PROMITHEAS – 4

Armenia

Mapping national procedures, sources, available data and information

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1. General information

1.1. Government structure

The Republic of Armenia (RA) was established on 21 September 1991. The capital of the Republic of Armenia is Yerevan.

According to the Constitution (passed on 5 July 1995), the Republic of Armenia is a self-governing, democratic, social and juridical state.

State power in the Republic of Armenia is exercised on the basis of the principle of separation and balance of legislative, executive and judicial powers.

The head of the state is the President of the Republic. The President is elected by citizens of the Republic of Armenia for a five-year term of office.

The legislative power in the Republic of Armenia is vested in the National Assembly (Parliament). The National Assembly is comprised of 131 deputies, elected for a five-year period.

Election of the President of the Republic, the National Assembly, and local self-governing bodies is carried out by secret voting, on the basis of general, equal and direct election rights.

The executive power of the Republic of Armenia is exercised by the Government whose responsibilities include development and implementation of country's internal policy. The external policy of the Republic of Armenia is developed and implemented jointly by the Government and the President of the Republic.

The Government comprises the Prime-Minister, Vice Prime-Minister and Ministers.

The structure of the Government includes 18 ministries and 7 state management bodies adjunct to the Government, which include services, administrations, committees and the Police.

The Republic of Armenia employs a three-level governing system: centralized state governing, regional (marz) state governing and local (community) self-governing.

The administrative-territorial units of the Republic of Armenia are marzes and communities. The Republic of Armenia consists of 11 marzes, including Yerevan. It has 931 communities, out of which 60 are urban and 871 - rural communities (2006). The biggest communities are: Yerevan (1104.9 thousand people), Gyumri (147.71 thousand people) and Vanadzor (105.2 thousand people).

Since 2 March 1992, the Republic of Armenia is a member to the United Nations Organization, CIS - from 21 December 1991; Council of Europe - from 25 January 2001, WTO - from 5 February 2003.

Since 2008, the Republic of Armenia has established and is maintaining diplomatic relations with 153 states of the world.

State environmental policy on protection and use of natural resources is developed and implemented by the Ministry of Nature Protection of the Republic of Armenia. Among the functions of the Ministry is development of a policy, strategy and tactical approaches for the implementation of country commitments under the international environmental conventions *(Second National Communication (2010)).*

1.2. Mapping national procedures

1.2.1. Key categories according to IPCC

Analysis of the key sources (AKS) level assessments were done for 1990 and 1997-2006. The detailed data on AKS are presented in Table 1.2.1.

According to the results of AKS level assessments, there were 13 key sources in the year 2000, where the source "1.A1 CO_2 emissions from stationery combustion of gas" was in the first place with a 25.4% share, and the source "4.D NO2 (direct and indirect) emissions from agriculture soils" was in the 13th place with a 1.5% share.

1.2.2. Methodology for retrieving key-category data

With respect to the methodology, the National GHG Inventory was prepared based on the Revised 1996 IPCC Guidelines for National GHG Inventories, Good Practice Guidance and Uncertainty Management in National GHG Inventories (IPCC 2000), and Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC 2003). In the "Solvent Use" sector Atmospheric Emission Inventory Guide books (CORINAIR-99) of the Cooperative Program for Monitoring and Evaluation of the Long-Range Trans boundary Air Pollution in Europe (EMEP) is used.

IPCC methodology is an open system, which can be completed, developed and updated based on country specific conditions. The work was done based on the following principles:

- strict compliance with the logic and structure of the IPCC methodology,
- prevalence of the use of national data and coefficients,
- use of all possible sources of information,
- maximum use of the possibilities of national information sources.

During the preparation of the GHG Inventory of Armenia, inventory of gases with direct greenhouse effect – CO_2, CH_4 and N_2O, from key sources were prioritized. The inventory of gases with indirect greenhouse effect - CO, NO_X,

NMVOC, SO_2, was also prepared. The emissions of HFCs, PFCs, SF6 compounds were not identified.

IPCC source categories	Sector	Source category, which should be assessed in key source analysis	Applicable GHG	Emissions assessment (without LULUCF) (Gg CO_2 eq)	Emissions assessment (with LULUCF) (Gg CO_2 eq)	Total net emissions (with LULUCF) (Gg CO_2 eq)	Level assessment (without LULUCF) (%)	Accumulated level (without LULUCF) (%)	Level assessment (with LULUCF) (%)	Accumulated level (with LULUCF) (%)
1.A.1	Energy	CO_2 emissions from stationary sources (gas-A)	CO_2	1665.2	-	1665.2	32.8	32.8	25.2	25.2
4.A	Agriculture	CH_4 emissions from livestock enteric fer-mentation	CH_4	687.4	-	687.4	13.6	46.4	10.4	35.7
1.A.3	Energy	CO_2 from fuel com-bustion activities in transport	CO_2	642.0	-	642	12.7	59.1	9.7	45.4
5.B	LULUCF	Croplands remaining cropland	CO_2	-	501.8	501.8		59.1	7.6	52.8
1.B.2	Energy	CH4 leakages from oil and natural gas activities	CH_4	473.3	-	473.3	9.3	68.4	7.2	60.0
6.A	Waste	CH_4 emissions from solid waste landfills	CH_4	468.0	-	468	9.2	77.6	7.1	67.0
1.A.2	Energy	CO_2 emissions from industrial processing and construction	CO_2	444.3	-	444.3	8.8	86.4	6.7	73.8
5.A	LULUCF	Forestlands remaining forestland	CO_2	-	441.0	441.0	-	86.4	6.7	80.4
5.C	LULUCF	Grasslands remaining grassland	CO_2	-	305.5	305.5	-	86.4	4.6	85.0
5.C	LULUCF	Lands converted into grassland	CO_2	-	292.8	292.8		86.4	4.4	89.5
1.A.4	Energy	Other sectors. Housing sector CO_2	CO_2	194.8	-	194.8	3.8	90.2	2.9	92.4
2.A	Industrial processes	CO_2 emissions from cement production	CO_2	119.7	-	119.7	2.4	92.6	1.8	94.2
4.D	Agriculture	N_2O (direct and indi-rect) emissions from agricultural soils	N_2O	100.0	-	100.0	2.0	94.5	1.5	95.7
Source – *Second National Communication (2010)*										

IPCC key source categories with their emission assessments: Table.1.2.1

Input data for the sectors were provided by the Ministry of Agriculture, Ministry of Energy and Natural Resources, Ministry of Economy, the State Revenue Committee under the RA Government, State Committee of the Real Estate Cadastre under the RA Government, National Academy of Sciences, municipalities of Yerevan, Gyumri, Vanadzor and other cities of Armenia, the "Scientific Research Institute of Energy" CJSC, "ArmRusgasprom" CJSC, "Hayenergo" CJSC, "Hayantar" SNCO, etc.

GHG emissions are projected for 2005-2020 and the calculations are based on the expected volumes of operations in the relevant sectors of economy and the basic macroeconomic development scenario with an average 6.0% of annual growth.

For all categories of emissions sources, two scenarios of GHG emissions were considered:

- "Business-as-usual" scenario, which assumes the overall continuation of practices and relationships at the national level, but also includes certain processes of modernization corresponding to international trends,

- "With measures" scenario, which includes certain measures contributing to the reduction of GHG emissions planned by sectorial development programs.

GHG emissions projections are assessed by applying the LEAP long-term planning computerized model. Considering that target indicators are defined by development plans for the main sectors of the economy, the model has been used as a tool for calculating emissions and determining their sectorial distribution, and also for assessing volumes of substituted fossil fuels and the corresponding reductions in emissions due to the use of renewable energy sources and nuclear energy *(Second National Communication (2010))*.

1.2.3. Responsible authorities and contact persons

The Republic of Armenia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993 and the Kyoto Protocol in 2002. By a Decree of the Government of Armenia, the Ministry of Nature Protection has been appointed as the Designated National Authority (DNA) for the Clean Development Mechanism

(CDM) of the Kyoto Protocol, one of the main functions of which is to approve the compliance of CDM projects with the requirements of the Kyoto Protocol, as well as to ensure effective participation of Armenia in international CDM processes. The procedure for submission and approval of CDM projects has been approved, according to which projects should be in line with the sustainable development strategy and criteria of the country *(Second National Communication (2010)).*

1.2.4. Procedures to address climate-change issues

In 2000, the National Assembly of Armenia passed the Law on Scientific and Scientific-Technical Activities. According to the Law, one form of public financing of scientific and scientific-technical activities is baseline funding, which is allocated to state scientific organizations for fundamental and significant applied research. According to the same Law, one of the main objectives of the state policy on scientific and scientific-technical sector is to improve the environmental conditions in the country.

On 11 July 2007, the Government of Armenia approved the concept paper on reforms in the science sector; the strategy for development of science and the relevant action plan for the next 10-15 years are currently being drafted.

Despite the fact that the annual financing of the science sector from the state budget is low and amounts to around 0.9% of the total budget expenditures, a significant increase in allocations is noted - from 5.49 mln. EUR in 2001 to 16.05 mln. EUR in 2009.

In 2009, over 70 scientific themes relating to environmental problems have been financed through the state budget of Armenia, the majority of which refer to biodiversity and desertification problems, and are, at the same time, relevant to climate change related issues.

Climate change related studies and programs in Armenia are basically devoted to vulnerability assessment of climate change consequences and developing adaptation measures. Since 2008, the following studies have been financed from the state budget:

- Dynamics and nature of changes in Armenia's flora as a result of the spread of invasive plant species and global climate change;

- Study of zoo complexes of Armenia's invertebrate animals in order to identify climate change biomarkers and to develop the scientific basis for monitoring biodiversity vulnerability;

- Assessment of water-temperature and radiation impact on crops yields based on modern approaches;

- Assessment of the changes in water resources of large river basins in Armenia;

- Development of methodologies for assessing and forecasting drought conditions and the losses to agricultural crops and piloting of those methodologies in Armenia's regions;

- Development of a methodology for forecasting crops yields on the territory of Armenia;

- Testing of the methodology for assessment and forecasts of Lake Sevan active water exchange zone, as a precondition for the management of the Lake's water resources. With the support of the UNDP, the "Greenhouse Gas Emissions Reduction and Energy-Efficiency Potential in Transport Sector in Armenia" Project was implemented in 2006, in the frames of which the potential for motor fuel saving and GHG emission reduction in the transport sector by 2020 was assessed.

- In 2008-2009, with the financial support of the UNDP, the following pilot projects were implemented to assess climate change impacts on various sectors of the economy and develop adaptation measures:

- "Assessment of climate change impact on the economy of Shirak region". Based on the vulnerability assessment, relevant adaptation measures for mitigating the impacts of climate change on the region's economy were proposed. Public perception on climate change was also assessed and public awareness building measures were implemented.

- "Social-economic impact of climate change in Armenia". The study was conducted in cooperation with the Stockholm Environmental Institute (USA). In the framework of the study, the impacts of climate change in the following sectors were analysed: water resources, agriculture, electricity production, forestry and natural disasters. Adaptation measures and policies for mitigating climate change impacts were proposed.

- "Assessment of climate change impacts on Lusadzor community of Tavush region". In the framework of the study, which was targeted on a community, where the UNDP CO is implementing a community development project, the current and forecasted changes to the climate were analysed in detail, climate proofing of community development activities were conducted, and the priority adaptation measures were selected, which will later be considered and addressed by the UNDP, local authorities and other donors.

- "Assessment of climate change impact on water resources in Marmarik River basin". In the framework of the study changes in the water resources of the Marmarik River basin up to 2007 were assessed, the vulnerability of water resources by 2030, 2070 and 2100 was forecasted, and impacts of climate change on financial-economic losses of the water system were analysed. At the same time, adaptation measures with economic justifications were proposed according to the following categories: a) no regret measures; b) low cost measures; c) economically justified measures; and d) long-term measures.

- "Climate change related risk assessment in Ararat region". The survey was conducted in the framework of the UNDP Natural Disasters Risk Assessment Project, implemented in the region for more than 30 communities. The survey revealed public opinion on the dynamics and risks of dangerous hydro-meteorological phenomena and natural disasters in Ararat region.

- "Adaptation to climate change impacts in mountain forest ecosystems of Armenia". In the framework of the preparatory stage of the UNDP/GEF project, climate change related risks were revealed and measures to be implemented in cooperation with national partners within 2009-2012 were developed. Since 2009 the "Adaptation to Climate Change Impacts in Mountain Forest Ecosystems of Armenia" UNDP/GEF Project is under implementation. A number of other studies were conducted to assess the potential sources and use of renewable energy in Armenia, which will contribute to the limited use of fossil fuel in the country, and, thus, reduction of GHG emissions *(Second National Communication (2010))*.

