as toxic industrial waste;
- improving chemical substances management, including the persistent organic polluters and heavy metals, etc.;
- strengthening collaboration with the neighbouring countries in view of creation a new water resources management system in compliance with international requirements;
- capacity building to implement water resources integrated management by improving the regulatory and administrative framework;
- protecting biodiversity, expansion the forest areas, rehabilitation of landscapes and ecosystems, expansion of wetlands and development of natural protected zones, including the transboundary zones;
- protecting the air, surface waters, underground waters and soil from pollution by introducing/revision of admissible emissions levels, promoting innovation, technology transfer, best techniques and environment sound practices;
- promoting efficient ways to mitigate the impact of the road transport on the environment (for example, maximal use of the public passenger transport, providing opportunities for practising cycling, building pedestrian zones, voluntary renouncing to use own cars in town and stop polluting the historical centres of towns with exhaust gases from road transport);
- development of a bank data on hazardous geological processes, hazards and risks prevention and mitigate their impact on the human society;
- promoting ecological education, ensuring access to information and decision making process;
- in-service training of professionals and public officers on environment protection issues, rational use of natural resources and adjusting national environmental legislation to the European Union requirements.

7.2 Financial Needs for Climate Change Mitigation and Adaptation Measures

7.2.1 Financial Needs

As result of the assessments performed, by taking into account the national strategies, policies and short and medium term development plans, there were identified the financial needs of the RM at the sector and national level for climate change mitigation and adaptation measures implementation within the 2009-2013 period (Table 7-1).

Table 7-1: Financial Needs of the Republic of Moldova for Climate Change Mitigation and Adaptation Measures Implementation for the period 2009-2013

Areas / Sectors	Financial Needs		% from the total
	Million MDL	Million USD[1]	
Electrical and Thermal Power	18,824	1,666	24.0
Transport and Road Administration	25,632	2,269	32.7
Gas and Oil Products Supply	2,300	204	2.9
Industry	3,341	296	4.3
Agriculture	6,536	578	8.3
Forestry	6,045	535	7.7
Waste Management	5,516	488	7.0
Water Supply and Sewerage Systems	7,467	661	9.5
Human Health	2,818	249	3.6
Total	**78,480**	**6,946**	**100.0**

Note: [1] - the official exchange rate of the National Bank of Moldova of the Moldovan lei to US dollar on 01.05.2009 - 11.2986 MDL/USD has been used (<http://www.bnm.md/md/official_exchange_rates>)

In view of combating the adverse effects of climate change in the period 2009-2013 the Republic of Moldova would need approximately 78.5 billion lei or 6.9 billion USD (*for comparison, in 2008 the Republic of Moldova reported a GDP of circa 62.8 billion MDL, or circa 6.1 billion USD*) with the following distribution:

- 32.7 percent of funding to be allocated to Transport and Roads Administration Sector (*in particular, for rehabilitation of roads, railways, waterways and urban transportation*);

- 24.0 percent of funding to be allocated to Electrical and Thermal Power Sector (*inclusive, for modernization, re-equipment of the existent electric power generation sources, construction of new power generation sources, renovation and decentralization of heat supply systems, use of renewable sources of energy, energy conservation activities, etc.*);
- 9.5 percent of funding to be allocated to the Water Supply and Sewage Systems (*in particular, for modernization, upgrading and construction of new water supply systems, improving the access of population to the respective service, as well as for modernization, upgrading and construction of new sewerage systems and wastewater treatment plants*);
- 8.3 percent of funding to be allocated to Agricultural Sector *(inclusive, for combating soil erosion, reuse of low productive lands and soil fertility enhancing; rehabilitation of irrigation systems and construction of new irrigation systems; maintenance and improvement of the breeding stock genetic pool; incentivizing technological upgrading of animal breeding farms, etc.*);
- 7.7 percent of funding to be allocated to Forestry Sector (*in particular, for expansion of forest areas on account of degraded lands [in perspective up to 20 percent of the territory of the country]; expansion of grasslands [in perspective up to 22 percent of the territory of the country]; planting of green protection, anti-erosion strips for agricultural lands, water basins; planting of energy forests; ecological reconstruction of the forest stand; forest management strengthening, etc.*);
- 7.0 percent of funding to be allocated to Waste Management (*in particular, for construction of managed solid waste disposal sites; for recovery of methane from the existent solid waste disposal sites; construction of waste incineration plants; for activities aimed at prevention, minimization, recycling of wastes, etc.*);
- 4.3 percent of funding to be allocated to the Industry Sector (*inclusive, for modernization and upgrading of enterprises; industrial optimization through energy conservation measures and reducing energy intensity per production unit; creation and development of industrial and innovation parks; promoting innovation, new industrial materials and products; implementing quality management systems; technology transfer projects, etc.*);
- 4.0 percent of funding to be allocated to Human Health Sector (*in particular for hospital restructuring and rehabilitation; improving the quality of primary health care and technical endowment of health care facilities, equipping the health centres with modern medical equipment [in particular, operation theatres, intensive care units, of imagistic sections of the public health care facilities], providing transport means to health care centres and family doctors' offices; enhancing efficiency of the secondary and tertiary level health care facilities and establishing centres of excellence; strengthening the control over the transmissible diseases and creating the information system for epidemiological surveillance of infectious diseases; improving public health by diminishing the burden of non-contagious diseases and developing the socio-hygienic monitoring with monitoring and optimization of the risk factors control, providing potable water supply in adequate amount, etc.*);
- 2.9 percent of funding to be allocated to Natural Gas and Oil Products Supply (*inclusive, for sustainable extension of natural gas distribution network and assuring complete gasification of the country; monitoring and good maintenance of natural gas record keeping systems in conformity with European requirements and precision standards at the borders of the country on the main pipelines and inter-systemic connections; providing the main pipelines with diagnostic equipment to monitor the pipeline condition and surface monitoring; mounting of slow type turbo-installations to produce electric energy by using the power of the super-pressure of the gas extracted from the high pressure main pipelines, etc.*).

7.2.2 Proposed Projects for Financing

The list of projects proposed for financing in the Republic of Moldova for Climate Change Mitigation and Adaptation Measures Implementation, in accordance with Article 12, paragraph 4 of the Convention, is provided below (Table 7-2).

Table 7-2: Proposed Projects for Financing in the Republic of Moldova for Climate Change Mitigation and Adaptation Measures Implementation within 2009-2013 period

Projects	Total cost, million	
	MDL	USD
Modernization, re-equipment of the CHP-1 in Chisinau and enhancing electric power generation capacity up to 90 MW	350	31
Modernization, re-equipment of the CHP-North in Balti and enhancing electric power generation capacity up to 100 MW	650	58
Modernization, re-equipment of the CHP-2 in Chisinau and enhancing electric power generation capacity up to 440 MW	3,500	310
Construction of a new TPP with a total installed capacity of 350 MW in Ungheni;	9,500	841
Modernization of thermal power production capacities and modernization of thermal plants into combined heat and power plants	100	9
Rehabilitation of the main heat supply and distribution networks in Chisinau municipality	350	31
Sustainable extension of natural gas distribution network and ensuring complete gasification of the Republic of Moldova	1,500	133
Construction of wind farms on potentially productive territories, such as Tigheci Highlands, Dnistrean Highlands, Ciuluc Hills, Hills of the Central Moldovan Upland and the hilly areas in Cahul and Taraclia regions, with a total installed power of 20 MW	500	44
Construction of in- flow micro-hydro-power plants on the Dniester, Pruth and Reut rivers with a total installed power of 3 MW	50	4
Construction of two plants for industrial production of bioethanol	750	66
Construction of two plants for industrial production of biodiesel oil	100	9
Implementing energy conservation programs in diverse branches of national economy, in particular in energy, manufacturing industry and constructions, transport, institutional and residential sector	500	44
Rehabilitation of the national and local roads network of the Republic of Moldova in conformity with the long term rehabilitation Plan	21,181	1,875
Rehabilitation of the railways network of the Republic of Moldova in conformity with the short term railways infrastructure rehabilitation Plan	900	80
Rehabilitation of internal waterways of the Republic of Moldova and improving the operational features of the hydraulic engineering installations	500	44
Optimization of industrial sector through technology transfer activities and energy conservation measures and reducing energy intensity per unit of production	600	53
Rehabilitation of irrigation systems in the Republic of Moldova	924	82
Construction of new irrigation systems in the Republic of Moldova	2,600	230
Implementing soil erosion control activities, using poorly productive lands and enhancing soil fertility	690	61
Endowment and modernisation of small and medium animal breeding farms	101	9
Planting of green protection strips around agricultural lands (12.1 thousand ha), antierosional (28.3 thousand ha) and water protecting (14.9 thousand ha)	1,500	133
Expanding forest areas by circa 7.5 thousand ha annually (prospectively, up to 20 percent of the territory of the country)on the account of degraded lands and privately owned lands	1,400	124
Expansion of grasslands by 3.9 thousand ha annually (prospectively, up to 20 percent of the territory of the country)on the account of eroded agricultural lands, slopes exceeding 7^0 etc.	140	12
Ecological reconstruction of the standing stock which does not correspond to stationary conditions (1.9 thousand ha annually)	250	22
Establishing ecological community networks and development of local programs on use, conservation and sustainable development of forestlands and grasslands	180	16
Planting of 20 thousand ha of energy forest to meet the public demand for fuel wood used for heating and cooking	640	57
Identification and implementation new solutions for preventing, minimization, recycling, and waste disposal, aiming at greenhouse gas emissions abatement in the Republic of Moldova	100	9
Recovery of methane from the existent solid waste disposal sites in the Republic of Moldova	300	27
Construction of municipal solid waste incineration plants in urban areas of the Republic of Moldova	2,700	239
Modernization, upgrading and construction of new water supply systems in the Republic of Moldova	4,480	397
Modernization, upgrading and construction of new sewerage systems in the Republic of Moldova	2,987	264
Reconstruction of municipal and industrial wastewater treatment plants in the Republic of Moldova	2,500	221

Note: [1] - the official exchange rate of the National Bank of Moldova of the Moldovan lei to US dollar on 01.05.2009 - 11.2986 MDL/USD has been used (<http://www.bnm.md/md/official_exchange_rates>)

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ANNEXES

Annex 1: Republic of Moldova's National Greenhouse Gas Inventory of Anthropogenic Emissions by Sources and Removals by Sinks of All Greenhouse Gases Not Controlled by the Montreal Protocol and Greenhouse Gas Precursors, 1990-2005

Annex 1-1: Inventory Year - 1990

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**34765.2823**	**-1676.4911**	**227.0661**	**10.8246**	**137.7408**	**429.0537**	**103.1150**	**294.9678**
1. Energy	**33365.5535**	**NO**	**45.8690**	**0.6180**	**134.6595**	**423.1362**	**71.9509**	**293.0068**
A. Fuel Combustion	33364.9158		13.3788	0.6180	134.6595	423.1362	71.3692	293.0068
1. Energy Industries	19332.7655		0.4423	0.1653	54.2987	4.9157	1.3281	203.2514
2 Manufacturing Industries and Construction	2188.7285		0.0953	0.0167	5.8887	1.4012	0.1954	24.1072
3. Transport	3926.6606		1.1921	0.3352	38.6268	289.6096	54.5258	4.3700
4. Other Sectors	7762.4898		11.6427	0.0993	35.4060	127.0250	15.3004	60.5137
5. Other (other works and needs in energy sector	154.2715		0.0064	0.0016	0.4393	0.1847	0.0195	0.7646
B. Fugitive Emissions from Fuels	0.6377		32.4902	0.0000	NO, NE	NO, NE	0.5817	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	0.6377		32.4902	0.0000	NO, NE	NO, NE	0.5817	NO, NE
2. Industrial Processes	**1334.1247**	**NO**	**0.6440**	**0.0035**	**2.9828**	**2.2995**	**10.1147**	**1.9610**
A. Mineral Products	1257.7837		0.0061	NO, NE	2.7844	1.3073	2.6883	1.8689
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.3657	NO, NE
C. Metal Production	56.7016		0.6379	0.0035	0.1985	0.9923	0.0638	0.0921
D. Other Production	19.6395		NO, NE	NO, NE	NO, NE	NO, NE	6.9970	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**65.6041**			**0.0001**			**21.0494**	
4. Agriculture			**109.0961**	**9.7835**	**NO,NE,IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			90.6384					
B. Manure Management			18.4577	4.2398			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				5.5438			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1676.4911**	**0.1099**	**0.0032**	**0.0985**	**3.6180**	**NO, NE**	**NO, NE**
A. Forest Land		-2197.5790	0.0112	0.0006	0.0071	0.2544		
B. Cropland		1307.5879	0.0987	0.0026	0.0914	3.3636		
C. Grassland		-786.5000	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**71.3471**	**0.4163**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			62.9108		NO, NE		NO, NE	
B. Wastewater Handling			8.4363	0.4163	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	217.3668		0.0430	0.0070	0.7949	0.8733	0.5202	0.0689
Aviation	217.3668		0.0430	0.0070	0.7949	0.8733	0.5202	0.0689
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	210.8274							

Abbreviations: IE –I ncluded Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-2: Inventory Year - 1991

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**30343.6201**	**-1158.7578**	**217.8026**	**10.5185**	**119.3428**	**371.6038**	**90.6729**	**256.2761**
1. Energy	**29193.0936**	**NO**	**40.9613**	**0.5390**	**116.4861**	**366.4809**	**63.4604**	**254.5103**
A. Fuel Combustion	29192.4796		10.4689	0.5390	116.4861	366.4809	62.9165	254.5103
1. Energy Industries	17361.2078		0.3826	0.1457	48.8473	4.4530	1.2021	172.1415
2 Manufacturing Industries and Construction	1684.7939		0.0827	0.0140	4.6748	1.3740	0.1698	19.1446
3. Transport	3548.3245		1.0880	0.2951	34.4576	264.4692	49.7832	3.9274
4. Other Sectors	6294.8303		8.9152	0.0818	27.7087	96.1384	11.7409	56.4259
5. Other (other works and needs in energy sector	303.3231		0.0005	0.0024	0.7977	0.0462	0.0205	2.8710
B. Fugitive Emissions from Fuels	0.6140		30.4924	0.0000	NO, NE	NO, NE	0.5438	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	0.6140		30.4924	0.0000	NO, NE	NO, NE	0.5438	NO, NE
2. Industrial Processes	**1090.8625**	**NO**	**0.5588**	**0.0031**	**2.7703**	**1.9456**	**8.0690**	**1.7658**
A. Mineral Products	1024.3505		0.0051	NO, NE	2.5980	1.0842	2.8324	1.6858
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.2883	NO, NE
C. Metal Production	49.2200		0.5537	0.0031	0.1723	0.8614	0.0554	0.0800
D. Other Production	17.2921		NO, NE	NO, NE	NO, NE	NO, NE	4.8930	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**59.6639**			**0.0001**			**19.1435**	
4. Agriculture			**98.1639**	**9.5932**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			83.3580					
B. Manure Management			14.8059	4.0151			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				5.5781			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1158.7578**	**0.0939**	**0.0025**	**0.0864**	**3.1774**	**NO, NE**	**NO, NE**
A. Forest Land		-1924.1010	0.0019	0.0001	0.0012	0.0426		
B. Cropland		1422.9232	0.0920	0.0024	0.0852	3.1348		
C. Grassland		-657.5800	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**78.0247**	**0.3807**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			70.1993		NO, NE		NO, NE	
B. Wastewater Handling			7.8254	0.3807	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	232.8115		0.0487	0.0074	0.8447	0.9641	0.5792	0.0738
Aviation	232.8115		0.0487	0.0074	0.8447	0.9641	0.5792	0.0738
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	427.7268							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-3: Inventory Year - 1992

