



MINISTRY OF ENVIRONMENT AND WATER
REPUBLIC OF BULGARIA

THIRD NATIONAL ACTION PLAN ON CLIMATE CHANGE

FOR THE PERIOD 2013-2020

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The present NAPCC was developed with the support of the Norwegian Government through the Norwegian Cooperation Programme for Economic Growth and Sustainable Development in Bulgaria. Project partner is the Institute for Social Research of the Norwegian University of Science and Technology in Trondheim. SINTEF, the largest independent research organization in Norway, a leader in developing technologies for reducing greenhouse gas emissions and "Bellona", the largest NGO in Norway which has implemented projects on climate change all over the world, also contributed to its elaboration.

The process of developing the Third NAPCC passed through an active exchange of information, positions and views between experts from the Ministry of Environment and Water and all interested institutions and organizations. The expert team included specialists from the Bulgarian Academy of Sciences, universities, NGOs, consulting companies and others. Two workshops and over ten consultation meetings were carried out, involving more than 140 representatives from 80 different institutions and organizations - ministries and agencies, NGOs, industry associations, investors, research and educational institutions, municipalities and citizens. A public consultation process was launched after publishing the first draft of the Plan. Numerous written submissions were received during the public consultation, which are reflected in substance in the approved document.

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Ministries and Agencies

Executive Agency Marine Administration
Executive Environment Agency
Executive Forestry Agency
Ministry of Agriculture and Food
Ministry of Economy, Energy and Tourism
Ministry of Education, Youth and Science
Ministry of Environment and Water
Ministry of Regional Development and Public Works
National Center for Public Health and Analysis
National Trust Eco Fund
State Energy and Water Regulatory Commission
Sustainable Energy Development Agency

Organizations and Companies

Association of Bulgarian Enterprises for International Transport
Aurubis Bulgaria AD
Bulgarian Academy of Sciences
Bulgarian Association of Cement Industry (BACI)
Bulgarian Association of Metallurgical Industry (BAMI)
Bulgarian Association of Municipal Environmental Experts
Bulgarian Biodiversity Foundation
Bulgarian Chamber of Chemical Industry

Bulgarian Ports Infrastructure Company
Bulgartransgaz EAD
Centre for Environmental Information and Education
Confederation of Employers and Industrialists in Bulgaria
Council of European Scientific and Cultural Community
DENKSHTAT BULGARIA OOD
Devnya Cement AD
European Forum on Nature Conservation and Pastoralism
EVN Bulgaria
"Green and Fair" AD, accredited verification body
Greenpeace
National Association "Green Sarnitsa"
National Electricity Company
Neochim AD
New IT and Engineering Ltd.
NGO Za Zemiata
Partners Bulgaria Foundation
Regional Environmental Centre – Bulgaria
Regional Environmental Centre (REC)
Solvay - Sodi JSC
State Enterprise "National Company Railway Infrastructure"
Stomana Industry Jsc
SWU "Neophyte Rilski" – Blagoevgrad
Union of Bulgarian Black Sea Local Authorities
WWF – Bulgaria



At the time we live in, the prosperity and growth are qualified as “green”, “low-carbon”, “resource-efficient”. Even the economic crisis in recent years is seen as an opportunity to build a low-carbon and generally more sustainable economy.

The challenges of climate change, biodiversity loss, unsustainable use of natural resources require relevant targeted and interrelated policies. In a long term perspective most successful will be the countries that first realize this and move towards an open, competitive and eco-efficient economy, which would improve peoples’ welfare while reducing the use of energy and natural resources.

The underlying concept of the Third Action Plan on Climate Change for the period 2013-2020 is the preservation, the rational and responsible use of resources as a key prerequisite not only for improving and protecting the environment but also for achieving sustainable economic growth and increasing the competitiveness of the Bulgarian economy. Opportunities are created to find new sources of growth and jobs through cost savings, marketing of innovations and better management of resources throughout their life cycle. The Plan provides for specific measures to reduce greenhouse gas emissions across all sectors while taking into account both the country’s relevant policies and the potential of the national economy.

Bulgaria currently has overachieved its international commitment under the Kyoto Protocol by reducing its greenhouse gas emissions by over 50% compared to their level in the base year 1988. The Third Action Plan on Climate Change lays the foundations of transition to a low carbon and resource efficient development of our country. Successful implementation of the envisaged measures will lead to a reduction of the greenhouse gas emissions by 2020 by over 18,5% compared to their 2005 levels. This will contribute to achieving and even going beyond the national targets derived from the respective European legislation.

Our country is facing the challenge to reach this goal without limiting the economic growth. The measures have their cost which amounts to nearly 5% of total investments in the economy envisaged by 2020.

The Government is willing to pursue them, because it believes that the benefits of their implementation in the medium and long run will far outweigh the costs incurred.

Climate change is a global problem that requires global action at all levels – by governments, business and each individual – in order to be overcome. Choice is our right and duty – to act and grasp the opportunities for low-carbon development or to be idle witnesses to the changing life on the planet that we will bequeath to the future generations.

Bulgaria today chooses to act!

