PROMITHEAS – 4

Bulgaria

Mapping national procedures, sources, available data and information

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Acknowledgements

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CONTENTS

1. General information

1.1 Governmental structure

Bulgaria functions as a parliamentary democracy. The country is governed under the Constitution of 1991. The President, who is the head of state, is popularly elected for a five-year term and is eligible for a second term. The Prime Minister, who is the head of government, is elected by the legislature, as is the cabinet. The 240 members of the unicameral National Assembly are popularly elected for four-year term.

1.2 Mapping national procedures

1.2.1 Key categories according to IPCC

In accordance with the requirement of 1996 IPCC GL [23] Bulgaria presents detailed information about GHG emissions in seven sectors: energy, industrial processes, solvent and other product use, agriculture, land use, land-use change and forestry, waste and other.

The elaboration of National Inventory Report (NIR-2011) follows the guidance of IPCC 2006 GL [16].

The key source categories are identified according to the method described in IPCC GPG 2000 [14]. For the estimation of emissions and removals from LULUCF the GPG-LULUCF, 2003 [15] approach is used.

Emission factors selection methods are shown on the next Table 1, Table 2 and Table 3**Σφάλμα! Το αρχείο προέλευσης της αναφοράς δεν βρέθηκε.**.

Greenhouse Gas Source and Sink	CO_2		CH_4		N_2O	
CATEGORIES	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
1. Energy	T1,T2	CS,D	T1,T2	D	T1,T2	D
A. Fuel Combustion	T1,T2	CS,D	T1,T2	D	T1,T2	D
1. Energy Industries	T1,T2	CS,D	T1	D	T1	D
2. Manufacturing Industries and Construction	T1,T2	CS,D	T1	D	T1	D
3. Transport	T1,T2	CS,D	T1,T2	D	T1,T2	D
4. Other Sectors	T1,T2	CS,D	T1	D	T1	D
5. Other	NA	NA	NA	NA	NA	NA
B. Fugitive Emissions from Fuels	T1	D	T1	D	NA	NA
1. Solid Fuels	NA	NA	T1	D	NA	NA
2. Oil and Natural Gas	T1	D	T1	D	NA	NA
2. Industrial Processes	D,T1,T2	CS,D,PS	D	D	T3	PS

Table 1: Methods and the emission factors applied (CO_2, CH_4, N_2O)

Greenhouse Gas Source and Sink	CO_2		CH_4		N_2O	
CATEGORIES	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
A. Mineral Products	T1,T2	CS,D,PS	NA	NA	NA	NA
B. Chemical Industry	D,T2	D,PS	D	D	T3	PS
C. Metal Production	D,T2	CS,D,PS	NA	NA	NA	NA
D. Other Production	NA	NA				
E. production of halocarbons and SF						
F. Consumption of halocarbons and SF						
G. Other	NA	NA	NA	NA	NA	NA
3. Solvent and other product use	D, TI	D			D	CS, D
4. Agriculture	D,T1,T2	CS,D	D,T1,T1a,T1b	CS,D	D,T1,T2	CS,D
A. Enteric Fermentation			T1,t2	CS,D		
B. Manure Management			T1,T2	CS,D	D	D
C. Rice Cultivation			D	CS		
D. Agricultural Soils			NA	NA	T1,T1a, T1b	D
E. Prescribed Burning of Savannas			NA	NA	NA	NA
F. Field Burning of Agricultural Residues			D	CS,D	D	CS,D
G. Other			NA	NA	NA	NA
5. Land Use, Land-Use Change and Forestry	T1,T2	CS,D	T1	D	T1,T2	CS,D
A. Forest Land	T1,T2	CS,D	T1	D	T1	D
B. Cropland	T1,T2	CS,D	NA	NA	T2	CS
C. Grassland	T1	CS	NA	NA	NA	NA
D. Wetlands	T1	CS	NA	NA	NA	NA
E. Settlements	T1	CS	NA	NA	NA	NA
F. Other Land	NA	NA	NA	NA	NA	NA
G. Other	NA	NA	NA	NA	NA	NA
6. Waste	T1	D	D,T2	CS,D	D	D
A. Solid Waste Disposal on Land			NA	NA	T2	CS,D
B. Waste-water Handling			D	CS,D	D	D
C. Waste Incineration	T1	D	NA	NA	NA	NA
D. Other	NA	NA	NA	NA	NA	NA
7. Other (as specified in Summary 1.A)	NA	NA	NA	NA	NA	NA

Table 1 (continued). *Source: NIR-2011 [18]*

Greenhouse Gas Source and Sink	HFCs		PFCs		SF6	
CATEGORIES	Method applied	Emission factor	Method applied	Emission factor	Method applied	Emission factor
2. Industrial Processes	T2	D	T2	D	T2	D
A. Mineral Products						
B. Chemical Industry	NA	NA	NA	NA	NA	NA
C. Metal Production	NA	NA	NA	NA	NA	NA
D. Other Production						
E. Production of Halocarbons and SF6	NA	NA	NA	NA	NA	NA
F. Consumption of Halocarbons and SF6	T2	D	T2	D	T2	D
G. Other	NA	NA	NA	NA	NA	NA

Table 2: Methods and the emission factors applied: HFCs, PFCs, SF_6

Source: NIR-2011

The notations are shown on the following Table3.

Use the following notation keys to specify the method applied:		
D (IPCC default)	**T1a, T1b, T1c** (IPCC Tier 1a, Tier 1b and Tier 1c, respectively)	**CR** (CORINAIR)
RA (Reference Approach)	**T2** (IPCC Tier 2)	**CS** (Country Specific)
T1 (IPCC Tier 1)	**T3** (IPCC Tier 3)	**OTH** (Other)
If using more than one method within one source category, list all the relevant methods. Explanations regarding country-specific methods, other methods or any modifications to the default IPCC methods, as well as information regarding the use of different methods per source category where more than one method is indicated, should be provided in the documentation box. Also use the documentation box to explain the use of notation OTH.		
Use the following notation keys to specify the emission factor used:		
D (IPCC default)	**CS** (Country Specific)	**OTH** (Other)
CR (CORINAIR)	**PS** (Plant Specific)	

Table3: Notations on Table 1 and Table 2. *Source: NIR-2011*

Methodology for retrieving key-category data

Described in 2.1.4

Responsible authorities and contact persons

Described in 2.1.1 and 2.1.2.

The postal and electronic addresses of the single national entity are [12]:

Executive Environment Agency at the Ministry of Environment and Water

136 "Tzar Boris III" Blvd,Sofia 1618, Bulgaria, P.O.Box 251

Tel.: +359 2 9559011

Fax: +359 2 9559015

E-Mail: vgrigorova@ eaa.government.bg

E-mail: ncesd@eaa.government.bg

http://eea.government.bg/eng

National Focal Point (NFP):

Milya Dimitrova, Head of Climate Change Policy Directorate Organization: Ministry of Environment and Water, Address: 22 "Maria Luiza" blvd., 1202 Sofia, Bulgaria

E-mail: madimitrova@moew.government.bg

Tel.: +359 2 940 62 85

National Inventory Focal Point (NIFP) & National Inventory Compiler (NIC):

Evelina Nikolova, Head of Air Quality unit in Air Monitoring Department Organization: Executive Environment Agency, Address: 136, "Tsar Boris III" blvd., 1618 Sofia, Bulgaria

e-mail: serafimov@eaa.government.bg

Tel.: +359 2 940 64 87

Fax: +359 2 955 90 15

Procedures to address climate-change issues

Not available.

1.3 Population

Since 1990 a steady tendency towards decreasing of the Bulgarian population has started.

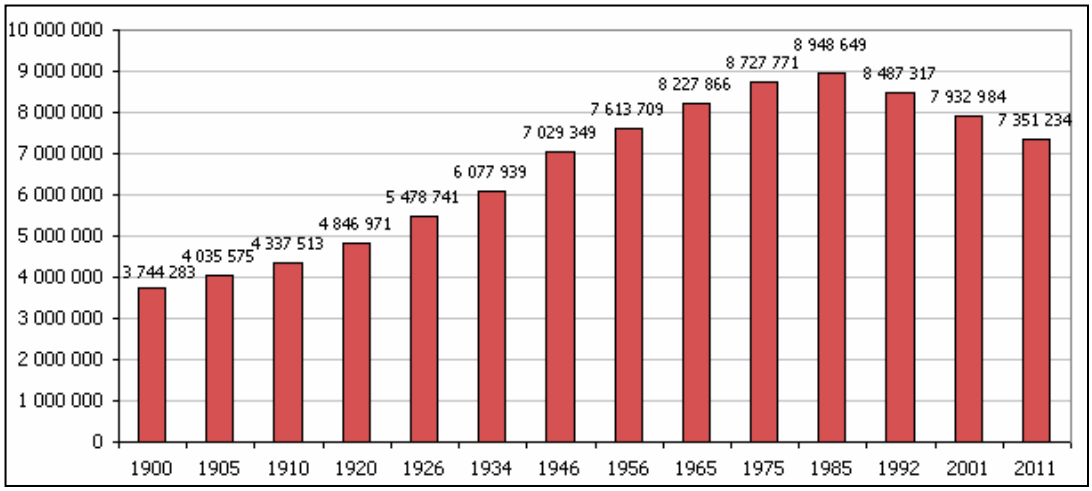

Figure 1: Population in accordance with the censuses 1900 – 2011. *Source: NSI[1], Census 2011*

According to results of the last census (February 2011), the country's permanent population is 7 364 570 persons. In the last ten years, as a result of the greater number of deaths compared to that of births and the negative international migration balance, the number of the population has decreased almost by 600 thousand persons.

The share of females in the total population (51%) prevails over that of males.

[1] http://www.nsi.bg/index.php

Ageing of population is one of the main demographic problems. As of February 2011, the share of the population up to 17 years of age is 16% and of persons over 65 years - 19%, compared to 15% and 16.9% in 2001. As a rule, ageing of population is stronger amongst female population, due to the higher mortality of men and the respective lower life expectancy.

1.3.1 Country's demographic characteristics

In 2009 there were 5302 settlements in Bulgaria, of which 255 cities and 5047 villages. No population was present in 148 settlements.

The urban population represents more than 70% of the total country population. This distribution is caused mainly by natural population growth and migration.

The main migration flows are directed towards the capital city (120 000 persons during the last decade); with much smaller percentage are Plovdiv, Varna and Burgas. As of 2011, the population of the city of Sofia has increased (1 291 591 inhabitants) in comparison with 2001 (1 173 988 inhabitants), which makes more than 18% of the total population of the country.

Around 50% of the country's population live in the South-West Region – 2 113 thousand persons (28%) and in the South Central Region – 1 528 thousand persons (20%). They are followed in terms of population number by South-East and the North- East regions with a population of 1 117 thousand and 989 thousand persons respectively, or a total of 28% of the population of Bulgaria. The North Central and the North-West regions have a population of 915 thousand and 903 thousand persons respectively, or by 12% of the country's population.

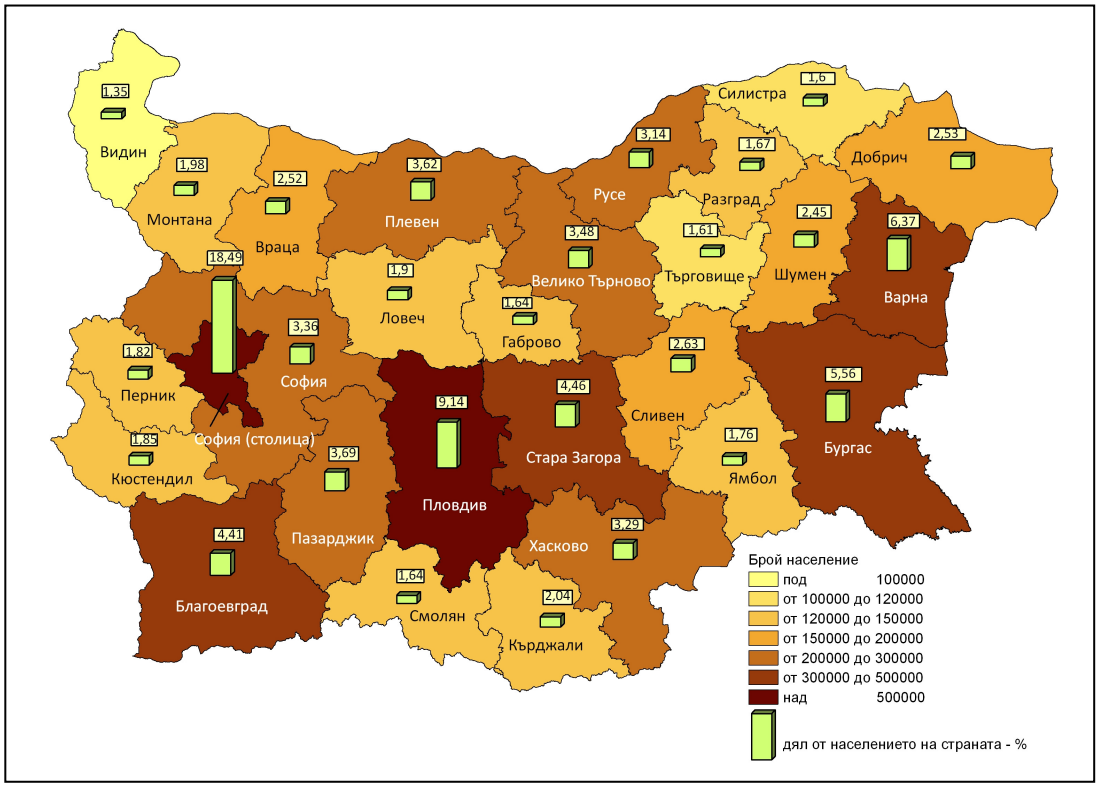

Figure 2: Population by districts as per 01.02.2011. *Source: NSI, Census 2011*

The formed positive tendencies of the Bulgarian demographic development in the last years continue in 2009 as well. They could be seen in the delay of population decrease, improvement of indicators of natural movement, increase of life expectancy. Compared to the other European countries, the high levels of crude death rate, lower life expectancy and negative international migration are still considerable problems. Nevertheless, it can be summarized that the country is going out of the hard demographic crisis of the last decade of the previous century. Regardless of the positive changes in some demographic indicators the population will continue to decrease. According to the population projection elaborated by the National Statistical Institute (NSI) the population is expected to be around 7 528 thousand persons in 2010 and 7 137 thousand persons in 2020. If the tendencies of demographic processes development remain the same during the whole period till 2060, the population will be around 5 475 thousand persons at the end of the last year.[21]

1.3.2 Development indicators

Stable tendency of increase of the household's nominal income is observed during the last 10 - 11 years. For the 1999 - 2009 period the total income per household member increases from 1 502 to 3 693 BGN or 2.5 times.

Social transfers (benefits, pensions, social assistance payments and child allowances) provided in 2009 increased 3.7 times and their share within the total income increase by 10.1% compared to 1999. Pensions are dominating amongst the social transfers. Compared to 1999, average income from pension per capita increase from 266 to 1 020 BGN in 2009 or almost four times.

Share of expenditure on housing, water, electricity and fuels increased during the analyzed period - from 11.9% in 1999 to 14.5% in 2009. Expenditure on health increased almost five times from 2.9% in 1999 to 5.3% in 2009. Similar tendency is observed in respect to expenditure on communications. Expenditure on transport increased to 6.9% in 2008 and in 2009 decreased by 26 BGN compared to the previous year.

Data also shows a relatively higher poverty level amongst persons aged 0-15 years and 65 years and more. High is the share of poor persons amongst the unemployed. Based on the indicators "Before the social transfers (received by the poor households)" and "Including pensions before the other social transfers" the conclusion could be done that the pensions contribute considerably to the reduction of poverty level – more than 22 per cents during the last years. Quantile ratio2 and Gini coefficient3 have slightly increased after 2006.

1.4 Geographic profile

1.4.1 Geomorphologic characteristics

The relief of Bulgaria is varied. In the relatively small territory of the country there are extensive lowlands, plains, hills, low and high mountains, many valleys and deep gorges. The main characteristic of Bulgaria's topography is alternating bands of high

[2] Measures households' polarization by income.

[3] Measures households' differentiation by income. Ranged between 0 and 1.

and low terrain that extend east to west across the country. From north to south, those bands (called geomorphological regions) are the Danubian Plain, Stara Planina, the Transitional region and the Rilo-Rhodopes Massif. The easternmost sections near the Black Sea are hilly, but they gradually gain height to the west until the westernmost part of the country is entirely high ground.

1.4.2 Ecosystems

Despite Bulgaria's comparatively small area (110 912 esq.), it possesses a very rich and unique biodiversity. The country hosts 94 mammals, 383 birds, 36 reptiles, 16 amphibians, 207 Black-Sea and fresh water fishes, around 27 000 insects and other invertebrates, 3 500-3 750 vascular plant species and more than 6 500 non-vascular plants and fungi.

Endemic plants account for about 5% of the entire flora.

Endemic are also 8.8% of non-insect and 4.3% of the insect species.

Categorised as rare in the flora and fauna have also been more than 700 vascular plants, 567 non-insect invertebrates, more than 1 500 insect species; 29 species of Black Sea and fresh water fishes; 2 species of snakes; 78 birds and at least 10 large mammal species including the Black Sea monk seal, endemic dolphin subspecies – the sea porpoise and the bottle-nosed dolphin, chamois, brown bear, wolf, otter and the European marbled polecat.

As a result of anthropogenic pressure, a number of Bulgarian species have decreased to a level of becoming extinct during the last decades. They include at least 31 vascular plant species, 7 invertebrates, 3 fish species, 2 snakes, 3 birds, 2 (or, possibly, 3) mammal species and 6 local animal breeds. In total Bulgaria has 473 protected animal species and 389 protected plant species.

Bulgaria has representatives of almost all the main habitats and biotopes known in Europe. Bulgaria's national collections of genetic resources harbour a rich diversity of species. In addition to already known commercial species, non-commercial species, including Black Sea and fresh water fish, could provide important economic and ecological benefits in the future. For instance more than 200 edible mushroom species and scores of medicinal plants can be found in Bulgaria. Bulgaria also hosts many relatives of domesticated species.[12]

The ecosystems in Bulgaria include:

- Black Sea;
- Black Sea coastal ecosystems;
- Black Sea seaside wetlands;
- Danube river and Danubian wetlands;
- Inland waters and wetlands ecosystems;
- Lowlands (meadows);
- Agricultural ecosystems;
- Mountain ecosystems (above 1900 m above sea level);
- Forests (up to 2000 m above sea level).