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**21197.7105**	**-918.5706**	**210.4103**	**8.9111**	**80.2690**	**190.4780**	**54.1789**	**170.1090**
1. Energy	**20587.3862**	**NO**	**32.7354**	**0.3529**	**78.3833**	**186.1429**	**32.6833**	**169.0262**
A. Fuel Combustion	20586.8688		5.1318	0.3529	78.3833	186.1429	32.1902	169.0262
1. Energy Industries	13009.2232		0.2828	0.1102	36.6784	3.3396	0.8992	128.3280
2 Manufacturing Industries and Construction	962.3355		0.0403	0.0070	2.6619	0.4088	0.0879	10.8429
3. Transport	1986.1727		0.5432	0.1830	19.7994	128.4896	24.2288	2.4049
4. Other Sectors	4388.8608		4.2655	0.0508	18.6192	53.8737	6.9587	26.7322
5. Other (other works and needs in energy sector	240.2766		0.0000	0.0019	0.6244	0.0312	0.0156	0.7182
B. Fugitive Emissions from Fuels	0.5175		27.6036	0.0000	NO, NE	NO, NE	0.4931	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	0.5175		27.6036	0.0000	NO, NE	NO, NE	0.4931	NO, NE
2. Industrial Processes	**563.4552**	**NO**	**0.5422**	**0.0030**	**1.8058**	**1.3972**	**6.4575**	**1.0828**
A. Mineral Products	504.1955		0.0043	NO, NE	1.6385	0.5604	2.1108	1.0051
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.1398	NO, NE
C. Metal Production	47.8192		0.5380	0.0030	0.1674	0.8368	0.0538	0.0777
D. Other Production	11.4405		NO, NE	NO, NE	NO, NE	NO, NE	4.1531	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**46.8690**			**0.0001**			**15.0382**	
4. Agriculture			**92.8638**	**8.2075**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			78.9349					
B. Manure Management			13.9289	3.8520			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				4.3555			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-918.5706**	**0.0869**	**0.0023**	**0.0799**	**2.9379**	**NO, NE**	**NO, NE**
A. Forest Land		-1766.5038	0.0020	0.0001	0.0013	0.0466		
B. Cropland		1431.6372	0.0849	0.0022	0.0786	2.8912		
C. Grassland		-583.7040	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**84.1819**	**0.3454**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			77.1248		NO, NE		NO, NE	
B. Wastewater Handling			7.0571	0.3454	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	96.2635		0.0189	0.0031	0.3512	0.3847	0.2288	0.0305
Aviation	96.2635		0.0189	0.0031	0.3512	0.3847	0.2288	0.0305
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	531.1505							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-4: Inventory Year - 1993

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**16317.4510**	**-545.2022**	**193.3539**	**7.6992**	**63.4771**	**155.4473**	**44.0071**	**145.6472**
1. Energy	**15776.0700**	**NO**	**28.9628**	**0.2933**	**61.6055**	**149.7682**	**25.0331**	**144.5701**
A. Fuel Combustion	15775.6384		4.1598	0.2933	61.6055	149.7682	24.5895	144.5701
1. Energy Industries	11336.5625		0.2533	0.1010	32.0283	2.8827	0.7709	121.2726
2 Manufacturing Industries and Construction	539.8762		0.0267	0.0043	1.4796	0.6719	0.0576	5.0323
3. Transport	1463.2667		0.3525	0.1382	15.0985	85.9911	16.2216	1.8949
4. Other Sectors	2249.3719		3.5220	0.0478	12.4659	60.0628	7.5191	15.0889
5. Other (other works and needs in energy sector	186.5611		0.0054	0.0020	0.5331	0.1598	0.0203	1.2813
B. Fugitive Emissions from Fuels	0.4316		24.8030	NO, NE	NO, NE	NO, NE	0.4437	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	0.4316		24.8030	NO, NE	NO, NE	NO, NE	0.4437	NO, NE
2. Industrial Processes	**504.3335**	**NO**	**0.5520**	**0.0030**	**1.7531**	**1.3248**	**7.0871**	**1.0772**
A. Mineral Products	443.1365		0.0034	NO, NE	1.5825	0.4715	2.1688	0.9979
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0997	NO, NE
C. Metal Production	48.7616		0.5486	0.0030	0.1707	0.8533	0.0549	0.0792
D. Other Production	12.4354		NO, NE	NO, NE	NO, NE	NO, NE	4.7637	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**37.0475**			**0.0001**			**11.8869**	
4. Agriculture			**78.4598**	**7.0714**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			68.1893					
B. Manure Management			10.2705	3.1485			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				3.9229			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-545.2022**	**0.1279**	**0.0035**	**0.1185**	**4.3542**	**NO, NE**	**NO, NE**
A. Forest Land		-1491.3852	0.0001	0.0001	0.0001	0.0001		
B. Cropland		1433.9670	0.1278	0.0033	0.1183	4.3540		
C. Grassland		-487.7840	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**85.2514**	**0.3280**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			78.1765		NO, NE		NO, NE	
B. Wastewater Handling			7.0749	0.3280	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	62.0927		0.0099	0.0020	0.2331	0.2215	0.1293	0.0197
Aviation	62.0927		0.0099	0.0020	0.2331	0.2215	0.1293	0.0197
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	763.4134							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-5: Inventory Year - 1994

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**13704.7649**	**-875.4389**	**191.8003**	**6.8307**	**54.0902**	**141.2932**	**39.3583**	**102.5218**
1. Energy	**13304.3447**	**NO**	**28.1184**	**0.2592**	**52.9312**	**137.2315**	**22.9155**	**101.8663**
A. Fuel Combustion	13303.9395		4.2469	0.2592	52.9312	137.2315	22.4886	101.8663
1. Energy Industries	9489.7382		0.1808	0.0865	27.2991	2.6489	0.6597	82.8434
2 Manufacturing Industries and Construction	285.2936		0.0131	0.0020	0.7908	0.2992	0.0312	1.5249
3. Transport	1271.1186		0.3262	0.1270	12.4665	79.3899	14.9588	1.4527
4. Other Sectors	2112.0567		3.7236	0.0423	11.9701	54.7840	6.8245	14.8890
5. Other (other works and needs in energy sector	145.7325		0.0033	0.0014	0.4045	0.1096	0.0145	1.1562
B. Fugitive Emissions from Fuels	0.4052		23.8714	0.0000	NO, NE	NO, NE	0.4269	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	0.4052		23.8714	0.0000	NO, NE	NO, NE	0.4269	NO, NE
2. Industrial Processes	**369.1496**	**NO**	**0.5718**	**0.0032**	**1.0820**	**1.2286**	**6.4095**	**0.6556**
A. Mineral Products	306.9414		0.0021	NO, NE	0.9048	0.3422	1.0754	0.5733
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0302	NO, NE
C. Metal Production	50.6480		0.5698	0.0032	0.1773	0.8863	0.0570	0.0823
D. Other Production	11.5602		NO, NE	NO, NE	NO, NE	NO, NE	5.2469	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**31.2706**			**0.0001**			**10.0333**	
4. Agriculture			**78.6824**	**6.2820**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			68.9186					
B. Manure Management			9.7638	3.0700			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				3.2120			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-875.4389**	**0.0842**	**0.0023**	**0.0770**	**2.8331**	**NO, NE**	**NO, NE**
A. Forest Land		-1743.7096	0.0031	0.0002	0.0020	0.0710		
B. Cropland		1471.9506	0.0811	0.0021	0.0751	2.7621		
C. Grassland		-603.6800	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**84.3435**	**0.2840**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			77.7414		NO, NE		NO, NE	
B. Wastewater Handling			6.6021	0.2840	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	37.8235		0.0058	0.0012	0.1433	0.1323	0.0766	0.0120
Aviation	37.8235		0.0058	0.0012	0.1433	0.1323	0.0766	0.0120
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	599.5042							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-6: Inventory Year - 1995

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**10852.0027**	**-758.7649**	**186.7724**	**6.4087**	**47.1408**	**139.2113**	**39.8312**	**60.8743**
1. Energy	**10456.7637**	**0.0000**	**29.4076**	**0.1980**	**46.1500**	**134.8160**	**23.1543**	**60.3516**
A. Fuel Combustion	10456.3479		2.9521	0.1980	46.1500	134.8160	22.6782	60.3516
1. Energy Industries	6913.6176		0.1314	0.0496	19.4831	2.0275	0.5135	46.0290
2 Manufacturing Industries and Construction	315.7781		0.0129	0.0020	0.8694	0.2497	0.0333	1.3217
3. Transport	1288.2094		0.3426	0.1068	12.2869	83.4016	15.7099	1.4489
4. Other Sectors	1766.0697		2.4609	0.0378	13.0293	48.9299	6.4033	9.8040
5. Other (other works and needs in energy sector	172.6731		0.0043	0.0018	0.4813	0.2073	0.0181	1.7481
B. Fugitive Emissions from Fuels	0.4158		26.4555	0.0000	NO, NE	NO, NE	0.4761	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	0.4158		26.4555	0.0000	NO, NE	NO, NE	0.4761	NO, NE
2. Industrial Processes	**367.1749**	**0.0000**	**0.5930**	**0.0033**	**0.9027**	**1.1514**	**7.6724**	**0.5227**
A. Mineral Products	302.6786		0.0019	NO, NE	0.7188	0.2319	0.7373	0.4373
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0256	NO, NE
C. Metal Production	52.5439		0.5911	0.0033	0.1839	0.9195	0.0591	0.0854
D. Other Production	11.9524		NO, NE	NO, NE	NO, NE	NO, NE	6.8504	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**28.0642**			**0.0000**			**9.0046**	
4. Agriculture			**73.5903**	**5.9380**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			65.9346					
B. Manure Management			7.6557	2.9941			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.9439			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-758.7649**	**0.0953**	**0.0025**	**0.0882**	**3.2439**	**NO, NE**	**NO, NE**
A. Forest Land		-1620.7949	0.0002	0.0000	0.0001	0.0041		
B. Cropland		1481.5719	0.0951	0.0025	0.0880	3.2398		
C. Grassland		-619.5420	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**83.0864**	**0.2669**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			76.9801		NO, NE		NO, NE	
B. Wastewater Handling			6.1063	0.2669	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	41.9185		0.0060	0.0013	0.1573	0.1413	0.0820	0.0133
Aviation	41.9185		0.0060	0.0013	0.1573	0.1413	0.0820	0.0133
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	645.5674							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-7: Inventory Year - 1996

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**11092.6625**	**-741.7788**	**184.6133**	**5.8192**	**44.4726**	**136.9144**	**38.6704**	**58.8716**
1. Energy	**10688.3599**	**NO**	**32.5208**	**0.1902**	**43.5677**	**133.1780**	**22.4609**	**58.3902**
A. Fuel Combustion	10687.8919		3.7653	0.1902	43.5677	133.1780	21.9449	58.3902
1. Energy Industries	7040.6936		0.1332	0.0467	19.7380	2.1139	0.5338	42.2225
2 Manufacturing Industries and Construction	261.0795		0.0114	0.0017	0.7217	0.2207	0.0283	1.2002
3. Transport	1260.1985		0.3262	0.1003	11.6357	79.4585	14.9584	1.3585
4. Other Sectors	1981.0872		3.2902	0.0399	11.0627	51.1579	6.4083	12.4329
5. Other (other works and needs in energy sector	144.8332		0.0043	0.0016	0.4095	0.2271	0.0162	1.1762
B. Fugitive Emissions from Fuels	0.4680		28.7555	NO, NE	NO, NE	NO, NE	0.5160	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	0.4680		28.7555	0.0000	NO, NE	NO, NE	0.5160	NO, NE
2. Industrial Processes	**376.0921**	**NO**	**0.6039**	**0.0033**	**0.8369**	**1.2317**	**7.1580**	**0.4814**
A. Mineral Products	305.5178		0.0017	NO, NE	0.6495	0.2950	0.5779	0.3944
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0148	NO, NE
C. Metal Production	53.5279		0.6022	0.0033	0.1873	0.9367	0.0602	0.0870
D. Other Production	17.0465		NO, NE	NO, NE	NO, NE	NO, NE	6.5051	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**28.2105**			**0.0000**			**9.0515**	
4. Agriculture			**65.8815**	**5.3644**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			58.8935					
B. Manure Management			6.9880	2.7946			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.5698			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-741.7788**	**0.0739**	**0.0019**	**0.0681**	**2.5046**	**NO, NE**	**NO, NE**
A. Forest Land		-1705.1295	0.0010	0.0001	0.0007	0.0237		
B. Cropland		1541.4666	0.0728	0.0019	0.0674	2.4809		
C. Grassland		-578.1160	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**85.5333**	**0.2593**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			79.5359		NO, NE		NO, NE	
B. Wastewater Handling			5.9974	0.2593	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	65.8650		0.0048	0.0021	0.2556	0.1687	0.0901	0.0209
Aviation	65.8650		0.0048	0.0021	0.2556	0.1687	0.0901	0.0209
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	615.3433							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-8: Inventory Year - 1997

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**9380.4981**	**-1328.8314**	**167.1490**	**5.6906**	**39.9567**	**131.5095**	**38.0953**	**33.8937**
1. Energy	**8932.2405**	**NO**	**26.0185**	**0.1547**	**38.8713**	**125.5585**	**22.2158**	**33.3266**
A. Fuel Combustion	8931.1349		2.3511	0.1547	38.8713	125.5585	21.7974	33.3266
1. Energy Industries	5360.3805		0.1057	0.0240	14.6387	1.7337	0.4367	21.4411
2 Manufacturing Industries and Construction	298.6884		0.0113	0.0017	0.8205	0.2406	0.0313	0.9572
3. Transport	1281.9412		0.3706	0.1016	12.3542	90.2265	16.9737	1.4095
4. Other Sectors	1854.6157		1.8593	0.0259	10.6761	33.1438	4.3402	8.5640
5. Other (other works and needs in energy sector	135.5091		0.0042	0.0015	0.3818	0.2139	0.0154	0.9549
B. Fugitive Emissions from Fuels	1.1056		23.6674	0.0000	NO, NE	NO, NE	0.4183	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.1056		23.6674	0.0000	NO, NE	NO, NE	0.4183	NO, NE
2. Industrial Processes	**418.3766**	**NO**	**0.7302**	**0.0041**	**0.9614**	**1.3904**	**6.2921**	**0.5671**
A. Mineral Products	331.5758		0.0006	NO, NE	0.7345	0.2555	0.6921	0.4617
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0044	NO, NE
C. Metal Production	64.8524		0.7296	0.0041	0.2270	1.1349	0.0730	0.1054
D. Other Production	21.9484		NO, NE	NO, NE	NO, NE	NO, NE	5.5226	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**29.8810**			**0.0000**			**9.5875**	
4. Agriculture			**57.5070**	**5.2631**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**0.0000**
A. Enteric Fermentation			51.3233					
B. Manure Management			6.1837	2.5712			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.6919			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1328.8314**	**0.1339**	**0.0035**	**0.1239**	**4.5606**	**NO, NE**	**NO, NE**
A. Forest Land		-2132.2121	0.0003	0.0000	0.0002	0.0072		
B. Cropland		1532.3067	0.1336	0.0035	0.1237	4.5534		
C. Grassland		-728.9260	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**82.7595**	**0.2652**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			76.7563		NO, NE		NO, NE	
B. Wastewater Handling			6.0032	0.2652	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	75.6443		0.0055	0.0024	0.2921	0.1965	0.1020	0.0240
Aviation	75.6443		0.0055	0.0024	0.2921	0.1965	0.1020	0.0240
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	322.4374							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-9: Inventory Year - 1998