*Nona Karadjova
Minister of Environment and Water*

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LIST OF ABBREVIATIONS

AA	agricultural area
AAU	assigned amount units
AI	access to information
ALPA	Agricultural Land Protection Act
APSA	Agricultural Producers Support Act
BAS	Bulgarian Academy of Sciences
BEEF	Bulgarian Energy Efficiency Fund
bln.	billion
BSR	Bulgarian State Railways
CAAA	Clean Ambient Air Act
CAP	Common Agricultural Policy
CCS	carbon capture and storage
CDM	Clean Development Mechanism
CM	Council of Ministers
DCA	Draft Climate Act
DCM	Decree of the Council of Ministers
DHW	domestic hot water
EA	environmental assessment
EA	Energy Act
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EC	European Community
ECOFIN	Economic and Financial Affairs Council
EE	energy efficiency
EEA	European Environment Agency
EEA	European Economic Area
EEA	Energy Efficiency Act
EEA	Executive Environment Agency
EEI	end-use energy intensity
EFA	Executive Forest Agency
EMEPA	Enterprise for Management of Environment Protection Activities
EP	European Parliament
EPA	Environmental Protection Act
eq.	equivalent
ETS	Emission Trading Scheme
ETS	Emission Trading Scheme
EU	European Union
FA	Forestry Act
FEC	final energy consumption
FL	forest litter
GAV	Gross added value
GDP	Gross Domestic Product
GHG	greenhouse gases
GSCDA	Geological Storage of Carbon Dioxide Act

HCV	high conservation value
HEI	higher educational institution
ICAO	International Civil Aviation Organization
ICCC	Interinstitutional Commission on Climate Change
IET	International Emissions Trading (under the Kyoto Protocol)
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
IPCC	Intergovernmental Panel on Climate Change
IS	industrial systems
ITS	intelligent transport system
IWG	interinstitutional working group
JI	Joint Implementation
KP	Kyoto Protocol (to the UN Framework Convention on Climate Change)
LGLAA	Local Government and Local Administration Act
LULUCF	Land-use, land use change and forestry
MAF	Ministry of Agriculture and Food
MBT	mechanical and biological treatment
MEET	Ministry of Economy, Energy and Tourism
MEW	Ministry of Environment and Water
MEYS	Ministry of Education, Youth and Science
MF	Ministry of Finance
MFF	Multiannual Financial Framework
MI	Ministry of Interior
mln.	million
MRDPW	Ministry of Regional Development and Public Works
MS	Member-State
MTITC	Ministry of Transport, Information Technology and Communications
MV	motor vehicles
MW	megawatt, unit for the measurement of power
NAAS	National Agricultural Advisory Service
NAP	National Allocation Plan (for allocation of greenhouse gas emission allowances)
NAPCC	National Action Plan on Climate Change
NAPRE	National Action Plan for Renewable Energy
NCSR	National Council for Scientific Research
NEC	National Electricity Company
NGO	non-governmental organizations
NIMH	National Institute of Meteorology and Hydrology
NP	national park
NP	natural park
NPP	nuclear power plant
NPPCUWWTP	National programme for priority construction of urban waste water treatment plants
NSI	National Statistical Institute
NTEF	National Trust Eco Fund
NWMP	National Waste Management Programme

OP	Operational Programme
OPE	Operational Programme Environment
PAG	Programme for accelerated gasification
PEC	primary energy consumption
PEI	primary energy intensity
ppm	parts per million
R&D	research and development
RDP	Rural Development Programme
RE	renewable energy
REA	Renewable Energy Act
REDD+	Reduction of emissions from deforestation and forest degradation
RES	renewable energy sources
RIEW	Regional Inspectorate of Environment and Water
RT	Railway transport
SA	Statistics Act
SAMTS	State Agency for Metrological and Technical Surveillance
SB	state budget
SE	state enterprise
SEDA	Sustainable Energy Development Agency
SEWRC	State Energy and Water Regulatory Commission
SG	State Gazette
SNAPEE	Second National Action Plan on Energy Efficiency
SPA	Spatial Planning Act
TFEU	Treaty on the Functioning of the European Union
TFS	total floor space
toe	tonnes oil equivalent
TPP	thermal power plant
UAA	utilized agricultural area
UN	United Nations
UNDP	UNDP
UNFCCC	UN Framework Convention on Climate Change
USA	United States of America
UWWTP	urban waste water treatment plant
WAM	with additional measures
WM	with measures
WMA	Waste Management Act
WMP	Waste Management Programme
MWh	megawatt hour
Xt.CO ₂ eq.	X tonnes of carbon dioxide equivalent

SUMMARY

1. OBJECTIVE, SCOPE AND STRUCTURE OF THE THIRD NATIONAL ACTION PLAN ON CLIMATE CHANGE

Bulgaria's policy on climate change is based on two essential aspects related, on one side, to the country's international commitments undertaken with the ratification of the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol and, on the other side, to the newly adopted European legislation in this area. The main strategic objective of the Third National Action Plan on Climate Change (NAPCC) is to outline the framework for action to combat climate change for the period 2013-2020 and to focus the country's efforts on actions leading to reduction of the negative impacts of climate change and implementation of the undertaken commitments.

