Kazakhstan

Mapping national procedures, sources, available data and information

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Contents

1. GENERAL INFORMATION

1.1. Government structure

The Republic of Kazakh was formed as an autonomous Republic within the Russian Federation in August 1920 and became a Republic of the Soviet Union in December 1936. Kazakhstan declared independence on 16 December 1991 (20 years ago). As stated in the Constitution, Republic of Kazakhstan is a unitary state with presidential form of government. N. Nazarbayev - the President of the Republic of Kazakhstan is the Head of the state (since 1991), its highest official determining the main course of the government's domestic and foreign policies.

The state power is unique and consists of legislative power, exercised by the Parliament; executive power, exercised by the Government; and judicial power, exercised by the state courts. The only source of state power is people of the Republic of Kazakhstan.

The President of Kazakhstan as stated in the Constitution is elected for a seven-year term by the secret ballot of the people of Kazakhstan. N. Nazarbayev is the first and the only President of Kazakhstan since 1991.

The legislative power in Kazakhstan is exercised by the Parliament, which is the main representative body of the Republic. Kazakhstan has a two chamber parliament, consisting of Mazhilis (the lower house) and Senate (the upper house). The Senate is composed of deputies elected in twos from each region, the city and the capital of the Republic of Kazakhstan.

The House is headed by the Chairman, elected by the Senate from among its members who are fluent in the official language, by secret ballot by a majority vote of all members of the House.

Mazhilis consists of one hundred and seven deputies. Ninety-eight Mazhilis-men are elected from political parties on party lists under a single national district on the basis of universal, equal and direct suffrage by secret ballot. Nine Mazhilis elected by the Assembly of Peoples of Kazakhstan. The House is headed by Chairman elected from among deputies of the Mazhilis, who are fluent in the official language. Candidates for the post of Chairman of the Majilis are nominated by the deputies of the Chamber.

The executive power in Kazakhstan is exercised by the Government of the Republic. The Government is organized by the President of Kazakhstan. The head of the Government is

Prime Minister who is appointed by the President and who coordinate the work of the Government.

Figure 1-1. Kazakhstan map, capital Astana

Source: http://news.bbc.co.uk/2/hi/asia-pacific/country_profiles/1298071.stm

The legislative power is in fact controlled by the president. The Government is accountable to the President, but not to Parliament.

The judicial power is exercised by the Constitutional Court and the system of local courts. Justice in the Republic of Kazakhstan is carried only by the court. Judicial power is exercised through civil, criminal and other statutory forms of judicial proceedings. In the cases stipulated by law, criminal trials are held with the participation of jurors.

The establishment of the special and extraordinary courts under any name is not allowed. Judicial power is exercised on behalf of the Republic of Kazakhstan and is intended to protect the rights, freedoms and lawful interests of citizens and organizations, ensuring compliance with the Constitution, laws, other legal acts, international treaties of the Republic. Decisions, sentences and other court orders are binding throughout the Republic.

The Government consists of the central bodies (ministries, agencies) and local authorities or municipalities (Akimats) - the executive bodies at local level. There are 14 oblasts and two cities municipalities: Astana and Almaty. All act as representatives of the central government in the respective oblast. Astana is the capital of the Republic of Kazakhstan.

The Republic of Kazakhstan is located in Central Asia. Kazakhstan is the 9-th country by territory in the world and the area is bigger than 12 countries of the European Union[1].

[1] Statistical book "Kazakhstan today", 2011, page 7, available at: *http://www.stat.kz/publishing/Pages/publications.aspx*.

1.2. *Mapping national procedures*

1.2.1. Key categories according to IPCC

Key categories have a decisive influence on the magnitude and dynamics of total national emissions of greenhouse gases in the country. In Kazakhstan key source analysis was conducted in accordance with the using of Tier 1 method of IPCC Good Practice Guidance (IPCC, 2000). Tier 1 method assumes that the key categories include the categories of emission sources, which make the greatest contribution to the overall amount of greenhouse gases (Level assessment) or trend (Trend assessment of the total emissions compared to the 1990 base year (estimated trend). The total share in the general trend of emissions from the key source categories is 95%.

The results of the key source analysis for the GHG inventory in 2009 inventory for Kazakhstan are presented in Tables 1.1.1–1.1.4. It was conducted by the UNFCCC secretariat and included into the Synthesis and assessment report, Part 1 (http://unfccc.int/resource/webdocs/sai/2011.pdf) and presented to Kazakhstan during the GHG inventory review.

In accordance with the guidelines (IPCC, 2000), the analysis of key categories was carried out in two variants, including and excluding the sector "Land use, land-use change and forestry"(LULUCF) for the base year (1990) and for the last inventory year (2009).

№	Key Category	Level assessment	Cumulative total
1	1.Stationary Combustion - Solid Fuels - CO_2	43.2 %	43.2 %
2	1.Stationary Combustion - Liquid Fuels - CO_2	10.1 %	53.3 %
3	1.B.1.a Coal Mining and Handling - CH_4	9.7 %	63.1 %
4	1.Stationary Combustion - Gaseous Fuels - CO_2	6.8 %	69.9 %
5	4.A Enteric Fermentation - CH_4	5.7 %	75.6 %
6	1.A.3.b Road Transportation - CO_2	4.3 %	79.9 %
7	1.B.2 Oil and Natural Gas - CH_4	2.4 %	82.3 %
8	2.C.1 Iron and Steel Production - CO_2	2.2 %	84.5 %
9	4.D.1 Direct Soil Emissions - N_2O	1.7 %	86.2 %
10	4.D.2 Pasture. Range and Paddock Manure - N_2O	1.6 %	87.8 %
11	1.B.2 Oil and Natural Gas - CO_2	1.5 %	89.3 %
12	1.A.3.c Railways CO_2	1.2 %	90.6 %
13	4.D.3 Indirect Emissions - N_2O	1.2 %	91.7 %
14	6.A Solid Waste Disposal on Land - CH_4	0.9 %	92.7 %

Table 1.1.1(continued)			
15	1.Stationary Combustion - Other Fuels - CO_2	0.9 %	93.5 %
16	5.B.1 Cropland remaining Cropland - CO_2	0.9 %	94.4 %
17	2.A.1 Cement Production - CO_2	0.9 %	95.3 %

Note: For the base year a level key source assessment is not applicable as it should be calculated on the basis of the time series. * - UNFCCC secretariat data

Table 1.1.1: IPCC default Tier 1 key category assessment, integrated analysis: Kazakhstan, 1990*

Source: The Synthesis and assessment report, Part 1, available at: http://unfccc.int/resource/webdocs/sai/2011.pdf

№	Key Category	Level assess-ment	Cumula tive total	Trend assess-ment	Cumu-lative total
1	1.Stationary Combustion - Solid Fuels - CO_2	41.0 %	41.0 %	0.7 %	0.7 %
2	1.Stationary Combustion - Gaseous Fuels - CO_2	16.7 %	57.7 %	33.4 %	34.1 %
3	1.B.1.a Coal Mining and Handling - CH_4	7.2 %	64.9 %	6.9 %	41.1 %
4	1.Stationary Combustion - Liquid Fuels - CO_2	6.4 %	71.3 %	10.6 %	51.7 %
5	1.A.3.b Road Transportation - CO_2	4.7 %	76.0 %	1.9 %	53.6 %
6	4.A Enteric Fermentation - CH_4	4.6 %	80.6 %	2.8 %	56.4 %
7	1.B.2 Oil and Natural Gas - CH_4	2.2 %	82.8 %	-	-
8	5.C.2 Land converted to Grassland - CO_2	2.2 %	84.9 %	7.3 %	63.7 %
9	2.C.1 Iron and Steel Production - CO_2	2.0 %	86.9 %	0.5 %	64.2 %
10	4.B Manure Management - N_2O	1.3 %	88.2 %	3.8 %	68.0 %
11	5.B.1 Cropland remaining Cropland - CO_2	1.3 %	89.5 %	1.5 %	69.5 %
12	6.A Solid Waste Disposal on Land - CH_4	1.3 %	90.8 %	1.2 %	70.7 %
13	4.D.2 Pasture, Range and Paddock Manure - N_2O	1.1 %	91.9 %	1.4 %	72.1 %
14	1.B.2 Oil and Natural Gas - CO_2	1.1 %	93.0 %	1.2 %	73.4 %
15	1.A.3.e Other Transportation - CO_2	0.9 %	93.9 %	2.7 %	76.1 %
16	2.A.1 Cement Production - CO_2	0.7 %	94.6 %	-	-
17	2.C.2 Ferroalloys Production - CO_2	0.7 %	95.3 %	0.8 %	76.9 %
18	4.D.1 Direct Soil Emissions - N_2O	-	-	4.2 %	81.1 %
19	4.D.3 Indirect Emissions - N_2O	-	-	3.5 %	84.6 %
20	1.A.3.c Railways – CO_2	-	-	3.2 %	87.8 %
21	1.Stationary Combustion - Other Fuels - CO_2	-	-	2.7 %	90.5 %

Table 1.1.2 (continued)

22	2.C.3 Aluminum Production - PFCs	-	-	1.0 %	91.5 %
23	5.C.1 Grassland remaining grassland - CO_2	-	-	1.0 %	92.5 %
24	2.A.3 Limestone and Dolomite Use - CO_2	-	-	0.8 %	93.3 %
25	5.A.1 Forest Land remaining Forest Land - CO_2	-	-	0.7 %	94.0 %
26	2.B.4 Carbide Production - CO_2	-	-	0.6 %	94.7 %
27	1.A.3.a Civil Aviation - CO_2	-	-	0.6 %	95.2 %
28	2.A.2 Lime Production - CO_2	-	-	0.5 %	95.7 %

Note: Non-key source categories are shown by dash

* - UNFCCC secretariat data

Table 1.1.2: IPCC default Tier 1 key category assessment, integrated analysis: Kazakhstan, 2009*

Source: The Synthesis and assessment report, Part 1, available at:

http://unfccc.int/resource/webdocs/sai/2011.pdf

№	Key Category	Level assessment	Cumulative total	Trend assessment	Cumulative total
1	1.Stationary Combustion - Solid Fuels - CO_2	41.0 %	41.0 %	0.7 %	0.7 %
2	1.Stationary Combustion - Gaseous Fuels - CO_2	16.7 %	57.7 %	33.4 %	34.1 %
3	1.B.1.a Coal Mining and Handling - CH_4	7.2 %	64.9 %	6.9 %	41.1 %
4	1.Stationary Combustion - Liquid Fuels - CO_2	6.4 %	71.3 %	10.6 %	51.7 %
5	1.A.3.b Road Transportation - CO_2	4.7 %	76.0 %	1.9 %	53.6 %
6	4.A Enteric Fermentation - CH_4	4.6 %	80.6 %	2.8 %	56.4 %
7	1.B.2 Oil and Natural Gas - CH_4	2.2 %	82.8 %	-	-
8	5.C.2 Land converted to Grassland - CO_2	2.2 %	84.9 %	7.3 %	63.7 %
9	2.C.1 Iron and Steel Production - CO_2	2.0 %	86.9 %	-	-
10	4.B Manure Management N_2O	1.3 %	88.2 %	3.8 %	67.5 %
11	5.B.1 Cropland remaining Cropland - CO_2	1.3 %	89.5 %	1.5 %	69.0 %
12	6.A Solid Waste Disposal on Land - CH_4	1.3 %	90.8 %	1.2 %	70.2 %
13	4.D.2 Pasture, Range and Paddock Manure - N2O	1.1 %	91.9 %	1.4 %	71.6 %
14	1.B.2 Oil and Natural Gas - CO_2	1.1 %	93.0 %	1.2 %	72.9 %

Table 1.1.3.(continued)

15	1.A.3.e Other Transportation - CO_2	0.9 %	93.9 %	2.7 %	75.6 %
16	2.A.1 Cement Production - CO_2	0.7 %	94.6 %	-	-
17	2.C.2 Ferroalloys Production - CO_2	0.7 %	95.3 %	0.8 %	76.4 %
18	4.D.1 Direct Soil Emissions - N_2O	-	-	4.2 %	80.6 %
19	4.D.3 Indirect Emissions - N_2O	-	-	3.5 %	84.1 %
20	1.A.3.c Railways - CO_2	-	-	3.2 %	87.3 %
21	1.Stationary Combustion – Other Fuels – CO_2	-	-	2.7 %	90.0 %
22	2.C.3 Aluminum Production - PFCs	-	-	1.0 %	91.0 %
23	5.C.1 Grassland remaining grassland - CO_2	-	-	1.0 %	92.0 %
24	2.A.3 Limestone and Dolomite Use - CO_2	-	-	0.8 %	92.8 %
25	5.A.1 Forest Land remaining Forest Land - CO_2	-	-	0.7 %	93.5 %
26	2.B.4 Carbide Production - CO_2	-	-	0.6 %	94.2 %
27	1.A.3.a Civil Aviation - CO_2	-	-	0.6 %	94.7 %
28	2.A.2 Lime Production - CO_2	-	-	0.5 %	95.2 %

Note: Non-key source categories are shown by dash

* - UNFCCC secretariat data

Table 1.1.3: IPCC default Tier 1 key category assessment including LULUCF: Kazakhstan, 2009*

Source: The Synthesis and assessment report, Part 1, available at:
(http://unfccc.int/resource/webdocs/sai/2011.pdf

№	Key Category	Level assessment	Cumulative total	Trend assessment	Cumulative total
1	1.Stationary Combustion - Solid Fuels - CO_2	42.9 %	42.9 %	3.9 %	3.9 %
2	1.Stationary Combustion - Gaseous Fuels - CO_2	17.4 %	60.3 %	35.1 %	39.0 %
3	1.B.1.a Coal Mining and Handling - CH_4	7.5 %	67.9 %	8.1 %	47.1 %
4	1.Stationary Combustion - Liquid Fuels - CO_2	6.7 %	74.6 %	12.1 %	59.2 %
5	1.A.3.b Road Transportation CO_2	4.9 %	79.5 %	1.7 %	61.0 %
6	4.A Enteric Fermentation - CH_4	4.8 %	84.3 %	3.4 %	64.4 %
7	1.B.2 Oil and Natural Gas - CH_4	2.3 %	86.6 %		
8	2.C.1 Iron and Steel Production - CO_2	2.1 %	88.7 %	0.7 %	65.1 %
9	4.B Manure Management - N_2O	1.4 %	90.1 %	4.1 %	69.1 %
10	6.A Solid Waste Disposal on Land - CH_4	1.3 %	91.4 %	1.2 %	70.3 %

Table 1.1.4 (continued)

11	4.D.2 Pasture, Range and Paddock Manure - N_2O	1.2 %	92.5 %	1.6 %	71.9 %
12	1.B.2 Oil and Natural Gas - CO_2	1.1 %	93.7 %	1.4 %	73.4 %
13	1.A.3.e Other Transportation - CO_2	1.0 %	94.6 %	2.9 %	76.3 %
14	2.A.1 Cement Production - CO_2	0.7 %	95.3 %	-	-
15	4.D.1 Direct Soil Emissions - N_2O	-	-	4.6 %	80.9 %
16	4.D.3 Indirect Emissions - N_2O	-	-	3.8 %	84.7 %
17	1.A.3.c Railways - CO_2	-	-	3.5 %	88.2 %
18	1.Stationary Combustion - Other Fuels - CO_2	-	-	3.0 %	91.2 %
19	2.C.3 Aluminum Production - PFCs	-	-	1.1 %	92.2 %
20	2.C.2 Ferroalloys Production - CO_2	-	-	0.8 %	93.1 %
21	2.A.3 Limestone and Dolomite Use - CO_2	-	-	0.8 %	93.9 %
22	2.B.4 Carbide Production - CO_2	-	-	0.7 %	94.6 %
23	1.A.3.a Civil Aviation - CO_2	-	-	0.6 %	95.2 %

Note: Non-key source categories are shown by dash.* - UNFCCC secretariat data

Table 1.1.4: IPCC default Tier 1 key category assessment excluding LULUCF: Kazakhstan, 2009*
Source: The Synthesis and assessment report, Part 1, available at:
(http://unfccc.int/resource/webdocs/sai/2011.pdf

The results of trend assessments give 21-26 key source categories depending on the kind of analysis (including or excluding LULUCF).

1.2.2. Methodology for retrieving key-category data

The methodology of the key source analysis is based on IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (IPCC, 2000) and the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (IPCC, 2003).

It is a good practice to provide key source analyses in order to define the categories with the largest contribution in national GHG emissions. It allows further to prioritize the key sources for mitigation measures and to use higher Tier methodology for the key sources.

Kazakhstan did not use Tier 2 IPCC method for key source analysis.

1.2.3. Responsible authorities and contact persons

There is one principal ministry in Kazakhstan which is responsible for climate change policy and implementation of the UNFCCC and the Kyoto Protocol. It is the Ministry of Environmental Protection (MoEP). It has also overall responsibility for the national inventory, including the official submission to the UNFCCC secretariat.