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**7759.5498**	**-1159.9929**	**156.8954**	**5.0138**	**32.8847**	**116.0268**	**34.4315**	**26.9145**
1. Energy	**7389.1416**	**NO**	**24.1235**	**0.1374**	**31.9402**	**110.7788**	**19.3845**	**26.4155**
A. Fuel Combustion	7388.0726		1.9733	0.1374	31.9402	110.7788	18.9922	26.4155
1. Energy Industries	4419.9973		0.0888	0.0184	12.0088	1.4414	0.3635	17.0883
2 Manufacturing Industries and Construction	259.1851		0.0091	0.0013	0.7091	0.1905	0.0270	0.8653
3. Transport	1118.4626		0.3158	0.0911	10.7981	76.9210	14.4691	1.2361
4. Other Sectors	1497.9511		1.5573	0.0256	8.1631	32.1244	4.1229	6.7794
5. Other (other works and needs in energy sector	92.4763		0.0023	0.0010	0.2611	0.1016	0.0098	0.4463
B. Fugitive Emissions from Fuels	1.0691		22.1502	0.0000	NO, NE	NO, NE	0.3923	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.0691		22.1502	0.0000	NO, NE	NO, NE	0.3923	NO, NE
2. Industrial Processes	**340.0224**	**NO**	**0.6468**	**0.0036**	**0.8347**	**1.2078**	**5.2976**	**0.4990**
A. Mineral Products	268.5748		0.0005	NO, NE	0.6336	0.2024	0.6434	0.4057
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0036	NO, NE
C. Metal Production	57.4496		0.6463	0.0036	0.2011	1.0054	0.0646	0.0934
D. Other Production	13.9979		NO, NE	NO, NE	NO, NE	NO, NE	4.5859	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**30.3859**			**0.0000**			**9.7495**	
4. Agriculture			**51.8780**	**4.6092**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			46.8051					
B. Manure Management			5.0729	2.2749			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.3344			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1159.9929**	**0.1196**	**0.0032**	**0.1099**	**4.0403**	**NO, NE**	**NO, NE**
A. Forest Land		-2027.8925	0.0031	0.0002	0.0020	0.0714		
B. Cropland		1571.3056	0.1165	0.0030	0.1078	3.9689		
C. Grassland		-703.4060	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**80.1275**	**0.2603**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			74.3283		NO, NE		NO, NE	
B. Wastewater Handling			5.7992	0.2603	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	72.4974		0.0046	0.0023	0.2802	0.1828	0.0919	0.0230
Aviation	72.4974		0.0046	0.0023	0.2802	0.1828	0.0919	0.0230
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	409.1761							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-10: Inventory Year - 1999

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**6008.4787**	**-1314.1772**	**159.5257**	**4.7325**	**23.7914**	**79.5244**	**25.6009**	**13.9877**
1. Energy	**5655.7435**	**NO**	**23.8628**	**0.0899**	**22.9060**	**74.5434**	**12.7405**	**13.5331**
A. Fuel Combustion	5654.7210		1.7650	0.0899	22.9060	74.5434	12.3455	13.5331
1. Energy Industries	3314.4426		0.0663	0.0082	8.8462	1.1511	0.2882	6.1854
2 Manufacturing Industries and Construction	236.8620		0.0072	0.0010	0.6440	0.1479	0.0230	0.4769
3. Transport	763.1569		0.1863	0.0574	7.2014	45.4970	8.5604	0.8729
4. Other Sectors	1284.0173		1.5018	0.0225	6.0485	27.4683	3.4649	5.6902
5. Other (other works and needs in energy sector	56.2421		0.0033	0.0008	0.1660	0.2791	0.0090	0.3077
B. Fugitive Emissions from Fuels	1.0225		22.0978	0.0000	NO, NE	NO, NE	0.3950	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.0225		22.0978	0.0000	NO, NE	NO, NE	0.3950	NO, NE
2. Industrial Processes	**322.9788**	**NO**	**0.7167**	**0.0040**	**0.7836**	**1.2400**	**3.3129**	**0.4546**
A. Mineral Products	250.9522		0.0002	NO, NE	0.5607	0.1256	0.5513	0.3511
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0032	NO, NE
C. Metal Production	63.6854		0.7165	0.0040	0.2229	1.1145	0.0716	0.1035
D. Other Production	8.3413		NO, NE	NO, NE	NO, NE	NO, NE	2.6869	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**29.7564**			**0.0000**			**9.5475**	
4. Agriculture			**51.3597**	**4.3854**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			45.8021					
B. Manure Management			5.5576	2.3282			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.0572			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1314.1772**	**0.1106**	**0.0029**	**0.1017**	**3.7409**	**NO, NE**	**NO, NE**
A. Forest Land		-2111.2238	0.0023	0.0001	0.0015	0.0534		
B. Cropland		1593.4246	0.1082	0.0028	0.1002	3.6875		
C. Grassland		-796.3780	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**83.4760**	**0.2502**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			77.9046		NO, NE		NO, NE	
B. Wastewater Handling			5.5714	0.2502	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	72.4938		0.0044	0.0022	0.2641	0.1693	0.0862	0.0213
Aviation	72.4938		0.0044	0.0022	0.2641	0.1693	0.0862	0.0213
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	373.6048							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-11: Inventory Year - 2000

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**5206.6999**	**-1354.2861**	**152.8825**	**4.5795**	**22.0042**	**75.5600**	**26.7160**	**9.8661**
1. Energy	**4870.8284**	**0.0000**	**25.6355**	**0.0924**	**20.9849**	**72.8803**	**12.5882**	**9.3075**
A. Fuel Combustion	4869.8276		1.7121	0.0924	20.9849	72.8803	12.1561	9.3075
1. Energy Industries	2650.8620		0.0511	0.0057	7.0799	0.9510	0.2342	2.5730
2 Manufacturing Industries and Construction	257.7106		0.0074	0.0010	0.6994	0.1627	0.0251	0.4589
3. Transport	824.4456		0.1895	0.0640	8.1773	46.3416	8.7298	1.0309
4. Other Sectors	1085.5561		1.4617	0.0210	4.8791	25.3142	3.1599	5.0210
5. Other (other works and needs in energy sector	51.2533		0.0024	0.0007	0.1492	0.1108	0.0071	0.2237
B. Fugitive Emissions from Fuels	1.0007		23.9235	0.0000	NO, NE	NO, NE	0.4321	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.0007		23.9235	0.0000	NO, NE	NO, NE	0.4321	NO, NE
2. Industrial Processes	**302.8214**	**0.0000**	**0.8175**	**0.0045**	**0.9832**	**1.3494**	**3.5234**	**0.5586**
A. Mineral Products	217.9282		0.0002	NO, NE	0.7290	0.0780	0.9686	0.4405
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0061	NO, NE
C. Metal Production	72.6478		0.8173	0.0045	0.2543	1.2713	0.0817	0.1181
D. Other Production	12.2455		NO, NE	NO, NE	NO, NE	NO, NE	2.4670	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**33.0501**			**0.0000**			**10.6043**	
4. Agriculture			**47.6478**	**4.2309**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			43.0030					
B. Manure Management			4.6448	2.1456			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.0854			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1354.2861**	**0.0391**	**0.0010**	**0.0362**	**1.3303**	**NO, NE**	**NO, NE**
A. Forest Land		-2140.3185	0.0001	0.0000	0.0001	0.0019		
B. Cropland		1611.5604	0.0390	0.0010	0.0361	1.3284		
C. Grassland		-825.5280	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**78.7426**	**0.2506**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			73.1627		NO, NE		NO, NE	
B. Wastewater Handling			5.5799	0.2506	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	66.1989		0.0041	0.0021	0.2528	0.1657	0.0818	0.0210
Aviation	66.1989		0.0041	0.0021	0.2528	0.1657	0.0818	0.0210
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	367.8560							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-11: Inventory Year - 2000 (National GHG Inventory of Anthropogenic Emissions of HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC s, (Gg)						PFCs, (Gg)		SF_6 (Gg)
	HFC-23	HFC-134	HFC-134a	HFC-143a	HFC-125	HFC-32	CF_4	C_2F_6	
Total National Emissions and Removals	**NO, NE**	**NO, NE**	**0.00305**	**0.00003**	**0.00004**	**0.00001**	**NO, NE**	**NO, NE**	**NO, NE**
1. Energy									
A. Fuel Combustion									
1. Energy Industries									
2 Manufacturing Industries and Construction									
3. Transport									
4. Other Sectors									
5. Other (other works and needs in energy sector									
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes	**NO, NE**	**NO, NE**	**0.00305**	**0.00003**	**0.00004**	**0.00001**	**NO, NE**	**NO, NE**	**NO, NE**
A. Mineral Products									
B. Chemical Industry									
C. Metal Production	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
D. Other Production									
E. Production of HFCs and SF_6	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
F. Consumption of HFCs and SF_6	NO, NE	NO, NE	0.00305	0.00003	0.00004	0.00001	NO, NE	NO, NE	NO, NE
G. Other									
3. Solvent and Other Product Use									
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. LULUCF									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Lands									
E. Other									
6. Waste									
A. Solid Waste Disposal on Land									
B. Wastewater Handling									
C. Waste Incineration									
D. Other									
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items									
International Bunkers									
Aviation									
Marine									
CO_2 emissions from Biomass									

Abbreviations: NE –Not Estimated; NO –Not Occurring

Annex 1-12: Inventory Year - 2001

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**6415.1877**	**-1390.0293**	**144.1815**	**4.4453**	**25.3798**	**78.9760**	**28.2556**	**9.4254**
1. Energy	**6074.5528**	**NO**	**25.3272**	**0.1079**	**24.3746**	**75.6838**	**13.2321**	**8.8862**
A. Fuel Combustion	6073.5297		1.5601	0.1079	24.3746	75.6838	12.8052	8.8862
1. Energy Industries	3412.9734		0.0658	0.0072	9.1224	1.2689	0.3047	2.3780
2 Manufacturing Industries and Construction	285.4794		0.0094	0.0014	0.7932	0.1685	0.0277	0.6479
3. Transport	897.8487		0.2058	0.0783	9.2534	50.3374	9.4886	1.1639
4. Other Sectors	1414.2708		1.2760	0.0202	5.0166	23.7341	2.9750	4.4348
5. Other (other works and needs in energy sector	62.9575		0.0031	0.0009	0.1890	0.1749	0.0091	0.2616
B. Fugitive Emissions from Fuels	1.0231		23.7671	0.0000	NO, NE	NO, NE	0.4269	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.0231		23.7671	0.0000	NO, NE	NO, NE	0.4269	NO, NE
2. Industrial Processes	**305.9360**	**NO**	**0.8706**	**0.0048**	**0.9532**	**1.3828**	**3.8902**	**0.5391**
A. Mineral Products	211.1638		0.0002	NO, NE	0.6824	0.0288	0.9063	0.4134
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0099	NO, NE
C. Metal Production	77.3706		0.8704	0.0048	0.2708	1.3540	0.0870	0.1257
D. Other Production	17.4015		NO, NE	NO, NE	NO, NE	NO, NE	2.8869	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**34.6990**			**0.0000**			**11.1334**	
4. Agriculture			**45.4266**	**4.0710**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			41.5412					
B. Manure Management			3.8854	1.8860			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.1850			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1390.0293**	**0.0578**	**0.0017**	**0.0520**	**1.9094**	**NO, NE**	**NO, NE**
A. Forest Land		-2195.4199	0.0053	0.0003	0.0034	0.1208		
B. Cropland		1649.5012	0.0525	0.0014	0.0486	1.7887		
C. Grassland		-844.1107	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**72.4993**	**0.2598**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			66.8245		NO, NE		NO, NE	
B. Wastewater Handling			5.6748	0.2598	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	58.1538		0.0032	0.0019	0.1997	0.1447	0.0683	0.0177
Aviation	58.1538		0.0032	0.0019	0.1997	0.1447	0.0683	0.0177
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	353.0871							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-12: Inventory Year - 2001 (National GHG Inventory of Anthropogenic Emissions of HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC s, (Gg)						PFCs, (Gg)		SF_6 (Gg)
	HFC-23	HFC-134	HFC-143a	HFC-134a	HFC-125	HFC-32	CF_4	C_2F_6	
Total National Emissions and Removals	**NO, NE**	**NO, NE**	**0.00005**	**0.00389**	**0.00006**	**0.00001**	**NO, NE**	**NO, NE**	**NO, NE**
1. Energy									
A. Fuel Combustion									
1. Energy Industries									
2 Manufacturing Industries and Construction									
3. Transport									
4. Other Sectors									
5. Other (other works and needs in energy sector									
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes	**NO, NE**	**NO, NE**	**0.00005**	**0.00389**	**0.00006**	**0.00001**	**NO, NE**	**NO, NE**	**NO, NE**
A. Mineral Products									
B. Chemical Industry									
C. Metal Production	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
D. Other Production									
E. Production of HFCs and SF_6	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
F. Consumption of HFCs and SF_6	NO, NE	NO, NE	0.00005	0.00389	0.00006	0.00001	NO, NE	NO, NE	NO, NE
G. Other									
3. Solvent and Other Product Use									
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. LULUCF									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Lands									
E. Other									
6. Waste									
A. Solid Waste Disposal on Land									
B. Wastewater Handling									
C. Waste Incineration									
D. Other									
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items									
International Bunkers									
Aviation									
Marine									
CO_2 emissions from Biomass									

Abbreviations: NE –Not Estimated; NO –Not Occurring

Annex 1-13: Inventory Year - 2002

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**6484.9806**	**-1232.2750**	**144.3642**	**4.6540**	**27.1859**	**95.1302**	**33.9985**	**10.4569**
1. Energy	**6118.1710**	**NO**	**27.7102**	**0.1234**	**26.2110**	**93.9662**	**16.4128**	**9.9173**
A. Fuel Combustion	6117.1614		1.9376	0.1234	26.2110	93.9662	15.9456	9.9173
1. Energy Industries	3045.5982		0.0601	0.0067	8.1521	1.1945	0.2750	1.9609
2 Manufacturing Industries and Construction	284.5227		0.0077	0.0010	0.7716	0.1809	0.0277	0.3329
3. Transport	1124.1042		0.2642	0.0913	11.3034	64.5591	12.1688	1.4196
4. Other Sectors	1598.7738		1.6018	0.0235	5.7931	27.8599	3.4641	5.7988
5. Other (other works and needs in energy sector	64.1625		0.0039	0.0009	0.1907	0.1717	0.0101	0.4051
B. Fugitive Emissions from Fuels	1.0096		25.7726	0.0000	NO, NE	NO, NE	0.4672	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.0096		25.7726	0.0000	NO, NE	NO, NE	0.4672	NO, NE
2. Industrial Processes	**326.0406**	**NO**	**0.4621**	**0.0026**	**0.9643**	**0.7764**	**4.5048**	**0.5396**
A. Mineral Products	268.0506		0.0002	NO, NE	0.8206	0.0579	1.0527	0.4729
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0085	NO, NE
C. Metal Production	41.0598		0.4619	0.0026	0.1437	0.7185	0.0462	0.0667
D. Other Production	16.9302		NO, NE	NO, NE	NO, NE	NO, NE	3.3974	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**40.7690**			**0.0000**			**13.0810**	
4. Agriculture			**47.3090**	**4.2594**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			43.4618					
B. Manure Management			3.8472	1.9553			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.3041			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1232.2750**	**0.0123**	**0.0004**	**0.0106**	**0.3876**	**NO, NE**	**NO, NE**
A. Forest Land		-2134.8652	0.0028	0.0002	0.0018	0.0648		
B. Cropland		1683.0621	0.0095	0.0002	0.0088	0.3228		
C. Grassland		-780.4720	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**68.8706**	**0.2682**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			63.1911		NO, NE		NO, NE	
B. Wastewater Handling			5.6795	0.2682	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	58.6473		0.0030	0.0019	0.2072	0.1443	0.0661	0.0186
Aviation	58.6473		0.0030	0.0019	0.2072	0.1443	0.0661	0.0186
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	389.5020							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-13: Inventory Year - 2002 (National GHG Inventory of Anthropogenic Emissions of HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC s, (Gg)						PFCs,(Gg)		SF_6 (Gg)
	HFC-23	HFC-134	HFC-143a	HFC-125	HFC-134a	HFC-32	CF_4	C_2F_6	
Total National Emissions and Removals	**NO, NE**	**NO, NE**	**0.00008**	**0.00009**	**0.00536**	**0.00002**	**NO, NE**	**NO, NE**	**NO, NE**
1. Energy									
A. Fuel Combustion									
1. Energy Industries									
2 Manufacturing Industries and Construction									
3. Transport									
4. Other Sectors									
5. Other (other works and needs in energy sector									
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes	**NO, NE**	**NO, NE**	**0.00008**	**0.00009**	**0.00536**	**0.00002**	**NO, NE**	**NO, NE**	**NO, NE**
A. Mineral Products									
B. Chemical Industry									
C. Metal Production	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
D. Other Production									
E. Production of HFCs and SF_6	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
F. Consumption of HFCs and SF_6	NO, NE	NO, NE	0.00008	0.00009	0.00536	0.00002	NO, NE	NO, NE	NO, NE
G. Other									
3. Solvent and Other Product Use									
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. LULUCF									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Lands									
E. Other									
6. Waste									
A. Solid Waste Disposal on Land									
B. Wastewater Handling									
C. Waste Incineration									
D. Other									
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items									
International Bunkers									
Aviation									
Marine									
CO_2 emissions from Biomass									