The following main strategic documents of the country were taken into account for the development of the NAPCC:

- National Development Programme: "Bulgaria 2020";
- Energy Strategy of the Republic of Bulgaria until 2020;
- National Energy Efficiency Programme until 2015;
- National Action Plan for Renewable Energy;
- National Programme for Promotion of the Biofuels Use in the Transport Sector 2008-2020;
- Strategy for Development of the Transport System of the Republic of Bulgaria until 2020;
- National Strategy for Development of the Forestry Sector in Bulgaria 2006-2015;
- National Strategic Plan for Gradual Reduction of Biodegradable Waste Intended for Landfilling 2010-2020.

The Third National Action Plan on Climate Change provides specific measures for reduction of greenhouse gas emissions across all sectors and these measures are consistent with both the national policy on climate change and the potential of the national economy to reduce emissions. The overall effect of the measures will ensure the implementation of the commitments taken and the achievement of the legally binding European objectives.

The Plan is structured logically, starting with a brief description of global trends and scenarios on climate change and presenting their basic aspects relating to Bulgaria - facts, scenarios and possible consequences. The next two sections of the Plan address key aspects of the international and European climate policy and objectives that the EU is to achieve by 2020, namely:

- 20% increase in energy efficiency;
- 20% reduction of greenhouse gas emissions compared to their 1990 levels;
- 20% share of renewable energy in the total EU energy consumption by 2020 including a 10% share of biofuels in transport.

The "three 20" are tightly interrelated. Achieving 20% reduction in greenhouse gas emissions would be impossible without progress in the other two relating to the promotion of renewable energy and energy efficiency.

The third section draws special attention to the legislative package "Climate and Energy" which outlines the framework of the active EU policy on climate change for the

period 2013-2020 and was adopted by the European Parliament and the Council at the end of 2008. It is expected to play a significant role in the achievement of the above ambitious objectives which the EU has set itself. The package of legislative measures relates to: the revision of the existing *emission trading scheme* of the Community; the establishment of differentiated ceilings for greenhouse gases for *sectors outside the scheme* (transport, building, agriculture, waste); the formulation of binding national targets for increasing the *share of renewable energy* in the energy balance and introduction of rules to promote new *technologies for carbon capture and storage*. A number of flexibility mechanisms are provided for in order to achieve the objectives in a cost-effective way. 2005 was chosen as a reference year for setting the 2020 targets, because the first verified data on greenhouse gas emissions are since that year.

Reduction of greenhouse gas emissions from the sources within the scope of the scheme by 21% compared to their 2005 levels is set for all EU Member States through a linear factor for reducing the permitted emission ceiling for the sectors under the European Trading Scheme (ETS). The main flexibility mechanism in the revised scheme is the redistribution of rights for emission allowances trading (auctioning rights), which is expected to generate substantial financial resources for investment in the improvement of energy efficiency, promotion of renewable energy and reduction of greenhouse gas emissions. For the sectors outside the scheme the differentiated emission ceilings range from -20% to +20%. Bulgaria has an individual commitment allowing it to increase the emissions by 20% compared to their 2005 level. The national objectives of the Member States in terms of share of renewables in the final energy consumption by 2020 range from 10% to 49%. Bulgaria's goal is set at 16%, including 10% share of biofuels in the final consumption of transport fuels.

The "Climate and Energy" package does not contain direct binding measures to improve energy efficiency although it has an indirect effect in this direction. The individual commitments of Member States in the field of energy efficiency are still taken on a voluntary basis and are rather political than legally binding. At this stage they are defined in the context of the strategy "Europe 2020" where resource (including energy) efficiency is a flagship initiative. According to the commitment undertaken within the framework of "Europe 2020" Bulgaria aims to reduce the energy intensity of GDP by 50% by 2020. The implementation of the energy efficiency measures and policies set in the National Energy Strategy until 2020 aims to lead to an improvement of the energy efficiency by approximately **25%** or to saving more than 5 mln. toe. primary energy compared to the baseline development scenario by 2020.¹

The fourth section of NAPCC describes the Bulgarian legislation related to climate change and the existing legal mechanisms underlining the sectoral measures. Activities on climate change are very diverse and affect various sectors of the economy. For that reason the review of the legislation covers a large number of laws and regulations in different fields, which are directly or indirectly related to the measures laid down in the Plan.

The next part of NAPCC presents an assessment of the status and trends of greenhouse gas emissions in Bulgaria until 2009 in various sectors and the scenarios and projections of the emissions in these sectors by 2030 before and after the implementation of the measures.

The policies and measures planned to achieve the objectives of the country with regard to climate change are presented by sectors and represent the most significant and

¹ PRIMES Baseline, 2007, EUROSTAT

voluminous part of the Third Action Plan on Climate Change. The process of selection of specific measures in each sector includes consultations with the relevant government institutions, numerous consultations with stakeholders, businesses, NGOs and academic circles. The received comments and opinions on the proposed policies and measures have been taken into account. Thus transparency and coordination in preparing the Plan is ensured.

After specifying the policies and measures by sector, their feasibility was analyzed from economic point of view. The effective reduction of greenhouse gas emissions was assessed without need to reduce the production and the consumption on the basis of the baseline scenario for the economic development of the country by 2030.