1.3. Population

The population of the Republic of Armenia at the end of 2006 was 3,222.9 thousand and the average population density was 108 persons/km².

The distribution of the population is very uneven, which is due to the mountainous terrain of the country and the level of economic development in various areas. The maximum density of population, 686 persons/km², is recorded in altitudes up to 1000 m, while the minimum – 22 persons/km², is noted in altitudes of 2000-2500 m.

Men constitute 48.3% of the population, women 51.7% (2006). The average life expectancy is 73.3 years - 70 years for men and 76.4 years for women (2006).

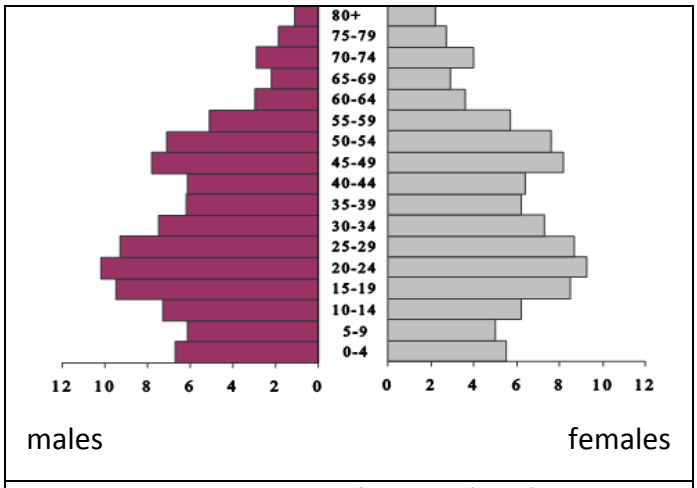
As of 1 January 2007, the number of the economically active population is 1,181.3 thousand. In 2000-2006, 64% of the population was urban, and the remaining 36% - rural. The natural growth of population per thousand people has declined from 15.6 (1990) to 3.2(2006) (*Second National Communication (2010)*).

1.3.1. Country's demographic characteristics

Distribution of population is extremely disproportionate, due to the country's mountainous relief and the varying level of economic development.

The maximum density of population, 686 person/km², is characteristic of high-altitude zones of up to 1000 m height, the minimum density, 22 persons/km², is observed in high-altitude zones of up to 2000-2500 m of height *(Second National Communication (2010))*. In 2009, the number of urban population was 64% and rural population – 36%.

Figure 1.3.1 shows the share of population by sex and age as of January 1, 2010.



Source *– Statistical Yearbook of Armenia (2010)*

Population by sex and age in % of total: Figure.1.3.1

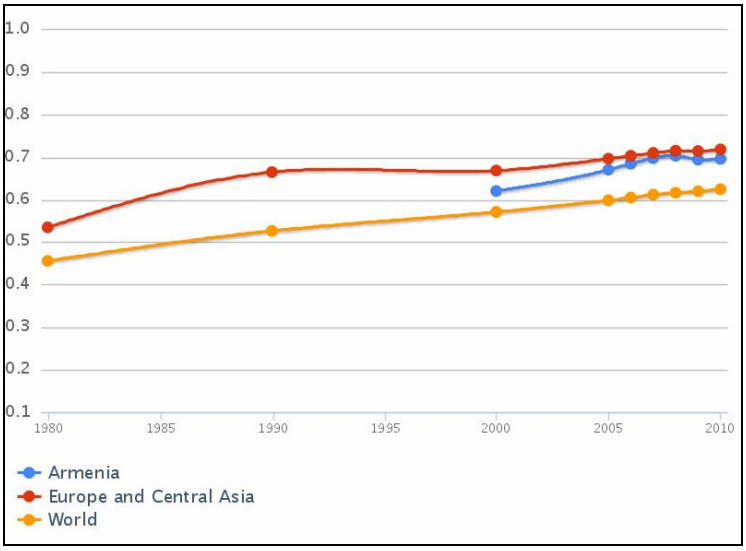
1.3.2. Development indicators

Table 1.3.2 summarises the Human Development Indices up to 2010.

Indicator	2005	2006	2007	2008	2009	2010
Human Development Index	0.669	0.684	0.697	0.702	0.693	0.695
Source *– Country profile of human development indicators, Armenia*						

Human development indices in 2005 – 2010: Table.1.3.2.1

Figure 1.3.2.1 shows Human Development Indices trend in comparison with Europe and Central Asia and with whole World as well.



Human Development Index: Trends 2000 – present *(Source – Country profile of human development indicators, Armenia)*: Figure.1.3.2

Inequality-adjusted income index is 0.483. Tables 1.3.2 and 1.3.3.3 show the life expectancy and prevalence of undernourishment in the Republic of Armenia.

Indicators	2005	2006	2007	2008	2009
Total population	73.5	73.3	73.5	73.8	73.9
Males	70.3	70.0	70.2	70.4	70.6
Females	76.5	76.4	76.6	76.9	77.0
Source – *Statistical Yearbook of Armenia (2010)*					

Life expectancy at birth, 2005-2009, years: Table.1.3.2.2

Indicator	2010
Life expectancy (years)	74.2
Prevalence of undernourishment in total population (% of population)	23
Source – *Country profile of human development indicators, Armenia*	

Life expectancy and prevalence of undernourishment in total population, 2010: Table.1.3.2.3

Table 1.3.2.4 shows the poverty percentage in RA. Since 2009, an improved methodology for the poverty measurement will be used by the support of the World Bank, and the computations are under the process. Therefore, the indicators for 2009 and 2010 are not presented in the following table *(Statistical Yearbook of Armenia (2010)).*

According to NCAP, the first HIV case was registered in Armenia in 1988, and transmission occurred through heterosexual intercourse. That same year, the first AIDS case was also registered. The first death from AIDS was recorded in 1989, the year the NCAP was established. In 1990, the first case of transmission through drug injection was registered. The first female HIV case was recorded in 1996; the first transmission through homosexual intercourse in 2000; and the first child HIV infection and death in 2001.

Indicator		2005	2006	2007	2008
Extremely poor	Total	4.6	4.1	3.8	3.1
Poor		29.8	26.5	25.0	23.5
Poverty Gap		5.4	3.8	4.9	3.1
Severity of poverty		1.6	1.1	1.5	0.8
Extremely poor	Urban	5.3	5.0	4.6	3.9
Poor		30.7	28.2	24.7	23.8
Poverty Gap		5.9	4.4	5.0	3.3
Severity of poverty		1.9	1.3	1.6	0.9
Extremely poor	Rural	3.2	2.4	2.3	1.7
Poor		28.3	23.4	25.5	22.9
Poverty Gap		4.6	3.0	4.6	2.6
Severity of poverty		1.2	0.7	1.2	0.6
Source – *Statistical Yearbook of Armenia (2010)*					

Poverty indicators (%): Table.1.3.2.4

According to NCAP, the first HIV case was registered in Armenia in 1988, and transmission occurred through heterosexual intercourse. That same year, the first AIDS case was also registered. The first death from AIDS was recorded in 1989, the year the NCAP was established. In 1990, the first case of transmission through drug injection was registered. The first female HIV case was recorded in 1996; the first transmission through homosexual intercourse in 2000; and the first child HIV infection and death in 2001.

Though the number of infections through drug use decreased by more than 50% between 2002 and 2007 the overall number of yearly registered infections has increased significantly. Between 1988 and April 30, 2011, 1040 HIV cases were registered in Armenia – 747 males and 293 females, 22 of them children—according to NCAP, though the estimated number is closer to 2,000. In 2001, the number of reported cases was 169, and in 2010-148 *(From the Shadows: HIV/AIDS in Armenia, Stigma, misinformation, and discrimination)*.

1.4. Geographic profile

1.4.1. Geomorphologic characteristics

The Republic of Armenia is located in the north-east of the Armenian Highland at the turn of Caucasus and south-western Asia. The length of the RA state borders is 1,479 km. It borders with Georgia in the north, Azerbaijan in the east, Turkey in the west and south-west and with Iran in the south.

The RA territory is 29,743 km². The greatest extension of the territory from south to north is 360 km and 200 km from west to east.

Armenia is a mountainous country; 76.5% of its territory is 1000-2500 m above sea level. According to the Land Balance data of 2006, 71.6% of the territory of Armenia falls under agricultural lands, 12.5% - forests (10.4% - under forest covered), 7.4% - specially protected areas of nature, 0.9% - water surface, 5.4% - settlements, industry, transportation and communications territory, 1.3% - other areas.

Due to vertical alternation, 10 landscape zones have been formed in Armenia - from semi-desert to snowy highlands, including 6 climate patterns - from dry sub-tropical to frosty highlands. These natural conditions have enabled the existing bio-diversity. The territory of Armenia is inhabited by 3,600 plant species (which is almost half of the whole Caucasian flora), around 450 species of vertebrate animals and 17,000 species of invertebrates. The significant part of biodiversity is represented by endemic and rare species. To preserve the biodiversity, specially protected areas of nature have been created, including 3reserves, 2 national parks and 26 sanctuaries.

The rivers of Armenia are the confluents of the big rivers in Southern Caucasus -Araks and Kur. Armenia has around 9,500 small and medium rivers, the total length of which is 25 thousand km. The longest rivers are: Araks (1,072 km),Vorotan (179 km), Debed (178 km), Hrazdan (146 km). The density of rivers network varies significantly across the country (0-2.5 km/km^2).

The irregularity of river flow distribution (both annually and multi-annually) is typical for the rivers of Armenia.

The average annual flow of surface waters is about 6.8 km^3. The flow of ground waters is approximately 4.0 billion cubic meters.

The greatest lake of Armenia is Sevan - one of the largest high-mountain fresh-water lakes of the world. Presently (2006), the level of the Lake is 1898 m, the surface area – 1,257 km^2, the volume - 33.4 km^3. Armenia also has 100 small mountain lakes, with a total volume of 0.8 km^3.

The territory of Armenia is characterized by high seismicity and intensive exogenous processes, contributing to landslide occurrence and development of erosion. The frequency and magnitude of hazardous hydro-meteorological phenomena also contribute to emergence of hazards and incur significant losses for the population and economy.

According to the National Action Plan to Combat Desertification (2002), 81.9% of the current territory of Armenia is prone to various degrees of desertification, including 26.8% - to extremely high, 24.6% - high, 19.6% - medium, and 8.8% - low degrees. Additional concern is caused by projected intensification of the mentioned phenomena due to the forecasted global climate change *(Second National Communication (2010))*.

1.4.2. Ecosystems

Armenia's vegetation includes all main types of vegetation in the Caucasus (with the exception of humid sub-tropical vegetation) - deserts, semi-deserts, arid open forests, shibliak, mountain steppes, forests, meadow steppes, sub-alpine meadows, alpine meadows and carpets. Intra zonal vegetation types are widely represented while vegetation of wetlands, petrophile vegetation, tragakant vegetation, vegetation of disturbed areas.

Armenia's flora has about 3600 species of vascular plants (half of Caucasian flora), including 123 local endemic species. Thus, Armenia has high floristic richness - more than 100 species per square kilometre. In addition, an important characteristic of Armenia's flora is the fact

that the genetic pool of wild relatives of cultivated plants is richly represented (cereals, fruits and vegetable-melon crops).

According to expert assessments, there are 17,500 species of invertebrates in Armenia, including 12,000 species of insects, and about 534 species of vertebrates, with 38 species of fish, 8 species of amphibians, 53 species of reptiles, about 350 species of birds and about 85 species of mammals. According to the floristic division of the country, Armenia is at the border of Caucasian and Armenian-Iranian floristic provinces, and in a wider sense between Boreal and Ancient Mediterranean floristic sub-kingdoms. The Caucasian Province is more humid and the Armenian- Iranian one is more arid. The border between those two provinces coincides with the borders of Armenia's floristic regions. Borders of floristic regions do not correspond to Armenia's administrative divisions. The southern parts of Shirak, Aragatsotn and Syunik marzes (regions), and Armavir, Ararat and Vayots Dzor marzes in their entirety belong to the Armenian-Iranian province. The rest of the Armenian territory belongs to the Caucasian province.

In the First National Communication of Armenia on Climate Change, the possible changes to mountain ecosystems under various climate change scenarios were analysed. Using the climatogram method, it was shown that in the next 100 years the boundaries of natural ecosystems might shift upwards on mountain slopes by 200 m, which may result in serious changes in the structure of the ecosystems, as well as the spread of certain representatives of biodiversity.

Mass reproduction of forest pest insects in southern regions of Armenia was also forecasted. The forecast proves to be totally correct in Syunik marz, where as a result of mass reproduction of pest insects, damaged areas and desiccated forests currently cover 19 to 30 thousand hectares *(Second National Communication (2010))*.