A legal framework for the inventory preparation process has been put in place in Kazakhstan through two orders of MoEP: No. 258 of 4 December 2009 “On executive body for supporting activity of authorized body on coordination of realization of the Kyoto Protocol to the UNFCCC” and No. 193 of 23 July 2010 “On approval of the National Green House Gas Inventory System”. MoEP is responsible for elaboration of national legislation on national GHG emissions regulations and rules and procedures for the development of the domestic carbon trade system. MoEP has a special department of the Kyoto Protocol which is responsible for practical implementation of the policy in climate change area.

MoEP is located in Astana at Orynbor Street, 8, Building of Ministries, porch 14. E-mail: info@eco.gov.kz

The Kazakh Research Institute of Ecology and Climate (KazNIIEK), under the supervision of MoEP, is responsible for the planning, preparation and management of the national inventory. KazNIIEK is located: 050022, Almaty, Seifulin Street, 597.

Contact person for national reports on GHG Inventory (NIRs), two National Communications (2000, 2009) is the following:

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The Ministry of Industry and Innovative Technologies (MINT) is responsible for energy efficiency policy , has the special department on Innovative Technologies who deals with energy efficiency (EE) policy, in particular drafting the law "on energy saving and energy efficiency"(2011), preparing Action Plan on EE up to 2015(2011). The Committee of Energy Supervision and Control under MINT is responsible for energy usage control and monitoring, for legislation development on energy issues.

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1.2.4. Procedures to address climate-change issues

Climate change is recognized in Kazakhstan as a global problem bringing a serious threat for the economy and natural resources. This statement was marked in the Concept of Ecological Security of the Republic of Kazakhstan which was approved by the Decree of the President of the Republic of Kazakhstan № 1241 of December 3, 2003.

The UN Framework Convention on Climate Change was ratified by the President of Kazakhstan on the 4-th of May, 1995, by the Decree № 2260. The Kyoto Protocol was signed by Kazakhstan on March, 12-th, 1999. On March, 26th, 2009, the President of the Republic of Kazakhstan signed the Law on Ratification of the Kyoto Protocol to the UN Framework Convention on Climate Change. On September, 17-th, 2009, the Kyoto Protocol officially came into force for Kazakhstan and according to the decision of the 7-th Conference of the Parties in Marrakech Kazakhstan may be considered as the Party of the Annex I of UNFCCC for the purposes of the Kyoto Protocol in accordance with Article 1, paragraph 7, of the Protocol.

Kazakhstan is not included into the Annex B of the Kyoto protocol. This is the reason, that the republic does not have the quantified emission limitations. At its 32-d session in June, 2010, the Subsidiary Body for Implementation (SBI) noted the proposal from Kazakhstan, communicated to the UNFCCC Secretariat on 18 September 2009, to consider including Kazakhstan into the Annex B of the Kyoto Protocol with a quantified greenhouse gas emission limitation under Article 3 of the Kyoto Protocol of 100 per cent from the 1992 level in the first commitment period 2008 to 2012 and a footnote indicating that the country is undergoing the process of transition to a market economy. The SBI acknowledged the submission by Kazakhstan of its first and second national communications on 5 November 1998 and 4 June 2009, respectively, its 2010 greenhouse gas inventory report on 9 April 2010 and noted the notification from the secretariat on the in-country review from 16 August to 21 August 2010.

The SBI also noted with appreciation the efforts made by Kazakhstan to implement the provisions of the Kyoto Protocol. The SBI recalled the conclusions adopted at the fifth session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (FCCC/KP/CMP/2009/21, paragraphs 88 – 94). It noted that the proposed amendment to Annex B to the Kyoto Protocol had been communicated by the secretariat to Parties of the Kyoto Protocol and to parties and signatories to the Convention on 21 January

2010, and, for information, to the Depository on 6 January 2010, in accordance with Article 21, paragraph 3, of the Kyoto Protocol.

The SBI concluded that the CMP, in its consideration of the proposal at its sixth session, may wish to focus on the legal and technical implications of this proposal, particularly reduction commitment and base year proposed by Kazakhstan as well as the assumption of a quantified emission limitation and reduction of the commitment during the first commitment period. To facilitate consideration of this item at the sixth session of the CMP, the SBI encouraged interested Parties to carry out further consultations among themselves on these issues during the intercessional periods.

The SBI noted that Kazakhstan is willing to demonstrate a flexible approach as regards choosing its base year and limitation or reduction commitment, i.e. change its base year from 1992 to 1990 (according to p.3, Article 5 of the Kyoto Protocol) and express its reduction commitment based on 1990 with the reduction commitment of 6 %. SBI noted that Kazakhstan is currently in the process of developing of national limitations regime and domestic trading system in order to meet its commitments under the Kyoto Protocol and any future regimes of emissions limitation. This proposal was considered at CMP7 in Durban in December of 2011 and it was concluded to postpone it for CMP8 next year.

Besides international activities Kazakhstan is developing national mitigation measures and programs. Now GHG inventory at the level of the companies are in a process of functioning in the Republic of Kazakhstan. According to the Governmental Order of the Republic of Kazakhstan of August 6, 2009, № 1205, the Ministry of Environment Protection is appointed as the Designated National Authority (DNA) on implementation of the Kyoto Protocol to the UNFCCC.

At the 21st plenary session of Council of foreign investors in June 2009 the President of Kazakhstan has noticed, that the ratification of the Kyoto Protocol opens new possibilities in introduction of energy effective technologies and using Kyoto mechanisms. For realization of the international commitments the Ministry established the Department of the Kyoto Protocol.

According to the accepted Plan of measures on performance of the Kyoto protocol in April 2009 the MoEP worked out the "Road Map" defines the basic actions on realization of the Kyoto Protocol. The Road Map includes a number of steps to create all necessary conditions for Kyoto Protocol implementation in cooperation with other governmental organizations.

It will promote the decision of the following problems:

- Performance of the obligations accepted by the Republic of Kazakhstan according to

the Articles 4.1 and 12 of UNFCCC;

- Preparation of the Third National Communications of the Republic of Kazakhstan to the Conference of the Parties of UNFCCC;
- Working out the national low carbon development strategy;
- Preparation of conditions for creation of national system for GHG emission monitoring and reporting;
- Defining possible quantitative obligations of Kazakhstan on GHG emission reductions on the post-Kyoto period after the year 2012;
- Creation of National Register for participation in Kyoto mechanisms for emissions reductions;
- Working out GHG emissions scenarios.

Carrying out of GHG emission inventories at a level of the enterprises and companies allows getting additional data about the emissions specifying calculations for national reports on GHG inventory given at the international level to the UNFCCC Secretariat. Regulations of GHG emissions at a level of companies will promote realization of the policy and measures on GHG emission reduction in the republic and create a domestic carbon trading scheme which is developing now in Kazakhstan.

The revised guidelines on national GHG inventories of IPCC have been put into a basis for methodology of accounting GHG emissions for companies according to Ecological Code of the Republic of Kazakhstan. The legal basis of the GHG inventory at a level of companies is a new Law adopted in 9th of December and a number of supporting national regulations which are elaborated now in Kazakhstan by the MoEP.

For the restriction of GHG emissions into the atmosphere the authorized body in the field of environment protection (MoEP) annually will define the limits (quota) of maximum permissible emissions of GHG in the atmosphere for separate kinds of sources of GHG emissions of the companies which emits more than 20 thousand tons of emissions in CO_2-equivalent. Thus maximum permissible GHG emissions should not exceed the level of emissions of GHG in the base year.

1.3. Population

1.3.1. Demographic characteristics

The population of Kazakhstan is 16,442,000 in 2011 January while in 1991 it was 16,358,200

and the lowest was in 2002 in amount of 14,851,100. The last population census was in 2009; therefore the data used in this report are taken from the official web page of Kazakhstan Statistics[2]. Kazakhstan has a big territory, but a very few people spreading all over the country. When the Soviet Union broke down, many people left Kazakhstan for their historical native. Therefore now there is a special demographic policy in the Republic to increase of population of the Republic. The gender index of the population in 2010 was about: 48% male, 52% female. 54% of population is urban, 46% is rural. The next table represents the rate of increase in Kazakhstan population. The average age of Kazakhstan population is 31.5 years. In 1999, the population density was in 5.5 persons per sq. km, in 2010 it was in 5.9 persons per sq. km, and in the January 2011 it was 6.0 persons per sq. km, and it is going to increase further. There some tables below illustrating the population situation in Kazakhstan today.

Year of birth	Life births	Deaths	Rate of natural increase
2007	321 963	158 297	10.6
2008	357 555	152 878	13.1
2009	357 552	142 780	13.3
2010	367 752	145 875	13.6

Table1.3.1.1.The rate of natural increase of Kazakhstan population

Source:' Demographical annual of Kazakhstan", 2011(in Russian language). Available at: http://www.stat.kz/publishing/Pages/publications.aspx.

Year	All	Male	Female
1999	65.63	60.58	70.87
2009	68.33	63.53	73.15
2010	68.41	63.51	73.32

Table 1. 3.1. 2. The duration of average life in Kazakhstan

Source:' Demographical annual of Kazakhstan", 2011(in Russian language). Available at: http://www.stat.kz/publishing/Pages/publications.aspx.

[2] www.stat.gov.kz

Year	1999	2010	2011
Total	100.00	100.00	100.00
Kazakh	53.3	63.52	64.03
Russian	30.02	23.29	22.83
Other	16.68	13.19	13.14

Table 1.3.1.3. The structure of population in Kazakhstan (by percentage)

Source: "Demographical annual of Kazakhstan", 2011(in Russian language). Available at: http://www.stat.kz/publishing/Pages/publications.aspx.

According to forecasts of the Government the population in 2020 is expected as 18 million.

1.3.2. Development indicators

The Human Development Index (HDI) is a comparative measure of life expectancy, literacy, education and standards of living for countries worldwide. It is a standard means of measuring well-being, especially child welfare. It is used to distinguish whether the country is a developed, a developing or an under-developed country, and also to measure the impact of economic policies on quality of life.

The second indicator is educational attainment, which is indicated, on the one hand, by adult literacy, and on the other hand, mean years of schooling (of adult years).

National Statistics presents GDP in national currency (KZT) and US dollars (USD). In 2009 GDP was, or 115308.1 mln. USD,[3] or 82697.48 Euros[4]. In 2010 GDP was 148052.0 USD or 111525.57 mln. Euros[5].

Dynamics of indicators of human development calculated based on UNDP methodology is presented in the table 1.3.2 below.

Unemployment rate can be used also as the development indicator and in 2010 it was 5.8%. Other characteristics of Kazakhstan are the following: the population below poverty line: 8.2% (2009); household income or consumption by percentage share: lowest 10%; 3.8%, highest 10%; 25.2% (2007).

[3] http://www.stat.gov.kz, "Kazakhstan in numbers", 2011, page 13.
[4] 17007647.0 mln.KZT, recalculation to Euro at the rate: 1Euro=205.661 KZT(average for 2009),http://kazfin.info/archive/2009.
[5] 21815 517.0 mln.KZT, recalculation to Euro at the rate: 1Euro=195.61KZT(average for 2010),http://kazfin.info/archive/2010

Years	2006	2007	2008	2009	2010
Life expectancy index	0.687	0.689	0.702	0.727	0.724
Educational attainment index	0.974	0.969	0.965	0.965	0.961
Income index	0.765	0.782	0.789	0.790	0.809
HDI	0.808	0.813	0.818	0.827	0.831

Table 1.3.2. Dynamics of Human Developments indicators in Kazakhstan during 2006-2010

Source is Statistical book:' Environment and Sustainable Development of Kazakhstan, 2011, page 30 (in Russian language). Available at: http://www.stat.kz/publishing/Pages/publications.aspx

Distribution of family income in Kazakhstan or Gini index is 26.7 (2009).

1.4. Geographic profile

1.4.1. Geomorphologic characteristics

Kazakhstan is situated in the centre of Eurasian continent at the crossroads of two continents - Europe and Asia. 15% of the territory of Kazakhstan is located in Europe and 85% in Asia. The geographical centre of the European-Asian subcontinent is precisely in Kazakhstan (at the intersection of the meridian of 78 to 50 parallel).

Kazakhstan occupies an area of 2 724.9 thousand square km[6] including land - 2,699,700 sq. km and water- 25,200 sq. km. Land boundaries in total is 12,185 km with border countries China, Kyrgyzstan, Russia, Turkmenistan and Uzbekistan. Kazakhstan borders the Aral Sea, now split into two bodies of water (1,070 km), and the Caspian Sea (1,894 km).

Kazakhstan in the occupied area is in ninth place in the world, i.e. among the ten largest in the territory of the world - after Russia, Canada, China, USA, Brazil, Australia, India and Argentina.

The territory of Kazakhstan stretches from the lower Volga in the west to the Altai Mountains in the east, and from the West Siberian Plain in the north to the Tien Shan Mountains in the south. In the southeast, rising mountain range Khan Tengri (the highest point Pick Khan-Tengri is 6,995 m, while the lowest is Vpadina Kaundy -132 m).

[6] www.stat.gov.kz, "Kazakhstan in2010" statistical book, 2011,page 7

In the lowlands (200-250 m) accounted for about one third of the area. More than half of its area is covered with hills, valleys, plateaus and hills with elevations arrays of 500-600 m. The mountains occupy 10% of the territory of Kazakhstan.

By estimates of scientists of many countries Kazakhstan takes up the sixth place in the world by useful minerals reserves: 99 out of 110 elements of the periodic table are found in the subsurface of Kazakhstan, 70 of them are prospected, while deposits of only 60 elements are produced and used. Kazakhstan is the second largest producer of oil and coal among the CIS countries. Kazakhstan has considerable reserves of oil and gas concentrated in its western part, which makes it one of the largest oil producing countries in the world.

1.4.2. Ecosystems

Kazakhstan is located in the center of Eurasia. In accordance with a landscape zoning MoEP identified five types of landscapes - forest-steppe, steppe, dry steppe, semi-desert, and desert, and mountain ranges - 7 types, including nival, mountain meadow, forest, forest-steppe, steppe, semi-desert, and desert[7]. This variety of landscapes due to expression of latitudinal zone and vertical zone among the Central Asian states is characteristic only for Kazakhstan.

Ecological system of Kazakhstan has been formed under a continental climate with a low and unsustainable humidity. Due to latitude change of climatic zones a change is taking place, from semi arid forest steppe in the north of Kazakhstan through to cold continental semi deserts and deserts to the warm moderate continental deserts in the south. The ecological systems within the limits of the latitude zones and sub zones such as the mountain ranges are characterized by clearly observed organizational features and a strange composition.

The mountain ecosystem zone occupies 18.6 million hectares. The four large mountain blocks can be specified: Western- Tien Shan (the mountains of Karatau and Western Tien Shan), Northern Tien Shan, Kazakhstan- Dzhungar and the Altai ranges. This occupies 7% of the territory of Kazakhstan.

The forest steppe zone occupies not a small territory and is represented by forest (0.7 million hectares) and transformed steppes rich in various types of grass. The steppe zone occupies 110.2 million hectares or 28% of the total territory of Kazakhstan.

The desert ecological systems occupy 124.6 million hectares.

[7]MoEP report " National Report about biodiversity in Kazakhstan"2010,, page 14 (in Russian only),Available at: www.eco.gov.kz

Water and coastal ecological systems is represented by nine rivers and large, small lakes . The largest lakes are - Balhash, Alakol and Markakol. Alkakol is the deepest one (22 meters)[8].

Agricultural ecological systems in Kazakhstan are created and regulated by human beings, pastures (about 29.1 million ha), gardens and vineyards 138.4 thousand ha), forest and park plantations, soil protecting and by- road forest plots, the plantations made on lands damaged by human impact, fallow lands, improved pastures, etc. Their diversity depends on the economic activities and is determined by humans. At the present time due to the loss of soil humus, erosion and erosion in the ploughed lands, development of desert, the 17 million hectares have been withdrawn from arable.

The ecosystems of Kazakhstan while being very important for human development are very vulnerable to climate change[9].

1.4.3. Land use, land-use change and forestry

Land Fund of the Republic of Kazakhstan in 2009 amounted to 272.49 million hectares[10].

Agricultural lands occupy 91.704 million hectares or 33.7% of land-use. Land use is as the following: arable land: 12%, permanent crops: 11%, permanent pastures: 57%, forests and woodland: 4% and other: 16%. According to UN 66% of total area is prone to desertification.

The settlements lands (cities, towns and villages) occupy 22.9 million hectares (2009) or 8.0% of the land fund of the republic.

Industrial, transportation, communication, defence and other non-agricultural use was 13.9 million hectares (2009) or 5.0 % of the land fund of the republic.

Forest lands are 28.7 million hectares (2009) or 4.5%[11], the Watered Land - 2.08 million hectares, nature protected territories are 22.4 million hectares or 8.0%.The Kazakhstan forestry area includes bushes and saxauls and may be deemed very vulnerable to climate change.