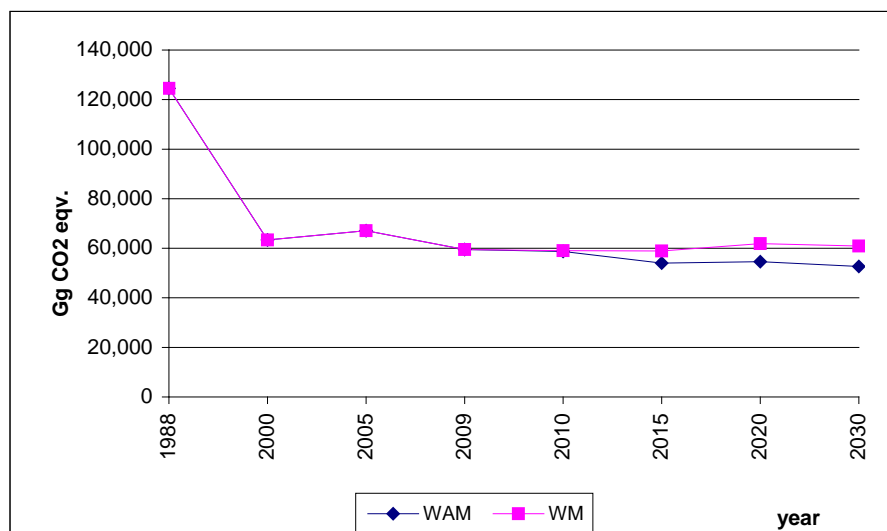
Finally, NAPCC pays special attention to the administrative capacity necessary to implement the planned measures, as well as to the responsibilities for monitoring and reporting the implementation of the Plan. Besides the leading role of the competent institutions it underlines the specific role and functions of municipalities. A special feature of the activities on climate change is that they cover a large number of institutions and bodies both from the central and the local authorities because of their horizontal and cross-cutting nature.

2. SCENARIOS AND PROJECTIONS OF GREENHOUSE GAS EMISSION CHANGES

The emissions of greenhouse gases decreased by approximately 52% in 2009 compared to their levels in base year 1988 due to several reasons such as transition to a market economy, restructuring of industry, policy towards liberalization of energy markets, including factors such as decreasing population and decreasing GDP. The basic scenario set out in the Third NAPCC reflects all approved and implemented policies and measures to reduce GHG emissions in the country by the end of 2009 and is called a Scenario With Measures - WM. According to its projections the amount of GHG emissions in 2020 will be approximately 61,800 Gg CO₂ eq.

The second scenario is the Scenario With Additional Measures - WAM. It reflects all adopted policies and measures to reduce GHG emissions in the country since 2009 including the impact of policies and measures presented in this Plan. Under this scenario the total emissions of the country in 2020 will be about 54,500 Gg CO₂ eq. The comparison between the GHG emissions under the two scenarios shows a difference of over 7,200 Gg CO₂ eq. or 11.8%.

Total GHG emissions for Bulgaria under the two scenarios



3. SECTORAL POLICIES AND MEASURES FOR IMPLEMENTATION OF NAPCC MEASURES

The sectoral policies and measures described in the NAPCC are formulated to meet the main objective of the plan – reduction of greenhouse gas emissions in Bulgaria and implementation of the existing EU legislation on climate change. Priority axes for the development of the sector are set and the measures for each priority axis are defined. They are summarized for each sector and the total effect of their implementation is reflected in the scenarios and projections of GHG emissions by 2020 presented above.

The measures are grouped in two directions – measures with measurable effect on the reduction of greenhouse gas emissions and measures with indirect effect which also result in reduction of emissions, but are more difficult to measure. Instruments necessary for the implementation of each measure are proposed. They may be legislative amendments implementing laws and regulations, programmes, plans, schemes, etc., as well as introduction of incentives, conducting information campaigns, training, etc. Target groups, institutions responsible for reporting on the implementation, starting dates and time limits, as well as required financial resources and sources of funding are indicated for each measure. There is a performance indicator that is related directly or indirectly to the estimation of the expected effect, and target values by years. Additional information is presented regarding the measure that specifies the regulation or strategic document on which the measures is based, the assumptions used to estimate the reduction of emissions, the relationship between the measure, the tools, the responsible institutions, etc.

The **Energy Sector** has the largest share in the total emissions of greenhouse gases in the country and that defines its paramount importance for the implementation of the national targets for reducing GHG emissions. The production of electricity and thermal energy from coal contributes for over 90% of the GHG emitted in the sector where the major potential for reduction of emissions is concentrated. The policies and measures in the Energy Sector provided in this Plan are based on those set out in the Energy Strategy of Bulgaria until 2020 and the National Action Plan for Renewable Energy. The measures are grouped into five priority axes as follows:

- Priority 1: Cleaner production of electricity from existing coal-fired plants;
- Priority 2: Transition to a low-carbon electricity mix;
- Priority 3: The district heating system - an instrument for low-carbon energy;
- Priority 4: Increased penetration of decentralized energy production;
- Priority 5: Development of low-carbon networks for transmission and distribution of electricity and natural gas.

The implementation of the planned additional measures in this sector will lead to reduction of GHG emissions by 13.8% compared to the levels of the baseline scenario by 2020.

The **Household and Services Sector** is characterized by an upward trend of GHG emissions, which is due to the improved standard of living and respectively to the increased energy consumption by households. The measures in this sector are based on the Energy Strategy of Bulgaria until 2020 and the national indicative target under Directive 2006/32/EC. They are aimed primarily at increasing energy efficiency and the use of renewable energy sources. The projected emissions reduction in this sector as a result of the implementation of the measures in the Plan is 22% compared to the emissions in the baseline scenario for 2020, which indicates its significant reduction potential.

