The First Biennial Updated Report of the Republic of Azerbaijan to the UN Framework Convention on Climate Change

Submitted in accordance with the UN Framework Convention on Climate Change Conference of the Parties (COP) Decision 1/CP.16

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ABBREVIATIONS

ADB	Asian Development Bank
BAU	Business As Usual
CCAP	Center for Clean Air Policy
CDM	Clean Development Mechanism
DTU NINO	Danish Technical University NAMAs Information Note
EBRD	European Bank for Reconstruction and Development
ETS	Emission Trading System
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse gases
GIZ	German International Cooperation
GUAM	Georgia, Ukraine, Azerbaijan and Moldova
HPS	Heat Power Stations
IEA	International Energy Agency
IPCC	International Panel on Climate Change
KfW	German Development Bank
LULUCF	Land Use, land use change and forestry
MENR	Ministry of Ecology and Natural Resources
MRV	Monitoring, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plan
NAIIS	Greenhouse Gas Inventory Software for non-Annex I Parties
NC	National Communication
NFP	National Focal Point
NGO	Non Governmental Organization
OSC	Open Stock Company
OSCE	Organization of Security and Cooperation of Europe
SAARES	State Agency on Alternative and Renewable Energy Sources
SOCAR	State Oil Company of Azerbaijan Republic
SSC	State Statistical Committee
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Program
UNEP	United Nations Environmental Programme

INTRODUCTION

Global climate change is one of the most difficult environmental problems facing the humanity and its prevention requires synergy and cooperation from all the countries of the world.

The Republic of Azerbaijan, having joined the United Nations Framework Convention on Climate Change and the Kyoto Protocol to the Convention as its supplementary document, actively supports international efforts to mitigate the negative impacts of global climate change and implements a number of measures in this area. As a Party to the UN Framework Convention on Climate Change and Non-Annex I country to the Convention, the Republic of Azerbaijan has committed itself to develop, implement and publicize national and regional programs aimed to the reduction of the expected impacts of the global climate change. One of the obligations of Azerbaijan stemming from the Convention (Article 6) is to educate the public about the expected impacts of climate change and qualify scientific-technical personnel in this field.

As a Non-Annex I Country of the Convention, Azerbaijan did not take any quantitative commitments under the Kyoto Protocol on the reduction of greenhouse gases, and only participates in the Kyoto Protocol's Clean Development Mechanism. Notwithstanding that Azerbaijan has not taken any quantitative commitments, it has been implemented a number of measures to mitigate climate change in the country. The use of renewable energy sources, application of more efficient technologies in the energy sector, forestation of new areas, and use of natural gas instead of black oil in thermal power stations could be shown as an example.

In the previous years, Azerbaijan prepared and submitted its first and second National Communications to the Secretariat of the Convention. The Third National Communication is currently being prepared and is to be submitted to the Convention in 2015.

Azerbaijan’s First Biennial Updated Report was developed in accordance with the recommendations and innovations made by the UN Framework Convention on Climate Change Conference of the Parties, as well using experience of other projects implemented in the country. The aim of the report is to join the global integration process related to climate change and help to ensure the continuity of the institutional and technical capacity building process by pursuing national and sectoral development policies.

One of the main objectives of the preparatory process for the First Biennial Updated Report of Azerbaijan is to strengthen institutional and analytical capacity to integrate the respective database and the climate change priorities into the country's development strategies and associated sectoral programs. The report has analyzed, recalculated the results of the inventories carried out from 1990-2005 in the Initial and Second National Communications and it was conducted GHG inventory from 2006-2010 comparing data with the other relevant sources.

Current report is prepared with the support of UNDP/GEF and contribution of the of Ministry of Ecology and Natural Resources with the participation of relevant experts representing related Ministries and Agencies (Ministry of Economy and Industry, Ministry of Agriculture, Ministry of Transport, Ministry of Energy, ABEMDA, SOCAR etc.), as well academic and NGO sector.

I. National circumstances

1.1. Geographic position

The territory of the Republic of Azerbaijan extends about 400 km from North to South, 500 km from West to East, and is located at 38°25'-41°55' North Latitude and 44°50' - 50°51' East Longitude.

Azerbaijan, located at the crossroads of Europe and Asia, having a unique geopolitical and geographical position, has preserved its importance to the global economic and cultural ties from the ancient times up to now.

The Republic of Azerbaijan shares borders with 5 countries. The length of its borders is about 2.850 km. The country borders Russia to the North - 289 km., Georgia to the North-West - 340 km., Armenia to the West - 766 km., Turkey to the South-West with - 11 km. and Iran to the South - 618 km. The Eastern part of the country in about 825 km area is washed by the waters of the Caspian Sea.

1.2. Population

Azerbaijan's population is about 9477.1 thousand people according to information as of the beginning of 2013. 53.2% of its population is urban, while the remaining 46.8% is rural population. Azerbaijan is considered to be one of the densely populated countries. The average population density is 109 people per km^2. The Absheron Peninsula is the most densely populated territory, the middle-and high-mountain zones of the most sparsely populated territories.

Historically, Azerbaijan had high birth rate. There were such periods when birth rate was 40-50 per thousand people. However, during the first years of its independence this figure dropped up to 8 persons, per thousand people due to the transition period. Since 2003, this indicator has risen and according to the data for 2013 this indicator increased by 13 person per thousand people.

1.3. Political Profile

Azerbaijan declared its independence on October 18, 1991 and was recognized as a sovereign state by the World community. Azerbaijan is a member of the United Nations, the Organization for Security and Cooperation in Europe (OSCE), NATO's Partnership for Peace, the Euro-Atlantic Partnership, the World Health Organization, the GUAM (Georgia, Ukraine, Azerbaijan, and Moldova) Organization for Democracy and Economic Development, the Council of Europe, the International Monetary Fund (IMF), the Organization of the Islamic Conference and the Nonaligned Movement. In 2011, Azerbaijan was elected to the UN Security Council as a non-permanent member, representing the East Europe Group for the 2012–2013 terms.

Like all contemporary political systems, the political system of Azerbaijan is characterized by pluralism - the existence of more than one political party.

The formation of the structure of Azerbaijan's political system was completed on November 12, 1995, by the adoption of the new Constitution. In accordance with the Constitution, Azerbaijan was

established as a democratic, secular, unitary republic. According to the form of administration of the state power in the political system Azerbaijan is a Presidential Republic.

In accordance with the principle of the division of power, were established three branches of power that are independently formed and functioning: the legislative, executive and judicial powers. The activity of each of these branches is regulated by the Constitution and legislative acts.

In the Republic of Azerbaijan the legislative power is executed by the Parliament (the Milli Majlis), the executive power -by the President, the judicial power -by the courts of the Republic of Azerbaijan.

The Executive power in the Republic of Azerbaijan belongs to the President of the Republic of Azerbaijan. The President of the Republic of Azerbaijan establishes the Cabinet of Ministers for implementation of the executive powers of the President. The Cabinet of Ministers, is the upper executive body of the President, and is under the subordination of the President and is accountable to the President. It is composed of the Prime Minister, Vice Premier (Deputy Prime Ministers), Ministers and other heads of central executive bodies The government (Cabinet of Ministers) is subordinate to the president, who appoints the prime minister and cabinet subject to approval by the Milli Majlis. The Cabinet of Ministers oversees the implementation of the state budget and financial, credit and monetary policies, as well as state social programmes.

From administrative point of view, Azerbaijan has one autonomous province - Nakhchivan Autonomous Republic, and 66 districts. There are 78 cities (towns) in Azerbaijan, the capital Baku is the largest city. There are 13 urban districts, 262 regions and 4.255 villages in Azerbaijan.

1.4. Economic profile

The territory of the Republic of Azerbaijan has favorable natural and climatic conditions and rich natural resources. In industrial sector is driven mainly by oil and gas production and processing industry, chemical and petrochemical industries, metallurgy, machinery, textile, food processing; the agricultural sector consists mostly of grain, cotton, wine, fruit, tobacco, tea, vegetables, and cattle-breeding.

During 23 years of its independence the modern Azerbaijan has taken a complicated, but at the same time an honorable course. At the beginning of the 1990s, the deep crisis in socio-political structure of socialism resulted in the economic stagnation and social degradation in Azerbaijan along with other post-Soviet countries. At that time, the situation in the country was exacerbated by the military aggression against our country, the occupation of more than 20 percent of the territories of the country and displacement of more than one million Azerbaijanis from their homeland.

After gaining independence, one of the major challenges facing the country was the establishment of the national economy based on the market principles that meets the requirements of a sovereign country and integrates effectively to the modern world economy.

Since the mid-90s of the last century, under the leadership of great leader Heydar Aliyev, the country gradually began to revive and take steps to address the crucial issues. First of all, the sustainability of the country's independence was secured and political stability was established in

the country. Thus, Azerbaijan began to pursue the market oriented policy for transition to a free market economy that was scheduled since 1995.

In Azerbaijan's economy the first signs of progress began to emerge for the first time since 1995, it was as a result of contracts known as the Contract of the Century signed with the prestigious international oil companies and the economic reforms adopted by the State in the course of partnerships with local and international organizations. In the coming years, there was economic stability and in 2005 economic growth more than doubled compared with the previous year.

In the following years the country's economy showed a sustainable growth dynamics and more than doubled in 2005 compared to the previous years as result of the country's big oil revenues gained due to the boom in oil-gas production and export volumes under the international oil contracts in the country and increase in the world market oil prices. In 2006, the highest gross domestic product (GDP) indicator (34.5%) was observed in Azerbaijan. At present the country's economy is mainly driven by oil and gas sector, however non-oil sector becomes during last years important in the general economical growth. In 2013, 43.5 million tons of oil was produced in the country. In the same year, gas production in the country made up 17.9 billion cubic meters. According to official statistics and macroeconomic indicators the growth in non-oil sector of the country in 2015 is expected to be at the level of 6-7%.

Azerbaijan's economy is still maintaining the pace of dynamic economic growth and is one of the fastest growing economies in the world. In 2012 economic growth dynamics was observed and in 2013 GDP reached USD 57.7 with 5.8% growth indicator. In 2013, 58.4 percent of the GDP in the country was achieved in industry, 9.1 percent -in agriculture, forestry and hunting, 7.6 percent-in construction, 20.1 percent - in trade and paid services, 0.2 percent in transport and freight transportation, 1.5 percent in the field of communication and information services.

In addition to the successful boom in the oil industry in the years of independence, development in the non-oil sector, revival of the regions, integration to the global economic development, and increase in the competitiveness of the economy became irreversible in the country. At present, Azerbaijan pursues a successful policy in the area of building the green economy as a component of the sustainable development.

One of the directions of enhancing entrepreneurial activity in regions and developing industrial fields is creating industrial neighborhoods in different cities of the country using local resources efficiently. Industrial neighborhoods have great importance in the terms of reduction of infrastructure costs for organizing industrial process, strengthening cooperative ties, developing Small and Medium Entrepreneurship etc. Memorandum of Understanding is one of the main documents that aimed at strategic partnership in the field on energy between Azerbaijan and European Union and the document was signed by the President of the Republic of Azerbaijan on November 7, 2006. According to agreement, the parties have agreed to cooperate in the following four specific areas:

- Developing strategy and program for harmonization of legislation of the Republic of Azerbaijan to the European Union legislation on the strategy field-this event will bring together electricity and gas markets;

- Enhancing the safety and security of energy supplies from Azerbaijan and Caspian basin to the EU;
- Development of a comprehensive energy demand management policy as well as preparation of energy efficiency and climate change management activities;
- Using relevant mechanisms in the framework of Kioto Protocol. In this context, the development of renewable energy should be a priority.
- Technical Cooperation and the exchange of expertise.

Regards ***energy industry,*** this sector has been developing in the recent years in the country. Currently there are 14 thermal and 14 hydroelectric power stations operating in the country to meet the energy needs of the country. As a result of investments made in the electric power industry both new thermal and hydro power plants are being built in the country and the existing ones are being re-built to meet modern requirements. Moreover, due to the efficient policy carried out in the existing thermal power plants, the use of black oil as fuel was replaced by the use of gas.

As a result of the work done in recent years, Azerbaijan is not only supplied with the electricity, but it also exports electricity to neighboring countries. According to official statistics in 2013, 21.5 billion kilowatt/hour of electricity was generated in the country. Per capita production in the country is currently 2.287 kW/h, that can be compared with the indicators registered in many countries of Europe.

Alternative and renewable energy sector is one of the priority areas for Azerbaijan which has abundant renewable and alternative energy potential. The Country President, His Excellency Mr. Ilham Aliyev stated the following in one of his speeches: *"The use of alternative and renewable energy sources is a modernity, innovation and environmentally friendly technology. This is our vision into the future.* "As a result of a deliberate policy pursued in the recent years, significant work has been done in terms of the efficient use of alternative and renewable energy, and creation of modern infrastructure in this field. All of this work made it possible to expand the use of alternative and renewable energy in the economic and social fields and created favorable conditions for the implementation of measures related to the production, consumption, efficiency of this type of energy. As a result of the work done in this area in 2004, the State Program on the Use of Alternative Energy Sources was adopted. Taking ino consideration the importance of the State Program and in order to accelerate the consistent and effective implementation of the issues arising from this program the State Agency for Alternative and Renewable Energy Sources was established in 2009 as part of the Ministry for Industry and Energy, and in fact, it began functioning in 2010. In June 1, 2012 the State Agency was liquidated and on its basis was founded the State Company on Alternative and Renewable Energy Sources which provides state service in the field of using alternative and renewable energy sources, as well as determines the sources of alternative and renewable energy and performs other work related to the development of this field. Later by the Presidential Decree N810, dated February 1, 2013 the State Company was reorganized and renamed as "Azalternativenerji" Limited Liability Company and was transferred to the subordination of the newly formed SAARES (State Agency on Alternative and Renewable Energy Sources).

Agriculture is historically the strategic sector in Azerbaijan, and the driving component of the of non-oil economy. Although 40% of the population in Azerbaijan works in agricultural sector, agricultural products make up only 9% of the total GDP and this provides employment and income for only about 40% of the total labor force (employed and self-employed individuals).

The forest sector is one of the most valuable national natural resources. The Azerbaijan forests are state-owned and belong to the first group by performing their protective functions. Total area of the Azerbaijan forests is 1021 hectares, and that makes up about 11.8 per cent of the country's territory. Per capita forest area is 0.12 ha in Azerbaijan. Currently 261 thousand hectares of forest area has been occupied by Armenia. Despite the difference in composition of the forests, the main forest-forming species are the broad-leaved (deciduous) species. The International Food Safety Organization (FAO) divided the forest ecosystems of Azerbaijan into 5 ecological zones: a temperate mountain forest, temperate continental forest, temperate desert, subtropical mountain and humid subtropical mountain forests.

II. Information on GHG inventory and emission trends

This section provides information on the country's anthropogenic emissions and absorbers of the "Green House Gases", recalculated in accordance with revised 1996 IPCC methodology, as well as information about the emission trend covering period from 1990-2010. Moreover, a brief overview is provided on the institutional framework for the conducting inventory.

2.1. Institutional Framework

One of the international commitments assumed after the Republic of Azerbaijan has ratified the United Nations Framework Convention on Climate Change in 1995, is inventory, updating, and submitting to the Conference of the Parties (COP) of Convention anthropogenic emissions of GHG not regulated by the Montreal Protocol and its removal.

For the first time the inventory process of GHG was conducted in Azerbaijan during the period 1998-2000 within the "First National Communication of the Republic of Azerbaijan to the United Nations Framework Convention on Climate Change" project. The inventory of GHG covered the period 1990-1994. Later, inventory process was carried out in the following Communications.

In 2003-2006, with the support of Global Environmental Facility (GEF), UNDP implemented regional project to enhance the quality of GHG inventory. Within the project the issues of increasing the quality of inventory categories of transport and fugitive waste in energy sector, the enteric fermentation and manure in the agricultural sector and the solid-waste in the waste industry were considered. GHG inventory was conducted here and GHG emissions were compared with the GHG emissions for the period 1990-1994, uncertainties for emissions were estimated, the issues of quality assurance, quality control and documentation were considered.

With the purpose of specifying the amount of GHG emissions from the industrial sector, and documenting them, "Information about the GHG emissions resulting from business activities" form relevant to the Energy and Industry processes sectors was developed by the Ministry of Ecology and Natural Resources on the basis of the IPCC's methodology by applying indexes from them and was proposed for inclusion into reports of the State Statistics Committee.

This information is being published regularly since 2008 in the "Environment in Azerbaijan" Report of the State Statistics Committee.

The Climate Change and Ozone Center was established within the Ministry of Ecology and Natural Resources for the development and coordination of National GHG inventory. The staff of the Center includes 19 people; the work is carried out at 4 divisions: GHG inventory, Climate Change Impact Assessment and Adaptation, Climate and Ozone Divisions.

A number of organizations and companies have already started the inventory process since 2008 and appropriate departments have been established within Azerenergy OSC and SOCAR. Most of the industrial enterprises allocate personnel to make reports to the SSC. Relevant experts are engaged from the organizations of all sectors when developing the inventory over the country.

2.2. Total emissions by sectors

Before preparation of the First Updated Biennial Report of the Republic of Azerbaijan to the United Nations Framework Convention on Climate Change, GHG Inventories have been conducted in the framework of the Initial (1990-1994) and Second (1995-2005) National Communications of the country.

In the First Updated Biennial Report the country's information for 1990-2005 was recalculated and the inventory for 2006-2010 was conducted using revised 1996 IPCC methodology and NAIIS software recommended by UNFCCC.

In the National Communications the results of the inventories implemented so far were analyzed and compared also with other sources. Those data, emission factors and uncertainties were assessed.

Total emissions by all sectors in Azerbaijan are given in the following table.

Table 1. GHG emissions and absorptions by sectors

Sector	**GHG (waste) emissions and absorptions (Gg CO_2 eq.)**							
	1990	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Emissions								
Energy	63 928	33 006	39 216	38 642	35 655	42 543	37 192	36 596
Industrial processes	1 447	554	1 781	1 986	2 303	2 043	1 780	2 108
Agriculture	6 261	5 368	6 469	6 689	7 003	7 175	7 266	7 244
Waste	1 694	1 837	2 023	2 084	2 130	2 182	2 199	2 260
Total emissions	**73 331**	**40 774**	**49 490**	**49 401**	**47 091**	**53 943**	**48 437**	**48 209**
Removal								
LULUCF	-3690	-4870	-5349	-5353	-5438	-5383	-5360	-5410
Net emissions	**69 641**	**35 904**	**44 141**	**44 048**	**41 653**	**48 560**	**43 077**	**42 799**

As it is shown in the table in 2010 total emission in the country accounts for 65.7% of 1990 base year. So it means that total emission decreased by 34.3%, removals increased by 46.6%.

Emissions of energy sector decreased sharply in 2010 in comparison with base year and it composed approximately 57% of base year while emissions from industrial processes increased by 46%.

The chart below gives the distribution of GHG data by sectors for 2010 as well as the dynamics of change in emissions for the period 1990-2010 (20 years).

Figure 1: Emissions by Sector

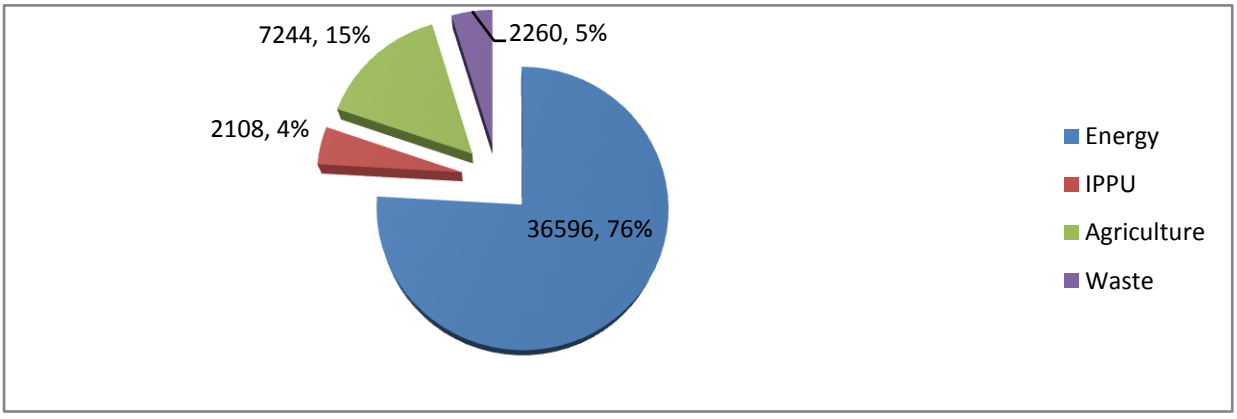
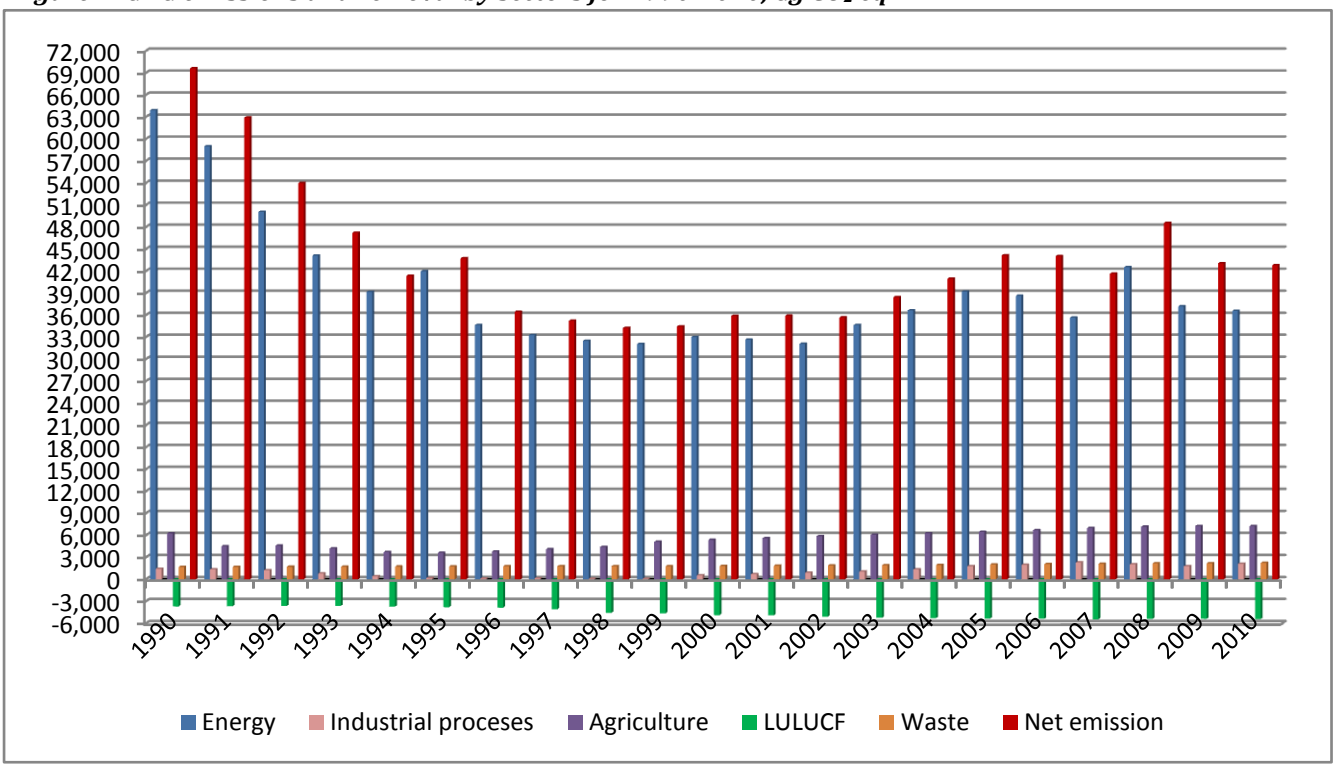


Figure 2: GHG emissions and removal by sectors for 1990-2010, Gg CO_2 eq.



GHG intentory results are provided at the end of the current report (*Annex 1)* prepared in tables according to the decision CP/16 of the Conference of Parties to UNFCCC.

2.2.1. Energy sector

Main emissions in the energy sector are those of CO_2, CH_4 and N_2O gases. These gases come from the losses occurring in the processes of burning fossil fuel in the sector, as well an oil and gas production, storage, processing, transportation and distribution. According to the IPCC's methodology these losses are called fugitive emissions.

2.2.1.1. Emissions from fuel combustion processes

The amount of GHG for the period of 1990-2010 has been calculated based on the methods of Baseline approach which takes into account the import-export operations and changes in reserves and "Sectoral approach" which takes into account the different categories for all fuels produced and consumed in the country.

The amount of CO_2 emitted into the atmosphere from the fuel burned was calculated by the main types of fuel for the period 1990-2010. The report was prepared based on the revised IPCC guidelines. The data of the State Statistics Committee (SSC) and the data obtained during the preparation of the National Data were used in the assessment.

Emission factors used during calculations were based on revised 1996 IPCC methodology.

The report made on baseline approach shows that the main sources of carbon dioxide are the oil, gas condensate and burnings of natural gas. Motor fuels of refined fuels have the biggest net volumes of import and export operations.

The amount of CO_2 emitted into the atmosphere in 2010 is 29.2 million which accounts for 46% of the 1990 baseline year. The comparison between the emissions from the baseline and sectoral approaches are shown in Table 2.

Table 2. Comparative characteristics of CO_2 in baseline and sectoral approaches, Gg

Indicators	**1990**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Baseline approach	64494	31832	35905	35995	31853	35373	31082	29172
Sectoral approach	54751	28889	34279	33002	27754	31094	26046	25333
Difference	**9743**	**2943**	**1626**	**2993**	**4099**	**4279**	**5036**	**3839**

Calculations of CO_2 emissions emitted during fuel combustion according to the data on energy supply of the country are taken into account when applying Baseline approach. Sectoral approach is considered as GHG emission calculation based on the data on actual consumption of fuel according to the type of fuel and different economic sectors.

The amount of ***CO_2*** emissions from fuel burnings by categories of energy sector is given in Table 3.

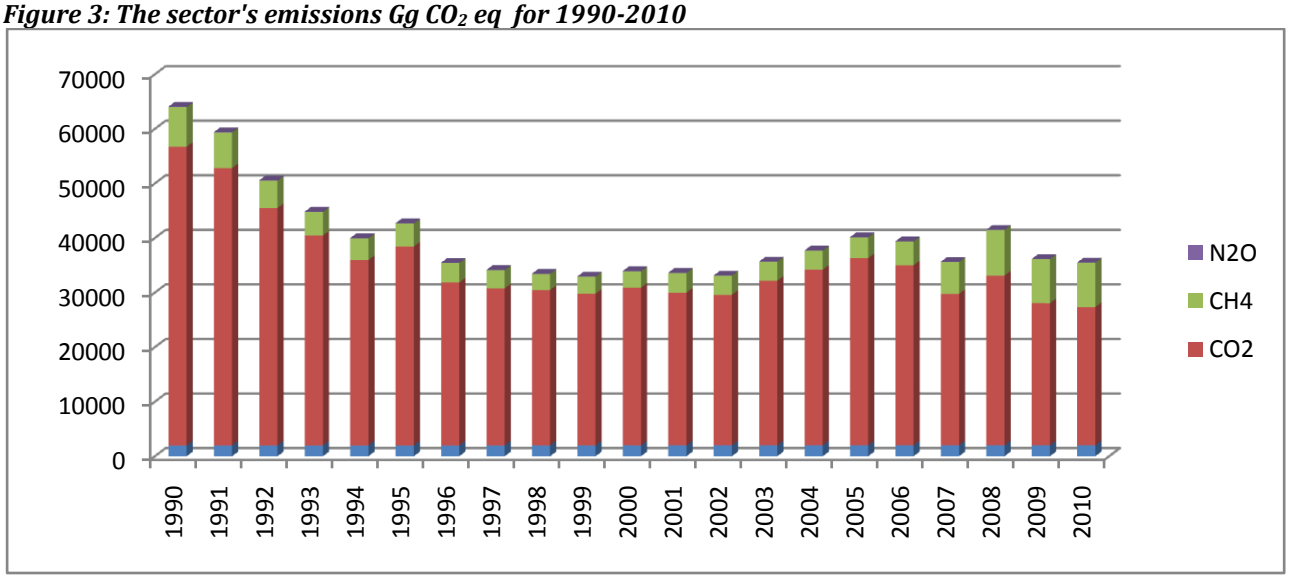
Table 3. CO_2 emissions by categories, Gg

Sector	**1990**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Energy industry	22383	16527	17410	17778	15431	14953	12047	10706
Industry and construction	17709	2711	2099	2021	456	2157	1237	1092
Transport	5394	2119	4158	4727	3729	4687	4166	4861
Others	8522	4864	7555	6461	6927	8467	7876	8138
Miscellaneous	743	2668	3075	2016	1210	831	720	537
Total	**54751**	**28889**	**34297**	**33002**	**27753**	**31094**	**26046**	**25333**

*Note * - Others include commercial, residential and agriculture/forestry sectors, ** Miscellaneous include entities not included to other sectors (such as military and commercial secrets).*

The amount of emissions from the energy sector by their structure is as follows:

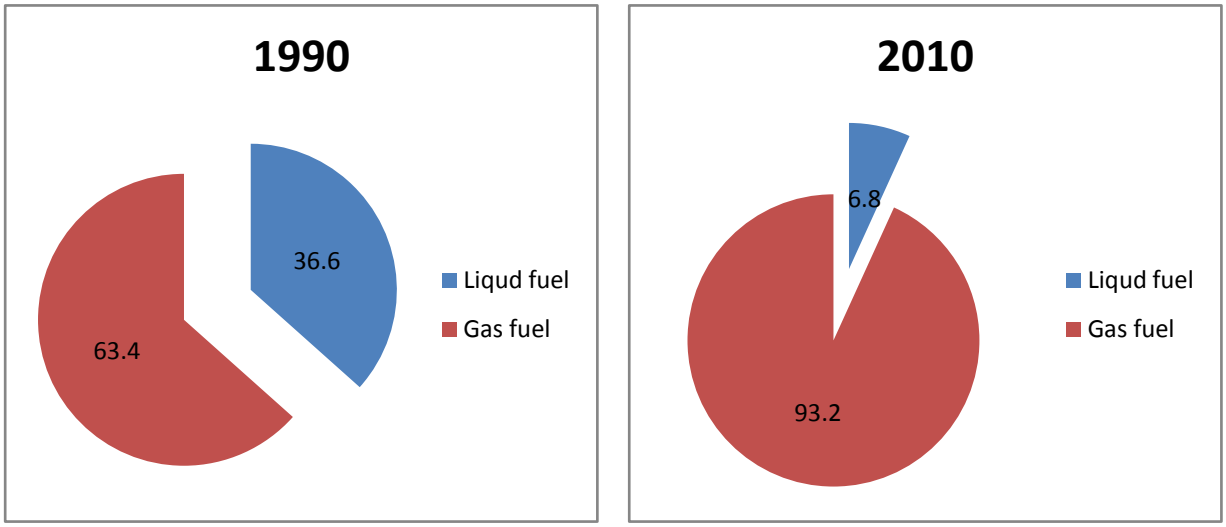
Figure 3: The sector's emissions Gg CO_2 eq for 1990-2010



As it is seen from the chart, starting from 2002 the sector's emissions increased, and then began to decrease again.