The forests play an important role in soil protection, in climate and water regulation, water protection and in recreation. The forming of a propitious environment for stable forest

[8]Statistical book "Environment and Sustainable Development of Kazakhstan, 2006-2010", 2011, page 95-96 (in Russian language). Available at: http://www.stat.kz/publishing/Pages/publications.aspx "

[9] National Human development Report, 2008, UNDP, www.undp.kz

[10], Statistical book "Environment and Sustainable Development of Kazakhstan, 2006-2010", 2011, page 83*(in Russian language).* Available at:http://www.stat.kz/publishing/Pages/publications.aspx

[11] www.stat.gov.kz, statistical book " Environment and Sustainable Development of Kazakhstan,2006-2010",page 160

regulation takes on an important significance in climate change conditions. Aiming at realization of the governmental regulation of the Republic of Kazakhstan, No. 319 of 20 April 2007, the program "Zhasyl El" for 2008–2010 was developed and ratified, No. 958 of 16 October 2007. The Republic has significant areas of grazing land (185.2 million hectares), of which 75% are desert and semi desert mire.

Land resources of the Republic of Kazakhstan with their management and development, can ensure production of various agricultural products in quantities that meet domestic and export needs.

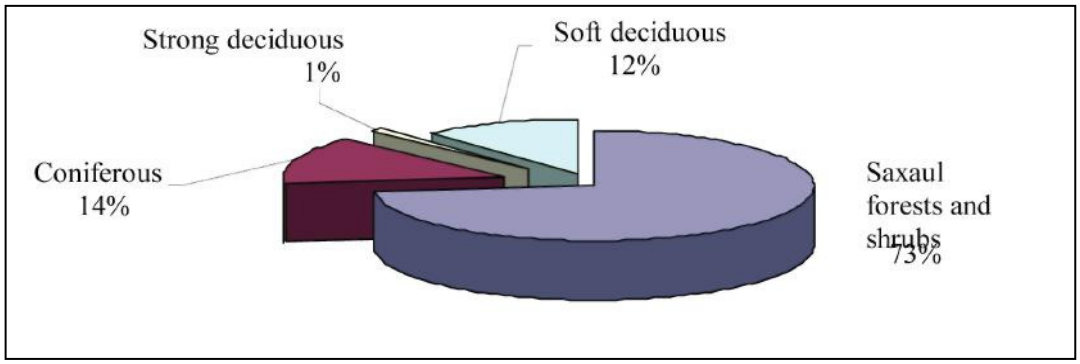

Figure 1.4.3. The structure of forest lands in Kazakhstan. Source : Second National Communication , page 46, http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php

It plans to create forests on 145 180 ha, and set the pattern for future work on forest protection and expansion. The problem of protecting, restoring and sustainable using the biological and landscape diversity has been made difficult in the absence of scientifically grounded recommendations and measures to protect and reclaim of bio- and landscape diversities, and the limited resources in terms of plantations.

The LULUCF sector is the only absorption category in Kazakhstan.

1.5. Climatic profile

The climate of Kazakhstan is continental, characterized with hot summer and cold winter. Continental climate is characterized not only with hot summer and cold winter, but also with low precipitation. On the territory of the country there are the driest regions found in the CIS countries: in some desert areas in the south the average annual precipitation is not above 100 mm. On the slopes of Altai and Trans-Ili Alatau mountains precipitation is accounted to be the same as on the shore of the Baltic Sea (700-800 mm), and near perpetual snows it is above 1000 mm, in some years even 1500 mm. But such humid places in the country are but few. For the most part of the territory of Kazakhstan, especially southern plains, it is typical to have a low precipitation; in particular precipitation in the steppe is 200-500 mm per year and in the desert 100-200 mm per year.

The four climatic zones were identified: forest - in the North part of the country, steppe- the vast territory in the North, semi-desert- in the central part of Kazakhstan and desert zone occupies central Kazakhstan.

Forest zone is characterised by the shortest season: 1.5 months in spring, 3.0 months in summer and 7.0 months in winter.

Steppe is characterised by high wind speed, with shorter winter and longer summer.

Semi-desert is arid steppes with hot summers and harsh winters, while the desert zone is characterised by high air aridity, cold winters and hot summers.

Average temperature of January, the coldest month, ranges from –18^{o}C in the north areas to –3^{o}C in the south. On the plain part of Kazakhstan average July temperature ranges from +19^{o}C in the north to +29^{o}C in the south.

The data on average temperature in Kazakhstan is presented in the table 1.5.2 below.

While developing climate change scenarios, five double models of common atmospheric and ocean circulation were used by MoEP researches during the period of 2006-2010, and the scenarios with different climatic characteristics for 2030-2085 were developed. The 1961 to 1990 period was accepted as the base period.

Due to the information presented in Table 1.5 below the worst precipitation conditions derive from the "hard" scenario, where by 2085 there may be a northward zone shift of 250–300 km. In this situation, all the northern districts of Kazakhstan will be in the semi-arid zone and the semi-arid zone will cover a very wide area. Other scenarios indicate much less of a northward zone shift.

The research indicated air temperatures rising in all seasons of the year in southern and eastern Kazakhstan pastures.

In Table 1.5 below the changes in average annual surface air temperature and annual total precipitation are presented. The changes are according to "hard", "medium" and "soft" scenarios of GHG concentrations developed in the report "Kazakhstan. Concise report and summary of national publications on climate change dimensions and impacts"[12].

[12] *htpp://www.fao.org/docrep/014/.../k9589e08.pdf*

Scenario	Climatic characteristics	2030	2050	2085
Medium	Change in average annual air temperature	1.4°C	2.7°C	4.6°C
	Change in total annual precipitation	+2%	+4%	+5%
Extremely high (hard)	Change in average annual air temperature	1.2–1.9°C (1.3°C)	2.5–4.0°C (3.0°C)	5.7–8.0°C (6.2°C)
	Change in total annual precipitation	-2– +8% (2.2%)	-4– +15% (3.7%)	8–28% (6.5%)
Extremely low (soft)	Change in average annual air temperature	1.5–2.2°C (1.7°C)	1.6–2.6°C (2.0°C)	3.1–3.4°C (3.3°C)
	Change in total annual precipitation	0-8% (3.0%)	-3– +9% (1.7%)	-2– +13% (4.1%)

Table 1.5. Changes in average annual surface air temperature and annual total precipitation

Source: *Report "Kazakhstan. Concise report and summary of national publications on climate change dimensions and impacts", 2010. Available at: htpp://www.fao.org/docrep/014/.../k9589e08.pdf*

1.5.1. Precipitation

The Republic of Kazakhstan is characterized by lack of rainfall. The amount of 500 to 1600 mm precipitation per year the foothills receive, 100 to 200 mm in the desert and 200 to 500 mm in the steppe[13].

More detailed data on precipitation temperature in Kazakhstan is presented in the Table 1.5.2 and Figure 1.5.1 below.

[13] Kazakhstan's "Second National Communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change", page 29. Available at: http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php

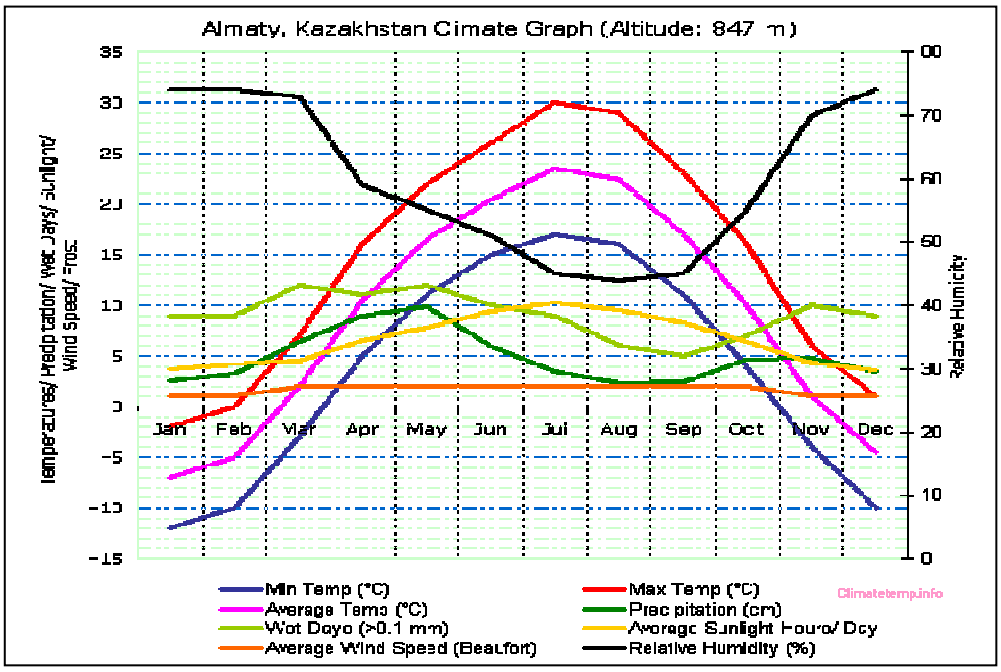

Figure 1.5.1. Climate profile of Kazakhstan. Source: http://www.climatetemp.info/kazakhstan/

1.5.2. Temperature

Average temperatures of January range from -18°C in the north part of Kazakhstan to -3°C in the south parts of the country, and in July from +19°C in northern parts to +28°C in the south regions of Kazakhstan. The average temperature characteristics calculated based on data from Kazhydromet (former main hydrometeorology department of the Republic of Kazakhstan) are presented in Table 1.5.2 below.

Weather in Kazakhstan	Average Minimum Temperatures in Kazakhstan (°C)	Average Maximum Temperature in Kazakhstan (°C)	Kazakhstan Average Temperature (°C)	Average Precipitation/ Rainfall (mm)	Wet Days (>0.1 mm)	Average Sunlight Hours/ Day	Relative Humidity (%)	Average Number of Days with Frost Almaty (851m)
January	-12	-2	-7	26	9	3.7	74	29.3
February	-10	0	-5	32	9	4.2	74	24.3
March	-3	7	2	64	12	4.5	73	11.5
April	5	16	11	89	11	6.5	59	3
May	11	22	17	99	12	7.8	55	0
June	15	26	21	59	10	9.4	51	0
July	17	30	24	35	9	10.2	45	0
August	16	29	22	23	6	9.5	44	0
September	11	23	17	25	5	8.3	45	0.3
October	4	16	10	46	7	6.4	55	3.6
November	-4	6	1	48	10	4.3	70	14.4
December	-10	1	-4.5	35	9	3.6	74	28.5

Table 1.5.2 Average temperatures in Kazakhstan. Source: http://www.climatetemp.info/kazakhstan/

1.5.3. Other climatic characteristics

As the territory of Kazakhstan is huge, it has a big range of temperatures and climatic conditions in all over the territory. The most part of Kazakhstan is located in Siberia, surrounded by Altai on East, Ural and Caspian Sea on West, Tian Shan on South. The southern regions of Kazakhstan could be concerned as tropics or sub-tropics.

Kazakhstan does not have sea borders, therefore Kazakhstan has a sharply continental climate, which is characterized by hot summers and cold winters.

The annual average wind speed in the central part of Kazakhstan is more than 40 m/s.

The snow cover is established earliest in the Northern parts of Kazakhstan usually at the beginning of November and stays there up to the beginning of April. In the southern regions of Kazakhstan permanent snow cover predominantly forms in the middle of January, sometimes permanent snow cover does not form at all here.

Several other climatic characteristics, such as average minimum and maximum temperatures, wet days, average sunlight hours per day, number days with frost and relative humidity are presented in the Table 1.5.2.

Mean relative humidity for an average year is recorded as 59.9% and on a monthly basis it ranges from 44% in August to 74% in January, February & December.

There is an average range of hours of sunshine in Kazakhstan of between 3.6 hours per day in December and 10.2 hours per day in July. On balance there are 2392 sunshine hours annually and approximately 6.6 sunlight hours for each day.

1.6. Economic profile

1.6.1. General

Following independence in 1991, Kazakhstan was one of the earliest and most vigorous reformers among the countries of the former Soviet Union. In the early years of transition prices were liberalized, trade distortions reduced, and small- and medium-scale enterprises privatized. The treasury and budget processes were dramatically improved. Kazakhstan scores much less favourably, however, in the land reform in rural areas, in creating an enabling environment for small and medium sized enterprises, and in the elimination of corruption.

The government established a basic framework to attract foreign direct investment into its resource-rich oil and mineral sector. Banking reforms and state-of-the-art pension reform followed, together with the unbundling and partial privatization of the electricity sector.

The dynamics of Gross Domestic Product (GDP) for the period 2002 – second quarter of 2011 is presented at Figure 1.6.1.

Following the economic crisis, the GDP real growth rate was 1.2% in 2009, a sharp decrease from 8.9% in 2007, 7% (2010). The composition by sector of GDP is: services 51.2%, industry 42.8%, and agriculture 6%.

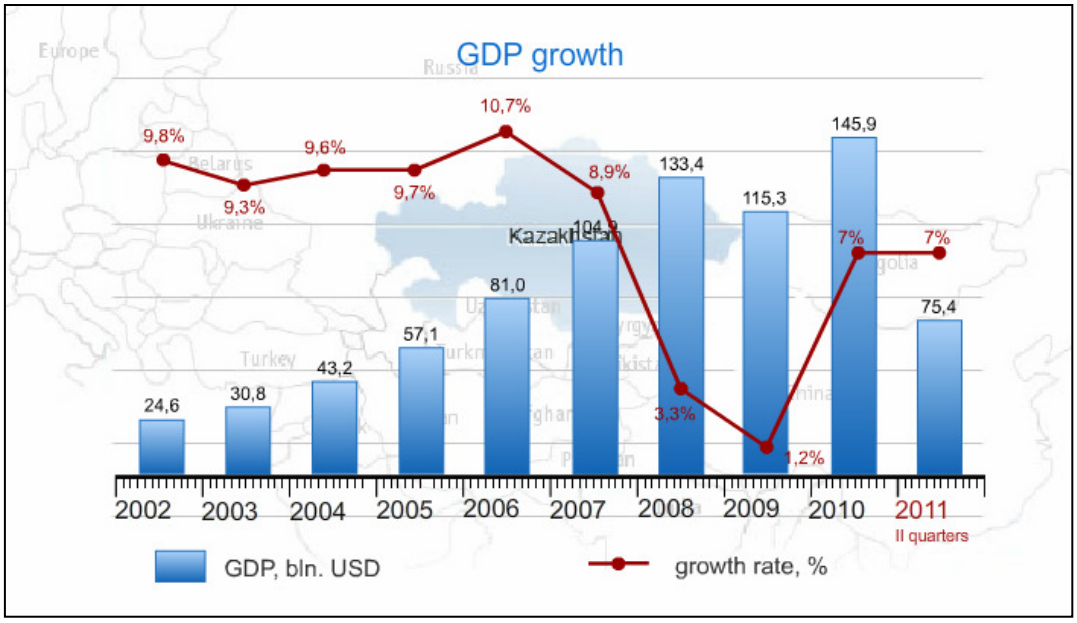

Figure 1.6.1. GDP growth in Kazakhstan. Source: http://www.invest.gov.kz.

Main industries include oil, coal, iron, steel, and other processing industry. Key exports are oil and oil products (59%), ferrous metals (19%), chemicals (5%). Since 2000, Kazakhstan has experienced stable growth in production and consumption of energy resources, including: coal, oil, gas and electricity. In 2009, Kazakhstan exported 1.42m bbl oil/day and 18.8 Mtoe of coal[14]. Oil and oil products represented 59 percent of Kazakhstan's commodity exports, followed by ferrous metals, chemicals and machinery.[15] Trade balance is presented at Figure 1.6.1.1.

The positive economic activity of recent years has seen considerable industry growth and around US$50 trillion of direct investments injected into Kazakhstan's economy. The priority investment sectors identified due to the Second National

Communication were oil and natural gas (33.9%), operations including, geological exploration and engineering survey at 21.1%, transport and communications at 14.8%, and industry at 10.4%.

Kazakhstan has embarked on an ambitious diversification program, aimed at developing targeted sectors like transport, pharmaceuticals, telecommunications, petrochemicals and food processing.

[14] BP Statistical Review of World Energy,2010. National statistics presents numbers only in units of tons of coal equivalent, which makes difficult to compare with other EU countries.

[15]

In 2011 the average monthly gross wages and salaries (October, 2011) were 630 US dollars (90980 KZT)[16] or 454 Euro[17].