A particularly important sector with very high potential for emission reductions is the **Waste Sector**. The expected reductions after the implementation of the measures envisaged in the Plan are equivalent to 36.4% compared to the emissions in the baseline scenario. The sector is one of the major sources of GHGs in three main areas - emissions from waste landfills, wastewater treatment and waste incineration. The measures are focused mainly in the Waste Landfilling Subsector which has the largest share in the level of emissions. Many of the measures planned for this sector can be achieved by implementing the existing legislation without investments of very large financial resources which makes them highly effective.

The importance of taking steps in the **Transport Sector** is due to the fact that it is one of the largest emitters of GHGs with sustainable growth, but largely ignored until recently in terms of its impact on climate change. The most significant emitters of greenhouse gases are private cars, followed by the heavy-freight vehicles. In this regard, the main measures in the sector are aimed at achieving an optimal balance in the use of the potential of different types of transport and are divided into four priority axes:

- reduction of transport emissions;
- reduction of fuel consumption;
- diversification of transport;
- informing and training consumers.

The implementation of the planned additional measures in the sector will lead to reduction of GHG emissions by 11.3% compared to those in the baseline scenario.

The total effect of the proposed measures by sectors, expressed in expected reduction of greenhouse gas emissions by 2020, is estimated at 44.832 mln. t.CO₂eq. It should be taken into account that the measures laid down in the Plan include implementation both of *current* (by 2012) and of *planned* (by 2020) strategies and sectoral policies.

4. ECONOMIC ANALYSIS OF THE OPPORTUNITY TO UNDERTAKE MEASURES BY SECTORS

The economic analysis makes an assessment of the possible measures by sector in terms of economic development, i.e. effective reduction of emissions without reducing the volume of production and consumption.

In evaluating the investment opportunities by sectors it was taken into account that their total amount for the entire economy for the period 2012-2020 is 214 bln. BGN at prices of 2011. **The cost of the measures is estimated at 10.575 bln. BGN or 4.9% of the total investments in the economy during that period.** Related to the total estimated GHG reductions these costs mean an average price of 236 BGN per ton CO₂eq.

The following table presents the average costs per ton of emission reductions for each sector including only measures with direct effect:

	Required financial resource (measures with direct effect)	Tons reduced emissions CO₂eq	Average price per reduced ton CO₂ eq.
Energy	1 753 mln. BGN	18 000 000	97.4 BGN
Household and Services	950 mln. BGN	3 521 117	269.8 BGN
Industry	261.6 mln. BGN	5 600 000	46 BGN
Waste	455 mln. BGN	12 000 000	38 BGN
Agriculture	372.3 mln. BGN	28 600	over 12 thousand BGN
LULUCF	27.9 mln. BGN	80 800	345 BGN
Transport	2 071.8 mln. BGN	5 600 000	370 BGN

The data in the table above shows that the most economically advantageous measures are the ones in the Waste Sector followed by those in the Industry Sector. The measures in the Agricultural Sector require the biggest amount of resources, but they lead to a relatively small reduction of greenhouse gases and may be considered as recommended measures. The cost of their implementation and the reductions in greenhouse gas emissions resulting from these measures are accounted for in the estimates and the economic analyzes, but their performance depends on whether they will be identified as priority measures for funding by the EU funds over the next period from 2014. If implemented, the measures will have a multiple impact. Their high cost is mainly due to the need for significant capital investments for restructuring and mechanization of farms, for building new plants and facilities and for purchase of equipment.

There are also measures planned in the field of science and education with a total value of 90 mln. BGN the effect of which is not measured by direct emission reductions but their results should be considered in the long term and within the context of the flagship initiatives of the EU Strategy for smart and sustainable growth “Europe 2020”.

The main sources of funding identified in the Plan are: the EU funds; international financial institutions; the EU ETS; the National Green Investment Scheme, the National Energy Efficiency Fund; the Fund “Kozloduy”; the Enterprise for Management of Environment Protection Activities and others. The measures that will receive financing or cofinancing from the state budget have already been approved as national priorities and

sources for their financing by 2015, and for some measures – by 2020 – are envisaged in the relevant strategic documents.

To meet the objectives set out in the Third National Action Plan on Climate Change the period 2013-2020 will be crucial in terms of investments and measures in the sectors *outside the emission trading scheme*, and particularly in transport and energy infrastructures. A number of financial mechanisms are provided at European level to support the achievement of these goals. The implementation of an integrated and well-coordinated climate change policy at all levels of governance is a prerequisite for the adequate and full use of these mechanisms.

Although the negotiations on the instruments of the Multiannual Financial Framework for 2014-2020 within the Council of the EU will only be completed in 2013 and the conditions for the individual Member States have not been agreed yet it has already become clear that the *early planning* and the *integrated approach* in the formulation of national priorities will have key importance for the utilization of the EU funds.

Bulgaria is in process of preparation for the next programming period and the measures provided in the NAPCC will be considered as priorities to be included in the relevant axes for financing. Some of them are planned to be supported also under the Green Investment Scheme with the proceeds from the sale of allowances.