1.4.3. Land use, land use change and forestry

GHG emissions from the sector were assessed using the IPCC Best Practices Manual (BPM IPCC, 2003). Within the framework of the First National Communication of Armenia, GHG emissions from the sector were assessed using IPCC Guidelines of 1995. The transition to the new methodology was a very complicated issue, which was overcome due to the support of capacities built under the regional program for capacity building to improve the quality of the Second National GHG Inventory.

The main problem in the sector was the inadequate availability of the necessary data. In particular, land balances were not prepared for 1998-2005, and the most recent comprehensive data on state inventory of forests were available for 1988. For the baseline year of 2000, emissions/removals were calculated using the interpolation method, based on Land Balance data available for 1995, 1996, 1997, 2006 and 2007.

Due to the mentioned reasons, GHG emissions from the sector were calculated only for the year 2000 and recalculated for the year 1990. According to recalculated data for 1990, net flows of CO_2 from the “LULUCF” sector amounted to -736.0 Gg, which constituted -617 Gg according to the First National GHG Inventory data. This change is not only based on the

improvements in the methodology of IPCC, but also updating of the data on activities for land-use categories, as well as improvements in a number of local emission factors for the "Forestry" sector.

Table 1.4.3.1 presents land area data of the Republic of Armenia in 2008 and 2009.

Land area	01.07.2008	01.07.2009
	1000 ha	*1000 ha*
Total land area	2,974.3	2,974.3
of which		
Agricultural land	2,121.2	2,120.3
Settlements land *of which:* Homestead and gardening land	1,51.2 94.7	151.6 94.9
Land for industrial use of entrails of the earth and other production purposes	29.2	29.4
Land for objects of energetic, communication, transport, communal infrastructure	12.2	12.4
Land of special protected territories	229.7	229.9
Land with special purpose	31.7	31.7
Forest land *of which:* Covered with forest lands	369.8 305.8	369.8 305.9
Water land	28.6	28.6
Reserve land	0.7	0.6
Source – *Statistical Yearbook of Armenia (2010)*		

Land areas of the Republic of Armenia: Table.1.4.3.1

CO_2 emissions/removals, as well as emissions of CH_4, N_2O, NO_X and CO were assessed from forest fires and land use changes. In the "LULUCF" sector in the year 2000, compared to 1990, a sharp increase in the emission-removal net was recorded - from -736 Gg to 1563.6 Gg, which means that the sector is transformed from a sink into a source of emissions (Table 1.4.3.2) *(Second National Communication (2010))*.

1.5. Climatic profile

The climate of Armenia is highly variable, even on small territories, due to the country's complex relief. Almost all types of climatic patterns can be observed in Armenia - from dry sub-tropical to frosty highlands.

1.5.1. Precipitation

The average annual precipitation in Armenia is 592 mm. The most arid regions are Ararat valley and Meghri region. The annual precipitation here is 200-250 mm. The highest annual precipitation - up to 1,000 mm - is observed in high-altitude mountain regions. In Ararat valley the average precipitation during summer does not exceed 32-36 mm.

1.5.2. Temperature

The average annual temperature is 5.5 °C. The highest average range of temperature is 12-14 °C (in Alaverdi and Meghri). Negative average annual temperatures are recorded at the altitude of 2,500 m and higher.

Summer is temperate. The average temperature in July is 16.7 °C, although in Ararat valley it varies between 24-26 °C. The absolute maximum temperature is recorded in Artashat (43 °C), whilst the absolute maximum temperature for Yerevan is 42 °C. Winter is cold. January is the coldest month of winter with an average temperature of -6.7 °C. The absolute minimum temperature is recorded in Paghakn (-42 °C). Winter is temperate in north-eastern and south-eastern regions of the country.

Sectoral categories	Net GHG flows (Gg CO_2 eq)	
	1990	2000
5. Land use, land use change and forestry, total	-736.0	1,563.6
5A Forestlands	-837.1	441.0
5A1 forestland remaining forestland	-816.4	441.0
5A2 land converted into forest land	-20.7	0.0
5B Croplands	-134.0	501.8
5B1 croplands remaining cropland	-150.2	501.8
5B2 land converted into cropland	16.2	0.0
5C Grassland	173.4	598.3
5C1 grasslands remaining grassland	173.4	305.5
5C2 lands converted into grassland	0.0	292.8
5D Wetlands	71.2	27.7
5D1 wetlands remaining wetland	55.5	28.3
5D2 lands converted into wetland	15.7	0.0
5E Settlements	-9.4	-5.2
5E1 settlements remaining settlement	-12.5	-5.2
5E2 lands converted into settlement	3.0	0.0
5F Other lands	n/c	n/c
5F1 lands converted into other land*	n/c	n/c
Source – *Second National Communication (2010)*		

**According to IPCC Best Practice Guidelines the emissions are not calculated (n/c) for the lands ("Other lands") which are not subject to human interference.*

Net flows of greenhouse gases in the "LULUCF" sector, 1990 and 2000 (Gg CO_2 eq): Table.1.4.3.2

These changes are mainly due to the increase in the volume of forest logging and the deteriorating of croplands and grasslands quality.

1.5.3. Other climatic characteristics

The average annual wind speed is not evenly distributed across the country and ranges from 1.0 m/sec in Meghri to 8.0 m/sec in Sisian mountain pass. In some of the regions, particularly Ararat valley, mountain-valley winds are well observed. The wind speed in summer can reach 20 m/sec and more *(Second National Communication (2010))*.

1.6. Economic profile (EP)

1.6.1. General

After the sharp economic decline of 1991-1994, overcoming the difficulties of the transition period, Armenia was able to ensure economic stability and growth (Table 1.6.1.1). Economic growth in 1995-2000 amounted to an annual average of 5.4%, and in 2001-2006 the average growth rate was 12.4%.

Indicator	1995	2000	2001	2002	2003	2004	2005	2006
GDP (million EUR[1])	-	2,067.9	2,365.0	2,515.7	2,484.9	2,879.0	3,932.1	5,098.0
EGDP index (%)	106.2	105.9	109.6	113.2	114.0	110.5	113.9	113.3
Export (million EUR)	-	325.1	381.7	534.8	606.6	582.3	781.5	786.3
Import (million EUR)	-	957.1	979.6	1,045.1	1,132.1	1,088.0	1445.7	2,387.8
GDP per capita EUR)	-	642.2	735.7	783.4	773.3	896.4	1222.1	1,582.6
GDP per capita (at PPP) (EUR)	-	2,504.4	2,898.9	3,149.5	3,062.4	3,236.3	3,765.0	3,986.8
External state debt (million EUR)	-	930.4	1,010.8	1,085.2	970.7	952.9	881.9	961.8
EUR exchange rate	-	498.7	497.2	541.6	653.8	662.3	570.4	521.2
***Source** – Second National Communication (2010)*								

Main macroeconomic indicators of Armenia, 1995-2006: Table.1.6.1.1

In 2006, Armenia's gross domestic product (GDP) amounted to 5,098.0 million EUR; the per capita GDP was EUR 1,582.6 (with a PPP equivalent of EUR 3,986.8).

Structural changes of the economy resulted in changes to the composition of GDP - with a decrease in the share of industrial production and an increase in the share of construction and services. In 2006, the GDP had the following composition - industrial production - 17.9%, agriculture - 18.1%, construction - 24.5%, services - 32.3%, and net taxes -7.2% (Table 1.6.1.2).

Sector	1990	1995	2000	2001	2002	2003	2004	2005	2006
Industry	44.0	24.3	21.9	20.2	20.0	19.9	19.2	18.8	17.9
Agriculture	13.0	38.7	23.2	25.0	23.1	21.3	22.6	18.7	18.1
Construction	18.0	8.5	10.3	10.7	12.6	15.5	15.6	21.7	24.5
Services	25.0	24.8	35.5	34.5	34.6	34.2	34.2	32.3	32.3
Net Taxes	-	3.1	9.1	9.6	9.7	9.1	8.4	8.5	7.2
***Source** – Second National Communication (2010)*									

Structure of the GDP of Armenia, 1990-2006 (%): Table.1.6.1.2

Priority issues for economic development of the country are addressed in the frames of the 2008- 2012 Socio-Economic Development Program of the RA Government, the Sustainable

[1] The official exchange rate has been used here and below (Source: http://armstat.am/en/?nid=126&id=17012 – for Euro; http://armstat.am/en/?nid=126&id=17010&submit=Search – for US$.

Development Program, and the Millennium Development Goals *(Second National Communication (2010))*.

1.6.2. Primary sector

According to the Land Balance data of 2006, agricultural lands in Armenia occupy 2129.6 thousand hectares, including plough-lands - 452.9 thousand hectares (21.3%), perennial plantings - 27.3 thousand hectares (1.3%), hayfields -127.5 thousand hectares (6%), pastures – 1,125.0 thousand ha, and other lands - 396.9 thousand hectares (18.6%). The territory of the perennial plantings of household and garden plots of the residential area covers 23.8 thousand hectares.

Armenia's agriculture has also undergone the consequences of severe economic crisis of 1991-1994. In the result of the agrarian reform and land privatization, major agricultural households were transformed into 338 thousand small agricultural households, each having the land share of approximately 1.4 hectares. The land fund was divided into parts, impeding the efficiency of its households. Table 1.6.2.1 presents the absolute volume of the gross agriculture output in 2000-2010 separately.

Year	Absolute value	In comparison with same period of last year (%)
2010	1,285.4	86.5
2009	1,095.2	99.9
2008	1,395.2	101.3
2007	1,355.0	109.6
2006	1,066.6	100.4
2005	864.3	111.2
2004	761.1	114.5
2003	627.3	104.3
2002	697.3	104.4
2001	705.9	111.6
2000	563.8	-
Source- *(Time Series, Volume of gross agriculture output 2011)*		

Volume of gross agriculture output, mln. Euro, 2000-2010: Table.1.6.2.1

Production infrastructure was also affected. The area and structure of agricultural lands changed as well; the sown area was reduced by approximately 30%. The cattle-head was reduced too (Table 1.6.2.2). The area of irrigated lands was reduced twice, whilst the use of chemical fertilizers was decreased thrice.

Livestock/poultry	1990	1995	2000	2001	2002	2003	2004	2005	2006
Cattle	690.0	507.5	478.7	497.3	514.2	535.8	565.8	573.3	592.1
Sheep and goats	1,291.0	603.2	548.6	540.0	592.1	602.6	628.5	603.3	591.6
Pigs	329.3	79.6	70.6	68.9	97.9	111.0	85.4	137.5	152.8
Horses	-	-	11.5	11.4	12.1	12.1	12.2	11.9	12.6
Poultry	11,245.0	3,100.0	4,255.1	3,975.2	4,239.0	4,625.0	5,023.8	4,861.7	4,954.1
Source *– Second National Communication (2010)*									

Number of livestock and poultry (thousands heads): Table.1.6.2.2

Prevention of further decline in agriculture, ensuring stabilization and further development required tremendous efforts and implementation of various programs. Slowly but steadily agricultural production grew (Table 1.6.2.3).

Agriculture output	1990	1995	2000	2001	2002	2003	2004	2005	2006
Grains	271.0	262.7	224.8	367.3	415.5	310.0	456.9	396.2	212.5
Potatoes	212.5	427.7	290.3	363.8	374.3	507.5	576.4	564.2	539.5
Vegetables	389.7	450.9	375.7	456.0	466.0	569.4	600.8	663.8	780.0
Watermelons	31.4	54.0	52.8	54.8	89.7	115.4	112.9	117.8	134.9
Fruit and berries	155.5	146.1	128.5	102.4	82.6	103.1	113.7	315.6	286.0
Grape	143.6	154.9	115.8	116.5	104.0	81.6	148.9	164.4	201.4
Meat (slaughter weight)	145.0	82.4	49.3	48.3	50.2	52.6	53.4	56.0	66.8
Milks	432.0	428.3	452.1	465.3	489.5	513.7	555.2	594.6	620.0
Eggs (million pieces)	606.0	518.0	385.4	448.3	477.7	502.2	563.0	518.2	463.7
Source *– Second National Communication (2010)*									

Production of main types of agricultural output in Armenia (thousands ton): Table.1.6.2.3

Within 2000-2006, average annual growth of agricultural production was 7.7%. In the same period, average share of plant growing in aggregate agricultural production reached 57% and 43% - that of stock-breeding.

Average share of agriculture in Armenia's GDP structure was 21.7% within 2000-2006 with 18.1% in 2,000. 502 thousand people are employed at farms that make up to 43% of total workforce.