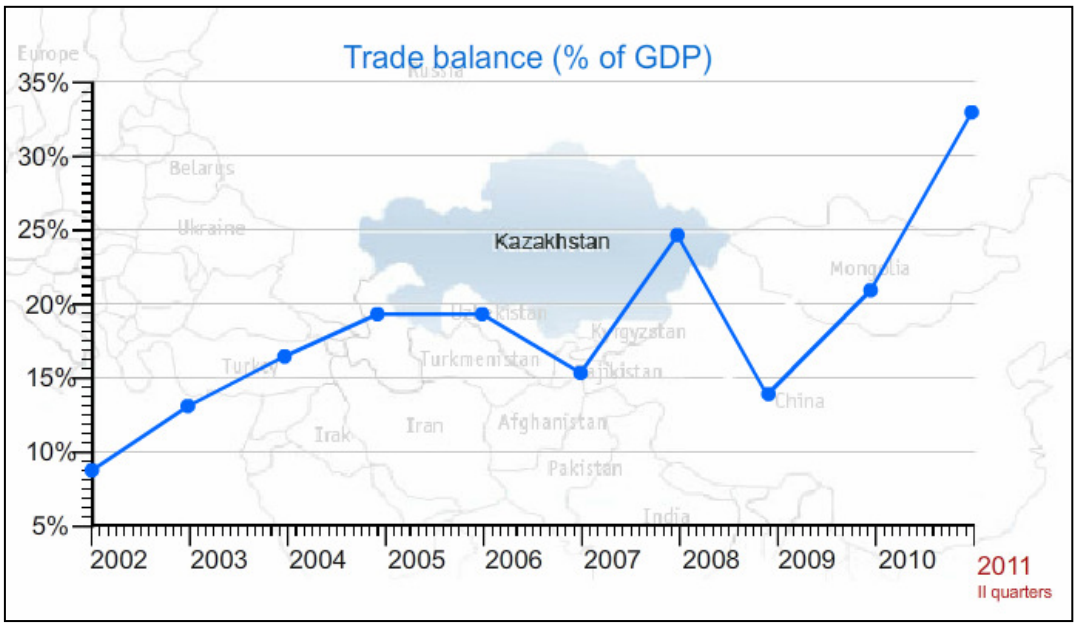

Figure1.6.1.1: Trade balance of Kazakhstan. Source: http://www.invest.gov.kz.

1.6.2. Primary sector

Mining, including coal, oil and gas mining is the most important source of income in Kazakhstan.

In 2008 oil mining increased 2.7 times towards the level of 1991 (up to 70.7 thousand tons) and gas mining increased 4.2 times (from 7.9 up to 32.9 million m^3) according to National Statistics 2008 data.

Agriculture is the second important sector of activity. Agriculture constitutes 6% of the total GDP in 2010 according to the National Statistics 2010 data, while in 2008 it was 5.3%. The main agricultural products are: grain, potatoes, vegetables and dairy products and meat.

[16] http://www.stat.kz ,Statistical book "Kazakhstan today",2011(in Russian)
[17] Recalculation into Euro at the rate 1 euro=1.39 USD(2011),

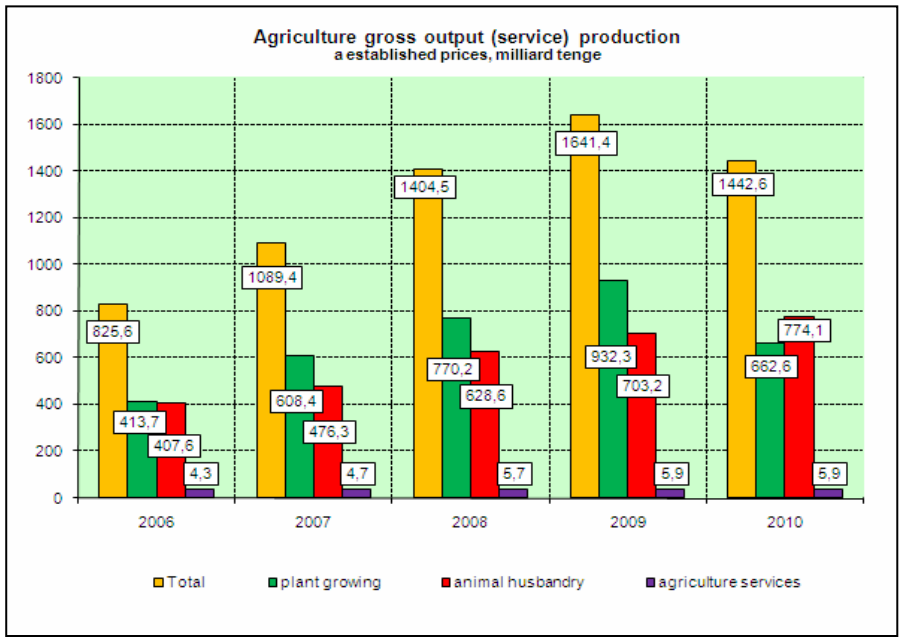

Figure 1.6.2.1. Dynamics of agriculture gross output production in Kazakhstan. Source: Statistical book "Environment and Sustainable Development of Kazakhstan during 2006-2010". Available at: http://www.stat.gov.kz.

Grain production is the main activity in large farms and agricultural enterprises. Kazakhstan fully covers its grain demand, and even exports it to the neighbour countries.

1.6.3. Secondary sector

Kazakhstan industries include: Iron, steel, refinery and other processing industry, engineering, electronics, information technology, telecommunications. Industry constitutes 42.8% of the total GDP in 2010[18]. The share of iron and steel industry accounts for more than 35% of the total manufacturing industry.

The growth dynamics of industrial production is shown in Figure 1.6.3.1.

Cement industry contributes 15%, metal production (iron and steel in particular) - 46% of total GHG emissions from industrial process in 2009.

Today, there are five major cement manufacturers in Kazakhstan. Most of them use wet technology for cement production.

The Government plans to spend about 50 mln. Euro by 2014 in order to switching to dry technology and to increase the capacity of cement manufactures by 2.5 million tons. There

[18] www.stat.kz

are also plans to construct 4 new cement plants with total capacity of 4.4 million tons and 5 clinker-cement terminals.

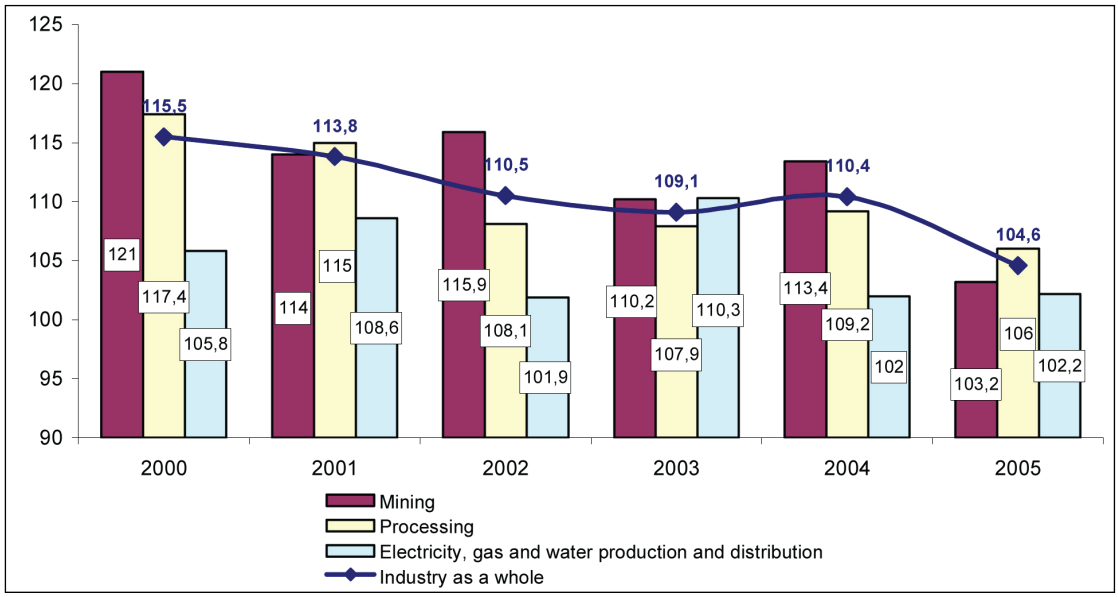

Figure 1.6.3.1. Trend of industry growth rate of the Republic of Kazakhstan in 2000 – 2005, % to previous year. Source: Report "Kazakhstan Second National Communication to UNFCCC", 2009, page 35, available at: http://unfccc.int/national_reports/)

Kazakhstan possesses reserves of almost all ferrous, non-ferrous and precious metals. At the moment Arcelor Mittal-Temirtau is the biggest metallurgy enterprise with full metallurgy circle and installed capacity of 4.5 million rolled products per year.

The Government plans to implement a new project to increase steel production up to 6 million tons and to construct a new plant with installed capacity of 4 million tons. It is also planned to construct a number of small steel plants with installed capacity about 200 thousand tons.

Refinery industry is represented by three large and 11 small refineries. Deficiency of production of jet fuel and high-octane gasoline, along with high diesel and fuel oil production which is more than domestic consumption characterizes the overall condition of the oil-refining industry.

In addition, some production capacities depend on oil supplies from Russia.

Currently, Pavlodar Refinery Plant operates fully on imported oil from the Russian Federation, the Shymkent refinery processes up to 50% of Russian oil. The total volume of Russian oil is 50% of the refined oil at Kazakh oil refineries.

Energy intensity of industry in Kazakhstan is 30% higher than in developed countries. The high wear of the equipment in the metallurgical industry, averaging more than 58%, and the individual - as high as 70%.

1.6.4. Tertiary sector

During the years of transition to a market economy the services sector was changed, mostly because of the government involvement was decreased considerably.

Commercial services sector experiences rapid development, and the number of service companies (small and medium-size businesses) grows every year.

However, the development of this sector is still insufficient and this can explain its small share in the overall energy consumption as compared to developed countries.

Services are sectors (including transport) that constitute 54.0 % of the total GDP in 2009 and 51.2% of total GDP in 2010[19].

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

Economy of Kazakhstan is highly export-oriented. Forecast of external trade is presented on Figure 1.6.5.

The average annual growth of industrial production in 2012 - 2014 will be 7.3%. Increase in industrial production will contribute to the growth of the mining (5.7%) and manufacturing (10.2%) industries. In order to enter into the number of high-income countries, Kazakhstan must improve the welfare of its citizens and bring GDP per capita in 2015 to 15 thousand U.S. dollars or 10.8 thousand Euros. For this purpose, it is required to provide the annual real

[19] Agency RK of Statistics, "Kazakhstan today", 2011,page 25(in Russian), http://www.stat.gov.kz

growth of GDP of at least 7%. Additional growth of the economy should be achieved through intensive development of non-raw sector.

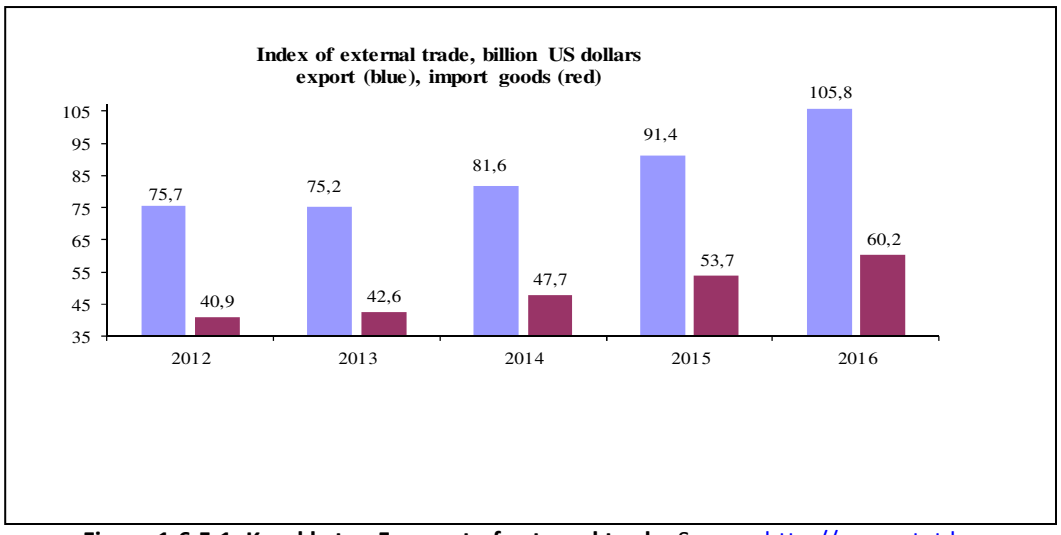

Figure 1.6.5.1. Kazakhstan Forecast of external trade. Source: http://www.stat.kz, http://www.minplan.kz.

According to the forecast of the Ministry of economy and Trade, officially done in April 2011[20,] export markets are assumed to increase by 7.8% per year during 2012-2016.It is expected to rise up to 120 billion Euro in 2016.

The volume of oil, according to forecasts of the Ministry of Oil and Gas in 2012 to reach 83.0 million tons increasing to 102.0 million tons in 2016.Within the frames of oil and gas sector development, by the end of 2015 18 major projects are planned, 9 of which will be implemented within the framework of sector programs, 9 - in the frames of maps of industrialization.

[20] http://www.minplan.kz, Forecast of social-economic development of t he Republic of Kazakhstan 2012-2016 years, approved by the Government, Protocol #30, 27.08.2011

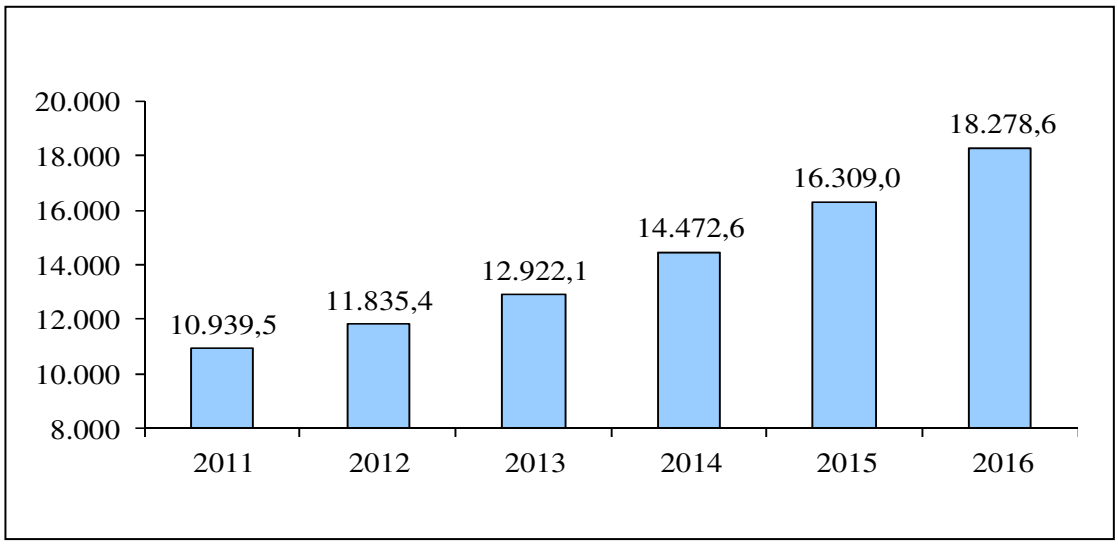

Figure 1.6.5.2. Kazakhstan GDP per capita forecast of economic development by 2016. Note: figures of GDP are presented in US dollars[21]. Source: **http://**www.stat.kz, **http://**www.minplan.kz.

The forecast of socio-economic development for 2012 - 2016 is based on objective indicators of the development of industries, approved in the "Guidelines for the economic and social policies to ensure the 7% growth in the economy in 2011 - 2015."

Kazakhstan plans to increase GDP per capita up to 13 thousand Euros by 2016 in order to enter into number of countries with high incomes and promote the welfare of the citizens of Kazakhstan.

Average annual growth in the steel industry in 2012 - 2016 will be 11.8%. The development of the industry will encourage potential related industries (mechanical engineering, chemical industry), increase and diversify the foreign trade. 43 projects with total investment of 8387.13 million Euro creating 54,845 jobs are included into the Industrialization Map.

Output growth in the chemical industry at average of 10.4% per year in 2012 - 2016 should be achieved through the creation of new competitive chemical industry, technical upgrading and modernization of existing enterprises. Presently 11 projects of chemical industry are included into the Industrialization Map for 2010-2014.

Output growth of the engineering industry will be 12.2% at average in 2012 – 2016. In the engineering industry by the end of 2016 22 projects are planned, 17 of which are in industry program, 5 projects are on the Industrialization Map. By the end of 2016 compared to 2011 the gross value added of the industry will increase by 2 times by increasing the production of

[21] All the figures in national planning and National Statistics are presented in local currency (KZT) or US dollars. In the text of analysis the figures are recalculated into Euro.

agricultural machinery by 2 times, in petroleum engineering by 2.5 times, in the mining engineering industry by 2.7 times, in electrical engineering by 1.7 times.