1.4.3 LULUCF

The total surface of Bulgaria is 11 100 190.2 ha, allocated in 6 categories as follows:

Type territory according to the purpose	Surface, ha	%
Agricultural	6 376 481.7	57.44
Forestry	3 715 753.8	33.47
Settlements and other urbanized areas	460 341.6	4.15
Water flows and areas	201 038.5	1.81
Territory for mining and quarrying raw materials	271 086.7	2.44
Transport and infrastructure territory	75 487.9	0.68

Source: Geodesy, Cartography and Cadastre Agency

Agricultural lands are 57.44%, out of which 78.05% are arable lands including 14.97% irrigated.

The distribution of land use is presented on the following Figure 3.

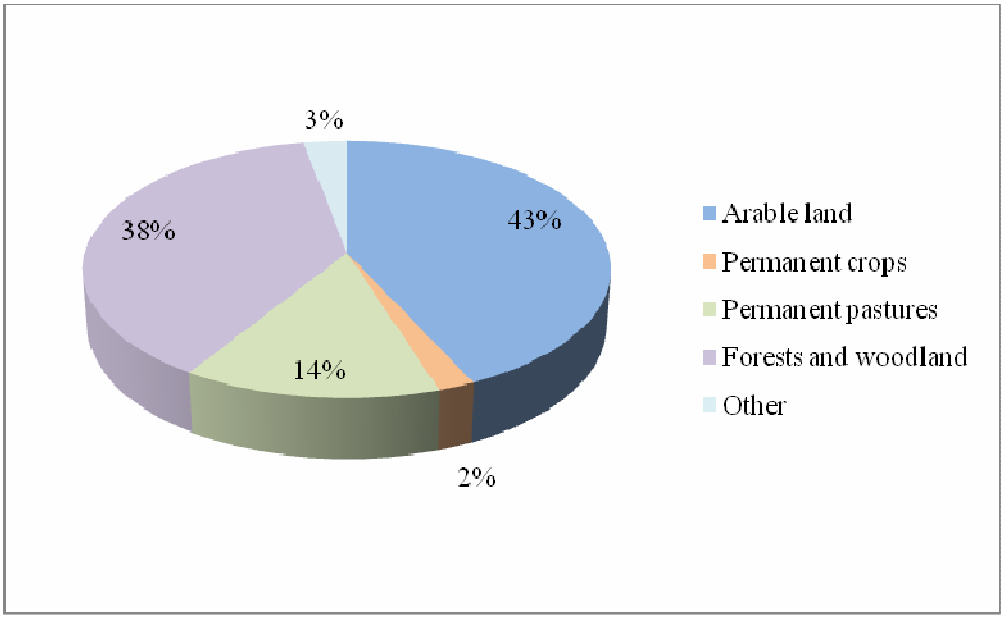

Figure 3: Distribution of the land use. *Source: MAF*

1.5 Climate profile

The climate in Bulgaria is moderate and transitional-continental with clearly distinguished four seasons. There are about 2 000 to 2 400 hours of sunlight per year. The summer is mostly dry and hot and the winter is cold, with snowfalls. The average annual temperature in 2009 was in the interval 11.9°C (Vidin) – 14.7°C (Sandanski).

A Mediterranean climate, with dry summers and mild, humid winters, prevails in the valley of the south-western Rhodope Mountains. The northern limits of the climatic zone are the Balkan Mountains.

The absolute highest temperature (45.2°C) was registered on 5th of August 1916 in the village of Sadovo, and the lowest (-38.3°C) – in the town of Tran (West Bulgaria, close to Sofia) on 25th of January 1947.

The precipitations are insufficient: from less than 400 mm/a in the north-eastern part of the country, to about 500 - 550 mm/a.

1.6 Economic profile

In the past, till 1989, the Bulgarian economy relied on heavy industry and agriculture, with some good achievements of the light industry. The main market for Bulgarian heavy industry and food industry production were the countries of Eastern Europe and the ex-Soviet Union but also countries from Africa and the Near East. The political changes in the early 1990-ies were accompanied by unreasonable economic reforms, complete lack of control and plundering, which all together brought the country to one of the heaviest crises in its history. Industry lost its markets; the agriculture was disorganized through an unwise restitution. After the severe crisis and hyperinflation in 1997, an economy recovery process had started.

In the next decade, the Bulgarian economy achieved considerable economic growth, mainly thanks to the Direct Foreign Investments (DFI), which were directed to realty, financial mediation, trade, production and others. According to the analyses of the Ministry of Economy, Energy and Tourism, the DFI, however, had not been allocated in the most sustainable sectors.

Since the end of 2007 a sharp decline started and continued till the second half of 2010. The export went down (from 9 b€ in 2007 to 3.2 b€ in 2009) due to the worsen conditions and lack of clear perspectives, the local consumption shrank. The inflation in 2009 went beyond 10%.

A tendency of economy stabilization has been observed during the last months, but the indicators for recovery are still uncertain.

Bulgaria remains the member-country of the EU with the lowest GDP per capita, which is around 40% of the EU average (

Figure **4** below).

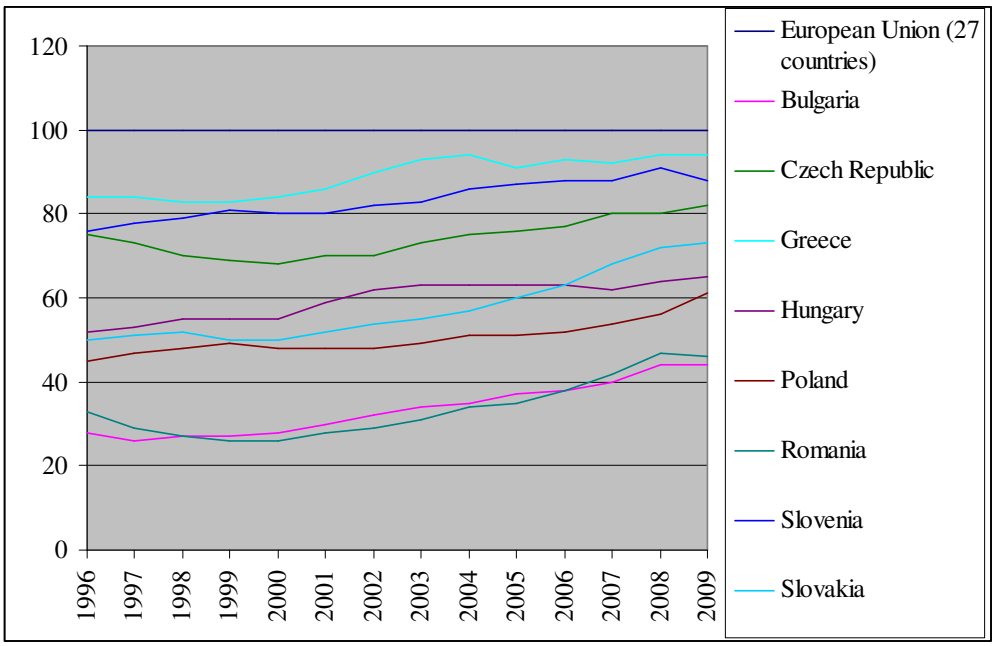

Figure 4: GDP of selected country-members in percents in relation to the EU average (100%). *Source: Eurostat*

More than 80% of the country's economy has been privatized. The corporate tax is 10%, VAT - 20%. The country is in conditions of a Currency Board, which imposes restrictions on the National Bank power.

The Bulgarian industry has long traditions in the production of metals, cement, glass, textile fibres, chemicals, medical goods etc. There are also possibilities for development of innovative sectors: computers, electrical motors, household appliances, arms, mechanical machines etc.

The current Bulgarian economy gives priority to three sectors: IT, energy efficiency technologies and medical technologies [25]. The Ministry of Economy, Energy and Tourism defines the following supporting instruments:

- Increase of RTD funding to 1.4 – 2% of GDP;
- Support to investments in innovative technologies (up to 50% subsidies in RTD to priority projects);
- Ensuring risk capital through different funds and Jeremy credit line;
- Regulatory framework established by an Innovation Act.

The banks in Bulgaria belong mainly to big international banking institutions with head offices in Europe or worldwide. According to the EBRD, the Bulgarian banking sector is well organized and the central banks have large amounts of foreign reserves. [5]

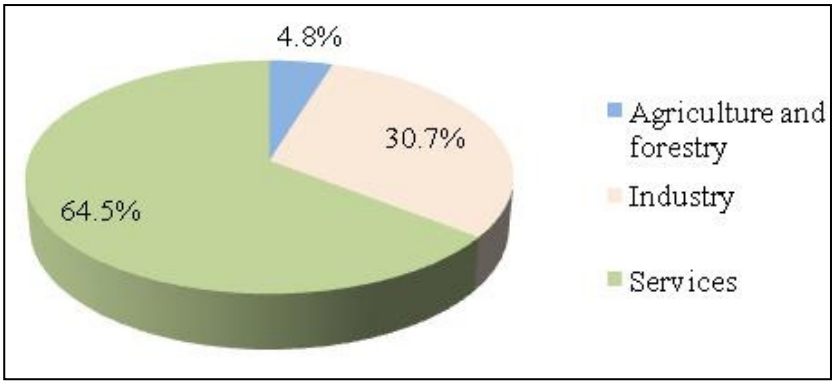

Figure 5: GVA per sectors. *Source: NSI*

1.6.1 Primary sector (agriculture, livestock, forestry)

The gross value added created in agriculture in 2009 decreased by 22% compared to 2008. It amounted to 2 880.5 million BGN at base prices (total for the agricultural sector – 3 313 million BGN).

In 2009 GVA at base prices was 38.76% of the value of gross output (Agrarian Report)[17] (Table 4).

GVA (thousand BGN)		Employment (thousands), 2009
Total for agriculture and forestry	2 836 721	738.2 (20% of the total for all sectors)
Agriculture, hunting and forestry	2 819 308	736.6
Fishing	17 413	1.6

Table 4: Contribution of primary sector to GVA at basic prices (thousand BGN), 2009. *Source: NSI*

The land for agricultural use in 2009 was 5 490 113 ha. In 2008 it was 5 648 206 ha and occupied 50.9% of the territory of the country.

The utilized agricultural area (UAA) includes arable land, permanent crops, permanent grasslands, kitchen gardens and greenhouse areas. The utilized agricultural area in 2009 was 5 029 585 ha, or 45.3% of the territory of the country. UAA continues decreasing and in 2009 it is by 1.4% compared to 2008.

Arable lands are the areas included in the crop rotation system, temporary grasslands with wheat and leguminous grasses. In 2009 they occupied 3 122 516 ha, or 62.1% of the country's UAA. During the years, the size of arable lands has increased from 59.5% to 62.1% of the UAA and in 2009 the growth is by 2.1% compared to 2008. This growth is caused by the increase of areas, planted with corn crops (wheat, barley, rye) and oil crops (rapeseed). [17] The Arable land and utilized agricultural area are shown on Table 5 below.

Arable land	3 122 516
Utilized agricultural area	5 029 585
Of which: kitchen gardens	21 411
orchards	63 102
vineyards	84 438
mixed permanent crops	16 996
meadows - orchards	19 057
permanent productive grassland	453 274
rough grazing	1 118 872
greenhouses, shelters and high penthouses	2 094
Alpine pastures	127 825

Table 5: Arable land and utilized agricultural area (hectares), 2009. *Source: NSI*

The development of livestock breeding in 2009 and the changed number of livestock holdings, animals and obtained products, was connected with the organizational, structural and legislative changes, imposed after the country became a full member of the EU.

The number of livestock breeding holdings in 2009 was about 290 000, which is less by 12.6% compared to 2008. This reduction was observed mainly in farms, breeding from 1 to 9 female breeding animals and it was determined by the continuing consolidation and concentration of livestock production. According to the statistical data, more than 51% of cows were bred in farms with more than 10 cows, 61% of buffalos were bred in farms with more than 20 buffalos and 5% of sheep were bred in farms with more than 50 sheep. There were changes also in swine farms, where 78% of swine were bred in farms with more than 50 sows. Poultry marked a growth of 17.7% in farms, breeding from 100 to 10 000 hens and pullets.

In 2009 it was registered a drop in the number of all types of bred animals, compared to 2008. Cattle decreased by 4.5%, goats by 16.1%, buffalos by 9.9%, sheep by 5.1%, swine by 6.9%. For poultry this reduction was only 0.8%. [17] Details can be seen on Table 6 which follows.

Cattle	539 555

Buffaloes	8311
Pigs	729 798
Sheep	1 400 252
Goats	360 822
Poultry	17 399 773
Beehives	624 965

Table 6: Livestock (number), 2009. *Source: NSI*

The value of final output in agriculture (production value after deduction of internal turnover) at basic prices (including subsidies on products) in 2009 was 7 438.1 million BGN, marking a drop of 20% compared to 2008.

Apart from the decrease of the physical quantities in the two sub-sectors – for plant-growing 1.1% and for livestock production – 8.8%, this result was also due to the decrease of prices of the most agricultural products in 2009 compared to 2008. The prices of wheat, corn, sunflower and vegetables decrease by 30%. The prices of livestock increase – 13.3% of cattle, sheep and goats – 5.2%, but decrease of swine by 2.4% and poultry by 1.6%. It is important the drop of milk production, which makes half of the value of products in this sub-sector – the physical volume decreases by 12.6%, the prices – by 18.1%.

In the structure of final production, the biggest share goes to plant-growing – 51.1%. [17] The values of agricultural products at current prices is shown on Table 7 below.

Cereal crops	1 321.3
Industrial crops	1 039.0
Fodder crops	571.9
Vegetables	475.0
Potatoes	203.5
Fruit	309.8
Other crop products	15.6
Crop output	3 936.1
Livestock	1 196.2
Livestock products	1 016.9
Livestock output	2 213.1
Agricultural; goods outputs	6 149.2

Table 7: Agricultural products – values at current prices (million BGN), 2009. *Source: NSI*

The total forest area of Bulgaria is 4.1 million ha, which constitutes 34% of the country's territory. Deciduous forests cover 2 572 260 ha – 70.4%, and coniferous forests 1 078 983 ha – 29.6 %.

The natural forests constitute 73.4% of the forested area (2 679 130 ha), of which coniferous forests constitute 399 522 ha (14.9%).

The wood fund is about 590 million m^3.

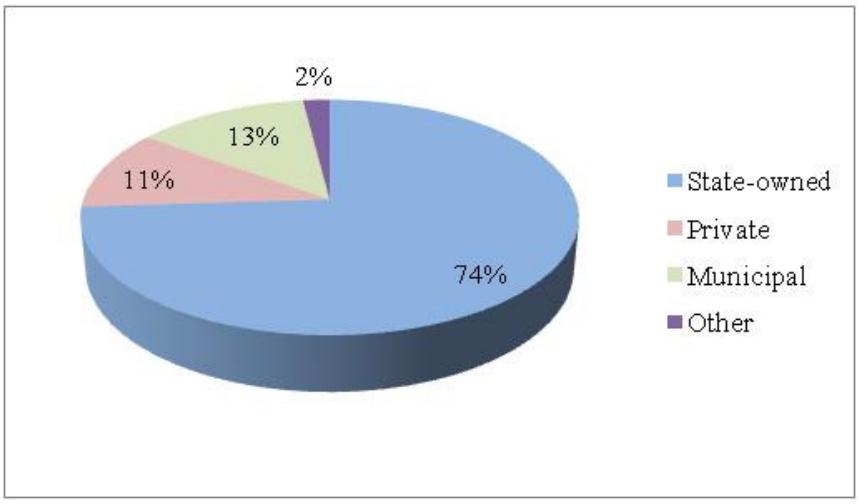

Figure 6: Distribution of forests, according to their ownership. *Source: NSI*

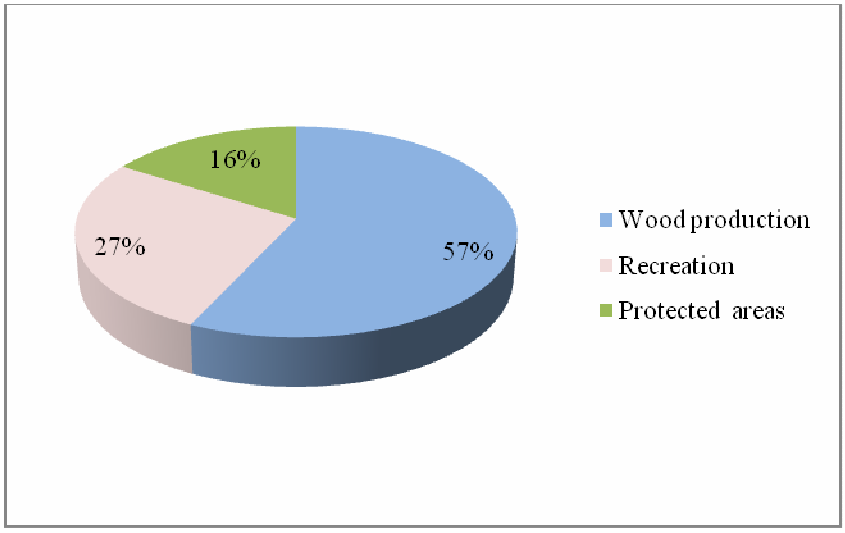

Figure 7: Distribution of forests, according to their function. *Source: NSI*

1.6.2 Secondary sector (mining, manufacture, construction, energy industries)

In 2009 GVA at basic prices for the secondary sector was 30.7%. The Contribution of processing industry to gross value added at basic prices is shown on Table 8.

GVA (thousand BGN)		Employment (thousands), 2009
Total for industry	17 996 307	1 032 (28% of the total for all sectors)
Mining and quarrying	1 216 959	29.6
Manufacturing	9 286 631	679.7
Electricity, gas and water supply	2 489 150	54.6
Construction	5 003 567	268.1

Table 8: Contribution of processing industry to gross value added at basic prices (thousand BGN), 2009. *Source: NSI*

1.6.3 Tertiary sector (trade, tourism, transport, communication)

The sector of services constitutes 64.5% of the total GDP. The contribution of tertiary sector to gross value added at basic prices may be seen on the next Table 9.

GVA (thousand BGN)		Employment (thousands), 2009
Total for services sector	35904122	1954.6 (52% of the total for all sectors)
Trade, repair of motor vehicles and personal and household goods	6 511 816	556.0
Hotels and restaurants	1 445 380	148.3
Transport, storage and communications	5 773 944	231.5
Financial intermediation	4 093 758	60.3
Real estate, renting and business activities	9 629 080	237.3
Public administration, compulsory social security	3 513 574	238.9
Education	2 100 252	181.3
Health and social work	1 530 836	154.9
Other community, social and personal service activities	1 305 482	146.1

Table 9: Contribution of tertiary sector to gross value added at basic prices (thousand BGN), 2009. *Source: NSI*

1.6.4 Future prospects for the country's economy

On the next Table 10 several basic macroeconomic indicators accepted are shown.