Abbreviations: NE –Not Estimated; NO –Not Occurring

Annex 1-14: Inventory Year - 2003

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**7086.3880**	**-1314.0306**	**144.0511**	**4.5458**	**29.9830**	**110.2302**	**36.9111**	**12.9969**
1. Energy	**6664.8414**	**NO**	**29.4339**	**0.1466**	**28.9496**	**108.8955**	**19.0557**	**12.4319**
A. Fuel Combustion	6663.7757		2.1832	0.1466	28.9496	108.8955	18.5301	12.4319
1. Energy Industries	2924.3551		0.0573	0.0063	7.8320	1.1555	0.2648	1.3954
2 Manufacturing Industries and Construction	300.9019		0.0079	0.0010	0.8129	0.1999	0.0288	0.4528
3. Transport	1410.1533		0.3164	0.1128	14.2763	77.3296	14.5979	1.8777
4. Other Sectors	1911.0517		1.7990	0.0253	5.7075	30.0633	3.6270	7.6583
5. Other (other works and needs in energy sector	117.3137		0.0026	0.0012	0.3209	0.1472	0.0117	1.0477
B. Fugitive Emissions from Fuels	1.0657		27.2507	0.0000	NO, NE	NO, NE	0.5255	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.0657		27.2507	0.0000	NO, NE	NO, NE	0.5255	NO, NE
2. Industrial Processes	**379.8911**	**NO**	**0.7977**	**0.0044**	**1.0312**	**1.2597**	**4.4900**	**0.5650**
A. Mineral Products	287.2761		0.0002	NO, NE	0.7831	0.0191	0.9513	0.4498
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0102	NO, NE
C. Metal Production	70.8912		0.7975	0.0044	0.2481	1.2406	0.0798	0.1152
D. Other Production	21.7239		NO, NE	NO, NE	NO, NE	NO, NE	3.4488	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**41.6555**			**0.0000**			**13.3654**	
4. Agriculture			**46.4539**	**4.1213**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			42.5780					
B. Manure Management			3.8759	2.0237			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.0976			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1314.0306**	**0.0032**	**0.0002**	**0.0021**	**0.0750**	**NO, NE**	**NO, NE**
A. Forest Land		-2135.8765	0.0031	0.0002	0.0020	0.0710		
B. Cropland		1689.9220	0.0001	0.0000	0.0001	0.0041		
C. Grassland		-868.0760	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**67.3623**	**0.2733**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			61.6285		NO, NE		NO, NE	
B. Wastewater Handling			5.7338	0.2733	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	70.0426		0.0024	0.0023	0.2336	0.1555	0.0725	0.0222
Aviation	70.0426		0.0024	0.0023	0.2336	0.1555	0.0725	0.0222
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	359.7899							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-14: Inventory Year - 2003 (National GHG Inventory of Anthropogenic Emissions of HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC s, (Gg)						PFCs, (Gg)		SF_6 (Gg)
	HFC-23	HFC-134	HFC-143a	HFC-134a	HFC-125	HFC-32	CF_4	C_2F_6	
Total National Emissions and Removals	**NO, NE**	**NO, NE**	**0.00012**	**0.00711**	**0.00011**	**0.00002**	**NO, NE**	**NO, NE**	**0.0000002**
1. Energy									
A. Fuel Combustion									
1. Energy Industries									
2 Manufacturing Industries and Construction									
3. Transport									
4. Other Sectors									
5. Other (other works and needs in energy sector									
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes	**NO, NE**	**NO, NE**	**0.00012**	**0.00711**	**0.00011**	**0.00002**	**NO, NE**	**NO, NE**	**0.0000002**
A. Mineral Products									
B. Chemical Industry									
C. Metal Production	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
D. Other Production									
E. Production of HFCs and SF_6	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
F. Consumption of HFCs and SF_6	NO, NE	NO, NE	0.00012	0.00711	0.00011	0.00002	0.0000	0.0000	0.0000002
G. Other									
3. Solvent and Other Product Use									
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. LULUCF									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Lands									
E. Other									
6. Waste									
A. Solid Waste Disposal on Land									
B. Wastewater Handling									
C. Waste Incineration									
D. Other									
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items									
International Bunkers									
Aviation									
Marine									
CO_2 emissions from Biomass									

Abbreviations: NE –Not Estimated; NO –Not Occurring

Annex 1-15: Inventory Year - 2004

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**7283.9604**	**-1319.4200**	**141.0560**	**4.5863**	**31.1675**	**112.6899**	**40.9736**	**11.1841**
1. Energy	**6790.7099**	**NO**	**31.2109**	**0.1439**	**30.0491**	**110.9883**	**20.3923**	**10.5421**
A. Fuel Combustion	6788.9057		1.8907	0.1439	30.0491	110.9883	19.2951	10.5421
1. Energy Industries	2940.9450		0.0592	0.0066	7.8839	1.2213	0.2693	1.3138
2 Manufacturing Industries and Construction	319.2672		0.0087	0.0011	0.8625	0.2500	0.0308	0.5484
3. Transport	1578.2557		0.3838	0.1138	15.7369	84.6959	15.9993	2.1080
4. Other Sectors	1827.8676		1.4364	0.0212	5.2373	24.6065	2.9835	6.3854
5. Other (other works and needs in energy sector	122.5701		0.0026	0.0012	0.3285	0.2146	0.0121	0.1865
B. Fugitive Emissions from Fuels	1.8042		29.3202	0.0000	NO, NE	NO, NE	1.0973	NO, NE
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.8042		29.3202	0.0000	NO, NE	NO, NE	1.0973	NO, NE
2. Industrial Processes	**445.4484**	**NO**	**0.9121**	**0.0051**	**1.1110**	**1.4368**	**5.2437**	**0.6420**
A. Mineral Products	327.8973		0.0002	NO, NE	0.8274	0.0183	0.9527	0.5103
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0106	NO, NE
C. Metal Production	81.0531		0.9118	0.0051	0.2837	1.4184	0.0912	0.1317
D. Other Production	36.4980		NO, NE	NO, NE	NO, NE	NO, NE	4.1892	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**47.8021**			**0.0001**			**15.3376**	
4. Agriculture			**43.7569**	**4.1672**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			40.1884					
B. Manure Management			3.5686	1.9059			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.2613			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1319.4200**	**0.0105**	**0.0005**	**0.0074**	**0.2649**	**NO, NE**	**NO, NE**
A. Forest Land		-2183.7322	0.0082	0.0005	0.0052	0.1864		
B. Cropland		1691.4682	0.0023	0.0001	0.0021	0.0785		
C. Grassland		-827.1560	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**65.1656**	**0.2696**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			59.7384		NO, NE		NO, NE	
B. Wastewater Handling			5.4272	0.2696	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	67.2294		0.0018	0.0022	0.2272	0.1469	0.0639	0.0213
Aviation	67.2294		0.0018	0.0022	0.2272	0.1469	0.0639	0.0213
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	296.5059							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-15: Inventory Year - 2004 (National GHG Inventory of Anthropogenic Emissions of HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC s, (Gg)						PFCs, (Gg)		SF_6 (Gg)
	HFC-23	HFC-134	HFC-143a	HFC-134a	HFC-125	HFC-32	CF_4	C_2F_6	
Total National Emissions and Removals	**NO, NE**	**NO, NE**	**0.00012**	**0.00942**	**0.00012**	**0.00003**	**NO, NE**	**NO, NE**	**0.00001**
1. Energy									
A. Fuel Combustion									
1. Energy Industries									
2 Manufacturing Industries and Construction									
3. Transport									
4. Other Sectors									
5. Other (other works and needs in energy sector									
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes	**NO, NE**	**NO, NE**	**0.00012**	**0.00942**	**0.00012**	**0.00003**	**NO, NE**	**NO, NE**	**0.00001**
A. Mineral Products									
B. Chemical Industry									
C. Metal Production	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
D. Other Production									
E. Production of HFCs and SF_6	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
F. Consumption of HFCs and SF_6	NO, NE	NO, NE	0.00012	0.00942	0.00012	0.00003	0.0000	0.0000	0.00001
G. Other									
3. Solvent and Other Product Use									
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. LULUCF									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Lands									
E. Other									
6. Waste									
A. Solid Waste Disposal on Land									
B. Wastewater Handling									
C. Waste Incineration									
D. Other									
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items									
International Bunkers									
Aviation									
Marine									
CO_2 emissions from Biomass									

Abbreviations: NE –Not Estimated; NO –Not Occurring

Annex 1-16: Inventory Year - 2005

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	CO_2 emissions (Gg)	CO_2 removals (Gg)	CH_4 (Gg)	N_2O (Gg)	NO_x (Gg)	CO (Gg)	NMVOC (Gg)	SO_x (Gg)
Total National Emissions and Removals	**7576.5774**	**-1381.4077**	**137.3363**	**4.5295**	**31.5802**	**115.2218**	**42.2495**	**11.7886**
1. Energy	**6986.1381**	**NO**	**33.0165**	**0.1462**	**30.3018**	**113.3175**	**20.9266**	**11.0858**
A. Fuel Combustion	6984.2572		1.9685	0.1462	30.3009	113.3161	19.7443	11.0710
1. Energy Industries	2986.5715		0.0584	0.0064	7.9998	1.1854	0.2709	1.1564
2 Manufacturing Industries and Construction	396.3804		0.0102	0.0013	1.0698	0.2949	0.0381	0.4599
3. Transport	1610.9493		0.3573	0.1163	16.0797	87.3249	16.4945	2.1474
4. Other Sectors	1872.3084		1.5365	0.0211	4.8350	24.3582	2.9300	6.1395
5. Other (other works and needs in energy sector	118.0475		0.0062	0.0011	0.3166	0.1527	0.0108	1.1677
B. Fugitive Emissions from Fuels	1.8809		31.0480	0.0000	0.0010	0.0014	1.1823	0.0148
1. Solid Fuels			NO		NO	NO	NO	NO
2. Oil and Natural Gas	1.8809		31.0480	0.0000	0.0010	0.0014	1.1823	0.0148
2. Industrial Processes	**541.4561**	**NO**	**0.9437**	**0.0052**	**1.2678**	**1.5164**	**5.6063**	**0.7027**
A. Mineral Products	416.8380		0.0003	0.0000	0.9743	0.0490	1.0412	0.5665
B. Chemical Industry	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	0.0110	NO, NE
C. Metal Production	83.8512		0.9433	0.0052	0.2935	1.4674	0.0943	0.1363
D. Other Production	40.7669		NO, NE	NO, NE	NO, NE	NO, NE	4.4599	NO, NE
E. Production of HFCs and SF_6								
F. Consumption of HFCs and SF_6								
G. Other	NO, NE		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
3. Solvent and Other Product Use	**48.9833**			**0.0001**			**15.7166**	
4. Agriculture			**41.1160**	**4.0786**	**NO, NE, IE**	**NO, IE**	**NO, NE, IE**	**NO**
A. Enteric Fermentation			37.7552					
B. Manure Management			3.3608	1.8229			NO, NE	
C. Rice Cultivation			NO				NO	
D. Agricultural Soils				2.2556			NO, NE	
E. Prescribed Burning of Savannas			NO	NO	NO	NO	NO	
F. Field Burning of Agricultural Residues			IE	IE	IE	IE	IE	
G. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	
5. LULUCF		**-1381.4077**	**0.0116**	**0.0003**	**0.0106**	**0.3878**	**NO, NE**	**NO, NE**
A. Forest Land		-2246.2332	0.0008	0.0000	0.0005	0.0178		
B. Cropland		1684.2815	0.0109	0.0003	0.0101	0.3700		
C. Grassland		-819.4560	NE	NE	NE	NE		
D. Wetlands		NE	NE	NE	NE	NE		
E. Settlements		IE	NE	NE	NE	NE		
F. Other Lands		NE	NE	NE	NE	NE		
E. Other		NO, NE	NO, NE	NO, NE	NO, NE	NO, NE		
6. Waste			**62.2486**	**0.2992**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
A. Solid Waste Disposal on Land			56.4860		NO, NE		NO, NE	
B. Wastewater Handling			5.7626	0.2992	NO, NE	NO, NE	NO, NE	
C. Waste Incineration					NO, NE	NO, NE	NO, NE	NO, NE
D. Other			NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items								
International Bunkers	63.9592		0.0010	0.0021	0.2247	0.1331	0.0537	0.0203
Aviation	63.9592		0.0010	0.0021	0.2247	0.1331	0.0537	0.0203
Marine	NO		NO	NO	NO	NO	NO	NO
CO_2 emissions from Biomass	295.0374							

Abbreviations: IE –Included Elsewhere; NE –Not Estimated; NO –Not Occurring

Annex 1-16: Inventory Year - 2005 (National GHG Inventory of Anthropogenic Emissions of HFCs, PFCs and SF_6)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	HFC s, (Gg)						PFCs , (Gg)		SF_6 (Gg)
	HFC-23	HFC-134	HFC-143a	HFC-134a	HFC-125	HFC-32	CF_4	C_2F_6	
Total National Emissions and Removals	**NO, NE**	**NO, NE**	**0.00017**	**0.01354**	**0.00016**	**0.00003**	**NO, NE**	**NO, NE**	**0.00001**
1. Energy									
A. Fuel Combustion									
1. Energy Industries									
2 Manufacturing Industries and Construction									
3. Transport									
4. Other Sectors									
5. Other (other works and needs in energy sector									
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes	**NO, NE**	**NO, NE**	**0.00017**	**0.01354**	**0.00016**	**0.00003**	**NO, NE**	**NO, NE**	**0.00001**
A. Mineral Products									
B. Chemical Industry									
C. Metal Production	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
D. Other Production									
E. Production of HFCs and SF_6	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE	NO, NE
F. Consumption of HFCs and SF_6	NO, NE	NO, NE	0.00017	0.01354	0.00016	0.00003	NO, NE	NO, NE	0.00001
G. Other									
3. Solvent and Other Product Use									
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. LULUCF									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Lands									
E. Other									
6. Waste									
A. Solid Waste Disposal on Land									
B. Wastewater Handling									
C. Waste Incineration									
D. Other									
7. Other	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**	**NO, NE**
Memo Items									
International Bunkers									
Aviation									
Marine									
CO_2 emissions from Biomass									

Abbreviations: NE –Not Estimated; NO –Not Occurring

Annex 2: Sector Action Plans on Mitigation and Adaptation to Climate Change in the Republic of Moldova for the period 2009-2013