Growth of power production will be 4% at average in 2012-2016.To meet the needs of newly generating capacity in the solid fuel it is provided to increase the volume of coal production in 2015 to 131 million tons in 2020 - up to 152 million tons. It is planned to invest 3.4 billion US dollar into coal production industry.

Average annual growth of constructing would be 1.5% in 2012-2016. Forecast for industries in Kazakhstan is presented on Figure 1.6.5.2.

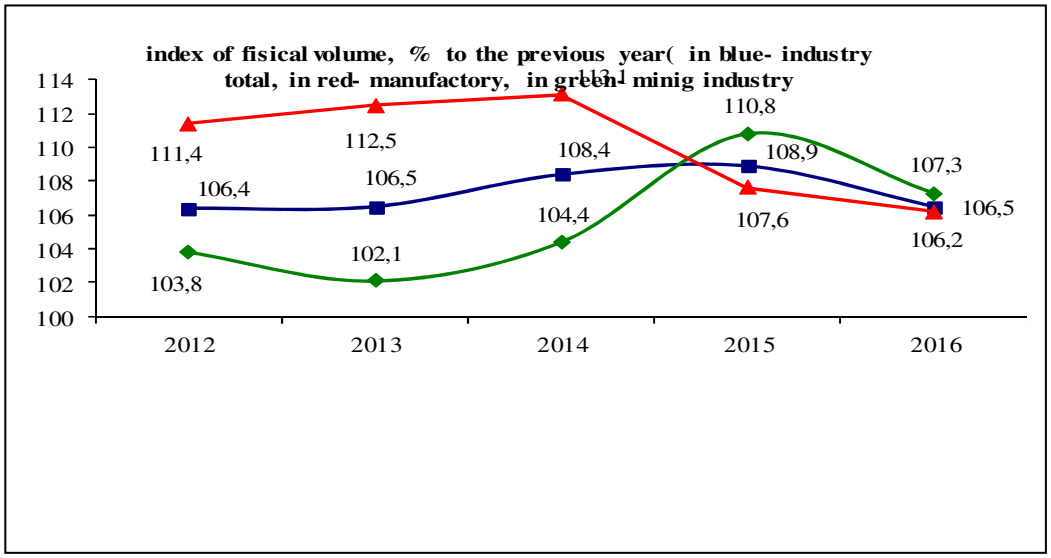

Figure 1.6.5.3. Forecast for industries development in Kazakhstan. Source: http://www.minplan.kz.

The average annual growth of information and communication services in 2012 - 2016 will sum 8.4%, according to forecast data. Annual inflation rate in 2012 - 2016 will be in the range of 6.0-8.0% (December to December of previous year). The task for the 7% strength of economic growth will be addressed in conjunction with social modernization. In order to modernize the social sector the actions of improvement the quality of education and health services, reduce unemployment and poverty will be taken. It is projected decline in unemployment from 6.2% in 2012 to 5.4% in 2016, while the poverty rate will decrease to 6.1%.

The forecast for transport sector development in Kazakhstan is presented at the figure 1.6.5.4.

To provide increase the volume of freight transport services by 2017 according to forecast the data will reach 428.8 billion ton-miles (the volume of cargo - up to 3 billion tons), the passenger - 224.3 billion passenger-kilometers (volume of passengers – 18.6 billion people).

In the road sector about 5.5 thousand km will be reconstructed, 6 thousand km of roads of national significance and 10 thousand km of local roads will be repaired (28 infrastructure projects are approved by the government).

Implementation of the Program of Housing Construction for 2011 - 2014 will provide start-up of about 24.3 million square meters of housing area from all sources of funding.

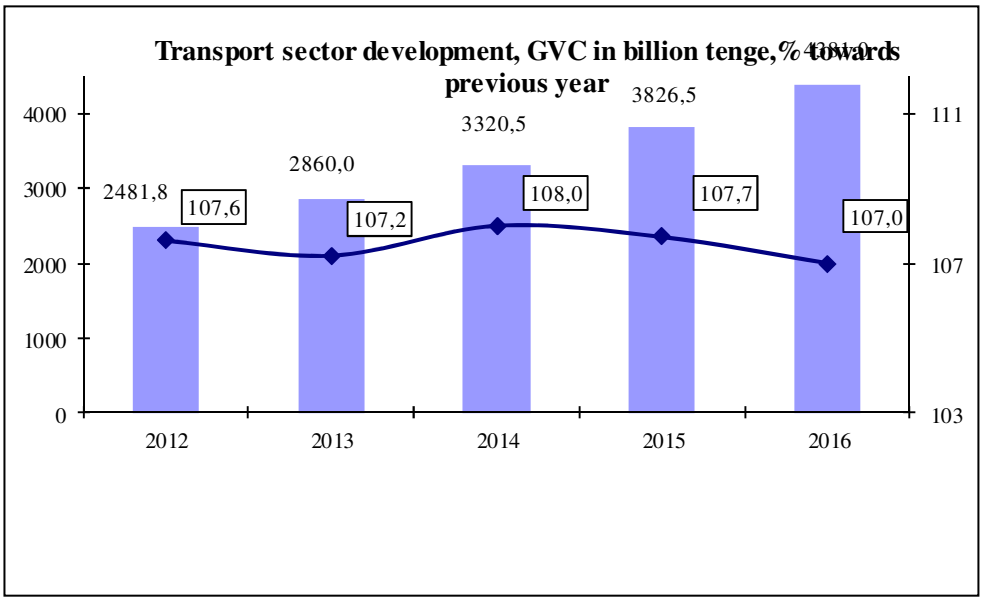

Figure 1.6.5.4. Forecast for transport sector development in Kazakhstan. Source: "Transport Strategy 2020", http://www.minplan.kz.

In 2013, the project "Western Europe - Western China" will be implemented. Expected freight on this corridor will be 19.5 million tons in 2015.

In the field of railway transport two new railway road will be built - "Zhetygen-Korgas", "Uzen-state border with Turkmenistan" (439 km). Total projected volume of freight traffic on the new lines by 2016 will be 41 million tons**.**

In the field of civil aviation in 2015 it is planned to reconstruct and construct runways, passenger and cargo terminals at 13 airports in the country.

In the sector of water transport it is planned to complete reconstruction and modernization of the Ust-Kamenogorsk, Bukhtarma, Shulbinsk shipping locks.

The aim of economic policy in the electricity will be providing of meeting needs of the economy in power and energy independence.

According to preliminary estimates electricity generation in 2016 will amount to 106.66 billion kWh and consumption to 103.6 billion kWh.

According to the Programme of forced industrial-innovative development in the electricity sector it is planned to realize 13 projects.

Policies for development of alternative energy will be directed at increasing the share of renewable energy sources (small hydro, solar plants) in the country's energy.

It is planned to implement projects for construction of the first wind power plants. Suggested areas include accommodation in Astana, Akmola region, Dzungarian Gates and Shelek corridor - in the Almaty region. By 2015, it is planned to build wind farms, to introduce new small hydropower stations.

Program on tariff policy for 2010-2014 projects to increase wholesale prices for electricity from 0.07 Euro/ kWh (10.14 KZT/kWh) to 0.10 Euro/kWh (14.KZT/kWh), within the Customs Union in order to standardize the rates for the carriage of goods by rail it is planned to increase annual rates for 15 %.

Forecast of the main indicators of socio-economic development of Kazakhstan for the period of 2012 – 2016 has been developed by the Ministry of Economy and Trade of the Republic of Kazakhstan (Table 1.6.5).

The indicators of real sector of economy including agriculture, industry (mining, construction, oil, manufacturing, and electricity production), transport and some other are presented in the Table 1.6.5 below.

Number	Name	2011 estimate	forecast				
			2012	2013	2014	2015	2016
1	GDP, billion tenge	26 310.2	28 952.2	31 610.5	35 403.5	39 895.7	44 713.8
2	GDP, billion Euro	105.03	112.56	119.87	128.38	137.88	146.42
3	Real growth of GDP, % of previous year	107.0	106.9	106.5	107.1	107.4	106.2
4	GDP, billion US dollars, official rate	180.2	195.0	212.9	238.4	268.7	301.1
5	GDP per capita, Euro(towards official US dollars rate)[22]	7870.14	8514.67	9296.47	10411.94	11733.09	13150.07
	Indicators of real sector, %						
6	Volume of gross agriculture output, % of previous year	105.0	104.5	104.4	105.0	104.9	105.0
7	Volume of gross industrial output, % of previous year	106.0	106.4	106.5	108.4	108.9	106.5
8	The volume of mining and quarrying, % of previous year	103.6	103.8	102.1	104.4	110.8	107.3
9	Volume of oil, million ton	81.0	83.0	83.0	85.0	95.0	102.0
10	Volume of gross manufacturing output, % of previous year	109.7	111.4	112.5	113.1	107.6	106.2
11	Electricity, gas, steam and air conditioning, % of previous year	106.4	103.0	103.8	104.4	105.6	103.0
12	World oil price Brent, U.S.$/bbl at an average annual	90.0	80.0	70.0	70.0	70.0	70.0
13	Construction, % of previous year	102.5	103.1	101.8	101.0	100.7	101.0
14	Transport and storage services, % of previous year	107.0	107.6	107.2	108.0	107.7	107.0

[22] Official rate is presented in US dollars in National data, recalculated to Euro at rate 1.39 for the purpose of the report

Table 1.6.5.(continued)							
15	Information and communication, % of previous year	107.0	108.0	108.0	109.0	108.0	109.0
16	Trading, % of previous year	112.0	110.2	109.0	108.6	108.2	108.5

Table 1.6.5. Forecast of the main indicators of socio-economic development of Kazakhstan

For the period 2012 – 2016. Source: Ministry of Economy and Trade of Kazakhstan, Statistics of Kazakhstan, http://www.minplan.kz.

1.7. *Transportation*

The population of Kazakhstan travels less than counterparts in OECD countries, whether by road, rail or air. As Kazakhstan's economy expands, GHG emissions from the transport sector are likely to increase. The share of transport in total economy in 2010 is 8%[23].

The penetration rate of motor vehicles in Kazakhstan is relatively low: in 2007, there were 170 motor vehicles per 1,000 capita (As the national income grows. The low fuel prices will contribute to the increase in demand for road transport and higher emissions.

Years	1991	2000	2010
Million tons			
All kinds of transportation, including:	921.6	1293.1	2439.4
Railway	328,2	171,8	267.9
Rod	561.8	982.0	1971.8
Shipping: river /sea	11.2/-	0.5/-	1.1/4.6
Air(thousand tons)	36.4	14.4	28.9
Table 1.7(continued)			
Pipelines	20.4	138.8	194.0

[23] Statistical book "Kazakhstan today", 2011, page 24(in Russian). Available at: http://www.stat.gov.kz

Billion tons km			
All kinds of transportation, including:	410.9	207.1	385.3
Railway	374.2	125.0	213.2
Road	17.9	31.0	80.3
Shipping (river)	3.4	0.04	0.08
Shipping (sea)	-	-	3.1
Air (thousand tons km)	67.4	117.5	90.1
Pipelines	15.3	50.9	88.6

Table 1.7.Transportation and freight turnover in Kazakhstan. Source: Statistical book "Kazakhstan today", 2011, page 36. Available at: **http://www.stat.gov.kz**

Demand for air transport in Kazakhstan is still quite low – in 2008, only around 19,000 domestic and international flights departed from the country. Again, there is scope for further growth in aviation, which will add to the transport sector's GHG footprint.

The transport network in Kazakhstan consists of the infrastructure needed for road, rail and air, water traffic. The roads and railways networks account around 88.4 and 14.0 thousand km respectively. The density of the network at 1000 km^2 of area is about 5.1 km of railway, 32.4 km of roads paved. The length of utilized waterways is 3.9 thousand km and airways - 61 thousand km, the density is, 1.5 km of inland waterways, In consideration of the rapid development of cities in Kazakhstan and a steady trend towards further urbanization of the country, the development of urban passenger transport is one of the priorities of local executive bodies' activity.

Industrial and innovative development in transport sector assumes that the main network of roads and railways, as well as internal shipping infrastructure will remain in state ownership. The terminals will be gradually transferred to the private sector.

The system of air navigation will be much self-supporting through navigation charges at airports and route navigation charges. Air terminals will be transferred to the responsibility of airports and financed by the terminal fees. Major airports will be in the private sector,

which will be responsible for maintenance and renewal of infrastructure funded through fees for takeoffs and landings at airports.

Construction and maintenance of terminals at seaports will mainly be the responsibility of the private sector. Maritime infrastructure of common use will be the responsibility of the state.

The infrastructure of the road sector user charges will be more directly tied to road users.

The share of CO_2 in 2008 is 99.4%, while the share of CH_4 and N_2O is very small, 0.5% and 0.1% accordingly.

In 2008 the share of road transport was 80.7%, rail-3%, shipping-0.1%, aviation-2.3% and pipeline- 14% (NIR 2008 KZ). Pipeline transportation consumes 61.6 PDJ of energy in 2008, including oil and gas from one side (1%) and gas fuel (99%) - from another.

1.7.1. Road transport

Car park is characterized by high wear - the proportion of vehicles that are in operation for more than 12 years is 63%, including buses - 57%, motor cars - 59% and trucks - 84%. In this regard, in the Republic of Kazakhstan emissions of pollutants from stationary sources are about 2.7 million tons / year, while transport emissions are more by 1.2 million tons / year.

Phased introduction of the Euro Standard will restrict the importation of obsolete vehicles, improve the competitiveness of Kazakhstan's car assembly plants, as well as improve the quality of manufactured and imported fuels.

Thus, by 2015 will reduce the number of vehicles operating over 12 years from 63% to 50%. In 2011 Kazakhstan will be introduced euro standards Euro-3 for vehicles, and from January 1, 2014 - Euro-4. Introduction of the Euro-3 would ban the import of European cars older than 2001 issue.

According to “Transport Strategy of the Republic of Kazakhstan up to 2015” approved by the President of Kazakhstan in2006 (No. of Order is 86), the use of road transport is planned to increase 1.5 times towards 2000.

Implementing the provisions of the technical regulations on emissions of pollutants by vehicles will restrict the import to Kazakhstan and production of cars in the Republic that do not meet the Euro standards. In addition, this measure will improve the quality of automotive fuels. Ultimately, the introduction of eco standards creates conditions for the renewal of the existing auto parks, and will help to solve environmental problems (especially in big cities) and the problem of increasing the level of safety on the roads.

Economic and geographic features of Kazakhstan (a large area, landlocked, uneven spatial distribution of human settlements and natural resources), make its economy one of the most cargo intensity in the world, causing a high dependency on the transport system.

At the same time, the geographical position of Kazakhstan in the heart of the Eurasian continent creates favorable conditions for the use of highways, emerging transcontinental routes in the direction Asia - Europe, most of which include areas of Kazakhstan's road network. According to international analytical centre s' assessments, transit flows in the direction of South East and East Asia - Europe are estimated at 330-400 billion USA dollars. It is assumed that up to 20% of transit traffic should pass the territory of the Russian Federation and Kazakhstan by rail and road routes. The forecast for further growth in motor transport will raise GHG emissions; this is presented in Figure 1.7.1 below.

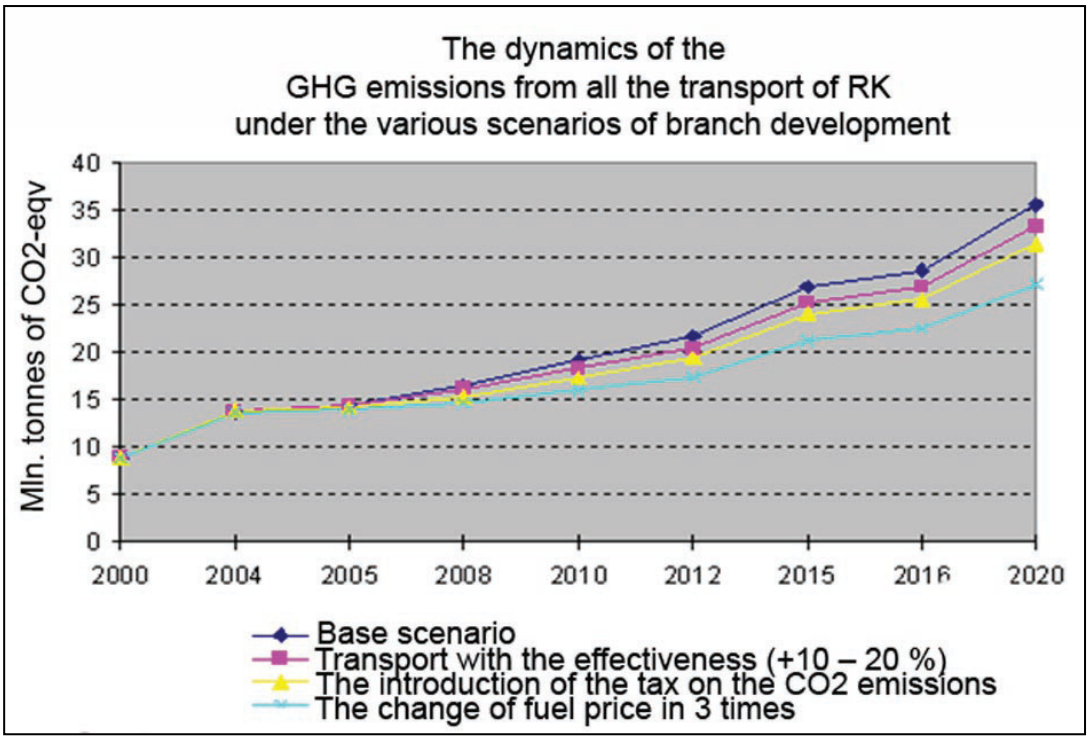

Figure 1.7.1. **The scenarios of the GHG emissions from transport s in Kazakhstan.** Source: Second National Communication to UNFCCC, 2009, page 81. Available at: http://unfccc.int/national_reports.