	2010	2011	2012	2013	2014	2015
Currency rate (average annual)	1.33	1.32	1.31	1.30	1.29	1.28
GDP – (real terms, % change) - World economy	4.96	4.43	4.48	4.59	4.66	4.67
GDP – (real terms, % change) - EC	1.82	1.73	2.04	2.15	2.18	2.12
Oil prices (USD/barrel)	27.92	35.52	0.79	-2.13	-0.95	0.48
6 months LIBOR denominated in USD deposits	0.52	0.63	0.88	1.38	2.38	3.38
3 months LIBOR denominated EUR deposits	0.81	1.39	2.11	2.71	3.18	3.56
International prices (% annual)	26.27	25.06	-4.31	-6.79	-6.30	-3.82
Food	11.43	24.09	-4.72	-6.42	-5.40	-3.83
Beverages	14.12	23.88	-3.52	-10.97	-11.32	-10.74
Agricultural resources	33.24	24.78	-11.53	-7.34	-3.31	-3.22
Metals	48.12	26.50	-0.75	-6.37	-7.78	-3.15

Table 10: Projections about main macroeconomic indicators till 2015. *Source: National programme for reforms [26]*

On this basis on the following Table 11 projections about economic indicators till 2015 are presented. For the period 2011-2015 it is foreseen moderate, but stable economic growth between 3.6% and 4.4%. After 2011 the domestic demand will increase the pressure on import. The growth rate of consumption and investments will

increase in medium-term, but their share in GDP will remain lower in comparison to the levels before crisis.

During the period until 2020 it is expected that the Bulgarian economy will grow with an average rate of 3.9%. In the mid-term until 2015 the growth rates are expected to be above 4%, however, the deviation from the potential GDP will remain negative by 2013. According to the base scenario, grounded on production function, it is assessed that the potential growth during the period 2011-2014 will be 2.8% average, and during the period till 2020 – 3.4% respectively. Potential GDP will be increasing its growth by 2016, after that it will retain, due to the negative influence of labour, caused by the ageing of population and decreasing of the employment coefficient.

		2010	2011	2012	2013	2014	2015
GDP – current prices	Mln.EUR	36032.8	38640.9	41330.3	44216.5	47084.4	50199.7
Real GDP growth	%	0.2	3.6	4.1	4.4	4.2	4.3
Contribution to the GDP growth:							
Investments	%	-4.1	1.4	1.8	1.9	2.0	2.2
Demand	%	-0.9	2.2	27	3.3	2.6	3.0
Net export	%	5.2	0.1	-0.4	-0.8	-0.3	-0.9
GDP deflator	%	3.0	3.5	2.7	2.5	2.2	2.2
Harmonized inflation – average for the period	%	3.0	3.9	3.3	2.6	2.4	2.4
Current account (GDP)	%	-1.0	-2.2	-3.3	-3.9	-3.8	-4.0
Trade balance	%	-6.7	-7.1	-7.8	-8.4	-9.0	-9.6
Services, net	%	5.3	5.3	5.2	5.1	5.3	5.4
Income, net	%	-3.9	-4.2	-4.5	-4.2	-3.5	-3.0
Current transfers, net	%	4.3	3.9	3.7	3.6	3.3	3.2
Capital and financial account, incl.	Mln.EUR	289.9	2463	4938	3652	4603	4076
Direct foreign investment	Mln.EUR	1638.6	2242	3266	3429	3601	3781
Overall balance	Mln.EUR	-383.9	1631	3562	1913	2805	2048

Table 11: Projections about economic indicators till 2015. *Source: National programme for reforms [26]*

It is expected that export development and recovery of domestic demand will influence positively the investments, which will start recovering, but at lower rates compared to the period before 2009. In 2011, as a result of the intensified demand and

broadening of geographic and product structure of the export, it is expected more active investment activity and increase of gross fixed capital formation by 5.6%.

During the whole forecasted period, the share of investments in GDP will be increasing and will reach 28% in 2015; however, the growth rate of gross fixed capital formation will remain at levels below 8%.

Labour productivity in 2011 will hold back to 3.4%, but in 2012-2014 it is expected to grow with slow accelerating rates, accompanied by moderate growth of employment and decrease of unemployment up to 8.7% in 2015.

During the period 2011-2015 it is expected moderate, delaying inflation.

In 2011 the average annual inflation rate is expected to accelerate, because the consumer prices of food and energy goods will be increasing on annual basis, following the changes of international prices of energy sources, foods and metals. Basis inflation on the other hand, will increase slowly as a result of the recovering domestic demand and labour market. In the next years it is not expected considerable increase of international prices of resources in USD and in condition of stable EUR rate, there will not be inflation growth caused by external factors.

In 2012-2015 the economy recovery on supply side will limit the prices growth, mainly regarding traded goods, in accordance with expectations of a higher production growth and of labour productivity in industry than in construction and services sectors. Petrol prices at international markets are not expected to increase significantly.

During the period 2011-2015 the contribution of administrative prices to the total inflation is expected to be moderate as well.

The influence of tax policy on the inflation in 2011 also is expected to stay low, because of the stable level of direct taxes; from indirect taxes only excise duty will have slight influence on consumer prices. The main risks, connected to the inflation forecasts, are relating to the international prices and to the economy growth rate in Bulgaria. In mid-term, the current accounts deficit will remain below 4% of the GDP, accompanied by the lower trade deficit and the bigger transfers, mainly from EC. The expected stable growth of revenues from tourism and of export of transport services would contribute to keeping the services balance surplus to above 5% of the GDP. In the period 2011-2015 the real growth of goods and services will hold back and stabilize at rates above 7%. This delay will be caused by the decrease of real growth of export of goods, while the export of services will grow moderately.

In 2011 the restored domestic demand will bring to an increase of the import of both goods and services. The delay of the real rate of the export limits the rate of the total import to 7.8%. As a whole, the trade deficit should remain at levels below 10% of the GDP in the mid-term. By restoring the investment confidence and improving the business environment in the country, it is expected to restore the international capital flow. Although at levels, that are below the ones of the pre-crisis period, direct foreign investments will be enough to ensure stable deficit payment of current account. It is expected to restore external finance of the companies. In the same time, due to the high liquidity of the banks, in mid-term period it is not likely to expect considerable financial flows in the sector.

1.7 Transportation

1.7.1 Road transport

Total number of vehicles; vehicle categories (and number per category)

The car stock in Bulgaria increased continuously during the last 20 years. Bulgarians received the possibilities to import "second-hand" very cheap, inefficient, low quality, high polluting cars from Western Europe. This process corresponded with the economic situation – collapse of the economy and fall down of the population wealth.

The passenger cars stock in Bulgaria has disadvantageous age structure. Used vehicles account for 85% of the country's vehicle stock and imports of used vehicles outnumber new vehicles by 10 to one. New cars represent just 15% of total automotive imports. The average age of cars on Bulgarian roads is around 17-20 years, according to the Association of Car Manufacturers and their Authorised Representatives for Bulgaria (SVAB4). On Table 12 registered motor vehicles number is shown.

Passenger cars	2502020
Buses and coaches	24448
Lorries	290784
Special vehicles	30613
Road tractors	27024
Motorcycles and mopeds	117595
Total	2992484

Table 12: Registered motor vehicles, as of 31.12.2009, Number. *Source: NSI; Ministry of Interior, GD Security Policy*

Age of vehicles per category (and engine type if available, e.g., Euro III, diesel etc)

Distribution of cars by age is shown on Figure 8. The annual mileage per category is presented on Table 13.

[4] Association of Car Manufacturers and their Authorized Representatives in Bulgaria http://www.svab.bg/Frame_BG/Index.htm

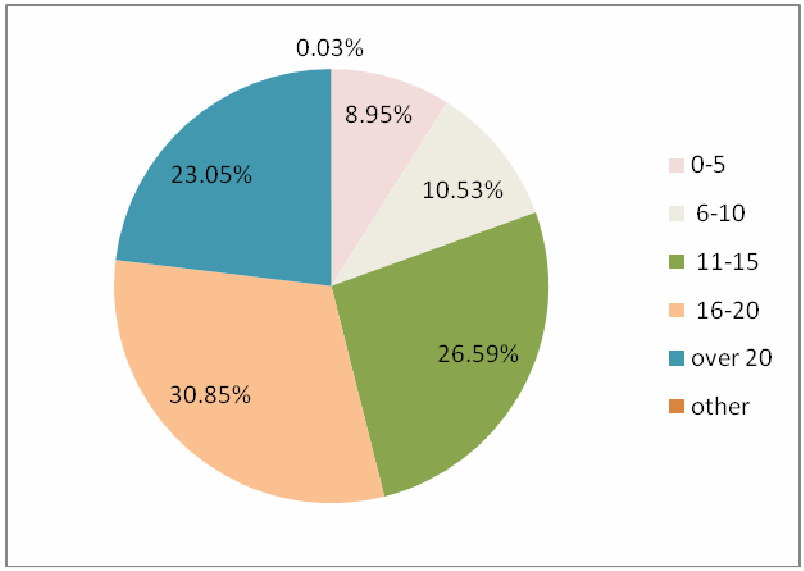

Figure 8: Age of the car fleet in Bulgaria, 2007. *Source: Executive Environment Agency (Ministry of Interior)*

Annual mileage per vehicle category

Subsector	Technology	2008	2009
Gasoline <1.4 l	PRE ECE	2353	2321
Gasoline <1.4 l	ECE 15/00-01	2834	2795
Gasoline <1.4 l	ECE 15/02	2870	2831
Gasoline <1.4 l	ECE 15/03	3383	3336
Gasoline <1.4 l	ECE 15/04	4544	4481
Gasoline <1.4 l	Improved Conventional		
Gasoline <1.4 l	Open Loop		
Gasoline <1.4 l	PC Euro 1 – 91/441/EEC	5470	5395
Gasoline <1.4 l	PC Euro 2 – 94/12/EEC	6338	6251
Gasoline <1.4 l	PC Euro 3 – 98/69/EC Stage2000	7313	7212
Gasoline <1.4 l	PC Euro 4 – 98/69/EC Stage2005	7748	7641
Gasoline <1.4 l	PC Euro 5 – EC 715/2007		
Gasoline 1.4 – 2.0 l	PRE ECE	2522	2487
Gasoline 1.4 – 2.0 l	ECE 15/00-01	3019	2978
Gasoline 1.4 – 2.0 l	ECE 15/02	3168	3124
Gasoline 1.4 – 2.0 l	ECE 15/03	3631	3581
Gasoline 1.4 – 2.0 l	ECE 15/04	4883	4816
Gasoline 1.4 – 2.0 l	Improved Conventional		
Gasoline 1.4 – 2.0 l	Open Loop		
Gasoline 1.4 – 2.0 l	PC Euro 1 – 91/441/EEC	6043	5959
Gasoline 1.4 – 2.0 l	PC Euro 2 – 94/12/EEC	6814	6720
Gasoline 1.4 – 2.0 l	PC Euro 3 – 98/69/EC Stage2000	7863	7755
Gasoline 1.4 – 2.0 l	PC Euro 4 – 98/69/EC Stage2005	8343	8228
Gasoline 1.4 – 2.0 l	PC Euro 5 – EC 715/2007		
Gasoline >2.0 l	PRE ECE	2652	2616
Gasoline >2.0 l	ECE 15/00-01	3173	3129
Gasoline >2.0 l	ECE 15/02	3228	3184
Gasoline >2.0 l	ECE 15/03	3829	3776
Gasoline >2.0 l	ECE 15/04	5080	5010
Gasoline >2.0 l	PC Euro 1 – 91/441/EEC	6191	6105

Table 13: Annual mileage per category

Subsector	Technology	2008	2009
Gasoline >2.0 l	PC Euro 2 – 94/12/EEC	7273	7173
Gasoline >2.0 l	PC Euro 3 – 98/69/EC Stage2000	8097	7986
Gasoline >2.0 l	PC Euro 4 – 98/69/EC Stage2005	9103	8977
Gasoline >2.0 l	PC Euro 5 – EC 715/2007		
Diesel <2.0 l	Conventional	9055	8035
Diesel <2.0 l	PC Euro 1 – 91/441/EEC	10201	9052
Diesel <2.0 l	PC Euro 2 – 94/12/EEC	12015	10662
Diesel <2.0 l	PC Euro 3 – 98/69/EC Stage2000	13633	12098
Diesel <2.0 l	PC Euro 4 – 98/69/EC Stage2005	13754	12205
Diesel <2.0 l	PC Euro 5 – EC 715/2007		
Diesel >2.0 l	Conventional	9999	8873
Diesel >2.0 l	PC Euro 1 – 91/441/EEC	11329	10053
Diesel >2.0 l	PC Euro 2 – 94/12/EEC	12736	11301
Diesel >2.0 l	PC Euro 3 – 98/69/EC Stage2000	14888	13212
Diesel >2.0 l	PC Euro 4 – 98/69/EC Stage2005	15405	13670
Diesel >2.0 l	PC Euro 5 – EC 715/2007		
LPG	Conventional	48589	50095
LPG	PC Euro 1 – 91/441/EEC	55151	56860
LPG	PC Euro 2 – 94/12/EEC	58555	60370
LPG	PC Euro 3 – 98/69/EC Stage2000	61379	63282
LPG	PC Euro 4 – 98/69/EC Stage2005	60003	61863
LPG	PC Euro 5 – EC 715/2007		
2-Stroke	Conventional	1965	1938
Hybrid Gasoline <1.4 l	PC Euro 4 – 98/69/EC Stage2005		
Hybrid Gasoline 1.4 – 2.0 l	PC Euro 4 – 98/69/EC Stage2005		
Hybrid Gasoline >2.0 l	PC Euro 4 – 98/69/EC Stage2005		
Gasoline <3.5t	Conventional	8494	8377
Gasoline <3.5t	LD Euro 1 – 93/59/EEC	9854	9718
Gasoline <3.5t	LD Euro 2 – 96/69/EEC	10840	10691
Gasoline <3.5t	LD Euro 3 – 98/69/EC Stage2000	11827	11664
Gasoline <3.5t	LD Euro 4 – 98/69/EC Stage2005	13637	13449
Gasoline <3.5t	LD Euro 5 – 2008 Standards		
Diesel <3.5 t	Conventional	9086	8063
Diesel <3.5 t	LD Euro 1 – 93/59/EEC	9086	8063
Diesel <3.5 t	LD Euro 2 – 96/69/EEC	11109	9858
Diesel <3.5 t	LD Euro 3 – 98/69/EC Stage2000	15155	13448
Diesel <3.5 t	LD Euro 4 – 98/69/EC Stage2005	17852	15841
Diesel <3.5 t	LD Euro 5 – 2008 Standards		
Gasoline >3.5 t	Conventional	8494	8377
Rigid <=7.5 t	Conventional	13500	11979
Rigid <=7.5 t	HD Euro I – 91/542/EEC Stage I	15828	14046
Rigid <=7.5 t	HD Euro II – 91/542/EEC Stage II	18649	16548
Rigid <=7.5 t	HD Euro III – 2000 Standards	21822	19364
Rigid <=7.5 t	HD Euro IV – 2005 Standards	23597	20940
Rigid <=7.5 t	HD Euro V – 2008 Standards		
Rigid 7.5 – 12 t	Conventional	13887	12323
Rigid 7.5 – 12 t	HD Euro I – 91/542/EEC Stage I	17440	15476
Rigid 7.5 – 12 t	HD Euro II – 91/542/EEC Stage II	20482	18176
Rigid 7.5 – 12 t	HD Euro III – 2000 Standards	24223	21495
Rigid 7.5 – 12 t	HD Euro IV – 2005 Standards	26443	23465

Table 13 (continued)

Subsector	Technology	2008	2009
Rigid 7.5 – 12 t	HD Euro V – 2008 Standards		
Rigid 12 – 14 t	Conventional	12111	10747
Rigid 12 – 14 t	HD Euro I – 91/542/EEC Stage I	15818	14037
Rigid 12 – 14 t	HD Euro II – 91/542/EEC Stage II	18910	16781
Rigid 12 – 14 t	HD Euro III – 2000 Standards	23593	20936
Rigid 12 – 14 t	HD Euro IV – 2005 Standards	24332	21591
Rigid 12 – 14 t	HD Euro V – 2008 Standards		
Rigid 14 – 20 t	Conventional	15242	13525
Rigid 14 – 20 t	HD Euro I – 91/542/EEC Stage I	19113	16960
Rigid 14 – 20 t	HD Euro II – 91/542/EEC Stage II	22026	19545
Rigid 14 – 20 t	HD Euro III – 2000 Standards	25537	22661
Rigid 14 – 20 t	HD Euro IV – 2005 Standards	26096	23157
Rigid 14 – 20 t	HD Euro V – 2008 Standards		
Rigid 20 – 26 t	Conventional	15265	13546
Rigid 20 – 26 t	HD Euro I – 91/542/EEC Stage I	19367	17186
Rigid 20 – 26 t	HD Euro II – 91/542/EEC Stage II	22209	19707
Rigid 20 – 26 t	HD Euro III – 2000 Standards	26376	23406
Rigid 20 – 26 t	HD Euro IV – 2005 Standards	24030	21324
Rigid 20 – 26 t	HD Euro V – 2008 Standards		
Rigid 26 – 28 t	Conventional	15204	13492
Rigid 26 – 28 t	HD Euro I – 91/542/EEC Stage I	18714	16606
Rigid 26 – 28 t	HD Euro II – 91/542/EEC Stage II	21513	19090
Rigid 26 – 28 t	HD Euro III – 2000 Standards	25279	22432
Rigid 26 – 28 t	HD Euro IV – 2005 Standards	25964	23040
Rigid 26 – 28 t	HD Euro V – 2008 Standards		
Rigid 28 – 32 t	Conventional	15238	13522
Rigid 28 – 32 t	HD Euro I – 91/542/EEC Stage I	18958	16823
Rigid 28 – 32 t	HD Euro II – 91/542/EEC Stage II	21813	19357
Rigid 28 – 32 t	HD Euro III – 2000 Standards	25901	22984
Rigid 28 – 32 t	HD Euro IV – 2005 Standards	24415	21665
Rigid 28 – 32 t	HD Euro V – 2008 Standards		
Rigid >32 t	Conventional	18775	16660
Rigid >32 t	HD Euro I – 91/542/EEC Stage I	20716	18383
Rigid >32 t	HD Euro II – 91/542/EEC Stage II	25420	22557
Rigid >32 t	HD Euro III – 2000 Standards	29278	25981
Rigid >32 t	HD Euro IV – 2005 Standards	26821	23800
Rigid >32 t	HD Euro V – 2008 Standards		
Articulated 14 – 20 t	Conventional	19853	17617
Articulated 14 – 20 t	HD Euro I – 91/542/EEC Stage I	23991	21289
Articulated 14 – 20 t	HD Euro II – 91/542/EEC Stage II	28704	25471
Articulated 14 – 20 t	HD Euro III – 2000 Standards	35788	31758
Articulated 14 – 20 t	HD Euro IV – 2005 Standards	37989	33711
Articulated 14 – 20 t	HD Euro V – 2008 Standards		
Articulated 20 – 28 t	Conventional	22013	19534
Articulated 20 – 28 t	HD Euro I – 91/542/EEC Stage I	26151	23205
Articulated 20 – 28 t	HD Euro II – 91/542/EEC Stage II	31313	27787
Articulated 20 – 28 t	HD Euro III – 2000 Standards	37948	33674
Articulated 20 – 28 t	HD Euro IV – 2005 Standards	37989	33711