Annex 2-1: Electrical and Thermal Power Sector

No	Domain and actions	Time-frame	Responsible institution	Total Cost	Funding Sources / Special Notes
1.	**Sector Policies**				
1.1.	Revision of energy policies by sectors in view of UNFCCC and Kyoto Protocol provisions implementation				
1.1.1.	Implementation of the National Program on renovation and decentralization of heat supply systems in the settlements of the Republic of Moldova	2009-2013	MET, PLA	750 mil. MDL	Funding source: local public authorities budgets, technical assistance, grants, investments, co-financing.
1.1.2.	Development, approval and implementation of the National Program on using renewable energy sources	2009-2013	ASM, MET, AEE	500 mil. MDL	Funding source: government contribution, technical assistance, grants.
1.1.3.	Development, approval and implementation of the Sector Energy Conservation Programs	2009-2013	MET, AEE	50 mil. MDL	Funding source: energy efficiency fund, grants
1.1.4.	Revision of the text of on the Energy Strategy of the Republic of Moldova until 2020, paragraphs 100 and 101, replacing the wording "mini-CHP-s" in item 1.10 of Annex 1, with "mini-power efficient plants"	2009	MET	No financial coverage needed	Mini-CHP-s in the Republic of Moldova are efficient only providing the maximal thermal power use time exceeding 4100 hours, which is currently not the case of the country.
1.1.5.	Divesting the thermal power supply and distribution system of the Termocom JSC from Chisinau to CHP-2, what will allow to produce electrical and thermal power more efficiently, and respectively reduce GHG emissions	2009-2010	MET	No financial coverage needed	
1.1.6.	Applying zone and binomial tariffs in view of countervailing the consumption load curve	2009	ANRE	No financial coverage needed	This measure entails decreased fuel consumption per 1 kWh produced, with respective impact on GHG emissions reduction.
1.1.7.	Starting the procedure of developing, circulation for comments and effecting an executive document (Energy Sector Development Scheme), periodically approved for a period of 4-5 years in view of adequate monitoring and implementation of the Energy Strategy of the Republic of Moldova until year 2020. The executive document shall cover: concrete accomplishable targets; investments needs and sources of funding; the program for targets accomplishment. The executive document shall be based on: detailed surveys, discussions with stakeholders, legally approved implementation decisions	2009	MET	No financial coverage needed	The Energy Sector Development Scheme has to reflect all necessary aspects, for the country to have all necessary capacities to cover the demand, and energy security and price for the power for the short and long term to be reasonable under the current conditions of the country. It will also allow to attract more institutions and qualified expertise to assess the environmental impact of the new targets, as well as propose solutions to overcome the environmental issues.
2.	**Institutional, Legal and Regulatory Framework**				
2.1.	Revision of the institutional framework of the energy sector in view of implementing the UNFCCC and Kyoto Protocol provisions				
2.1.1.	Strengthening of the institutional framework needed for an efficient operation of the electric power market	2009-2013	ANRE	100 thousand MDL	Funding source: technical assistance
2.1.2.	Strengthening of the institutional framework needed to put the energy conservation potential into value	2009-2013	MET, AEE	100 thousand MDL	Funding source: technical assistance
2.1.3.	Strengthening of the institutional framework needed to efficiently use the renewable energy sources	2009-2013	AEE, ANRE	100 thousand MDL	Funding source: technical assistance
2.1.4.	Setting -up energy service companies (ESCOs) and carrying out energy auditing of companies and public institutions in view of accomplishing energy efficiency measures	2009-2013	MET, AEE	1 mil. MDL	Funding source: technical assistance
2.1.5.	Setting -up a didactic-scientific and demonstration centre on energy efficiency and renewable energy sources	2009-2010	TUM, MET, AEE	150 thousand MDL	Funding source: technical assistance
2.2.	Revision of the legal and regulatory framework of the energy sector in view of implementing the UNFCCC and Kyoto Protocol provisions				
2.2.1.	Harmonization of the national energy legislation with the Acquis Communautaire	2009-2013	MET, ANRE	200 thousand MDL	Funding source: technical assistance, grants
2.2.2.	Modification of the Law on Energy No. 1525-XIII as of 19.02.1998 and of the Law on Electricity No. 137-XIV as of 17.09.1998 to exclude cross-subsidies	2009	MET, ANRE	No financial coverage needed	This measure contributes to sending correct signals to consumers, adequately stimulating rational use of energy.

No	Domain and actions	Time-frame	Responsible institution	Total Cost	Funding Sources / Special Notes
2.2.3.	Approval of the draft Law on Thermal Energy	2009	MET, TUM, ASM	No financial coverage needed	
2.2.4.	Development and approval the draft Law on Cogeneration	2009-2010	MET, UTM, ASM	No financial coverage needed	The Law on Cogeneration should stipulate: (i) mandatory procurement by the distribution enterprises of the electricity produced by cogeneration; (ii) facilitation of cogeneration equipment import.
2.2.5.	Including in the Law on State Budget and Fiscal Code of the tax exemptions for import of installations used to produce energy from renewable sources	2009-2013	MET, UTM, ASM	No financial coverage needed	These exemptions should facilitate import of such equipment as: heat pumps; biogas production installations; solar water heaters; biomass collection and processing installations, installations to produce brickbats and pellets, etc.
2.2.6.	Modification of the Law no. 1347-XIII as of 09.10.1997 on domestic and industrial waste, by introducing stipulations on use of wastes with energy potential.	2009	MET, UTM, ASM	No financial coverage needed	
2.2.7.	Development and approval of the Regulation of the National Fund for Renewable Energy	2009	MET, AEE	20 thousand MDL	Funding source: technical assistance
2.2.8.	Establishment of the National Fund for Renewable Energy	2009	MET, MF	10 mil. MDL	Funding source: state's contribution
2.2.9.	Development and approval of the Regulation on issuing and use of green certificates	2009	MET, AEE	30 thousand MDL	Funding source: technical assistance
2.2.10.	Development and approval of the Methodology to calculate tariffs for energy produced from renewable sources	2009	ANRE	20 thousand MDL	Funding source: technical assistance
2.2.11.	Development and approval of the Methodology to calculate tariffs for biofuel	2009	ANRE	20 thousand MDL	Funding source: technical assistance
2.2.12.	Development and approval of certain secondary legislation: the regulation on energy audit; the regulation on expertise of energy efficiency projects; methodology to calculate the cost of energy audit; methodology to calculate the cost of the state expertise on energy efficiency	2009-2010	MET, AEE, UTM	75 thousand MDL	Funding source: technical assistance
2.2.13.	Development, approval and implementation of standards, norms and technical regulations: standards, specifications and technical regulations in renewable sources of energy; standards and quality norms for electric and thermal power; consumption standards for home appliances; standards and norms for environment pollution applied in the EU in a energy production; consumption norms for energy resources per unit; energy consumption norms for public buildings; the requirements for mandatory insulation of buildings built before 01.01.1997; construction requirements for industrial and domestic Waste-water treatment plants regarding mandatory installation of equipment to produce biogas	2009-2013	MET, ASM, ANRE, UTM, MENR	200 thousand MDL	Funding source: technical assistance and the state's contribution
2.2.14.	Expanding the taxes for harmful gases emissions on all consumers of fossil fuels with consumption exceeding 10 MJ/day (125 kg c.c./year) per person	2010-2013	MET, MENR, MF	No financial coverage needed	
3.	**International Cooperation and Investment Attraction**				
3.1.	Enhancement of international cooperation and improving the investment climate in view of implementing the UNFCCC and Kyoto Protocol provisions				
3.1.1.	Development of facilities in view of attracting investments to effectively use the renewable energy sources	2009-2013	MF, MET	30 thousand MDL	Funding source: technical assistance and the state's contribution
3.1.2.	Providing the Ministry of Economy and Trade with the best practices of comparative analyses in energy sector, with models of documents needed to develop and carry out the relevant feasibility studies regarding construction of electric power plants, or organising tenders, or expressing interest.	2009-2013	MET, ASM	150 thousand MDL	Funding source: technical assistance MET will seek recommendations regarding the most appropriate types of contracts and funding projects for electric power plants operation. It is expected that these electric power plants will operate in conditions of a protecting regime which implies that the electric power generated at these plants will be procured based on regulated tariffs to allow the investors recover their investments. Using the international experience, the MET will obtain examples of good practice for each type of the electric power plant included in the sources development investment plan.

No	Domain and actions	Time-frame	Responsible institution	Total Cost	Funding Sources / Special Notes
3.1.3.	Launching projects on energy efficiency focused on improving energy security, upgrading of the existent power plants, construction of new power plants and rehabilitation of thermal power networks: - Modernization, re-equipment of the basic equipment of the CHP-1 in Chisinau and increasing electric power generation capacity up to 90 MW; - Modernization, re-equipment of the basic equipment of the CHP-North in Balti and increasing electric power generation capacity up to 100 MW; - Modernization, re-equipment of the basic equipment of the CHP-2 in Chisinau and increasing electric power generation capacity up to 440 MW; - Construction of a new TPP with a total installed capacity of 350 MW in Ungheni; - Modernization of power production and modernization of some thermal plants into electric power plants with thermofication; - Rehabilitation of the main and distribution thermal power networks in Chisinau municipality	2009-2013	MET	350 mil MDL 650 mil MDL 3500 mil MDL 9500 mil MDL 100 mil MDL 350 mil MDL	Funding source: investments, co-financing, grants, technical assistance (including under the Millennium Challenge Account), state's contribution, local public authorities budgets.
3.1.4.	Launching projects on construction of wind farms with a total installed power of 20 MW	2009-2013	Projects beneficiaries	500 mil. MDL	Funding source: private investments
3.1.5.	Launching projects on construction of micro-hydro power plants on inflow on the rivers Dniester, Pruth and Reut	2009-2013	TUM, Projects beneficiaries	50 mil. MDL	Funding source: private investments, local public administration authorities funds.
3.1.6	Launching projects on implementing devices to produce energy from solar radiation	2009-2013	ASM, TUM, Projects beneficiaries	10 mil. MDL	Funding source: private investments, local public authorities funds.
3.17.	Launching projects on setting-up agricultural residues processing plants to produce solid fuels	2009-2013	Projects beneficiaries	450 mil. MDL	Funding source: private investments
3.1.8.	Launching projects on construction of production of biogas from manure	2009-2013	Projects beneficiaries	100 mil. MDL	Funding source: investments, co-financing, grants, local public authorities funds.
3.1.9.	Launching projects on construction of plants for industrial production of bioethanol	2009-2013	MET, ASM, Projects beneficiaries	750 mil. MDL	Funding source: investments, co-financing, grants, technical assistance, local public authorities funds.
3.1.10.	Launching projects on construction of plants for industrial production of biodiesel	2009-2013	MET, ASM, Projects beneficiaries	100 mil. MDL	Funding source: investments, co-financing, grants, technical assistance, local public authorities funds.
3.1.11.	Development of the infrastructure for use of biofuels, including laboratories for biofuels certification, installing equipment to keep account for production and consumption of biofuels	2009-2013	MET, SSM, TA	50 mil. MDL	Funding source: contribution of the state, technical assistance, grants, investments
3.1.12.	Selection of the most efficient projects putting into value the renewable sources of energy and promoting their implementation	2009-2013	ASM, AEE	30 thousand MDL	Funding source: technical assistance
3.1.13.	Feasibility studies regarding the opportunity to implement projects focused on renewable energy use	2009-2013	Projects beneficiaries	30 thousand MDL	Funding source: technical assistance, private funds
3.1.14.	Launching projects on energy conservation in different sectors of national economy	2009-2013	AEE	500 mil. MDL	Funding source: contribution of the state, technical assistance, grants, co-financing, private investments.
4.	**Education and Training**				
4.1.	Organization of training and education activities in view of implementing the UNFCCC and Kyoto Protocol provisions				
4.1.1.	Development of new educational programs for energy engineers and developing of programs on energy awareness, including the impact of the energy sector on the environment	2009-2013	UTM, MET	No financial coverage needed	
4.1.2.	Organization of training and advanced training courses of the staff involved in the activities aimed at efficient use of renewable energy resources	2009-2013	MET, ASM, TUM	500 thousand MDL	Funding source: contribution of the state, technical assistance
4.1.3.	Making familiar and training of local public administration authorities and population on the spirit of efficient use of renewable energy sources and use of the renewable energy	2009-2013	MET, ASM	100 thousand MDL	Funding source: contribution of the state, local public authorities budgets, grants, technical assistance
5.	**Research, Development And Information Systems**				
5.1.	Mobilization of the scientific potential in view of implementing the UNFCCC and Kyoto Protocol provisions				

No	Domain and actions	Time-frame	Responsible institution	Total Cost	Funding Sources / Special Notes
5.1.1.	Identification and assessment of options regarding transformation of the thermal plants into CHP-s; specification of technical characteristics and costs needed to be invested in rehabilitation of the power plants	2009-2010	ASM, UTM, MET	1 mil MDL	Funding source: State Budget and technical assistance
5.1.2.	Review of conditions and development of recommendations on modernization of the technical means of the energy system and its structure in conformity with operation requirements in the unified energy system UCTE, including: developing detailed investment plans for the development of the electric power and thermal power centralized supply sector, identification of preliminary options to finance these plans to ensure sustainability	2009-2010	ASM, TUM, MET	100 thousand MDL	Funding source: State Budget and extra-budgetary means
5.1.3.	Identification and implementation of the theoretic and applicative scientific research works to ensure sustainable development of the energy sector, including: research of the economic impact on agriculture, forestry and human health from emissions generated by local electric power plants, formulation of economic measures aiming at mitigating harmful emissions generated by energy production sources.	2009-2010	ASM	200 thousand MDL	Funding source: state-guaranteed order
5.2.	Improving information management, monitoring and reporting system				
5.2.1.	Development of information systems and applications designed to support the reform processes in the electric and thermal power sector	2009-2013	MET, ANRE	100 thousand MDL	Funding source: State Budget, technical assistance
5.2.2.	Development of an efficient information collecting, monitoring and reporting system for the electric and thermal power sector	2009-2010	MET, ANRE, ASM	100 thousand MDL	Funding source: technical assistance
	Total:			**18,824 million MDL**	

Annex 2-2: Transport Sector

No.	Domain and actions	Time-frame	Responsible Institution	Total Cost	Funding Source
1.	**Sector Policies**				
1.1.	Strengthening of Sector Policies on Rehabilitation of Transports and Road Administration Sector Infrastructure				
1.1.1.	Implementation of the Short Term Roads Rehabilitation Plan	2009-2013	MCTD, S.E ASD	21,181 mil MDL	Funding source: investments, co-financing, grants, technical assistance.
1.1.2.	Implementation of a Short Term Railways Rehabilitation Plan	2009-2013	Moldavian Railways	900 mil MDL	Funding source: technical assistance and contribution of the state
1.1.3.	Implementation of the Short Term Internal Navigable Waterways Rehabilitation Plan and improving the Operation Parameters of Hydro-Technical Installations	2009-2013	Transport Agency	500 mil MDL	Funding source e: technical assistance and contribution of the state
1.1.4.	Implementation of the Short Term Roads Rehabilitation Plan in Urban Areas	2009-2013	LPA	1,000 mil MDL	Funding source: technical assistance, contribution of the state and of local public authorities
1.2.	Strengthening of Sector Policies on Infrastructure Development				
1.2.1.	Development of a Long Term Investment Plan on Roads Infrastructure Development and assessment of the Funding Schemes for New Investments in Roads Sector	2009-2013	MCTD, S.E ASD	No financial coverage needed	
1.2.2.	Development of a Long Term Investment Plan on Railways Infrastructure Development and assessment of the Funding Schemes for New Investments in Railways Sector	2009-2013	SE CFM	No financial coverage needed	
1.2.3.	Development of a Long Term Investment Plan on Navigation Waterways Infrastructure Development and Assessment of the Funding Schemes for New Investments in Navigation Waterways Sector	2009-2013	TA	No financial coverage needed	
1.2.4.	Development of a Long Term Funding Plan on Urban Transport Infrastructure	2009-2013	LPA	No financial coverage needed	