One of the main reasons of emission reduction in "Energy Industry" is the change of fuel. In 1990 liquid fuel was more widely used, however in recent years, gas is much more used.

Figure 4: Changes in the use of fuel type in 1990-2010, %



Another developed sector is transport. Information on emissions is given in the following table:

Table 4. CO_2 emissions from transport Gg

Source	**1990**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Aviation	186	52	196	220	208	176	190	275
Road transport	5188	2041	3897	4472	3467	4361	3865	4477
Railway	15	20	49	27	53	45	45	23
Sea transport	5	7	16	9	0	104	64	86
Total	**5394**	**2119**	**4158**	**4727**	**3729**	**4686**	**4165**	**4861**

As it is seen from the table the higest indicators for emission is obversed for road transport. The main reason for that is increase in the number of vehicles in road transport during recent years.

The areas included in the "Others" category are commercial, population, as well as agriculture, forest and fishery. The dynamics of change in the areas listed in the table below.

Table 5. CO_2 emissions by categories, Gg

Source	**1990**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Commercial	-	795.32	34.11	57.55	324.90	395.65	337.66	303.30
Population	4678.52	3773.72	6741.38	6259.08	5992.59	7294.6	6521.62	6777.76
Agriculture, forestry, fishery	3843.04	295.32	779.99	144.14	609.54	776.84	1017.2	1056.56
Total	**8521.56**	**4864.36**	**7555.48**	**6460.77**	**6927.03**	**8467.09**	**7876.48**	**8137.62**

As it is seen from the table emission in population area is increasing immensely in comparison with others. An increase in the number of population, improvement of living conditions leads to more usage of energy.

2.2.1.2. Fugitive emissions

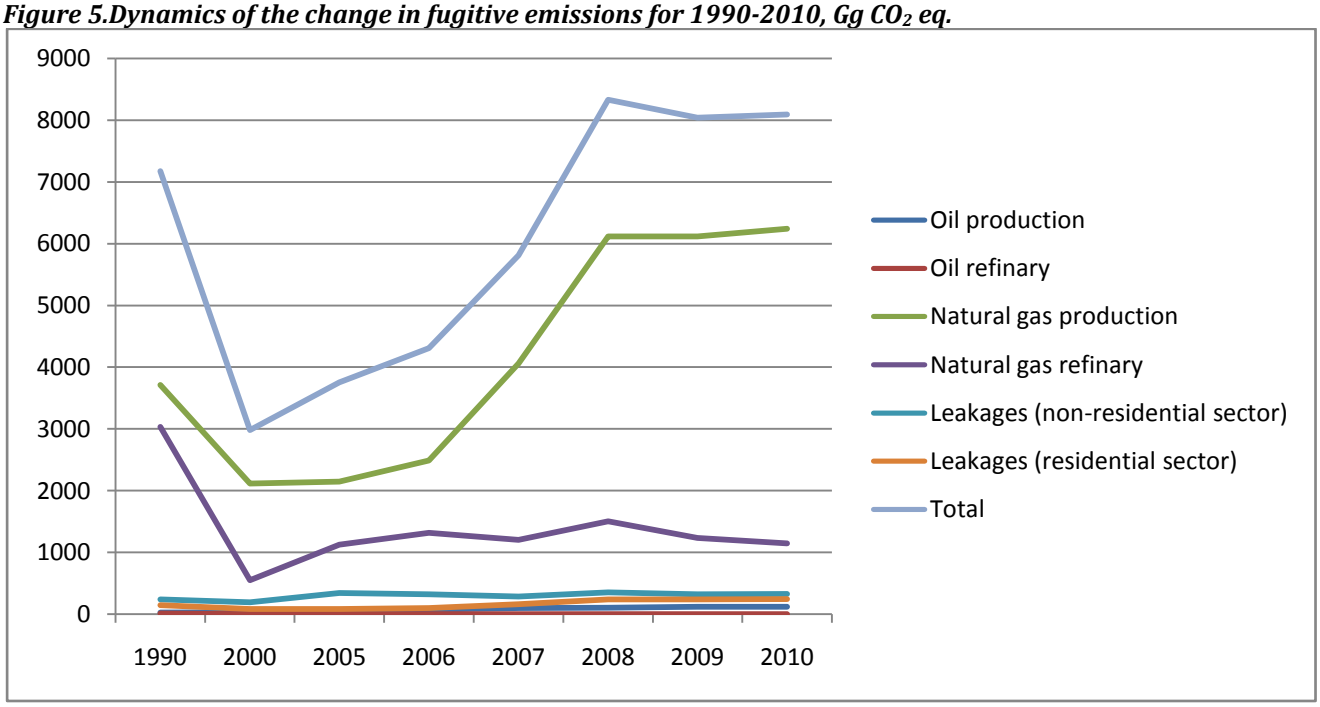
As it was noted fugitive emissions (mainly methane) generate due to oil-gas production, proccessing, transportation and distribution. These emissions generate from intelligence and drilling of oil wells for oil production, extraction of oil and gas from wells, emitting associated gas that can not be held directly to atmosphere air, processing, refining, transmission and distribution of natural gas. Fugitive emissions of energy sector with CO_2 eq. amount is given in the following table below:

Table 6. Fugitive emissions of energy sector, Gg CO_2 eq

Activity	1990	2000	2005	2006	2007	2008	2009	2010
Oil production	30	34	53	77	102	107	121	122
Oil processing	11	5	5	5	5	5	4	4
Natural gas production	146	83	84	98	160	240	240	245
Natural gas production / processing	3713	2116	2145	2491	4059	6117	6117	6242
Natural gas transmission / distribution	1840	1049	1063	1235	2012	3032	3032	3094
Natural gas leaks (non-residential sector)	3035	552	1127	1321	1203	1508	1238	1150
Natural gas leaks (residential sector)	240	193	343	319	284	352	319	328
Total	**9 014**	**4 032**	**4 820**	**5 546**	**7 825**	**11 361**	**11 072**	**11 186**

As oil-gas production has been increasing, emissions are rising too. In 2010 in this subsector the total emission has risen and it became 11.816 Gg CO_2 eq.

Figure 5.Dynamics of the change in fugitive emissions for 1990-2010, Gg CO_2 eq.



2.2.2. Industrial sector

The gases of the sector are of wide variety and there are specific gases depending on the types of industry. These include CO_2, CH_4 and HFC-gases.

Coefficients (emission factors) in the industrial sector are taken from the revised 1996 IPCC's methodology. As a result of the inventory conducted the amount of GHG emitted from there as of industrial process and its amount in equivalence of CO_2 have been calculated. In this category CO_2 accounts for the largest emission. It is generated mainly from the activity of the cement plants (Table 7).

Table 7. Emissions from industrial process categories CO_2, Gg

	1990	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Cement	477.97	121.04	742.5	783.1	816.51	770.84	621.03	617.4
Lime	34.76	0.14	3.88	21.52	12.12	0	0.59	0.68
Cast Steel	630	0.06	429.15	502.95	702	417.5	225.48	459.75
Aluminum	40.2	-	-	-	-	-	-	-
Total	**1182.93**	**121.24**	**1175.5**	**1307.6**	**1530.6**	**1188.3**	**847.1**	**1077.8**

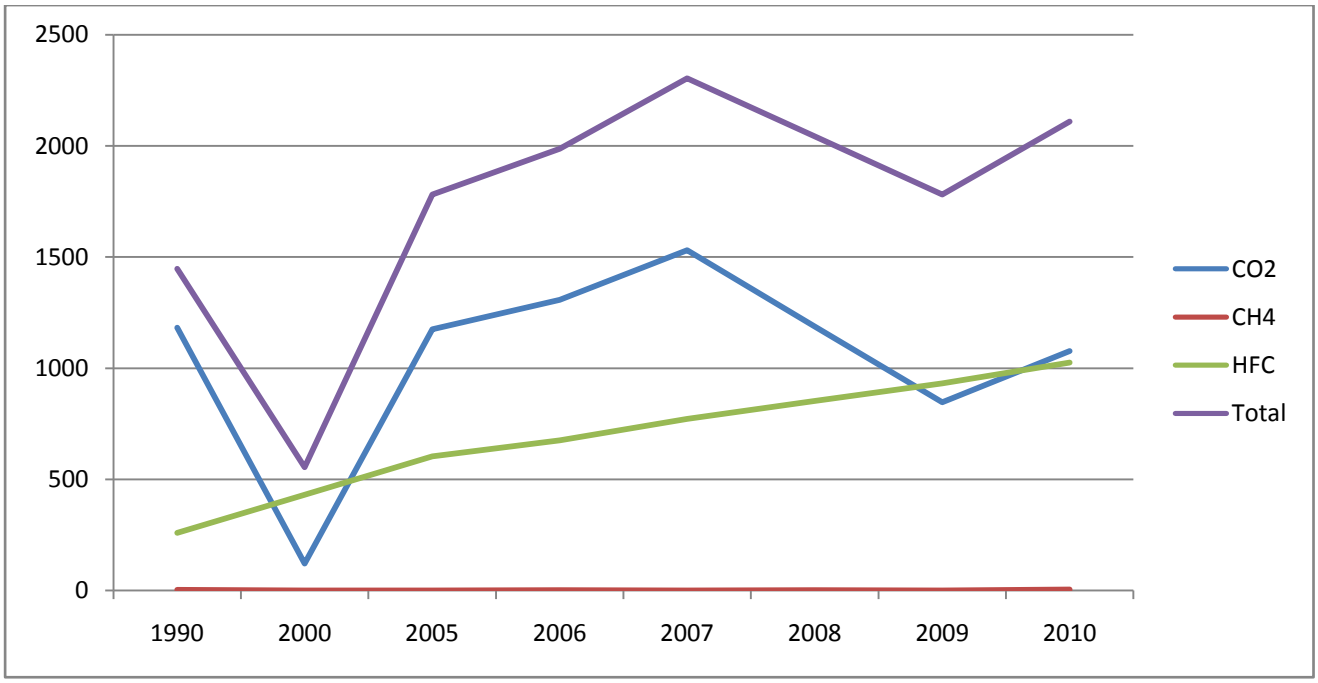
Though methane and other gases are of little amount, but their high heat capacity increases this amount (Table 8). Information about CO_2 eq. amount of HFC gases have been taken from the report prepared by the support of GIZ.

Table 8. Amount of emissions from industrial process category, Gg CO_2 eq

Gases	**1990**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
CO_2	1182.93	121.24	1175.53	1307.57	1530.63	1188.34	847.1	1077.83
CH_4	3.78	1.05	1.26	2.1	0.84	1.68	1.26	5.46
HFC	260	431.31	604.39	676.07	771.41	852.51	931.85	1025.07
Total	**1447**	**554**	**1781**	**1986**	**2303**	**2043**	**1780**	**2108**

The chart below gives the distribution of emissions dynamics of change in CO_2, CH_4 and HFC emissions for the period 1990-2010.

Figure 6. Dynamics of change in emissions from industrial categories for 1990-2010, Gg CO_2 eq.



2.2.3. GHG emissions from agricultural sector

In the calculation of GHG emissions from the agricultural sector, the calculations of CH_4 and N_2O were carried out by enteric fermentation, manure management, rice production and burning of agricultural residues by using revised 1996 IPCC guidelines.

It should be noted that in recent years a significant increase in the number of cattle in Azerbaijan has played a crucial role in the increase of methane (CH_4) emissions. Our calculations revealed that the CH_4 emissions in agriculture in 2010 increased by 51% compared to 1990. Thus, in 1990-1994 the number of animals has decreased leading to reduce of CH_4 emissions.

However the growth happened in livestock breeding since1995 has influenced on this area. As a result, in 2010 CH_4 emitted into the atmosphere during the enteric fermentation increased by 52% and in manure management by 63%, compared to 1990.

As rice production in Azerbaijan covers a limited area, the share of this sector in CH_4 emissions in 2010 is totaled to 0.16 Gg. Burning of residues of agricultural products in the fields in Azerbaijan, occurs as well in the extremely small number of cases. Therefore, methane emissions from the burning of residues of agricultural products decreased by 71% in 2010 compared to1990.

Table 9. CH_4 emissions of the sector ,Gg

Source	1990	2000	2005	2006	2007	2008	2009	2010
Enteric fermentation	115.66	129.12	153.68	162.95	167.39	176.58	173.99	175.4
Manure	12.1	14.59	17.69	18.12	18.68	20.57	19.52	19.74
Rice planting	0.05	0.45	0.23	0.12	0.11	0.13	0.17	0.16
Burning of agricultural residues	1.34	0.3	0.66	0.49	0.42	0.32	0.25	0.25
Total	**129.15**	**144.46**	**172.26**	**181.68**	**186.6**	**197.6**	**193.93**	**195.55**

N_2O emissions from agriculture decreased by 11.6% in 2010 compared to 1990. Thus the share N_2O emissions in manure management associated with the livestock development increased by 76% in 2010 compared to 1990. However, due to the sharp decrease in fertilization of plants N_2O emissions in agricultural lands decreased by 22.5% in 2010 compared to 1990.

Table 10. N_2O emissions of the sector, Gg

Source	1990	2000	2005	2006	2007	2008	2009	2010
Manure	1.28	1.95	2.15	2.17	2.21	2.23	2.24	2.25
Agricultural lands	10.14	5.6	7.04	7.09	7.73	7.52	8.06	7.86
Other	0.03	0.01	0.01	0.01	0.01	0.01	0	0.01
Total	**11.45**	**7.56**	**9.2**	**9.27**	**9.95**	**9.76**	**10.3**	**10.12**

Finally, it can be noted that the amount of emissions in agriculture in Azerbaijan decreased rapidly from 1990 to 1997. The main reason for this was the economic crisis and the decline in the production happened in the country in the early years of independence. Since 1997, in parallel to the country's economic development the amount of emissions in the agricultural sector began to increase and its amount in CO_2 equivalent in 2010 reached 7 million 244 thousand tons. It is more by 15.6% than the 1990 level.

Table 11. Emissions by the sector, Gg CO_2 eq

Source	1990	2000	2005	2006	2007	2008	2009	2010
Enteric fermentation	2429	2712	3227	3422	3515	3708	3654	3683
Manure	651	911	1038	1053	1077	1123	1104	1112
Rice planting	1	9	5	3	2	3	4	3
Agricultural lands	3143	1736	2182	2198	2396	2331	2499	2437
Burning of agricultural residues	28	6	14	10	9	7	5	5
Others	9	3	3	3	3	3	0	3
Total	**6262**	**5377**	**6469**	**6689**	**7003**	**7175**	**7266**	**7244**

The charts below give the distribution of emissions from the agricultural sector by subsectors for 2010, as well as the dynamics of change in emissions for 1990-2010.

Figure 7: Emissions by the sector, 2010, Gg CO_2 eq

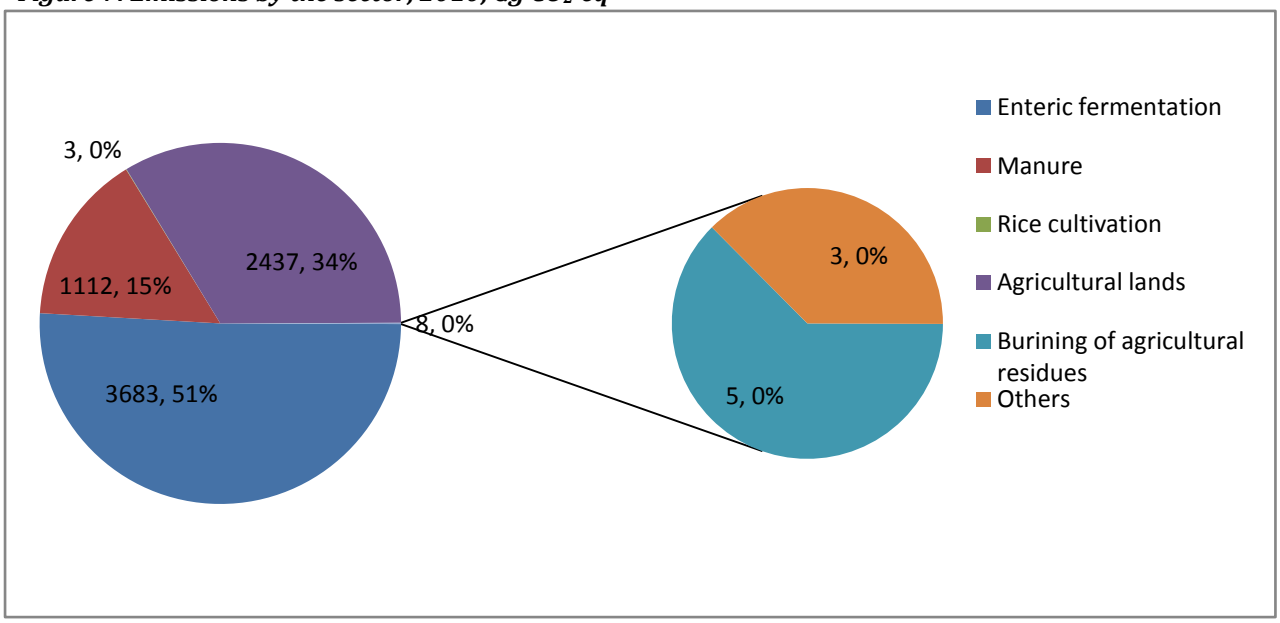
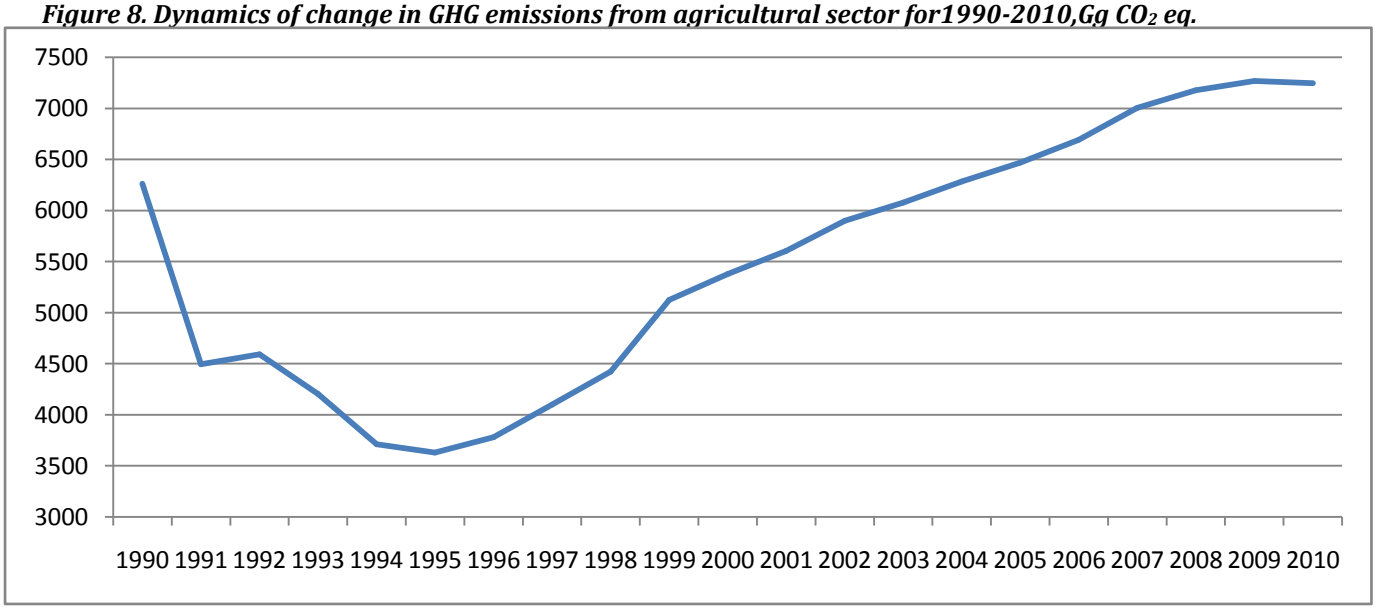


Figure 8. Dynamics of change in GHG emissions from agricultural sector for1990-2010,Gg CO_2 eq.



2.2.4. Land use, land use change and forestry

The Republic of Azerbaijan is one of the countries with limited land resources. According to the information as of the end of 2013 there are 0.20 ha per capita tillage and 0.52 ha per capita arable land available in the country. Limited arable land is one of the factors that conditions small share of agriculture in the emissions. It should be noted, as a result of the Armenian occupation of 20 % of the Azerbaijani territories a part of the country's arable lands' remaining under the occupation have been taken into account in the calculations.

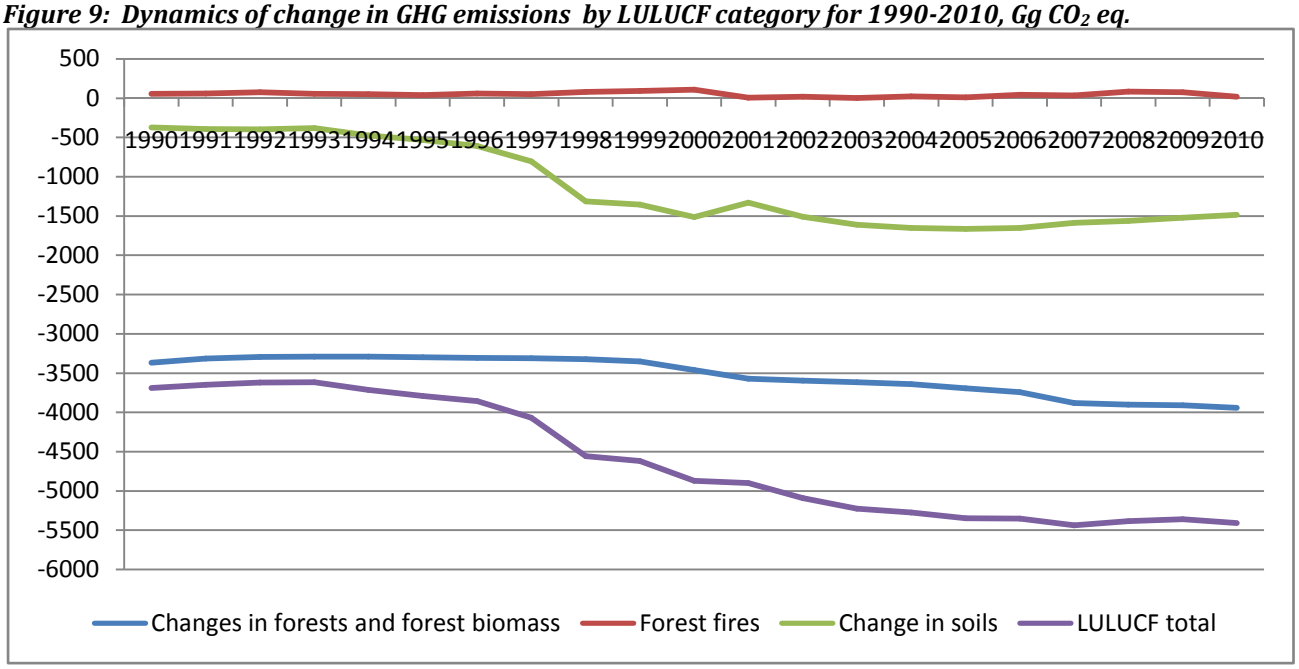
In the calculation of GHG emissions from the Land use, land use change and forestry (LULUCF) category revised 1996 IPCC Guidelines were used to calculate emissions removed from forestry sector, pastures, agricultural lands use and wetland areas for 1990-2010.

Table 12. Emissions/absorbtions by LULUCF category, Gg CO_2 eq

Source	1990	2000	2005	2006	2007	2008	2009	2010
Changes in forests and other forest biomass resources	-3367	-3463	-3694	-3743	-3883	-3902	-3910	-3942
Forest fires	52	108	10	43	34	84	74	19
Land changes	-375	-531	-1665	-1653	-1589	-1565	-1524	-1487
Total	**-3690**	**-3790**	**-5349**	**-5353**	**-5438**	**-5383**	**-5360**	**-5410**

The chart below shows the dynamics of change by LULUCF category for 1990-2010.

Figure 9: Dynamics of change in GHG emissions by LULUCF category for 1990-2010, Gg CO_2 eq.



2.2.4.1 Results of the forest sector inventory

Forests are one of the most valuable natural resources in Azerbaijan. Azerbaijan forests are state-owned and they are of no industrial importance, only sanitation cutting is carried out in the forests and they have important role in soil-conservation, water regime regulation, biodiversity shelter, microclimate establishing, carbon removal and so on. Total area of the Azerbaijan forests is 1.021 hectares, and that makes up about 11.8 per cent of the country's territory. Per capita forest area in

Azerbaijan is 0.12 ha. Currently 261 thousand hectares of the forest area are under Armenian occupation.

In the inventory conducted on the forest sector the criteria such as changes in forest and other tree resources, forest fires, and deforestation of forest lands have been taken into account and relevant calculations have been made. It should be noted that biomass by the forest sector burned as fuel to generating heat and power was not taken into account and was calculated within energy category.

In the calculations tree species were divided into 2 categories: coniferous and broad-leaved (deciduous), as well as the trees in urban and rural areas and parks and trees along the highways were taken into account. The results obtained allow us to say that, in the period 1990-1995, while decline was observed in carbon removal by the sector, in the following years, especially since 2000 the reforestation and afforestation activities in the territory of the Republic (93.122 hectares during 2000-2010) resulted in enlargement of forest lands and this ultimately led to the increase in the amount of carbon removal (see Table 12). Though emission removal from the forestry sector was 3367 Gg in 1990, in 2000 this figure increased and reached 3694 Gg, and in 2010 - 3942 Gg.

2.2.4.2 Pastures, agricultural land use and wetlands

In the inventory conducted by pastures, agricultural land use and wetlands changes that happened since 1970 in the country in pastures, agricultural land use and wetlands were taken into consideration, and respective calculations were conducted. In the calculations it was found out that during the recent years increase is being observed in the amount of carbon absorptions from pastures, agricultural land use and wetlands. Thus, although in 1990 emission absorptions in this sub-sector was -375 Gg, it increased in the following years and reached -1665 Gg in 2005. An increase in the area of grazing lands in the agricultural sector as well as an increase in natural wetland areas after gaining independence can be noted as the main reason for this.

However, the decrease observed in later years in the areas of grazing lands (the cases of using grazing lands for agricultural purposes,) has resulted in a decrease in the level of emission absorptions by this sub-sector (1487 Gg in 2010).

Pastures

Pastures and hayfields account for 55 percent of arable lands in Azerbaijan (2614.2 thousand ha according to 2010 data). These areas are characterized by more carbon absorption. Changes in grazing lands from 1970 to 2010 were taken into account in the calculations conducted based on revised 1996 IPCC guidelines, and the relevant calculations (during these years, in grazing areas a 334 thousand ha increase was observed) were conducted.

Wetlands

According to the data as of 2010, there are wetland areas in the territory of the Republic of Azerbaijan which belong to its hydrological network and consist of nearly about 250 large and small water reservoirs-wetlands with a total area of approximately 977 km^2. Wetland areas differ mostly with carbon capturing. In the calculations conducted in accordance with the revised 1996

IPCC guidelines, the changes in the wetland areas in the Republic from 1970 to 2010 (during these years an increase of 20 km^2 in the wetland areas was observed) were taken into account.

2.2.4.3 Badlands

In the current inventory, badlands scattered in the territory of the Republic have been explored in order to investigate accumulation and dissimilation, synthesis between carbon, its compounds and the lands devoid of soil -vegetation (left without purposeful use) and the dynamics of progress of emissions into the atmosphere through oxidation. The analysis has revealed that badlands account for 27.7% or 2.397.725 hectares of the territory of our Republic. Moreover, 25.6% or 613.452 ha of them are bare rocks, 31.4% or 747.688 hectares-clay-salt rockout crops, 10.8% or 256.490 ha - river basin cones, 18.6% or 443.835 ha – anthropogenic deformation lands, 2.1% or 50000 hectares – the coastal sands, 12% or 286.260 ha non-registered other lands.

2.2.5. Waste sector

In the Republic of Azerbaijan the waste sector has special share in GHG emissions (mainly CH_4 and N_2O). Particularly in recent years, the increase in the number of population and enhanced economic indicators (including industrial production) caused an increase in emissions from the waste sector.

In the calculation of GHG emissions in the waste sector it was used the revised 1996 IPPC guidelines and the emissions from solid waste and wastewater (including industrial production) were taken into account. Emission factors used in the calculations were chosen according to the regional factors, but taking into account the specific conditions of the country. It should be noted that as the calculations covered the period of 1990-2010, the emissions from waste incineration have not been taken into account in the calculations. Thus, the first waste incineration plant in Azerbaijan was built 2012 in the Balakhany district of Baku and currently waste sorting and incineration processes are underway in this plant.

Table 13. CH_4 emissions in waste sector, Gg

Waste sector	**1990**	**2000**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Solid waste	64.63	69.00	74.31	75.63	76.67	78.15	79.42	81.00
Industrial and domestic wastewater	12.95	14.48	16.87	18.28	19.45	20.16	19.55	20.86
Total	**77.58**	**83.48**	**91.18**	**93.91**	**96.12**	**98.31**	**98.97**	**101.86**

In recent years by the waste sector the increase of CH_4 emissions is observed both from solid domestic waste sector, as well as from industrial and domestic waste water. The main reason for this is the increase in the number of population and expansion of the industries. Generally, in the periodof1990-2010, 25.3% increase is observed in CH_4 emissions from solid waste, 61% increase – in CH_4 emissions from industrial and domestic waste water.

Oxides of Nitrogen-1 mainly consist of industrial and domestic wastewater emissions generated from human activities. Although the amount of N_2O is very small, due to its great heat generating capability coefficient, it can create some potential.

Increase has not noticed in N_2O emissions from industrial and domestic waste water for 1990-1995. During the following years a slight increase N_2O emissions has been noticed. The main reasons for this are the increase both in the number of population and in the amount of protein consumed by the

population (while in 1990 this figure was 21.9 kg/person/year, in 2010, it was 32.85 kg/person/year, respectively), as well as the increase in industrial production.