Table 13 (continued)

Subsector	Technology	2008	2009
Articulated 20 – 28 t	HD Euro V – 2008 Standards		
Articulated 28 – 34 t	Conventional	23633	20971
Articulated 28 – 34 t	HD Euro I – 91/542/EEC Stage I	27731	24608
Articulated 28 – 34 t	HD Euro II – 91/542/EEC Stage II	33167	29432
Articulated 28 – 34 t	HD Euro III – 2000 Standards	40001	35496
Articulated 28 – 34 t	HD Euro IV – 2005 Standards	43551	38646
Articulated 28 – 34 t	HD Euro V – 2008 Standards		
Articulated 34 – 40 t	Conventional	22537	19999
Articulated 34 – 40 t	HD Euro I – 91/542/EEC Stage I	28973	25710
Articulated 34 – 40 t	HD Euro II – 91/542/EEC Stage II	34364	30494
Articulated 34 – 40 t	HD Euro III – 2000 Standards	41490	36817
Articulated 34 – 40 t	HD Euro IV – 2005 Standards	43982	39029
Articulated 34 – 40 t	HD Euro V – 2008 Standards		
Articulated 40 – 50 t	Conventional	26018	23088
Articulated 40 – 50 t	HD Euro I – 91/542/EEC Stage I	31915	28321
Articulated 40 – 50 t	HD Euro II – 91/542/EEC Stage II	39270	34848
Articulated 40 – 50 t	HD Euro III – 2000 Standards	46897	41615
Articulated 40 – 50 t	HD Euro IV – 2005 Standards	43982	39029
Articulated 40 – 50 t	HD Euro V – 2008 Standards		
Articulated 50 – 60 t	Conventional	23927	21233
Articulated 50 – 60 t	HD Euro I – 91/542/EEC Stage I	28418	25218
Articulated 50 – 60 t	HD Euro II – 91/542/EEC Stage II	34409	30533
Articulated 50 – 60 t	HD Euro III – 2000 Standards	41925	37203
Articulated 50 – 60 t	HD Euro IV – 2005 Standards	43982	39029
Articulated 50 – 60 t	HD Euro V – 2008 Standards		
Urban CNG Buses	HD Euro I – 91/542/EEC Stage I		
Urban CNG Buses	HD Euro II – 91/542/EEC Stage II		
Urban CNG Buses	HD Euro III – 2000 Standards		
Urban CNG Buses	EEV		
Urban Biodiesel Buses	Conventional		
Urban Biodiesel Buses	HD Euro I – 91/542/EEC Stage I		
Urban Biodiesel Buses	HD Euro II – 91/542/EEC Stage II		
Urban Biodiesel Buses	HD Euro III – 2000 Standards		
Urban Biodiesel Buses	HD Euro IV – 2005 Standards		
Urban Biodiesel Buses	HD Euro V – 2008 Standards		
Urban Buses Midi <=15 t	Conventional	24135	21417
Urban Buses Midi <=15 t	HD Euro I – 91/542/EEC Stage I	29716	26369
Urban Buses Midi <=15 t	HD Euro II – 91/542/EEC Stage II	31717	28145
Urban Buses Midi <=15 t	HD Euro III – 2000 Standards	33833	30023
Urban Buses Midi <=15 t	HD Euro IV – 2005 Standards	31962	28362
Urban Buses Midi <=15 t	HD Euro V – 2008 Standards		
Urban Buses Standard 15 – 18 t	Conventional	25556	22678
Urban Buses Standard 15 – 18 t	HD Euro I – 91/542/EEC Stage I	31060	27562
Urban Buses Standard 15 – 18 t	HD Euro II – 91/542/EEC Stage II	34620	30721
Urban Buses Standard 15 – 18 t	HD Euro III – 2000 Standards	36919	32761

Table 13 (continued)

Subsector	Technology	2008	2009
Urban Buses Standard 15 – 18 t	HD Euro IV – 2005 Standards	35745	31719
Urban Buses Standard 15 – 18 t	HD Euro V – 2008 Standards		
Urban Buses Articulated >18 t	Conventional	24482	21725
Urban Buses Articulated >18 t	HD Euro I – 91/542/EEC Stage I	31234	27716
Urban Buses Articulated >18 t	HD Euro II – 91/542/EEC Stage II	35181	31219
Urban Buses Articulated >18 t	HD Euro III – 2000 Standards	37339	33134
Urban Buses Articulated >18 t	HD Euro IV – 2005 Standards	35450	31458
Urban Buses Articulated >18 t	HD Euro V – 2008 Standards		
Coaches Standard <=18 t	Conventional	24626	21852
Coaches Standard <=18 t	HD Euro I – 91/542/EEC Stage I	28793	25551
Coaches Standard <=18 t	HD Euro II – 91/542/EEC Stage II	31744	28169
Coaches Standard <=18 t	HD Euro III – 2000 Standards	34361	30491
Coaches Standard <=18 t	HD Euro IV – 2005 Standards	35945	31897
Coaches Standard <=18 t	HD Euro V – 2008 Standards		
Coaches Articulated >18 t	Conventional	24372	21627
Coaches Articulated >18 t	HD Euro I – 91/542/EEC Stage I	29382	26073
Coaches Articulated >18 t	HD Euro II – 91/542/EEC Stage II	33562	29782
Coaches Articulated >18 t	HD Euro III – 2000 Standards	35573	31567
Coaches Articulated >18 t	HD Euro IV – 2005 Standards	35538	31536
Coaches Articulated >18 t	HD Euro V – 2008 Standards		
<50 cm³	Conventional	1369	1350
<50 cm³	Mop – Euro I	1443	1423
<50 cm³	Mop – Euro II	1071	1056
<50 cm³	Mop – Euro III		
2-stroke >50 cm³	Conventional	2036	2008
2-stroke >50 cm³	Mot – Euro I	2123	2094
2-stroke >50 cm³	Mot – Euro II		
2-stroke >50 cm³	Mot – Euro III		
4-stroke <250 cm³	Conventional	2637	2601
4-stroke <250 cm³	Mot – Euro I	2933	2892
4-stroke <250 cm³	Mot – Euro II		
4-stroke <250 cm³	Mot – Euro III		
4-stroke 250 – 750 cm³	Conventional	2713	2676
4-stroke 250 – 750 cm³	Mot – Euro I	3053	3011
4-stroke 250 – 750 cm³	Mot – Euro II		
4-stroke 250 – 750 cm³	Mot – Euro III		
4-stroke>750cm³	Conventional	2755	2717
4-stroke>750cm³	Mot–EuroI	3139	3096
4-stroke >750 cm³	Mot – Euro II		
4-stroke >750 cm³	Mot – Euro III		

Table 13 (continued). *Source: Executive Environment Agency*

Annual speed per vehicle category

Not available

1.7.2 Shipping

Number and percentage type of vessels

Since Bulgaria does not have big internal waterways, its river transport is organized only along the Danube River where the main ports Russe, Lom and Vidin are situated. The most important sea ports of the country – Varna and Burgas – are on the Black Sea coast and process more than 60% of the national foreign trade volume. The number of vessels/ships in 2009 is shown on Table 14.

Inland waterways transport, 2009	
Non-self-propelled cargo vessels	158
Tags and pushers	36
Passenger vessels	2
Maritime transport, 2009	
Sea cargo ships	28
Sea passenger ships	3

Table 14: Water transport vessels / ships. *Source: NSI*

Number of passengers

The number of passengers in 2009 is shown on Table 15.

Passenger vessels: passengers carried (thousands), 2009	237
Sea passenger ships: passengers carried (thousands), 2009	3

Table 15: Passengers. *Source: NSI*

Goods transported

The tonnage of transported goods in 2009 is shown on Table 16.

Freight vessels: goods carried (thousand tons), 2009 of which	4 229
International	4 203
Self-propelled cargo ships: good carried (thousand tons), 2009 of which	5 718
International	5 718

Table 16: Transported goods. *Source: NSI*

1.7.3 Railways

Total length of railway network

The Bulgarian railway network consists of 4 316 km lines, 94.3% of which are normal, the rest 5.6% are narrow-gauge lines (760 mm). Only 22% of the system consists of double-track railway lines, 70% are electrified, which is higher than the average European level. The density of the Bulgarian railway network is 0.036 km/km2. which makes it well accessible when referring to the density of population.

The length of railway lines as of end of 2009 is shown on Table 17.

Lines	Length
Running track	4 150
Normal (1 435 mm)	4 025
Narrow (760 mm)	125
Platforms	1 738
Railway lines, supplied with automatic block system	1 694
Total	5 888

Table 17: Length of railway lines as of end of 2009, km. *Source: NSI*

Number of passengers

The number of passengers in 2009 is shown on Table 18.

Passengers transported (thousands), of which	30 101.9
inland carriages	29 670.9
international carriages	431.0
Transport performance (million pkm), of which	2 099.7
inland carriages	2 054.2
international carriages	54.5

Table 18: Passengers carried and transport performance, 2010. *Source: NSI*

Goods transported

The tonnage of carried goods in 2009 by railway transport is shown on Table 19.

Goods carried (thousand tons), of which	12 939.5
inland carriages	9 252.0
international carriages	3 687.5
Transport performance (million tkm), of which	3 063.5
inland carriages	2 099.7
international carriages	963.8

Table 19: Goods carried by railway transport, 2010. *Source: NSI*

The Ministry of Transport (MOT) sets the national railway policy. The National Railway Infrastructure Company (NRIC) is the railway infrastructure manager in Bulgaria (a rail network of 4 000 km), and it is a 100-percent state-owned company.

The Bulgarian State Railways (BDZ) is a 100% state-owned railway operator for passengers (100% of market) and freight (about 80% of freight). Several private freight companies capture about 20% of the railway freight market[5].

The control and the coordination of the railway transport activities are exercising by "Railway Administration" Executive Agency through its headquarter in Sofia and Regional units. The Agency functions as a Regulatory body in the railway transport. It is the National Safety Authority (NSA) for the railway transport in Republic of Bulgaria.

5 http://www.worldbank.bg/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/BULGARIAEXTN/0,,contentMDK:22833126~pagePK:141137~piPK:141127~theSitePK:305439,00.html

Railways related GHG emissions are quite low in Bulgaria. The reason stems from the fact that the fuel consumption decreased by 81% in the period 1990 – 2009 for locomotives powered by liquid and solid fuels. [18]

1.7.4 Air transport

Number of Landing/Takeoff cycles (LTO)

Not available

Number of passengers and goods transported

The number of passengers, tonnage and air transport performance in 2009 are presented on Table 20.

Passengers carried (thousands), of which	2 184
domestic airlines	118
Transport performance (million pkm) , of which	3 713
domestic airlines	45
Goods carried (tons), of which	19 250
domestic airlines	20
Transport performance (thousand tkm) , of which	10 189
domestic airlines	10

Table 20: Civil aviation activity, 2009. *Source: NSI*

Number of airports

There are five civil international airports in Bulgaria, three additional airports, which do not function and a number of certified airfields as shown in the next Table 21**Table** and Figure 9.

Airport type	Number	Location
International airports	5	Sofia, Plovdiv, Varna, Burgas, Gorna Oryahovitsa
Certified airfields	14	Erden (Boichinovtsi), Grivitsa (Pleven), Bohot (Pleven), Lesnovo, Draganovtsi, Ihtiman, Kalvacha (Ovoshtnik), Stryama (Banya), Belchin, Dolna Banya, Primorsko, Balchik, Bazan, Kainardzha
Certified heliport	1	Lozen
Non-functioning airports	3	Stara Zagora, Ruse, Targovishte

Table 21: Airports. *Source: Ministry of Transport, DG Civil Aviation Administration*

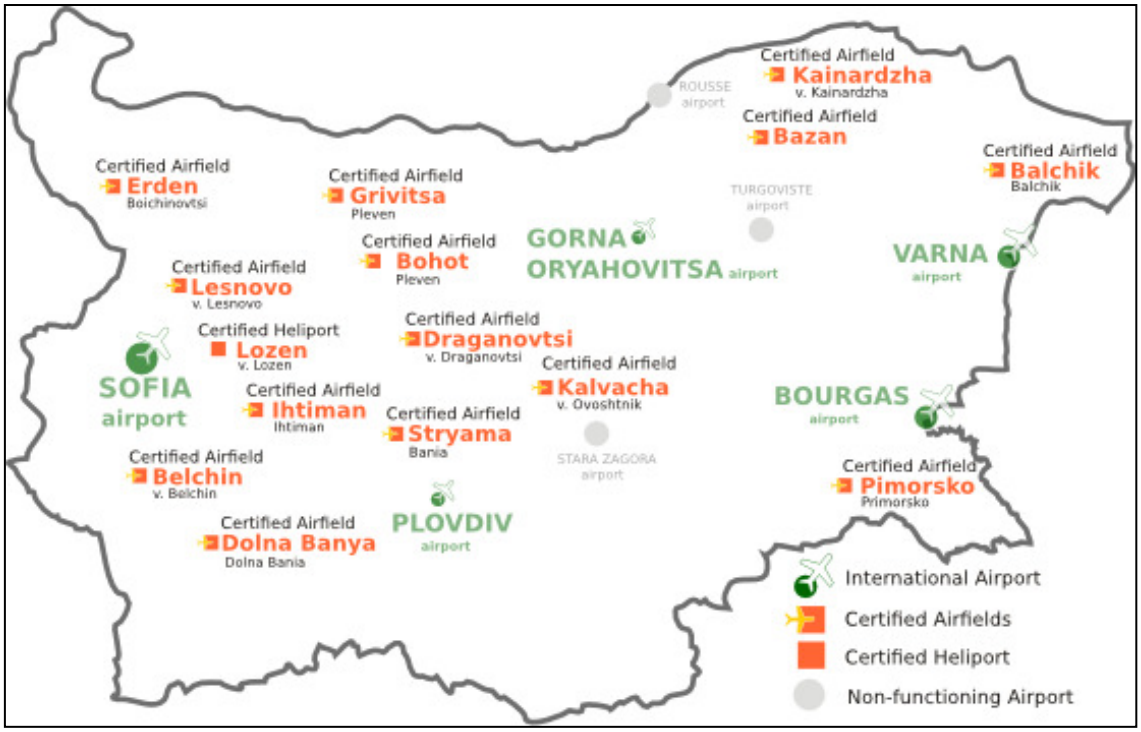

Figure 9: Airports in Bulgaria. *Source: Ministry of Transport, DG Civil Aviation Administration*

The consumption of jet kerosene in domestic aviation decrease with 46% from 1990 to 1998. The international jet kerosene decrease for the period 1993 to 1999 with 81.4%. After 1999 the consumption of international jet kerosene rapidly increased with 70% till 2008. Decrease of 28% is observed in 2009 compared to the previous year. The number of passengers for the three biggest airports increased for about three times in the period 2000 – 2008.

The IPCC GPG Tier 1 method, based on an aggregate figure of fuel consumption for civil aviation multiplied by average emissions factors, is applied. The emissions factors have been averaged over all flying phases based on the assumption that 10% of the fuel is used in the LTO phase. Emissions are calculated according to the following equation:

Emissions = Fuel Consumption x Emission Factor

(NIR-2011)

1.8 Energy

On Table 22 the Energy Balances for the latest several years is shown.

	2005	2006	2007	2008	2009

	2005	2006	2007	2008	2009
Primary Production (ktoe)	10 539	11 011	9 738	9 953	9 588
Recovered products (ktoe)	85	96	122	156	100
Imports (ktoe)	12 908	14 096	14 952	15 071	11 939
Stock change (ktoe)	44	159	-88	-601	-70
Export (ktoe)	3 342	4 624	4 507	4 568	3 868
Bunkers (ktoe)	110	106	52	122	207
Total primary energy supply (ktoe)	20 122	20 637	20 341	19 889	17 482
Population, thousands	7 718.8	7 679.3	7 640.2	7 606.6	7 563.7
TPES per capita, toe/cap	2 575	2 674	2 676	2 615	2 311
Total final energy consumption (ktoe)	9 293	9 722	9 528	10 739	8 475
Primary energy intensity (ktoe/1000 €)	1 095.63	1 057.63	977.62	910.39	842.54
	23 232	25 803	28 524	33 794	34 151

Table 22: Energy balance. *Source: NSI, Eurostat*

1.8.1 Energy supply

On Table 23 the Energy Sources Balance Sheet for 2009 is shown.

	Total	Coal	Coal fuels	Natural gas	Crude oil and feed-stocks	Petro-leum products	Renewable fuels and wastes	Geothermal energy	Electricity from RES	Nuclear energy	Heat	Electricity
Primary Production (ktoe)	9 588	4 560	-	13	25	-	719	33	318	3 878	42	-
Recovered products (ktoe)	100	16	-	-	-	-	84	-	-	-	-	-
Imports (ktoe)	11 939	1 702	48	2 131	6 324	1 505	-	-	-	-	-	229
Stock change (ktoe)	-70	46	-6	17	65	-182	-10	-	-	-	-	-
Export (ktoe)	3 868	5		-	-	3 166	32	-	-	-	-	665
Bunkers (ktoe)	207	0	-	-	-	207	-	-	-	-	-	-
Total primary energy supply (ktoe)	17 482	6 319	42	2 161	6414	-2 050	761	33	318	3 878	42	-436

Table 23: Bulgaria energy sources balance sheet for 2009, 1000 toe

Source: NSI

On Table 24 the installed capacities and electricity generation in 2009 are presented.

Plants	Installed capacity, MW	Available capacity in annual maximum, MW	%	Generation, MWh
NPP	2 000	2 000	16.57	15 248 626
Lignite TPP	3 979	3 064	32.96	18 084 160
Hard coal	1 678	1 151	13.90	4 883 548
Gas	794	789	6.54	1 847 777
HPP, incl.	6 108	2 724	18.02	5 523 189
Out of which PSHPP	938	938	7.77	636 462
Reservoir	1 266	1 131	-	-
Pondage	761	655	-	-
Run-of-river	143	-	-	-
Wind	488	-	4.04	658 181
Electricity by Solar Converters	25	-	0.21	14 320
TOTAL	-	-	-	46 259 801

Table 24: Electricity generation, MWh. *Source: ESO*

1.8.2 Energy consumption

Energy consumption is decreasing since 2008 due to the crisis

Energy consumption for 2007 – 2009 and comparisons 2009/2008 are presented on the following Table 25.