No.	Domain and actions	Time-frame	Responsible Institution	Total Cost	Funding Source
2.	**Institutional, Legal and Regulatory Framework**				
2.1.	Revision of Institutional, Legal and Regulatory Framework in Transport Sector				
2.1.1.	Modification of the Law on the Roads Fund No. 720-XII as of 02.02.1996 and the Fiscal Code No. 1163 as of 24.04.1997 in view of assuring a stable funding framework of the process of roads rehabilitation and roads fund reform	2009	MCTD, MF, Transport Agency	No financial coverage needed	
2.1.2.	Modification of the Fiscal Code and of the State Budget Law to promote the market and economic instruments that would stimulate use of alternative types of fuel and vehicles, as well as efficient passenger and goods freight systems, such as: fiscal initiatives and subsidies for use of alternative, less polluting types of fuel and vehicles (hybrid vehicles, vehicles on hydrogen, biofuel, liquefied and compressed gases, use of "fuel cell" technology, etc.); differentiated taxes initiatives for efficient vehicles use; initiatives focused on implementing efficient passenger and goods freight systems; increase of fuel taxes	2009 - 2013	Ministry of Finance, Transport Agency	No financial coverage needed	
2.1.3.	Implementing institutional arrangements to provide a stable framework for rehabilitation, maintenance and continuous development of the infrastructure and integration into the European transport networks	2009-2013	MCTD, Transport Agency, S.E ASD	26 mil. MDL	Funding source: technical assistance and contribution of the state
2.1.4.	Internal organizational division of the S.E. "Moldavian Railways" into three units (infrastructure, freight transport and passenger transport)	2009-2010	TA, Moldavian Railways	500 mil MDL	Funding source: technical assistance and contribution of the state
2.1.5.	Implementing the roads maintenance system reform, inclusive through: re-classification of the roads network; expanding the contract based roads maintenance; development of the roads maintenance enterprises capacity building program; reducing the number of roads maintenance enterprises by merger	2009-2013	MCTD, S.E ASD	1.5 mil. MDL	Funding source: technical assistance and contribution of the state
2.1.6.	Searching the internal navigable waterways and drafting pilot maps indicating all navigation signs in compliance with the European navigation rules and implementation of modern systems of waterway navigation and traffic management	2009-2013	Transport Agency	1.5 mil. MDL	Funding source: technical assistance and contribution of the state
2.1.7.	Assuring security of navigation on internal navigable waterways, including ecological security, through development of a navigation security management system in navigation transport; regulation and coordination of control and supervision functions of the state bodies to enhance efficiency in conditions of non-interference of such bodies in the companies activity.	2009-2013	Transport Agency	1 mil. MDL	Funding source: technical assistance and contribution of the state
2.1.8.	Development of the interaction between the navigation transport and other types of transport, by implementing new logistical schemes and transportation process organization technologies, intermodal transportations in the first place e	2009-2013	Transport Agency	No financial coverage needed	
2.1.9.	Providing support to municipal authorities in seeking technical assistance for developing key projects (detouring road for Chisinau municipality, comprehensive study of urban transport, etc.), which would facilitate funding of such activities .	2009-2013	MCTD, MF, Transport Agency	20 mil. MDL	Funding source: technical assistance, contribution of the state and of local public administrations
2.1.10.	Development of a framework allowing to address and find solutions for the needs that exceed the possibilities of each town, including through setting up of a commission to coordinate the urban transport related issues, comprising representatives of the Government and public authorities, with participation of other stakeholders (transport companies, users, etc.)	2009-2010	MCTD, Transport Agency, PLA	No financial coverage needed	
2.1.11.	Adopting some measures to upgrade the level of security and technical regulations regarding passenger public transport means	2009-2010	Transport Agency	No financial coverage needed	
3.	**International Cooperation and Investments Attraction**				
3.1.	Intensification of International Cooperation and Improving the Investment Climate				
3.1.1.	Providing the MCTD and Transport Agency with the best comparative analysis practices in the transport sector, models of the documents needed to carry out feasibility studies on roads, railways and navigable waterways infrastructure development	2009-2013	MCTD, Transport Agency, Moldavian Railways	200 thousand MDL	Funding source: technical assistance

No.	Domain and actions	Time-frame	Responsible Institution	Total Cost	Funding Source
3.1.2.	Launching investment projects focused on rehabilitation of roads, railways and internal navigable waterways networks, including from external funding sources: the European Union –financial assistance through grants under the New Good Neighbourhood Policy; development grants from the US Government through the Millennium Challenge Corporation; World Bank – funding through credits with low interest rate; European Bank for Reconstruction and Development– loans for infrastructure development	2009-2013	MCTD	1,500 mil MDL	Funding source: investments, co-financing, grants, technical assistance.
	Total:			**25,632 million MDL**	

Annex 2-3: Gas and Oil Products Supply Sector

No.	Domain and actions	Time-frame	Responsible Institution	Total Costs	Funding Source
1.	**Sector Policies**				
1.1.	Revision of Sector Policies in the Gas and Oil Products Supply Sector				
1.1.1.	Updating and Monitoring the National Gasification Program of the Republic of Moldova	2009-2010	MET, JSC Moldovagaz	No financial coverage needed	
1.1.2.	Identification of new sources and alternative ways to supply natural gases	2009-2013	MET, JSC Moldovagaz	No financial coverage needed	
2.	**Regulatory Framework of the Sector**				
2.1.	Development of the regulatory framework for the gas and oil products supply sector				
2.2.1.	Development of the concept for the gas and oil products supply sector development	2009-2013	MET, SSM	100 thousand MDL	Funding source: technical assistance and contribution of the state
3.	**International Cooperation and Investments Attraction**				
3.1.	Intensification of international cooperation and investments climate improvement				
3.1.1.	Development of a framework facilitating investments for the total gasification of the country	2009-2013	MF, MET	30 thousand MDL	Funding source: technical assistance and contribution of the state
3.1.2.	Finalization of construction of the main gas pipeline Balti -Ungheni, with a total length of 126 km and natural gas transportation capacity of 3 mil. m^3/day or 1 billion m^3/year , what will allow to gasify 250 settlements in Sangerei, Falesti, Telenesti and Ungheni districts	2009	MET, JSC Moldovagaz	250 mil. MDL	Funding source: contribution of the state and support of the international financial institutions
3.1.3.	Sustainable extension of the natural gas distribution network and assuring complete gasification of the country	2009-2013	MET, JSC Moldovagaz	1500 mil MDL	Funding source: contribution of the state and local public authorities budgets, beneficiaries
3.1.4.	Selection of the most efficient projects allowing to mitigate fugitive emissions generated from the natural gas and oil products supply sector and promotion of such projects implementation	2009-2013	MET, JSC Moldovagaz	30 thousand MDL	Funding source: technical assistance
3.1.5.	Carrying out feasibility studies regarding the opportunity to implement projects focused on reduction of fugitive emissions from gas and oil products supply sector	2009-2013	MET, JSC Moldovagaz	100 thousand MDL	Funding source: technical assistance, grants
3.1.6.	Estimating technical possibilities to install slow type turbo-installations to produce electric power by using the energy of the super-pressure of the gas extracted from the high pressure main gas pipelines	2009-2013	JSC Moldovagaz	10 mil. MDL	Funding source: budget of the Moldovagaz JSC, technical assistance
3.1.7.	Launching the projects focused on of fugitive emissions from gas and oil products supply sector	2009-2013	MET, JSC Moldovagaz	200 mil. MDL	Funding source: contribution of the state, technical assistance, grants, co-financing, private investments.
4.	**Research, Development and Information Systems**				
4.1.	Mobilization of the scientific potential in view of implementing the UNFCCC and Kyoto Protocol provisions				
4.1.1.	Prospecting and exploitation of the local natural gas and oil deposits	2009-2013	MENR, MEC	150 mil. MDL	Funding source: private investments through concessions

4.1.2.	Research of geological structures and identifying the chances for having the underground natural gas and oil deposits on the territory of the Republic of Moldova	2009-2013	AGeoM, ASM, MENR	100 mil. MDL	Funding source: contribution of the state
4.2.	Improving the information management, monitoring and reporting system				
4.2.1.	Setting up an efficient information collection, monitoring and reporting system for the natural gas and oil supply sub-sector	2009-2010	ANRE, MET, JSC Moldova-gaz	100 thousand MDL	Funding source: technical assistance
4.2.2.	Monitoring and maintenance of natural gas accounting systems at high level, in conformity with the European precision standards and requirements, at the borders of the country, on the transit pipelines and inter-systemic connections	2009-2013	JSC Moldova-gaz	55 mil. MDL	Funding source: budget of the JSC Moldovagaz
4.2.3.	Providing the main transit gas pipelines with systems to diagnose the pipelines condition, and surface diagnostic complex systems	2009-2010	JSC Moldova-gaz	20 mil. MDL	Funding source: budget of the JSC. Moldovagaz
4.2.4.	Carrying out the auditing of the technical condition of the main gas pipelines	2009-2010	Independent company	15 mil. MDL	Funding source: technical assistance
	Total:			**2,300 million MDL**	

Annex 2-4: Industry Sector

No	Domain and actions	Time-frame	Responsible institution	Total Cost	Funding source
1.	**Sector Policies**				
1.1.	Strengthening of Sector Policies in Industry Sector				
1.1.1.	Development of priority industry branches development programs	2009-2013	MET	No financial coverage needed	
1.1.2.	Development and implementation of sectoral energy conservation programs	2009-2013	MET	No financial coverage needed	
1.1.3.	Promoting aggressive Technology Transfer and Innovation Policies and commercial demonstration of advanced technologies, including clean technologies through the newly created industrial parks	2009-2013	MET, ASM	No financial coverage needed	
1.2.	Widening of the Industrial Sector Structural Reform				
1.2.1.	Speeding up the de-nationalization of enterprises through investment tenders and auctions	2009-2010	MET, MF	No financial coverage needed	
1.2.2.	Revitalization of the industrial enterprises in difficulty and improving their financial condition through a rigorous monitoring of the restructuring plans implementation process	2009-2013	MET, MF	No financial coverage needed	
1.2.3.	Development of a data base with information on the available floor space of the industrial enterprises, and placing it on the MET website in view of developing new manufacturing processes	2009-2013	MET	100 thousand MDL	Funding source: technical assistance, contribution of the state
1.3.	Stimulating and development of entrepreneurial activities				
1.3.1.	Continuous stimulation of the fixed capital investments by provision of tax benefits	2009-2013	MF, MET	No financial coverage needed	
1.3.2.	Development of programs aimed at energy and raw material consumption optimization in view of decreasing the final products costs	2009-2013	MET, companies	No financial coverage needed	
1.3.3.	Setting up marketing centres to provide advisory services, organize seminars to promote the best practices in the area	2009-2013	MET, CCI	No financial coverage needed	

No	Domain and actions	Time-frame	Responsible institution	Total Cost	Funding source
1.3.4.	Carrying out the state expertise of industrial projects (construction, modernization, re-equipment, etc.) in view of sustainable development and environment protection	2009-2013	MENR, companies	No financial coverage needed	
2.	**Institutional, Legal and Regulatory Framework**				
2.1.	Revision of the institutional, legal and regulatory framework in the industry sector				
2.1.1.	Development of a normative framework stimulating the process of the country's industrialization: development and approval of the secondary legislation on setting up, operation and development of industrial and innovation parks; improving the legislative basis in view of increasing the investment attractiveness of the industry sector; undertaking measures to attract external technical assistance to develop legislative and normative basis in industry sector; modification of legislation on free economic zones in view of establishing preferential conditions to attract investments in principally new and clean technologies and production; development and implementation of energy efficiency standards; carrying out of energy auditing of companies and implementation of measures aimed at increasing energy efficiency, setting up and implementation of energy services companies (ESCOS)	2009-2013	MET, AEE, ASM, TUM	100 mil. MDL	Funding source: technical assistance, contribution of the state
2.1.2.	Harmonization of national legislation with the European Directives regarding products conformity declaration by suppliers	2009-2010	MET	No financial coverage needed	
2.1.3.	Cluster development as a mechanism to stimulate economic growth, inclusively through: identification of the existent and potential industrial and innovation clusters; carrying out diagnostic analysis and development of each cluster development programs; development of technical documents and industrial parks as key elements of the selected clusters; modification and supplementing of the national strategies in view of using their potential to stimulate cluster development under the relevant areas of sector strategies	2009-2011	MET	116 mil. MDL	Funding source: technical assistance, grants, contribution of the state
2.1.4.	Attraction of funding from technical assistance provided by the international bodies to accelerate the process of implementing quality and productivity management systems in industry sector	2009-2013	MET	36 mil. MDL	Funding source: technical assistance, grants
2.1.5.	Encouraging implementation of quality management systems and systems assuring safety at industrial enterprises	2009-2011	MET	39 mil. MDL	Funding source: technical assistance, contribution of the state
2.1.4.	Development of technical regulations in industry sector, harmonized with the European legislation	2009-2010	MET	No financial coverage needed	
2.1.5.	Coordination and promotion of actions aimed at development of the information system in technical regulation, quality infrastructure and conformity evaluation	2009-2013	MET	No financial coverage needed	
3.	**International Cooperation and Investment Attraction**				
3.1.	Intensification of International Cooperation and Investment Climate Improvement				
3.1.1.	Providing the MET with the best practices of comparative analysis in industrial sector, models of documents needed to carry out feasibility studies on construction, modernization and re-equipment of the industrial enterprises in the country	2009-2013	MET	200 thousand MDL	Funding source: technical assistance
3.1.2.	Signing and assuring implementation of international collaboration agreements and technical-scientific and production cooperation in industry sector	2009-2013	MEAEI, MET	No financial coverage needed	
3.1.3.	Launching of investment projects in the priority areas of industry focused on modernization and re-equipment of enterprises, including from external funding sources	2009-2013	MET	2000 mil MDL	Funding source: investments, co-financing, grants, technical assistance.
3.1.4.	Financial support and implementation of projects in energy efficiency in industry sector	2009-2013	MET, AEE	300 mil MDL	Funding source: FEE, investments, co-financing, grants, technical assistance, companies funds

No	Domain and actions	Time-frame	Responsible institution	Total Cost	Funding source
4.	**Education, training, research and development**				
4.1.	Organization of training, education, professional development activities				
4.1.1.	Development of new educational programs for engineers and development of the public awareness programs, including programs regarding the environmental impact produced by the industry sector, on specific groups and society as a whole	2009-2013	TUM	No financial coverage needed	
4.1.2.	Continuous modernization of the professional development process, coordination of training and professional development programs with relevant ministries and industrial enterprises	2009-2013	MET, CCI TUM, companies	50 mil. MDL	Funding source: State Budget and extra-budgetary means
4.1.3.	Optimization and development of the secondary professional education and vocational education system, including through: reorganization of eight vocational lyceums; renovation and upgrading of the material and technical base for professional training; development and implementation of flexible curricula for professional training with mixed specialization in secondary professional training and improvement of professional raining programs in secondary speciality education institutions; optimization of specialization in the secondary professional and secondary vocational education institutions; providing opportunities for continuous professional training of the teaching staff in the secondary professional and secondary vocational education	2009-2013	MET	100 mil. MDL	Funding source: SB and extra-budgetary means
4.2.	Mobilization of the scientific potential and encouraging implementation of innovation in practice				
4.2.1.	Identification and implementation of theoretical and applicative scientific research works to ensure sustainable development of the industry sector, inclusive through research and innovation in strategic directions: nano-technologies, industrial engineering, new products and materials; industry optimization through energy conservation measures and reduction of energy intensity per production unit	2009-2013	ASM	500 mil MDL	Funding source: State Budget and extra-budgetary means
4.2.2.	Implementation of technology transfer projects by co-financing of at least 40 percent of competitively selected projects	2009-2013	ASM, companies	100 mil. MDL	Funding source: State Budget and extra-budgetary means
	Total:			**3,341 million MDL**	

Annex 2-5: Agricultural Sector

No	Domain and actions	Timeframe	Responsible Institutions	Total Costs	Funding Sources
1.	**Sector Policies**				
1.1.	Land Consolidation and Improving the Agricultural Lands Management				
1.1.1.	Implementation of the Agricultural Lands Consolidation Program	annually	MAFI, LRCA	340 mil. MDL	Investments (projects, grants)
1.1.2.	Implementation of the Program to Combat Soil Erosion and Use of Low Productive Lands	annually	MAFI, LRCA	350 mil. MDL	Investments (projects, grants)
1.1.3.	Implementation of the New Lands Use and Soil Fertility Enhancement Program	annually	MAFI, LRCA		
1.1.4.	Development and Implementation of Integral Soil Fertility Enhancement and Reproduction System	2009-2011	MAFI	3 mil. MDL	State budget
1.1.5.	Optimization of the Land Resources	2009-2013	MAFI, LRCA	71.7 mil. MDL	State budget, companies funds
1.2.	Plant Growing Sector				
1.2.1.	Updating of the National Horticulture Development Program	2009	MAFI	No financial coverage needed	
1.2.2.	Elaboration of Commercial Crops Development Program	2009	MAFI	No financial coverage needed	
1.2.3.	Elaboration of the Vegetables Development Program	2009	MAFI	No financial coverage needed	