1.7.2. Shipping

Domestic navigation in Kazakhstan includes river vessels. In 2010 it was planned commissioning of the ship repair base in the port of Bautino with a capacity of up to 60 ships per year parking 6.8 ships on the quays at a time.

In 2011-2015, taking into account the increase in the number of vessels operating in the

Kazakhstan's sector of the Caspian Sea and the Irtysh river basin will be constructed new shipbuilding base and reconstructed shipyards with a glance of predicted demand.

The national data on shipping is presented in the Table 1.7 above.

1.7.3. Railways

According to "Transport Strategy of the Republic of Kazakhstan up to 2015" approved by the President of Kazakhstan in2006 (No. of Order is 86), the use of railways is planned to increase 1.5 times towards 2000.

National data on railway transportation is presented in the Table 1.7 above.

Railway transportation in Kazakhstan is a small emission source in transport sector. Railway transport is operated by steam and diesel locomotives. The rail transport is used mostly for transport of goods. The contribution of railways into GHG emissions is only 3% in 2009.

1.7.4. Air transport

The scale of air traffic of passengers in Kazakhstan decreased due to lower demand of the population, rising of energy prices, increase of the cost of spare parts and a proportionate increase in tariffs for aeronautical services. However, due to improved general economic situation in the country was marked a growth in conveyance of passengers and an increase in passenger turnover. The predominance of the transit flow in the airspace of the Republic and the high level of competition with neighboring states require constant use of flexible and transparent pricing policy in air navigation services, including air-navigation services and transportation services.

According to "Transport Strategy of the Republic of Kazakhstan up to 2015" approved by the President of Kazakhstan in2006 (No. of Order is 86), the use of air transport is planned to increase 6.0 times towards 2000.

As a priority, will be carried out the reconstruction and upgrade in airfield infrastructure of the following airports:

- In 2006-2010 - Almaty, Aktau, Aktobe, Atyrau, Zhezkazgan, Kostanay, Kyzylorda, Pavlodar, Ust-Kamenogorsk and Shymkent. In the future, the organization provides air services between regional centers and places of historical and cultural significance for the development of tourism (Turkistan), as well as places with a health resort infrastructure (Alakol Balkhash Bayanaul, Borovoye);
- In 2011-2015 years – Balkhash, Karaganda, Kokshetau, Petropavlovsk,

Semipalatinsk, Taldykorgan, Taraz and Uralsk.

- In 2010 commissioning of the reconstructed runways at airports in Aktau and Kyzylorda, as well as the new international airport in Almaty;

- Until the year 2015-reconstruction of the runways at 7 airports (Kokshetau, Semey, Kostanay, Uralsk, Taldykorgan, Ust-Kamenogorsk, Petropavlovsk); construction and renovation of passenger terminals at 3 airports (Atyrau, Shymkent, Kokshetau);construction of the new international airport Kenderli and second runway at the airport in Astana.

Aviation sector has very minor share into total emissions. The contribution of civil aviation was 2% in 2009.

1.8. Energy generation

1.8.1. Energy supply

Kazakhstan is rich in reserves of fossil fuel and meets the vast majority of its energy needs from fossil sources. Kazakhstan also has significant renewable energy potential in the form of hydropower, solar, wind and biomass; these resources have been largely undeveloped with the exception of hydropower. Total energy production in Kazakhstan is estimated to be around 41% coal, 40% natural gas, 16% petroleum, and 3% hydro[24].

Electricity is produced from coal (70%), gas (11%), hydro (11%), and oil (8%).[25] Approximately 4% of domestic electricity is exported and a roughly equivalent amount is imported (from Russia, Kyrgyzstan, and Tajikistan).

The basis of energy supply is combined heat and power plants, amounting 87%[26] of total installed capacity (19 GW in 2010). The coefficient of efficiency on coal based power plants is 30-32% (in comparison in world practice the same is 42-53%).The increase of share of gas turbine power plants is expected to 7.8-7.9% in 2015 from existing level of 6.5%.

[24]US DOE/EIA. Kazakhstan Energy Data, Statistics, and Analysis. November 2009. http://www.eia.doe.gov/cabs/Kazakhstan/Full.html

[25]International Energy Agency. Electricity/Heat in Kazakhstan in 2007.http://www.iea.org/stats/electricitydata.asp?COUNTRY_CODE=KZ, National Inventory Report, 2009, www.ecogov.kz

[26] "Kazakhstan's second national communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change", page 58, http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php

Production of electricity and heat in Kazakhstan during 2006-2010 is presented in the Table 1.8.1 below.

Years	2006	2007	2008	2009	2010
Electricity, million kWh	71668	76621	80348	78729	82646
Heat, thousand Gcal	83183	93218	94057	93373	96118

Table 1.8.1. Dynamics of electricity and heat production in Kazakhstan. Source: Statistical book "Environment and Sustainable Development in Kazakhstan during 2006-2010", 2011, page 74.Available at: http://www.stat.gov.kz.

1.8.2. Energy consumption

The majority of energy is used for electricity and heat generation. Electricity consumers include industry (62%; primarily metallurgy, food/tobacco, and chemical/petrochemical), residential (12%), commercial and other (8.5%), transport (4%), and agriculture (1.5%). Electricity distribution losses are estimated in 13%.

Between 2000 and 2007, electricity demand growth's has averaged over 6% per year, with particularly rapid growth in the southern regions (at ~8% per year).

For a medium term horizon, the crucial strategic document was "Plan of Measures for the development of the power sector of the Republic of Kazakhstan for 2007-2015" approved by Prime Minister Decree No. 147-r of 31 May 2007. The plan makes forecasts of the likely development of demand, and calculates the likely deficit of power overall, and region by region (see Figure1.8.2 below).

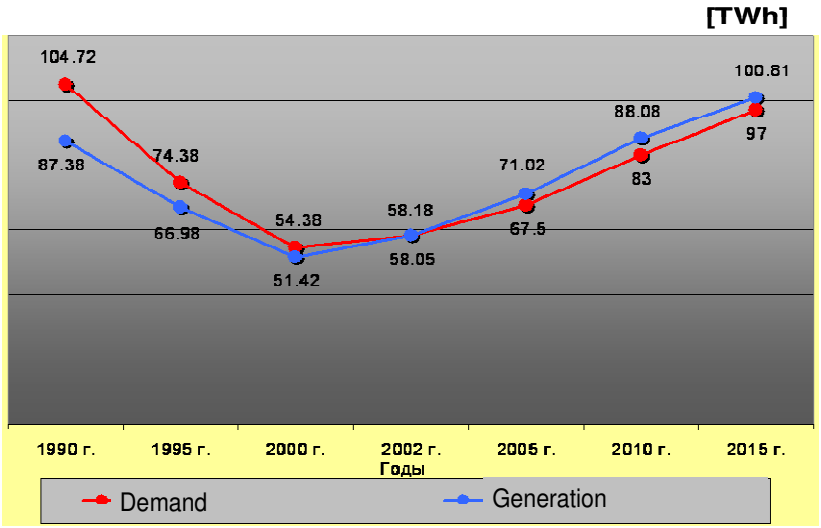

Figure 1.8.2. Balance of Electric Energy of Kazakhstan in the period 1990- 2015 according to the United Electrical System Development Program. Source: http://www.mint.gov.kz.

The plan also provides estimates for the necessary investments into the electricity sector of Kazakhstan (2. 23-2.51 billion Euro for the reconstruction of existing national level power plants and modernization of CHP plants, and for the construction of additional 2430-2550 MW capacity, without reconstruction of rural distribution networks). The plan was elaborated in 2009 (Decrees No. 153 and 154 of 26 June 2009), approved the estimated demand and supply balances for each year till 2015, as well as the list of modernization, reconstruction and new construction projects, which amount to approx. 8.000 MW installed capacity in the period from 2009 to 2015.

According to the Strategic Plan 2020, approved in 2010, the forecast of electricity demand was revised and looks as the following (Table 1.8.2):

Year	2010	2011	2012	2013	2014	2015	2020
Consumption	83.8	85.9	89.5	93.0	96,8	100.5	116.0
Supply	82.3	87.6	90.3	93.8	97,9	103.5	120.0

Table 1.8.2.Electric Power Supply and Demand Forecast (billion kWh). *Source: Kazakhstan Development Strategic Plan 2020.Available at.* http://www.mint.gov.kz.

Kazakhstan's plans to increase electricity supply are ambitious, and if achieved, given the current supply mix, would result in a dramatic increase in GHG emissions. Reduction of industrial energy consumption through energy efficiency investments could significantly help mitigate the supply deficit, while also reducing industrial production costs, enhancing competitiveness and will reduce GHG emissions.

According to forecast of the Ministry of Industry and New Technologies the electricity production in 2030 is expected 144.7 billion kWh including 79.2% from Power Plants and

Combined Heat Power Plants, 6.9% from Hydro, 9.7% from Renewable Sources and 4.2% from nuclear (in comparison of 2010 data- 82.3 billion kWh, including 92.2% from Power Plants and Combined Heat Power Plants, 9.3% from the Big Hydro and 0.5% from Renewable Sources).

Heating supply in Kazakhstan is presented by three types:

- Central heating with combined of heat and electrical energy on the CHP(dominant of heat supply, 38% of total recently);
- Big district boiler - houses;
- Decentralized heat supply systems - for compact consumer groups.

The heat transportation network extends 11, 5 thousand km (in the double pipeline system's calculation). The average existing heat losses in the heating networks are 2.5 times higher than standard (developed) for the new heat networks. The decrease of these losses is one of priorities for improvement of energy efficiency in Kazakhstan and GHG emissions reduction accordingly.

1.9. Waste disposal

As a result of mining and metallurgical complex in the territory of more than 20 billion tons of industrial waste, with an annual admission of about 1 billion tons, including 230 million tons of radioactive has been identified. 95% of the total volume of mined ore falls into the waste, often highly toxic and placed in inappropriate storage locations.

Available statistics noted an increase of toxic waste (150 million tons annually) over the past four years. They are concentrated mainly in the Karaganda - 29.4%, East-Kazakhstan - 25.7%, Kostanai - 17%, of the Pavlodar - 14.6% of areas. Heavy metals and petroleum contaminated land and Kyzylorda, Atyrau and West Kazakhstan regions.

In 2010, the Program "Ghasyl Damu" for 2010-2014 was approved by the Government of the Republic of Kazakhstan. One of sections is devoted to industrial waste disposal. In 2010 34 billion tons of industrial wastes on the open land fills , including toxic wastes 250 million tons annually (figure 1.9).About 16% of this volume is used by enterprises and about 2.5.% is recovered.

Years	Formation of toxic wastes	Use of toxic wastes at the enterprises	Recover of toxic wastes
2006	264.0	42.2	6.5
2007	281.8	24.9	31.3
2008	453.4	48.4	0.6
2009	228.1	3.3	0.5
2010	303.1	19.6	0.6

Table 1.9.Formation, use and recovering of toxic wastes in Kazakhstan, million tons per year.
Source: Statistical book "Environment and Sustainable Development in Kazakhstan during 2006-2010", 2011, page 154.Available at: http://www.stat.gov.kz.

1.9.1. Solid waste disposal

The lack of infrastructure for waste management is one of reasons of existing of a lot of not managed landfills; these lead to air, water and soil contamination (table 1.9.1).

Recently the volume of Solid Wastes generated amounts 22 billion tons and is increasing annually.

The emissions from Unmanaged Waste Disposal Sites were 1528 Gg CO_2 and 72.77 Gg CH_4 in 2009.Emissions from Municipal Solid Wastes disposal sites make 94%.

Years	2006	2007	2008	2009
Solid wastes, million tons	12.7	6.5	6.8	3.6

Table 1.9.1. Dynamics of Solid Wastes disposed to landfills in Kazakhstan. Source: Operational information of MoEP. Available in Russian at : http://www.eco.gov.kz.

Kazakhstan has identified solid domestic waste as a problem area, with the country accumulating each year more than 14 million m3 of solid domestic waste at the rate of 1.3 to 2.2 m3 per inhabitant. The most affordable, acceptable and safe method of long-term waste disposal involves organized dump sites.

As mentioned above Kazakhstan has accumulated more than 20 billion tons of production and consumption waste of which 6.7 billion tons are toxic wastes (pollution from land, surface, groundwater and air quality).

The volume of toxic industrial solid waste accumulated in the non-ferrous metallurgy is more

than 5.2 billion tons. Due to data from the Ministry of Environment Protection wastes of metallurgy and gold mining industry accounts for 14 billion tons and occupies 50 thousand hectares.

1.9.2. Wastewater treatment

Every year in the surface waters of the Republic of Kazakhstan dumped more than 200 million m^3 of contaminated wastewater[27]. More than 3 thousand sources of pollution of underground waters were identified which range from a few to hundreds of square kilometers.

Waste water treatment is characterized by adoption of biological and membrane treatment methods. The secondary treatment removes an average more than 80 % of organic pollution

According to National report on GHG emissions inventory (2008) the waste structure of GHG emissions does not change much and emissions from wastewater handling contributed 6% of which the largest amount come from industry (4%) and 2% from domestic.

[27] http://www.nauka.kz/

2. THE NATIONAL GHG INVENTORY

2.1. Development of a national system for the GHG inventory

The responsible government agency for compliance with international obligations of Kazakhstan under the UN Framework Convention on Climate Change and the Kyoto Protocol is the Ministry of Environmental Protection. KazNIIEK is its Working Body, which is responsible for national GHG inventory report preparation and common reporting format tables.

In July 2010 the Minister of Environment Protection signed the order on the National system for the GHG inventory. According to the order the national systems are defined departments and agencies that provide activity data and background information for GHG inventory on the annual basis. Inventory activities include the collection of activity data, selecting methods and emission factors, use of national or IPCC default emission factors, estimating anthropogenic emissions by sources and removals by sinks, implementing uncertainty assessment, quality assurance and quality control procedures (QA/QC) and the implementation of the verification procedures of inventory data at the national level.

The initial data for national GHG inventory are mainly provided by the Agency for Statistics of the Republic of Kazakhstan. Agency of Statistics is provided data on industrial production, and production of major products, data on the fuel and energy balance of RK, consumption and distribution of energy sub-sectors of the economy from annual Statistical Yearbooks.

Large business and mining companies in Kazakhstan also provide information on its activities during the reporting year with the characteristics of fuel burning and KazNIIEK conducts the analysis and processes of initial data as well as subsequently enters them into the database and perform calculations of GHG emissions and absorption.

The system of data collection for the GHG inventories compilation in Kazakhstan includes:

- A review, study and use of published statistical handbooks, procedures, ecological passports of enterprises, the reports from enterprises containing information on GHG emissions and wastes;

- Preparing and sending requests to the ministries and departments, the Regional Office of Environmental Protection for information that is absent in the received materials;

- Consultations with experts and expertise on GHG emissions indicators that are not in

government and agency statistical reporting;

- Determination of emission factors of greenhouse gases according to the IPCC Guidelines, as well as from companies and experts from different sectors, using all possible sources of information;

- Assessment of uncertainty and reliability of the data sources of published and calculated data.

The main categories of GHG sources presented in Kazakhstan inventory are as follows

Energy activities; Industrial Processes, including solvents and other product use; Agriculture, Land use, land-use change and forestry, and Waste (municipal waste, waste water treatment, clinical waste incineration).

The main types of information for GHG inventory are divided into three groups:

- The volume of fuel consumption by industry and its production volumes;

- GHG emission factors by sectors and different activities;

- Indicators which is specific to each sector/plant/national activities/technologies used.

The indicators of the first group are obtained primarily from the state statistics, as well as directly from national enterprises. Indicators of this group are contained in publicly available sources (published data) or from sector experts at the request of agencies, enterprises, regional authorities and inspections of the MoEP. For the second group the values of GHG emission factors are obtained from enterprises or IPCC Guidelines as default values in case of the absent the national ones. The third group of data or indicators is obtained from enterprises or from IPCC Guidelines as the default values if national data on technology used or national studies are absent.