	2007	2008	2009	2009 as % to 2008
Total	9 528	9 419	8 475	90.0
Industry	3 611	3 357	2 428	72.3
Transport	2 678	2 830	2 774	98.0
Households, commerce, public authorities etc	3 239	3 232	3 273	101.3
Households	2 073	2 125	2 149	101.1
Agriculture, hunting and forestry	265	186	183	98.4

Table 25: Energy consumption in 2009, ktoe

Source: NSI

1.9 Waste disposal

1.9.1 Solid waste disposal

In 2009 the total waste quantity in Bulgaria amounts to 18 110 kt (including 706 kt hazardous, 3 561 kt household, 13 843 kt industrial). The reduction in comparison to 2008 is about 1 709 kt, owing mainly o the drop of the quantity of non-hazardous

waste (1 600 kt). The quantities of waste by types for the period 2000-2009 are presented on the next figure.

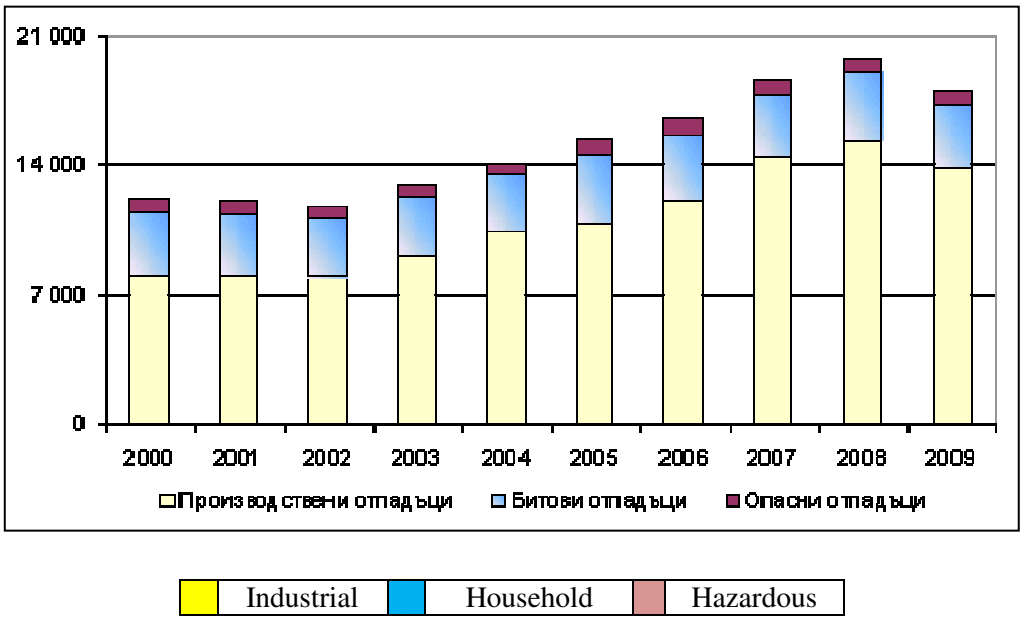

Figure 10: Waste quantities by types, kt. *Source: ExEA and NSI*

Since 1999, the average quantities of household waste per capita have been lower that those of EU-278. The accumulation rate for EU-27 in 2009 was 513 kg/capita/year, while for Bulgaria it was 470 kg/capita/year, inclusive of the quantities, not covered by the system of the organized waste collection.

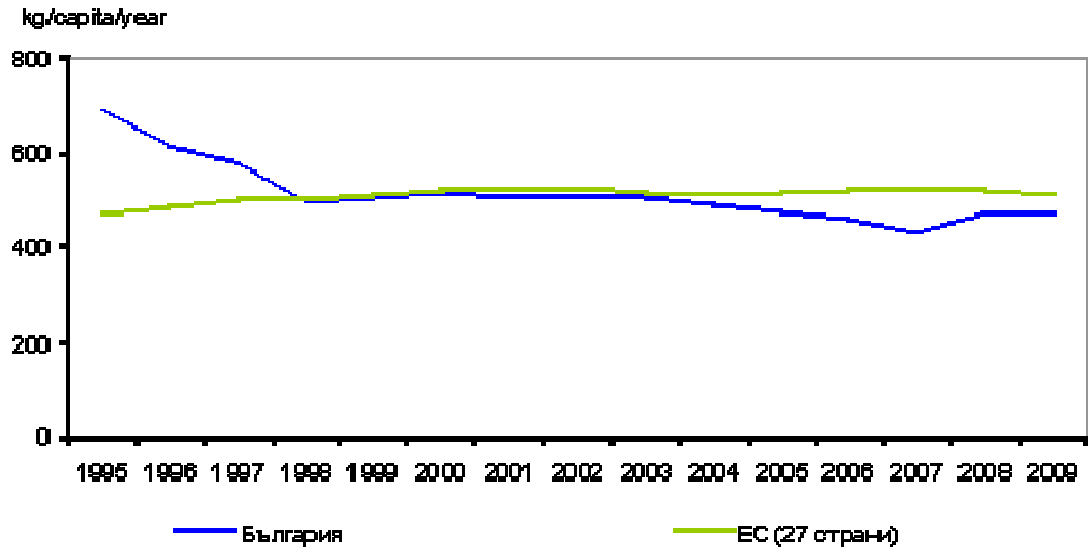

Figure 11: Household waste per capita in EU-27 and Bulgaria, kg/capita/year

Source: Eurostat

The main option of waste disposal in Bulgaria is the land storage method. Construction of new waste processing facilities started in 2010. The first two installation started operation in June 2011.

Table 26 shows the household waste production in Bulgaria and on the next Table 27 the waste composition may be seen.

Year	Population, 1000 p	Quantity, kt	kg/capita
2002	7 845.8	3 945	0.503
2003	7 801.3	3 916	0.502
2004	7 761.0	3 826	0.493
2005	7 718.8	3 680	0.477
2006	7 679.3	3 548	0.462
2007	7 640.2	3 314	0.434
2008	7 606.6	3 615	0.475
2009	7 563.7	3 561	0.471

Table 26: Households waste production. *Source: NSI*

Waste composition	Content
A-paper, paperboard and textile waste	16.62
B-garden waste	10.15
C-food (kitchen) waste	18.23
D-Wood waste	1.75
Degradable Organic Carbon	11.63

Table 27: Waste composition 2009, %. *Source: NSI*

1.9.2 Waste water treatment

Information about the waste water treatment is placed in Table 28.

	2004	2005	2006	2007	2008	2009
Waste water treatment stations–total[1]						
Number	56	56	59	62	68	73
Design capacity–(1000m^3/day)	2011.13	1999.20	1990.15	2026.42	2106.32	2133.03
Design capacity BOD5 ($tonO_2$/day)[2]	.	415.10	416.96	419.85	430.96	434.03
Primary treatment						
Number	15	14	16	15	15	13
Design capacity–(1000m^3/day)	163.24	161.98	161.71	161.15	161.15	148.96
Design capacity BOD5 ($tonO_2$/day)		39.29	37.08	36.89	36.89	30.72
Secondary treatment						
Number	41	42	43	46	52	59
Design capacity–(1000m^3/day)	1847.89	1837.22	1828.44	1845.16	1929.14	1968.04
Design capacity BOD5 ($tonO_2$/day)		375.81	379.88	375.23	387.92	397.16
Tertiary treatment						
Number	0	0	0	1	1	1
Design capacity–(1000m^3/day)	0	0	0	20	16	16
Design capacity BOD5 ($tonO_2$/day)	0	0	0	7.73	6.15	6.15
Sludge–dry matter (1000ton)[3]	58.40	41.72	37.99	39.92	42.85	39.37
Deactivated	56.26	24.42	28.27	27.25	29.04	25.34
Out of which						
Sent for agricultural purposes	0.00	0.00	11.86	6.45	11.20	14.20
Composted	0.06	0.12	0.00	0.00	0.00	0.00
Deposited	51.23	23.35	16.40	20.77	17.83	11.12
Others	4.96	0.95	0.01	0.03	0.01	0.01

Table 28: Waste water treatment. *Source: NSI*

Sludge is utilized in agriculture, recultivation of violated lands, forestry, lawns, parks, etc. In 2009 the total utilized sludge was 46%, out of which 1% was used for recultivation of lands (126.56 t), and 45% (i.e. 16 644.19 t) in agriculture.

2. The national GHG inventory

2.1 Developing a national GHG-inventory system

The Bulgarian National Inventory System (BGNIS) is based on the provisions of Decision 19/CMP.1 Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol. [3]

Bulgaria's Inventory System was reviewed in 2009 as part of the review of the Bulgaria 2009 annual inventory submission. The UNFCCC Expert Review Team (ERT) found that Bulgaria's institutional arrangements and arrangements for the technical competence of its staff within the National System involved in the inventory development process were insufficient to enable the adequate planning, preparation and management of Bulgaria's annual submission in accordance with the aforementioned guidelines.

The Enforcement Branch has confirmed that there were unresolved problems with respect to implementation of the general and specific functions set out in the guidelines for national systems.

During the period after the in-country review and after the notification of the country on the subject of the question of implementation the Competent Authorities have undertaken significant effort to improve the status of the National System. In 2010 a Compliance Action Plan for ensuring the effective and timely functioning of BGNIS in accordance with the requirements of Decision 19/CMP.1 [3] was developed and implemented.

The conclusions and recommendations of ERT set out in the Report of the individual review of 2010 annual submission of Bulgaria (FCCC/ARR/2010/BGR) [6] indicate that all activities for improvements of institutional, legal and procedural arrangements within the national inventory system as well as for improvement of quality of inventory were adequately planned and implemented by the Bulgarian government in 2010. As a result from implemented activities for improvements "No questions of implementation were identified by the ERT during the review".

In accordance with Decision of Enforcement Branch CC-2010-1-17/Bulgaria/EB from 4 February 2011 Bulgaria is fully eligible to participate in the mechanisms under Articles 6, 12, and 17 of the Kyoto Protocol.

The following documents represent a basis for BGNIS:

1. Environmental Protection Act (EPA, State Gazette No. 91/25.09.2002; corrected, SG No. 96/2002; last amendment June 2011); [9]
2. Statute on the organization and structure of ExEA (Decision of Council of Ministers 162/03.08.2010); [24]
3. Order № 110/30.04.2010 by the Executive Director of ExEA, amended by new Order № 202/29.09.2010 (Sector experts/QC experts); [19]
4. Order № RD-218/05.03.2010 by the Minister of Environment and Water (QA experts); [20]

5. Regulation of Council of Ministers 215/21.09.2010 SG 76/2010 on the manner and order of organization of the National Inventories of hazardous substances from greenhouse gases in the ambient air. [22]

The latter regulation establishes and maintains the institutional, legal and procedural arrangements necessary to perform the general and Specific functions of BGNIS, defined in Decision 19/CMP.1 for national systems. The regulation reinforces the existing institutional agreements by specifying the roles of all data providers.

2.1.1 Governmental authorities responsible for collecting GHG data

MoEW (Climate Change Policy Directorate) has the political responsibility for compliance with commitments under the UNFCCC and the Kyoto Protocol, including for functioning of BGNIS in accordance with the requirements of Decision 19/CMP.1. [3]

Since 2008 the Executive Environment Agency (ExEA) is responsible for the whole process of National Inventory planning, preparation and management and is designated as single national entity. Until 2007 the national emissions inventory as well as the relevant NIR were prepared by an external company through an open tender procedure under the rules of the Public Procurement Act.

The Executive Environment Agency has the following obligations:

- acts as National Inventory Compiler (supervises inventory preparation process);
- manages BGNIS;
- compiles CRF tables and NIR;
- coordinates the work of engaged consultants for supporting inventory;
- coordinates and implements the activity of National QA/QC Plan;
- National Inventory Focal Point.

The organisation and the general responsibilities of all institutions engaged in the functioning of the BGNIS are illustrated on Figure 1 and Figure 2.

On Figure 12 organizational chart of Bulgarian National Inventory System is presented.

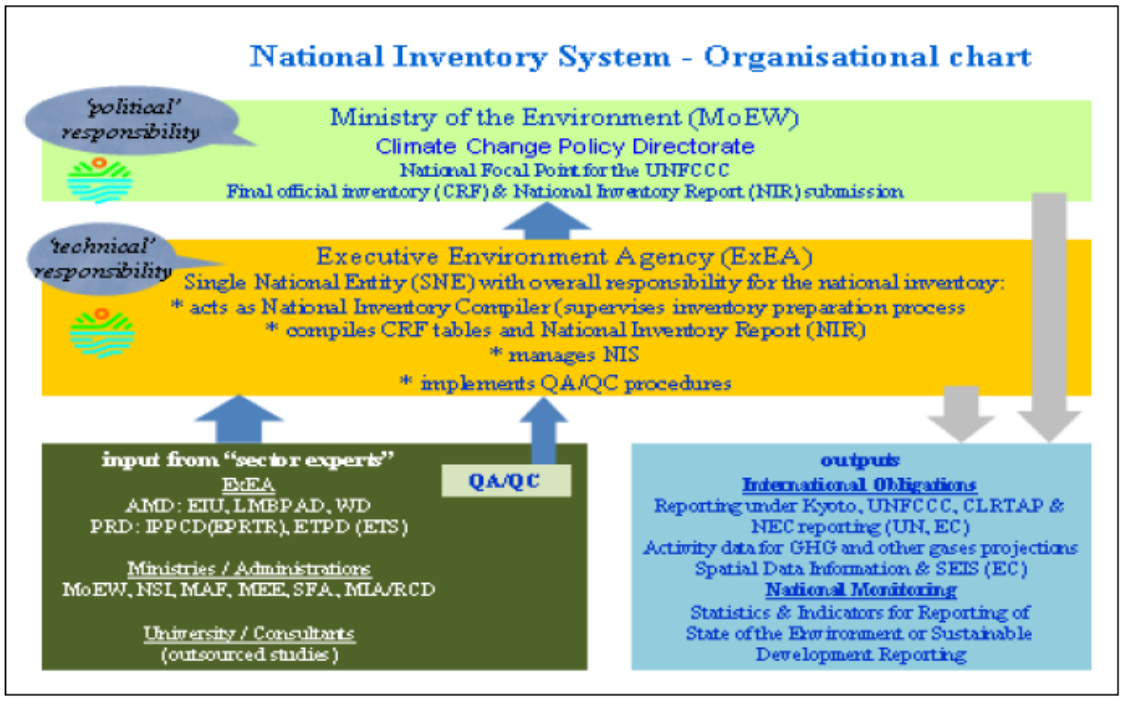

Figure 12: Organizational chart BGNIS. *Source: NIR-2011*

The general responsibilities of all engaged institutions with regard to the BGNIS are illustrated on Figure 13.

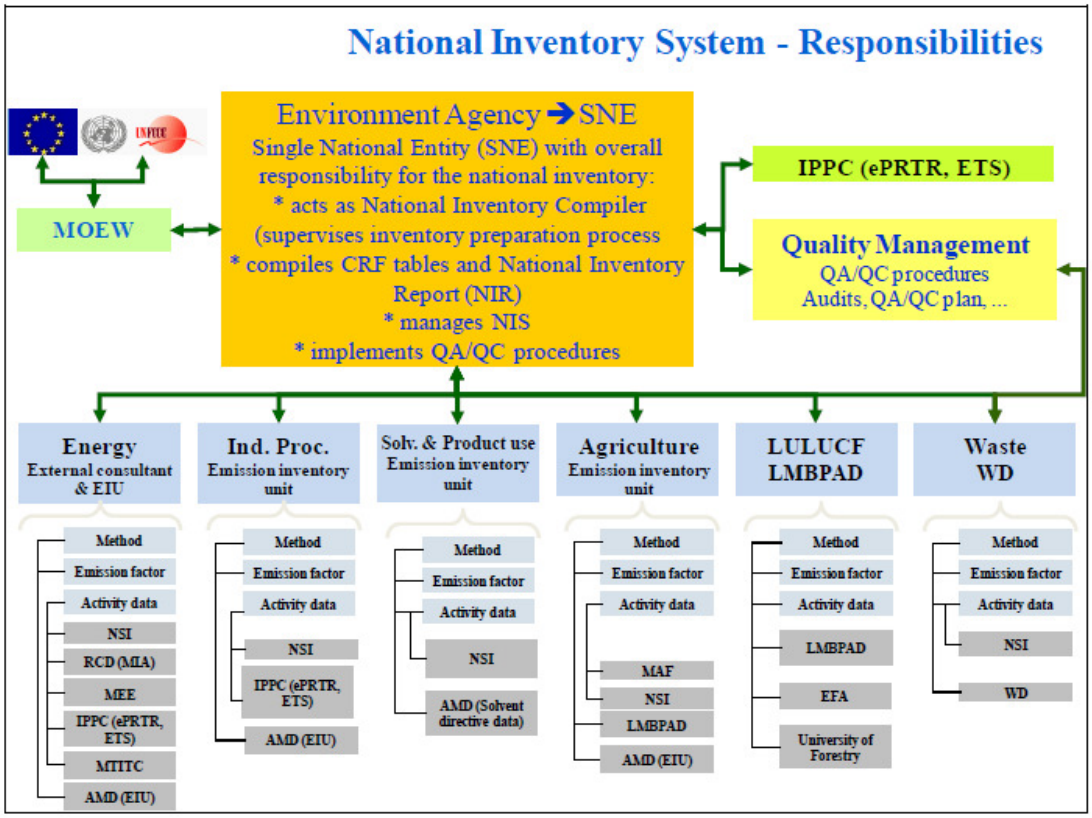

Figure 13: Responsibilities in the National Inventory System. *Source: NIR-2011*

2.1.2 Supporting institutions

In order to strengthen the institutional arrangements and to fulfil the required general and specific functions of BGNIS official agreements between MoEW and the main data providers were signed in 2010:

- National Statistical Institute (RD21-35/12.02.2010);
- Ministry of Agriculture and Food and its body Executive Forest Agency (04-00-517/26.02.2010 and RD 50-47/15.03.2010);
- Ministry of Economy, Energy and Tourism (14/06/2010);
- Ministry of Interior (MI) (08/06/2010).

The new agreements ensure the support from these organisations regarding the choice of the activity data and EFs and methods, in the compilation of emission estimates and QA/QC of these estimates.

Information for the collection of inventory data is also provided by the Ministry of Transport, Information Technologies and Communications (MTITC) and also by:

- Large industrial plants and
- Branch Business Associations.

The BGNIS was enshrined in law through the Regulation on the Order and Procedure on the Organization of the National Inventories of Harmful Substances and Greenhouse Gases, adopted by Decree of the Council of Ministers No 215/21.09.2010, SG No 76/28.09.2010 [22]. The new regulation establishes and maintains the institutional, legal and procedural arrangements necessary to perform the functions of BGNIS, defined in Decision 19/CMP.1 [3] for national systems.

Table 29 gives more detailed information about the responsibilities of the relevant supporting institutions with regard to the preparation of the different Sectors in the NIR.