Table 14. N_2O emissions in waste sector, Gg

Waste sector	1990	2000	2005	2006	2007	2008	2009	2010
Industrial and domestic waste water	0.21	0.27	0.35	0.36	0.36	0.38	0.39	0.39

Finally, it should be noted that by the waste sector the volume of general waste disposal in the equivalent of CO_2 has increased by 33.4% from its level in 1990 and reached 2 million 260 thousand tons.

Table 15.Emissions in waste sector, Gg, CO_2 eq

Waste sector	1990	2000	2005	2006	2007	2008	2009	2010
Solid domestic waste	1357	1449	1561	1588	1610	1641	1668	1701
Industrial and domestic waste water	337	388	463	495	520	541	531	559
Total	**1694**	**1837**	**2023**	**2084**	**2130**	**2182**	**2199**	**2260**

The charts below describe the distribution of emissions from the waste sector by subsectors for 2010, as well as the emission trend from 1990-2010.

Figure 10: GHG Emissions in waste sector for 2010, Gg CO_2 eq.

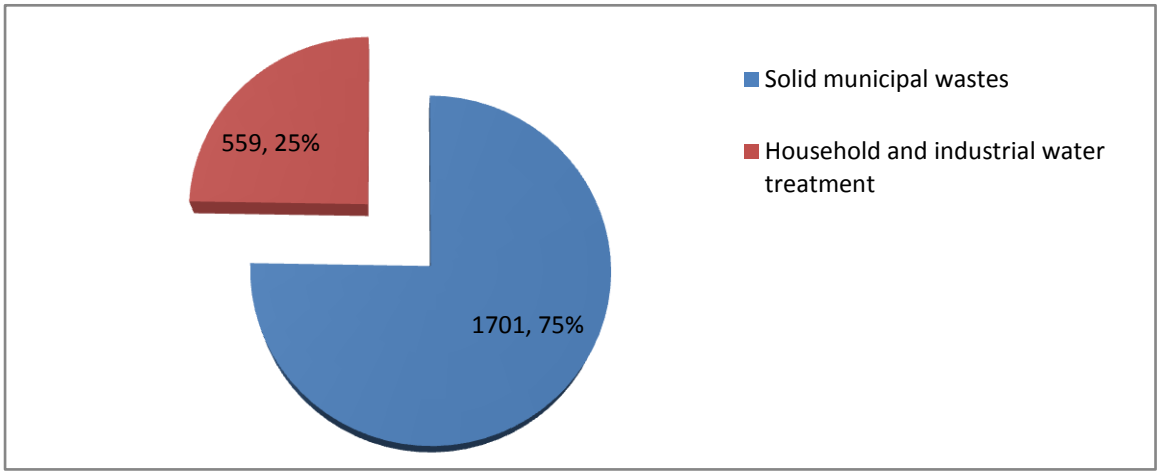
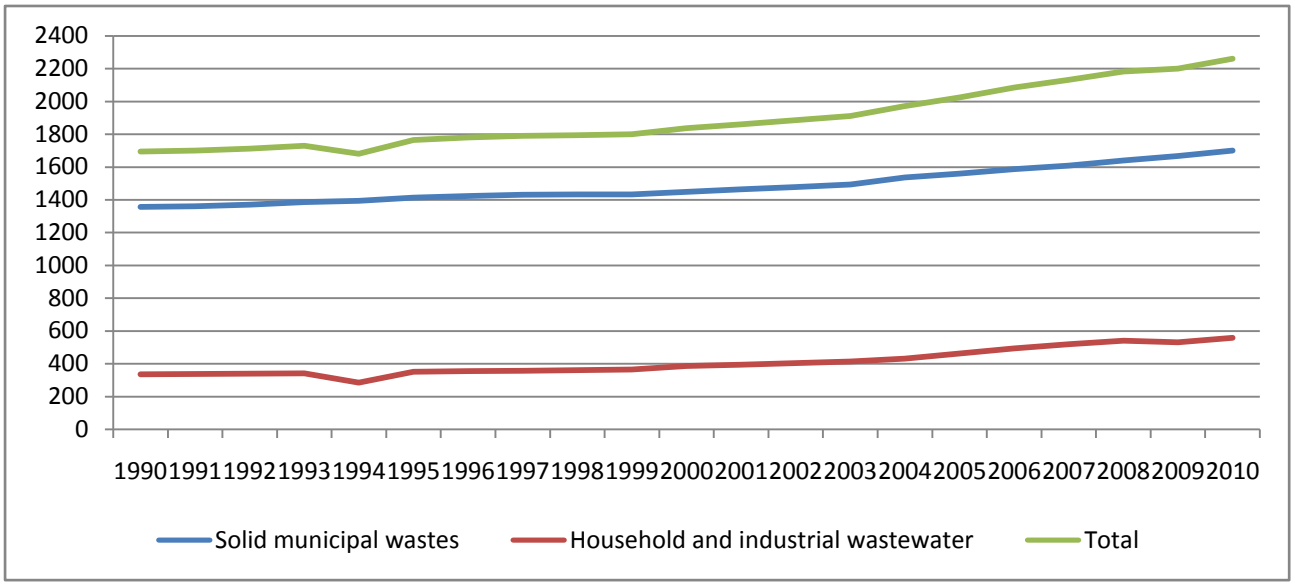


Figure 11: Dynamics of change in GHG emissions by waste sector for 1990-2010, Gg CO_2 eq.



2.2.6. Others

The calculation of GHG emissions has not been conducted in the solvents sector given the difficulties in defining the data and choosing the coefficients in this sector. Information on any other industry is not available.

2.3. Uncertainty analyses

Uncertainties of the data obtained in the inventory process and the emission factors used have been analyzed and evaluated. The analysis conducted for every sector represents the degree of accuracy of the calculated greenhouse gases in that sector.

Many uncertainties in the ***energy sector*** arise in oil and gas production, energy consumption mainly in the residential sector.

Generation of methane gas, which is released into the atmosphere in the oil industry, occurs in extraction, processing, transportation and storage of oil. The volumes of methane emissions from these sources are unclear. Thus, in most cases, there are no measurement tools for the gas released from sources. As the tools are quite expensive, their installation is not economically viable for the company. For this reason, uncertainties arise in the data, as the methane gas extracted with the oil cannot be measured.

In some cases, uncertainties in the residential sector come from the lack of control and measuring instruments. In this case, electricity, gas consumption is calculated according to regulations. Natural gas used by the population is released into the air as the result of leakages. And it is difficult to know the exact amount of it. Therefore, for the reduction of the percentages of uncertainties in the inventory of the sector, there is need for further studies.

The uncertainties of data in the energy balance for 2006-2010, which have been provided by State Statistical Committee, have been compared to the statistical difference for each year. The uncertainties of the data do not exceed 3.2%.

In the emission rates, liquid fuels uncertainties do not exceed 5%. The uncertainty of natural gas is 17.5% compared to the emission coefficient in 2006. Thus, the low thermal coefficient used in the National coefficient is different from the coefficient adopted the methodology.

Methane gas uncertainty has been calculated by using the 2003 "Positive Experience" document. An uncertainty of 34.7% has been estimated.

In the ***industrial processes*** sector, there are uncertainties in the data gathered for 1990-2004. Since 2007, a relative increase of accuracy in the State Statistics Committee data enables to reduce the level of uncertainties in the emissions calculations. Also, there are uncertainties in the determination of emission factors. The uncertainties in the data about changes in the range of raw materials for cement production, waste materials of the steel production, the raw materials used in food products and beverages reduce the accuracy of the emission factors.

The uncertainty in the calculation of the emissions in a timeframe, i.e. for the base year, has also been high for the calculation of F-gases. Thus, as a result of lack of information about the sources of these gases for the years of 1990-1999, their quantities haven't been calculated for the mentioned years.

It has been found out that the uncertainties concerning the CH_4 released from internal fermentation and manure by the best practices method in the Agricultural sector are approximately 19.5%. In reality, the figure could be much higher. Thus, accurate data on the number of cattle in the households are not provided in any source. Studies are needed to reduce uncertainties.

In the land use, land use change and forestry (LULUCF) sector, there are very huge uncertainties. The IPCC methodology also points out the huge uncertainties in carbon absorptions of the artificial forest areas in this sector. Even in the areas, where in-depth studies are conducted, up to 50% uncertainties are reported. Such great uncertainty have been impacted by the microclimate in the territory of the forest, the necessary conditions for the development of trees in that area, soil fertility of the area and other conditions.

In the forests of Azerbaijan Republic, it's very difficult to make a reliable estimate on the amount of carbon dioxide removal. This is due to the fact that unlike other forests, the sorts of trees in the country's forests are wide range, and therefore, they are sharply different from each other for their annual growing and carbon capacity. On the other hand, more than 90% of forests are located in the mountain and foothill areas, which, in turn, make certain difficulties. Therefore, the selection of an average rate for the emission factors creates large uncertainty.

In addition, there are uncertainties in the data in the ***land use, land use change and forestry (LULUCF)*** sector. Thus, after the distribution of lands to private ownership by the State, the lack of statistical data on their use increases the uncertainties level.

In the territories occupied by Armenia, due to failure to obtain any information on the use of lands, situation of forests in the area, the areas of burnt fields and burning ecosystem, the uncertainty is 100%.

As a result, there's necessity to conduct in-depth research to reduce uncertainties in the emission factors and in the data.

In the ***waste*** sector, the percentage of uncertainty for solid wastes of households CH_4 emissions is lower than the percentage of the CH_4 emissions of waste waters. In total, the uncertainty for CO_2 emissions is nearly 17%.

III. Mitigation analyses

3.1. State policy and programmes on climate change mitigation

The Republic of Azerbaijan is a signatory to the UN Framework Convention on Climate Change and its Kyoto Protocol. Despite the fact that Azerbaijan has not undertaken quantitative obligations in regards to reduce of the amount of GHG emissions, GHG reduction is one of the main environmental priorities for the country. In this regards, a number of institutional measures have been implemented in order to coordinate and plan the activities in this area. Based on the Decree of the President of the Republic of Azerbaijan issued on April 30, 1997 State Commission on Climate Change was established in order to coordinate national activities in regards to the UN Framework Convention on Climate Change. Furthermore, Climate Change and Ozone Centre was established in 2001, within the National Hydrometeorology Department of the Ministry of Ecology and Natural Resources.

As an independent state, the Republic of Azerbaijan has already defined its national development priorities and strategies and considers protection of the environment a priority**.** Azerbaijan 2020: Look to the Future, a Concept Document which identifies national development priorities, includes a dedicated section on environmental issues. The Concept Document states that*:* ***"During the period covered by the concept, it is planned to bring the amount of energy used for the production of one unit of GDP and the amount of carbon dioxide in line with the appropriate indicator of member countries of the Organization for Economic Cooperation and Development, and this is important in terms of implementing the development goals of the millennium."***

Mr. President Ilham Aliyev, in his speech delivered during a conference on one of the socioeconomic development programmes stated that: ***"… we have rich gas and oil reserves and during at least the next 100 years we will not be faced with a shortage of internal resources, in other words, of energy sources. However, I consider that the development of renewable energy sources and improvements in this area is also important. First of all, this would create additional financial opportunities for us. Furthermore, development of such new technologies, renewable technologies, and "green energy" would be our contribution to solving environmental problems in the world."***

Issues related with mitigating the effects of climate change are addressed as part of a number of state programmes, some of which are mentioned below:

- State Programme for the Development of the Fuel and Energy Sector (2005–2015);
- State Programme for the Socio-economic Development of the Regions of Azerbaijan (2014-2018);
- State Programme for Poverty Reduction and Sustainable Development (2008-2015);
- State Programme for Socioeconomic Development of Baku and its Settlements (2011-2013);
- State Programme for Utilization of Renewable and Alternative Sources of Energy (2005-2013);
- National Programme for Restoration and Expansion of Forests in the Republic of Azerbaijan (2003-2010);

- Complex Plan of Activities for Improvement of the Environmental Situation in the Republic of Azerbaijan (2006-2010);
- State Programme for Socioeconomic Development of Baku and its Settlements (2014-2016);
- State Programme for Reliable Provision of the Population with Food Products in the Republic of Azerbaijan (2008-2015);
- State Programme for Development of Viticulture in the Republic of Azerbaijan (2012-2020) and etc.

It should be noted that the State Strategy for Utilization of Renewable and Alternative Sources of Energy has been developed and is in the process of adoption.

In addition, the Plan of Activities for Improvement of the Environmental Situation and Efficient Use of Natural Resources (2015-2020) and the State Programme for Saving on Energy Resources and Improving Efficient Energy Utilization (2015-2020) is undergoing interstate procedures for approval.

There is a special chapter on climate change in the "Action Plan on improvement of ecological situation and efficient use of natural resources in Azerbaijan Republic (2015-2020)" which considers preparation of NAMAs and NAPs that incorporates MRV characteristics.

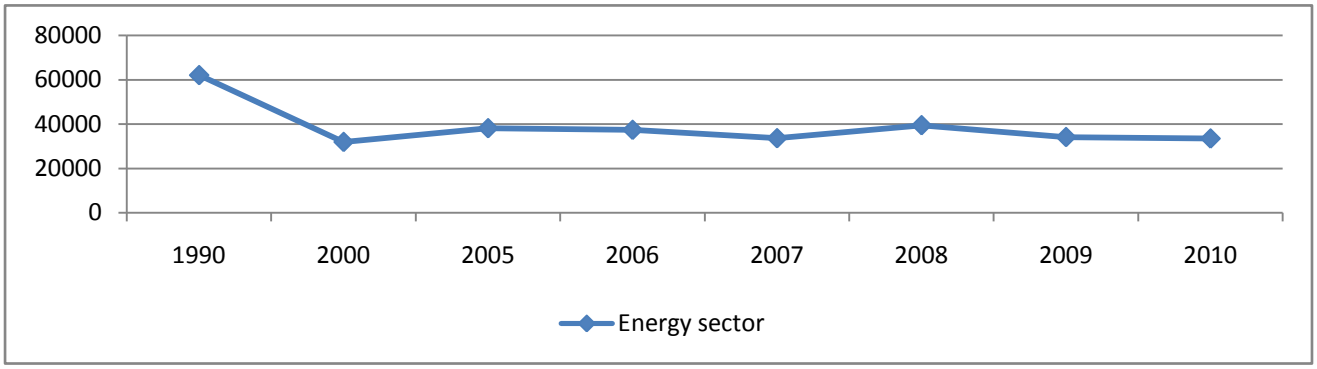
3.2. Implemented activities in the field of climate change mitigation and the existing potential

Despite the fact that the Republic of Azerbaijan has not undertaken any quantitative obligations under the Kyoto Protocol on GHG reduction, a number of significant measures have been implemented in the area of emission reduction. These measures included introduction of low-waste technologies, renewable energy sources, efficient waste management, and expansion of forests. Consequently, with 2010 taken as a baseline point, GHG emissions have decreased by 34.3%. The following sections of this Report provide information on activities implemented and the existing potential in regards to reduction of GHG emissions in different sectors.

3.2.1. Energy sector

Based on the GHG inventory, carried out within the framework of this Report, the energy sector was responsible for 75.6% of the overall national emissions during 2010. This signifies the importance of activities implemented in the **energy** sector, in terms of mitigating the effects of GHG emissions on climate change.

Figure 12. Changes in GHG emission levels in the energy sector during 1990-2010, Gg CO2 eq.



As illustrated in Figure 12 above, GHG emissions have been decreasing during the past years in this category. During 1990-2000, the decrease in GHG emissions was due to decreased utilization of oil and oil products. After 2000, the reduction was related with introduction of new technologies, capturing of associated gas in production facilities, replacing of oil products with natural gas in electricity generation plants, and other mitigation efforts.

In 2006, a Memorandum of Understanding on cooperation in the energy sector was signed between Azerbaijan and the European Union, which facilitated activities aimed at reorganization of this sector in accordance with international standards. Furthermore, Azerbaijan became one of the closest partners of the European Union, in the area of energy security. As part of this Memorandum, a twinning project entitled as "Legal approaches in the energy sector of Azerbaijan and structural reforms" was planned. This project aims at developing laws on electricity, gas supply, as well as codes on electricity and gas networks, in accordance with EU directives on electricity and gas supply.

The following sections provide information on the current situation in regards to oil and gas production, electricity generation, energy efficiency, renewable energy sources and the transportation sector, as well as activities aimed at mitigating the effects of climate change and the existing potential.

3.2.1.1. Oil and gas production

Azerbaijan is rich with oil and gas and is considered to be the oldest oil producing country. Oil production with industrial methods has a history of about 170 years in Azerbaijan. The first oil wells were drilled in 1847 with mechanical methods. During the Soviet period, oil and gas production enjoyed a steady increase. Despite the fact that oil and gas production decreased during the early years of Azerbaijan's independence from the Soviet Union, the oil contract signed on September 20, 1994 served as an impetus for the development of oil and gas sector. The first contract on "Agreement on the Joint Development and Production Sharing for the Azeri and Chirag Fields and the Deep Water Portion of the Guneshli Field in the Azerbaijan Sector of the Caspian Sea" was signed on this date. This contract, which became known as the "Contract of the Century," provided new opportunities for foreign companies in Azerbaijan to sign new agreements later on. Since 1994, the SOCAR has signed 27 agreements with foreign oil companies on exploration and production of hydrocarbon resources and production sharing. Currently, 30 oil companies from 14 countries are involved in implementation of these contracts. During 1995-2013 the amount of investments in the Azerbaijani economy was 128.7 billion US dollars. The share of foreign investments was 46.6 billion US dollars.

These contracts anticipate about 60 billion US dollars of investments in the oil and gas sector in Azerbaijan, of which, 25.5 billion US dollars have already been realized as foreign investments. According to initial calculations, 45 billion US dollars will be invested in Shahdeniz-2, TANAP and TAP projects. Currently, Azerbaijan's hydrocarbon resources are estimated to be more than 4 billion tons, which position the country among the most important oil regions in the world for all categories. According to official statistics, 43.457 million tons of oil was produced in Azerbaijan during 2013.

One of the main directions of the oil strategy is the transportation of Azerbaijani oil to world markets. In this regard, the Baku-Tbilisi-Jeyhan main export pipeline Project has been carried out. This strategic Project ensures protection of Azerbaijan's interests in the long term, development of large scale international economic cooperation, oil production in the region and transportation of oil from the region to world markets. Production of natural gas in Azerbaijan is carried out by the State Oil Company of Azerbaijan Republic and off-shore oil fields operated by the British Petroleum. During 2013, the amount of natural gas production in Azerbaijan was 29.245 billion m3. Significant developments have been achieved in the area of gas production. Within the framework of the Shahdeniz Stage 2 Project, natural gas will be transported from the Caspian Sea to Turkey and European Markets through the South Gas Corridor.

There is a significant potential in regards to reduction of GHG emissions in the oil and gas extraction industry and in refineries. As of 2007, the State Oil Company of Azerbaijan Republic launched activities aimed at capturing associated gas in oil and gas production facilities. In 2008, SOCAR joined the Global Gas Flaring Reduction - World Bank. Thanks to the efficient cooperation established with this organization, SOCAR has implemented a number of projects aimed at minimizing the loss of associated gas and its distribution to end users. Consequently, SOCAR has been able to achieve significant reductions in loss of associated gas. Currently, 97% of the associated gas is captured and supplied to end users. All new projects provide for capturing of associated gas.

The SOCAR is successfully implementing its Strategy for Mitigating Climate Change Effects. Within the framework of this Strategy, the Company has developed an action plan for identifying the potential in this area and its realization. This plan includes the following aspects: creation of an advanced monitoring system for regular measuring and reporting of greenhouse gases, minimizing leaks in gas supply lines, increasing energy efficiency in technological processes, transfer to low-carbon energy models, use of alternative and renewable energy, application of innovative technologies, cleaning of territories polluted with oil and planting of trees in such areas, and conducting various awareness raising activities. Furthermore, the Strategy aims to decrease the amount of energy utilized in extraction and processing of oil products, as well as achieving European standards in regards to prevention of losses in gas supply lines.

It should be noted that in addition to planned activities, a number of energy efficient and energy saving projects have been implemented in fuel and energy sector in the country:

- Installation of a compressor at Guneshli field, which enabled capturing and supply of 310 million m3 of associated gas;
- 70 vacuum compressors have been installed in Neft Dashlari Oil and Gas Extraction Unit, in order to capture associated gas. The annual amount of captured gas was 280 million m^3, using locally produced compressor equipment;
- The "dry gas" produced in Baku oil refinery named by Haydar Aliyev is transferred by pipelines to the Sumgait Ethylene-polyethylene Factory, to be used as a raw material. This project enabled savings on transportation costs and vehicles, which in turn contributed to decreased emissions of GHG and other emissions;

- The old Lancashire boilers used for heating in a number of buildings owned by SOCAR, were replaced with new Yetsan boilers. Consequently, GHG emissions from these boilers were reduced by 12%;
- The old metal melting furnace used by the Ship Repair Factory was replaced with a new induction furnace, which increased the energy efficiency by more than 3.5 times;
- The old copper and aluminium melting furnace, which was operated with liquid fuels, was replaced with new energy efficient furnaces and consequently, CO_2 amount was reduced by 6-7 times;
- The new Nitrogen–oxygen Complex is able to provide high quality nitrogen and oxygen for the Ethylene-polyethylene Factory and oxygen for the Renovation-construction Unit. Energy consumption in the new Complex was decreased by 5 times, compared with the older plant. It was calculated that thanks to these measures, emissions were reduced by about 750 tons;
- In ethylene production, a J-66 water cooling equipment was used since 1987. This equipment consisted of 7 units of 1600 kVt and 3 units of 800 kVt synchronous engines. The daily energy consumption of this water cooling equipment was 175 thousand kVt/hour. The new water cooling equipment includes 4 units of 1600 kVt and 6 units of 185 kVt asynchronous engines. This equipment's daily energy consumption is 120 thousand kVt now, which means 55 thousand kVt of savings on electricity. In other words, the annual CO_2 emission amount was decreased by 39 thousand tons;
- Electricity supply of oil and gas extraction facilities in offshore units was provided by Gas Turbine Power Station (QTES-48), which was commissioned in 1986. Some of the equipment was out of order in this old Station, which led to increased fuel usage and production costs. Therefore, a new electricity station was constructed in 2009, which composed of 6 gas turbine generators, each with a 7.5 MVA potential. The annual amount of CO_2 reduction equals to 76 thousand tons;
- A new project is being developed for replacing incandescent light bulbs with LED technology at SOCAR administrative buildings. This project should help reduce the annual energy consumption by 37.8 million kVt;
- A new project has been developed on replacing a number of outdated compressors with new ones, used at compressor stations of the Gas Storage Facility at the Azneft Production Unit. This project will help reduce the annual CO_2 emissions by 37 thousand tons, thanks to improved efficiency in operations.

3.2.1.2. Energy efficiency

The Republic of Azerbaijan has ratified the Energy Charter Treaty and its Protocol on Energy Efficiency and Related Environmental Aspects in 1997. Joining these documents, Azerbaijan has undertaken the obligation to take measures in order to ensure efficient use of energy and mitigate the negative effects on the environment.

In accordance with the State Programme for the Socioeconomic Development of the Regions of Azerbaijan (2009-2013) and European practice, bare wires are being replaced with insulated self-supporting cables for electricity supply to residential buildings, in 0.4 kV distribution networks

(Azerenerji OSC and Bakıelektrikshebeke OSC), in order to minimize losses in consumption and increase efficiency in sales.

Furthermore, new technologies are being used in energy accounting. In order to ensure distance management of newly constructed substations, SCADA system (partial) has been installed, along with modern relay switches and automated devices. Thanks to the comprehensive reconstruction in the network and updating of the accounting system with modern technologies, energy saving has been significantly improved.

With the support of the European Union, a project entitled "Energy Efficiency in Buildings" has been successfully carried out. Implemented in Binagadi district of Baku, the Project generated a lot of interest among stakeholders. Within the framework of this Project the Binagadi-1 condominium was developed, which was registered by the Ministry of Justice and issued with a relevant certificate. Along with Binagadi, other districts in Baku have also initiated large scale activities in the areas of increasing energy efficiency and building management.

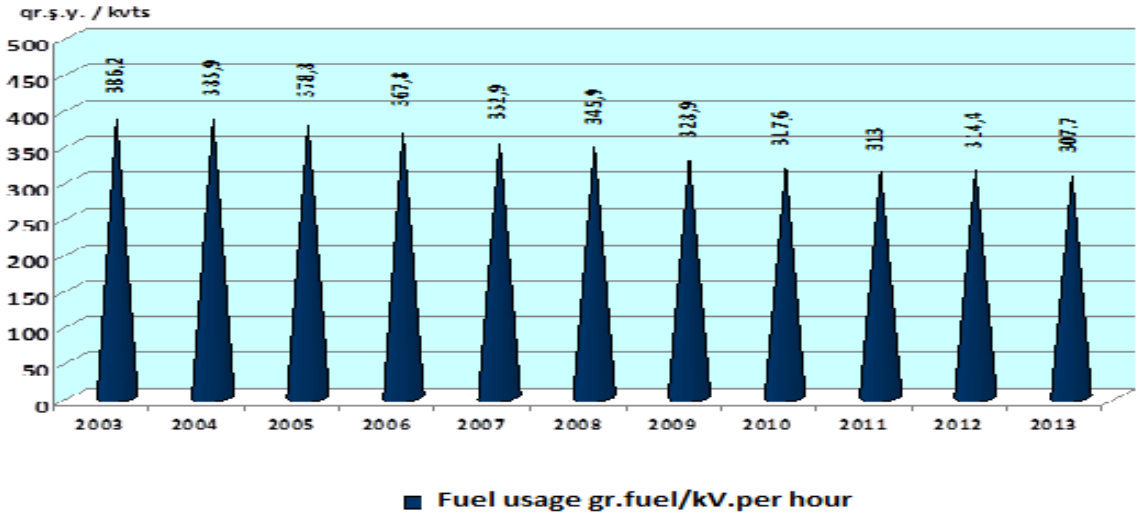
Results of conducted assessments show that energy efficiency could be improved through application of efficient lighting and heating systems in commercial and residential sectors. At present, there is a potential for efficient energy use in commercial and residential sectors. Furthermore, replacement of 5-10 Vt light bulbs used for lighting purposes with LED technology would help reduce energy consumption by 15-30 million kVt/hour.

Introduction of measurement and control systems in the energy sector could help minimize losses. Installation of electricity meters during 2007-2008 helped decrease energy production from 26.6 billion kVt to 18.9 billion kVt in 2008. Furthermore, application of modern universal system technologies for control and accounting of energy consumption helps reduce losses as well. According to calculations carried out by local experts, these measures can help save 30% of the annual energy consumption. Introduction of this system will also contribute to decreasing CO_2 emissions. From this point of view, there is a need for additional awareness raising activities to promote low-waste technologies.

Moreover, reconstruction of the heating and hot water supply system in Baku would help save about 383 thousand tons of fuel and reduce CO_2 emissions by 600 thousand tons per year.

Introduction of fuel efficient technologies have helped reduce fuel usage from 376.5 gr per kVt/hour to 307.7 gr per kVt/hour for production of 1 kVt/hour of electricity during the past 10 years, which means savings of approximately 1.8 million tons of fuel per year and less emissions.. Increasing the generation capacity in the energy sector and improvements in the existing energy production facilities are aimed at reducing the amount of fuel usage to 260 gr per kVt/hour for production of 1 kVt/hour of electricity, which is indicated by the State Programme.

Figure 13: Fuel usage in energy production during 2003-2013



The State Programme for Saving on Energy Resources and Improving Efficient Energy Utilization (2015-2020) is being developed by relevant state agencies in order to achieve the above mentioned objectives.

The State Programme envisages creation of a state information system on energy security, energy efficiency of the national economy, environmental security of the energy sector, saving energy resources and efficient usage, as well as decreasing the energy consumption in the gross household product and other relevant measures, which would contribute to a more energy efficient society in Azerbaijan.

"Azeristiliktechizat" OSC which was established in 2005, is responsible for provision of heat supply of households and buildings, education, health care and other social facilities in Baku City and other regions of the Republic by performing functions such as thermal energy production, transmission, distribution, sale and services. According to the "State Program on socio-economic development of Baku City and its suburbs in 2011-2013" approved by the Decree of the President of the Republic of Azerbaijan dated May 4, 2011, necessary activities are presently underway in relation with the implementation of measures envisaged by "Azeristiliktechizat" OSC in 2011-2013. These activities are dedicated to the improvement of heat supply in the Republic of Azerbaijan as the continuation of measures taken during previous years and aimed at fundamentally improving completion of necessary works for heating industry, restoration and modernization of relevant heating facilities and sources, construction of new heating houses, reconstruction of heat supply systems and accordingly, organization of dependable and high-quality heat supply services for consumers in Baku City and its surrounding settlements.

Provided calculations show that renovation of heating supply system and hot water supply system of only Baku city may result with reduce of usage of 287 mln m^3 natural gas annually.

3.2.1.3. Electricity generation

According to the 2013 statistics, the overall capacity of electricity generation stations is more than 7100 MVt, of which, 83.2% accounts for thermal power stations and 16.8% for hydro power stations.

The State Programme for Development of Fuel-Energy Complex of the Republic of Azerbaijan (2005-2015) was adopted in 2004. A number of projects have been implemented within the framework of this Programme, aimed at increasing the generation capacity and updating of energy transmission networks. To this end, 6 module power stations were commissioned in various regions of the country, with a capacity of 557 MVt. Furthermore, the Sangachal module power station, with a total capacity of 300 MVt (composed of 16.6 MVt units) was commissioned in 2008. Located in the Southern section of the Absheron Peninsula, this module power station is designed to supply for the peak energy demand. The generation unit N 1 at the Shamkir Hydro power station with an overall capacity of 190 MVt was renovated and connected to the network in December of 2008. On November 19, 2009 in Sumgait, a combined-cycle power station with a capacity of 525 MVt was commissioned. In addition, the following power stations were commissioned in different regions of the country: a 25 MVt Fuzuli hydro power station in Fuzuli district in 2012; a 780 MVt South power station in Shirvan city in 2013; and a 25 MVt Taxtakorpu hydro power station in 2014.

Currently, there are 14 thermal power stations and 14 hydro power stations in Azerbaijan. The national energy system includes more than 200 substations with capacities ranging from 500, 330, 220 and 110 kilowatts.

It should be mentioned that, thanks to the national leadership's target oriented policies, oil as a fuel has been replaced with natural gas in thermal power stations, which helps to reduce GHG emissions.