Armenia is a forest-poor country. According to the Land Balance data of 2006, forest lands cover about 373.0 thousand hectares, with 308.5 thousand hectares forest-covered (10.4% of country's territory). Forests mainly grow on steep slopes in cross-country mountains at 550-2400 m above sea-level. Forest covered territories are distributed unevenly with 62.5% in the north-east, 21.6% - in the south-east; 13.5% in the central part and 2.4% in the south. About 270 tree and bush species grow in the forests; oak, beech; hornbeam and pine-tree are major natural components of the forests.

Because of the energy crisis of 1992-1995, the massive, including illegal cuttings brought about negative impacts on forest ecosystems. Degraded forest ecosystems only partially use the potential of natural growth, which in its turn, reduces carbon absorption from the atmosphere.

Intensive forestation and reforestation efforts are required to promote forest regeneration. 21.5 thousand hectares of area underwent reforestation and forestation activities within 1998-2006: including 16.1 thousand hectares during the period of 2004-2006.

According to the Forest Code of 2005, Armenia's forests are classified as important for protective, special and production purposes. Armenia's forests and forest lands are the property of the State. For the purpose of increasing the forest cover, the Forest Code defines the right for community and private ownership over self-established forests. The preservation, rehabilitation, natural reproduction and sustainable use of forests are ensured with the help of Armenia's National Forest Policy and Strategy paper, as well as Armenia's National Forest Program (2005) *(Second National Communication (2010))*. Table 1.6.2.4 presents the employment rate in Primary sector.

Types of economic activity	2005	2006	2007	2008	2009
Employed in Primary sector, total	507.6	504.5	506.9	493.5	496.5
Agriculture, hunting and forestry	507.5	504.3	506.7	493.0	496.2
Fishing, fish-breeding	0.1	0.2	0.2	0.5	0.3
Source – *Statistical Yearbook of Armenia (2010)*					

Employed population in Primary sector (average annual, X1000 persons): Table.1.6.2.4

1.6.3. Secondary sector

Structural changes of the economy resulted in changes to the composition of GDP - with a decrease in the share of industrial production and an increase in the share of construction and services. In 2006, the GDP had the following composition -industrial production - 17.9%, agriculture - 18.1%, construction - 24.5%, services - 32.3%, and net taxes -7.2%.

Industrial output of Armenia has the following composition by types of economic activity - electricity, gas and water production and distribution - 17.4%, processing industries – 65%, mining industry - 17.6% (2006). Tables 1.6.3.1 and 1.6.3.2 summarise the industrial production by economic activity of the secondary sector at current prices and in total percentage *(Second National Communication (2010))*.

Secondary Sectors	2005	2006	2007	2008	2009
Total Industry	**1,142.9**	**1,237.3**	**1,531.7**	**1,642.1**	**1,309.7**
Mining	198.7	217.7	243.3	207.2	181.1
Manufacturing	744.0	804.3	1,021.7	1,130.7	869.7
Production and distribution of electricity, gas, water	200.3	215.3	266.7	304.3	258.9
Source – *Statistical Yearbook of Armenia (2010)*					

Volume of industrial production by economic activity of the secondary sector at current prices, mln. Euro: Table.1.6.3.1

Secondary Sectors	2005	2006	2007	2008	2009
Total Industry	**100**	**100**	**100**	**100**	**100**
Mining	17.4	17.6	15.9	12.6	13.8
Manufacturing	65.1	65.0	66.7	68.9	66.4
Production and distribution of electricity, gas, water	17.5	17.4	17.4	18.5	19.8
Source – *Statistical Yearbook of Armenia (2010)*					

Structure of Industrial production by economic activity of the secondary sector in % of total: Table. 1.6.3.2

Table 1.6.3.3 presents the employment rate in Secondary sector of the Republic of Armenia in 2005-2009.

Types of economic activity	2005	2006	2007	2008	2009
Employed in Secondary sector, total	174.8	170.6	166.0	188.0	164.6
Mining and quarrying	7.0	7.6	8.6	8.3	7.3
Manufacturing	114.3	110.5	103.6	94.8	83.9
Electricity, gas and water supply	18.9	22.8	22.7	24.5	23.9
Construction	34.6	29.7	31.1	60.4	49.5
Source *– Statistical Yearbook of Armenia (2010)*					

Employed population in Secondary sector (average annual, X1000 persons): Table.1.6.3.3

1.6.4. Tertiary sector

Table 1.6.4.1 shows the volume of trade turnover in Armenia for the period of 2000 – 2010.

Year	Absolute value	In comparison with same period of last year (%)
2010	3,587.6	104.2
2009	3,132.4	95.9
2008	3,724.4	107.9
2007	3,039.3	109.3
2006	2,082.7	113.6
2005	1,879.3	109.7
2004	1,469.2	104.2
2003	1,323.4	118.4
2002	1,282.9	116.3
2001	1,191.1	116
2000	991.3	-
Source *– Time Series, Volume of trade turnover (2011)*		

Volume of trade turnover, 2000-2010 (mln. Euro): Table.1.6.4.1

The volume of services reflects the volume of various types of rendered services.

Hotels and restaurants, transport, travel agency activities, communication are the entirety of the services reflecting the profile of the rendered services in the country. Table 1.6.4.2 summarises the volume of the services of the hotels and restaurants, transport, travel agency activities and communication.

Type	2005	2006	2007	2008	2009
Hotels and restaurants	31.3	39.2	50.7	64.0	63.7
Transport	185.8	240.3	282.4	362.3	324.7
Travel agency activities	2.3	2.5	3.4	5.2	4.3
Communication	141.9	242.1	325.6	375.7	324.0
Total	**361.3**	**524.1**	**662.0**	**807.2**	**716.7**
Source **–** Statistical Yearbook of Armenia (2010)					

The volume of services by types, mln. Euro: Table.1.6.4.2

Table 1.6.4.3 shows the volumes of hotels and restaurants, transport, travel agency activities and communication services per capita.

Type	2005	2006	2007	2008	2009
Hotels and restaurants	9.7	12.2	15.7	19.8	19.6
Transport	57.7	74.6	87.5	112.0	100.1
Travel agency activities	0.7	0.8	1.0	1.6	1.3
Communication	44.1	75.1	100.9	116.2	99.9
Total	**112.3**	**162.7**	**205.2**	**249.6**	**221.0**
Source – *Statistical Yearbook of Armenia (2010)*					

Volume of the rendered services per capita, Euro: Table.1.6.4.3

The transport sector in Armenia includes railway, vehicle, air and pipeline transportation routes.

As a result of significant structural changes in the economy and the transportation blockade, substantial changes have occurred in the transport sector of Armenia since 1990 - the overall shipment volume reduced by four times and passenger transportation declined by 2.8 times.

In 2006, the share of pipeline routes transportation in the total volume of shipments amounted to 67.1%, rail transportation - 28.5%, vehicle transportation - 3.9%, and air transportation - 0.5%. In the overall passenger transportation volume, vehicle transportation's share was 69.2%, air transportation - 25.8%, and rail transportation - 0.5%. The fuels used for vehicle transportation for 2006 are gasoline (43.2%), diesel fuel (21.5%), compressed natural gas (35.1%) and liquid gas (0.2%). Compared to 1990, freight turnover fell 4 times in all types of transportation in 2006: 7.3 in railways, 48.7 in highways, 4 in air routes. Total passenger turnover decreased 2.8 times with 11.4 in railways, 1.6 in highways and 6.7 in air routes (Table 1.6.4.4) *(Second National Communication (2010))*.

Indictors	1990	2000	2001	2002	2003	2004	2005	2006
Freight turnover (million ton km)	9,410.0	1,705.1	1,722.1	1,535.6	1,740.5	2,007.3	2,300.9	2,345.5
-railroads	4,884.0	353.6	343.5	451.8	529.2	678.2	654.1	668.0
-highways	4,477.0	40.0	43.0	68.2	79.3	55.3	55.5	91.2
-air routes	49.0	9.6	9.1	5.5	5.5	10.0	10.7	12.4
-main pipe lines	-	1,301.9	1,326.5	1,010.1	1,126.5	1,263.8	1,580.6	1573.9
Passenger turnover (million passengers*km)	9,511.5	2,063.4	2,450.4	2,615.4	2,719.4	3,074.8	3,199.4	3,271.1
-railroads	316.0	46.8	48.2	48.4	41.1	30.0	26.6	27.7
-highways	3,526.0	1,310.0	1,561.6	1,706.8	1,858.1	1,954.3	2,072.4	2,264.6
-air routes	5,557.0	579.2	725.1	753.9	719.2	984.0	959.5	822.2
-other types of transport	112.5	127.4	115.5	106.3	101.0	106.4	140.9	156.6
Source – *(Second National Communication (2010))*								

Transport sector indicators, 1990-2006: Table.1.6.4.4

The following table presents the employment rate in Tertiary sector.

Types of economic activity	2005	2006	2007	2008	2009
Employed in Tertiary sector, total	164.3	162.2	162.1	177.2	170.5
Trade	108.9	105.9	106.1	113.2	104.2
Tourism	5.7	7.7	8.4	12.4	12.5
Transport and communication	49.7	48.6	47.6	51.6	53.8
Source – Statistical Yearbook of Armenia (2010)					

Employed population in Tertiary sector (average annual, X1000 persons): Table.1.6.4.5

1.6.5. Future prospects for the country's economy and development

Priority issues for economic development of the country are envisaged to be addressed in the framework of the 2008-2012 Socio-Economic Development Programme of the Government, Sustainable Development Programme, and the Millennium Development Goals.

The expansion of "decent employment"[2] is the reasonable prospect of overcoming poverty through the economic development. First and foremost, the decent employment implies a minimum level of labour remuneration, which allows employee and his/her family members to avoid poverty.

In this regard, despite the significant progress recorded in recent years about 24% of employed persons and their family members were considered[3] poor in 2005. Of course, the comparison of this rate with the poverty general level shows that the employment significantly reduces the risk of poverty (about 10% points in 2005). It will be especially pronounced if the levels of employed and unemployed are compared with.

However, significant presence of the employed poor (which is often the result of low labour productivity) itself requires that the solution of the problem becomes one of the priorities of the poverty reduction strategy.

In parallel with the expansion of the employment and the reduction of unemployment the prospective goals of the program also will be the reduction of the risk of being poor among the employed persons so that the poor share in 2015 lowered to no more than 5% level. It is expected that the problem completely will be solved in 2021 as the fully employed family member's minimum remuneration will equal with the poverty line of the average family size.

Overall, in terms of poverty reduction the special importance will be attached to unemployment level reduction among the actual unemployment, especially long-term structural unemployment and youth, as well as to increase of the efficiency and volumes of support provided to the unemployed. The medium term target of real level of the unemployment (which reckoning sources will be the labour force sample surveys) in Sustainable Development Programme will be a 15% by 2015, while long-term target of no more than 10%. As for the unemployment rate index, then it will not be the target of the

[2]This concept has been put into circulation by ILO (International Labour Organization) in recent years. http://www.ilo.org/public/english/standards/relm/ilc/ilc91/pdf/rep-i-a.pdf
[3]This rate amounted to about 49% in 1999.

Programme and its variations, as well as the phenomenon of the possible increase in registered unemployment will not be considered as Programme deviations *(Sustainable Development Programme (2008))*.

Basic principles in the field of improvement of competitive environment and protection of market of the Republic of Armenia are:

- ensuring the fair trade and free market
- application of non-discriminated and transparent legislation
- ensuring the application of WTO rules and principles
- promotion of reforms in the related field

As a result of the consecutive economic policy of the Government of RA Armenia became a member of the World Trade Organization (WTO), on 2003 which is of a huge importance to our country for effective integration to the world economy, neutralization of the negative influence of restrictions of domestic market, as well as, resistance to adverse foreign influence, if necessary. Becoming WTO member, let it possible domestic producers to enter into new markets and participate in international competition and apply "protection" measures by the country, if necessary. The WTO agreement on safeguard measures is the base for other state for prohibition of grey area measures (export restriction, system of monitoring of export prices, export and import control, obligatory import cartels, system of licensing of export and import etc.).

For establishment and improvement of necessary legal base for liberal market economy development and competitive environment formulation in the Armenia the hereinafter laws was adopted by the Government of the Republic of Armenia before the membership.

The law on protection of economic competition of the Republic of Armenia (Adopted on November 6, 2000) defines the relations within market parties related to the unfair competition. Pursuant to this law for the protection of economic competition of the Republic of Armenia the State Competition Commission was established. The main tasks of the Commission are follows: to protect and promote the economic competition, to ensure an appropriate environment for fair competition, prevention and restriction of anti-competitive practices.

The law on protection of domestic market (safeguard Measures) of the Republic of Armenia (Adopted on 18 April, 2001) determines the relations concerned to application of safeguard measures on the import of products into the territory of the Republic of Armenia.