Sector	Activity data	Methodology and selection emission factors	Preparation of sector inventories
Energy CRF1A1 CRF1A2 CRF1A4	NSI	ExEA, NSI	External consultant „Denkstatt"
Energy/Transport CRF1A3	NSI MI MTITC	ExEA, NSI MI, MTITC	Sector expert ExEA and external consultant „Denkstatt"
Energy CRF1A4	NSI	ExEA, NSI	External consultant „Denkstatt
Energy CRF1B	NSI MEET	ExEA, NSI, MEET	External consultant „Denkstatt"
Industry processes CRF2	NSI ExEA MOEW	ExEA, NSI, Branch chambers, Installations operators	Sector expert ExEA and For F-gases external consultant „Denkstatt"
Solvents use CRF3	NSI ExEA	ExEA, NSI	Sector expert ExEA

Agriculture CRF4	MAF	ExEA, MAF	Sector expert ExEA
LULUCF CRF5	EAF	ExEA, EAF	Sector expert ExEA and University of Forest
Waste CRF6	NSI	ExEA, NSI	Sector expert ExEA and University of Chemical Technology and Metallurgy
	ExEA		

Table 29: Preparation of the GHGs emission inventory for 2011 submission.
Source: NIR-2011

2.1.3 Measurement methodology

The recommended in [23[6]] default emission factors and default oxidation factors are used to calculate the emissions in NIR-2011. For some of the most important categories like lignite, sub-bituminous coal and natural gas country specific factors were calculated on the basis of the verified reports of operators and suppliers. Country specific factors were used for anthracite, bituminous coal, and Petroleum coke as well. [18]

No specific measurements for NIR have been done.

2.1.4 Activity data collection

The data collection in Bulgaria is regulated by the Regulation of the Council of Ministers 215 of 21.09.2010 [22]. The collection is organised by ExEA on the basis of contracts with the main suppliers: NSI, ministries, institutions, professional organisations, large energy consuming companies, experts etc.

ExEA initiates the collection by letters sent to all responsible bodies.

The main source of information is the database of NSI. Especially for the needs of NIR the National Statistical Institute submit detailed energy and material balances as well as statistical information about the solid and liquid wastes. NSI statistic is in general harmonised with Eurostat.

Additional fresh information is gathered directly from the companies and organisations mentioned above. All information is processed by ExEA.

The following Table 30 presents the supporting organisations, which supply the data for the relevant activity.

[6] 1996 IPCC GL Vol. II, Ch. 1, Table 1-2 and Table 1-4 correspondingly

Sectors	Data Source of Activity Data	Activity Data supplier	
1. Energy			
1.A Fuel Combustion	Energy balance (IEA – EUROSTAT – UNECE Energy Questionnaire)	NSI	National Statistical Institute
1.A.3 Transport	Energy balance (IEA – EUROSTAT – UNECE Energy Questionnaire)	NSI	National Statistical Institute
	Statistics vehicle fleet	MI/RCD	Ministry of Interior/ Road Control Department
	Country specific parameters used in the COPERT IV related to car fleet and vehicle split.	MTITC	Ministry of Transport, Information Technologies and Communications
1.B Fugitive emissions	Energy balance (IEA – EUROSTAT – UNECE Energy Questionnaire)	NSI	National Statistical Institute
	National statistics	MEET	Ministry of Economy, Energy and Tourism
2. Industrial processes	National production statistics	NSI	National statistical Institute
	National registers (EPRTR and ETS)	ExEA	Executive Environment Agency
	National studies	MoEW/ExEA	Ministry of Environment and Water/ Executive Environment Agency
3. Solvents and Other product use	National production statistics National VOC register	NSI ExEA	National statistical Institute Executive Environment Agency
4. Agriculture	National agriculture statistics	MAF	Ministry of Agriculture and Food Supply /Statistics Department
5. LULUCF	National Forest Inventory	EFA	Executive Forestry Agency
6. Waste	National statistics	NSI	National statistical Institute
	National studies	ExEA	Executive Environment Agency/ Waste Department

Table 30: Sources of activity data for preparation of national GHGs emission inventory. *Source: NIR-2011*

2.1.5 Conformity with data exchange standards

No changes concerning conformity with data exchange standards occurred during the reported period.

2.2 Systematic observations

The following chapter includes summary information on the current status of national plans, programs and support for ground and space-based climate observing systems.

It should be pointed out that up to now activities in this field have been undertaken separately from the climate change policies and measures. They were more closely linked to the general commitments of the country in the field of meteorology.

There are no GSN (Global Surface Network) and GUAN (Global Upper Air Network) stations located in Bulgaria. There is only one GAW (Global Atmosphere Watch) station in the country (Rozhen).

2.2.1 Meteorological measurements

Meteorological observations are conducted by the National Institute on Meteorology and Hydrology[7]. Its activities include measurement and collecting information about synoptic conditions, air temperature, precipitations, solar radiation, cloudiness, wind etc., disseminate them through various means of public information and store for professional use by interested persons and institutions.

2.2.2 Oceanic observations

Monitoring of surface water is part of the National Automated System for Ecological Monitoring (NASEM) and covers programmes for control and operational monitoring. The control monitoring programmes aim to provide the information, necessary for the assessment of waters within river basin or sub-basin. The operational monitoring programmes should define the condition of water bodies in risk and to assess the changes, occurred as a result of the programme measures applied. The networks of control and operational monitoring of surface waters and the measured indicators are regulated by the Ordinance No. RD 715/02.08.2010 of the Minister of Environment and Waters.

2.2.3 Terrestrial observation

In 2004 the Minister of Environment and Waters developed and adopted a new programme for terrestrial observation. The programme fully complies with the latest requirements of the EC and EEA, with the good practices in the European countries, as well as with the national legislation, adopted later in 2007-2009 (Soils Act, Regulation on Soils Monitoring). The monitoring programme is organized at three levels, as follows:

First Level Observations (large-scale monitoring) are carried out in a uniform network 16x16 km, at 407 points and is providing data about the condition of soils regarding the following indicators: 9 heavy metals, general nitrogen, phosphorus, organic carbon, active soil reaction (pH), nitrate-nitrogen, general carbon and

[7] http://www.meteo.bg/

sustainable organic pollutants – 16 PAH, 6 PCB, 8-chlorine organic pollutants, mass density. Observations are made in 5-year periods.

Second Level Observations are directed towards regional occurrences of degradation processes – fermentation (54 ranges) and salination (12 ranges). Processes of surface-water and wind erosion are observed through specially developed mathematical models for assessment and forecasting. Soil sealing is assessed on the basis of statistical data and mapping of land surface (project CORINE Land Cover).

Third Level Observations are identical to the so called local soil pollutions, within which frameworks it should be made inventory of areas with polluted soil. The inventory is still partial and irregular, based on available data. In 2007 a specialized regulation to the Environmental Protection Act was approved; the inventory methodology is due.

The regularity of observations depends on the processes. Soil tests are carried out in 15 regional accredited laboratories to the ExEA.

2.2.4 Air-quality monitoring

The National Automated System for Ecological Monitoring assesses the air-quality on the territory of the country, divided into 6 regions for air-quality assessment and control, regulated by the Ordinance No 580/17.07.2007 of the Minister of Environment and Waters.

The national system for monitoring of the air-quality consists of 58 stations, including 14 stations in which testing materials are gathered manually and the corresponding laboratory analysis is performed manually as well, 29 automated test stations, 11 automated differential visual absorption spectrometry systems (DVAS), as well as 4 automated test stations for monitoring of air-quality in forest ecosystems – Complex background locations Rozhen, Yundola, Vitinya, Staro Oryahovo.

The concentrations of the main indicators are controlled every day, according to the Clean Air Act [7]: general dust, fine particles (PM10, PM2.5), sulphur dioxide, nitrogen-dioxide/nitrogen oxides, carbon oxide, ozone, benzene, lead, cadmium, nickel, arsenic, polycyclic aromatic hydrocarbons. Additionally, depending to the emissions character and sources in the different regions of the country's territory, specific indicators are being controlled: phenol, ammonia, aerosols of sulphuric acid, toluene, xylene, styrene, carbon sulphide, hydrogen sulphide, methane and non-methane hydrocarbons, and some other specific pollutants.

3. Reporting

The UN Framework Convention of Climate Change is the first major international legal instrument affecting climate change globally. The main objective of the Convention is "to stabilize concentrations of greenhouse gases (GHG) in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

Bulgaria signed the UNFCCC in Rio de Janeiro in June 1992 and the Parliament ratified it in March 1995. In compliance with Article 4.6 and 4.2(b) of the FCCC, Bulgaria as a country in transition has adopted 1988 as a base year for the implementation of the Convention instead of 1990. As an Annex I Party of the UN FCCC the Republic of Bulgaria adopted the target to stabilize emissions of greenhouse gases by 2000 at a level not exceeded that in 1988. The same year was used when comparing, evaluating and projecting greenhouse gas emissions. The 2000 target was successfully achieved.

At the third Session of the Conference of the Parties (COP) to the UNFCCC held in 1997 in the city of Kyoto, Japan, was signed the "Kyoto Protocol". Its main objective was: "To reduce GHG emissions worldwide, a total of 5%".

By ratifying the Kyoto Protocol in August 2002, Bulgaria undertook the duty to reduce its greenhouse gas emissions for the first commitment period (2008-2012) by 8% compared to emission levels in 1988, chosen as the base year. Bulgaria fulfils its obligations under the UNFCCC to prepare and periodically update inventories of greenhouse gases in the country by sources and removals by sinks for all greenhouse gases not controlled by the Montreal Protocol.

In accordance with these obligations Bulgaria presents annual greenhouse gas inventories, starting with the base 1988. The annual inventory and reporting of greenhouse gas emissions and removals provide an information base for the planning and monitoring of climate policy. Bulgaria's National Greenhouse Gas Inventory System was to be set up at the beginning of 2005. The first inventories covered the period 1988 – 1994 as a part of the international project "Country Study to Address Climate Change".

The annual GHG inventories for the period 1995 – 1997 followed the actual IPCC Guidelines on National GHG Inventories, 1995 and the results were published in the I-st and II-nd National Communications on Climate Change and in the National Action Plan on Climate Change. The GHG Inventories for 1998 and 1999 followed the Revised 1996 IPCC Guidelines, adopted as a basic methodological act for GHG emissions assessment by the UNFCCC. Since 1998 inventory data and results have been presented in the new Common Reporting Format (CRF).

The national system produces data and background information on emissions and removals for the UNFCCC, the Kyoto Protocol and the EU Commission. In addition, the scope of the system covers the archiving of the data used in emission estimations, the publishing of the results, participation in inventory reviews and the quality management of the inventory.

The Decision of the European Parliament and of the Council concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol [11] obliges the Member States (MS) of the

European Union (EU) to participate in the compilation of the EU's common greenhouse gas inventory and other climate policy, as well as in the monitoring and evaluation of its detailed measures. This procedure causes a two-phased submission of MS inventory reporting to the Commission with annual deadlines for submission 15 January and 15 March.

Annual submission of National Inventory Report (NIR) of Bulgaria to the EU, the UNFCCC and the Kyoto Protocol includes data of the anthropogenic emissions by sources and removals by sinks of all greenhouse gases (GHGs) not controlled by the Montreal Protocol, i.e. carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6). Hydrofluorcarbon emissions (HFCs), perfluorcarbons (PFCs) and sulphur hexafluoride (SF_6) are being studied in Bulgaria since 1995 as base year.

Indirect CO_2 emissions resulting from atmospheric oxidation of CH_4 and NMVOC emissions from non-biogenic sources are also included in the inventory. These have been separately estimated for fugitive emissions in the Energy sector and sources in the Industrial Process and Solvent and Other Product Use sectors using the methodology given in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006). For fossil fuel combustion, indirect emissions are included in the methodology to estimate CO_2 emissions. The estimation and reporting of indirect CO_2 emissions are also addressed in the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1996) and the UNFCCC reporting guidelines on annual inventories (UNFCCC 2006).

The NIR includes also estimates of so-called indirect greenhouse gases (carbon monoxide - CO, nitrogen oxides - NOx and non-methane volatile organic compounds – NMVOCs, and sulphur dioxide - SO_2 meaning sulphur oxides and other sulphur emissions calculated as SO_2).

The emission estimates and removals are presented by gas and by source category.

The structure of NIR was elaborated in order to follow the UNFCCC reporting guidelines on annual inventories (UNFCCC 2006).

The EU's greenhouse gas monitoring mechanism (280/2004/EC) combines information on annual emission inventories, the climate strategy and the evaluation of the effects of the policy measures and planning of new measures into a dynamic process. The Commission decisions on the implementing provisions and rules of the monitoring mechanism (29 October 2004 and 10 February 2005) specify in detail the content of the reports to be submitted to the Commission. The rules and modalities for reporting of greenhouse gas inventory data are based on those applied in the reporting under the UNFCCC and Kyoto Protocol, supplemented with provisions for reporting to enable the assessment of actual and projected progress of the Community and its Member States to meet their commitments under the UNFCCC and the Kyoto Protocol.

Bulgaria's reporting obligations to the UNFCCC, UNECE and EC are being administered by the Ministry of Environment and Water (MoEW). All activities on preparation of GHG inventories in Bulgaria are coordinated and managed on the state level by MoEW.

The Bulgarian Government through MoEW (Climate Change Policy Directorate) has the political responsibility for compliance with commitments under the UNFCCC and the Kyoto Protocol, including for functioning of Bulgarian National Inventory System in accordance with the requirements of Decision 19/CMP.1 under Article 5, paragraph 1, of the Kyoto Protocol.

The Executive Environment Agency (ExEA) has been identified as the responsible organization for preparation of Bulgaria's National GHG Inventory under the UNFCCC and the Kyoto Protocol and designated as single national entity.

Since 2007 the National System for GHG inventories is in accordance with the requirements of Article 5, paragraph 1 from the KP and the Marrakech Accord (respectively, Decision 19/CMP.1).

The ExEA has the overall responsibility for the national inventory, comprising greenhouse gases as well as other air pollutants. Within the inventory system specific responsibilities for the different emission source categories are defined ("sector experts"), as well as for all activities related to the preparation of the inventory, including QA/QC, data management and reporting.

The sector experts are in charge of specific responsibilities related to choice of methods, data collection, processing and archiving. Sector experts are also responsible for performing Quality Control (QC) activities that are incorporated in the Quality Management System (QMS).

ExEA has the technical responsibility for the national inventory:

- acts as National Inventory Compiler (supervises inventory preparation process);
- compiles CRF tables and NIR;
- manages BGNIS;
- Implements QA/QC procedures;
- National Inventory Focal Point.

The distribution of responsibilities of different institutions for inventory preparation is according to:

- Order № RD-54/25.01.2007 by the Minister of Environment and Water;
- Order № RD-377/08.06.2007 by the Minister of Environment and Water;
- Order № RD- 78/26.08.2009 by the Executive Director of ExEA;
- Order № RD-218/05.03.2010 by the Minister of Environment and Water.

The overall objective of the Bulgarian National Inventory System is annually to produce a high quality inventory (National CRF, Kyoto and SEF tables and National Inventory Report) for compliance with its Kyoto commitment and to submit it by the required deadline.

3.1 National Inventory Methodology

According to Clean Air Act (CAA), article 25 (6) the Minister of Environment and Water in co-ordination with the interested ministers issues an order for the approval of

a Methodology for the calculation, with balance methods, of the emissions of harmful substances (pollutants), emitted in the ambient air. The national Methodology (approved with Order RD 77 from 03.02.2006 of MoEW) is harmonized with CORINAIR methodology for calculation of the emissions according to the CLRTAP.

During 2007, MoEW/ExEA implemented a project for development of Common methodology for emissions inventory under CLRTAR and UNFCCC, i.e. to update the present Methodology under article 25 (6) CAA. (approved with Order RD 40 from 22.01.2008 of MoEW). The aim of the project was harmonization of the national Methodology with IPCC, including the three main greenhouse gases – CO_2, CH_4 and N_2O (plus relevant ODS and SF_6). The second part of the project was amended to include additional requirements for establishment of Data Quality Control System, i.e. to include procedures for QA/QC at all stages of data collection and calculation of emissions.

The first project was finalized in 2007 and the second one in 2008.

The Bulgarian national GHGs inventory and NIR are compiled according to requirements of the following documents:

- Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (1996 IPCC GL) which specify the reporting obligations according to Articles 4 and 12 of the UNFCCC (IPCC Guidelines, 1997);
- IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories 2000 (GPG 2000);
- IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry 2003 (GPG LULUCF 2003);
- 2006 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC 2006 GL)25;
- EMEP/EEA air pollutant emission inventory guidebook – 2009.

The emission factors are mainly from the same documents and in addition country-specific factors.

3.2 Improvement of the National inventory system

In 2009 the MoEW approved four projects, whose defined objectives were to improve the Party's current estimation methodologies, the technical competence of the staff within the national system, and the management and archiving of data. The four projects are already finalized:

Project 1

"Development of methodology for calculation of emissions and removals for LULUCF sector according to requirements of UNFCCC and Kyoto Protocol". This project was contracted on 24 November 2009 and it was completed by 24 April 2010. The result of the project is incorporated into the 2010 submission.

Project 2

"Recalculations of previously submitted estimates of emissions under UNFCCC and the European Monitoring and Evaluation Programme/Convention on Long-range Transboundary Air Pollution (EMEP/CLRTAP) according to the new Common

Methodology from the base year to all subsequent years, up to the year in which recalculations are made and cover all inventory data". This project was contracted on 1 December 2009 and it was completed by 1 February 2011. The result of the project is incorporated into the 2011 submission.

Project 3

"Development of software tool and automatic preparation of national inventories under UNFCCC and UNECE/CLRTAP". This project was contracted on 28 December 2009 and is completed by 28 December 2010. The result of the project is incorporated into the 2011 submission.

Project 4

"National study for determine the quantity of actual fluorinated gases (F-gases) (HFCs, PFCs and SF6) in Bulgaria and methods for their calculations". This project was contracted on 28 December 2009 and was completed by 15 July 2010. A part of the results of this project is incorporated into the 2010 submission. The final result of successfully completed project is incorporated into the 2011 submission.

COPERT IV model was implemented into the last National transport emissions inventory.

3.3 Future Improvement of emissions inventories

The MoEW and ExEA work for systematic improvement of the emission inventories, i.e.:

- Improvement of uncertainty assessment;
- Improvement in KP-LULUCF accounting and reporting process especially in the field of tracking land use changes and providing information which is required by decision 15/CMP.1 [8] and 16/CMP.1 [2];
- Improvement of the relation with Branch Business Associations;
- Further collaboration with external organizations as University of Forest, Energy Institute, Bulgarian Academy of Science.