Table 16: Oil and natural gas used in thermal power stations, 2006 – 2010

Years	Type	Amount (thousand tons)	GHG (thousand tons)	Overall emissions (thousand tons)
2006	Oil	1316.0	4184.06	15557.98
	Natural gas	5222.0	11373.92	
2007	Oil	1063.8	3382.22	14819.52
	Natural gas	5251.1	11437.30	
2008	Oil	457.8	1455.52	14403.32
	Natural gas	5944.6	12947.80	
2009	Oil	129.3	411.09	10018.59
	Natural gas	4411.0	9607.50	
2010	Oil	1.3	4.13	8903.32
	Natural gas	4085.8	8899.19	

As illustrated in Table 16 above, the transfer from oil to natural gas in thermal power stations and at the same time introduction of more modern technologies helped reduce emissions by 6.655 thousand tons of CO_2 equivalents between 2006 and 2010.

The government of Azerbaijan has carried out close cooperation with international organization and introduced the most modern technology in this area. For instance, within the framework of

cooperation with the European Reconstruction and Development Bank, 165 million Euros was invested for reconstruction and modernization of the AzDRES Thermal Power Station. This Project was submitted to the UN Framework Convention on Climate Change as a CDM Project and verified by CDM board in 2012. The Project will achieve reduction of emissions by 3 million tons of CO2 equivalents. Another example in terms of efficient cooperation with international organizations is the Power System Optimization Project, funded by the World Bank. The Project budget is 50 million Euros. Further, the BNP Paribas (France) funded a reconstruction Project for the Sumgait Thermal Power Station has a total budget of 336 million Euros investment provided by mentioned banks. All these initiatives have been registered as CDM projects.

3.2.1.4. Alternative and renewable energy sources

During the past few years significant efforts have been launched in Azerbaijan in the area of alternative and renewable energy sources. Azerbaijan is rich with such sources and development of these is a priority for the country.

Based on the Decree of the President of Azerbaijan, issued on February 1, 2013, a limited liability company – Azalternativenerji was established within the State Agency for Alternative and Renewable Energy Sources of Azerbaijan. Furthermore, the Strategy for Development of Alternative and Renewable Energy Sources is in the process of adoption. Currently, there are several production units which are engaged in manufacturing of solar panels and collectors. At the same time, several solar and wind power stations are being constructed around various regions of the country.

Based on a Presidential Decree issued in 2009 on Additional measures in regards to development of alternative and renewable energy sources in Azerbaijan, both the Azerenerji OSC and the Ministry of Industry and Energy of the Republic of Azerbaijan were allocated one million manats each (in total two million manats). Azerenerji OSC spent this allocation on identification of sites for hydro power stations and investigation on hydrological parameters of rivers. At this stage, the main objective is to learn about the existing renewable energy sources in the country, carrying out relevant analysis, verifying the sustainability of the alternative and renewable energy approach, and review of various development options.

The potential for alternative energy sources and activities carried out

The existing potential in Azerbaijan justifies the investments in this area. The potential for various alternative energy sources available in Azerbaijan is detailed in the following table, based on the existing level of technology.

Table 17. The potential for alternative energy sources in Azerbaijan

Resources	**Potential**
Solar energy	>5000 MVt
Wind energy	>4500 MVt
Biomass energy	>1500 MVt
Geothermal energy	>800 MVt
Small scale hydro power generation (small hydro power stations)	>350 MVt

Solar energy

The annual vertical solar radiation in Azerbaijan is 1500-2000 KVt-hour/m2. As of 2012, the Azguntex factory has been in operation in Sumgait, with an annual output potential of 120 thousand solar panels.

Currently, a 1.8 MVt solar power plant is in operation in the Gobustan Experimental Polygon (*picture from the polygon is provided at title page*). On July 16, 2014 Azalternativenerji LTD's Surakhani Solar Power Plant was inaugurated. The Power Plant is located on six hectares of land with 8 thousand solar panels. These panels are able to produce 12 thousand kilowatt/hour of electricity per day. Additionally, 4 thousand solar panels will be installed. The Project capacity of the Plant is 2.8 MVt. The annual electricity output of the Plant is 4 million kilowatt/hour. With full capacity, the Plant will help save 1.5 million m^3 of natural gas per year. In addition, on October, 2014, 1 MVt part of the "Pirallahi" Solar Power Plant was put into operation.

As of 2010, a Solar Collectors and Boilers Factory started operation in Sumgait Technology Park. These high quality collectors are designed for heating water. Depending on weather conditions, these units have the capacity to heat 100 liters of water at 40-80 ^oC and more, within a one hour period. The Factory produces water systems composed of closed hot water collectors that work with natural circulation and chrome water tanks, as well as high pressure boiler systems.

In general, introduction of solar energy projects will result with save of usage of 97.5 mln m^3 of natural gas annually.

Wind energy

The territory of the Republic of Azerbaijan, especially the Absheron Peninsula and the Caspian Sea coastline is rich with wind energy resources. According to the investigations in this area, technical wind resources in Azerbaijan constitute 4500 MVt. 1500 MVt of this volume is in the Absheron Peninsula, 500 MVt in the Caspian coastline stretching from the Kur river-mouth to Dagestan border, and 70 MVt in Nakhchivan Autonomous Republic.

The researches indicate that the number of windy days on the Absheron coastline is 245-280 days. Energy qualities of the wind are 2-3 times higher than Europe and other regions. Continuous developments in the area of the wind energy generation and improvement of policies will help increase wind energy output to 1500 MVt by 2020. According to the information provided by the State Agency for Alternative and Renewable Energy Sources of Azerbaijan, the overall capacity of wind turbines in Azerbaijan will be increased to 700 MVt by 2020. This requires legislative and institutional arrangements and normal conditions for investors.

In 1999, a Japanese company called Tomen installed two wind towers in the Absheron Peninsula, one with 30 meters and the other with 40 meters height. The average annual wind speed was calculated to be around 7.9 – 8.1 m/sec. This company has developed a feasibility study to install a 30 MVt wind power plant in Gobustan district.

In 2002, EBRD funded an assessment of the national potential for wind energy. The assessment revealed that the Absheron Peninsula has a significant potential for generation of wind energy. The annual average wind speed in coastline areas with an elevation of 40-50 m is 7 m/s. In the Absheron Peninsula, at an elevation of 12-14 meters this indicator is between 5.6-7.1 m/s.

Wind energy generation plants in Azerbaijan consist of the following (including those under construction):

- In 2009 two V52 model wind energy turbines were installed, each with a capacity of 850 KVt (Vestas production) as a pilot project. The Project owner is the Caspian Technologies Company. Additionally, an Experimental Training Centre (polygon) was established and a V39 model wind energy turbine was installed with a capacity of 500 KVt (Vestas production);
- Alten Group Project – In 2011 4 wind energy turbines, each with 2 MVt capacity, were installed (Gamesa production). The Project owner is the Alten Group Hotel Coordina Company;
- Shurabad Project – Construction of a wind energy generation facility is about to be completed. This facility is composed of 16 wind turbines, each with a capacity of 3 MVt (Vestas production). The Project owner is the Caspian Technologies Company;
- Mitaki Project GmbH Company Project – Construction of a wind energy generation facility is underway. This facility is composed of 25 wind turbines, each with a capacity of 2 MVt (Fuhrlander AG production). The Project owner is the Caspian Technologies Company.

The Pilot Wind Energy Generation Project carried out near Shurabad village in Khizi district, produced 7 million kilowatt/hour of energy within one year, which was transferred to the high voltage electricity network. This volume equals to half of Khizi district's electricity needs through "green energy." A thermal power plant would consume 2 million m^3 of natural gas to generate this volume.

As a result of implemented activities, it is planned to reach 10% of alternative and renewable energy in total energy production.

Hydro energy

Small scale hydro energy generation potential is high in Azerbaijan. According to calculations, the overall hydro energy generation potential of rivers in Azerbaijan is about 40 billion kVt/hour. Of this volume, 16 billion kVt/hour is considered to be technical and 7.6 billion kVt/hour to be economic potential. Currently, only about 2 billion kVt/hour of this potential is being used. This means that there is a great potential to be tapped in the hydro energy generation sector in Azerbaijan. Currently, the existing hydro power stations are mainly based on large rivers – Kur and Araz. Furthermore, construction of new hydro power stations on these rivers would not be justified from economic, social, physical (terrain), nor environmental perspectives. Therefore, construction of new hydro power stations on smaller rivers would be more promising.

In accordance with the State Programme for the Socioeconomic Development of the Regions of Azerbaijan (2009-2013), small scale hydro power stations were constructed in various economic regions of the country:

- In 2012, Gusar-1 hydro power station, with a capacity of 1 MVt, was commissioned, which can produce 5 million kilowatt/hour of electricity per year; and
- In 2013, Ismayilli hydro power station, with a capacity of 1,6 MVt, was commissioned, which can produce 8 million kilowatt/hour of electricity per year.

In addition, construction of the following hydro power stations is underway:

- Astara-1 hydro power station, with a capacity of 1.7 MVt;
- Goychay-1 hydro power station, with a capacity of 3 MVt; and
- Balaken-1 hydro power station, with a capacity of 1.5 MVt.

According to available assessments, the technical potential of this sector is 4.9 billion kVt/hour and the economic efficiency potential is 1.7 billion kVt/hour. A feasibility study, carried out by Azerenerji OSC, reveals that with increased capacity and construction of new hydro power stations, the share of power generation in hydro energy stations can be increased by 28.2%, which means double the output in comparison with the baseline year.

Table 18. The amount of saved fuel and decreased CO_2 emissions after the commissioning of hydro power stations

Indicators	Years		
	2015	2020	2025
Electricity production – billion kVt	2.4	3.3	3.9
Saved fuel (thousand tons)	720	990	1170
Volume of decreased CO2 emissions (thousand tons)	2216	3047	3602

Basic investigations and reports suggest that up to 280 hydro power stations can be constructed in mountain and hillside rivers, as well as other small waterways, with indicative sites, capacity and annual outputs.

Biomass

One of the alternative and renewable energy sources is biomass. The main composition of biogas, obtained through treatment of organic waste with bacteria, is methane and carbon dioxide. The advantage of fuel generation through this method is the use of various types of waste from household, agricultural and food processing industries. After generation of energy, the waste is treated to be used as fertilizers and in order to prevent pollution of underground water sources.

The rapid development of the industry, agriculture and social service sectors in Azerbaijan create new opportunities for biomass energy generation. A great part of the waste, generated in various economic sectors, is composed of biomass materials. Treatment and burning of household and industrial waste could be used for heating residential buildings. One of the main sources of biomass is agricultural waste materials. This includes wastes from grain products, manure from farm animals, offal waste from slaughterhouses and etc. Development of special equipment and their use for utilization of biogas in household, public and service sectors and in heating facilities helps prevent deforestation and decrease emission of harmful materials into the atmosphere.

Biomass raw material includes the following as well: wood waste, briquettes, charcoal, agricultural waste, plants, hazelnut and walnut hulls, sunflower residues, cane, vines, tree branches, cotton plants, household waste, waste oil, as well as biogas, liquid bio-fuels – bio-ethanol and biodiesel.

The first private company in Azerbaijan to produce biogas devices is the ALTEN GROUP Company. Based on orders from local farmers, the Company produces biogas reactors with various capacities (5, 10, 15, and 20 m3). Fertilizers produced during biogas energy generation enriche soil with fibres and minerals, increasing productivity by 15-20%.

A 1 MVt bioenergy device has been installed in the Gobustan Experimental Polygon, with possibilities for replication in the future.

Geothermal energy

Various regions of Azerbaijan is rich with thermo-mineral waters of therapeutic and heating-energy qualities. According to calculations, the overall reserve of such waters is 419.093 m^3/day. However, hydro geological researches have been carried out in only three large hydro geothermic regions: Caspian coastline - Guba, Lenkoran hillside plains, and Kur lowlands. In these three regions the following studies have been conducted: calculation of reserves and prognosis of thermal waters, technical and economic commentary on utilization of thermal waters, technical and economic reports, and a feasibility study on temporary conditioning of thermal waters in the Caspian coastline - Guba hydro geothermic region. These studies revealed that there is a 25.67 m^3/day capacity that can be utilized.

Underground thermal water deposits in the Delimemmedli region of Samukh district are located at 1600-3000 m depth – on Paleogene and Cretaceous sediments. Water output is usually 1500-1000 and sometimes 2000-3000 m3/day, with a temperature range of 40-70°C. There are possibilities to make efficient use of the heat energy of geothermal waters found in various districts.

Other alternative energy sources

The types of thermal pumps in use include the following: "Air-water", "water-water" and "ground-water." The operation principle of this device is similar to that of the household refrigerator. The device includes a compressor and a circulation pump.

The first thermal pumps in the country (with a capacity of 1.3 MVt) were commissioned in 2011, in the Azerbaijan Diplomatic Academy (currently, the ADA University) campus. The characteristics of this device include the following: temperature of heating sources and stability, geographical conditions and constructive structure of building locations, the amount of heating required and the type of heating system (centralized or individual). Use of heating pumps is more efficient in buildings and facilities.

The State Agency is implementing various heating projects in schools, healthcare and sports facilities around the country, with use of heating pumps.

Investments in alternative energy sources

During the past years about 300 million manats have been invested in alternative energy development through various sources, including the public and the private sector. State investments have constituted 70 million manats and the rest accounts for international organizations and private investments.

The State Agency has constructed a hybrid power station (wind, solar and biogas) in Gobustan, with a preliminary capacity of 5.5 MVt. Currently, the State Agency is looking for ways to increase the capacity of this station and to introduce smart grid technologies in the district energy network, through renewable energy sources. According to the information released by the Agency officials, these works will be completed in 2015.

Furthermore, the State Agency commissioned construction of a 2.8 MVt solar power station in Surakhani district. Additionally, the State Agency carried out various projects, involving small scale

solar energy and heat pump projects in schools, kindergartens, and healthcare and sports facilities in Baku, suburban settlements, as well as other districts.

A number of projects have been implemented by the private sector as well. For instance, Caspian Management Systems and AZTORQ companies have each installed 25 MVt wind power facilities (in total 50 MVt) in Yeni Yashma. Currently, this facility is in the process of being connected to the national grid.

The Caspian Technology Company is about to complete construction of two wind power stations, one with 48 MVt and the other 1.7 MVt capacity, in Shurabad.

Trans TS Company has constructed a wind power plant with a capacity of 3.6 MVt. The Alten Group has completed construction of an 8 MVt wind power plant in Hokmali, Absheron district. Energy production in this plant is currently on the testing stage.

The total capacity of wind power plants commissioned by the above mentioned 5 companies is 111 MVt. Investment costs for these projects have constituted 180 million euros, including transportation of the devices to Azerbaijan with average world market prices, installation and other expenses.

During the past few years, cooperation with international organizations in regards to use of alternative energy sources have increased. A financing agreement reached between the governments of Azerbaijan and Germany provides for low interest loans by the KfW – 130 million Euros for development of alternative energy in Azerbaijan and 20 million Euros for improving solid waste management in Ganja city. The Project on development of renewable energy is currently on the feasibility study phase. International consulting companies have been recruited for the feasibility study of the solid waste management Project and currently, the parties are working on developing the loan agreement.

The European Union has allocated 13 million Euros as a grant to develop relevant normative-legal acts, preparation of new laws and drafting of other documents and implementation of pilot projects.

With financial assistance from the United Nations Development Programme, the European Commission, and the Norwegian Government to promote use of alternative energy in Azerbaijan several initiatives have been carried out: drafting of legislation on alternative energy within the framework of Supporting Sustainable Energy in Azerbaijan Project; and feasibility study of three pilot projects on solar, wind and biomass energy, and a small hydro power station in Sheki district.

The Asian Development Bank has allocated a grant in the amount of 1 million US dollars, in order to carry out a feasibility study on the use of bio-energy resources in the country.

The International Finance Corporation has signed a 15 million US dollar worth of loan contract with the Bank Respublika on financing of energy efficiency projects in the country.

The European Bank for Reconstruction and Development has allocated loans for local financial institutions in Azerbaijan for financing of energy efficiency projects. These allocations were carried out within the framework of Caucasus Energy Saving Programme. Until now, three banks have received loan funds with a total value of 12.2 million US dollars. These loans are designated for only energy efficiency and renewable energy projects. Local entrepreneurs and individuals can apply for these funds to procure energy efficient equipment and materials.

The share of renewable and alternative energy sources, together with hydro energy power is expected to constitute 20 percent of the total energy production by 2020.

3.2.1.5. Transport sector

According to statistics, emissions from the transportation sector in Azerbaijan have been increasing for the last few years. Every year more than 100.000 cars are imported to the country, 80% of which are used in Baku. Official statistics indicate that the number of motored vehicles was 612069 in 2005, whereas this figure has increased to 1.135.936 in 2012. In other words, there has been an increase of 85,5% in the number of motored vehicles between 2005 and 2012. Considering the annual 10% increase in the number of motored vehicles in the country, the number of motored vehicles will reach 3 million in 10 years.

The Government of Azerbaijan has been carrying out a number of measures for improving the national transportation system, such as: The State Programme for Development of the Transportation System in the Republic of Azerbaijan (2006-2015) and the State Programme for Renovation and Development of Automobile Road Network in the Republic of Azerbaijan (2006-2015).

The main objectives of the State Programme for Development of the Transportation System in the Republic of Azerbaijan (2006-2015) constitute of the following: to meet the growing public and economic demand for transport services; creation of a sustainable transport system; ensuring transportation needs, protection and development of the country's transit potential, increasing the transit potential of the country and quality of transportation services, and achieving socioeconomic development through decreasing passenger and cargo transportation costs. These measures are expected to have indirect mitigating the effects. The programme enabled construction of a number of roads, pedestrian crossings and parking spaces, as well as expansion of the existing roads. These activities have contributed to decreasing congestion on roads and improved the duration of transportation on roads, which in turn have helped decrease emissions to a certain degree.

Considering the fact that the population and motored vehicles in Baku is on the increase, measures aimed at improving the transportation network of the city should regularly be reviewed. It should be mentioned that the Ministry of Transport of the Republic of Azerbaijan has formulated a Development Scheme for the Baku Transportation Network (infrastructure) until 2030. In addition, the Conceptual Development Scheme of the Baku Metro Lines and the State Programme for the Development of Baku Metro Network (2011-2015) were approved by the Decree of the President of the Republic of Azerbaijan on March 18, 2011. This plan envisages expansion of metro lines and increasing the number of metro stations from 23 to 70.

The introduction of the Euro 4 Standard has served as one of the most important measures implemented in terms of emission reduction in the transportation sector. Based on the latest decision of the Cabinet of Ministers, the Euro 4 Standard was applicable as of April 2014. Motor vehicles, including passenger cars, busses and trucks that do not meet this Standard are not imported to the country as of this date.

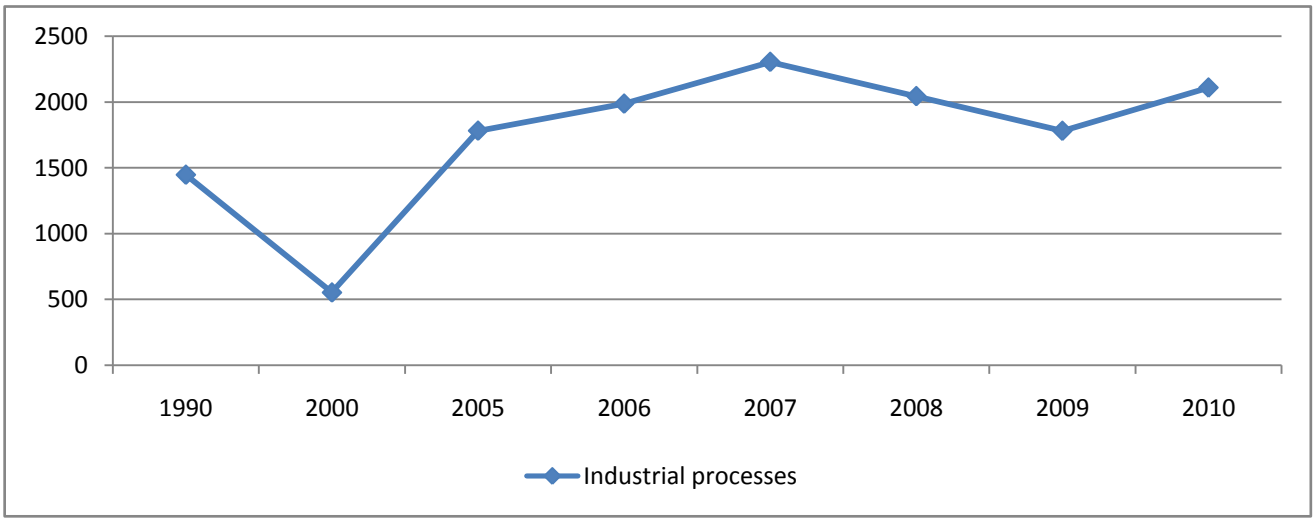
Another important measure in this area is the Intellectual Transport Management System in Baku. This Project, which is implemented together with Korean companies, will be fully operational in 2015. The System is designed to regulate the transportation flow in Baku, provide information on road traffic to drivers, and administer traffic lights during traffic. In addition, information on road traffic is regularly updated on the www.niim.az. The System also provides for measuring the number and median speed of vehicles on roads. In sum, this facility provides for regulation of transportation, minimize traffic jams and hence, decrease emission levels.

Potential areas for GHG reduction in the railway transportation sector, with introduction of new technologies have been identified. Full electrification of the railways will decrease fuel consumption leading to reduce in CO_2 emissions.

3.2.2. Industry

According to the GHG inventory carried out within the framework of this report, industrial processes accounted for 4.7% of the overall emission volume in 2010. The level of GHG emissions in this category for the past 20 years is illustrated in the following figure:

Figure 14. Level of GHG emissions in the industrial processes category during 1990-2010, Gg CO_2 eq.



The majority of industrial facilities in the Soviet period were not equipped with waste control devices. Those with such equipment could only ensure 50% reduction in waste generation. In 1990, the volume of waste generated from stationary sources reached 1447 thousand tons. This period could be characterised as a recession, due to the collapse of the Soviet economic system. During 1990-2000, emissions decreased by about 3 times. The main sources of emissions during this period consisted of the following: outdated technology and equipment in industrial enterprises, frequent errors in production networks, mismanagement of waste disposal equipment in production facilities, and lack of taking note of environmental aspects of industrial facilities.

The period after 2000 was characterised with stable development in this sector. Despite the economic development, emission levels have not been very high. This was due to replacement of outdated factories with new and environmentally friendly facilities. Given the current economic development, production facilities and the workforce would keep growing. New production facilities are created in order to meet the growing demand, which will increase emission levels.

However, the majority of large production units in Baku, especially those in the oil and gas sector have started to introduce modern and low-waste technologies, which prevents increases in emission levels.

During the past few years, a number of important measures have been taken in order to decrease GHG emissions in the heavy and light industry sectors in Azerbaijan. The Regional Development Plan of Greater Baku, which was developed by the State Committee for Architecture and Urban Planning covers the city´s development plan up to 2030. According to this plan, industrial facilities located in central parts of the city will be moved to the outskirts and around Elet Sea Port. The White City Project, which is currently being implemented, is considered to be part of this plan. Heavy industrial facilities are being moved from the urban area, known as the "black city."

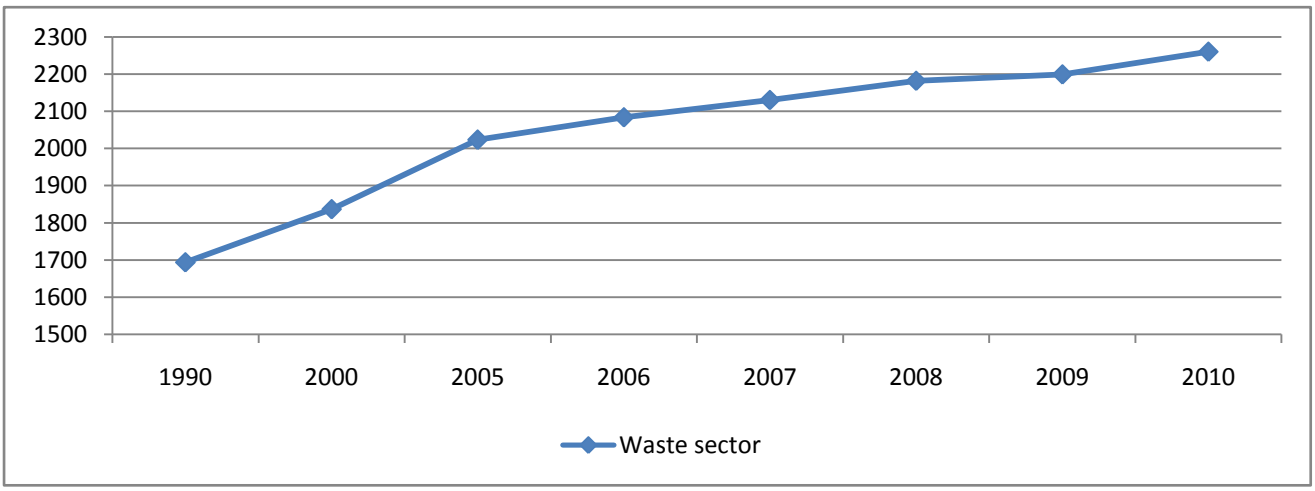
As in all other sectors of the economy, the 2000´s was marked with significant developments in Azerbaijan´s industrial development. During this period, the volume of industrial development grew by 2.7 times, competitive and modern industrial areas were established, a number of projects were implemented in order to improve the industrial infrastructure of the country, new jobs were created and the country's economy started a new development phase.

Keeping modern challenges and new initiatives in mind, a series of activities are of special importance, in order to modernize the national industry and ensure diversification of the non-oil sector. This includes the following: making use of the existing natural and economic resources in the national economy; creation of new priority production areas and industrial parks, along with traditional industrial areas; strengthening of the industrial potential in the regions; and creating opportunities for innovative development of the industry. In consideration of this, the year 2014 was declared as the Industry year by the President of Azerbaijan.

3.2.3. Waste sector

According to the GHG inventory carried out within the framework of this report, the waste treatment sector accounted for 5% of the overall emission volume in 2010. The level of GHG emissions in this sector for the past 20 years is illustrated in the following figure:

Figure 15. Level of GHG emissions in the waste sector during 1990-2010, Gg CO_2 eq.



As illustrated above figure, GHG emissions have been on a steady increase in the waste management sector. This could be explained by the increase in the number of population (annually around 1%) and economic growth during the recent years.

It should be mentioned that waste management during the Soviet period was underdeveloped. During this administration, waste materials were not sorted and were either burnt in open spaces or buried. After independence, a number of projects were developed in the area of waste management.

During the past few years, the most frequently used methods for waste management have been *recycling* and *waste-to-energy*. Based on the Complex Plan of Activities for Improvement of the Environmental Situation in the Republic of Azerbaijan (2006-2010), which was approved by the Decree of the President of Azerbaijan on 28 September 2006, a waste treatment factory was constructed. Based on a 20 hectares land in Balakhani settlement, the total design and construction costs of this plant was 346 million Euros. For the following 20 years, the factory was will be managed by a French CNIM SA Company. The factory has a capacity to treat 500 thousand tons of waste per year. There are two lines in the factory, each with a capacity of 250 thousand tons and an electricity generation turbine. The 37 MVt power station installed in the factory (annual electricity generation is 231 million KVt/hour) provides 33 MVt to the city electricity grid.

This Solid Waste Treatment Factory will prevent 660 thousand tons of GHG emissions (CO_2) during 10 years of operation.

Based on the Decree of the President of Azerbaijan, issued on August 6, 2008 on Improving Household Waste Management in Baku, all types of solid household waste regardless of source of generation is collected and transported by the City Executive Authority. The Clean City (Tamiz Shahar) OSC, established by the same Presidential Decree, is responsible for neutralization and treatment of waste from Baku city, in accordance with modern standards.

The Republic of Azerbaijan has established efficient cooperation with a number of international organizations, aimed at improved waste management. To this end, the Government of Azerbaijan implements the Absheron Environmental Rehabilitation Programme together with the World Bank. The Integrated Solid Waste Management Project, which is carried out under the above mentioned Programme, aims at supporting the reforms related with sustainable and systematic waste collection and treatment. In this regard, a loan agreement was signed between the Government of Azerbaijan and the World Bank on May 20, 2009. The amount of loans to be provided over a 5 year period is 41.5 million US dollars. The activities under the Project are organized under five components. The Project supports completion of strategic planning, as well as the establishment, operations and development of Tamiz Shahar OSC.

Under the Balakhani polygon improvement and management Component of the Project the following activities are financed: controlling the environmental effects of solid household waste management; improving the efficiency of the existing polygon and procurement of equipment and machinery in accordance with modern standards (truck scales, bulldozers and etc.); construction works (fences, burying of waste, internal roads and etc.). In addition to improving the functionality of Balakhani polygon, preparations are being made for its eventual closing. At the same time, preparatory work will be carried out for construction of new and modern polygons. Under the Closing and management of other polygons Component of the Project, the following activities will

be funded: closing and cleaning of unofficial landfills; and improving management of (or closing) other polygons. Under the Waste collection equipment Component, the Project will fund the following: quality improvement activities in the districts of Baku city, including regions where waste materials are not adequately collected; and procurement of trucks and waste collection containers in order to increase solid household waste collection in high demand areas and efficiency of services.

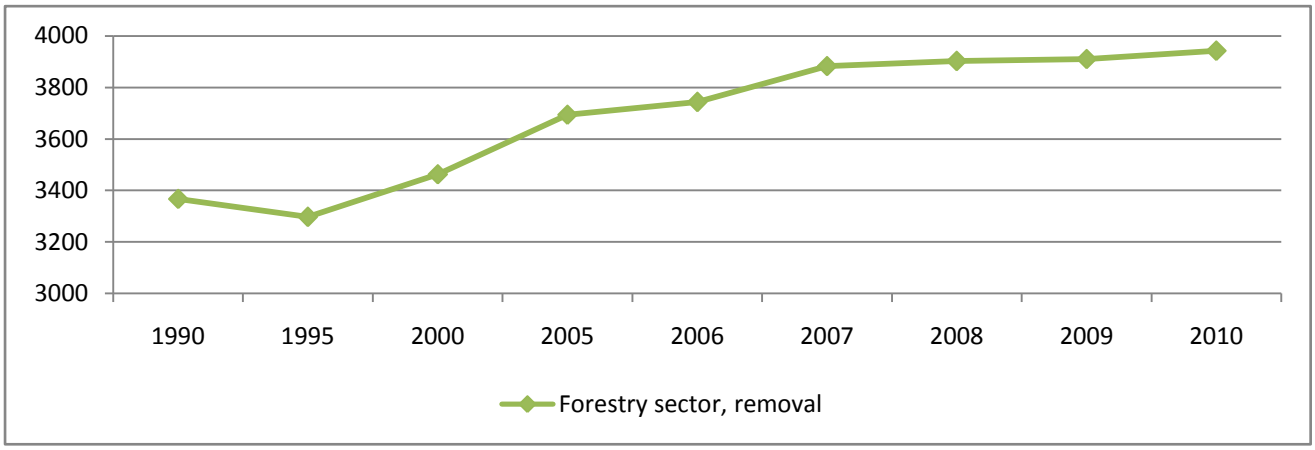
The above mentioned activities should contribute to resolution of household waste issues, improvement of the environmental situation in Absheron, and elimination of waste related threats to drinking water, the environment and health.