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

One of the main obligations of the Republic of Kazakhstan as a UNFCCC Party included into the Annex I is periodically submitting the report on national GHG emissions inventory report and the National Communications, and realized policies and measures addressed to GHG emissions reduction.

KazNIIEK is a scientific and research division within the structure of the MoEP which is responsible for preparation of national GHG inventory emissions report which is carried out annually by the contract with the MoEP annually since the year 2000. MoEP has a

responsibility on coordination and control of the preparation of national GHG inventory reports and further reporting to the UNFCCC and the Conference of the Parties.

There is a list of the main governmental bodies which provide the demanded information to KazNIIEK on the annual basis. These are the following, including contacts:

Ministry of Oil and Gas	http://www.mgm.gov.kz
Ministry of Economic Development and Trade;	http://www.minplan.kz
Ministry of Finance	http://www.minfin.kz
Ministry of Industry and New Technologies	http://www.mint.gov.kz
Ministry of Agriculture	http;//www.minagri.kz
Ministry of Transport and Communications	http://mtc.gov.kz
Ministry of Health	http://www.minzdrav.kz
Ministry on Extraordinary Situations	http://www.emer.kz
Agency RK on Statistics	http//:www.stat.kz
Agency of RK on land resources management	http://www.auzr.kz
Ministry of Environment Protection	http://www.eco.gov.kz

Preparation of the National GHG Report is included into the state budget program of MoEP. MoEP heads the work on interaction between the governmental bodies and other organizations which provide the information for national GHG inventory report. KazNIIEK develops the plan of the control and maintenance of quality of inventory and sent the report on approval to the MoEP.

Activity under the control over the report quality include the general methods, such as check of accuracy of received data and calculation of emissions, use of the standardized procedures of calculation and measurement of emissions, uncertainty estimations, archiving information and the reporting.

Statistical Agency is a source of the official statistical information on activity data, fuel and energy balance and other data, which is used for the national GHG report. The Ministry of

the Environment Protection (MoEP) is responsible for submission of greenhouse gas inventory reports to the UNFCCC on the annual basis.

KazNIIEK under Ministry of Environment Protection (MoEP.) is responsible for collecting, analyzing, storing, reporting and publishing of the GHG inventory information and reports. The contact infomation on GHG inventory report in MoEP:

2.1.2. Supporting institutions

Experts from other relevant institutions participate in the national GHG inventory reports preparation on the contract base with KazNIIEK. The Institute „Energia“ is provided annual data on fuel consumption by HPS and large boiler houses. The other involved institutions are as follows: KazNIPIenergoprom, Institute of Transport and Communications, Agency on Constructing and Housing, The Kazakh Institute of Arable Farming, Institute of Livestock and Meadow Farming, the Kazakh Forestry Management enterprise. Agency of Statistics of the Republic of Kazakhstan is one of the main supporting institutions of GHG inventory report preparation.

In 2011 GHG inventory is preparing in collaboration with „Scientific and Methodological Center ”Agrohimsluzhba“, experts from ”Aluminum of Kazakhstan“, air company ”Air Astana“ and ”Mittal Steel“.

2.1.3. Measurement methodology and data sources

The national inventory reports are prepared on national activity data on fossil fuel consumption (coal, natural gas, oil and petroleum products) and production of the main industrial branches (iron and steel, ferroalloys, chemical and mineral products, fuel combustion by all kinds of transport, organic solid waste management and wastewater treatment, agriculture and livestock, forestry and land use. National GHG emissions in Kazakhstan are not measured near the sources of their discharges (near a chimney or pipe). They are calculated on the basis of IPCC methodology.

The inventory reports are mainly based on national statistical data and data from the Kazakh enterprises. Before the year 2008 GHG emissions were calculated on the basis of IPCC work sheets and reported in the form of IPCC tables. Since 2007 inventory data have been started reporting in electronic tables of the Common Reporting Format which were prepared by the UNFCCC Secretariat with the using of elaborated special software. Every year the GHG inventory responsible person sends a request to the secretariat to send an updated version of CRF tables in order to add data for one more new year. National activity data, emission factors and GHG inventory assessments archiving by the responsible sector experts. Next year it is implied to use network access data storage for archiving and storing all inventory data in KazNIIEK.

2.1.4. Activity data

National GHG inventory reports are preparing with the using of mainly official statistical data. In the case when data from the national statistical agency are presented in too aggregated form, it is necessary to have them disaggregated and send an additional request to the Agency. In some cases there is a need to ask other state organizations or enterprises to provide activity data, as the Agency on Statistics may not have them.

Data on Energy activities are usually obtained from the annual statistical report „Fuel and Energy Balance“(further, FEB) which is issued Kazakhstan on the annual basis. As a rule energy statistics contains sufficient data required for the IPCC reference approach and the approach of source categories, only the quality of this information from the energy balance should be better.

The structure of the energy balance in Kazakhstan, where possible, should approach the structure of the FEB of the International Energy Agency (IEA). According to the quality control of inventory, a country should compare their data with relevant international organizations. For example, the IEA estimates the GHG emissions based on national statistics with international IPCC methodology (IPCC, 1996). At present the original data on production, exports, and imports by major fuel type, represented by the Agency of Statistics of the IEA, does not coincide with the data represented in the national FEB. Therefore, one of the main tasks of the Statistics Agency at the present time is a rigorous tracking of the source data submitted by the IEA and national FEB. These data should be identical, exactly the same data as in the IEA must be submitted to KazNIIEK.

FEB structure should be as much disaggregated as possible for the national GHG reporting estimates and can be presented in details that are required by the IPCC methodology, both by fuel and by sector. However, data from the Statistics Agency are still preferable, due to the fact that they go through quality assessment and quality control.

Data for the sector of Industrial processes can be obtained from the Agency on Statistics. However in many cases it would be preferable to get activity data directly from the enterprises because they use very different technologies and emission factors can differ substantially. In case of categories of „Soda ash production and use» and „Carbide production» the data can be obtained from the Agency on statistics. For the other industrial processes because of different technologies the activity data should be obtained from the companies. In case of F-gases the activity data should be requested from the Custom Committee as there is no their production in Kazakhstan.

Agriculture sector data – data on live weight of farm animals, fat content of milk can be obtained through research, peer review or statistical databases.

Waste sector – data can be obtained from the regional authorities (municipal waste), the Committee on Water resources (waste water management) and Chief Medical Officer (clinical waste incineration). For the last three years the data on municipal waste can be obtained from the Statistical Yearbooks on Environment. However they provide the data on municipal waste deposited on landfills, but there are no data on management practise and landfill conditions of the disposal sites (deep or shallow), as well as data on morphological content of municipal waste are not available. In order to have the required activity data and parameters the additional research should be conducted on the solid waste polygons.

LULUCF –data on area of forests and tree species can be received from the Forest Management Enterprise, and the Committee on Forest and Hunting of the Ministry of Agriculture. As for land use practice the activity data may be founded at the State Agency on the Land Resources Management. Some data can be received from the satellite observations.

2.1.5. Conformity with data-exchange standards

The data for GHG inventory reports in Kazakhstan are in compliance with data exchange standards. The activity data are collecting and reporting according to the requirements of national inventory system and IPCC Guidelines. All reporting tables contain data in accordance with CRF reporting tables.

All reporting tables are presented in a form as required by the UNFCCC reporting Guidelines on Annual Inventories. CRF tables are produced with the using of CRF Reporter software. The methodology used in calculations of emissions is harmonized with the Guidelines for National Greenhouse Gas Inventories, Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories published by the Intergovernmental Panel on Climate Change (IPCC, 2000). Thus, all data and tables are meet the requirements of standards. The final results and total emissions are presented in Gg or thousands of tons.

2.2. Systematic observations

2.2.1. Measurements of meteorological parameters and instrumentation deployed

Systematic instrumental measurements of meteorological parameters (surface air temperature, precipitations, wind, air humidity, atmospheric phenomena's, atmospheric pressure and some others) are carried out on the 256 meteorological stations every 3 hours 8 times a day in Kazakhstan by the Republican State Enterprise "Kazhydromet". Kazhydromet is a branch of the MoEP. 65 meteorological stations work as synoptic stations within the ground sub-system of the Global Telecommunication Network (GTN) with the "SYNOP" reports for four main terms: 00, 06, 12 and 19 hours of the World coordinated time. Out of

the 65 stations the 43 stations provide the "CLIMAT" monthly reports. Meteorological observation data are collected, archived and stored on paper and electronic carriers in the special department of Kazhydromet named "The State Hydro meteorological Data Foundation".

Since 2010, the National Hydro meteorological Service has been issuing an annual climate bulletin of Kazakhstan based on the analysis of the long-term time series data observations of meteorological stations. The main purpose of the bulletin is to provide accurate scientific information on climate variability and change. Bulletin describes the climatic conditions observed in a calendar year, including the assessment of extreme values of surface air temperature and precipitation. It also provides information on trends in the mean meteorological values and extremes that have taken place since the 40th of the last century. By now three bulletins[28] have been already issued.

2.2.2. Oceanic observations

Kazhydromet has no oceanic observations although it provides environmental and hydro meteorological monitoring on the Caspian Sea. In the Caspian region Kazgidromet maintains:

• Observations at 19 meteorological stations;

• Marine observations at 6 coastal stations and 5 stations of the secular section of the North and Middle Caspian Sea;

• Hydrological observations at five gauging stations at the river estuaries;

• Environmental monitoring with the observation of the state of air, precipitation, surface and marine;

Waters, soils and sediments, and the radiation conditions;

• Environmental monitoring in the special economic zone "Seaport Aktau" conducting observations over the air, waters, soils and sediments.

The information on monitoring is available at http://www.kazhydromet.kz

2.2.3. Terrestrial observations

There are several systems of terrestrial observations in Kazakhstan including monitoring of natural resources and some special types of monitoring.

Natural resource monitoring includes the following:

1) monitoring of land;

[28] http://www.kazhydromet.kz/nauka/bulleten.php

2) monitoring of water bodies and their uses;
3) monitoring of mineral resources;
4) monitoring of protected areas;
5) monitoring of mountain ecosystems and desertification;
6) monitoring of forests;
7) monitoring of wildlife;
8) monitoring of the plant world.

The special type of monitoring includes:

1) monitoring of military test sites;
2) monitoring of space-rocket complex "Baikonur";
3) monitoring of greenhouse gases and ozone-depleting substances;
4) sanitary and epidemiological monitoring;
5) monitoring of climate and ozone layer;
6) monitoring of areas of environmental emergencies and environmental disasters;
7) remote sensing monitoring.

Terrestrial environmental monitoring is carried out on specially created sites by state territorial and private observation networks. Analysis of contaminants in the samples is taken by accredited analytical laboratories.

2.2.4. Air-quality monitoring

Besides the national meteorological network Kazhydromet has a system of environmental monitoring of the air pollution. Air-quality monitoring is a system of observations on the state of air pollution in the settlements of the Republic of Kazakhstan. The number of state monitoring sites and their location in each city or village are determined by the authorized body in the field of environmental protection within its jurisdiction, taking into account population, terrain, and the actual level of pollution.

Air-quality monitoring on the territory of Kazakhstan is conducted in 28 locations in 78 sites of observations with manual air sampling at 56 stations in 23 settlements of the republic: Aktau, Aktobe, Almaty, Astana, Atyrau Balkhash, Zhezkazgan, Karaganda, Kokshetau Kostanai , Kyzylorda, Ridder, Pavlodar, Petropavlovsk, Families, Taldykorgan, Taraz, Temirtau, Ust-Kamenogorsk, Shymkent, Ekibastuz, Special Economic Zone (SEZ)-Aktau Sea Port and the village of Glubokoye and at 22 automatic stations of observation in 10 settlements: Almaty, Astana, Atyrau, SKFM "Borovoe", Petropavlovsk, Taraz, Shuchinsk, SNNP "Burabai" sanatorium Shchuchinsk and Oral .

3. REPORTING

3.1. The GHG inventory, emissions per sector

Inventory of GHG emissions in Kazakhstan includes assessments of emissions by 5 categories of sources: “Energy activities”, “Industrial processes”, “Agriculture”, “Land use, land use change and forestry” (LULUCF), and “Waste”. The GHG emissions from “Solvent and other product use» are not estimated. The last national inventory report in Kazakhstan have been prepared for the inventory period 1990-2009. According to the results of inventory of greenhouse gases in Kazakhstan overall emissions of gases with direct greenhouse effect in 2009 amounted to 278.4 million tons of CO_2 equivalent, including 245.9 million tons of emissions from energy activities, 14.3 million tons of industrial processes, 23.4 million tons from agriculture and 6.2 million from the category of "Waste" (Figure 3.1). Total national emissions including LULUCF is 25% lower in 2009 compared to 1990 and 23% lower excluding LULUCF.

Energy sector has the largest share in total national emissions both in 1990 (82%) and in 2009 (84%). Industrial processes has a share of 5% in both years, agriculture contributed 11% in 1990 and decreased to 8% in 2009. The share of waste sector has not changed and accounted to 2% of the total GHG emissions both in the base 1990 year and in the last year of inventory (Figure 3.1.1.).

“Energy activity” inserts the largest contribution to total national GHG emissions in Kazakhstan. In 2009, the share of this sector accounted to 84% of total GHG emissions (excluding LULUCF). Approximately 98.4% of emissions in 2009 in the sector "Energy" had on emissions in the category of “fuel combustion", followed by losses in the category of "Emissions associated with leaks (fugitive emissions)" which amounted to 1.6%. In 2009 total emissions from the "Energy activity" decreased by 17.7% compared to 1990 and increased by 9.7% compared to 2008. The main sources of GHG emissions in this category according to international methodology are: production of heat and electricity (52.8%), manufacturing and construction (17%), transport (8%), other sectors and sources amounted to 21.1% of emissions in this category.

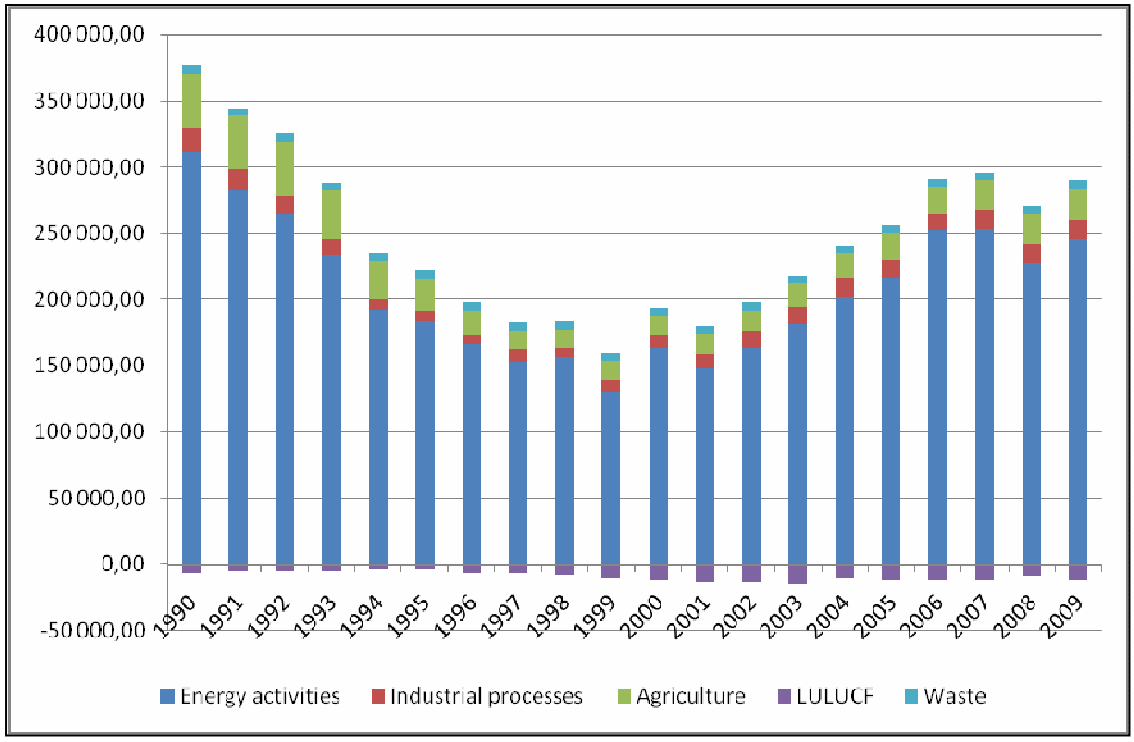

Figure 3.1.1 – GHG emissions time series in Kazakhstan in Gg of CO_2-eauivalent for the years 1990-2009. Source: National inventory Report, 2009, KAZNIEK. Source: http://www.ecoclimate.kz.