3.4 GHG emissions per sector

Under the UNFCCC and the Kyoto Protocol, Bulgaria is required to submit annually to secretariat of the Convention a national greenhouse gas inventory covering emissions and removals of direct greenhouse gases from the six sectors (Energy, Industrial processes, Solvent and other product use, Agriculture, Land Use, Land-Use change and Forestry and Waste) and for all years from the base year or period to the most recent year. The preparation and reporting of the inventories are guided by the UNFCCC guidelines (UNFCCC 2006) and are based on the above mentioned IPCC methodologies to ensure the transparency consistency, comparability, completeness and accuracy of the inventories (TCCCA).

Detailed information of GHG emission estimates in last Bulgarian NIR-2011 are given for the seven sectors:

- CRF 1: Energy;
- CRF 2: Industrial processes;

- CRF 3: Solvent and other product use;
- CRF 4: Agriculture;
- CRF 5: Land use, land-use change and forestry;
- CRF 6: Waste;
- CRF 7: Other.

Bulgaria has provided estimates for all significant IPCC source and sink categories according to the detailed CRF classification. Estimates are provided for the following gases: CO_2, N_2O CH_4, F-gases (HFC, PFC and SF_6), NMVOC, NOx, CO and SO_2. In accordance with the IPCC Guidelines, international aviation and marine bunker fuel emissions are not included in national totals. However, CO_2, CH_4 and N_2O emissions from lubricants from International bunkers are included in emissions from feedstock and non-energy use of the fuels. Lubricants are not split between domestic and international, as only information on total sales of lubricants is available in fuel statistics.

All sources and sinks included in the IPCC Guidelines are addressed. No additional sources and sinks specific to Bulgaria have been identified.

The geographic coverage is complete. There is no part of the Bulgarian territory not covered by the national inventory.

A complete set of CRF tables are provided for all years and the estimates are calculated in a consistent manner.

The sources and sinks not considered in the inventory but included in the IPCC Guidelines are indicated, the reasons for such exclusion are explained. In addition, the notation keys are used to fill in the blanks in all the tables in the CRF. Notation keys used in the NIR are consistent with those reported in the CRF. Notation keys are used according to the UNFCCC guidelines on reporting and review (FCCC/CP/2002/8).

The overall emissions by sectors for the period 1988-2009, in CO_2-eq are shown in table 28 and figure 11. The quantities of CO_2, sequestrated by forestry, are also included (without F-gases).

Table 31 below shows the GHG aggregated emission trends by IPCC sectors. Obviously, sector Energy had the biggest contribution to the overall emissions, expressed in CO_2-eq. Sector Agriculture, Waste and Industrial processes followed it.

Year	Total (incl. LULUCF)	Energy	Industrial Processes	Solvent	Agriculture	LULUCF	Waste
1988	110 336	85 349	12 404	9 000	18 979	-14 141	6 846
1989	107 886	84 233	12 026	900	17 946	-13 989	6 770
1990	97 595	76 330	10 741	898	16 790	-13 806	6 643
1991	75 766	59 447	8 219	896	14 415	-13 672	6 462
1992	69 991	56 931	6 678	897	12 354	-13 339	6 470
1993	68 773	56 854	6 643	830	10 674	-12 621	6 393
1994	66 755	54 834	8 201	127	9 615	-12 400	6 378
1995	67 928	55 932	10 068	96	8 078	-12 886	6 640
1996	68 479	56 141	9 948	92	7 588	-11 871	6 583
1997	65 070	53 927	8 906	79	7 656	-11 937	6 439
1998	59 450	52 035	6 339	64	6 682	-11 931	6 260
1999	52 182	45 401	5 410	57	7 202	-11 944	6 056
2000	53 068	44 032	6 485	68	6 789	-10 276	5 969
2001	55 754	47 797	6 282	55	6 487	-10 605	5 739
2002	51 943	45 170	5 609	57	6 623	-11 109	5 593
2003	57 179	49 437	6 180	60	6 369	-11 121	6 253
2004	56 119	47 968	6 417	49	6 951	-11 441	6 174
2005	55 774	48 563	6 670	51	6 533	-11 336	5 294
2006	56 891	50 197	6 452	54	6 375	-11 406	5 219
2007	61 509	53 562	6 935	50	6 110	-10 255	5 105
2008	57 463	51 632	6 084	51	6 311	-11 566	4 951
2009	47 711	45 075	3 438	48	6 177	-11 782	4 755

Table 31: Aggregated GHG emissions by sector, Gg, CO_2-eq. *Source: NIR-2011*

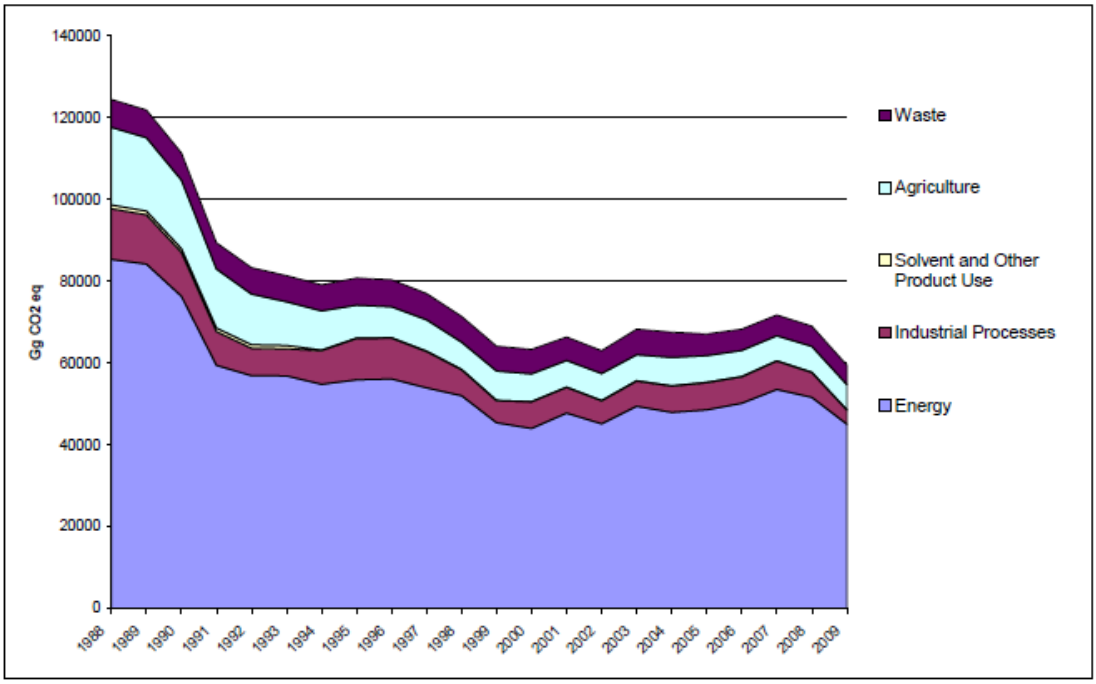

Figure 14: GHG emissions per sectors. *Source: NIR-2011*

The reduction of total GHG emissions (including LULUCF) from the base year to current inventory year is respectively 56.8%. The reductions by IPCC sectors is presented on Table .

According to the data presented on Table 32the emissions in 2009 decreased with 47.2% compared to the base year in Energy sector.

A steady trend towards emission reduction in Industrial processes sector is observed since 1988. The emissions in 2009 decreased with 72.3% compared to the base year.

The main sources of greenhouse gas emissions in Industrial processes sector are Mineral Products and Chemical Industry, which cause about 64.45% and 25.15%, respectively, of the emissions from this sector in 2009.

The overall emission reduction in the Agriculture sector has amounted to 67.5% since 1988.

The total emission reduction in Waste sector from the base year is 30.5%.

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2008	2009	Change from base (1988) to latest reported year
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	(%)
1. Energy	51 632.15	45 075.23	-47.19
2. Industrial Processes	6 083.95	3 437.84	-72.28
3. Solvent and Other Product Use	51.10	47.84	-94.68
4. Agriculture	6 310.89	6 177.13	-67.45
5. Land Use, Land-Use Change and Forestry(5)	-11 565.81	-11 781.88	-16.68
6. Waste	4 950.71	4 755.00	-30.54
7. Other	N/A	N/A	0.00
Total (including LULUCF)(5)	57 463.00	47 711.16	-56.76

Table 32: The reductions of GHG emissions by sectors by base year. *Source: NIR-2011*

3.5 GHG emissions per type

As an Annex I Party to the Convention Bulgaria reports annually its GHG inventory/emissions from the base year to the year preceding the year of reporting.

The main greenhouse gases to be reported pursuant to UNFCCC are as follows:

- Carbon dioxide – CO_2;
- Methane – CH_4;
- Nitrous oxide – N_2O;
- Hydrofluorocarbons – HFCs;
- Perfluorocarbons – PFCs;
- Sulphur hexafluoride – SF_6.

Each of these gases has a different warming effect. As an example, the gases HFCs, PFCs and SF_6 (so called F-gases) have much greater warming effect, in some cases over one hundred times, compared to methane (21), nitrous oxide (310) and carbon dioxide (1).

Because of that, a common assessment criterion for the effect of each GHG on the atmosphere warming should be introduced. This criterion is the so-called Global Warming Potential (GWP), representing GHG emissions as CO_2-eq. emissions. It allows totalling the effect of all GHGs, adjusted to a common base.

For defining of GWP, the Parties to the Convention and Kyoto Protocol accept values, over a time horizon of 100 years, as mentioned in the IPCC Second Assessment Report of 1999.

Other gases have indirect warming effect to the atmosphere (as NOx, CO and NMVOCs), or cooling effect as SOx. These gases are precursors of the greenhouse gas – troposphere ozone, and are subject of regional control protocols. They do not have global effect on the climate changes as the main GHG. That is why in the NIR only the total GHG emissions – precursors, as well as the total SOx emissions are reported.

The inventories are prepared according to the UNFCCC Guidelines, adopted at the 21st session of the SBSTA (December 2004, Buenos Aires) and establishing the NIR structure in compliance with the Revised IPCC Guidelines from 1996 and the IPCC Good Practice Guidance (for National GHG Inventories) from 2000.

The method to identify key source categories follows the Tier 1 method – quantitative approach described in the Good Practice Guidance (IPCC-GPG, 2000) [14]. The key source identification of the Bulgarian inventory includes all reported greenhouse gases CO_2, CH_4, N_2O, HFC, PFC and SF_6, and all IPCC source categories, including LULUCF. The key source analysis is performed by the ExEA with data for greenhouse gas emissions of the corresponding current submission and comprises a level assessment for all years between 1988 and the last reported year and trend assessments for the trend of the latest reported years with respect to base year emissions.

Emissions and removals from LULUCF are included in the key category analysis which is performed according to the IPCC Good Practice Guidance for Land use, land-use change and forestry (IPCC-GPG-LULUCF, 2003) [15].

In 2009 Bulgaria's greenhouse gas emissions totalled 59 493.04 Gg CO_2. The emissions decreased by 52.2% compared with the base year and on 51.2% below the level of 122 000 Gg CO_2 to which Bulgaria should limit its emissions during the Kyoto Protocol's first commitment period between 2008 and 2012. Emissions in 2009 were 13.8% lower in comparison with the emissions of the previous year. The total greenhouse gas emissions as CO_2 equivalence are presented in Table 33.

Year	Total (exc. LULUCF)	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
1988	124 477	93 317	16 349	14 807	IE,NA, NO	IE, NA, NE, NO	3
1989	121 875	92 003	16 250	13 618	IE,NA, NO	IE, NA, NE, NO	4
1990	111 401	83 379	15 436	12 583	IE,NA, NO	IE, NA, NE, NO	4
1991	89 438	65 021	14 496	9 917	0	IE, NA, NE, NO	4
1992	83 330	61 031	13 987	8 307	0	IE, NA, NE, NO	4
1993	81 394	60 930	13 032	7 427	0	IE, NA, NE, NO	5
1994	79 155	59 761	12 163	7 226	0	IE, NA, NE, NO	5
1995	80 814	62 149	12 059	6 591	9	IE, NA, NE, NO	5
1996	80 350	62 216	11 768	6 350	11	IE, NA, NE, NO	5
1997	77 007	59 261	11 530	6 197	14	IE, NA, NE, NO	6
1998	71 381	55 280	11 098	4 979	19	IE, NA, NE, NO	6
1999	64 126	48 192	10 616	5 288	24	IE, NA, NE, NO	6
2000	63 344	47 609	10 621	5 080	28	IE, NA, NE, NO	7
2001	66 359	51 176	9 985	5 156	35	IE, NA, NE, NO	7
2002	63 052	48 005	9 892	5 102	46	IE, NA, NE, NO	8
2003	68 300	52 681	10 782	4 767	62	IE, NA, NE, NO	8
2004	67 560	51 342	10 708	5 415	86	IE, NA, NO	9
2005	67 110	52 081	9 740	5 166	114	IE, NA, NO	9
2006	68 297	53 504	9 725	4 880	179	IE, NA, NO	9
2007	71 763	57 126	9 593	4 826	209	IE, NA, NO	9
2008	69 029	54 315	9 351	5 043	310	0	10
2009	59 493	45 802	8 759	4 654	268	0	10

Table 13: Summary of emission trends per gas, Gg, CO2-eq. *Source: NIR-2011*

The most important greenhouse gas in Bulgaria is carbon dioxide. The share of CO_2 emissions from the total greenhouse gas emissions has varied from 56.9% excluding LULUCF and 70.9% including LULUCF. In absolute terms CO_2 emissions have decreased 57.2% since 1988. Around 76% of total CO_2 eq. emissions originate from the energy sector. The amount of energy-related CO_2 emissions has fluctuated much according to the economic trend, the energy supply structure (including electricity exports) and climate conditions.

Methane emissions (CH_4) have decreased by 46.4% from the 1988 level. This is mainly due to the improvements in waste collection and treatment and a reduction in animal husbandry in the Agriculture sector. Correspondingly, emissions of nitrous oxide (N_2O) have also decreased by 67.8%, which has been occasioned mostly by the reduced nitrogen fertilization of agricultural fields, the biggest decline was in the beginning of time series.

The emissions of F-gases have increased over tenfold during 1995-2009. A key driver behind the trend has been the substitution of ozone depleting substances (ODS) by F-gases in many applications.

On Table 34 the CO_2 equivalent emissions in 2008 and 2009 are shown and also – the change from 1988 to 2009.

GREENHOUSE GAS EMISSIONS	2008	2009	Change from base (1988) to latest reported year
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	(%)
CO_2 emissions including net CO_2 from LULUCF	42 567.06	33 849.43	-57.16
CO_2 emissions excluding net CO_2 from LULUCF	54 315.27	45 802.22	-50.92
CH_4 emissions including CH_4 from LULUCF	9 366.70	8 765.21	-46.39
CH_4 emissions excluding CH_4 from LULUCF	9 350.64	8 758.51	-46.43
N_2O emissions including N_2O from LULUCF	5 209.54	4 818.43	-67.81
N_2O emissions excluding N_2O from LULUCF	5 043.19	4 654.22	-68.57
HFCs	310.00	268.00	100.00
PFCs	0.00	0.01	100.00
SF_6	9.70	10.07	188.36
Total (including LULUCF)	57 463.00	47 711.16	-56.76
Total (excluding LULUCF)	69 028.81	59 493.04	-52.21

Table 34: The reductions of GHG emissions by base year. *Source: NIR-2011*

Bulgaria is chosen to report under Article 3.3 of the Kyoto Protocol the coverage of carbon pools and emission sources reported under afforestation (A), reforestation (R) and deforestation (D). In accordance with Article 7 KP the country will report in

the National Inventories the following activities, as given in Decision 16/CMP.1 [2] Land use, land-use change and forestry.

Emissions and removals from KP-LULUCF activities are reported for the second time, thus trends are not available. Net removals from AR in 2009 were 1 672.81 Gg CO_2 eq. and net emissions from D activities were 152.82 Gg CO_2 eq. {NIR-2011}

3.5.1 Information publicly available

Section E of the annex to decision 13/CMP.1 [1] outlines provisions for the national registry to support, via a user-interface, non-confidential information being made available to the public.

The registry terms and conditions, operators guide, forms and guidance for opening the holding accounts are available at the website of Executive Environment Agency[8].

Bulgaria has made this information available on the Registry's website[9].

The following information has been made accessible to the public in line with the requirements that this information is non-confidential. Bulgaria considers all information to be confidential that is determined to be confidential according to Annex XVI of the EU Registry Regulation No 916/2007/EC [10] accounts holding's publicly accessible information[10].

The registry terms and conditions, operators guide, forms and guidance for opening the holding accounts are available at the website of Executive Environment Agency[11]:

Information on Joint Implementation (JI) projects is publicly accessible on the site of MoEW[12].

Information according to paragraph 45 – 48 of the annex to decision 13/CMP.1 [1] include:

(a) Account name: the holder of the account;

(b) Account type: the type of account (holding, cancellation or retirement);

(c) Commitment period: the commitment period with which a cancellation or retirement account is associated;

(d) Representative identifier: the representative of the account holder, using the Party identifier (the two-letter country code defined by ISO 3166) and a number unique to that representative within the Party's registry;

(e) Representative name and contact information: the full name, mailing address, telephone number, facsimile number and e-mail address of the representative of the account holder. According to Annex XVI of the EU Registry Regulation No 916/2007/EC [10] this information is published unless the registry

[8] http://nfp-bg.eionet.eu.int/bul/About/RR/R_TE/registry/index.html

[9] http://bg-server1.etr.moew.government.bg/

[10] http://bg-server1.etr.moew.government.bg/iaos/contacts.php

[11] http://nfp-bg.eionet.eu.int/bul/About/RR/R_TE/registry/index.html

[12] http://bg-server1.etr.moew.government.bg/iaos/projects.php

administrator allows account holders to request keeping all or some of this information confidential and the account holder requested the registry administrator in writing not to display all or some of this information.