The law on anti-dumping and countervailing measures of the Republic of Armenia (Adopted on 19 June, 2002) defines the rules regulating the implementation of anti-dumping and countervailing measures on products imported into the territory of the Republic of Armenia.

The adoption of above mentioned laws in that stage of economic development of Armenia, requested the establishment and strengthening of effective protection of domestic market

and appropriate legal basis for free competition. Meanwhile, the adoption of mentioned laws give the possibility, to apply equivalent measures to increasing quantities or dumped import for protection of domestic producers (economic branches), if necessary.

For this purpose the following regulations have been adopted by the Government of the Republic of Armenia.

- "The regulation on granting import permissions in the case of application of quotas and tariff quotas" (The decree on July 22, 2004 N 1161-N of the Government of RA)

- "The regulation of organization of consultations for the purpose of the application of safeguard measures (Minister's decree on October 4, 2005 N 206-A).

State policy of improvement of competition environment and protection of market, being in the centre of private business and social legal and economy aimed at establishment of effective relations thereof, the success of which doesn't only depend on full application of competition legislation, but existing commercial usage between the market parties *(The Ministry of Economy of the Republic of Armenia, Market and Competition).*

The fulfilment of the international obligations taken by Republic of Armenia in the direction of international security, as well as national security of RA requires to implement control on the export of such products and transit of them through the territory of RA, as well as transfer of such information and results of intellectual activity which are used for civilian purposes and in accordance with their characters and features can also be used for military purposes, including weapons of mass destruction and the creation of means for its transportation (controlled intangible values). Legal acts adopted for this goal define a mechanism which aims to establish control on export of controlled items and their transit through the territory of Republic of Armenia as well as transfer of intangible values. Here you can learn more about the legislation regulating the field, and get information about the order of granting permissions to export controlled items, and transfer of intangible values as well as about the order of transit of controlled items through the territory of Republic of Armenia *(The Ministry of Economy of the Republic of Armenia, Export control)*.

A policy of direct export incentive has been adopted in our republic for ensuring progressive rates of exportation not satisfied by the elimination of external barriers. Besides constantly simplifying administrative procedures, certain measures are being taken for promoting export paying no attention to the objective export limitations. In terms of increasing export volumes and ensuring a progressive rate of export growth with respect to importation, a fairly liberal current field is being continually improved focusing on the promotion of exporting outputs of science intensive production. Further development of this policy in Armenia will be advanced by way of ensuring an alternative solution to the transport issue, introducing an effective system of promoting exporters and /or privileged crediting, complete introduction of systems for insuring the risks of exporters, marketing and quality control, and involving trans-national corporations *(The Ministry of Economy of the Republic of Armenia, Export control Economic Policy & Development Planning)* .

In relation to investments RA has declared and carries out the policy of "open doors" and this liberal approach is specified in the legislation, in particular in the Law "On foreign investments" of RA adopted in 1994, in the Concept of the Investment policy adopted in 2005, and in other legislative acts regulating economic environment concerning investments.

Investment policy of RA was made and carried out on liberal bases and directed to the integration of Armenia into the world economy.

The main principles of investment policy of RA are:

- application of liberal principles of economic activities in investment sphere;
- maintenance of attraction and stability of the legislation regulating the investments;
- maintenance equal, not discriminatory economic conditions for foreign and internal investors;
- granting of the national treatment and most favoured nation treatment to foreign investors and investments;
- maintenance of protection of legitimate interests of investors and investments.

The basic purposes of investment policy of RA are: maintenance of stable economic growth and increase of a living standard of the population by means of increase of economic activity, increase in volumes of investments and creation of a favourable investment climate.

For formation of the favourable investment environment and increase in volumes of foreign and internal investments special importance is given to the problem of overcoming of bureaucratic obstacles in the investment environment.

Stimulation of investments, presence of their significant volumes in economy was and remains the determinative for maintenance of comprehensible rates and volumes of economic development of RA.

With the purpose of improvement of the investment environment and stimulation of investments, the Government of RA aspires to carry out some primary steps what the following are:

- In order to prevent unequal regional development of the country and stimulation of investments in regions targeted measures - development of economic infrastructures, relations and communications, application of effective system of stimulation and assistance - are carried out. At the same time the development and realization of complex programs of regional development will be continued.
- Steps are taken for an essential change of structure of competitive advantages of the country taking into account modern tendencies of direct foreign investments, such as progressive increase in investment volumes in science intensive branches where the role of presence of natural resources and a cheap labour should gradually decrease and at the same time there should be decisive "created actives" such as qualified personnel, scientific and

technical structures, development of infrastructures. A special attention is attached to the development of communicative and information technologies and their wide application. Now these technologies are one of the basic strategic directions of the policy of state development.

- Realization of more directed and active cooperation with Diaspora by means of formations of mutually reliable and favourable environment.

- Formation of an insurance system corresponding to the world standards with the purpose of investment protection from possible investment risks *(The Ministry of Economy of the Republic of Armenia, Investment Policy and Foreign Economic Cooperation)*.

The improvement trend of the indicators characterizing the external debt of the Republic of Armenia (RA) is continuous. GDP ratio of state external debt reduction is not only the progressive growth of GDP and external debt reduction but also the result of appreciation of the RA currency against the U.S. dollar. Since 1999, the state external debt of the Republic of Armenia has increased due to the preferential loans. That trend continued in 2003-2006, and at the end of 2006 the share of concessional loans in the structure of the total external debt amounted to 98.9%.

Table 1.6.5.1 introduces the predictions of the indicators characterizing the state debt of RA predicted in 2008 for the period of 2011-2021.

Indicators	2011 (Predicted in 2008)	2015	2018	2021
State debt of RA, % of GDP	17.0	19.8	21.9	23.9
External state debt of RA, % of GDP	13.3	14.5	15.3	15.9
Internal state debt of RA, % of GDP	3.7	5.3	6.6	8.0
External debt service/ goods and services export, %	1.42	1.17	1.01	0.781
Interest of state debt/ income tax, %	2.11	2.32	2.4	2.9
Interest of state debt/consolidated budget expenditures, %	1.84	2.03	2.24	2.5
Source- *Sustainable Development Programme (2008)*				

Predications of the indicators characterizing state debt of RA: Table.1.6.5.1

If the essential goods inflation exceeds 30% per month the government of RA will set its price regulation measures.

It is envisaged that the price regulatory policy will be in effect for 20 products - beef, chicken, fish, milk, butter, cheese, eggs, potatoes, onion, carrots, tea, wheat, rice, Buckwheat, flour, sunflower oil, margarine, sugar, bread and salt. In case of over 30% increase of prices per month the authorized body, the Ministry of Economy will establish the upper threshold price or the extra charge of commercial size in 90-day period *("Found the Way of Inflation Restrain", Armtown (2011))*.

2012-2014 State Medium-Term Expenditure Program of the Republic of Armenia was submitted to the Government for approval on July 7, 2011.

On the basis of 2012-2014 State Medium-Term Expenditure Program of RA the Actual GDP annual growth in 2012- 2014 intended to be respectively 4.2, 4.5 and 4.8% which will be mainly contributed by the sectors of services and industry. The expectations and analysis on the global economic recovery submitted by the International organization were the basis for the medium – term predictions.

GDP ratio of 2012-2014 state budget deficit of RA will gradually reduce from GDP 3.1% to 2.4% in 2012-2014 for the planned 3.9% of 2011 and will amount to 227.5 mln. EUR_{2011} from 255.5 mln. EUR_{2011}, while the ratio of domestic sources of the state budget deficit financing in the total volume of deficit financing sources will vary from the range of 54.3% to 59.0% in 2012-2014 for the planned 55.3% of 2011 *("Government Will Approve the Cost Program, Project's Main Indicators")*.

Let us note that Armenia's economic growth was 2.6% in 2010, while the growth forecast set 4.6% for the State Budget in 2011.

According to official data, the economic growth rate has accelerated in Armenia. The preliminary estimates in January-May show that the industrial growth rate is higher from the growth rate of January-April by 1%. It is expected that the industrial growth will be in the range of 6.5-7% in January-May and the growth in May will amount to 16% compared to the rate of May in previous year *("Economic Growth in 2011 Will Be (5-6)%, Minister of Economy", Armtown (2011))*.

Table 1.6.5.2 briefs the deficit of the consolidated budget of RA in 2000-2011.

Year	Absolute value	In comparison with same period of last year (%)
2010	-345.9	-
2009	-464.9	-
2008	-59.1	-
2007	-103.6	-
2006	-65.9	-
2005	-67.6	-
2004	-44.3	-
2003	-31.9	-
2002	-61.8	-
2001	-99.2	-
2000	-99.6	-
Source- *Time Series, Consolidate Budget of Armenia (2011)*		

Consolidated budget of RA, mln. Euro, deficit (-) / surplus (+) , 2000-2011: Table.1.6.5.2

1.7. Transportation

The transport sector in Armenia includes railway, vehicle, air and pipeline transportation routes.

1.7.1. Road transport

The length of Armenia's primary roads amounts to 10,818 kilometres (km), and are divided into interstate (1,686 km), republican (1,747 km), local (4,271 km), and urban (3,114 km). The road network serves as the backbone of the country's economic development, providing connectivity within the country, to neighbouring countries, and to mainland Asia and Europe *(Asian Development Bank (ADB), Armenia's Transport Outlook, Transport Sector Master Plan, Transport And Communication, Armenia (2011))*.

Table 1.7.1 briefs the total number of vehicles and their average annual millage by categories and engine types.

Category		Total	Engine							
			Diesel		LPG (Liquefied petroleum gas)		Gasoline		Liquid gas	
			Total	Average annual mileage, km	Total	Average annual mileage, km	Total	Average annual mileage, km	Total	Average annual mileage, km
I	**Trucks**									
1	CIS countries	22873	9136	16269.2	3957	10653.6	9731	9057.0	49	12630.7
2	Foreign make	6238	3075	15785.2	1149	10497.2	2014	9094.4	0	0.00
Total		**29111**	**12211**	**16147.3**	**5106**	**10618.4**	**11745**	**9063.4**	**49**	**12630.7**
II	**Motorbuses**									
1	CIS countries	10273	1827	21655.7	4996	13530.5	3450	12890.8	0	0.0
2	Foreign make	5712	2292	21655.7	2160	13530.5	1260	12890.8	0	0.0
Total		**15985**	**4119**	**21655.7**	**7156**	**13530.5**	**4710**	**12890.8**	**0**	**0.0**
III	**Motor cars**									
1	CIS countries	212365	0	0.0	49130	10145.0	161687	9524.2	1548	12620.1
2	Foreign make	47224	6668	12420.8	2242	10145.0	38138	9524.2	176	12620.1
Total		**259589**	**6668**	**12420.8**	**51372**	**10145.0**	**199825**	**9524.2**	**1724**	**12620.1**
Consolidated		**304685**	**22998**	**16053.4**	**63634**	**10563.7**	**216280**	**9572.5**	**1773**	**12620.4**

Source *– Data from Armenian Customs Service*

Number and average annual mileage of vehicles per category and engine type: Table.1.7.1

In Armenia, the average age of vehicles is about 12 years. About 30% of the transport sector, including public transport, is privatized and this share is increasing. The age and technical conditions of the imported vehicles are not restricted *(WHO Europe/ United Nations, Transport, Health and Environment Pan-European Programme)*.

1.7.2. Shipping

Armenia has no water spaces for merchant marine.

1.7.3. Railways

The Armenian railway network consists of 845 km electrified line, mostly single track. All lines are electrified, electric power is 3 kV DC. The area is mountainous, so several of the lines are heavily graded and have very narrow curves.

In 2007 the Russian Railways RZD won the tender to operate the Armenian railways for at least 30 years, for which the name South Caucasus Railway is used. Of the original 845km only around 780km is still in operational condition, and 726km is used for passenger trains.

Table 1.7.3 summarises the quantity of the passengers and goods transported by South Caucasus Railways in 2009.

Kind of transportation	2009
Gross Transported by railways (1000 t)	2,942.6
Passengers carried by railways (mln. passengers)	0.8
Source – *Statistical Yearbook of Armenia (2010)*	

Number of transported passengers and goods: Table.1.7.3

1.7.4. Air transport

Table 1.7.4.1 represents the Number of Landing/Takeoff cycles (LTO) and Table 1.7.4.2 – number of transported passengers and goods by air.