The growth in the number of population and industrial development during the next few years will increase GHG emissions by 60 thousand tons of CO_2 equivalent per year in the waste management sector. In order to decrease emissions generated in the waste management sector, there are plans to construct waste management plants in various regions and large cities around the country.

3.2.4. Forestry sector

According to the GHG inventory carried out within the framework of this report, in 2010, in the forestry sector carbon removal level has reached -3942 tons of CO_2. The level of GHG absorption in this category for the past 20 years is illustrated in the following figure:

Figure 16. Level of GHG emission removal in the forestry sector during 1990-2010, Gg CO_2 eq.



It should be mentioned that CO_2 removal level decreased during 1990-1995, due to shrinking forests around the country. However, measures aimed at expanding the existing forests and planting new forests during the following period helped increase CO2 absorption. It should be mentioned that within the framework of the National Programme on Rehabilitation and Expansion of Forests in the Republic of Azerbaijan (2003-2010), as well within other initiatives the Ministry of Environment and Natural Resources has carried out forest rehabilitation activities in more than 103 thousand hectares of land. The main advantages of this National Programme was restoration of degraded forests, improving tree composition quality in forests, and expanding the share of forests in the country in accordance with international norms.

Furthermore, according to the Decree of the President of the Republic of Azerbaijan on planting trees along protection stripes of highways, more than 1.750.000 evergreen and other types of trees and bushes were planted: along the Elet-Hajiqabul highway, Bayil hillside – 20th field, Guneshli pass, around the International Airport, and along the Elet-Astara highway.

During the past few years, green areas and the number of trees have been increasing in cities, towns and villages around the country. Areas covered with trees and bushes in cities, towns and villages in the country have reached 451.765.9 hectares in 2014. This has been possible thanks to the focus on these initiatives. For instance, within the framework of "Let's plant a tree each" campaign, initiated by the First Lady Mrs. Mehriban Aliyeva in 2007, more than 7.500.000 trees were planted in Baku and the districts, which covers 2000 hectares of land with evergreen and other types of trees. Planting of trees were actively continued out during 2010, which was declared as the year of "Environment".

In addition, a new mechanism has been developed by the IDEA Organization for protection of trees, which aims at rehabilitation of and protection of forests. Within the framework of this campaign, more than 3.500.000 trees have been planted in various regions of the country.

A number of projects have been carried out with participation of international donors as well. Some of these projects are mentioned below:

- A pilot CDM Project (2003-2005) - Rehabilitation of degraded lands and forestry, financed by the Canadian International Development Agency (4 ha community forest in Devechi district);
- A pilot Project (2009-2011) – Forestry in Ismayilli-Zaqatala region, financed by the KfW;
- Forestry activities aimed at preventing floods in Kish village of Sheki district, financed by the Asian Development Bank (2004-2005);
- A Global Environment Fund financed Project (2013-2017) – Sustainable management of land and forests in the South Caucasus landscape.

The policies that have been carried out in the forestry sector in the Republic of Azerbaijan indicate that the absorption capacity of the forests in the country will keep increasing during the upcoming years as well. According to information provided by experts from the Forestry Development Department, forests will be expanded as described in the following Table, which will contribute to a total absorption volume of 840 thousand tons.

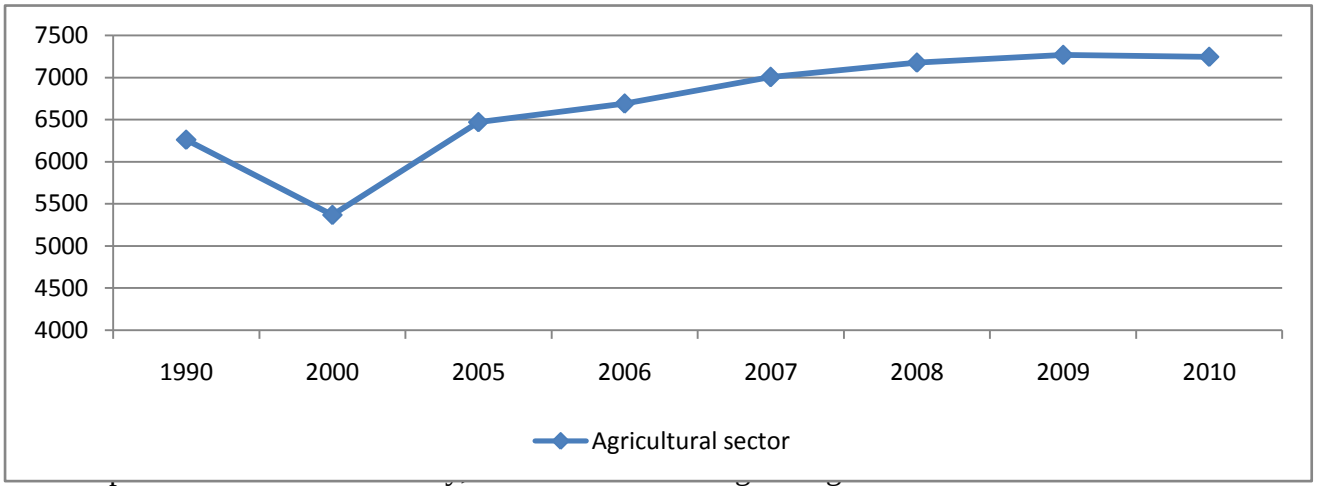
Table 19. Forest expansion plans for the next few years

Years	Planned expansion, ha	Expected emission absorption, Gg
2020	30.000	0.09
2030	90.000	0.25
2040	90.000	0.25
2050	90.000	0.25
Total	**300.000**	**0.84**

3.2.5. Agricultural sector

According to the GHG inventory carried out within the framework of this report, the agriculture sector accounted for 16% of the overall emission volume in 2010. The agricultural sector is the second largest pollutant, after the energy category. The level of GHG emissions in this category for the past 20 years is illustrated in the following figure:

Figure 17. Level of GHG emissions in the agricultural sector during 1990-2010, Gg CO_2 eq.



It should be mentioned that in comparison with other sectors, less activities have been carried out in the agriculture sector, in regards to mitigating the effects of climate change. The private sector started to emerge after the completion of the land reform in 1997. However, this sector suffered from severe lack of skills and knowledge in regards to mitigating the effects of climate change. During the following years, various initiatives, such as pilot biogas projects have been carried out, mainly by the Ministry of Environment and Natural Resources, as well as awareness raising on prevention of agricultural waste in arable fields. These initiatives have helped decrease emissions to a certain extent.

Furthermore, it should be mentioned that the State Agency for Alternative and Renewable Energy Sources of Azerbaijan plans to construct an agro energy complex in Samukh district (*picture of planned construction is placed at title page of this report*). Feasibility study for this Project has already been completed. As an initial stage, the State Agency has started the construction and installation of a 2.8 MVt solar power station. During the first stage, a new settlement with a capacity of 300 families will be constructed within the agro energy complex. Additionally, various production facilities will be established to provide for more than two thousand jobs. Energy needs of this small town will be provided through environmentally clean solar, wind, geothermal and biogas sources.

Such projects, including use of more advanced methods in animal husbandry management and activities focused on mainstreaming use of biogas devices in remote villages will help curb emissions in the agriculture sector.

3.3. Activities carried out under the Clean Development Mechanism of the Kyoto Protocol

Based on the Decree of the President of Azerbaijan, issued on April 1, 2005 the Ministry of Environment and Natural Resources has been identified as the Designated National Authority in regards to CDM projects within the framework of Kyoto Protocol. In this capacity, the Ministry has developed various proposals to amend the environmental legislation and submitted to the Cabinet of Ministers.

The Ministry has signed memorandums on international cooperation in the area of CDM projects with Danish and German governments. Negotiations on similar agreements with other countries are continuing.

CDM projects have generated a great deal of interest in Azerbaijan after the Kyoto Protocol entered into force in 2005,. Bu this time, various projects have been developed in Azerbaijan on reduction of GHG emissions in various sectors. 34 of these projects have been approved by the Designated National Authority.

Table 20: CDM projects registered by the Designated National Authority

Sector	**Number of project proposals**	**GHG reduction level. thousand tons of CO2 equivalent per year**
Energy	17	13675.4
Alternative energy	9	1775.0
Agriculture	2	3331.0
Waste materials	3	287.1
Expansion of forests and creation of new forests	3	62.7
Total	**34**	**19131.2**

The following Table provides a summary of CDM projects that have been verified by CDM Board of the UN Framework Convention on Climate Change:

Table 21: CDM projects that have been verified by the CDM board of the UNFCCC

Status and date of verification	**Registration N**	**Name of the project**	**Expected reduction of CO_2 emissions per year (tons)**	**Methodology**	**Verification of the status**
May 23, 2011	4822	Yeni Yashma Wind Energy Station	120898	ACM0002 No. 12	Reports on monitoring and verification are not available
August 20, 2012	5574	Increasing energy efficiency of the AzDRES	1023293	AM0061 No. 2	Monitoring report covering 24.08 - 31.12.2012 period has been published. However, there are no reports on verification.
October 10, 2012	7658	Baku Waste to Energy Project	66146	AM0025 No. 13	Reports on monitoring and verification are not available
November 12, 2012	8181	Balakhani waste landfill project	84639	ACM0001 No. 12	Reports on monitoring and verification are not available

Status and date of verification	Registration N	Name of the project	Expected reduction of CO_2 emissions per year (tons)	Methodology	Verification of the status
December 23, 2012	4884	Construction of the South Combined Cycle Power Plant in Azerbaijan	363826	AM0029 No. 3	Reports on monitoring and verification are not available
Recalled	9240	Capturing and processing of low pressure associated gas in Neft Dashlari and Palchiq Pilpilesi oilfields of the SOCAR	218558	AM0009 No. 5	-
Rejected		Construction of a Combined Cycle Power Plant in Sumgait	774430	AM0029 No 3	-

3.4. Activities related to Nationally Appropriate Mitigation Actions (NAMAs)

During the past few years, a number of activities have been carried out in relation to development of Nationally Appropriate Mitigation Actions. Currently, one such project (Nationally Appropriate Mitigation Actions (NAMAs) for low-carbon end-use sectors in Azerbaijan) have been registered by the UN Framework Convention on Climate Change. Another project (Introduction of environmentally friendly and energy efficient technologies in refrigerators and air conditioners in Azerbaijan) is in the development phase.

NAMA for low-carbon end-use sectors in Azerbaijan Project, which is jointly implemented by the UNDP and SOCAR, aims to support development of national actions on mitigating the effects of climate change in the low-carbon end-use sectors.

Pilot investments will be directed into low energy and low carbon technologies that are so far missing on a large scale on the Azerbaijani market.

The project will address on the one hand the existing potential to improve the energy performance of main end-use sectors on the Azeri market, namely buildings (new and existing residential, service and public buildings) and transportation (passenger cars, trucks, buses, special purpose vehicles). On the other hand, the oil & gas production sector being one of the main sources for GHG emissions in Azerbaijan, will be addressed in terms of mitigation activities that will indirectly benefit the energy end-use in the country through capturing of associated gases released from existing on-shore oil and gas fields and utilizing the gas as a fuel source for nearby residential areas.

The summary of the planned activities and their outcomes are provided in below table 22:

Table 22: Project components, planned outcomes

Project component	Annual amount of CO_2, (tons)	CO_2 amount during the 5 year Project duration (tons)	CO_2 amount during the exploitation period of the technology (tons)	Exploitation period of the technology
1st National Action Plan – Green Building Programme				
Direct reduction of emissions	420	2100	10500	25 years
Indirect reduction of emissions (top-down)	86 124	430 618	1 291 855	
2nd National Action Plan – Sustainable Transportation				
Direct reduction of emissions	162	808	1 616	10 years
Indirect reduction of emissions (top-down)	1 611	8 055	9 666	
3rd National Action Plan – Capturing of Associated Gas				
Direct reduction of emissions	21 962	109 809	549 044	25 years
Indirect reduction of emissions (top-down)	329 426	1 647 132	4 941 395	
Total direct reduction of emissions	22 543	112 717	561 160	
Total indirect reduction of emissions	417 161	2 085 805	6 242 916	

Furthermore, the National Action Plan on the Introduction of environmentally friendly and energy efficient technologies in foam sector in Azerbaijan Project is in the development phase. This Project is supported by the German International Cooperation (GIZ). The overall objective of the Project is to decrease the volume of HFC gasses emitted from refrigerators and air conditioners, through application of environmentally friendly and energy efficient technologies. Specifically, the project aims to assist local production lines in Azerbaijan in producing environmentally friendly technologies, namely household refrigerators and commercial air conditioners.

The Project will help reduce GHG emissions in this sector during the coming years as well. Related estimates are illustrated in the following Table 23:

Table 23: Planned project outcomes

	Total annual reduction of emissions by 2020 (mln t CO_2 equivalent)	Total annual reduction of emissions by 2030 (mln t CO_2 equivalent)
Split model household air conditioners	2.1	3.2
Household coolers	0.8	1.57
Condensing units (centralized commercial coolers)	0.032	0.057
Foam for commercial cooling equipment	7.4	48.9
Foam for household coolers	1.5	28.4

Currently, within Economics of Climate Change in Central and Western Asia project, funded by the Asian Development Bank it is developed a NAMA together with the State Agency for Alternative

and Renewable Energy Sources of Azerbaijan. Furthermore, it is planned to develop two sectoral NAMAs, within the framework of a European Union funded Project - Climaeast: mitigating the effects of climate change and supporting adaptation in Russia and Eastern European Partnership countries.

3.5. Projects implemented in regards to climate change mitigation

In addition to national initiatives on mitigation the effects of climate change, the Republic of Azerbaijan is working with a number of international organizations on implementation of various projects. Some of the main international donors that the Republic of Azerbaijan cooperates with in the field of climate change include: Global Environment Facility, European Union, Asian Development Bank, German KfW, and the German International Cooperation Organization.

In addition to reducing GHG emissions, these projects play an important role in bringing efficient international expertise to the country and capacity building with local experts. Table 24 provides information on the projects implemented and being implemented in the field of climate change by international donor organizations:

Table 24. Projects that have been completed and that are currently in the implementation phase, in regards to climate change mitigation

Project	Donor and implementing entity
Strengthening of CDM potential in Azerbaijan	Donor: Norwegian government Implementing entity: UNDP
CDM opportunities in the areas of industrial development and decreasing poverty	Donor: Norwegian government Implementing entity: ECON, NORSK Energy
Improving solid waste management	Donor: Norwegian government
Capacity building on GHG emission in Caspian basin (regional project)	Donor: Canadian International Development Agency
Waste management in Eastern European partnership countries (a regional project)	Donor: European Union
Improvement of forest legislation and management in Eastern European Partnership countries (a regional project)	Donor: European Union
Management of atmosphere air in Eastern European Partnership countries (a regional project)	Donor: European Union
Increasing sustainability of forest ecosystems in Southern Caucasus countries in regards to climate changes (a regional project)	Donor: European Union
Energy efficiency initiative in the building sector in Eastern European and Central Asian countries	Donor: European Union
Baku initiative on supporting Eastern European energy objectives, INOGATE technical support programme	Donor: European Union
Climaeast: Supporting mitigation and adaptation to the effects of climate change in Russia and Eastern Partnership countries	Donor: European Union
Improving normative and legal acts related with alternative energy in Azerbaijan	Donor: European Union
Technical support for South Caucasus countries and Moldova in meeting their obligations related with climate change issues	Donor: European Union TACIS Programme
Nationally appropriate mitigation activities for low-carbon consumer sectors in Azerbaijan (NAMAs)	Donor: GEF Implementing entity: UNDP

Project	Donor and implementing entity
Capacity building in GHG inventory	Donor: GEF
Sustainable land and forest management in the Greater Caucasus Landscape	Donor: GEF Implementing entity: UNDP
Coordinating water and flood management, along with climate change risks in vulnerable mountainous communities in the Greater Caucasus region of Azerbaijan	Donor: GEF Implementing entity: UNDP
Sustainable land and forest management in the South Caucasus landscape	Donor: GEF
Supporting the National Forest Programme and forestry legislation in Azerbaijan	Donor: Food and Agriculture Organization of the UN
Development of renewable energy (biomass) project	Donor: Asian Development Bank (ADB)
Economics of climate change in Central and Western Asia (a regional project)	Donor: Asian Development Bank (ADB)
Forest expansion activities in Kish village of Sheki district, in order to prevent floods	Donor: ADB
Sustainable management of solid household waste	Donor: World Bank
Capacity building on nationally appropriate mitigation activities in Southern Caucasus countries (a regional project)	Donor: German İnternational Cooperation
Supporting development of renewable energy in Azerbaijan	Donor: KfW
Improving solid household waste management in Ganja city	Donor: KfW
Forest expansion pilot Project in Ismayilli-Zaqatala region	Donor: KfW
Supporting energy efficiency projects in Azerbaijan	Donor: International Finance Corporation
Optimization of the electricity system in Azerbaijan	Donor: World Bank
Reconstruction and modernization of AzDRES Thermal Power Station	Donor: European Bank for Reconstruction and Development
Development of energy efficiency in Azerbaijan, as a component of the Caucasus Energy Saving Programme	Donor: European Bank for Reconstruction and Development

In addition to the above mentioned projects, a number of trainings and seminars on GHG reduction have been organized with the help of Latvia, Czech Republic, Germany and Turkey.

The Government of Azerbaijan takes GHG reduction efforts seriously and has invested very significant amounts of funds in various activities in this area. The Government plans to continue such investments in the future as well.

3.6. GHG emission prognosis

In addition to the information on activities that have been completed or that are currently in the implementation phase, it is important to prepare the prognosis regarding GHG emissions during the next years. The analysis in this area has been carried out within the framework of ADB supported Economics of Climate Change in Central and Western Asia Project, using a LEAP programme. The prognosis mainly cover the energy and transportation sectors up to the year 2050.

In the context of estimates on GHG emissions, it should be mentioned that Azerbaijan's case is different from other countries. Furthermore, the population of Azerbaijan has been growing steadily and this trend is expected to continue during the next few years.

Figure 18. Prognosis on population growth in Azerbaijan

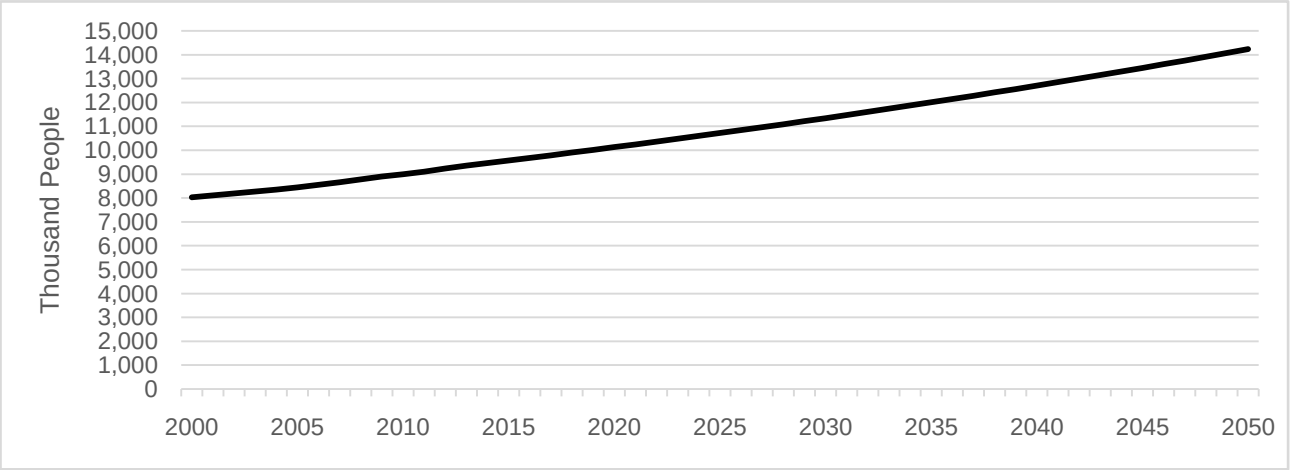


Figure 19. Prognosis on energy demand in Azerbaijan (BAU scenario)

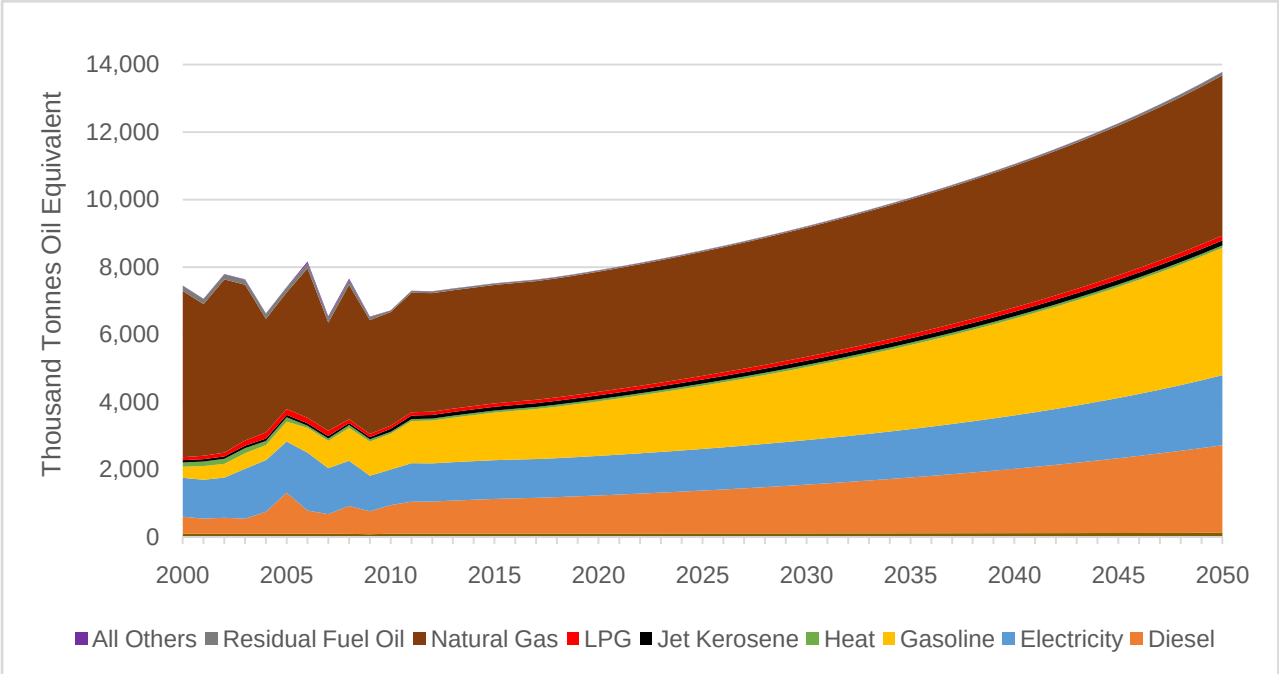
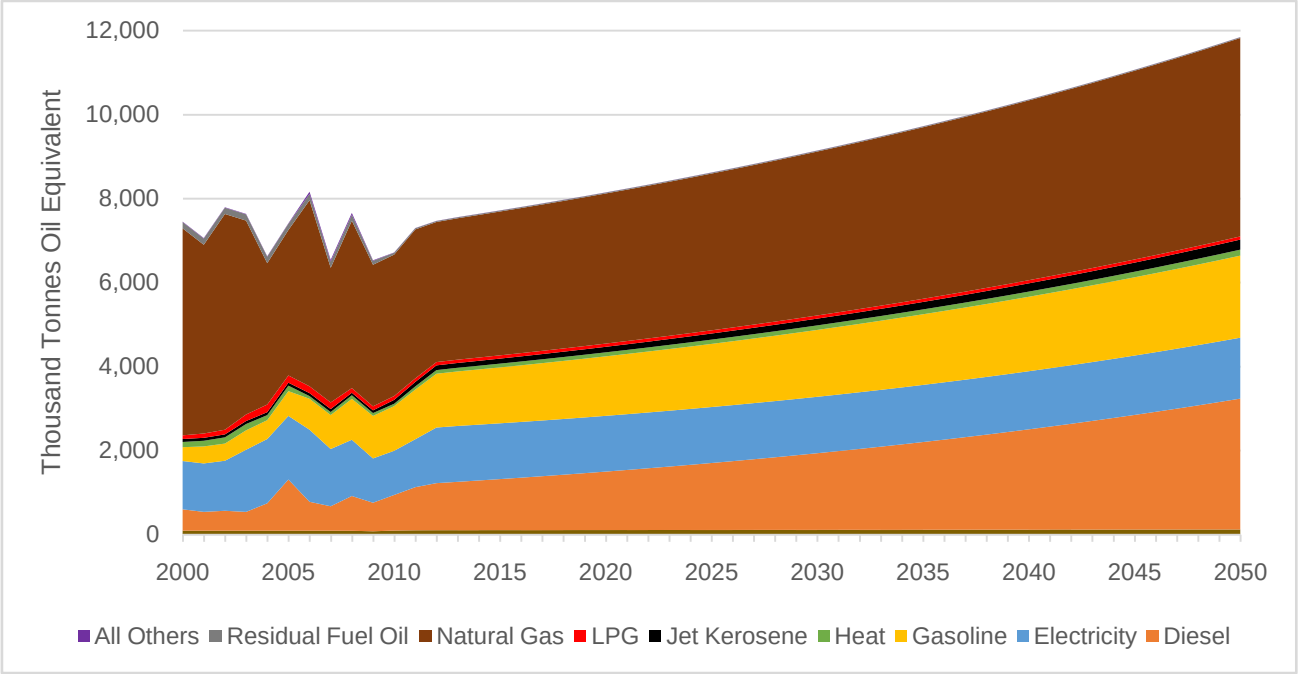


Figure 20. Prognosis on energy demand in Azerbaijan (Reference scenario)



As it is seen from the diagram, following the population growth in Azerbaijan will result of increase in energy demand, as well in demand for all other fuel subsequently leading to increase in GHG emissions.

In this regard, two types of analysis have been carried out: BAU (Business As Usual) and Reference scenario illustrated in below figures:

Figure 21. GHG emission prognosis estimations for Azerbaijan (BAU scenario)

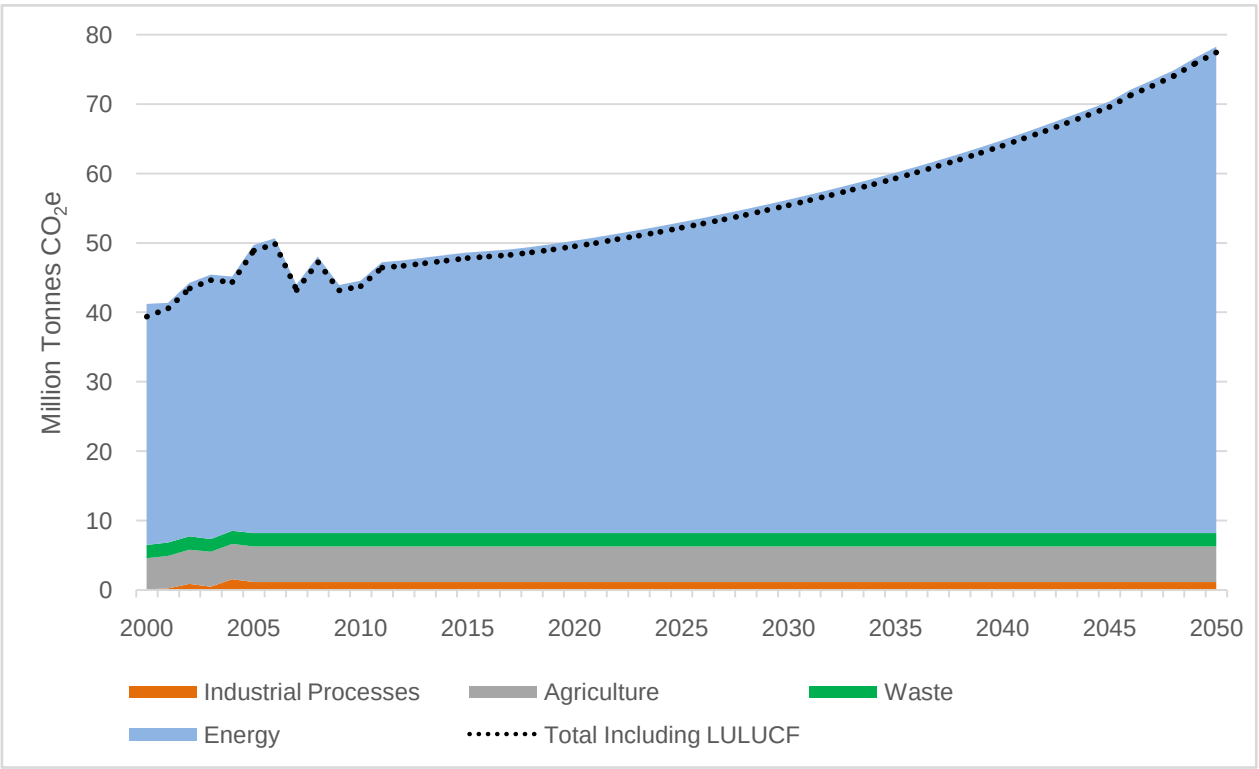
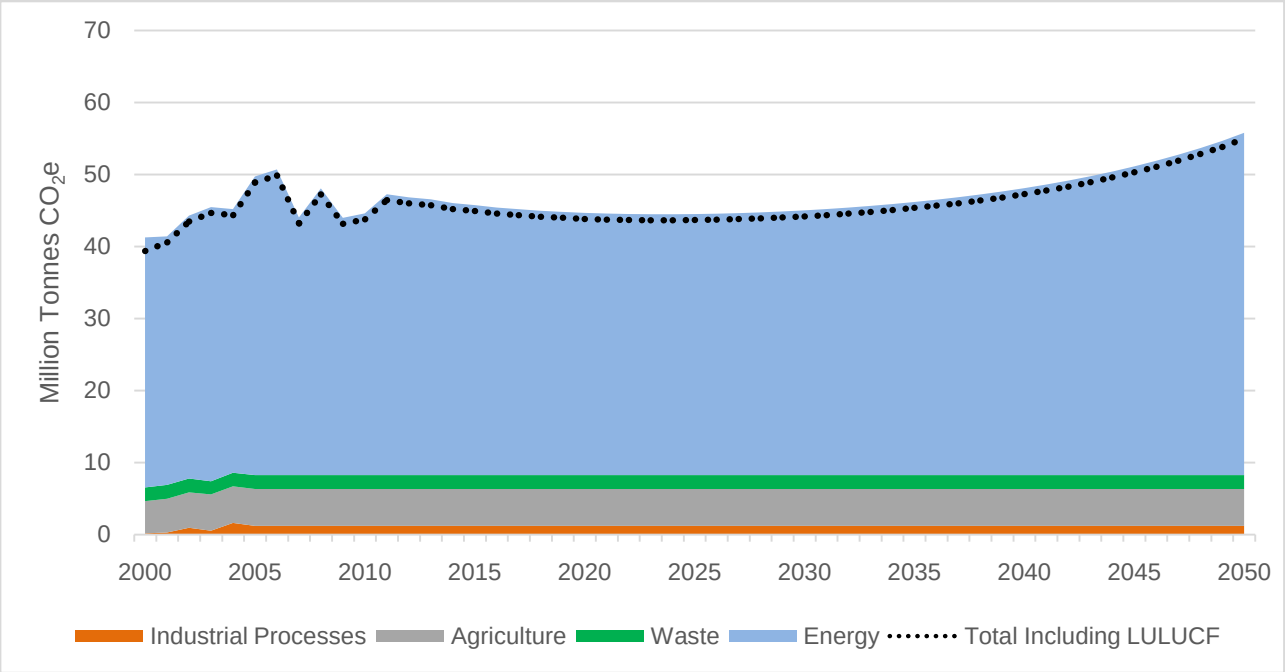


Figure 22. GHG emission prognosis estimations for Azerbaijan (Reference scenario)



As illustrated in the above figures, GHG emission prognosis has been provided in 2 scenarios: BAU scenario that does not take into account mitigation measures and Reference scenario that takes into account mitigation measures. So as, according to BAU scenario by 2050 it is forecasted that GHG emission level will reach up to 77 mln tons CO_2 eq. and according to Reference scenario GHG emissions will be around 53 mln tons CO_2 eq.