No	Domain and actions	Timeframe	Responsible Institutions	Total Costs	Funding Sources
1.2.4.	Elaboration of the Grain Crops Development Program	2009	MAFI	No financial coverage needed	
1.2.5.	Implementation of the Program on Tobacco Development Sector in 2003-2010	annually	MAFI, Agency Moldova-Tobacco		
1.2.6.	Implementation of the National Nuts Crops Development Program until year 2020	annually	MAFI		
1.2.7.	Organization and Carrying Out of the First General Agricultural Census	2009-2011	NBS, MAFI	93.6 mil. MDL	State budget, projects, grants
1.2.8.	Increasing of the Capacities of the Small and Medium Rural Enterprises to Process High Value Added Agricultural Products	2009-2013	MAFI	29 mil. MDL	State budget, projects, grants, companies funds
1.3.	Animal Breeding Sector				
1.3.1.	Implementation of the National Cows Breeding Program in 2006-2015	annually	MAFI		
1.3.2.	Implementation of the National Swine Breeding Program in 2003-2010	annually	MAFI		
1.3.3.	Implementation of the Poultry Sector Improvement Program in the period 2002-2010	annually	MAFI		
1.3.4.	Maintenance and Improvement of Breeding Animals Genetic Pool (Selection, Reproduction, Breeding and Animal Health)	2009-2013	MAFI	109.4 mil. MDL	State Budget
1.3.5.	Incentivizing Equipment and Re-Equipment of Small and Medium Animal Breeding Farms Outside the Settlements	2009-2013	MAFI	100.9 mil. MDL	Investments (grants, technical assistance), companies funds
1.3.6.	Development of Machinery Services Provision System for Production and Preparation of Fodder	2009-2011	MAFI	200 thousand MDL	State Budget
1.4.	Irrigation Sector				
1.4.1.	Rehabilitation of Irrigation Systems	2009-2013	"Apele Moldovei" Agency	923,9 mil. MDL	Investments (grants, technical assistance), companies funds
1.4.2.	Construction of New Irrigation Systems	2009-2013	"Apele Moldovei" Agency	2600 mil MDL	Investments (grants, technical assistance), companies funds
2.	**Legal, Regulatory and Institutional Framework**				
2.1.	Revision of the Legal Framework of Agricultural Sector				
2.1.1.	Development and approval of the Law on Agricultural Activities (Law on Agriculture)	2009	MAFI	No financial coverage needed	
2.1.2.	Development and approval of the Law on Agricultural Lands Consolidation	2009	MAFI, LRCA	No financial coverage needed	
2.1.3.	Development and approval of the Law on Low Productive Lands	2009	MAFI, LRCA	No financial coverage needed	
2.1.4.	Development and approval of the Law on Agricultural Cadastre	2009	MAFI, LRCA	No financial coverage needed	
2.1.5.	Development and approval of the Law on Setting Up the Risk Fund to Finance Investment Projects	2009	MAFI, MF, MET	No financial coverage needed	
2.1.6.	Development and approval of the Law on Plant Protection And Phytosanitary Quarantine	2009	MAFI, MF	No financial coverage needed	
2.2.	Revision of the Regulatory Framework of the Agricultural Sector				
2.2.1.	Development and approval of the Government Resolution on Re-Organization and Optimization of Scientific and Innovation Activities of the Agricultural Research Institutes	2009	ASM, MAFI	No financial coverage needed	
2.2.2.	Development of the Regulation on the ways to implement the Agricultural Cadastre	2009	MAFI	No financial coverage needed	
2.2.3.	Development of the Regulation on establishing technologies transfer mechanisms and commercialization of the research-innovation activity results in the agriculture sector and food processing industry	2009	ASM, MAFI	No financial coverage needed	
2.2.4.	Development of the Regulation on the Use of Financial Resources from the Agricultural Producers Subsidies Fund	2009	MAFI	No financial coverage needed	
2.2.5.	Continuation of Harmonization of the National Legislation with the EU Standards and Norms Pertaining to Agricultural and Food Products	2009-2013	MAFI	3 mil. MDL	State budget , projects, grands

No	Domain and actions	Timeframe	Responsible Institutions	Total Costs	Funding Sources
2.2.6.	Optimization of the legislative and executive veterinary basis in conformity with the EU standards and norms	2009-2011	MAFI	75.5 mil. MDL	State budget , projects, grands
2.2.7.	Development and implementation of the national standards management system in conformity with the European Union requirements	2009-2011	MAFI	No financial coverage needed	
2.3.	Revision of the Institutional Framework in Agricultural Sector				
2.3.1.	Development of the new regulation and organizational structure of the Ministry of Agriculture and Food Industry based on the results of the functional review made by the Department for Policy Coordination and proposals of the Agricultural Policies Project	2009	MAFI	No financial coverage needed	
2.3.2.	Setting up of the Payment and Intervention Agency in view of enhancing efficiency of the public funds use for the purpose of agricultural sector development	2009	MAFI	32.7 mil. MDL	State budget, projects, grants
2.3.3.	Setting up of the Phyto-Sanitary Agency	2009	MAFI	No financial coverage needed	
2.3.4.	Setting up of Sanitary – Veterinary and Food Safety Agency	2009	MAFI	150 mil. MDL	State budget, projects, grants
2.3.5.	Setting up of a General Agricultural Inspectorate	2009	MAFI	No financial coverage needed	
2.3.6.	Setting up of a State enterprise vested with functions to monitor the lands consolidation process, provide information services to land owners, companies, consider and comment on lands consolidation projects to be developed by private structures, other enterprises, education of the participants in the lands consolidation process	2009	MAFI	10 mil. MDL	State budget
2.3.7.	Development of the system of machinery services provision by establishing technological machines stations to provide machinery services to farmers	annually	MAFI	81 mil. MDL	State budget, projects, grants
2.3.8.	Development of marketing infrastructure in agricultural sector	2009-2013	MAFI	85.3 mil. MDL	State budget, projects, grants
3.	**International Cooperation and Investment Attraction**				
3.1.	Intensification of international cooperation and investment climate improvement				
3.1.1.	Providing the Ministry of Agriculture and Food Industry with the best practices of comparative analysis of results in agricultural and food industry sector, with models of documents needed to carry out feasibility studies on modernization, re-equipment and development of enterprises in agribusiness	2009-2013	MAFI	200 thousand MDL	Funding source: technical assistance
3.1.2.	Signing and assuring implementation of international collaboration and technical-scientific cooperation agreements in agricultural sector	2009-2013	MEAEI, MAFI	No financial coverage needed	
3.1.3.	Launching of investment projects in the priority areas of the agricultural and food industry sector, including from external funding sources (USAID, World Bank, European Investment Bank, European Bank for Reconstruction and Development, EU, etc.)	2009-2013	MAFI	1,000 mil MDL	Funding source: investments, co-financing, grants, technical assistance.
4.	**Education, Training, Research and Development**				
4.1.	Organization of training, education and professional development activities				
4.1.1.	Modernization of higher and secondary special agricultural education	2009-2013	MAFI	398.6 mil. MDL	State budget
4.1.2.	Development of the continuous and advanced training system for professionals in the agricultural and food industry sector and education of rural population	2009-2013	MAFI		
4.1.3.	Improvement of initial training programs in conformity with the European standards for intensive farming activities	2009	MAFI, ASM		
4.2.	Mobilization of the scientific potential and encouragement of implementing innovation in practice				
4.2.1.	Optimization of scientific research activities in the agricultural and food industry sector be delimitation of agricultural property and lands, separation of scientific activity from production activity and sales, as well as establishing contract –based relations with production	2009-2010	MAFI, ASM	50 mil. MDL	State budget
4.2.2.	Correlation of sector related science and innovation priority development directions with branch policies, targeting of financial resources, scientific potential to accelerate the process of development new plant varieties and animal breeds, competitive hybrids for intensive agriculture	2009-2013	MAFI, ASM	No financial coverage needed	
4.2.3.	Development of competitive technologies of cultivation and processing agricultural raw materials with low energy consumption and ecologically safe	2009-2013	ASM	13 mil. MDL	State budget, projects, grants

No	Domain and actions	Timeframe	Responsible Institutions	Total Costs	Funding Sources
4.2.4.	Development of a pilot scientific-technological park of intensive agriculture in Chisinau and of the scientific-technological park of ecological agriculture in Balti	2009-2010	ASM	15 mil. MDL	State budget, projects, grants
4.2.5.	Development, within the relevant research institutes, of innovation and technology transfer structures	2009-2010	MAFI, ASM	No financial coverage needed	
4.2.6.	Development and implementation of the Action Plan to reform the Agricultural Research System	2009-2010	MAFI, ASM		
	Total:			**6,536 million MDL**	

Annex 2-6: Forestry Sector

No	Domain and actions	Timeframe	Responsible Institution	Total Costs	Funding Sources
1.	**Sector Policies**				
1.1.	Revision of Sector Policies				
1.1.1.	Revision of the Forestry Sector Sustainable Development Strategy and of the Action Plan in the Context of Adjustment to New Social-Economic Realities	2009-2013	FA "Moldsilva", MENR, ASM	265 thous. MDL	State budget, projects, grants
1.1.2.	Development of Local Programs on the Use, Conservation And Development of Natural Resources (forests, other types of forest vegetation, grasslands), establishing community level ecological networks taking into account the geographical, pedoecological features, the relief, etc., including in the context of prevention/mitigation of natural hazards	2009-2013	LPA, FA "Moldsilva", MENR, ASM	180 mil MDL	State budget, local public authorities budgets, projects, grants, companies funds
1.1.3.	Development of Plans on Planting Forest Vegetation on Lands Managed by Other Entities than the Forestry Agency "Moldsilva" (70 thousand ha)	2009-2013	FA Moldsilva, ARFC, LPA	No financial coverage needed	
1.1.4.	Development and implementation of projects aimed at planting protection forestry strips: for agricultural lands protection – on 12.1 thousand ha; antierosional – on 28.3 thousand ha; for waters protection – on 14.9 thousand ha	2009-2013	FA "Moldsilva", LRCA, LPA	1,500 mil MDL	State budget, local public authorities budgets, projects, grants, companies funds
1.2.	Applying a single forestry regime in managing the forestry resources and forest vegetation, regardless the ownership				
1.2.1.	Implementing forestry landscaping on the entire territory covered by forestry resources and forest vegetation managed by local public administrations, accounting for all forestry resources	2009-2013	FA "Moldsilva", MENR, LPA	200 mil MDL	State budget, local public authorities budgets, projects, grants, companies funds
1.2.2.	Development of a National Landscaping System, taking into account the concrete conditions of the Republic of Moldova	2009	FA "Moldsilva", MENR, ASM	265 thous. MDL	State budget, projects, grants
1.2.3.	Strengthening of community forests to improve their condition, guarding, protection, regeneration and use, as well as to assure their wider specific poly -functionality	2009-2013	FA "Moldsilva", MENR, LPA	165 mil MDL	State budget, local public authorities budgets, projects, grants, companies funds
1.3.	Conservation and quantitative and qualitative development of forests and other types of vegetation				
1.3.1.	Expanding the areas covered by forests by 7.5 thousand ha annually (prospectively, up to 20 percent of the country's territory) on the account of degraded lands, private owners' lands, etc.	2009-2013	FA "Moldsilva", MENR, LPA	1400 mil MDL	State budget, local public authorities budgets, projects, grants, companies funds
1.3.2.	Expansion of grasslands areas by 3.9 thousand ha annually (prospectively, up to 22 percent of the country's territory) on the account of agricultural lands affected by erosion, slopes higher than 7^0 etc.	2009-2013	MAFI, MENR, LPA	140 mil MDL	State budget, local public authorities budgets, projects, grants, companies funds
1.3.3.	Development and implementation of the national program of ecological reconstruction of the standing stock which does not correspond to stationary conditions, providing for reconstruction of circa 1.9 thousand ha annually	2009-2013	FA "Moldsilva", MENR, ASM	250 mil MDL	State budget, projects, grants
1.3.4.	Planting of 20 thousand ha energy forests to satisfy the needs of population in fuel wood for heating, cooking, etc.	2009-2013	FA "Moldsilva", MENR, LPA	640 mil MDL	State budget, local public authorities budgets, projects, grants, companies funds
1.3.5.	Carrying out surveys to assess the real consumption of wood products, including from illegal logging, development and submitting periodic reports (2009 and 2013) on consumption of wood products	2009-2013	FA "Moldsilva", MENR, LPA, NBS	800 thous. MDL	State budget, projects, grants
2.	**Legal, Regulatory and Institutional Framework**				
2.1.	Revision of the Legal Framework				
2.1.1.	Development of the new version of the Forestry Code (to include some new chapters such as: communal and private sector in forestry; forestry taxes, including taxes for activities leading to fragmentation of the forestry fund through roads construction, marking out electric lines, gas pipelines cross-cutting forests, etc.)	2009	FA "Moldsilva", MENR, MF, MEC	215 thous. MDL	State budget, projects, grants

No	Domain and actions	Timeframe	Responsible Institution	Total Costs	Funding Sources
2.1.2.	Development of a new version of the Environment Protection Law	2009	MENR, ASM, FA "Moldsilva"	No financial coverage needed	
2.1.3.	Hardening the provisions of the Code of Administrative Contraventions and Penal Code regarding protection of forests against destructive actions	2009	FA "Moldsilva", MJ	No financial coverage needed	
2.2.	Revision of Regulatory Framework				
2.2.1.	Revision and development of a new important components of the forestry regulatory basis, as integral parts of the forestry regime, focusing on the following areas: maintenance and conservation of forestry stations; conservation of forestry genetic resources; ecological reconstruction of forests; certification of forests, forest products and management systems	2009-2010	MENR, ASM, FA "Moldsilva"	425 thous. MDL	State budget, projects, grants
2.2.2.	Development of a new version of the Regulation on the manner of keeping the state record of the forestry resources and the state forestry cadastre	2009-2010	MENR, ASM, FA "Moldsilva"	100 thous. MDL	State budget, projects, grants
2.2.3.	Development of a new version of the Regulation on classification of forests by groups, sub-groups and functional categories	2009-2010	MENR, ASM, FA "Moldsilva"	100 thous. MDL	State budget, projects, grants
2.2.4.	Revision of the regulatory framework pertaining to development of an appropriate financial mechanism in conservation and development of forestry resources, by imposing mandatory allocations from some extra-budgetary funds (ecological, roads, etc.) and taxes (ecological tax on import of oil products, for landscaping , etc.) needed for expansion of lands covered with forestry vegetation , etc.	2009-2010	MENR, MF, MEC, FA "Moldsilva"	100 thous. MDL	State budget, projects, grants
2.2.5.	Development and approval of the Regulation on the principles and way of funding the priority forestry activities, on the state's contribution to the priority forestry activities (landscaping, research, regeneration and expansion, guarding and protection of forests)	2009-2013	MENR, MF, MEC, FA "Moldsilva"	100 thous. MDL	State budget, projects, grants
2.2.6.	Development and approval of the Regulation on environmental valences and payment for their beneficiaries (agricultural land owners, treatment facilities, etc.), as well as establishing an economic infrastructure and a wood products market	2009-2013	MENR, MF, MEC, FA "Moldsilva"	265 thous. MDL	State budget, projects, grants
2.2.7.	Development and approval of the Regulation on implementation and assuring functionality of the principles of participatory management of public forest resources	2009-2013	FA "Moldsilva"	100 thous. MDL	State budget, projects, grants
2.2.8.	Development and approval of a Regulation on a wide promotion of forestry-pastoral and agricultural-forestry practices: to unify the efforts of the forestry and animal breeding /pastoral sectors, mitigate social conflicts, etc.	2009-2013	FA "Moldsilva", LPA	100 thous. MDL	State budget, projects, grants
2.2.9.	Approval and implementation by mayors of local regulations pertaining to forest vegetation and grasslands management, including signing agreements between the animal breeders and mayors of contracts for grazing of animals on communal grasslands, which will specify the obligations of the parties in terms of grasslands maintenance	2009-2011	LPA, FA "Moldsilva", MENR	950 thous. MDL	State budget, projects, grants
2.3.	Improvement of the Institutional Framework				
2.3.1.	Adequate adjusting of the new conditions of the central forestry authorities structure, with effects on the capacities to co-work and cooperate with other central authorities, local public administrations of all levels and local communities	2009-2010	FA "Moldsilva"	1.2 mil MDL	State budget, projects, grants
2.3.2.	Establishing by the Forest Research and Management Institute of an agency vested with functions to provide advisory and accounting services to public and private owners of forests and forest vegetation	2009-2010	FA "Moldsilva"	5.6 mil MDL	State budget, projects, grants
2.3.3.	Establishing of regional/local structures (self-financing, in the first place) responsible for organization /management of forests and forest vegetation owned by local public authorities and private owners (communal and inter-communal wood farms), as well as provision of the primary technical and logistical support	2009-2013	FA "Moldsilva", LPA	3.0 mil MDL	State budget, projects, grants
2.3.4.	Primary equipping of the Forestry Agency "Moldsilva" and its territorial structures with modern information technologies	2009-2011	FA "Moldsilva"	1.2 mil MDL	State budget, projects, grants
2.3.5.	Procuring of licensed software for developing mapping materials, data bases for the forestry sector, accounting and economic reports, etc.	2009-2011	FA "Moldsilva"	1.4 mil MDL	State budget, projects, grants
3.	**International Cooperation and Investments Attraction**				
3.1.	Intensification of international cooperation and investment climate improvement				
3.1.1.	Signing and assuring implementation of international collaboration and technical-scientific and production cooperation Agreements in the forestry sector	2009-2013	MEAEI, MAFI	No financial coverage needed	
3.1.2.	Launching of technical assistance projects in the forestry sector, including with the financial support of the international bodies (Global Environment Fund, World Bank, EU, etc.)	2009-2013	MAFI	1,000 mil MDL	Funding source: grants, technical assistance.
4.	**Education, Training, Research and Development**				
4.1.	Organization of training, education and professional development activities				