INTERNATIONAL AIRCRAFT TYPE	Total Number of LTO's per Aircraft type	Fuel Consumption per LTO (t/LTO)
IL-86	180	2.4
TU-154	1270	2.19
IL-62	17	2.4
TU-134	286	2.4
YAK-42	1069	2.4
AN-24	145	2.4
IL-76	26	2.4
AN-12	99	2.4
AN-26	8	2.4
YAK-40	76	2.4
A-310	85	1.55
A-320,319	3085	0.81
B-737	276	0.87
AYL TIPER	482	2.4
TOTAL b	**7104**	
Source – *Second National Communication (2010)*		

Number of Landing/Takeoff cycles: Table.1.7.4.1

Kind of transportation	2009
Gross Transported by air (1000 t)	8.4
Passengers carried by air (mln. passengers)	1.5
Source – *Statistical Yearbook of (Armenia 2010)*	

Number of transported passengers and goods: Table.1.7.4.2

Armenia has three main airports: Zvartnots, Shirak, and Erebuni. Zvartnots (or Yerevan) International Airport is the principal gateway to the country. Armenian International Airports manages and maintains the airports in Zvartnots and Shirak under a 30-year concession.

1.8. Energy Generation

Total gross inland energy consumption amounted to 2.21 Mtoe in 2008, from which by gas – 61.3%, electricity – 18.9% and oil products – 18.1% (Table 1.8).

Type	Percentage (%)
Oil	18.1
Gas	61.3
RE	0.045
Electricity	18.9
Heat	1.6
Source – *Second National Communication (2010)*	

Types of energy sources and their percentage contribution: Table.1.8

Ratio of domestic energy supply to gross inland consumption reaches to 0.0705 in case if nuclear is considered as an external energy source and 0.36 – if nuclear is considered as domestic energy source.

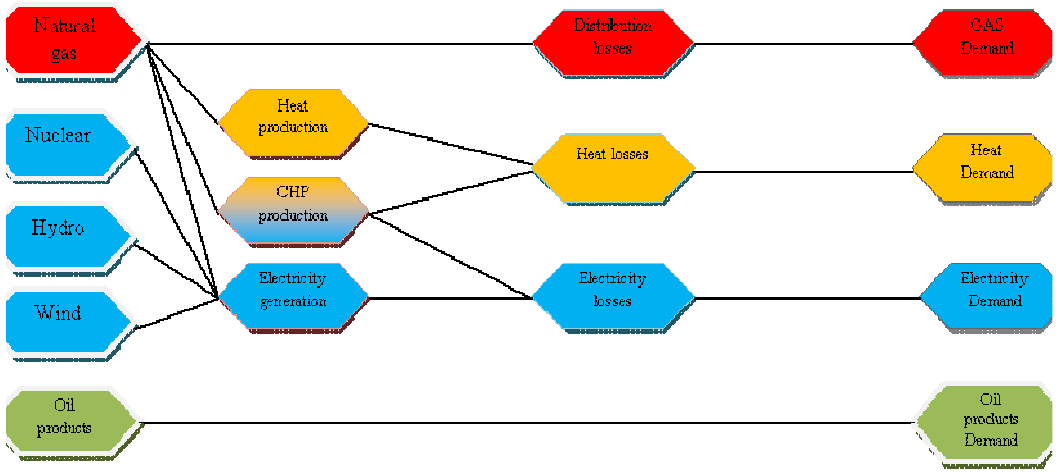
1.8.1. Energy supply

Armenia does not have its own fuel resources and the fuel demand is met through imports. Armenia produces around 31% of its energy by its own primary energy sources (hydro-energy and nuclear energy).

The main fuel type is natural gas. In 2000-2006, the share of natural gas in the total fuel consumption amounted to 70-79%. The composition of energy consumption is characterized by the large share of natural gas (53.6%) and nuclear energy (25.1%).

At present the total installed capacity of electrical energy systems is 3,453 MW including 1,931 MW of thermal power plants, 1,115 MW of hydro power plants, 408 MW of the nuclear power plant and other Renewable Energy Sources about 133 MW (including small HPP 130 MW) *(Ministry of Energy and Natural Resources of RA, Producing stations)*.

Production chain of the energy supply sources in Armenia is briefly represented in Figure 1.8.1



Production chain of energy supply sources in Armenia: Figure.1.8.1

Table 1.8.1 represents the installed capacity of the electricity generation system in 2011 and electricity generation in 2010 *(Public Services Regulatory Commission, Yearly reports)*.

Power Plants	Installed Capacity, MW (2011)	Generation, mln. kWh (2010)
Thermal (Natural gas)	1,931	1,442.5
Nuclear	408	2,490
Hydro	985	2,142.5
Other RES	133	415.9
Source – [21, 22]		

Installed capacity of the electricity generation system: Table.1.8.1

1.8.2. Energy consumption

The composition of energy consumption is characterized by the large share of natural gas (53.6%) and nuclear energy (25.1%).

In 2006, the total energy consumption in Armenia amounted to 114.2 PJ (34% of the 1990 level). The main areas of fuel consumption are transportation (26.6%), power production (23%) and the housing sector (22%) *(Second National Communication (2010))*.

The following Table 1.8.2 summarises domestic energy consumption in Mtoe.

Sector	Mtoe
Industry	0.96
Transport	0.32
Residential	0.17
Agriculture	0.07
Tertiary	0.69
Source – *Second National Communication (2010)*	

Energy consumption by sectors: Table.1.8.2

1.9. Waste disposal

1.9.1. Solid waste disposal

In 2000-2007, the average annual volume of municipal solid waste (MSW) generated in the country was 595 thousand tons, or 289 kilograms per city resident. MSW is collected, transported and stored in 48 managed landfills.

In all landfills, waste is accumulated without preliminary sorting and separation, and they are partially decontaminated by covering with a layer of gravel. In 2006, the organic carbon decomposed in MSW amounted to 68.5%. Storing large quantities of MSW in landfills, results in anaerobic fermentation and methane emissions.

Municipal wastewaters include household, commercial and, partially, industrial waste waters. In 2006, the volume of wastewater discharge in Armenia amounted to 174 million cubic meters, from which 59.8 million cubic meters from treatment facilities. The 20 waste water treatment facilities built before 1970s are in extremely poor technical conditions; they are non-operational and waste waters are discharged into surface waters without treatment. The sediment waste accumulated in the bulky equipment of the treatment plants are not decontaminated and part of the generated methane is emitted into the atmosphere.

Since 2008, the restoration and modernization of wastewater treatment plants and sewage networks have started in Armenia with international financial support *(Second National Communication (2010))*.

1.9.2. Wastewater treatment

There are no any waste water treatment plants under operation, but the plan of rehabilitation of Yerevan Waste Water Treatment Plant is under the development. The plant, which is the largest one in the country, with 550 cubic meters a day capacity and 4,200 km of system network and collectors, is operating with only mechanical treatment. The biological treatment system of the plant is completely out of service due to equipment failures and lack of funds for repairs and refurbishment. After the rehabilitation of the plant it will be possible to introduce biogas technologies to organize methane capture and its further destruction through utilization in gas engine generator or by flaring *(Second National Communication (2010))*.

2. The national GHG inventory

According to Article 4 of the UNFCCC, the Parties have primary commitment to develop, periodically update, publish and make available to the Conference of the Parties national inventories of anthropogenic emissions.

Armenia's First National GHG Inventory was prepared in 1996-1998, within the framework of preparation of the First National Communication to the UNFCCC. In the mentioned inventory, GHG emissions and sinks were evaluated for 1990 (baseline year) and 1994-1996, using the 1995 IPCC methodology.

In 2004, within the framework of the regional UNDP/GEF project for capacity building in order to improve the quality of national GHG inventories, the first inventory of GHG was improved, national experts were trained and some emission coefficients were updated. The key sources were also analysed and the emission sources which needed an improved inventory were identified. Inventory data for methane emissions from solid waste landfills and livestock enteric fermentation were revised. Within the framework of the project, a national manual for GHG inventory was also developed, which was widely used during the preparation of the Second GHG inventory of Armenia *(Second National Communication (2010))*.

2.1. Development of a national GHG inventory

According to the Guidelines (2003) for preparation of national communications of non-Annex I Parties, the year 2000 is selected as the baseline year for GHG inventory. For that year a comprehensive GHG inventory is developed, which includes all six sectors of IPCC - "Energy"; "Industrial Processes"; "Solvent Use"; "Agriculture"; "LULUCF" and "Waste". In order to complete the data series for the timeline 1990-2006, Data series were completed for the motioned period, with the exception of the "Solvent use" sector, for which data were collected only for the years 2000-2007, and the "LULUCF" sector, for which the necessary data have not been available. GHG emissions for "LULUCF" sector were calculated for the year 2000 and recalculated for 1990.

The main GHG is carbon dioxide. In 2000, in the total GHG emissions, without "Land use, land use change and forestry (LULUCF)" sector, the share of carbon dioxide amounted to 62.8%, methane - 34.2% and nitrous oxide - 3%. Carbon dioxide emissions in 2006 declined by 81% compared to the 1990 level, methane – by 38% and nitrous oxide - by 42% (Table 2.1.1) *(Second National Communication (2010))*.

Gas	1990	1994	2000	2006
CO_2	21,558.5	2,994.8	3,187.2	4,157.0
CH_4	3,200.5	1,557.3	1,733.3	1,986.5
N_2O	195.9	106.9	151.8	279.3
Total emissions, without LULUCF	24,954.9	4,679.0	5,071.3	6,422.8
Total emissions, with LULUCF	24,218.9	n/e	6,634.9	n/e
Source *– Second National Communication (2010)*				

GHG emissions in Armenia (Gg CO_2 eq): Table.2.1.1

In 2000, the total GHG emissions reduced by 80% compared to the baseline (1990). The sharp decline in emissions is due to the energy and economic crisis of 1992-1995, and significant changes in the economy - decline in the share of industrial production and increase in the share of non-production sectors, as well as prevalence of natural gas consumption. Table 2.1.2 introduces the "Energy" sector accounts for the major part of the total GHG emissions in 1990-2006.

Sector	1990	1994	2000	2006
Energy	22,777.0	3,268.6	3,550.6	4,441.4
Industrial processes	630.3	53.0	119.7	323.8
Agriculture	982.6	812.6	840.7	1,149.5
Waste	564.9	544.9	560.3	508.0
LULUCF	-736.0	n/e	1,563.62	n/e
Source – *Second National Communication (2010)*				

GHG emissions/removals by sectors (Gg CO_2 eq): Table.2.1.2

Sector	CO_2	CH_4	N_2O	CO_2 eq
Energy	3,067.57	22.84	0.01	3,550.62
Industrial processes	119.68			119.68
Agriculture		35.20	0.33	840.68
LULUCF	1,536.30	1.30	0.00	1,563.60
Waste		24.49	0.15	560.31
Total	4,723.55	83.83	0.49	6,634.89
Source – *Second National Communication (2010)*				

GHG emissions in Armenia, 2000 (Gg): Table 2.1.3

GHG emissions for 1990-2006 by sectors are presented in Table 2.1.4.

Year	Energy	Industrial Processes	Agriculture	LULUCF	Waste	Total
1990	22777.02	630.33	982.61	-736.02	564.96	24218.89
1994	3268.56	52.99	812.60	n/e	544.95	4679.09
1995	3757.19	120.00	804.04	n/e	531.49	5212.72
1996	3663.81	136.84	808.37	n/e	530.20	5139.23
1997	4216.37	141.02	739.69	n/e	532.84	5629.93
1998	4247.46	176.01	838.30	n/e	530.80	5792.57
1999	4031.84	144.02	846.37	n/e	536.90	5559.13
2000	3550.62	119.68	840.68	1563.60	560.31	6634.88
2001	3748.36	124.70	872.43	n/e	509.52	5255.01
2002	3003.68	165.31	911.49	n/e	509.71	4590.19
2003	3369.99	191.38	954.30	n/e	500.49	5016.17
2004	3746.44	268.81	1052.39	n/e	502.67	5570.32
2005	4315.47	317.71	1080.25	n/e	509.29	6222.72
2006	4441.40	323.78	1149.52	n/e	508.04	6422.74
Source – *Second National Communication (2010)*						

GHG emissions by sectors, 1990-2006 (Gg CO_2 eq): Table 2.1.4

The overall GHG emissions of Armenia for the year 2000 are 6634.9 Gg CO_2 eq or 27% of the 1990 year's level (Table 2.1.3). Carbon dioxide constitutes 71% of greenhouse gas emissions, 27% is methane, and 2% is nitrous oxide. The distribution of emissions by key sectors is as follows: "Energy" -53%, "LULUCF" – 24%, "Agriculture" – 13%, "Waste" – 8% and "Industrial Processes" – 2%.

Total emissions of gases with indirect greenhouse effect in 1990-2006 reduced by 78%, including reduction of CO emissions by 76%, NO_X by 80% and NMVOC by 66% (Table 2.1.5).