5. CONCLUSION

The levels of greenhouse gases in Bulgaria for the period covered by this Action plan on climate change under the Scenario With Measures indicate a decrease by 7.8% in the overall emissions compared to the levels reported in 2005, while the reduction under the Scenario With Additional Measures is 18.7%. The planned policies and measures are designed to lead to that greater reduction of GHG emissions, while contributing at the same time to the achievement of the national objectives arising from the European legislation. Our country faces a challenge to achieve this without limiting its economic growth, that is to pursue the development of an efficient economy with low carbon intensity, which is the main objective of the Third National Action Plan on Climate Change.

INTRODUCTION

After Bulgaria joined the European Union (EU) on 1 January 2007 the context of climate policy in the country changed considerably because apart from the international commitments under the UN Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) it is now aligned with the existing and newly adopted European legislation in this area. Over the period 2008-2012 the national climate change policy and legislation were harmonized with those of the EU and the National Action Plan on Climate Change (NAPCC) has not been updated during that process.

The following steps were undertaken to comply with the commitments taken as a result of Bulgaria's full membership in the EU:

- the provisions of Directive 2003/87/EC establishing a Community greenhouse gas emission allowance trading scheme were introduced;
- a National Plan for Allocation of Greenhouse Gas Emission Allowances (NAP) was developed and approved by the European Commission;
- steps were undertaken to introduce the newly adopted EU climate related legislation (the legislative package "Climate and Energy"), and the legislation for inclusion of aviation in the Community Emissions Trading Scheme (Directive 2008/101/EC);
- the National System for Greenhouse Gas Inventory was reviewed and revised in 2010 in order to improve reporting according to the UNFCCC guidelines and the requirements of the European legislation;
- a functioning Green Investment Scheme was set up to fund projects leading to reduction of greenhouse gas emissions.

After the adoption of the Bali Action Plan in 2007 the policy on climate change shifted considerably on global scale following the dynamics of international negotiations to reach a new global climate agreement that will cover all major (including the so called "emerging") economies, and an agreement on climate policy management after the first commitment period under the Kyoto Protocol (after 2012). Bulgaria participates as a full member of EU within the framework of international negotiations since 2007, i.e. according to the common, coordinated position of the Union in these negotiations.

The Second National Action Plan on Climate Change (NAPCC) applies to the period 2005-2008 and outlines the legislative framework and the institutional structure necessary to implement the policy on climate change in Bulgaria. The implementation of the Second Plan is related to the implementation of a package of coordinated actions that are consistent with the international obligations assumed by Bulgaria under UNFCCC and KP, and with the Climate Change Program of the European Union. The application of this plan was extended until 2012.

A main strategic objective of this Third Action Plan on Climate Change is to outline a framework for actions related to climate change for the period 2013-2020 by analyzing and taking into account both the international context and the new realities of global policy in this area, as well as the EU commitments reflected in the legislation adopted in the end of 2008 at the highest political level (by the European Council and the European Parliament). The measures planned by sectors are consistent with these two

aspects of climate policy after 2007 and with the potential of the national economy to reduce greenhouse gas emissions.

The following key strategic documents of Bulgaria were taken into account in the development of the Plan.

- National Development Programme: “Bulgaria 2020”;
- Energy Strategy of the Republic of Bulgaria until 2020;
- National Energy Efficiency Programme until 2015;
- National Action Plan for Renewable Energy;
- National Programme for Promotion of the Biofuels Use in the Transport Sector 2008-2020;
- Strategy for Development of the Transport System of the Republic of Bulgaria until 2020;
- National Strategy for Development of the Forestry Sector in Bulgaria 2006-2015;
- National Strategic Plan for Gradual Reduction of Biodegradable Waste Intended for Landfilling 2010-2020.

The measures laid down in the Plan include implementation both of *current* (by 2012) and of *planned* (by 2020) strategies and sectoral policies. The overall effect of the proposed measures by sectors, expressed in expected reduction of greenhouse gas emissions by 2020, is estimated at **44.832 mln. t.CO₂eq.**

When assessing the investment opportunities by sectors it was taken into account that their total amount for the entire economy for the period 2012-2020 is 214 bln. BGN at current prices of 2011 (since the investments proposed for individual sectors are also evaluated at current prices). **The total cost of the measures is estimated at 10.575 bln. BGN or 4.9% of the total investments in the economy during that period.** Related to the total estimated GHG reductions these costs mean an average price of **236 BGN** per ton CO₂eq. There are also measures planned in the field of science and education with a total value of **90 mln. BGN** the effect of which is not measured by direct emission reductions but their results should be considered in the long term and within the context of the flagship initiatives of the EU Strategy for smart and sustainable growth “Europe 2020”.

The main sources of funding identified in the Plan are: the EU funds; international financial institutions; the EU ETS; the National Green Investment Scheme, the National Energy Efficiency Fund; the Fund “Kozloduy”; the Enterprise for Management of Environment Protection Activities and others.

The measures that will receive financing or cofinancing from the state budget have already been approved as national priorities and sources for their financing by 2015, and for some measures - by 2020 – are envisaged in the relevant strategic documents. In this sense, no *additional* direct or indirect impact on the state budget is expected from the implementation of this Plan. Given the uncertainty of strategic planning related to the ongoing negotiations on the new Multiannual Financial Framework for 2014-2020 and the respective budgetary planning at national level, an update of the Third NAPCC in 2015 is foreseen in order to reflect the measures approved for funding in the next programming period. In the preparation for the next programming period the measures provided in this Plan will be considered as priorities to be included in the relevant axes for financing.