The information provided in this chapter is initial information and at present works in this directions are continued by experts of ADB and it is planned to finalize it by April of next year. Results of those analyses will be presented in next reports to be submitted to UNFCCC.

IV. Assessment of financial, technological and capacity building needs

Identification of Azerbaijan's needs in climate change-related technologies in current economic circumstances and assessment of financial and capacity building needs in this regards is an important issue in terms of prevention of dangerous consequences of global climate change.

It is important that the introduction, production and application of new technologies in the country should base on the national economic, social and environmental development priorities, and this process should bring no damage to the country's national interests, as well as should reflect other co-benefits along with climate change.

The technological needs of climate change in Azerbaijan cover a wide spectrum of issues. It covers technologies for GHG emissions reduction and adaptation technologies in different sectors of the economy, such as energy-efficient technologies to reduce GHG emissions in various sectors of economy, residential and commercial sectors, renewable energy technologies (wind, solar, biomass, etc.), efficient use of water, soil, forests and other natural resources, and prior adaptation technologies for food security and so on.

Assessment results show that the use of new technologies is of great importance in terms of economic, social and environmental aspects.

One of the most important factors in identification of climate change mitigation measures is the assessment of technological, financial and capacity building needs that are necessary for implementation of those mitigation measures. It is necessary to conduct an assessment of available technologies, the needs for additional technologies, the amount of funds necessary for it, funding source (internal or external sources), as well required knowledge and capacities for the implementation of those measures, the needs for new skills and abilities, and also the amount of the need for external support for the implementation of climate change mitigation measures in each sector.

4.1. Technological needs for climate change mitigation

As it was mentioned above, in order to implement climate change mitigation measures, first of all, the need for the technologies that enable the implementation of these measures should be assessed. If in the early years of independence Azerbaijan was fully dependent on exports in the field of application of new technologies, however, in recent years the production of such technologies has launched in the country. Thus, the Government of Azerbaijan has begun to make large-scale investments in the renewable energy sector and technologies. At present, solar panels and solar collectors are produced in the country by different entities. In accordance with the current programs and plans in related sector, local production of the LED bulbs, wind turbines (poles, propellers), generators, and other equipment will be promoted in the future, and it will create opportunity to export these technologies to neighbouring countries that want to develop renewable energy technologies.

Application of alternative and renewable energy sources in various sectors of the economy will prevent environmental pollution and contribute to ensuring the energy security.

In Azerbaijan, alternative and renewable energy sources can be used also in agricultural crop-drying, electricity supply of ventilation systems and heat energy supply of greenhouses. Necessary technologies in this area are already being produced in the country.

According to the provided calculations, opportunities for the use of hydropower potential of the rivers in ensuring the energy security of Azerbaijan and in mitigating climate change impacts is very high and during recent years several small hydroelectric stations have been built and put into operation in the country. There is a need to increase knowledge and skills of national specialists on the use of new technologies applied in this field.

The rapid development of industry, agriculture and social service sectors in Azerbaijan creates new opportunities for energy production by using biomass. Although biogas devises are already being produced in the country, there is a need to establish new enterprises by introduction of new technologies in this field.

The first experience ***from waste-to-energy technologies*** applied in waste sector in Azerbaijan is introduced in the Balakhani Solid Waste Incineration Plant and it is envisaged to replicate this experience in future in other regions of the country.

As regards ***energy efficiency technologies***, currently the wide application of "smart" measurement devises in the electricity supply cards continues in the country. Energy consumption could be minimized in the future by widely using "Smart" measurement system and the "Smart" network technologies in the country. In order to reduce energy consumption to minimum level, rational standards on energy characteristics of new and existing buildings should be applied, certification and expert evaluation of their energy characteristics should be ensured, "intelligent systems" and "smart grid" technologies should be used. Another technology used in energy supply - SCADA system, is already applied at energy network and as a result of application of this new technology a decrease of 30-35% can be achieved in electricity consumption by 2020.

Moreover, it should be noted that the involvement of Azerbaijan in the information technology market, generation of new jobs and establishment of technological parks for the realization of these kinds of objectives could be considered as effective attempt for the country with transition economy. Initial steps for the development of high technologies have already been taken in Azerbaijan, too. For instance, a range of products of national importance, including solar collectors, cables, transformers, high-voltage equipment, hydro-turbines, water pumps, electric motors, pipes, machinery equipment, electronic devices, technical gases and others are produced in Sumgait Technology Park which consists of 17 plants. The necessary measures are implemented at the high governmental level to launch the Sumgait Chemical Industrial Park, Balakhani Industrial Park and High-Tech Park.

Finally, in order to enable the application of low carbon modern technologies in the country, there is a need for continuous cooperation with international organizations and institutions, assessment of best international practices and implementation of different projects with the support of international donor organizations.

4.2. Financial needs for climate change mitigation

As it is indicated in the previous chapters of the current report, notwithstanding that Azerbaijan as Non-Annex I country of the Convention and has not taken any quantitative commitments on reduction of GHG, a lot of climate change mitigation activities has been implemented in the country. Almost all of these mitigation activities have been implemented at the expense of own resources of the country.

Attracting investments to the economy is of great importance in ensuring the long-term, sustainable and balanced development of the country. Continuous improvement of favourable investment climate is among major challenges facing the country to ensure the required quantity and quality of investments.

In general, according to official statistics, in 1995-2012, 50.7% of 144.4 billion US dollars investments made in the economy of country, i.e. about $ 73.2 billion US dollars, was foreign investment. During these years about 29.7 billion US dollars of foreign investments made in the economy of the country was directed to development of the non-oil sector, and 43.5 billion US dollars to the development of the oil sector. According to the trends of recent years, the volume of investments made in the non-oil sector exceeds the amount of investment in the oil sector.

Especially, it should be noted that, in accordance with the "Concept Paper on Economic and Social Development of the Republic of Azerbaijan for 2014 and the following three years and forecast indicators" prepared by the Ministry of Economy and Industry of the Republic of Azerbaijan, public investment in nanotechnologies and low-carbon production areas are stated as one of the priorities. This outlines key areas of public investment policy of the country for 2014-2017.

It is observed an increase in the amount of investments made for the development of ***energy sector*** in the country during recent years. Thus, according to the official statistics, public investments made in this sector during 2009-2013 totalled to about 4 billion US dollars. These investments were channelled to the reconstruction of the existing thermal power plants, construction of new thermal power plants, hydropower plants and small hydropower plants, upgrading of the existing power transmission and distribution network and other activities.

The dynamic development of the national economy, as well as population growth, has naturally increased the demand for electricity. Thus, according to the forecasts of "Azerenerji" OSC, starting from 2012, the demand for electricity in the country will increase by 2 times for the years of 2022-2023. Therefore, electricity production will approximately reach 37 million kWh/ hours in 2023. In this regards, 90 million Euros were allocated for upgrading power distribution units. An additional 4 billion US dollars investment is considered to be made in this sector in the coming years. The new SCADA system is applied within this investment program. According to estimations, as a result of the full implementation of the system, in 2020 electricity consumption can be reduced by 30-35%. About 800 million US dollars investment is required for the application of this system throughout the country.

Moreover, it should be noted that about 232 million US dollars has been allocated by the EBRD for the reconstruction of AzDRES heat power station. After a full reconstruction of this HES, total CO_2 reduction is expected to be in the amount of 3 million tons. Additional $ 100 million is required for the full reconstruction of this station.

By the construction of 8 hydroelectric power stations over the potentially small rivers of the country planned to be implement in the next years it is possible to reduce 500 thousand tons of CO_2 emissions. For these measures, there is a need for allocation of 250-300 million US dollars investment.

It should be noted that, in the "Concept Paper on Economic and Social Development of the Republic of Azerbaijan for 2014 and the following three years and forecast indicators" prepared by the Ministry of Economy and Industry of the Republic of Azerbaijan, it is considered some measures towards development of the energy industry and increase its efficiency. The Concept Paper envisage continuation of activities related to improve the energy system of the country, construction of new power plants and transmission networks, reconstruction of HESs and energy transmission system, expansion the use of alternative and renewable energy sources, support entrepreneurial activity in energy sector and achievement of reduction of technical and technological losses in energy production and transmission.

In recent years, so far it was invested about 300 million manats (about 384 million US dollars) for the use of renewable energy resources in the country from various sources, public and private sector funds.

In the coming years, the development of alternative and renewable energy sources in the country has been set as a target. It is planned to invest for about 3-4 billion manats for the development of this sector.

According to the Decree of the President of the Republic of Azerbaijan, dated December 29, 2011, a National Strategy on the use of available alternative and renewable energy potential in the country was drafted. The followings have been taken into account when developing the draft Strategy:

- Identifying main areas of heat and thermal energy production from alternative and renewable energy sources in the country;
- creation of legal and regulatory framework for the use of alternative and renewable energy sources;
- implementation of stimulating measures on the use of alternative and renewable energy sources;
- ensure the use of alternative and renewable energy sources in all sectors of the economy based on domestic and international scientific and technical potential.

In recent years the investments made in ***the transport sector*** has been increasing every year in order to reduce emissions from this sector. According to the official statistics, in the last 10 years more than 12 billion US dollars investment was made in the country to improve the transport infrastructure. These investments were channelled to upgrading the existing highway network, construction of new roads, bridges and tunnels in road crossings and other transportation infrastructures, establishment of intelligent transport management system, development of the metro network and other targeted areas.

In addition, the activities regards development of metro network in Baku city is continued and it is planned to increase the numebr of metro stations from 28 to 70 by the year of 2030. In order to achieve this target, there is a need for around 15-20 billion US dollars investnment.

The development of ***the industry*** is one of the highest priority areas in the country. In recent years, significant steps have been taken in order to develop this area and the work to reconstruct industrial enterprises, and provide them with modern low carbon technologies is underway in the country. Thus, the Government supports private initiatives for establishment of new industrial parks. Even, with the decision of the Government such newly established industrial parks are exempted from all taxes for the period of 7 years.

Regarding ***oil and gas industry***, it should be noted that at present there is a need for moderinisation of existing oil rafinery sector in Azerbaijan. Based on estimation made by government, for this there is a need for 850-900 million US dollars of investment. According to latest decision of the government, it is planned to construct new big and modern oil and chemical complex at the suburbs of Baku city and after start of its functioning to tear down old plants. Construction of such oil and chemical complex will need an investment for about 20 billion US dollars. Along with this, in order to prevent emissions from initial processing of oil and also gases from abandoned wells there is a need for at least 125 million US dollars of investment.

Regards ***waste sector***, it should be noted 346 million Euros was invested for the construction of the Balakhani Solid waste incineration plant with 37 MW power in Baku city. It is also planned to build such plants in other regions of the country in the future and there is a need for about 2 billion manats investment for this.

A number of activities were implemented in ***forest sector*** in recent years, using internal resources. Thus, during last 10 years, it was planted new forest areas of 103 thousand hectares in the country. According to the preliminary estimates in the coming years, planting of forest strips is envisaged in additional 300 thousand hectare areas and about 550 million US dollars investment is required to carry out this work.

4.3. Capacity building needs for climate change mitigation

After joining the Convention, the Republic of Azerbaijan has implemented a number of actions at the national level in order to implement the commitments stemming from the Convention and it was achieved good results. Nevertheless, in regards of changing Convention mechanisms and formulation of modern mechanism, methods and approaches it is important to implement additional actions and for this, there is a need for capacity building and improvement of skills related to climate change mitigation and adaptation:

- explore more efficient international practices in the field of climate change legislation and policy and develop it due to country-specific conditions;
- assessment of the future activities in the field of establishing domestic Monitoring, Reporting and Verification (MRV) system;
- creation of early warning system on climate change and improvement of existing forecasting system in order to prevent possible losses due to climate change impacts;
- preparation of low-carbon sustainable development strategies at the national and local levels and as well as by relevant sectors;
- development of NAMAs, involvement of donors to this activity and implement NAMAs using different financial mechanisms of the Convention;

- development of NAPs that takes into account national circumstances and based on modern scientific knowledge;
- increase awareness on climate change of local communities, the private sector, municipalities and other local authorities.

The knowledge and skills required to carry out the intended climate change mitigation measures are emerging as a very important factor. Thus, experts of the relevant organizations responsible for the implementation of the intended measures should have necessary knowledge and skills on the new applied technologies.

In order to coordinate the activities implemented in the area of climate change mitigation more efficiently, there is a need to increase the knowledge and skills of specialists of the Ministry of Ecology and Natural Resources, as well as the Climate Change and Ozone Centre. In this context, it is also considered to enhance the climate change-related knowledge and skills of employees of the Department of Forest Development of the Ministry of Ecology and Natural Resources.

Development of knowledge and skills of specialists working in the energy sector regarding the energy efficiency in various sectors of the economy and reduction of energy used for a single product is also one of important issues.

Generally, in order to improve energy efficiency and energy saving in the country, there is a need for organization awareness-raising events (round tables, training- seminars, etc.) aiming to enhance the knowledge and skills of individual consumers, municipalities and local authorities on these issues.

Moreover, there is a definite need to conduct educational (awareness-raising) activities on the biomass sources, biogas devices, the impact of manure produced from these devices on the productivity among the population engaged in agriculture and farming operations.

In addition, it should be also noted that the existing scientific research institutions in the country should actively be involved to the assessments on the technologies necessary for the implementation of climate change mitigation measures. To do this, their existing technical capacity should be strengthened, and also knowledge and skills of the specialists professionals working in this field should be increased.

V. Domestic monitoring, reporting and verification: current situation and assessment of future activities

5.1. General Information

The major challenge of international climate change policy is to reduce GHG emissions to a level consistent with 2° C objective established within the limits the global temperature. The objective requires the global emissions to peak before the year 2020, i.e. exceeding the peak level of emissions and stabilizing at around the equivalent of about 44 billion tons of CO_2 in 2020. The greatest emission abatement potential exists in developing countries.

There is a need to develop domestic MRV systems for National Appropriate Mitigation Actions (NAMAs) in all countries, as well in Azerbaijan. The goal here is both to support the national development, and also to ensure compliance with a future international set up.

Monitoring, Reporting and Verification (MRV) implies the following:

- The measurement of, for instance, CO_2 and other GHG emissions using established standardized measurement and calculation methodologies and tools;
- The reporting of information to internal and external stakeholders by using standardized definitions, units and performance indicators;
- The verification of the adequate application of the methodologies by the reporting entity, with the purpose to provide assurance of the quality and reliability of the reported information.

Azerbaijan has a system to monitor and report pollutant emissions into atmosphere and an administrative set-up with specific requirements to limit the pollution. However, there is still a need to improve the set-up and enforcement and the focus has not been GHGs. Monitoring and reporting of emissions, including GHGs, is carried out annually by entities themselves. The Department of Environmental Protection and the regional Departments of Ecology and Natural Resources, on behalf of the Ministry of Ecology and Natural Resources analyze and verify the data provided by entities. The entities submit annual reports in this regard to the State Statistics Committee.

The New Agreement on climate change, which is under preparation, requires all countries to develop a comprehensive MRV system that will include both GHG emissions in equivalent of CO_2 (all 6 Kyoto Protocol gases), and co-benefits. The quantification of GHG emissions reductions should be based on measurements and/or calculations. The potential type of co-benefits has not been described yet by the Convention and it can also dependent on the type of project. Therefore it is too early to judge how these shall be quantified or whether the co-benefits shall be quantified. A quantification of co-benefits can be a high cost and often with significant uncertainties. Therefore, the co-benefits shall be evaluated carefully.

The main task is to support the development of the first step towards the establishment of local MRV system based on NAMAs that ensure the reduction of carbon emissions in Azerbaijan, at the same time secure its compliance with the provisions and articles of the UNFCCC.

It should be mentioned that, SOCAR has established its monitoring, reporting and verification system and at present, it is implemented acitivities to improve this system. Current MRV system has 3 steps:

1. Structural units of SOCAR prepares reports on emissions to ambient air;
2. Ecological Unit of SOCAR provides monitoring at those structural units and prepares its monitoring report;
3. Then, external evaluator contracted by the SOCAR provides independent monitoring and prepares and submits summary report which is included to to the Sustainable Development Report of the company.

At present, it is implemented activities related to improvement of the MRV system at SOCAR aiming to apply unique methodoogy and increase capacity of experts involved to report development process.

5.2. The National Strategy and Policy on Climate Change

As in many countries in the world in Azerbaijan there is no specific strategy or action plan directly related to MRV system which is new within the Convention. However the start of this process was envisaged by "the Action Plan on Improvement of Environmental Conditions and the Efficient Use of Natural Resources the Republic of Azerbaijan" (for 2015-2020) that is currently under consideration and that imply the development of MRVs in the NAMAs. Notwithstanding this, issues related to air quality improvement and mitigation of impacts of climate changes have been mentioned in a number of former state programs and action plans as:

- National Action Plan on the Protection of Environment (1998-2003);
- National Program on Environmentally Sustainable Socio-Economic Development in the Republic of Azerbaijan (2003-2010);
- Complex Action Plan on Improving of Ecological Conditions in the Republic of Azerbaijan (2006-2010);
- State Programme on the use of Alternative and Renewable Energy Sources (2005-2013);
- Action Plan on Approximation of Legislative Basis of Azerbaijan to EU directives (2010-2012);
- State Programme for the Development of Fuel Energy Complex (2005–2015);
- "Azerbaijan-2020: Vision to future" Development Concept and etc.

During the period covered by the "Azerbaijan-2020: Vision to future Development Concept " it is planned to approximate the ratio of the amount of the energy used to produce a unit of GDP to carbon dioxide to the relevant indicator of the OECD member states and it is very important in terms of the implementation of the MDGs and GHG emission reduction at national level.

At present, "The Action Plan on Improvement of Environmental Conditions and the Efficient Use of Natural Resources the Republic of Azerbaijan" (for 2015-2020) is being developed and interstate process for its approval is underway. A special chapter of the Action Plan devoted to ambient air quality and climate changes envisages the adoption of the NAMA and development of the National Adaptation Plan (NAP).

Having joined the UNFCCC in 1995 Azerbaijan committed to develop and implement national and regional programmes and projects aimed at the reduction of the impacts of global climate change, and providing information to the public on these activities.

In 1997, the State Commission on Climate Change composed of high level representatives of all relevant authorities and ministries was established by the Presidential Decree.

In 2000 the Kyoto Protocol as amendment of UNFCCC convention was ratified. The Climate Change and Ozone Centre was established under the Ministry of Ecology and Natural Resources in order to coordinate. Four departments function within the Centre, one of which is GHG Inventory Department. For GHG Inventory calculations it is used revised 1996 IPCC guidelines. In next year it is planned to use IPCC 2006 for GHG inventory. Notwithstanding that still some of relevant persons in the field of climate change and environment policy do not have enough information on this methodology.

A number of laws, State programs and regulations related to that Convention and other relevant international instruments have been adopted and most of them support the reduction of the impacts of climate change.

5.3. "Polluter pays" principle

Azerbaijan applies the "polluter pays" principle. This is a commonly accepted practice that envisages that those who produce pollution should bear the costs of managing it to prevent damage to human health or the environment.

According to the law "On the Protection Ambient air " each entity which has stationary sources of pollutant emissions (CO_2 is not included as a pollutant) has to obtain “emission permit” from the State Expertise Department under the Ministry of Ecology and Natural Resources. Special emission permit for businesses is a document which specifies for entities the limits of emissions measured by ton/year or gr/sec. The validity period of emission permit is 3 years. 4 types of payment have been identified for emission permit: 99 manats, 189 manats, 297 manats and 396 manats. It depends on the mass emission and type of production of an enterprise.

The main document regulating the economic mechanism for the "Polluter pays" principle is the decision of the Cabinet of Ministers on “Application of fees for use of nature, fees for emission of pollutants into natural environment and rules of use of the amount collected from those fees” (the rules are approved by the Cabinet of Ministers Decision No.122 dated March 3, 1992, last updated in 1995). By this decision the rules of payments for pollution, use of natural resources, as well as principles for use of collected amount from those payments were identified.

As the amount of payments are very little and therefore many entities are not interested in emission mitigation actions. For example, in normal conditions payment for 1 tonne of SO2 is from 0.26 manats up to 1.32 manats (depending on location of entity). If the emission was due accident or more than permitted by “emission permit” then the payment will be ten times more. (In case of SO2 emissions from 2.6 manats up to 13.2 manats).

5.4. Accreditation

3 types of verifiers are practiced in Azerbaijan: First and third party verifiers and government bodies.

Generally there is no requirement for accreditation of first parties as it is an internal audit that an organization performs on itself. Also there is no requirement for accreditation of government bodies as they are already accredited.

Usually verified data and information by third parties are not acceptable and approved for government organizations of Azerbaijan. Entities want to have independent third party verifiers only for transparency for their international companions (as some of international entities demand it). So there is no requirement for accreditation of third parties by Azerbaijan legislation.

By Azerbaijan legislation independent auditors (in some cases may be it means verifiers) have to obtain license for auditing activity. Duration of license is 5 years and payment for it is 2200 manats. There are no other special requirements for obtaining of license, except for some establishment documents of entity and bachelor degree of employers in field of economy, finance, law, etc.

If Azerbaijan wants to have a national verification system of GHG emissions, it should consider the system of formal accreditation or the work in the scope of any accreditation system (for example, the UNFCCC).

5.5. Monitoring, reporting and verification (MRV)

This section gives an overview of the actual monitoring, reporting and verification practices and obligations in three different sectors. The three sectors are 1) environment, 2) Energy and 3) Occupational safety and health.

5.5.1 MRV in Environment

The main supervisory authority of the Ministry of Ecology and Natural Resources of Azerbaijan Republic is the Department of Environmental Protection. The Department of Environmental Protection was established in 2001 in accordance with the relevant order of the Ministry of Ecology and Natural Resources.

The Department is the competent authority for controlling of environmental legislation in local and foreign entities in the territory of Azerbaijan and the Azerbaijani section of the Caspian Sea. The main objectives of the Department are as follows:

- Exercise of state control in field of environment and use of natural resources, including environmental protection and the preservation of biological diversity;
- Environmental control of production, sale, import and export of food and other consumer products;
- Exercise of state control of efficient use, protection and augment of biological resources of water;
- Inspection of management of toxic and non-toxic, radioactive and municipal wastes.
- Control on geological and hydro-meteorological actions;

- Regulate and control of actions of regional units of the Ministry of Ecology and Natural Resources in the field of environmental protection and rational use of natural resources;
- Data collection and implementation of information systems in the field of hazardous waste.

In accordance with the "Law on regulation of inspections and protecting the interests of entrepreneurs" every controlling organization (including the Department of Environmental Protection) before making any inspection (investigations, inspections, monitoring, surveillance, controls, raids) has to register in "integrated data registry" which is under control of the Ministry of Justice. According to same Law controlling organization have to divide entities into 3 groups: high, medium and low risk groups. High risk group is not more 10 %, medium risk group is not more 30 % and low risk group is rest of entities which is going to be inspected. It is allowed by law to make inspections in high risk group entities annually, in medium risk group entities biennially and in low risk group entities once per three years. Duration of inspection for low and medium risk group entities is 5 days and for high risk group entities is 10 days.

Main part of inspection carried out by the Department of Environmental Protection in entities is inspection of emissions into the atmosphere, industrial and municipal domestic solid waste including waste water management as well as inspections of relevant permissions. Inspection of atmospheric emissions includes as well GHG. However, GHG emissions are not too interesting for controlling authorities as no payment was imposed for these gases. It means that entities have to measure and report these emissions, but they shall not pay any compensation for the damage to environment resulting from the emission of these gases and it does not depend on quantity of emissions.

In accordance with the national legislation of Azerbaijan every entity which has stationary sources of emissions shall submit Official Statistical Report On Atmospheric Air Protection until 25 January of each year to the regional statistical authority (after approval with the Department of Environmental Protection and regional units) or shall submit in electronic form via www.stat.gov website in real-time mode. The second section of the report is about GHG (see table below).

Table 25: Brief information on GHG required for reporting

II section. Greenhouse gases emissions			
Code of line	**Emissions (Pollutant substances)**	**Emissions (tonnes)**	
		In reporting year	**In previous year**
A	B	1	2
201	Carbon dioxide (CO_2)		
202	Nitrogen oxide (N_2O)		
203	Methane (CH_4)		
204	Hydrofluorocarbons (HFCs)		
205	Sulfur Hexafluoride (SF_6)		
206	Perfluorocarbons (PFCs)		

Monitoring and reporting of emissions, including GHGs is performed by entities themselves annually. Usually monitoring does not include actual measurement. The Department of Environmental Protection and regional units on behalf of the Ministry of Ecology and Natural Resources analyze and verify the data provided by entities. Regarding the reporting part, entities submit this information to the State Statistics Committee annually.

According to the Republic of Azerbaijan Administrative Code Article 81 officials who do not conduct monitoring of environment within the enterprise (production) or calculation and accounting of the impact caused by the economic activity on the environment, which may create an ecological threat shall be inflicted penalty at the rate of two thousand five hundred to three thousand five hundred, legal persons— eight thousand five hundred to ten thousand manats.

5.5.2 MRV in Energy sector

State energy policy in the Republic of Azerbaijan is enforced by the Ministry of Energy established according to the Presidential Decree dated October 22, 2013.

The main functions and authorities of the Ministry are as follows:

- Preparation of the country's fuel and energy balance;
- Implementation of measures to meet the country's demand for energy resources;
- Implementation of measures aimed at efficient utilization of energy resources in fuel and energy complex, as well as reduction of energy losses and technological consumption;
- Development and implementation of State Programs on the development of energy industry, fuel and energy complex.

The Ministry also carried out specific and necessary structural reforms related to survey, exploration, production, processing, transportation and distribution of energy resources in order to develop the energy sector. These reforms have been carried out in accordance with the State Program on the development of fuel and energy complex in the Republic of Azerbaijan for 2005-2015 and the State Program on the use of alternative and renewable energy sources. The purpose of the State Program Fuel on the development of fuel and energy complex in the Republic of Azerbaijan for 2005-2015 is to develop the country's fuel and energy complex in order to satisfy the demand of the population and various sectors of economy in electricity, natural gas and other energy resources on a more regular basis.

The State Program envisages the construction of new thermo and hydro-power stations in the country's energy system, modernization of the existing electric power stations, and increasing present generation capacity through utilization of renewable energy sources (small hydro, power, wind, solar stations and etc.)

State-owned SOCAR, "Azerenergy" OSC are the major energy companies that play the leading role in extraction/production, transmission, distribution and supply in the energy sector.

Generation of electricity is managed by the State joint stock company "Azerenergy" OSC. "Azerenergy" OSC is an open joint-stock company wholly owned by government. There are two separate electricity distribution companies. One of them is "Bakielektrikshebeke" OSC covering the

regions of Absheron peninsular and Baku city. The other company "Azerenergy" OSC covers the remaining parts of the country.

There are two types of counters currently available for the calculation of energy in country: Ordinary and smart counters. The main difference between these counters is payment time. In first case (ordinary counters) consumer uses energy and in the first week of next month when he obtain a bill for consumption pays for energy. But in second case (smart counters) consumer pays any amount that he wants to use for any period of time and only then can use energy. It is planned to replace all ordinary counters with smart counters gradually.

The Law on Regulation of prices dated May 30, 2003 specifies legal and economic bases of the state policy and concerned relations in the field of the regulation of prices and tariffs. The authority to issue licenses is given to the Tariff Council according to the Order No 341 on the Approval of Regulations on the Tariff Council, dated December 26, 2005, and the Rules on the Organization of State Control on the Formation of Tariffs (Order No 247), dated December 30, 2005.

Regarding the reporting part, both companies "Azerenergy" OSC and "Bakuelektricshebeke" OSC submit this information to Ministry of Energy and the State Statistics Committee. Both companies also upload their annual reports and other important information on the websites of the companies (www.azerenerji.gov.az and www.bes.az)

5.2.3 MRV in Health and Safety sector

The State Labour Inspectorate under the subordination of the Ministry of Labour and Social Protection of Population of the Republic of Azerbaijan was established by Decree of the President of the Republic of Azerbaijan N-544, dated 27 January 1997. The State Labour Inspectorate is the public body envisaged by the Constitution of the Republic of Azerbaijan to carry out state control over compliance with the labour legislation. (The Government of the Republic of Azerbaijan has formulated the National Employment Strategy. The National Employment Strategy which was further elaborated through the National Action Plan identifies several priorities, including a reform of the labour market institutions and policies.