No	Domain and actions	Timeframe	Responsible Institution	Total Costs	Funding Sources
4.1.1.	Modernization of the forestry educational institutions, including equipping them with modern equipment and technical facilities	2009-2013	FA "Moldsilva", MEY	4.3 mil MDL	State budget
4.1.2.	Organization of training/re-training programs of forestry professionals in information technologies	2009-2013	FA "Moldsilva", MEY, MID	1.4 mil MDL	State budget
4.1.3.	Development and implementation of training programs for owners (the staff involved in management, guarding and protection, in the first place) of communal and private forests and other types of forest vegetation	2009-2013	FA "Moldsilva", LPA, MENR	12.2 mil MDL	State budget, projects, grants
4.1.4.	Publishing of training and information materials on forestry sector	2009-2013	FA "Moldsilva", MENR	3.7mil MDL	State budget, projects, grants
4.1.5.	Strengthening the communication capacity of the state forestry bodies in view of setting up a sustainable social partnership with local communities through local public authorities	2009-2013	FA "Moldsilva", LPA	160 thous. MDL	State budget
4.2.	Mobilization of the scientific potential and encouragement for implementation of innovation in practice				
4.2.1.	Development of methodologies/technologies on assuring adaptability of forest ecosystems to climate change	2009-2010	FA "Moldsilva", MENR, ASM	265 mil MDL	State budget, projects, grants
4.2.2.	Description of the natural forest ecosystems in view of adequate execution of forestry works and assessing the vulnerability degree	2009-2013	FA "Moldsilva", MENR, ASM	265 thous. MDL	State budget, projects, grants
4.2.3.	Development of the general information system for the forestry sector of the Republic of Moldova	2009-2013	FA "Moldsilva", MID	450 thous. MDL	State budget, projects, grants
4.2.4.	Development of a software for forests inventory and forests cadastre development	2009-2013	FA "Moldsilva", MID	1.6 mil MDL	State budget, projects, grants
	Total:			**6,045 million MDL**	

Annex 2-7: Waste Sector

No.	Domain and actions	Timeframe	Responsible Institutions	Total Costs	Funding Sources
1.	**Sector Policies**				
1.1.	Capacity Building in the Waste Sector				
1.1.1.	Development of the Strategy on Environment Protection for the period until 2010-2020, taking into account the provisions of international conventions to which the Republic of Moldova is a part, including the relevant Action Plans and Strategies of the European Union	2009-2010	MENR	100 thousand MDL	Funding source: technical assistance, grants, contribution of the state
1.1.2.	Development of the Waste Management Program, including a chapter with reference to promoting separate collection of municipal solid wastes	2009-2010	MENR	150 thousand MDL	Funding source: technical assistance, grants, contribution of the state
2.	**Legal, Regulatory and Institutional Framework**				
2.1.	Revision of the Institutional Framework in the Waste Sector				
2.1.1.	Building on the administrative capacity of the governmental institutions at all levels (national and local) with competences and responsibilities in applying the environment protection legislation, by establishing relevant sub-divisions under the central and local public administrations	2009-2013	MENR, LPA	No financial coverage needed	
2.1.2.	Encouraging privatisation or concession of waste management related systems, to optimise their activities	2009-2013	MENR, LPA	No financial coverage needed	
2.2.	Revision of the Legal Framework on Waste Management				
2.2.1.	Supplementing the new framework Law on Environment Protection, with provisions on GHG emissions reduction and regulation of the GHG emissions sources, grouped under the following categories: energy, industrial processes, solvents and other products use, agriculture, waste management, land use, land-use change and forestry.	2009-2010	MENR	No financial coverage needed	
2.2.2.	Development of the new framework Law on Waste Management, to include the restriction on reducing by 50 percent of biodegradable waste disposed by 2015, in comparison with the amount of waste disposed in 2000	20010-2011	MENR	100 thousand MDL	Funding source: technical assistance, grants, contribution of the state
2.2.3.	Development of the Complex Scheme of placing the solid waste disposal sites in the settlements of the Republic of Moldova, in conformity with environment protection requirements	2010-2011	MENR, LPA	200 thousand MDL	Funding source: technical assistance, grants, contribution of the state

No.	Domain and actions	Timeframe	Responsible Institutions	Total Costs	Funding Sources
2.2.4.	Improving the statistical accounting in waste management and adopting the List of Wastes, inclusive the hazardous wastes	2009-2013	MENR, NBS	300 thousand MDL	Funding source: technical assistance, grants, contribution of the state
2.3.	Revision of the Regulatory Framework in Waste Management Sector				
2.3.1.	Development of technical requirements on waste disposal, setting up, operation, monitoring and closing down of the waste disposal sites	2009-2013	MENR, LPA	60 thousand MDL	Funding source: technical assistance, grants, contribution of the state
2.3.2.	Developing a Permit System for Waste Disposal Sites Operation	2009-2013	MENR, LPA	20 thousand MDL	Funding source: technical assistance, grants, contribution of the state
2.3.3.	Establishing the procedure of supervision and monitoring of the waste disposal sites after closure, that would also regulate biogas recovery activities	2009-2013	MENR, LPA	30 thousand MDL	Funding source: technical assistance, grants, contribution of the state
3.	**International Cooperation and Investments Attraction**				
3.1.	Intensification of International Cooperation and Investment Climate Improvement				
3.1.1.	Optimization of use of all available funds (National Ecological Fund, Global Environment Facilities, private funds, structural funds, etc.) to improve waste management, including through promotion of separate waste collection activities	2009-2013	MENR, LPA	No financial coverage needed	
3.1.2.	Signing and assuring implementation of international collaboration and technical-scientific and production cooperation Agreements in Waste management sector	2009-2013	MEAEI, MENR	No financial coverage needed	
3.1.3.	Launching of investment projects in the priority areas of the Waste Management Sector, focused on: - modernization, upgrading and construction of new water supply systems in the Republic of Moldova - modernization, upgrading and construction of new sewerage systems in the Republic of Moldova - reconstruction of wastewater treatment plants in the Republic of Moldova - construction of domestic solid waste incineration plants - recovery of methane from the solid waste disposal sites in the country	2009-2013	MENR, LPA	4,480 mil MDL 2,987 mil mDL 2,500 mil MDL 2,700 mil MDL 300 mil MDL	Funding source: State budget, investments, co-financing, grants, companies funds
3.1.4.	Promoting R&D Projects in recovery of methane from the solid waste disposal sites and wastewater treatment plants	2009-2010	MENR, LPA	2 mil MDL	Funding source: grants, companies funds
4.	**Education, Training, Research and Development**				
4.1.	Organization of training, education and professional development activities				
4.1.1.	Development of a new educational program for environmental engineers and development of awareness building programs, including programs regarding the environmental impact produced by the waste management sector, on specific groups and society as a whole.	2009-2013	MEY, TUM	200 thousand MDL	Funding source: state budget, grants
4.1.2.	Continuous modernization of the professional development process, coordination with the relevant ministries and municipal sanitation enterprises of the professional development programs for their staff	2009-2013	MEY, TUM private companies	5 mil MDL	Funding source: state budget, grants
4.1.3.	Organization and implementing public education and awareness programs on separate collection of solid domestic waste to reduce the amount of biodegradable waste disposed	2009-2013	MENR, REC, NGOs	1 mil MDL	Funding source: state budget, grants
4.1.4.	Building public awareness about the need to promote separate collection of solid domestic waste, reduce the amount of biodegradable waste disposed by depositing through organization of seminars, publication of bulletins, advertising posters, etc.	2009-2013	MENR, REC, NGOs	1 mil MDL	Funding source: state budget, grants
4.2.	Mobilization of the scientific potential and encouraging implementation of innovation in practice				
4.2.1.	Development of new solutions to prevent, minimize, recycle, disposal of waste, inclusive of the biodegradable wastes, to reduce GHG emissions.	2009-2013	ASM, MENR	3 mil MDL	Funding source: state budget, investments, co-financing, grants, companies funds
4.2.2.	Development of information systems to collect information on waste management monitoring	2009-2013	MID, MENR	0.5 mil MDL	Funding source: state budget, grants
4.2.3.	Providing ecological services with equipment and software to collect and process data on waste management monitoring and solid waste disposal sites monitoring	2009-2013	MENR	2 mil MDL	Funding source: state budget, grants, technical assistance
	Total:			**12,983 million MDL**	

Annex 2-8: Himan Health

Nr.	Area and actions	Timeline	Responsible Institution	Total Cost	Funding source
1	**Sector policies**				
1.1	Implement the State Program on Developing the Emergency Heath Care Services and ensure funding of the planned actions. Develop adaptation and emergency care measures in case of extreme climate events.	2009-2013	Ministry of Health, Local Public Authorities	30 mil MDL	State Budget, technical assistance, private investments.
1.2	Strengthen the transmissible illnesses control (*including the climate related illnesses : bacillary* dysentery, *scarlet fever,* salmonellas *infections, typhoid fever and paratyphoid fever, diphtheria, cholera, measles, viral hepatitis, epidemic parotiditis, flu and acute respiratory infections, pediculosis, scabies, malaria, ascariasis, tuberculosis, etc.*), in view of enhancing the efficiency of interventions in the transmissible illnesses control, inclusively by expanding and consolidation of monitoring and evaluation system by developing an interventional epidemiologic surveillance information system for infectious and parasitic diseases.	2009-2013	Ministry of Health	464 mil MDL	State Budget, technical assistance, private investments.
1.3	Strengthen the public health by reducing the burden of non-contagious illnesses *(including the climate related illnesses, such as circulatory system diseases: hypertension, atherosclerosis, ischemic cardiopathy, myocardial infarction, heart failure, miocarditis, etc. and respiratory illnesses: pneumonia, bronchitis, asthma, etc.),* inclusively by developing the Strategy on non-contagious diseases control and socio-hygienic monitoring and enhancing behavioral and environmental risk factors control.	2009-2013	Ministry of Health	9.4 mil MDL	State Budget, grants, technical assistance, private investments.
1.4	Develop primary health care and community health care, home and palliative care in view of expanding access of population to quality health services, inclusively by increasing the allocations for the primary health care from the health by up to 30%.	2009-2013	Ministry of Health	20 mil MDL	State Budget, private investments.
1.5	Strengthen the health services for mother and child to reduce infantile and maternal mortality, inclusively through: • Set up and provide equipment for three regional pediatric resuscitation and intensive care units and develop a referral system which would provide for assisted transportation for infants needing resuscitation and intensive care, as well as assure full coverage with vaccines in conformity with the National Immunization Program ; • Strengthening of 10 level I pre-natal care centers, 3 level II centers and one level III centre, along with the requirement to register newborns starting with the weight of 500 grams and pregnancy term of 22 weeks; • assure full coverage with vaccines in conformity with the National Immunization Program; • Research regarding the gap between the life expectancy at birth in men and women and further develop some programs to reduce the gap.	2009-2013	Ministry of Health, Ministry of Social Protection, Family and Child, National Bureau of Statistics	62.8 mil MDL	State Budget, grants, technical assistance, private investments.
2	**Legal, regulatory and institutional framework**				
2.1	Implement the EU and WHO legislation on adaptation of public health to climate change.	2009-2013	Ministry of Health, Ministry of Environment	No financial coverage needed	
2.2	Develop a regulatory framework on provision of community health services, home and palliative care.	2009-2013	Ministry of Health	No financial coverage needed	
2.3	Assure appropriate staffing of health care facilities, in particular in rural areas, inclusively through: • Continuous implementation of the mechanism providing benefits to young medical graduates assigned to their jobs after graduation; • Implementing the mechanism of competitive selection of doctors and pharmacists in public health care.	2009-2013	Ministry of Health	44.5 mil MDL	State Budget, private investments.
2.4	Develop and implement of the health care quality management system to enhance the quality of health services, inclusively through: • Development and dissemination of protocols, guidelines along the different health care levels; • Improving the accreditation system in health care; • Development of institutional mechanisms for non-judiciary settlement of the patients' claims.	2009-2013	Ministry of Health	10.4 mil MDL	State Budget, private investments.
3	**International cooperation and investments attraction**				

Nr.	Area and actions	Timeline	Responsible Institution	Total Cost	Funding source
3.1	Assure international cooperation and investments attraction by upgrading the resource basis of the public health care facilities and continue the restructuring of the hospital infrastructure, provide modern and cost-efficient equipment, implement new treatment technologies and other measures to provide for the ability of the public health to adapt to climate change, inclusively through: • Improving the quality of the primary health care by rehabilitating the inventory basis, inclusively by providing new equipment to health centers in rural areas; • Enhancing the quality of the health care services provided by family doctors by ensuring transportation to health centers and family doctors offices in rural areas; • Enhancing the quality of treatment in hospitals of patients with tuberculosis by rehabilitation of hospital buildings and providing medical equipment to tuberculosis hospitals; • Improving the quality of the secondary health care by rehabilitation and equipping the pilot regional hospitals; • Improving the quality of the emergency health care by providing state of the art equipment in particular to operation rooms, resuscitation and intensive care units and imagistic sections of the public health care facilities; • Enhancing the health care assessment capacities by a phased acquisition of software and information equipment for the Integrated Medical Information System.	2009-2013	Ministry of Health	1569 mil MDL	State Budget, grants, technical assistance, private investments.
3.2	Assure international cooperation and investments attraction to enhance secondary and tertiary health care efficiency by modernization, developing centers of excellence and of a more efficient hospital care model, inclusively through: • Carrying out a feasibility study for the Republican Clinical Hospital and setting up a Diabetes Center ; • Developing a Hospital Restructuring Master Plan; • Setting up a Center of Excellence on the basis of the Republican Clinical Hospital and its rehabilitation; • Carrying out a feasibility study for the Balti Municipal Clinical Hospital; • Setting up a Center of Excellence on the basis of the Balti Municipal Clinical Hospital.	2009-2013	Ministry of Health	252 mil MDL	State Budget, grants, technical assistance, private investments.
4	**Education, training, research and development**				
4.1	University and post-university training in public health adaptation to climate change.	2009-2013	Ministry of Education; Ministry of Health	10 mil MDL	State Budget, technical assistance.
4.2	Improving the policies on staff training in medical and pharmaceutical education in view of enhancing the management of professional training in public health human resources, optimizing the costs and improving the quality of health care services, inclusively through: • Development of the Human Resources Strategy in public health care system; • Improving the students enrollment criteria for medical and pharmaceutical educational institutions; • Phased implementation and improving of distance learning (medical and pharmaceutical education).	2009-2013	Ministry of Education; Ministry of Health	4.4 mil MDL	State Budget, technical assistance
4.3	Improving the quality of medical staff training by modernization of the resource basis of the medical educational institutions	2009-2013	Ministry of Education; Ministry of Health	276 mil MDL	State Budget, grants, technical assistance.
4.4	Training of primary health care managers.	2009-2013	Ministry of Education; Ministry of Health	5.4 mil MDL	State Budget, technical assistance.
4.5	Planning and research on assessing vulnerability and adaptation of public health to climate change.	2009-2013	Ministry of Health, Academy of Science of Moldova	60 mil MDL	State Budget, technical assistance.
4.6	Carry out periodic surveys on public health and impact of the environment (including climate change) on human health.	2009-2013	Ministry of Health; Academy of Science, National Bureau of Statistics	0.5 mil MDL	State Budget, grants, technical assistance.
	Total			**2818.4 mil MDL**	