Given the horizontal nature of the climate change policy, the principle of integrating the climate considerations in key sectoral policies such as energy, households and services, industry, transport, agriculture, forestry and waste management is applied when envisaging

the measures in the Third NAPCC. Taking into account the close interaction of the policies in these areas with the strategic planning related to climate change, active involvement and commitment of all institutions responsible for carrying out the relevant policies is needed for the implementation and enforcement of the NAPCC.

The underlying concept of the Third Action Plan on Climate Change is the preservation, the rational and responsible use of resources as a key prerequisite not only for improving and protecting the environment but also for achieving sustainable economic growth and increasing the competitiveness of the Bulgarian economy. The introduction of low carbon, energy efficient and less waste generating technologies, as well as the recovery and recycling of greater amounts of waste contribute not only to the reduction of the total amount of greenhouse gas emissions but also to the improvement of productivity and resource efficiency. Opportunities are created to find new sources of growth and jobs through cost savings, marketing of innovations and better management of resources throughout their life cycle.

The Third National Action Plan on Climate Change 2013-2020 was developed with the support of the Norwegian Government through the Norwegian Cooperation Programme for Economic Growth and Sustainable Development in Bulgaria. Project partner is the Institute for Social Research of the Norwegian University of Science and Technology in Trondheim. SINTEF, the largest independent research organization in Norway, a leader in developing technologies for reducing greenhouse gas emissions and "Bellona", the largest NGO in Norway which has implemented projects on climate change all over the world, also contributed to its elaboration.

The process of developing the Third National Action Plan on Climate Change passed through an active exchange of information, positions and views between experts from the Ministry of Environment and Water and all interested institutions and organizations. The expert team included specialists from the Bulgarian Academy of Sciences, universities, NGOs, consulting companies and others. Two workshops and over ten consultation meetings were carried out, involving more than 140 representatives from 80 different institutions and organizations - ministries and agencies, NGOs, industry associations, investors, research and educational institutions, municipalities and citizens. A public consultation process was launched after publishing the first draft of the Plan. Twelve written submissions were received during the public consultation, most of which are reflected in substance in the revised document.

The Third National Action Plan on Climate Change 2013-2020 is adopted by Decision № 439/01.06.2012 of the Council of Ministers of Bulgaria.

1 CLIMATE CHANGE – THE REALITY WE LIVE IN

1.1 GLOBAL TRENDS

Record high temperatures in recent decades, melting glaciers, more humid air and another seven key indicators suggest that global warming is an indisputable fact. The comprehensive review of climate data over the last decade unites 303 scientists from 48 countries. The results of their collaboration were published in a report “State of the Climate in 2009”², issued by the American National Oceanic and Atmospheric Administration³ in July 2010.

The ten key indicators pointing to global climate warming are: (1) higher ground temperatures, (2) higher temperatures over the oceans, (3) high levels of heat in the oceans, (4) higher temperatures near the ground surface, (5) higher humidity (6) higher temperature of the sea surface; (7) rising sea level, (8) decreasing sea ice; (9) decreasing snow cover, (10) shrinkage of glaciers. The relative movement of each of these indicators – increase in the first seven and decrease in the last three of them - shows clearly that our planet has been warming up over the last half century and that every decade on the Earth has been hotter than the previous one since 1980.

The report confirms the conclusions of the UN Intergovernmental Panel on Climate Change⁴, established in 1988 and uniting 1500 scientists from all over the world with the task to assess and analyze the existing studies and knowledge on climate change and its impact and to prepare detailed reports on these issues on a regular basis. The data in the last of these reports, published in 2007 and known as the “Fourth Assessment Report”⁵, show that the world has been warmed up on an average by 0.76°C compared to preindustrial levels and that the temperatures increase at a growing rate. During 1993-2003 the sea levels rose almost twice faster than in the previous three decades. And more:

- 11 out of 12 consecutive years (1995-2006) were among the hottest since 1850 when the measurement of ground temperatures began on a global scale;
- the average arctic sea ice volume has decreased by about 40% in recent decades;
- the snow cover in the northern hemisphere has decreased by 10% since the 1960s;
- the spring comes earlier every year leading to changes in the biological life cycle;
- plant and animal species are moving toward the poles’ latitudes;

The temperature in Europe over the last century has also risen by almost 1°C, i.e. more than the global average temperature. Rainfall and snowfall has significantly increased in Northern Europe (by 10% to 40%) while in Southern Europe they have decreased by about 20% and drought occurs more frequently.