Investigation and registration of the accidents which happen in the production is regulated with Regulations approved by Decision No 27 of the Cabinet of Ministers of Azerbaijan Republic, dated 28 February 2000. These regulations are applied to all entities located in the territory of the Republic of Azerbaijan.

According to these regulations, entities shall inform the State Labour Inspectorate (or local department of the State Labour Inspectorate) for purpose of investigation immediately (within same day) about any accidents happened regardless of degree of the accident. The Investigation Commission of the State Labour Inspectorate carries out complex investigation about the accident. After investigation (within 1 day) the entity shall prepare act and submit one copy to injured person (in case of death to family member). If the Investigation commission finds any mistakes in this act, they have right to demand company to prepare it again. The company shall keep the investigation materials and the act for 45 years. Duration of investigation of accidents generally takes 20 days. In special cases this duration may be a bit longer.

5.6. NAMAs and MRV

According to the Bali Action Plan and its agreed outcome (Decision 1/CP.13), developing countries shall consider the implementation of National Appropriate Mitigation Actions (NAMAs) in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner.

The Cancun Agreements in 2010 (Decision 1/CP.16) reinforced the notion, stating that NAMAs should aim to achieve a deviation from business-as-usual (BAU) emissions in 2020, and NAMAs seeking international support shall be recorded in a registry and subject to international MRV.

In Durban conference in 2011, relevant decisions were also made on issues, such as reporting of emissions in developing countries, functioning of the registry, international consultation and analysis of developing countries' reports and market approaches to climate change mitigation (Decision 2/CP.17).

At the COP 19 in Warsaw limited progress has been observed related to NAMA and the focus is to have a treaty in place at the COP 21 in Paris in 2015 and realistic NAMA will only be a formal part of a climate agreement afterwards. General guidelines for domestic measurement, reporting and verification of domestically supported national appropriate mitigation actions by developing country Parties has been proposed and adopted.

5.6.1 National administrative structure for the UNFCCC

The Ministry of Ecology and Natural Resources is a National Coordinator for the UNFCCC. UNFCCC has developed a special registry system for NAMAs that, in which the national stakeholders can be registered as subjects that develop NAMAs and can apply for approval of the relevant NAMA to the NFP of by the UNFCCC to register NAMA at NAMA register system.

In addition, the Ministry of Economy and Industry, SOCAR, "Azernergy" OSC, the State Agency on Alternative and Renewable Energy Sources are also important players in developing and implementation of NAMA actions and the related MRV system.

5.6.2. NAMA activities

The MENR has informed that the two NAMA ideas are developed 1) National Appropriate Mitigation Actions for low-carbon end-use sectors in Azerbaijan and 2) Concept Note: NAMA in the foam, refrigeration, air-conditioning sectors in Azerbaijan. (Developed with the support of the German Society for International Cooperation and are still in the pipeline)

Although several other NAMA ideas have been proposed, they are still on a very immature stage. Therefore, they will not be presented here.

National Appropriate Mitigation Actions for low-carbon end-use sectors in Azerbaijan

NAMA for low-carbon end-use sectors in Azerbaijan Project, which is jointly implemented by the UNDP and SOCAR, aims to support development of national actions on mitigating the effects of climate change in the low-carbon end-use sectors.

This NAMA is placed within the existing national framework of Azerbaijan and provides a particular focus on a programmatic NAMA approach. That approach reflects specific GHG emission mitigation measures to be implemented by SOCAR, the State Oil Company the Republic of Azerbaijan.

The specific objective of the project is to support SOCAR in the development and implementation of selected programmatic NAMAs in the low-carbon end-use sectors. In these sectors pilot investments will be directed into low energy and low carbon technologies that are so far missing on a large scale on the Azerbaijan market.

The project will address on the one hand the existing potential to improve the energy performance of main end-use sectors on the Azeri market, namely buildings (new and existing residential, service and public buildings) and transportation (passenger cars, trucks, buses, special purpose vehicles). On the other hand, the oil & gas production sector being one of the main sources for GHG emissions in Azerbaijan, will be addressed in terms of mitigation activities that will indirectly benefit the energy end-use in the country through capturing of associated gases evaporating from existing on-shore oil and gas fields and utilizing the gas as a fuel source for nearby residential areas that are otherwise affected by large-scale deforestation activities.

Table 26: Overview of the emission reduction potential for NAMA

Project component	**Annual t CO_2**	**5 years project duration t CO_2**	**Lifetime of technology t CO_2**	**Caus ality Factor**	**Lifetime of technology**
NAMA 1 - Green Buildings Programme					
Direct emission reductions:	420	2100	10500		25 years
Indirect emission reductions (top-down)	86 124	430 618	1 291 855	60%	
NAMA 2 - Sustainable Transport					
Direct emission reductions:	162	808	1 616		10 years
Indirect emission reductions (top-down)	1 611	8 055	9 666	60%	
NAMA 3 - Gas capturing					
Direct emission reductions:	21 962	109 809	549 044		25 years
Indirect emission reductions (top-down)	329 426	1 647 132	4 941 395	60%	
Total direct emission reductions	**22 543**	**112 717**	**561 160**		
Total indirect emission reductions	**417 161**	**2 085 805**	**6 242 916**		

The project is planned to be implemented over a period of five years.

5.6.3. Types of MRV

The task of the MHV system is to keep track of the overall performance of the NAMAs. As the MRV system must reflect the objective of the activity to be documented, it is very important to understand the differences between NAMA types and how they could impact on the design of their MHV system.

There is no internationally agreed definition of NAMA; nevertheless, the two types have been recognized by the UNFCCC so far: Unilateral or national NAMA, and the internationally supported NAMA.

In case of a carbon market, above NAMA types could receive complementary funding in the form of carbon credits for emission reductions (often called "NAMA crediting". It should be noticed that the credited NAMAs has not been yet acknowledged in the UNFCCC decisions. The structure of the credited NAMA could be either a sector crediting NAMA or a sector trading NAMA.

Table 27. The different types of NAMAs

Internationally recognized NAMAs	
Unilateral supported NAMAs	This is solely a domestic administrated and supported system
International supported NAMAs	This is international supported system with different type of support.
Possible future credited NAMAs	
Sector crediting	Sector crediting would be based on an agreed emissions threshold or "no-lose target" at sector level.
Sector trading	Sector trading would follow the cap-and-trade approach

5.6.3.1. Description of the core value of MRV

Monitoring, Reporting and Verification (MRV) are key elements for ensuring greater transparency, accuracy and comparability of information with regard to climate change.

MRV can be considered as a knowledge-management system for tracking GHG emissions, actions to reduce GHG emissions, and climate change mitigation support.

Recent decisions within the international climate negotiations demonstrate a growing global consensus that common forms of measuring, reporting and verifying information are needed to track such knowledge.

In the future MRV can also be a system to describe the co-benefits.

The creation of domestic MRV system will help to:

- Underpin national GHG data quality;
- Identify national priorities (including NAMAs), as well as challenges and opportunities;
- Policy planning, prioritization and improving policy coherence, to ensure continuous improvement of MRV systems and implementing NAMAs;
- Keeping a record of NAMAs in place, tracking progress of the effectiveness of NAMAs; (e.g. emission reductions and progress to achieving objectives);
- Assure data quality, which is important to access climate finance and participate in market mechanism (e.g. emission trading system);
- Demonstrate to donors the emission reduction and impacts of NAMAs.

5.6.3.2. MRV at different levels

The MRV system can be developed at different level depending on the purpose of the MRV system.

Table 28: Description of the different level of which MRV can be performed

Level	Description
Country level	All emissions or the major part of emissions at a national level. This information is also what is needed to be reported in the national communication.
Sector level	All emissions within a sector, for instance a specific industrial sector or a municipal sector, for instance municipal waste.
Corporate level	All emissions within boundary of a corporate level, which can include for instance many companies belonging to the same group.
Company level	All emissions within boundary of a company
Facility level	All emissions within boundary of a project or installation
Product level	Product Carbon Footprint methodology and calculation tool enables to calculate the carbon footprint.

5.6.3.3. MRV of different NAMAs

Different type of NAMAs can also require different type of MRV system or MRV frameworks. The complexity and level of requirement can vary dependent on the country and relevant institution of the country that shall set-up MRV system. One approach could be identification of approximate Minimum MRV system requirements for type of NAMAs.

A number of options are available in order to design effective MRV framework for NAMAs. First of all, the scope and the institutional and legal elements of the MRV framework must be established. Subsequently, it will be important to provide transparent and well-defined monitoring, reporting and verification procedures for the large variety of NAMA types and country and sector specific priorities and targets.

The studies carried out show that the capacity and capabilities of developing countries to implement these MRV elements will differ. It is important to establish a set of minimum MRV requirements for different NAMAs for guidance. The table below provides a suggested list of minimum requirements with some key characteristics:

Table 29: Minimum MRV for the different types of NAMAs

MRV building block	Unilateral supported NAMAs (national)	International supported NAMAs	Credited NAMAs
Scope emissions	Activity which impacts emissions of one of the Kyoto Protocol gases	Activity which impacts emissions of one of the Kyoto Protocol gases	Activity which impacts emissions of one of the Kyoto Protocol gases
Scope co-benefits	Activity which impacts on of the agreed parameters	Activity which impacts on of the agreed parameters	None
Level of needed high level involvement	Government	Multilateral	International Body

MRV building block	Unilateral supported NAMAs (national)	International supported NAMAs	Credited NAMAs
Minimum level of set-up	National incentive programme	National legislation in place in two countries	International binding agreement National accredited verifiers
Issuance and compliance	Government body	Government body recognized by bilateral agreement	Government body recognized by international agreement
Monitoring and control entity	First and second parties	Third parties or Government Body	Third party
Reporting	National available	Public available	Public available
Standard	National standard	Bilateral standard	International recognized standard

The above table is an indication of the level which should as minimum be reached, but probably in many cases a higher level will be proposed and achieved. NAMA-s are mainly focused at the reduction of emissions, co-benefits, and implementation.

5.6.3.4. International NAMA templates with evaluation of MRV component

At least 5 templates for NAMAs have been developed and they are suitable for different purposes. The focus in this section is to present whether these NAMA templates have an important MRV component.

Table 30: Overview of NAMA templates with MRV presented for applying support to NAMAs

NAMA Template	Specific remarks	MRV focus
UNFCCC Template (Project for implementation)	It seems to be suitable for attracting partners for dialogue on potential support.	No focus on how a MRV should be.
UNEP DTU NINO (2012)	It seems suitable for projects that would like to develop in a UNFCCC context	Brief description of national system for data collection
NAMA Facility (2014)	It seems to be suitable for applying funds as a supported NAMA.	Brief description of national system for verification
Ecofys (2012)	It seems good for initial screening of projects and gathering of information	Limited attention to MRV
CCAP (2011)	Only as pdf and it seems not in use any more.	Only in the generic description it is mentioned that a data collection system for MRV should be developed as part of the NAMA

5.7. MRV system

The MRV will focus on the overall principles for setting up a national MRV system in compliance with an expected future international agreement.

The detailed monitoring will dependent on the specific mitigation actions and technological solutions of a specific NAMA. For instance the monitoring is very dependent on the technology solution. For Municipal waste it can be illustrated with two technological solutions, which in the same time require very different monitoring. For instance extraction of methane from a landfill or establishing a waste incinerator will require different monitoring.

It seems that the most developed NAMAs in Azerbaijan are focusing on projects with concrete mitigation potential. The policy NAMAs are less developed. So the focus should in the beginning be to support the development of MRV for project NAMAs.

5.7.1. Costs

The cost for all proposals for a MRV system will vary significantly dependent on the actual proposal. At this stage the solutions will be indicated as a low costs, medium costs and high costs. This can't be quantified in more detail at this stage. However it can be guidance for the costs of an actual action.

5.7.2. CO_2 emission reductions and co-benefit

The MRV system should include both CO_2 emissions and co-benefits. In many project the co-benefits can be of equal importance as the CO_2 emission reduction

The inclusion of co-benefits is important as it can be the driver for the investments. Monitoring of co-benefits can in general be considered as a high costs solution. Therefore for co-benefit it should be considered to develop a model which is more a description of the achieved benefits than a quantification based on actual survey and monitoring.

5.7.3. National and international drivers when setting up MRV

Setting up MRV for NAMAs can have wide implication and the MRV both on national and international levels can be the driver for the development on many levels in Azerbaijan, but also in an international context.

National Drivers

- MRV systems underpin national GHG data quality;
- MRV can if used correctly support business development;
- MRV helps identify national priorities;
- MRV demonstrate to donors the emission reduction and impacts of NAMAs.

International Drivers

- Improve trust amongst Parties
- International recognition for national performance

- Data quality is the key to address national reporting obligations to the UNFCCC mechanisms and progress national engagement in the UNFCCC process

Most of MRV is seen as an extra burden and a control function of the authorities. It is therefore of utmost importance to focus on the potential advantages and drivers by establishing a MRV system. Probably it should be carefully discussed with relevant national institutions and business sector that MRV can be seen positive and based on the principle that you can "only manage what is measured".

5.7.4. Monitoring

At the moment the monitoring is implemented at company level for the main industries and it is recommended to continue doing so. In different models the amount of savings can be documented either by specific measurements or by default values for a number of standardized solutions. This could be a cost-effective solution for establishing a MRV system (especially, in small and medium size enterprises with limited capacity and poor experience with monitoring).

5.7.5. Reporting

The reporting is already being implemented at company level. For larger companies it is also done at cooperate level. This level is appropriate for a solid reporting and it should continue at this level.

Reporting deadlines should be agreed both in term of date and frequency. Further it should be clarified whether a report needs to be verified. The dates and frequency is dependent on the content of NAMA so it shall be clarified at a later stage.

5.7.6. Verification

Verification at the national level

The structuring of the verification process may include different institutions for domestic MRV. For verification on MRV of NAMAs at least four control entities or verifiers can be identified as in below:

Table 31: Overview of possible verifiers of NAMAs

Type of verifier or control entity	Description
First Party	An internal audit that an organization performs on itself. Often part of an organization's internal quality assurance procedures.
Second Party	Verification conducted by a buyer, a supplier, or another organization that has a direct interest in the results of the verification.
Third Party	Verification conducted by an independent and qualified individual or organization
Government Body	Government institution

Probably it should be considered to have a combination of the different verifiers in a project. Thus they can supplement each other. For most facilities in a NAMA it is expected that the involved first party facilities will make self- monitoring or an internal audit. The First Party will probably also make the reporting. Azerbaijan considers it of importance to have national verifiers. It can be a

Third Party or Government Body. Azerbaijan can to some extent continue with the on-going practice of forming larger companies to utilize large credible companies to perform verification.

5.7.7. Legal and administrative system

Embedding MRV in legislation necessitates the consideration of a number of key elements that have direct impact on the effectiveness of the MRV system. Therefore at an early stage the following should be clarified to set-up the legal and administrative set-up:

- Authorities: Which organization is the authority and what does the authority entail?
- Responsibilities: Which organization is responsible for implementing which parts of the legislation / program?
- Compliance: Which organization will endorse the compliance with the requirements?
- Penalties: What are the consequences in cases of non-compliance?
- In order to have an effective MRV system that is taken seriously by all stakeholders, each NAMA should have a penalty component or at least the penalties should be considered.

The penalties are issued when the implementing entity and related facilities do not follow the rules and procedures agreed for the NAMA and as such have failed its MRV.

In some climate change programs the implementing entity will have to pay a penalty fee for not being in compliance (e.g. EU ETS, AUS ETS). While in others the penalty is that the offsets generated by the implementing entity is not being recognized and therefore will not get issued.

The penalty system will normally allow the penalized entity to seek recourse on decisions that they believe are incorrect. As such, the penalty system and the levels of the penalties are well defined within the MRV part of the legislation, as most systems rely on the national court system to settle any disputes in relation to the level of the penalty and the actually validity of the penalty.

5.8. Main gaps and barriers

Different gaps and barriers have been identified. Below it is provided an overview of the possible different gaps and barriers.

Table 32: Analyses of gaps and barriers to develop a MRV system

International experience and cooperation
Earlier Azerbaijan has only benefitted to a very limited degree from CDM. It was some bureaucratic obstacles as well. The introduction of anew mechanism will require a significant effort to get confidence that this NAMA system with a MRV component can and will actually benefit Azerbaijan. For supported NAMAs there is only limited attention to support Azerbaijan and in many programmes Azerbaijan has been excluded. If Azerbaijan is eligible it is difficult to compete with more developed NAMAs, which have received support to the initial NAMA project development.
Capacity
Limited awareness on economic and environmental benefits of technologies which will give difficulties when structuring a MRV. Very limited experience with CDM and NAMA and thereby international MRV systems.
Social
The unfamiliarity with new technologies will be a barrier as the socially accepted use of traditional methods in energy consumption and so on will be preferred.

Probably many stakeholders will consider MRV as solely a control and financing instrument from the central authorities. The potential positive drives will probably be overlooked.
Economic and financial
There are many barriers for implementation high investment costs, long payback period, inappropriate financial initiatives and low tariffs. Due to the already existing barriers it is important to establish a MRV with limited costs otherwise it will not be a priority.
Technological
Limited knowledge of new technologies, including also research institutions and suppliers in Azerbaijan. This will be a limiting factor when trying to structure and set-up a new innovative MRV system.

5.9. Capacity needs

In general, as for all countries, for Azerbaijan also there is a need to increase the knowledge of the potential new market mechanisms in the framework of UNFCCC convention, for instance NAMA. MRV is an integrated part of a NAMA and cannot been seen isolated. Based on earlier analyses and current study the following needs could be listed:

- Need for general awareness-raising on NAMA including MRV initiative, current opportunities and expected benefits of NAMA mechanism;
- Need for capacity increase and awareness raising of national stakeholders on NAMA procedures and MRV system;
- Need to increase the awareness that MRV can be seen as more than a control system, as it can be seen as a business development tool.

The above mentioned awareness issues are fundamental steps to focus on for a successful development of any MRV system.

In case a MRV system is developed further in the capacity development the early stage measurement and monitoring should be a focus.

The quality of measurement and preparation of primary data is very much dependent on the level of operational professionalism of the installation. At a later stage it will be very important to train and secure commitment of the staff directly involved in the monitoring.

For any monitoring system a detailed manual need to be developed and staff needs to be trained in how to use the manuals.

The below table shows an overview of the MRV framework for the EU-ETS and CDM and it is compared with a possible model for Azerbaijan. As the MRV framework is still under development, this comparison should also be seem, as an input to where future focus in the development of MRV should be.

Table 33. Comparison of MRV frameworks

MRV element	**EU-ETS**	**CDM**	**Azerbaijan (proposed)**
Scope	CO_2 emissions Specified Installations	6 Kyoto Protocol Gases	CO_2(all 6 Kyoto Protocol gases) and co-benefits
Set-up	EU Commission with National government transition into local legislation	Conference of Parties/Meeting of Protocole CDM	National government, but if possible compliance with UNFCCC

MRV element	EU-ETS	CDM	Azerbaijan (proposed)
Appeal	European Court. National Courts	CDM	National
Issuance and Compliance Body	Competent Authority	CDM	National authority. MENR
Standards	EU Directive. Installation specific monitoring plan	CDM Modalities & Procedures. Project Activity specific approved methodology.	Long term: UNFCCC and/or EU standard. Short term: National practice
Monitoring & Reporting.	Individual Installations	Project Proponent implementing the project activity	Individual installations and companies
Verification (supervision body and capacities)	Third Party Entities	Designated Operating Entity	Third party Entity or national body.
MRV Reporting at National Level	National Registries	Non / CDM Registry	National Registry, administrated by MENR
Penalty	Yes	No	Yes

The scope proposed model for Azerbaijan will differ from EU-ETS and CDM as it includes both emissions and co-benefits. Remarkable is the proposal of a national set-up, national appeal, national issuance and compliance body.

5.10. Conclusions and Recommendations

Along with own mitigation contributions, Azerbaijan, as developing country, is also interested in participation in different financial mechanisms, including NAMAs, of the UNFCCC in order to increase its contribution to global mitigation efforts. Azerbaijan is fully aware of the need to set-up a proper and reliable MRV system to secure international confidence to national climate change mitigation actions.

In Azerbaijan, there is a need to develop a robust institutional framework that encompasses the relevant institutional entities as well as the necessary staff, systems and processes, for an effective and nationally appropriate MRV system. In this regards, the "Action Plan on improvement of ecological situation and efficient use of natural resources in Azerbaijan Republic (2015-2020)", which is currently in the process of inside-state approval procedures, includes a section focusing on the development of MRV.

Azerbaijan, as many other countries, has limited experience with relatively new MRV systems of international standard and therefore there are some gaps and barriers which need to be addressed. This requires a significant effort to increase the awareness. The awareness shall be initial focus on the understanding at the installations and entities by training and making user friendly manuals.

The confidence of the private sector to the UNFCCC process is limited due to earlier "not good" experience with CDM and lessons learned, as well also due to limited knowledge of NAMA including MRV. Furthermore the business opportunities of a reliable MRV are only understood well by private sector. All this will require a very significant training effort to change the mind-set and clarify the importance of the business opportunities.

5.10.1. Main characteristic of a future MRV system

Azerbaijan has a system to monitor and report pollution and an administrative set-up with specific requirements to limit the pollution. Still, there is a need for the set-up and enforcement of the system in regards to new systems and mechanisms of UNFCCC. Furthermore though there is no specific strategy or action plan directly related to MRV system in Azerbaijan, the "Action Plan on improvement of ecological situation and efficient use of natural resources in Azerbaijan Republic (2015-2020)" includes a section focusing on the development of MRV.

Monitoring and reporting of emissions, including greenhouse gases is performed annually by entities themselves. The Department of Environmental Protection on behalf of Ministry of Ecology and Natural Resources analyses and verifies the data provided by entities. The entities submit annual reports to State Statistics Committee.

A detailed MRV system should be developed in Azerbaijan. The MRV system should include both CO_2 emissions (All of 6 gases indicated by the Kyoto Protocol) and possible co-benefits. The main sectors with CO_2 mitigation potential (like energy, transport and waste) also have different potential of development of MRV system. The quantification of GHG emissions reductions should be based on measurements and/or calculations. The potential type of co-benefits has not been described yet and it can also dependent on the type of project and therefore it is too early to judge how these shall be quantified or whether the co-benefits shall be quantified. A quantification of co-benefits can be a high cost and often with significant uncertainties. Therefore the co-benefits shall be evaluated carefully.

The monitoring of the main polluters is functioning in Azerbaijan. The monitoring is at company level (often self-monitoring) for the main industries. It is recommended to continuing in the same way. It seems that there is a possibility for a more detailed and maybe more strict administration. It should be very clear what is monitored and how a tighter follow-up could be done. It will both benefit the proposed MRV for the specific NAMA but also the general situation at the industries.

The monitoring of a NAMA could be done by the involved First Party entities by self- monitoring and/or an internal audit The First Party entity could probably also make the reporting of the NAMA activities.

It should be considered to develop default values for a number of standardized solutions as this will decrease the monitoring and verification costs and it could be an innovative model of establish a MRV system. This is especially important for Small and Medium Enterprises, as they only have limited experience and requirements for measurements at company level in Azerbaijan.

The annual reporting by the entities or the corporate level is appropriate for a solid reporting and it should continue at this level. Reporting deadlines should be agreed both what date and which frequency at least for MRV system of a NAMA. Probably annually reporting is suitable.

Azerbaijan considers it of importance to have national verifiers, it could be Third Party or Government Bodies. The Department of Environmental Protection could continue analyzing and verifying the data provided by entities. Azerbaijan can to some extent continue with the on-going practice from larger companies to utilize large credible international companies to perform verification.

The set-up for verifiers should be decided when an estimation of the potential number of NAMAs have been evaluated as it is costly to establish a new verification system. In case of a system with national verifiers it will probably also require an accreditation system.

According to the Azerbaijan legislation companies need a pollution permit and for the time being GHGs are not part of this permit system. In case GHGs should have more focus in the future it is recommended to include for instance CO_2 in the list.

It seems that the actual penalties for not compliance with actual pollution permits are a very low cost for the entities. In case the pollution permits system and MRV system shall function it is important that a penalty system is forcing the entities to actual comply with pollution permits.

As a future MRV system will have a national regulatory and enforcement system, it should be a priority to have an appeal system on the national level and not the international level. This will secure a more smooth process and probably with a higher comfort level by the national stakeholders, like entities.

In Azerbaijan, during the period of approximation of international recognized standards and methodologies of UNFCCC /or EU it should be used national standard and methodologies.

There is no international agreed template for NAMA proposals and the templates are very different whether MRV should be presented and to which degree of detail. Taking it into account, Azerbaijan needs to develop a national accepted NAMA template including the MRV component.

5.10.2. Recommendations

The focus in this section will be to recommend long-term and short-term actions. The long-term actions require a significant effort through many years, and in case of international donor support, it will require a significant national allocation of resources. The short-term should be initiated accordingly if possible and it can be many minor donor support contracts and/or parallel national allocation of resources. Some of the short-term recommendations will also be input to the long-term recommendations, but these short-term actions will contribute to more focus long term actions.

For each action the indicative input of consultancy service is provided. Although the authorities have resources, they need to be allocated significant internal resources also.

As many developing countries receive significant support it is important that Azerbaijan also receives support to setting up an appropriate national MRV system. Hopefully both long term actions and short terms actions can be initiated.

Table 34. Proposal of long term and short term actions

Long term actions (1- 5 years)	
Description	**Support**
Setting up the national MRV framework. Focus shall be on clear role description of all involved partners and the implementation. It shall include all the key elements: scope, set-up, appeal, issuance and compliance body, standards, measurement, reporting, verification, national registry and penalty.	Several years
Improve the actual monitoring and reporting system. It should be implemented monitoring plan in 3-5 years perspective. It will include all monitoring aspects and the experience from the concrete implementation. It can be handle separate and in parallel with proposal. If it is handled in parallel some concrete results can be achieved before the full scale implementation of the MRV framework is completed.	5 years

Setting up the national verifier system	1 year
Contribute to the international climate negotiations with focus on MRV and NAMAs	Regular
Incorporate MRV in strategies and action plans whenever it is relevant	Regular
Short term actions (< 1 year)	
Description	**Input**
Prepare a NAMA template with MRV component.	2 weeks
Prepare a detailed plan for how co-benefit should be included.	1 month
Training courses in MRV – also with focus on the business advantages	1 month
Develop and implement a national registry for NAMA projects.	2 months
Prepare a note explaining the importance of MRV on financing and financial support received	2 weeks
Prepare a note which illustrates how default values for a number of standardized solutions could function	1 month

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Annexes

BR CTF submission workbook

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Submission Key		Submission Status	
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Contents

Table 1 AZE_BR1_v1.0

Emission trends: summary
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GREENHOUSE GAS EMISSIONS	Base year[a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
CO_2 emissions including net CO_2 from LULUCF	52,244	48,251	40,926	35,518	30,558	32,771	26,111	24,865	24,011
CO_2 emissions excluding net CO_2 from LULUCF	55,934	51,901	44,547	39,136	34,273	36,561	29,966	28,935	28,567
CH_4 emissions including CH_4 from LULUCF	13,456	12,482	10,730	9,875	9,233	9,618	9,043	8,867	8,525
CH_4 emissions excluding CH_4 from LULUCF	13,456	12,482	10,730	9,875	9,233	9,618	9,043	8,867	8,525
N_2O emissions including N_2O from LULUCF	3,681	1,926	2,132	1,702	1,429	1,296	1,309	1,515	1,728
N_2O emissions excluding N_2O from LULUCF	3,681	1,926	2,132	1,702	1,429	1,296	1,309	1,515	1,728
HFCs	NA	NA	NA	NA	NA	NA	NA	NA	NA
PFCs	260	260	195	130	130	65	NA	NA	NA
SF_6									
Total (including LULUCF)	**69,641**	**62,919**	**53,983**	**47,225**	**41,350**	**43,750**	**36,462**	**35,247**	**34,264**
Total (excluding LULUCF)	**73,331**	**66,569**	**57,604**	**50,843**	**45,065**	**47,540**	**40,317**	**39,317**	**38,820**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year[a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
1. Energy	63,928	59,017	50,060	44,112	39,179	41,972	34,646	33,279	32,504
2. Industrial Processes	1,447	1,357	1,242	800	431	172	113	149	98
3. Solvent and Other Product Use	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Agriculture	6,262	4,496	4,592	4,202	3,712	3,631	3,780	4,100	4,424
5. Land Use, Land-Use Change and Forestry[b]	-3,690	-3,650	-3,621	-3,618	-3,715	-3,790	-3,855	-4,070	-4,556
6. Waste	1,694	1,700	1,710	1,729	1,744	1,765	1,779	1,790	1,794
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)	**69,641**	**62,919**	**53,983**	**47,225**	**41,350**	**43,750**	**36,462**	**35,247**	**34,264**

Table 1
Emission trends: summary
(Sheet 2 of 3)

AZE_BR1_v1.0

GREENHOUSE GAS EMISSIONS	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
CO_2 emissions including net CO_2 from LULUCF	23,250	24,141	23,344	22,941	25,507	27,736	30,124	28,957	23,846	26,900
CO_2 emissions excluding net CO_2 from LULUCF	27,869	29,011	28,243	28,031	30,733	33,011	35,473	34,310	29,284	32,283
CH_4 emissions including CH_4 from LULUCF	8,875	8,858	9,598	9,598	9,692	9,846	10,407	11,387	13,805	17,629
CH_4 emissions excluding CH_4 from LULUCF	8,875	8,858	9,598	9,598	9,692	9,846	10,407	11,387	13,805	17,629
N_2O emissions including N_2O from LULUCF	2,346	2,473	2,547	2,701	2,778	2,880	3,005	3,028	3,230	3,178
N_2O emissions excluding N_2O from LULUCF	2,346	2,473	2,547	2,701	2,778	2,880	3,005	3,028	3,230	3,178
HFCs	NA	431	439	450	482	523	604	676	771	853
SF_4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)	**34,471**	**35,904**	**35,929**	**35,691**	**38,459**	**40,985**	**44,141**	**44,048**	**41,653**	**48,560**
Total (excluding LULUCF)	**39,090**	**40,774**	**40,828**	**40,781**	**43,685**	**46,260**	**49,490**	**49,401**	**47,091**	**53,943**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt CO_2 eq	*kt CO_2 eq*	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq	kt CO_2 eq
1. Energy	32,082	33,006	32,664	32,089	34,642	36,654	39,216	38,642	35,655	42,543
2. Industrial Processes	85	554	700	911	1,057	1,353	1,781	1,986	2,303	2,043
3. Solvent and Other Product Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Agriculture	5,124	5,377	5,605	5,897	6,076	6,284	6,469	6,689	7,003	7,175
5. Land Use, Land-Use Change and Forestry[b]	-4,619	-4,870	-4,899	-5,090	-5,226	-5,275	-5,349	-5,353	-5,438	-5,383
6. Waste	1,799	1,837	1,859	1,885	1,910	1,970	2,023	2,084	2,130	2,182
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)	**34,471**	**35,904**	**35,929**	**35,691**	**38,459**	**40,985**	**44,141**	**44,048**	**41,653**	**48,560**

GREENHOUSE GAS EMISSIONS	*2009*	2010	Change from base to latest reported year
	kt CO_2 eq	*kt CO_2 eq*	(%)
CO_2 emissions including net CO_2 from LULUCF	21,533	21,001	-59.8
CO_2 emissions excluding net CO_2 from LULUCF	26,893	26,411	-52.8
CH_4 emissions including CH_4 from LULUCF	17,269	17,485	29.9
CH_4 emissions excluding CH_4 from LULUCF	17,269	17,485	29.9
N_2O emissions including N_2O from LULUCF	3,343	3,288	-10.6
N_2O emissions excluding N_2O from LULUCF	3,343	3,288	-10.6
HFCs	932	1,025	NA
SF_4	NA	NA	NA
Total (including LULUCF)	**43,077**	**42,799**	**-38.5**
Total (excluding LULUCF)	**48,437**	**48,209**	**-34.3**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	Change from base to latest reported year
	kt CO_2 eq	*kt CO_2 eq*	(%)
1. Energy	37,192	36,596	-42.8
2. Industrial Processes	1,780	2,108	45.7
3. Solvent and Other Product Use	NA	NA	0.0
4. Agriculture	7,266	7,244	15.7
5. Land Use, Land-Use Change and Forestry[b]	-5,360	-5,410	46.6
6. Waste	2,199	2,260	33.4
7. Other	NA	NA	0.0
Total (including LULUCF)	**43,077**	**42,799**	-38.5

Notes :

(1) 2010 is the latest reported inventory year.