Year	CO	NOx	NMVOC	SO_2
1990	279.13	76.59	50.44	0.39
2000	64.60	12.13	14.54	0.64
2006	62.52	15.07	17.26	0.36
Source – *Second National Communication (2010)*				

GHG emissions with indirect greenhouse effect and sulphur dioxide: Table.2.1.5

The following is the ratio of greenhouse gas emissions produced to GDP:

CO_2/GDP = 1.21 [kg CO_2/ 2000 EUR] (as of 2008) *(International Energy Agency)*

Below is the ratio of greenhouse gas emissions from "Energy" sector produced to total GDP:

$CO_{2\ Energy}$/GDP = 0.752 [kg CO_2/ 2000 EUR] (as of 2006) *(Second National Communication (2010))*

"Energy" sector's GHG emissions in 1990 and for the period of 1997-2006 are briefed in Table 2.1.6.

Year	Energy production	Transport	Processing Industry and construction	Commercial/ institutional	Housing	Agriculture/ forestry/ fishery	Leakage emissions	Other	Total
1990	11,931.46	3,783.05	2,058.23	1,725.45	1,687.70	145.79	1,670.16	315.19	**22,777.03**
1997	1,951.54	995.76	548.41	30.36	47.18	133.88	509.24	0.00	**4,216.37**
1998	9,991.08	912.00	517.89	27.18	163.69	121.53	514.11	0.00	**4,247.48**
1999	1,550.11	937.40	505.8	106.35	311.92	137.26	483.00	0.00	**4,031.84**
2000	1,666.76	647.84	445.49	39.62	195.34	82.23	473.35	0.00	**3,550.63**
2001	1,689.85	596.93	365.39	90.20	208.05	320.29	477.64	0.00	**3,748.35**
2002	980.99	682.50	387.10	84.53	198.24	316.80	353.53	0.00	**3003.69**
2003	974.92	768.38	416.02	140.77	334.82	350.97	384.12	0.00	**3369.99**
2004	1,014.37	822.13	545.45	73.66	468.85	368.60	453.38	0.00	**3746.44**
2005	1,158.37	853.17	687.01	35.78	634.43	384.08	562.64	0.00	**4315.48**
2006	956.12	947.94	680.78	109.08	792.18	366.43	588.87	0.00	**4441.40**
Source – *Second National Communication (2010)*									

GHG emissions in the "Energy" sector, 1990, 1997-2006 (Gg CO_2 eq): Table.2.1.6

Parallel to the decline in the total GHG emissions, the share of fuel combustion in the emissions from the "Energy" sector declined from 93% in 1990 to 87-88% in 1997-2006, and the share of methane leakages increased respectively from 7% to 12-13% .

The ratios of GHG emissions from Industry and Tertiary sectors to their GDPs are shown in Table 2.1.7.

Indicators	2006
Industry Emissions intensity, (t CO_2 / M€)	0.315
Tertiary sector Emissions intensity, (t CO_2 / M€)	0.641
Source – *Second National Communication (2010)**,** Statistical Yearbook of Armenia (2010)*	

Industry and Tertiary sectors' emissions intensities, (t CO_2 / M€): Table.2.1.7

GHG emissions from residential sector per capita amounts to 245.7 (kg / capita).

2.1.1. Government ministries/agencies responsible for collecting and inventorying data

The Republic of Armenia, as a non-Annex I Party to the Convention, does not have the obligation to prepare annual GHG inventories and its national inventories are prepared within the framework of preparations of National Communications. The sustainable institutional mechanism for preparation of national GHG inventories has yet to be established in Armenia and inventories are prepared by temporary working groups. Independent experts, as well as the "Scientific Research Institute of Energy" CJSC have been involved in the preparation of the Inventory *(Second National Communication (2010))*.

2.1.2. Supporting institutions

The Republic of Armenia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993 and the Kyoto Protocol in 2002. By a Decree of the Government of Armenia, the Ministry of Nature Protection has been appointed as the Designated National Authority (DNA) for the Clean Development Mechanism

(CDM) of the Kyoto Protocol, one of the main functions of which is to approve the compliance of CDM projects with the requirements of the Kyoto Protocol, as well as to ensure effective participation of Armenia in international CDM processes. The procedure for submission and approval of CDM projects has been approved, according to which projects should be in line with the sustainable development strategy and criteria of the country **(***Second National Communication (2010))*.

2.1.3. Measurement methodology and data sources

GHG emissions are projected for 2005-2020 and the calculations are based on the expected volumes of operations in the relevant sectors of economy and the basic macroeconomic development scenario with an average 6.0% of annual growth. Assumptions for the future volumes of operations and measures for reducing emissions are based on sectorial development plans. For all categories of emissions sources, two scenarios of GHG emissions were considered:

- "Business-as-usual" scenario, which assumes the overall continuation of practices and relationships at the national level, but also includes certain processes of modernization corresponding to international trends,

- "With measures" scenario, which includes certain measures contributing to the reduction of GHG emissions planned by sectorial development programs.

GHG emissions projections are assessed by applying the LEAP long-term planning computerized model. Considering that target indicators are defined by development plans for the main sectors of the economy, the model has been used as a tool for calculating emissions and determining their sectorial distribution, and also for assessing volumes of substituted fossil fuels and the corresponding reductions in emissions due to the use of renewable energy sources and nuclear energy.

With respect to the methodology, the National GHG Inventory was prepared based on the Revised 1996 IPCC Guidelines for National GHG Inventories, Good Practice Guidance and Uncertainty Management in National GHG Inventories (IPCC 2000), and Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC 2003). In the "Solvent Use" sector Atmospheric Emission Inventory Guide books (CORI-NAIR-99) of the Cooperative Program for Monitoring and Evaluation of the Long-Range Transboundary Air Pollution in Europe (EMEP) is used.

IPCC methodology is an open system, which can be completed, developed and updated based on country specific conditions. The work was done based on the following principles:

- strict compliance with the logic and structure of the IPCC methodology,

- prevalence of the use of national data and coefficients,

- use of all possible sources of information,

- maximum use of the possibilities of national information sources.

During the preparation of the GHG Inventory of Armenia, inventory of gases with direct greenhouse effect – CO_2, CH_4 and N_2O, from key sources were prioritized. The inventory of gases with indirect greenhouse effect - CO, NO_X, NMVOC, SO_2, was also prepared. The emissions of HFCs, PFCs, and SF6 compounds were not identified.

Input data for the sectors were provided by the Ministry of Agriculture, Ministry of Energy and Natural Resources, Ministry of Economy, the State Revenue Committee under the RA Government, State Committee of the Real Estate Cadastre under the RA Government, National Academy of Sciences, municipalities of Yerevan, Gyumri, Vanadzor and other cities of Armenia, the "Scientific Research Institute of Energy" CJSC, "ArmRusgasprom" CJSC, "Hayenergo" CJSC, "Hayantar" SNCO, etc *(Second National Communication (2010))*.

2.1.4. Activity data

Assessment of uncertainties is based on IPCC GPG 2000, and IPCC GPG LULUCF 2003. The uncertainties are conditioned by the uncertainties in the activity data used and emission

factors. When using statistical data, the uncertainty of activity data amounts to 6-10%, uncertainty of data received from enterprises is considered to be up to 5%. Uncertainties of emission factors taken from IPCC guidelines amount to 15-50% depending on the source of emissions and the greenhouse gases.

Uncertainties of key sources in the "LULUCF" sector are:

- croplands remaining cropland subcategory – 75%;
- forest land remaining as forest land subcategory – 101%.

The analysis of uncertainties by Tier 1 method was conducted with the same categories used for the analysis of key sources.

In Armenia, similar to other countries with transition economies, the difficulties in assessing uncertainties of activity data for 1990-2006 are conditioned by the following main circumstances:

- Absence of calculation of statistical data uncertainties at national statistics;
- Difficulties in assessing uncertainties based on trends, conditioned by:
- Sharp economic decline in 1990 and slow recovery starting in 1997;
- Significant changes in the sources of activity data;
- Difficulties of data collection related with the shadow economy *(Second National Communication (2010)).*

2.1.5. Conformity with data-exchange standards

N/A

Systematic observations

Systematic hydro-meteorological and climate observation in Armenia are carried out by the State HydroMeteorological and Monitoring Service ("Armstatehydromet" SNCO) under the Ministry of Emergency Situations of Armenia.

"Armstatehydromet" operates in accordance with the provisions of the Law on Hydro Meteorological Activities (2001) and provides actual hydro logical and meteorological data to the authorities of the Republic of Armenia, the public and various sectors of economy. Besides, "Armstatehydromet" provides information on the forecasts of weather and dangerous hydro-meteorological phenomena, climate and its changes.

The state authorized body in charge of hydrometeorological observations is the "State hydrometeorological and monitoring service of the Republic of Armenia" ("Armstatehydromet") SNCO. The network of hydro-meteorological observations in Armenia currently includes 42 meteorological and three specialized stations, 79 hydro-meteorological observation points (for measuring precipitation), and seven hydrological stations with 92

water gauging observation points. Three meteorological (Yerevan, Sevan, Amasya) and one aerological (Yerevan) station of the Service are included in the global communication system (GCS), and 20 more are included in the CIS intergovernmental hydro-meteorological network of the GCS.

Since 2003, the Yerevan aerological station of "Armstatehydromet" is included in the Global Climate Observation System (GCOS) Upper Air Network (GUAN). "Amberd" high mountainous station is included in the WMO Global Ozone Observation System (GAW/GO3OS). In 2007 "Aragatz" high mountainous station (3226 m), the only station in the region operating above 3000m of altitude, was included in the GCOS Surface Network (GSN). The station is operational since 1929 and is extremely significant for climate change studies in the region.

Being included in the European Climate Assessment and Dataset (ECA&D) program in 2003, the "Armstatehydromet" regularly provides observation data, which are used for calculation of the indices developed by IPCC for climate change assessment. In 2007, the computer software developed for calculating those indices was introduced in "Armstatehydromet", jointly with the German meteorological organization (DWD), is implementing the program "The use of CM-SAF satellite products for monitoring climate on Armenia's territory". In 2009, "Armstatehydromet" participated in the "Technical support to climate risks management" Project, implemented by the Asian Centre for Disaster Preparedness (ACDP) and the UNDP.

Research activities are conducted in "Armstatehydromet" by the Climate Study Centre, which includes divisions for climatology, digital modelling of hydro-meteorological processes, global and regional climate change studies, applied climatology and atmosphere pollution studies. The Climatology Division processes data from 280 stations and observation points operating at various periods on the territory of Armenia, prepares climate yearbooks where the climate resources of the territory are presented in detail.

The Global and Regional Climate Change Studies Division develops models, with the help of which climate change scenarios for the territory of Armenia are calculated taking into account the changes to the global climate. Long-term forecasting methods (monthly, seasonal, annual) are developed and used to interpret and solve various problems *(Second National Communication (2010)).*

2.2.1. Measurements of meteorological parameters and instrumentation deployed

Hydro-meteorological observations are conducted in Armenia since 1881, however initially they had a non-systematic nature. A proper observation network was established in 1920s. The maximum number of meteorological stations was 62 (1961). Currently there are 42 meteorological and 3 special stations, 79 hydro-meteorological observation points, and 7 hydrological stations with 92 water gauging observation points in the system. 12 of the stations, with 6 remote ones, are located at over 2000 m above sea level.

Three meteorological (Yerevan, Sevan, Amasya) and one aerological (Yerevan) stations are included in the global communications system (GCS), and 20 meteorological stations – in the

CIS intergovernmental hydro-meteorological network. Within the framework of voluntary cooperation with the World Meteorological Organization (WMO), a number of new systems and equipment were introduced in "Armstatehydromet" in 2000-2007.

Technologies corresponding to new international standards are used for obtaining data and exchanging information. The WAREP code for early warning on dangerous hydro-meteorological phenomena is being introduced. Since 2007, efforts are being undertaken to transit from the traditional letter-digit codes to the Binary Universal form for the Representation of meteorological data (BUFR), which is widely used all over the world. The "TV-inform" system installed in "Armstatehydromet" in 2002 was replaced with the "Mitra" system in 2004, and it was integrated with UniMAS and RETIM2000 systems *(Second National Communication (2010)).*

2.2.2. Oceanic observations

Not applicable.

2.2.3. Terrestrial observations

Episodic samplings were performed in late 80*s* to determine the land pollution but works were not continued and the examinations of the taken samples were made abroad *("ArmEcomonitoring" State Non-profit Organisation, Air-quality monitoring and Terrestrial Observation (2011))*.

2.2.4. Air-quality monitoring

"Environmental Impact Monitoring Centre" (Armecomonitoring) is currently performing observations aimed at the definition of the chemical pollution in the surface water and atmospheric air located close to the ground layer in a number of areas.