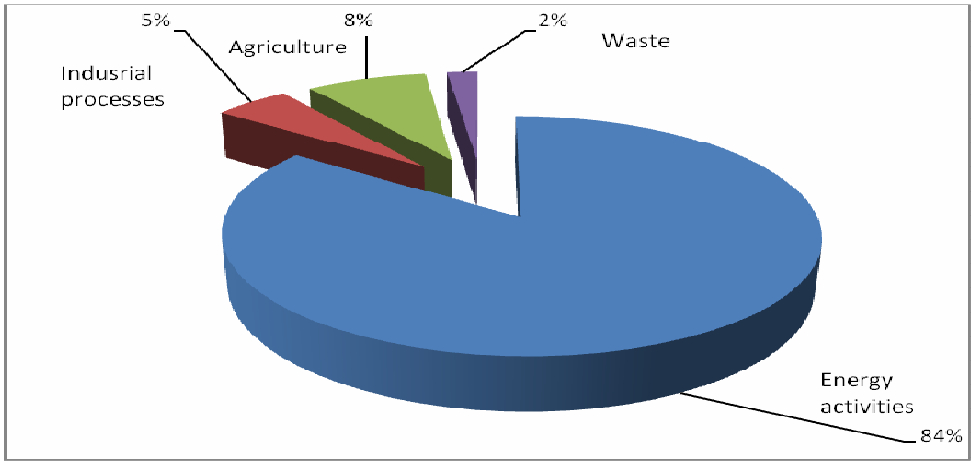

Figure 3.1.2. – Shares of different sectors in total GHG emissions in Kazakhstan in 2009 (Excluding LULUCF). Source: http://www.ecoclimate.kz.

"Agriculture" is the second largest GHG emission sector in Kazakhstan. The total emissions from this sector, including methane and nitrogen oxide, estimated as 23 407.02 Gg of CO_2 equivalent in 2009, which represents 8.4% of total national emissions. The share of methane emissions from the sector was 64 % that was totalled to 14937.41 Gg of CO_2 -

equivalent when nitrogen compounds (direct and indirect) were 8470.20 Gg of CO_2-equivalent, or 36% of the total emission from agriculture. Compared to 2008, total emissions from the sector increased by 824.46 Gg of CO_2-equivalent, or by 3%. Since 1993 the total component of methane emissions from the sector rose to 62-64% compared to 56-57% in 1990-1992.

With respect to the base year of 1990 the trend in total emissions from the sector of agriculture has changed enough. Beginning from 1999, they increased on average by 1000 Gg per year by 2009 and reached 54% of the base year.

In 2009 the emissions of gases within the sector are distributed by major sources in the following descending order:

-Internal fermentation of farm animals emitted about 13813.73 Gg of CO_2 equivalent, or 59 % of the total value of the sector;

-Collection and storage of manure produced 5094.28 Gg of CO_2-equivalent, or 22%;

-Manure management gives 4389 Gg of CO_2 equivalent, or 19% of the total;

-Rice fields (checks) produced only 109.62 Gg of CO_2 equivalent, or less than 0.46%.

"**Industrial processes**" is the next largest sector equalled to 5.1% of the total national GHG emissions (without LULUCF). The main sources of GHG in this sector are iron and steel industry (64.4%) and mineral products (33.6%). The share of emissions from chemical production is around 2% of the total emissions in the sector. In 2009, emissions in the sector "Industrial processes" were reduced by 27.7% compared to the base year and by 3.3% compared to 2008. The main reason for reducing emissions were decrease in the level of production associated with a reduction of demand for the industry products on the market.

In the sector of 'Solvent and other product "calculations were performed only for NMVOC share, which in 2009 was less than 0.1% of total GHG emissions (without LULUCF). In 2010, it is expected to continue to work on this category in this sector.

LULUCF sector includes both emission and absorption of carbon dioxide. The resulting value of inventory in the LULUCF sector is a net absorption. Net absorption of CO_2emissions in the sector varies across the time between 4 - 8% of the total annual GHG emissions. Net flow of CO_2in comparison with 1990 has increased, mainly due to the withdrawal from circulation of agricultural land. CO_2 absorption by "forest land" in recent years was reduced because of aging the trees and consequently reducing the average stock of timber per 1 hectare. The maximum absorption was 9319 Gg in 2003, and the smallest one was 1118 Gg in 1991.

Sinks of greenhouse gases from the category of "Forest lands" in Kazakhstan in 2009

decreased compared to 1990 more than three times mainly due to the forest fires.

The contribution of the "**Waste**" sector in 2009 into the total national emissions was 2.2% and practically did not change compare to its share in 1990. The main source of CH_4 emissions is landfill of the municipal solid waste (MSW), and N_2O emissions are mainly associated with waste water from human waste. With respect to the base year emissions in the sector in 2009 increased by 3.4% due to increased accumulation of solid waste in landfills.

3.2. GHG inventory, emissions per type

The GHG inventory in Kazakhstan covers the following gases: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated gases as hydro fluorocarbons (HFCs), per fluorocarbons (PFCs) and sulphur hexafluoride (SF_6). The base year for calculating the emissions of CO_2, CH4 and N_2O is 1990, and the base year for the emissions of fluorinated gases is 1995.GHG emissions in 2009 were (without LLUCF) 75,3 % of the 1990 level.

The share of each gas with direct greenhouse effect in the total national emissions in 2009 is as follows: CO_2 is 82.8%, CH4 is 17.3%, and N_2O is 3.5%. The total contribution of fluorinated gases (HFCs, PFCs and SF_6) was less than 0.5%. Total CO_2 emissions in 2009 were estimated to be 219.2 million tons in view of carbon sequestration, and excluding acquisitions as 230.5 million tons. Emissions of CH_4 and N_2O were assessed as of 48.3 and 9.6 million tons of CO_2 equivalents, respectively. Emissions of HFCs, PFCs and SF6 were minor and compiled to 416.26, 943.38 and 3.31 tons of CO_2 equivalents.

Total national GHG emissions without LULUCF in 2009 were 75.3% of the level of emissions in 1990 and compared to 2008 the increased by 6.1%.

3.3. Information publicly available

Information on national inventory report and CRF tables are publicly accessible through the web sites of KazNIIEK (http://www.ecoclimate.kz) and Designated National Authority (http://www.climatechange.kz).

Besides national inventory reports of Kazakhstan for 2008 and 2009 are available at the web site of the UNFCCC secretariat alone with the review report of the 2010 submission and CRF tables (http://unfccc.int/).

Information on national statistical data is available at web sites of Agency RK of Statistics: http://www.stat.kz/publishing/Pages/publications.aspx; http://www.stat.gov.kz/Pages/default.aspx.

It is necessary to note about specific features of the national statistical data: there are a lot

of gaps of in order to receive the necessary data and in dynamics, due to the fact that Kazakhstan is independent since 1991 the statistics for the period up to 2000 leaves much to be desired because of non consistent, the forms of presenting data changed each year. In general the national statistics presents figures related to economy in national currency and US dollars only, related to energy - in tons of coal equivalent and Gcal mostly, there is no necessary detail or specific information and it is far from forms of European Statistic's representation.

Other ways to find useful and operational information is to refer to the official web sites of the ministries of the Republic of Kazakhstan:

Ministry of Oil and Gas	http://mgm.gov.kz/
Ministry of Economic Development and Trade;	http://www.minplan.kz
Ministry of Finance	http://www.minfin.kz
Ministry of Industry and New Technologies	http://www.mint.gov.kz
Ministry of Agriculture	http://www.minagri.kz
Ministry of Transport and Communications	http://mtc.gov.kz
Ministry of Health	http://www.minzdrav.kz
Ministry on Extraordinary Situations	http://www.emer.kz
Ministry of Environment Protection	http://www.eco.gov.kz

Additional information could be used from the research reports funded by UNDP, EU, WB, EBRD or ADB, but they are rearly published.

4. VERIFICATION

4.1. Statistical methods for QA/QC analyses

The quality assurance/quality control (QA/QC) procedures used in Kazakhstan's GHG inventory report and QA/QC plan was compiled. When conducting an inventory of GHG emissions for the period of 1990-2009 years the basic elements of QA/QC procedures in accordance with the requirements of the IPCC good practice Guidance were used. QA/ QC system follows the procedures of Level 1 GPG practice with individual elements of level 2, relating to quality control in key categories.

Performing QA/QC procedures is a part of the inventory preparation process. In order to control the quality of the National Inventory the Working Body shall develop and implement an annual plan for QA/QC. This plan includes the following procedures:

— General QC procedures;

— QC procedures for source categories;

— Procedures way QA;

— Reporting procedures, documentation and archiving.

QA/QC plan includes the activities of the QA/QC schedule for the preparation of the inventory from the start of development to its submission to the Secretariat, the description of verification procedures, as well as the consolidation of those responsible for quality control procedures and deadlines.

Procedures for QA/QC plan includes the appointment of the person responsible for checking, setting his work schedule and timing verification, validation of input data, cross-checking of calculations between experts on specific industries, attracting international and national experts. Preparation of the annual GHG inventory requires constant monitoring of the quality of inventory data. Quality control is performed by visual inspection, cross-checking, automated checks to be recorded in an electronic database, and counting.

QA/QC plan shall be based on the IPCC methodology and should periodically look closely in order to improve the inventory.

The general QC procedures include the following activities:

1. Checking the documentation of assumptions and criteria for the selection of activity data, emission factors and other estimation parameters: correct recording and archiving.

2. Check for errors associated with copying the original data to verify the correctness of links to data sources, cross-check water data.

3. Check the correctness of the calculations of emissions and removals: the correct calculation formulas.

4. Check that the units of measurement parameters, conversion factors and emissions used appropriately.

5. Check the integrity of the database files.

6. Check the consistency between the categories.

7. Check for consistency in the assessment and the uncertainty of input data.

8. Check for consistency in time series: comparison with previous estimates of emissions inventories.

9. Check the completeness of the data.

10. Check trends in activity data and the availability of an explanation of unusual trends in activity data, emission factors and estimates.

11. Conduct a review of internal documents and archives, the presence of duplication of the internal documentation.

It is necessary to compile lists of checking all input data on the activities with responsible persons and the dates of commencement and completion inspection by sector.

Quality control procedures were performed during the preparation of the inventory by its developers, involving, if necessary, by specialists from the other organizations to obtain additional information required. Quality assurance procedures are carried out with outside organizations, ministries and departments.

Activities under the quality control were performed in accordance with the tables audits, which included both the general quality control procedures (level 1) and detailed procedures (level 2). The bulk of the procedures carried out by sector experts, namely, in-depth validation of initial data, emission factors, calculations, completeness of documentation, etc. Person responsible for QA/QC checks conducted of general trends, compliance methodologies.

4.2. Calculation of data-verification indices

Verification activities are usually done for each sector separately. The QC/QA plan for different sectors includes the QC activities described in the IPCC GPG (IPCC, 2000).

Activity data are checked annually for updating. Emission factors are compared with IPCC default and with emission factors of other countries and local factors.

Kazakhstan QA/QC plan and uncertainty assessment is currently under development and is planned to be used fore evaluation during development of the Third National Communication. The Second National Communication (2009) does not include such analysis.

REFERENCES

FCCC/CP/2001/20. Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol. UNFCC Conference of the Parties, Seventh session, 10 November 2001.

IPCC, 1997, *Greenhouse Gas Inventory Reporting Instructions, Vol. 1; and Greenhouse Gas Inventory Reference Manual, Vol. 3*, Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories, Intergovernmental Panel on Climate Change, Bracknell, U.K.

IPCC,2000, *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, Intergovernmental Panel on Climate Change, Organisation for Economic Co-operation and Development, and International Energy Agency, Tokyo.

IPCC, 2003, Good Practice Guidance for Land Use, Land-Use Change and Forestry. Intergovernmental Panel on Climate Change. Organisation for Economic Co-operation and Development, and International Energy Agency, Tokyo.

IPCC, 2006, *IPCC Guidelines for National Greenhouse Gas Inventories*, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published by the Institute for Global Environmental Strategies (IGHG), Hayama, Japan on behalf of the IPCC.

IPCC, 2000. IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories.

IPCC, 2003. Good Practice Guidance for Land Use, Land-Use Change and Forestry (GPG-LULUCF 2003)

Information bulletin named “About Environment status in 2010”, «KAZGIDROMET» MoEP, Astana 2011.Issue 2, p 12-17 (only in Russian)

International Energy Agency, 2007. Reference to “Electricity/Heat in Kazakhstan” website, available at: http://www.iea.org/stats/electricitydata.asp?COUNTRY_CODE=KZ

Kazakhstan's second national communication to the Conference of the Parties of the United Nations Framework Convention on Climate Change, available at:

http://unfccc.int/national_reports/non-annex_i_natcom/items/2979.php

Ministry of Environment Protection of the Republic of Kazakhstan, 2011. Program

"Ghasyl-Damu for 2010-2014" (in Russian), website, available at: http://www.nomad.su

Ministry of Environment Protection of the Republic of Kazakhstan, 2010."The National Annual Report on Biodiversity", (in Russian), website, available at: http://www.eco.gov.kz

Ministry of Environment Protection of the Republic of Kazakhstan, Program "Zhasyl El" for 2008–2010, 2008, (in Russian only), operational information, website, available at: http:// www.eco.gov.kz

Ministry of industry and new technologies RK, 2010. Reference to "Kazakhstan Development Strategic Plan 2020", website, available at: http://www.mint.gov.kz

National Human development Report, 2008, UNDP, website, available at:http://hdr.undp.org/en/statistics

Statistical book "Environment and Sustainable Development of Kazakhstan, 2006-2010", 2011, page 30, 74, 83,95-96, 154, 160 website, available at: http://www.stat.gov.kz, http://www.stat.kz/publishing/Pages/publications.aspx

Statistical book "Kazakhstan today", 2011, page7, 25, 36 (in Russian), website, available at: http://www.stat.gov.kz

Statistical book "Kazakhstan in numbers", 2011, page 13, website, available at:http://www.stat.gov.kz,

Statistical book "Kazakhstan during Independence 1991-2010", 2011, website, available at:http://www.stat.kz/publishing/Pages/publications.aspx

Statistical book "Kazakhstan in2010", 2011 (In Russian), http://www.stat.gov.kz,

Yesserkepova I., 2010. "Kazakhstan. Concise report and summary of national publications on climate change dimensions and impacts", website, available at: http://www.fao.org/docrep/014/.../k9589e08.pdf

US DOE/EIA. November 2009. Reference to "Kazakhstan Energy Data, Statistics, and Analysis". Website, available at: http://www.eia.doe.gov/cabs/Kazakhstan/Full.html

Website of Food and Agriculture Organization, available at: http://apps.fao.org.

Website of National Agency of Statistics, available at: http://www.stat.kz (in Russian)

Website of KazNIIEK. available at: http://www.ecoclimate.kz

Website of the Ministry of Environment Protection, available at:

http://www. eco.gov.kz

Website of the Ministry of Economy and Trade, available at: http://www.minplan.kz

Website, available at: http://www.invest.gov.kz

Website: http://www.kazhydromet.kz

Website, available at: http://unfccc.int/essential_background/library/items/3599.php?such=j&symbol=KAZ/COM/2

Website, available at: http://kazfin.info/archive/2009

Website, available at: http://www.stat.gov.kz

Website, available at: http://kazfin.info/archive/2010

Website, available at: http://hdr.undp.org/en/statistics

Website, available at: http://www.nauka.kz/

Website: http://www.climatetemp.info/kazakhstan/

APPENDIX

ABBREVIATIONS

ADB		Asian Development Bank
Bln. USD	-	Billion United States Dollars
CMP	-	Conference Meeting of the Parties
CHP	-	Combined Heat and Power
CRF	-	Country Reporting Format
CIS	-	Commonwealth of Independent States
DNA	-	Designated National Authority
EU	-	European Union
IEA	-	International Energy Agency
IPCC	-	Intergovernmental Panel for Climate Change
GDP	-	Gross Development Product
GTN	-	Global Telecommunication Network
GOK		Government of Kazakhstan
HDI	-	Human Development Index
FEB	-	Fuel and Energy Balance
KazNIIEK	-	Kazakh Research Institute of Ecology and Climate
KZT	-	Kazakhstan Tenge (Currency)
LULUCF	-	Land use, land-use change and forestry
MoEP	-	Ministry of Environmental Protection
MINT	-	Ministry of Industry and Innovative Technologies
Mln.		million
NIR	-	National Inventory Report
RK	-	Republic of Kazakhstan
SBI	-	Subsidiary Body for Implementation
QA	-	Quality Assurance
QC	-	Quality Control
UNFCCC	-	UN Framework Convention on Climate Change
UK	-	United Kingdom
UNDP	-	United Nations Development Program
WB	-	World Bank
$	-	United States Dollar
		Units
°C	-	Center Degrees
Gg	-	Giga grams
GWh	-	Giga Watt Hour
Gcal	-	GIga Calorie
kWh	-	Kilo Watt Hour
Mtoe	-	Million of tons of oil equivalent
mm	-	millimeter

MWh	-	Mega Watt Hour
PJ	-	Penta Joule
sq. km	-	square km
TWh	-	Tera Watt Hour