(2) 1 kt CO_2 eq equals 1 Gg CO_2 eq.

Abbreviation: LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Includes net CO_2, CH_4 and N_2O from LULUCF.

Table 1 (a)

Emission trend CO2

Sheet 1 of 3

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year* [a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	**54751.24**	**50808.75**	**43500.52**	**38467.17**	**33972.26**	**36455.26**	**29854.81**	**28787.06**	**28469.16**
A. Fuel Combustion (Sectoral Approach)									
1. Energy Industries	22383,40	21168,52	22810,35	22355,24	16788,40	16034,66	15888,69	15130,51	15877,20
2. Manufacturing Industries and Construction	17709,42	17476,11	10594,46	8489,53	8028,04	10114,07	5353,62	4894,49	2841,05
3. Transport	5394,16	4669,61	3917,23	3614,61	3162,94	2825,37	2622,85	2431,95	2205,05
4. Other Sectors	8521,56	7493,07	6170,30	4001,28	5991,43	6445,39	4582,15	4388,38	3596,79
5. Other	742,7	1,45	8,18	6,51	1,45	1035,76	1407,5	1941,74	3949,07
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes	**1182.93**	**1092.7**	**1046.16**	**669.25**	**300.42**	**106.1**	**111.03**	**147.95**	**97.85**
A. Mineral Products	512,73	454,6	421,56	311,35	222,72	96,95	108,18	146,45	97,1
B. Chemical Industry	40,2	38,1	29,1	20,4	22,2	5,55	1,2		
C. Metal Production	630	600	595,5	337,5	55,5	3,6	1,65	1,5	0,75
D. Other Production									
E. Production of Halocarbons and SF6									
F. Consumption of Halocarbons and SF6									
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. SolventandOtherProduct Use	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Agriculture									
A. Enteric Fermentation									
B. Manure Management									
C. Rice Cultivation									
D. Agricultural Soils									
E. Prescribed Burning of Savannas									
F. Field Burning of Agricultural Residues									
G. Other									
5. Land Use, Land-Use Change and Forestry	**-3690**	**-3650**	**-3621**	**-3618**	**-3715**	**-3790**	**-3855**	**-4070**	**-4556**
A. Forest Land	-3315	-3257	-3222	-3236	-3240	-3259	-3246	-3264	-3243
B. Cropland	779	929	1051	1027	1110	1172	1276	1556	2340
C. Grassland	-1128	-1294	-1430	-1394	-1573	-1712	-1901	-2373	-3663
D. Wetlands	-26	-28	-20	-15	-12	9	16	13	10
E. Settlements	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Other Land	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste									
A. Solid Waste Disposal on Land									
B. Waste-water Handling									
C. Waste Incineration									
D. Other									
7. Other (as specified in the summary table in CRF)									
Total CO2 emissions including net CO2 from LULUCF	**52,244**	**48,251**	**40,926**	**35,518**	**30,558**	**32,771**	**26,111**	**24,865**	**24,011**
Total CO2 emissions excluding net CO2 from LULUCF	**55,934**	**51,901**	**44,547**	**39,136**	**34,273**	**36,561**	**29,966**	**28,935**	**28,567**
Memo Items:									
International Bunkers									
Aviation									
Marine									
Multilateral Operations									
CO2 Emissions from Biomass									

Note: All footnotes for this table are given on sheet 3.

Table 1(a)

Emission trends (CO_2) (Sheet1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	**27785.9**	**28889.4**	**27983.1**	**27572.8**	**30159.3**	**32182.8**	**34297.1**	**33002.3**	**27753.5**	**31094.4**
A. Fuel Combustion (Sectoral Approach)										
1. Energy Industries	15834,19	16527,38	15532,21	14081,40	15574,55	16946,39	17410,03	17777,54	15431,07	14952,62
2. Manufacturing Industries and Construction	2877,94	2711,16	2397,05	3234,83	2774,33	2256,27	2098,56	2020,53	456,04	2157,31
3. Transport	1353,20	2118,61	2315,89	2696,26	2932,70	3709,69	4157,68	4727,44	3728,99	4686,80
4. Other Sectors	3813,65	4864,36	5323,95	6149,95	6805,75	6386,47	7555,47	6460,76	6927,03	8467,09
5. Other	3906,95	2667,85	2414,04	1410,37	2071,96	2883,99	3075,37	2016	1210,37	830,62
B. Fugitive Emissions from Fuels										
1. Solid Fuels										
2. Oil and Natural Gas			219,55	211,42	209,48	208,63	229,52	264,09	372,61	541
2. Industrial Processes	**83.32**	**121.24**	**260.01**	**458.62**	**573.67**	**827.98**	**1175.53**	**1307.57**	**1530.63**	**1188.34**
A. Mineral Products	82,83	121,18	253,11	409,57	489,07	692,38	746,38	804,62	828,63	770,84
B. Chemical Industry										
C. Metal Production	0,49	0,06	6,9	49,05	84,6	135,6	429,15	502,95	702	417,5
D. Other Production										
E. Production of Halocarbons and SF6										
F. Consumption of Halocarbons and SF6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4. Agriculture										
A. Enteric Fermentation										
B. Manure Management										
C. Rice Cultivation										
D. Agricultural Soils										
E. Prescribed Burning of Savannas										
F. Field Burning of Agricultural Residues										
G. Other										
5. Land Use, Land-Use Change and Forestry	**-4619**	**-4870**	**-4899**	**-5090**	**-5226**	**-5275**	**-5349**	**-5353**	**-5438**	**-5383**
A. Forest Land	-3263	-3355	-3566	-3578	-3615	-3623	-3684	-3700	-3849	-3818
B. Cropland	2437	2653	2299	2567	2597	2573	2569	2559	2486	2448
C. Grassland	-3801	-4169	-3670	-4063	-4194	-4208	-4207	-4195	-4064	-3998
D. Wetlands	9	0	44	-15	-13	-18	-26	-17	-11	-16
E. Settlements	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Other Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
6. Waste										
A. Solid Waste Disposal on Land										
B. Waste-water Handling										
C. Waste Incineration										
D. Other										
7. Other (as specified in the summary table in CRF)										
Total CO2 emissions including net CO2 from LULUCF	**23,250**	**24,141**	**23,344**	**22,941**	**25,507**	**27,736**	**30,124**	**28,957**	**23,846**	**26,900**
Total CO2 emissions excluding net CO2 from LULUCF	**27,869**	**29,011**	**28,243**	**28,031**	**30,733**	**33,011**	**35,473**	**34,310**	**29,284**	**32,283**
Memo Items:										
International Bunkers										
Aviation										
Marine										
Multilateral Operations										
CO2 Emissions from Biomass										

Note: All footnotes for this table are given on sheet 3.

Table 1(a)

Emission trends (CO_2) (Sheet 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	Change from base to latest reported year
	kt	kt	%
1. Energy	**26046.1**	**25333.3**	**-53.73**
A. Fuel Combustion (Sectoral Approach)			
1. Energy Industries	12047,08	10705,60	**-52.17**
2. Manufacturing Industries and Construction	1236,86	1092,01	**-93.83**
3. Transport	4165,83	4861,14	**-9.88**
4. Other Sectors	7876,48	8137,63	**-4.51**
5. Other	719,89	536,95	**-27.70**
B. Fugitive Emissions from Fuels			
1. Solid Fuels			
2. Oil and Natural Gas	527,24	532,65	**NA**
2. Industrial Processes	**847.1**	**1077.83**	**-8.88**
A. Mineral Products	621,62	618,08	**20.55**
B. Chemical Industry			
C. Metal Production	225,48	459,75	**-27.02**
D. Other Production			
E. Production of Halocarbons and SF6			
F. Consumption of Halocarbons and SF6			
G. Other			
3. Solvent and Other Product Use			
4. Agriculture			
A. Enteric Fermentation			
B. Manure Management			
C. Rice Cultivation			
D. Agricultural Soils			
E. Prescribed Burning of Savannas			
F. Field Burning of Agricultural Residues			
G. Other			
5. Land Use, Land-Use Change and Forestry	**-5360**	**-5410**	**46.6**
A. Forest Land	-3836	-3923	18.3
B. Cropland	2369	2260	190.1
C. Grassland	-3880	-3736	131.2
D. Wetlands	-14	-11	-57.9
E. Settlements	NA	NA	NA
F. Other Land	NA	NA	NA
G. Other	NA	NA	NA
6. Waste			
A. Solid Waste Disposal on Land			
B. Waste-water Handling			
C. Waste Incineration			
D. Other			
7. Other (as specified in the summary table in CRF)			
Total CO_2 emissions including net CO_2 from LULUCF	**21,533**	**21,001**	**-59.8**
Total CO_2 emissions excluding net CO_2 from LULUCF	**26,893**	**26,411**	**-52.8**
Memo Items:			
International Bunkers			
Aviation			
Marine			
Multilateral Operations			
CO_2 Emissions from Biomass			

Abbreviations : CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[b] Fill in net emissions/removals as reported in CRF table Summary 1.A of the latest reported inventory year. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

Table 1 (b) Emission trend CH4

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year* [a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	**433.84**	**387.88**	**309.15**	**265.83**	**245.42**	**260.19**	**225.92**	**211.74**	**189.99**
A. Fuel Combustion (Sectoral Approach)									
1. Energy Industries	0,61	0,62	0,77	0,75	0,58	0,58	0,56	0,53	0,57
2. Manufacturing Industries and Construction	1,5	1,53	0,91	0,72	0,69	0,88	0,47	0,42	0,23
3. Transport	1,74	1,53	1,27	1,12	0,94	0,85	0,76	0,71	0,64
4. Other Sectors	0,73	0,67	0,53	0,35	0,53	0,57	0,40	0,39	0,32
5. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas	429,25	383,54	305,67	262,89	242,68	257,31	223,73	209,69	188,23
2. Industrial Processes	**0,18**	**0,19**	**0,04**	**0,04**	**0,02**	**0,03**	**0,07**	**0,04**	**0,03**
A. Mineral Products									
B. Chemical Industry									
C. Metal Production									
D. Other Production									
E. Production of Halocarbons and SF6									
F. Consumption of Halocarbons and SF6									
G. Other									
3. Solvent and Other Product Use									
4. Agriculture	**129,15**	**128,47**	**123,43**	**125,12**	**114,46**	**116,98**	**123,15**	**128,51**	**133,75**
A. Enteric Fermentation	115,66	114,81	110,39	112,45	102,29	104,45	109,84	114,98	119,65
B. Manure Management	12,1	12,22	12,11	11,84	11,36	11,64	12,37	12,94	13,52
C. Rice Cultivation	0,05	0,1	0,09	0,12	0,1	0,2	0,24	0,25	0,25
D. Agricultural Soils	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	1,34	1,34	0,84	0,71	0,71	0,69	0,7	0,34	0,33
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Land									
G. Other									
6. Waste	**77,58**	**77,85**	**78,35**	**79,23**	**79,78**	**80,79**	**81,47**	**81,97**	**82,19**
A. Solid Waste Disposal on Land	64,63	64,84	65,25	65,99	66,38	67,29	67,77	68,16	68,23
B. Waste-water Handling	12,95	13,01	13,1	13,24	13,4	13,5	13,7	13,81	13,96
C. Waste Incineration	0	0	0	0	0	0	0	0	0
D. Other	0	0	0	0	0	0	0	0	0
7. Other (as specified in the summary table in CRF)									
Total CH4 emissions including CH4 from LULUCF	**640.75**	**594.39**	**510.97**	**470.22**	**439.68**	**457.99**	**430.61**	**422.26**	**405.96**
Total CH4 emissions excluding CH4 from LULUCF	**640.75**	**594.39**	**510.97**	**470.22**	**439.68**	**457.99**	**430.61**	**422.26**	**405.96**
Memo Items:									
International Bunkers									
Aviation									
Marine									
Multilateral Operations									
CO2 Emissions from Biomass									

Note: All footnotes for this table are given on sheet 3.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	**202.52**	**193.84**	**221.32**	**213.52**	**211.66**	**210.99**	**232.09**	**266.56**	**374.61**	**543.49**
A. Fuel Combustion (Sectoral Approach)										
1. Energy Industries	0,56	0,58	0,42	0,38	0,43	0,46	0,48	0,46	0,37	0,33
2. Manufacturing Industries and Construction	0,23	0,21	0,19	0,27	0,2	0,15	0,14	0,13	0,03	0,18
3. Transport	0,43	0,62	0,68	0,9	0,93	1,17	1,28	1,29	1	1,24
4. Other Sectors	0,33	0,43	0,48	0,55	0,62	0,58	0,67	0,59	0,60	0,74
5. Other	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
B. Fugitive Emissions from Fuels										
1. Solid Fuels										
2. Oil and Natural Gas	200,97	192	219,55	211,42	209,48	208,63	229,52	264,09	372,61	541
2. Industrial Processes	**0,06**	**0,05**	**0,04**	**0,09**	**0,06**	**0,07**	**0,06**	**0,1**	**0,04**	**0,08**
A. Mineral Products										
B. Chemical Industry										
C. Metal Production										
D. Other Production										
E. Production of Halocarbons and SF6										
F. Consumption of Halocarbons and SF6										
G. Other										
3. Solvent and Other Product Use										
4. Agriculture	**137,59**	**144,46**	**151,17**	**157,83**	**162,95**	**168,28**	**172,26**	**181,68**	**186,6**	**197,6**
A. Enteric Fermentation	122,94	129,12	135,19	141,19	145,69	150,32	153,68	162,95	167,39	176,58
B. Manure Management	13,99	14,59	15,28	15,97	16,56	17,21	17,69	18,12	18,68	20,57
C. Rice Cultivation	0,36	0,45	0,38	0,36	0,33	0,26	0,23	0,12	0,11	0,13
D. Agricultural Soils	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	0,3	0,3	0,32	0,31	0,37	0,49	0,66	0,49	0,42	0,32
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry										
A. Forest Land										
B. Cropland										
C. Grassland										
D. Wetlands										
E. Settlements										
F. Other Land										
G. Other										
6. Waste	**82,44**	**83,48**	**84,54**	**85,62**	**86,83**	**89,53**	**91,18**	**93,91**	**96,12**	**98,31**
A. Solid Waste Disposal on Land	68,27	69	69,7	70,43	71,18	73,21	74,31	75,63	76,67	78,15
B. Waste-water Handling	14,17	14,48	14,84	15,19	15,65	16,32	16,87	18,28	19,45	20,16
C. Waste Incineration	0	0	0	0	0	0	0	0	0	0
D. Other	0	0	0	0	0	0	0	0	0	0
7. Other (as specified in the summary table in CRF)										
Total CH4 emissions including CH4 from LULUCF	**422.61**	**421.83**	**457.07**	**457.06**	**461.50**	**468.87**	**495.59**	**542.25**	**657.37**	**839.48**
Total CH4 emissions excluding CH4 from LULUCF	**422.61**	**421.83**	**457.07**	**457.06**	**461.50**	**468.87**	**495.59**	**542.25**	**657.37**	**839.48**
Memo Items:										
International Bunkers										
Aviation										
Marine										
Multilateral Operations										
CO2 Emissions from Biomass										

Note : All footnotes for this table are given on sheet 3.

Table 1(b) AZE_BR1_v1.0

Emission trends (CH_4)

(Sheet 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	Change from base to latest reported year
	kt	kt	%
1. Energy	**529.37**	**534.93**	**23.30**
A. Fuel Combustion (Sectoral Approach)			
1. Energy Industries	0,25	0,22	**-85.25**
2. Manufacturing Industries and Construction	0,1	0,09	**-14.67**
3. Transport	1,11	1,28	**-60.34**
4. Other Sectors	0,67	0,69	**-5.5**
5. Other	0,00	0,00	
B. Fugitive Emissions from Fuels			
1. Solid Fuels			
2. Oil and Natural Gas	527,24	532,65	**24.1**
2. Industrial Processes	**0,06**	**0,26**	**44.4**
A. Mineral Products			
B. Chemical Industry			
C. Metal Production			
D. Other Production			
E. Production of Halocarbons and SF6			
F. Consumption of Halocarbons and SF6			
G. Other			
3. Solvent and Other Product Use			
4. Agriculture	**193,93**	**195,55**	**51,4**
A. Enteric Fermentation	173,99	175,4	51,7
B. Manure Management	19,52	19,74	63,1
C. Rice Cultivation	0,17	0,16	220,0
D. Agricultural Soils	NA	NA	NA
E. Prescribed Burning of Savannas	NA	NA	NA
F. Field Burning of Agricultural Residues	0,25	0,25	-81,3
G. Other	NA	NA	NA
5. Land Use, Land-Use Change and Forestry			
A. Forest Land			
B. Cropland			
C. Grassland			
D. Wetlands			
E. Settlements			
F. Other Land			
G. Other			
6. Waste	**98,97**	**101,86**	**31,3**
A. Solid Waste Disposal on Land	79,42	81	25,3
B. Waste-water Handling	19,55	20,86	61,1
C. Waste Incineration	0	0	0,0
D. Other	0	0	0,0
7. Other (as specified in the summary table in CRF)			
Total CH4 emissions including CH4 from LULUCF	**822.33**	**832.60**	**29.9**
Total CH4 emissions excluding CH4 from LULUCF	**822.33**	**832.60**	**29.9**
Memo Items:			
International Bunkers			
Aviation			
Marine			
Multilateral Operations			
CO_2 Emissions from Biomass			

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Custom Footnotes

Table 1(c) AZE_BR1_v1.0

Emission trends (N_2O)

(Sheet 1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year* [a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	**0.21**	**0.20**	**0.22**	**0.20**	**0.17**	**0.17**	**0.15**	**0.15**	**0.15**
A. Fuel Combustion (Sectoral Approach)									
1. Energy Industries									
2. Manufacturing Industries and Construction									
3. Transport									
4. Other Sectors									
5. Other									
B. Fugitive Emissions from Fuels									
1. Solid Fuels									
2. Oil and Natural Gas									
2. Industrial Processes									
A. Mineral Products									
B. Chemical Industry									
C. Metal Production									
D. Other Production									
E. Production of Halocarbons and SF6									
F. Consumption of Halocarbons and SF6									
G. Other									
3. Solvent and Other Product Use									
4. Agriculture	**11,45**	**5,8**	**6,45**	**5,08**	**4,22**	**3,79**	**3,85**	**4,52**	**5,21**
A. Enteric Fermentation	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Manure Management	1,28	1,23	1,17	0,93	0,83	0,79	0,81	0,94	1,07
C. Rice Cultivation	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Agricultural Soils	10,14	4,54	5,26	4,14	3,38	2,99	3,03	3,57	4,13
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	0,03	0,03	0,02	0,01	0,01	0,01	0,01	0,01	0,01
5. Land Use, Land-Use Change and Forestry									
A. Forest Land									
B. Cropland									
C. Grassland									
D. Wetlands									
E. Settlements									
F. Other Land									
G. Other									
6. Waste	**0,21**	**0,21**	**0,21**	**0,21**	**0,22**	**0,22**	**0,22**	**0,22**	**0,22**
A. Solid Waste Disposal on Land	0	0	0	0	0	0	0	0	0
B. Waste-water Handling	0,21	0,21	0,21	0,21	0,22	0,22	0,22	0,22	0,22
C. Waste Incineration	0	0	0	0	0	0	0	0	0
D. Other	0	0	0	0	0	0	0	0	0
7. Other (as specified in the summary table in CRF)									
Total N2O emissions including N2O from LULUCF	**11.87**	**6.21**	**6.88**	**5.49**	**4.61**	**4.18**	**4.22**	**4.89**	**5.58**
Total N2O emissions excluding N2O from LULUCF	**11.87**	**6.21**	**6.88**	**5.49**	**4.61**	**4.18**	**4.22**	**4.89**	**5.58**
Memo Items:									
International Bunkers									
Aviation									
Marine									
Multilateral Operations									
CO_2 Emissions from Biomass									

Note: All footnotes for this table are given on sheet 3.

Table 1(c) AZE_BR1_v1.0

Emission trends (N_2O)

(Sheet 2 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
1. Energy	**0.14**	**0.15**	**0.11**	**0.10**	**0.12**	**0.13**	**0.14**	**0.14**	**0.11**	**0.11**
A. Fuel Combustion (Sectoral Approach)										
1. Energy Industries										
2. Manufacturing Industries and Construction										
3. Transport										
4. Other Sectors										
5. Other										
B. Fugitive Emissions from Fuels										
1. Solid Fuels										
2. Oil and Natural Gas										
2. Industrial Processes										
A. Mineral Products										
B. Chemical Industry										
C. Metal Production										
D. Other Production										
E. Production of Halocarbons and SF6										
F. Consumption of Halocarbons and SF6										
G. Other										
3. Solvent and Other Product Use										
4. Agriculture	**7,21**	**7,56**	**7,84**	**8,33**	**8,56**	**8,87**	**9,2**	**9,27**	**9,95**	**9,76**
A. Enteric Fermentation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Manure Management	1,92	1,95	1,99	2,04	2,07	2,12	2,15	2,17	2,21	2,23
C. Rice Cultivation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D. Agricultural Soils	5,28	5,6	5,84	6,28	6,48	6,74	7,04	7,09	7,73	7,52
E. Prescribed Burning of Savannas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
F. Field Burning of Agricultural Residues	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
G. Other	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
5. Land Use, Land-Use Change and Forestry										
A. Forest Land										
B. Cropland										
C. Grassland										
D. Wetlands										
E. Settlements										
F. Other Land										
G. Other										
6. Waste	**0,22**	**0,27**	**0,27**	**0,28**	**0,28**	**0,29**	**0,35**	**0,36**	**0,36**	**0,38**
A. Solid Waste Disposal on Land	0	0	0	0	0	0	0	0	0	0
B. Waste-water Handling	0,22	0,27	0,27	0,28	0,28	0,29	0,35	0,36	0,36	0,38
C. Waste Incineration	0	0	0	0	0	0	0	0	0	0
D. Other	0	0	0	0	0	0	0	0	0	0
7. Other (as specified in the summary table in CRF)										
Total N2O emissions including N2O from LULUCF	**7.57**	**7.98**	**8.22**	**8.71**	**8.96**	**9.29**	**9.69**	**9.77**	**10.42**	**10.25**
Total N2O emissions excluding N2O from LULUCF	**7.57**	**7.98**	**8.22**	**8.71**	**8.96**	**9.29**	**9.69**	**9.77**	**10.42**	**10.25**
Memo Items:										
International Bunkers										
Aviation										
Marine										
Multilateral Operations										
CO2 Emissions from Biomass										

Note: All footnotes for this table are given on sheet 3.

Table 1(c) AZE_BR1_v1.0

Emission trends (N_2O)

(Sheet 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	Change from base to latest reported year
	kt	kt	%
1. Energy	**0.09**	**0.10**	**-55.5**
A. Fuel Combustion (Sectoral Approach)			
1. Energy Industries			
2. Manufacturing Industries and Construction			
3. Transport			
4. Other Sectors			
5. Other			
B. Fugitive Emissions from Fuels			
1. Solid Fuels			
2. Oil and Natural Gas			
2. Industrial Processes			
A. Mineral Products			
B. Chemical Industry			
C. Metal Production			
D. Other Production			
E. Production of Halocarbons and SF6			
F. Consumption of Halocarbons and SF6			
G. Other			
3. Solvent and Other Product Use			
4. Agriculture	**10,3**	**10,12**	**-11,6**
A. Enteric Fermentation	NA	NA	NA
B. Manure Management	2,24	2,25	75,8
C. Rice Cultivation	NA	NA	NA
D. Agricultural Soils	8,06	7,86	-22,5
E. Prescribed Burning of Savannas	NA	NA	NA
F. Field Burning of Agricultural Residues	NA	NA	NA
G. Other	0	0,01	-66,7
5. Land Use, Land-Use Change and Forestry			
A. Forest Land			
B. Cropland			
C. Grassland			
D. Wetlands			
E. Settlements			
F. Other Land			
G. Other			
6. Waste	**0,39**	**0,39**	**85,7**
A. Solid Waste Disposal on Land	0	0	0,0
B. Waste-water Handling	0,39	0,39	85,7
C. Waste Incineration	0	0	0,0
D. Other	0	0	0,0
7. Other (as specified in the summary table in CRF)			
Total N2O emissions including N2O from LULUCF	**10.78**	**10.61**	**-10.6**
Total N2O emissions excluding N2O from LULUCF	**10.78**	**10.61**	**-10.6**
Memo Items:			
International Bunkers			
Aviation			
Marine			
Multilateral Operations			
CO2 Emissions from Biomass			

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

Custom Footnotes

Table 1(d) AZE_BR1_v1.0

Emission trends (HFCs, PFCs and SF_4)
(Sheet 1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*Base year* [a]	1991	1992	1993	1994	1995	1996	1997	1998
	kt	kt	kt	kt	kt	kt	kt	kt	kt
Emissions of HFCsc - (kt CO2 eq)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-23	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-32	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-41	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-43-10mee	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-125	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-134	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-134a	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-152a	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-143	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-143a	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-227ea	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-236fa	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-245ca	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed HFCsd - (kt CO_2 eq)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of PFCsc - (kt CO2 eq)	260	260	195	130	130	NA, NO	NA, NO	NA, NO	NA, NO
CF_4	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_2F_6	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C 3F8	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_4F_{10}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
c-C_4F_8	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_5F_{12}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_6F_{14}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed PFCs(4) - (Gg CO_2 equivalent)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of SF6(3) - (Gg CO2 equivalent)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
SF_6	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO

Note: All footnotes for this table are given on sheet 3.

Table 1(d) AZE_BR1_v1.0

Emission trends (HFCs, PFCs and SF_4)
(Sheet 2 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*1999*	2000	2001	2002	2003	2004	2005	2006	2007	2008
	kt	kt	kt	kt	kt	kt	kt	kt	kt	kt
Emissions of HFCsc - (kt CO2 eq)	NA,	431	439	450	482	523	604	676	771	853
HFC-23	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-32	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-41	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-43-10mee	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-125	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-134	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-134a	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-152a	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-143	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-143a	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-227ea	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-236fa	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
HFC-245ca	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed HFCsd - (kt CO_2 eq)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of PFCsc - (kt CO2 eq)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
CF_4	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_2F_6	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C 3F8	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_4F_{10}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
c-C_4F_8	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_5F_{12}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
C_6F_{14}	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Unspecified mix of listed PFCs(4) - (Gg CO_2 equivalent)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
Emissions of SF6(3) - (Gg CO2 equivalent)	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO
SF_6	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO	NA, NO

Note: All footnotes for this table are given on sheet 3.

Table 1(d) AZE_BR1_v1.0

Emission trends (HFCs, PFCs and SF_6) (Sheet 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	*2009*	2010	Change from base to latest reported year %
	kt		
Emissions of HFCsc - (kt CO2 eq)	932	1,025	NA, NO
HFC-23	NA, NO	NA, NO	NA, NO
HFC-32	NA, NO	NA, NO	NA, NO
HFC-41	NA, NO	NA, NO	NA, NO

HFC-43-10mee	NA, NO	NA, NO	NA, NO
HFC-125	NA, NO	NA, NO	NA, NO
HFC-134	NA, NO	NA, NO	NA, NO
HFC-134a	NA, NO	NA, NO	NA, NO
HFC-152a	NA, NO	NA, NO	NA, NO
HFC-143	NA, NO	NA, NO	NA, NO
HFC-143a	NA, NO	NA, NO	NA, NO
HFC-227ea	NA, NO	NA, NO	NA, NO
HFC-236fa	NA, NO	NA, NO	NA, NO
HFC-245ca	NA, NO	NA, NO	NA, NO
Unspecified mix of listed HFCsd - (kt CO_2 eq)	NA, NO	NA, NO	NA, NO
Emissions of PFCsc - (kt CO2 eq)	NA, NO	NA, NO	NA, NO
CF_4	NA, NO	NA, NO	NA, NO
C_2F_6	NA, NO	NA, NO	NA, NO
C 3F8	NA, NO	NA, NO	NA, NO
C_4F_{10}	NA, NO	NA, NO	NA, NO
c-C_4F_8	NA, NO	NA, NO	NA, NO
C_5F_{12}	NA, NO	NA, NO	NA, NO
C_6F_{14}	NA, NO	NA, NO	NA, NO
Unspecified mix of listed PFCs(4) - (Gg CO_2 equivalent)	NA, NO	NA, NO	NA, NO
Emissions of SF6(3) - (Gg CO_2 equivalent)	NA, NO	NA, NO	NA, NO
SF_6	NA, NO	NA, NO	NA, NO

Abbreviations: CRF = common reporting format, LULUCF = land use, land-use change and forestry.

[a] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the Conference of the Parties. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[c]Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO2 equivalent emissions.

[d]In accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories", HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is kt of CO2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.)