The Information includes the following Article 6 project information, for each project identifier if the Party has issued ERUs for a project:

(a) Project name: a unique name for the project;

(b) Project location: the Party and town or region in which the project is located;

(c) Years of ERU issuance: the years in which ERUs have been issued;

(d) Reports: downloadable electronic versions of all publicly available documentation relating to the project, including proposals, monitoring, verification and issuance of ERUs, where relevant, subject to the confidentiality provisions in decision 9/CMP.1. [4]

The information includes the following holding and transaction information relevant to the national registry, by serial number, for each calendar year:

(a) The total quantity of ERUs, CERs, AAUs and RMUs in each account at the beginning of the year (displayed in the year X+5, according to EU Registry Regulation No 916/2007/EC [10] the information is confidential until the year X+5);

(b) The total quantity of AAUs issued on the basis of the assigned amount pursuant to Article 3, paragraphs 7 and 8 (displayed in the year X+1);

(c) The total quantity of ERUs issued on the basis of Article 6 projects (displayed in the year X+1);

(d) The total quantity of ERUs, CERs, AAUs and RMUs acquired from other registries and the identity of the transferring accounts and registries (displayed in the year X+5, according to EU Registry Regulation No 916/2007/EC [10] the information is confidential until the year X+5);

(e) The total quantity of RMUs issued on the basis of each activity under Article 3, paragraphs 3 and 4 (displayed in the year X+1);

(f) The total quantity of ERUs, CERs, AAUs and RMUs transferred to other registries and the identity of the acquiring accounts and registries (displayed in the year X+5, according to EU Registry Regulation No 916/2007/EC the information is confidential until the year X+5);

(g) The total quantity of ERUs, CERs, AAUs and RMUs cancelled on the basis of activities under Article 3, paragraphs 3 and 4 (displayed in the year X+1);

(h) The total quantity of ERUs, CERs, AAUs and RMUs cancelled following determination by the Compliance Committee that the Party is not in compliance with its commitment under Article 3, paragraph 1 (displayed in the year X+1);

(i) The total quantity of other ERUs, CERs, AAUs and RMUs cancelled (displayed in the year X+1);

(j) The total quantity of ERUs, CERs, AAUs and RMUs retired (displayed in the year X+1);

(k) The total quantity of ERUs, CERs, and AAUs carried over from the previous commitment period (displayed in the year X+1);

(l) The Information does not include current holdings of ERUs, CERs, AAUs and RMUs in each account because this is confidential according to EU Registry Regulation No 916/2007/EC.

The information includes a list of legal entities authorized by the Party to hold ERUs, CERs, AAUs and/or RMUs under its responsibility.

4. Verification

4.1 Methods for QA/QC analyses

As a responsible institution for the preparation of the GHGs Emission Inventory and the relevant National Inventory Reports under UNFCCC, the Executive Environment Agency (ExEA) is responsible also for coordination of quality assurance/quality control (QA/QC) activities.

In 2010 ExEA developed and implemented its QA/QC system with sector specific procedures. This system is based on the National plan for data quality management in the National Emission Inventory under the UN Framework Convention on Climate Change and is coordinated by an expert not directly involved in the inventory development process. Order № RD-218/05.03.2010 of the Minister of Environment and Water regulates the names and responsibilities of the MoEW and ExEA experts for implementation of the National QA/QC plan in emissions inventory of sectors Energy, Industry, Solvents, Agriculture, LULUCF and Waste, which is an internal document to organise, plan and implement the QA/QC activities.

The QA/QC system covers all participants in the Bulgarian National Inventory System and uses specific checklists. The National Inventory Report (NIR) provides a description of the QA/QC plan and its implementation in the context of the inventory preparation process.

The QA/QC plan has been updated in August 2010 in order to implement the new established legal, institutional and procedural arrangements within the BGNIS. It was normatively and legally regulated by the Regulation on the Order and Procedure on the Organization of the National Inventories of Harmful Substances and Greenhouse Gases, adopted by Decree of the Council of Ministers No 215/21.09.2010, SG No 76/28.09.2010 [22].

The National QA/QC Plan includes following elements:

- Responsible institutions;
- Data collection;
- Preparation of inventory;
- QC Procedures;
- QA Procedures;
- Uncertainty evaluation;
- Organisation of the activities in quality management system;
- Documentation and archiving.

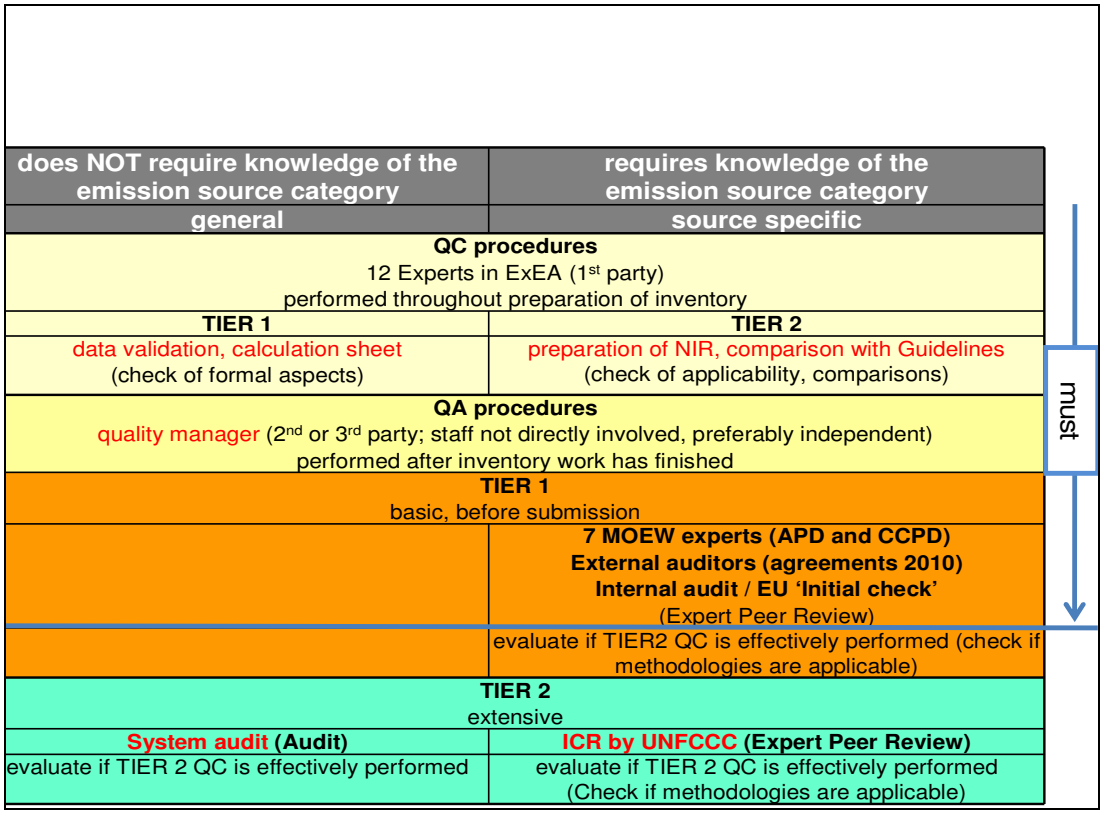

Figure 15: Quality Management System within the Bulgarian National Inventory System. *Source: NIR-2011*

The legal and institutional arrangements within the BGNIS regulate the responsibilities of all engaged institutions for implementation of the requirements of the National QA/QC Plan.

The QC procedures are implemented by all activity data providers and ExEA's sector experts and/or external consultants.

The cycle of QA/QC activities for inventory consists of the following steps:

1. The QA/QC Manager prepares a Plan for implementation of QA/QC activities for the current submission. The check list with all specific QA/QC procedures are part of the plan;
2. The plan for QA/QC is sent to all engaged QC and QA experts for implementation;
3. In the process of preparation of the inventory the QC experts (activity data provider and ExEA's sector experts) apply each of the specific procedures set in the check list for each of the sources categories they are responsible for;
4. The QA/QC Manager coordinates the exchange of the check lists between the QC experts for correction of the findings with input data for calculation of emissions (activity data and EF);
5. The QA/QC Manager sends to the QA experts the prepared by ExEA's sector expert and/or external consultants CRF tables and respective chapters from NIR;

6. The QA/QC Manager coordinates the exchange of the check lists between the QA experts and ExEA's sector experts and/or external consultants for correction of the findings on the quality of the inventory (CRF and NIR);
7. The QA/QC Manager prepares a summary of the results from the implemented QA/QC checks;
8. The QA/QC Manager prepares an attendant file for implemented procedures;
9. The QA/QC Manager prepares a report to the executive director of the ExEA on the outcome of the QA/QC procedure and improvement plan for the next reporting round;
10. The QA/QC Manager is responsible for documentation and archiving of all documents, related to the implemented QA/QC procedure in the national System for documentation and archiving of inventory in ExEA.

The archived information includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements.

4.2 Data verification

Bulgaria uses verification reports from EU ETS, the annual compliance reports under the Integrated Pollution Prevention and Control (IPPC) permit system under the European Union IPPC Directive (permits take into account air emissions from targeted industrial plants), and also the annual reporting under the European Pollutant Release and Transfer Register (EPRTR) Regulation (reporting includes CO_2 and N_2O emissions from targeted industrial plants) for verification and estimation of the CO_2 emissions data for the six key categories in the industrial processes sector and simultaneously undertook recalculations for all years of the inventory time-series using these data.

This verification procedure uses plant-specific data, which is in line with the IPCC Good Practice Guidance.

Bulgaria develops more automated procedures (e.g. electronic links and formula) to manage data entry, in order to avoid the risk of transcription and other errors in the emission estimation process when using a mixture of automated and manual data.

With a view to improve transparency, Bulgaria established a new set of calculation procedures for stationary combustion, transport and fugitive emissions categories and used them to estimate emissions from the energy sector for all years from 1988 to 2008. This has resulted in a clear view of the flow of data through the emission estimation process with very good transparency.

Verification of activity data in the specific sectors are shortly described as follows.

4.2.1 Energy sector

The primary source of energy data is the detailed national energy balance provided by the NSI. This in turn has supplied data to the Eurostat database system since 1990. Over the years, a number of alterations have been made to the nomenclature and allocations in the national energy balance. The Eurostat format, however, has remained stable and is therefore the basis for current activity data for energy. For

1988 and 1989 the International Energy Agency (IEA) energy data set, which is very close in format to Eurostat, transparent and consistent has been relied upon. Furthermore, with this approach, the activity data used for the estimates match international statistics. CO_2 emissions from fuel combustion were calculated using both the reference approach and the sectoral approach. The differences varied by year, but in all cases the differences in CO_2 emission estimates remained below 6%.

The verification of activity data includes:

- Revision of the activity data for consolidated Energy Balance for national and UNFCCC/ UNECE reporting obligation;
- Revising of the EF to update country specific emission factors;
- A cross-check with ETS, EPRTR, IPPC data;
- Providing carbon mass balance;
- Comparison of emissions using alternative approaches;
- Incorporation of documentation for the national energy balance, provided by National Statistic Institute.

4.2.2 Industrial sector

Bulgaria has developed an updated, transparent and logically thought out stationary combustion model to prepare emission estimates. These estimates are based on both tier 1 and 2 methods. EFs used are generally from the IPCC good practice guidance, but country-specific EFs have been developed for most coals. The country-specific EFs are based on averages of verified 2008 EU ETS data.

The verification of activity data includes:

- Revision of the activity data based on IEA/EUROSTAT questionnaire;
- A cross-check with ETS, EPRTR, IPPC data;
- Revision of the Emission Factors.

Investigation is carried out on the possibilities to update country specific emission factors (CS EF) for solid and liquid fuels. A comparison is made of applied EF and parameters with the (a) IEF with the default EF of the IPCC guidelines, (b) information about NCV of relevant fuels provided by NSI, and (c) the SAI 2009 report (Table 1.4; FCCCWEB/SAI/2009). This investigation includes updated/revised country specific NCV for the important fuels.

- Data from car producers and from the iron and steel industry was included in the CRF tables;
- Recalculations were made and time-series consistency was checked, due to revised activity data and EF;
- Investigation on combustion plant types and technology will be carried out (submission 2011/2012) because for the whole period after the base 1988, there have been no changes in methodology of calculation and collection of data.

4.2.3 Transport sector

For the 2010 submission Bulgaria prepared new road transportation estimates. The updated model estimates emissions according to an IPCC tier 1 method. Although the method is simple in structure, the estimates are consistent and transparent.

Investigation is carried out on the possibilities to update country specific emission factors for liquid fuels and gaseous fuels.

The verification of activity data includes:

- Detailed vehicle activity data, a prerequisite for the operation of higher-tiered models;
- Revision of the activity data based on IEA/EUROSTAT questionnaire and comparison to national statistics to ensure consistency;
- Revising of the EF (gasoline, Diesel, LPG);
- The model COPERT, which is a country support tool for reporting provided by the European Environment Agency (EEA) will be incorporated within the 2011 submission. With this model a higher Tier method for estimation CO_2, N_2O and CH_4 as well as non-GHG will be realized.

Consumption of Halocarbons and SF_6

Bulgaria submitted revised estimates for in-use emissions from refrigerated trucks. These estimates had been prepared in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. Representatives of the largest importer companies of insulation panels and foams have confirmed that they do not use any HFCs in their products. There is no production of metered dose inhalers within the country; instead these are imported containing HFC-134a. The emissions were estimated from imported aerosols and metered dose inhalers using GDP.

The verification of activity data includes:

A study on F gases actual emissions is being conducted. The main findings and proposals for methodologies to be used were presented in NIR-2010, submitted to UNFCCC and EC on 27/05/2010. The final results of the study are reported in the 2011 submission of the inventory.

4.2.4 Solvent and other product use

Recalculation of all the estimates of the sector based on the updated CORINAIR methodology is being carried out and are reported in the 2011 submission.

4.2.5 Agriculture

Bulgaria performed recalculations of its 2007 inventory based on the recommendations of the previous review report in relation to a revision of default methodologies and EFs used to estimate N_2O emissions from agricultural soils.

The verification of activity data includes:

Bulgaria performs basic verification of the activity data used for the agriculture sector, which was undertaken by the Ministry of Agriculture and Food (Division of Agricultural Statistics) using standard statistical tools.

4.2.6 Land-use, land-use changes and forestry

The Party developed a methodology to collect data on areas of land use and land-use change and the NIR also included a land-use change (LUC) matrix.

The verification of activity data includes:

- Bulgaria has successfully completed Project 1 – "Development of methodology for calculation of emissions and removals for LULUCF sector according to requirements of UNFCCC and Kyoto Protocol". The results of this project have already been incorporated into the 2010 submission. The methodology for calculation of emissions and removals for LULUCF sector according to requirements of UNFCCC and Kyoto Protocol has already been prepared under the contract between ExEA and University of Forest;
- In the 2010 submission an improvement of the inventory of the areas of the cropland as well as estimations of the organic carbon stock in cropland and grassland by soil groups was made;
- In 2011 submission estimations of the organic carbon stock in forest soil, by soil groups (World reference base 2006 [13]) is also planed;
- Bulgaria is carrying out an assessment of the most important factors contributing to the results of the LULUCF sectors together with their uncertainties as well as the available resources for improvements. On basis of this assessment a prioritization and a plan of improvement will be made.

4.2.7 Waste sector[13]

The 2010 annual submission included general descriptions of the methods used to estimate emissions from the waste sector, as well as the activity data on the amount of waste disposed to landfills or incinerated, and wastewater treated for the whole time series. Emissions from managed and unmanaged waste disposal on land and waste incineration have been recalculated based on the recommendations of the previous review report.

The verification of activity data includes:

- Incorporation of the First Order Decay (FOD) model provided by the 2006 IPCC Guidelines;
- Revision of activity data and emission factor when using data from the Waste statistics and degradable organic carbon (DOC) value and other related parameters;
- Collaboration with external auditors;
- Recalculations and time-series consistency.

[13] http://www.eea.europa.eu/publications/EMEPCORINAIR5

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Appendix

ABBREVIATION	FULL NAME
A	Aforestration
AAU	Assigned amount units
BDZ	Bulgarian State Railway
BGN	Bulgarian Lev (National currency)
BGNIS	Bulgarian National Inventory System
CAA	Clean Air Act
CER	Certified Emission Reduction
CH_4	Methane
CLRTAP	Convention on Long-range Transboundary Air Pollution
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO	Carbon monoxide
CO_2	Carbon dioxide
COP	Conference of the Parties
CRF	Common Reporting Format
CS EF	Country specific emission factors
D	Deforestration
DFI	Direct Foreign Investments
DOC	Degradable organic carbon
DVAS	Differential visual absorption spectrometry systems
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEA	European Environment Agency
EF	Emission factor
EFA	Executive Forestry Agency
EMEP	Cooperative programme for monitoring and evaluation of the long-range transmission of air pollutants in Europe
EPA	Environmental Protection Act
EPRTR	European Pollutant Release and Transfer Register
ERT	Expert Review Team
ERU	Emission reduction unit
ETS	Emission trading scheme
EU	European Union
EUR	Euro
ExEA	Executive Environment Agency
FCCC	Framework Convention of Climate Change
FOD	First Order Decay

ABBREVIATION	FULL NAME
GAW	Global Atmosphere Watch
GD	General Directorate
GDP	Gross Domestic Product
Gg	Gigagram
GHG	Greenhouse gas
GSN	Global Surface Network
GUAN	Global Upper Air Network
GVA	Gross Value Added
GWP	Global Warming Potential
ha	Hectare
HFCs	Hydrofluorocarbons
HPP	Hydro Power Plant
IEA	International Energy Agency
IEF	Implied emission factors
IPCC	Intergovernmental Panel on Climate Change
IPCC GL	IPCC Guidelines
IPCC GPG	IPCC Good Practice Guidance
IPPC	Integrated Pollution Prevention and Control
IT	Information technology
JI	Joint Implementation
KP	Kyoto Protocol
kt	kilotonne
ktoe	kilotonne of oil equivalent
LIBOR	London Interbank Offered Rate
LPG	Liquefied petroleum gas
LUC	Land use change
LULUCF	Land use, land-use change, forestry
MAF	Ministry of Agriculture and Food
MEET	Ministry of Economy, Energy and Tourism
MI	Ministry of Interior
MoEW	Ministry of Environment and Water
MOT	Ministry of Transport
MS	Member States (of the EU)
MTITC	Ministry of Transport, Information Technologies and Communications
MWh	Megawatt hour
N_2O	Nitrous oxide
NASEM	National Automated System for Ecological Monitoring
NCV	Net calorific value
NFP	National Focal Point
NIC	National Inventory Complier
NIFP	National Inventory Focal Point

ABBREVIATION	FULL NAME
NIR	National Inventory Report
NMVOC	Non-methane volatile organic compounds
NOx	Nitrogen oxides
NPP	Nuclear Power Plant
NRIC	National Railway Infrastructure Company
NSA	National Safety Authority
NSI	National Statistical Institute
ODS	Ozone depleting substances
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PFCs	Perfluorocarbons
pkm	Passengers per kilometer
PM	Particulates
PSHPP	Pump Storage Hydro Power Plant
QA	Quality assurance
QC	Quality control
R	Reforestration
RCD	Road Control Department
RES	Renewable Energy Sources
RMU	Removal unit
RTD	Research and Technology Development
SAI	Synthesis and assessment report on the greenhouse gas
SBSTA	Subsidiary Body for Scientific and Technological Advice
SEF	Standard electronic format
SF_6	Sulphur hexafluoride
SG	State Gazette
SO	Sulphur dioxide
TCCCA	Transparency, consistency, comparability, completeness and accuracy
tkm	Tons kilometer
TPES	Total primary energy supply
TPP	Thermal Power Plant
UAA	Utilized agricultural area
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar (US currency)
VOC	Volatile Organic Compounds