The regulated activities of the Republic state-level environmental pollution monitoring began in 60*s* of the last century. The monitoring activities were performed in scope of the identification of chemical pollution in the areas air and surface waters (rivers, lakes and reservoirs).

The Monitoring system was gradually declining in the post-Soviet years, and due to the physical wear and tear or incomplete funding the number of air observation station reduced; moveable observation stations disappeared; the number of air sampling lowered in several times, and Syunik Region with its Industrial facilities have been out of the air monitoring system so far.

During the Soviet Union period within the most polluted main industrial centres up to 23 air monitoring station were being operated in Yerevan, Vanadzor, Alaverdi, Ararat cities four of which were moveable (specially equipped cars) and examined up to 86,500 samples.

In the period of1997-1998, the atmospheric air-quality monitoring was being carried out within the four cities of Armenia – Yerevan, Vanadzor, Alaverdi and Ararat (observation of the systematically acted 11 indicators). Gyumri and Hrazdan cities have joined to the number of the aforementioned cities since 1999. The monitoring of the carbon monoxide has been

suspended since1997 due to the metering device's falling out. The most important part of observation stations of observation network completely dissolved and came out of the operation. At present, 3 of the 7previously existing regional air laboratories are operating in Yerevan, Vanadzor, Alaverdi but the instrumental and laboratory complexes are in need of substantial upgrades.

Currently 5 observation stations are acting in Yerevan, 3 in Vanadzor, 2 in Alaverdi and one in Gyumri, Ararat and Hrazdan singly. The analyses of 31,450 samples characterizing the atmospheric air quality were made in 2005. The contents of the airborne dust, ulphur and nitrogen dioxides in air were defined in Vanadzor and Alaverdi, and the contents of the ground close located ozone, nitrogen monoxide, chloroprene and aromatic hydrocarbons (benzol, toluene, ksilol, etilbenzol) in Yerevan. The content of the airborne dust in air has only been identified in Gyumri, Ararat and Hrazdan.

Currently, efforts are being made towards the introduction of new methods for air monitoring, which will enable to carry out full monitoring in all of the mentioned areas next year. The main subjects of the Centre (Armecomonitoring) are the development and implementation of the state policy and strategy for the ecological security, the organization of the monitoring (observation, forecasts, assessment) and study of the nature protection and anthropogenic impact on the environment and its consequences for the maintenance of permissible use of the natural resources on the needed basis aimed at the completing, regulating and coordinating the results of the efforts made by its and other organizations in that field and to provide the relevant information to the state bodies, organizations and population in the context of the overall national security of the Republic of Armenia *("ArmEcomonitoring" State Non-profit Organisation, Air-quality monitoring and Terrestrial Observation (2011))*.

3. Reporting

3.1. The GHG inventory, emissions per sector

The biggest reduction of GHG emissions occurred in the "Energy" (80%) and "Industrial Processes" (49%) sectors. Since 2000, the emissions have increased in the "Industrial Processes" sector due to growing volumes of construction (Table 3.1.1).

Year	Energy	Industrial Processes	Agriculture	LULUCF	Waste	Total
1990	22,777.02	630.33	982.61	-736.02	564.96	24,218.89
1994	3,268.56	52.99	812.60	n/e	544.95	4,679.09
1995	3,757.19	120.00	804.04	n/e	531.49	5,212.72
1996	3,663.81	136.84	808.37	n/e	530.20	5,139.23
1997	4,216.37	141.02	739.69	n/e	532.84	5,629.93
1998	4,247.46	176.01	838.30	n/e	530.80	5,792.57
1999	4,031.84	144.02	846.37	n/e	536.90	5,559.13
2000	3,550.62	119.68	840.68	1563.60	560.31	6,634.88
2001	3,748.36	124.70	872.43	n/e	509.52	5,255.01
2002	3,003.68	165.31	911.49	n/e	509.71	4,590.19
2003	3,369.99	191.38	954.30	n/e	500.49	5,016.17
2004	3,746.44	268.81	1,052.39	n/e	502.67	5,570.32
2005	4,315.47	317.71	1,080.25	n/e	509.29	6,222.72
2006	4,441.40	323.78	1,149.52	n/e	508.04	6,422.74
Source *– Second National Communication (2010)*						

GHG emissions by sectors, 1990-2006 (Gg CO_2 eq): Table.3.1.1

3.2. The GHG inventory, emissions per type

Year	CO_2	CH_4	N_2O	Total
1990	21,558.52	3,200.50	195.87	**24,954.92**
1994	2,994.83	1,577.32	106.97	**4,679.09**
1995	3,427.09	1,688.42	97.21	**5,212.72**
1996	3,376.95	1,664.10	98.18	**5,139.23**
1997	3,835.91	1,697.03	96.99	**5,629.93**
1998	3,897.38	1,703.71	191.48	**5,792.57**
1999	3,679.63	1,695.38	184.11	**5,559.13**
2000	3,159.90	1,760.58	150.76	**5,071.29**
2001	3,384.74	1,718.42	151.84	**5,255.01**
2002	2,803.80	1,628.44	157.95	**4,590.19**
2003	3,162.82	1,687.35	166.00	**5,016.17**
2004	3,546.91	1,769.37	254.04	**5,570.32**
2005	4,053.63	1,919.82	249.27	**6,222.72**
2006	4,157.02	1,986.47	279.25	**6,422.74**
Source *– Second National Communication (2010)*				

*Without LULUCF

Emissions of CO_2, CH_4 and N_2O, 1990-2006 (Gg CO_2 eq)*: Table.3.2.1

In 1995-2006, parallel to the stable growth of GDP, GHG emissions remained at a low level and, in effect, did not change (Table 3.2.1).

Compared to 1990, total GHG emissions in 1990-2006 reduced by four times – from 25,000 Gg CO_2 eq to 6400 Gg CO_2 eq. The largest decline in emissions took place in 1991-1994, as a result of the economic and energy crisis in the transition period.

3.3. Information publicly available

A number of guidelines, manuals and informational bulletins devoted to climate change issues for specialists, lecturers and decision-makers were published in 1999-2008, which also contributed to public awareness building. Some of the published materials include:

- Utilization of Renewable Energy in Armenia. Review of the Last Five Year Practical Activity;
- All About Climate Change. Climate Change Information Brochure;
- Caring for Climate: A Guide to the Climate Change Convention and the Kyoto Protocol, UNFCCC;
- Clean Development Mechanism manual for Armenia;
- Climate change and its impacts, guideline-explanations;
- Implementation of the Kyoto Protocol's Clean Development Mechanism in Armenia;
- Forest Biodiversity of Armenia's Syunik Marz and Global Climate Change;
- Main Approaches of Agriculture Sector Vulnerability Reduction to Global Climate Change;
- Armenia: Climate Change Problems. Collected Articles. I and II issues;
- Proceedings of Conferences on Renewable Energy and Energy Saving (2001, 2003, 2005 and 2008);
- A 2008 calendar reflecting consequences of climate change impact in Armenia.

The website of the Climate Change Information Centre of Armenia was created in 1997 in order to make information on climate change impacts in Armenia and the corresponding efforts available to stakeholders and the broader public.

Currently, the website includes information on climate change issues, mitigation of climate change impacts, international and national action plans, global environmental conventions, international and national partners, CDM projects in Armenia, as well as thematic literature. The website is updated regularly. In 2008, the website received the main prize in producing the best website in Armenia at the Third E-content Pan –Armenian Competition.

In 2009, the publication of the "Climate Change Newsletter-Armenia" electronic journal was launched. The newsletter is distributed through electronic networks to governmental agencies, international organizations, embassies, educational institutions, NGOs, representatives of the business sector, etc. Issues of the newsletter are published on the website of the Climate Change Information Centre of Armenia.

In cooperation with the Ministry of Nature Protection, an Armenian TV channel regularly airs the "Environmentalist's Diary" Program since 2005 which includes climate change related broadcasts. Some TV channels also refer to climate change issues with increasing frequency.

The coverage of environmental issues in the Armenian printed and online press has increased since 2005 and numerous references to climate change issues have been made.

Popular films and video materials have been produced, such as Climate Change (1999), Life-Giving Land (2004) and GHG and Climate Change (2007).

Environmental NGOs are actively involved in promoting ecological education and public awareness in the country. With the support of NGOs, a series of environmental education booklets and posters under the common title of "We and Our Planet", "Sowing Thoughts – the Same as Planting Trees" manual for teachers and "Energy: Know, Use, Save" manual in three volumes, among other materials, were published. Some of the mentioned posters and manuals have been approved by the National Education Institute of the Ministry of Education and Science as complementary manuals for teaching Ecology in secondary schools of Armenia and have been distributed to secondary schools.

Since 2002, 14 Public Ecological Information (Aarhus) Centres are operational in all regions of Armenia, which aim to build public awareness on environmental issues and promote public participation in decision-making processes *(Second National Communication (2010))*.

4. Verification

4.1. Statistical methods for QA/QC analyses

The quality control and quality assurance (QC/QA) procedures have been the integral part of the GHG inventory process in Armenia aimed at improving the quality of the inventory. The QC/QA procedures have been implemented based on the Tier 1 approach of the IPCC Good Practice Guidance, and organizations from respective sectors have taken part in the process.

QC process for all sectors has comprised the following:

- Check the incorrectness and mechanical errors of input data;
- Check the incorrectness and mechanical errors of data entered;
- Check the calculations for filling the data gaps;
- Check the entered measurement units and emission factors;
- Check the estimations of GHG emissions;
- Check the completeness/consistency of the timeline with focus on calculation methodologies, emission factors or other changing parameters;
- Check the accuracy of entered formulas in reporting sheets compliant to the national circumstances;
- Check the calculations of national emission factors;
- Check the respective documentation and references.

The QA, as defined in the IPCC Good Practice Guidance, is "...a planned system of review procedures conducted by the third party upon a finalized inventory". The quality assurance process usually includes both expert and general public review. Expert review is implemented in two stages: review of the preliminary version of the emission calculations, and review of the calculations and inventory report. In addition, during the review process experts are selected and involved to ensure additional review of the inventory and identification of ways for assessment and improvement of inventory methodologies and data *(Second National Communication (2010))*.

4.2. Calculation of data verification indices

N/A

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Appendix

Acronyms and Abbreviations

GS	Government structure
NOA	National Observatory of Athens
RA	Republic of Armenia
WTO	World Trade Organization
NP	national procedures
IPCC	Intergovernmental Panel on Climate Change
AKS	Analysis of the key sources
GHG	greenhouse gas
LULUCF	Land use, land-use change, forestry
QA	quality assurance
QC	quality control
CORINAIR	Core Inventory of Air Emissions
EMEP	European Monitoring and Evaluation Program
CJSC	closed joint stock company
SNCO	Statutory Nature Conservation Organisation
LEAP	Long range Energy Alternatives Planning System
UNFCCC	United Nations Framework Convention on Climate Change
DNA	Designated National Authority
CDM	Clean Development Mechanism
UNDP	United Nations Development Programme
USA	United States of America
GEF	Global Environment Fund
P	population
km^2	square kilometres
km	kilometre
m	metre
mm	millimetre
km^3	cubic kilometres
ha	hectare
kg	kilogramme
t	ton
kt	Kiloton
Gg	giga gramme
°C	Celsius
HIV	human immunodeficiency virus
GP	Geographic profile
BPM	Best Practices Manual
N/A	Not available

n/c	not calculated
CP	Climate profile
eq.	equivalent
m/sec.	metre second
EP	Economic profile
U.S.	United States
GDP	Gross Domestic Product
PPP	Purchasing Power Parity
mln.	million
T	Transportation
LPG	Liquefied petroleum gas
CIS	Commonwealth of Independent States
LTO	Landing/take-off cycle
E	energy
MW	Megawatt
MWh	Megawatt hour
Mtoe	Million tons of oil equivalent
WD	Waste disposal
MSW	municipal solid waste
SO	Systematic observations
GSC	global communication system
GCOS	Global Climate Observation System
GUAN	Global Upper Air Network
WMO	World Meteorological Organization
GAW	Global Atmosphere Watch
GO3OS	Global Ozone Observation System
GSN	Global Surface Network
ECA&D	European Climate Assessment and Dataset
DWD	Deutscher Wetterdienst (German weather forecasting service)
CM-SAF	The Satellite Application Facility on Climate Monitoring
ACDP	Asian Center for Disaster Preparedness
BUFR	Binary Universal Form for the Representation
UniMAS	University Malaysia Sarawak (University in Malaysia)
GHGT	GHG emissions per type
PI	Information publicly available
NGO	Non-Governmental Organization
DVI	Data verification indices
GVA	Gross Value Added