² The report is available at:

<http://www1.ncdc.noaa.gov/pub/data/cmb/bams-sotc/climate-assessment-2009-lo-rez.pdf>

³ National Oceanic and Atmospheric Administration (NOAA)

⁴ Intergovernmental Panel on Climate Change (IPCC)

⁵ The report is available at:

http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm

1.2 FACTS ABOUT BULGARIA⁶

- There has been a tendency towards warming up in Bulgaria since the late 1970s, the winters were milder in the second half of the 20th century.
- 20 of the last 23 years since 1989 have positive anomalies of the average annual air temperature compared to the climate standard (1961–1990).
- The average annual temperature in 2011 was by 0,4°C higher than the climate standard. This is 14th year in a row with temperatures higher than typical temperatures for the country.
- The longest periods of drought occurred in 1940s and during the last two decades of the 20th century, while the most significant droughts - in 1945 and in 2000.
- There are more and longer periods of drought followed by severe storms and heavy floods incurring damage and casualties.
- Increased frequency of extreme weather and climate phenomena such as: significant increase in the average number of days with overnight volume of precipitation above 100 mm – by about 30% for the period 1991-2007 compared to the baseline period (1961-1990); increased number of cases with heavy rainfall registered in the meteorological network; more frequent cases of cloudiness typical for spring and summer with rainfalls, thunderstorms and hailstorms during winter months like January and February; higher frequency of the average number of days with thunderstorms and hailstorms in April and September in the period 1991-2006 compared to the baseline period.
- The annual amplitude between the maximum and the minimum air temperature decreases – the minimum temperature rises faster than the maximum.
- The snowy months in the mountains decrease and the thickness of the snow cover shows a steady trend towards thinning.
- The upper forest limit of deciduous forests shifted to higher elevations.
- Data from the phenological observations indicate advanced development by 7-15 days in different climatic regions, which represents clear evidence of the warming up process over the past 30 years compared to previous periods.

1.3 CAUSES AND EFFECTS

Undoubtedly, the climate has changed in the past but never at such rate. Our planet has passed through ice ages as well as through much hotter periods than we witness today. Many natural factors (such as parameters of the Earth's orbit and solar activity, changes in the Earth's rotation speed, shifting of Earth's poles and changes in the physiographic aspect of the Earth) influence the distribution of temperature, the atmospheric circulation, the oceanic currents, the area of the cryosphere and from there – the climate. These changes, however, occur within very broad parameters of time and cannot be called what we describe today as “*climate change*”.

According to IPCC Fourth Assessment Report the observed rate and scale of warming up of the atmosphere and the ocean, as well as the loss of ice mass, confirm the conclusion that it is *very unlikely* for the global climate change over the past 50 years to have been caused only by the known natural phenomena. Scientific research and

⁶ Source: National Institute of Meteorology and Hydrology (NIMH) under the Bulgarian Academy of Sciences (BAS).

assessments show that the amount of solar and volcanic impacts during this period would have rather caused cooling than warming of the climate. The warming up in the climate system is found in the temperature changes of air near the ground surface, on the ground and in the changes in sea surface temperature. According to IPCC experts the observed pattern of tropospheric warming and stratospheric cooling is *most likely* due to the combined effects of increased volume of greenhouse gases and the ozone depletion in the stratosphere. The researchers concluded that the increase of GHG in atmosphere would have caused in itself much higher level of warming up than what we observe today and that the volcanic and the anthropogenic aerosols have actually offset some of this warming.

In support of the claims that the anthropogenic activity and the resulting greenhouse gases have influence on climate change, the IPCC report considered the changes in the concentration of carbon dioxide (CO₂) over the last 650000 years. The studies of ice cores show that the concentration of CO₂ during this period had relatively constant levels – between 180 and 300 parts per million (ppm). Since 1750 onwards, however, the global concentrations of atmospheric CO₂ has increased by 37% and at the current growth rates it can reach levels of about 730-1020 ppm by the end of the century. Scientists agree that human activities have significantly changed the composition of the atmosphere in the post industrial revolution period. This is mainly due to the burning of fossil fuels (coal, oil and natural gas) for production of energy and to deforestation. The official position of the World Meteorological Organization also points out that greenhouse gases have had a dominant role in terms of global climate change in recent decades.

If emissions are not reduced, the concentration of greenhouse gases in the atmosphere is expected to double by 2035 compared to the levels from pre-industrial times which will cause an increase of global temperature by more than 2°C. There is a risk of global warming by more than 5°C in the long term which corresponds to the temperature changes between the last ice age and the present condition on Earth. The consequences of such warming will cause significant changes in the global geographic map. Over 200 million people will need to migrate due to sea level rise and extreme phenomena like floods, droughts and hurricanes. Global warming of more than 2°C would cause irreversible damage to the planet's biodiversity, water resources and global food market.

1.4 GLOBAL CLIMATIC SCENARIOS

Although a temperature rise by about 1°C within a century seems insignificant, humanity has seen that warming of this magnitude and within such time frame, as well as seemingly minor changes in rainfall patterns, can change life on Earth.

Extreme weather conditions such as heat waves and floods pose a direct threat to human health and safety, and the very young, the elderly, the disabled people and low income households are particularly vulnerable. In crowded urban areas where the soil is “sealed” with heat absorbing surfaces, the effects of heat waves are amplified because of insufficient night cooling and poor air exchange. According to the European Environment Agency (EEA), the heat wave in Europe killed over 70000 people in the summer of 2003. EEA predicts an increase in mortality associated with extreme heat waves up to 25000 people per year by 2020, mainly in the central and southern European regions⁷.

⁷ Source: „The European Environment – state and outlook 2010” – a report by the European Environment Agency:
<http://www.eea.europa.eu/soer/synthesis/translations/evropeyskata-okolna-sreda-2014-sastoyanie>

IPCC foresees in the Fourth Assessment Report an increase in average global temperatures within the range of 1.1-6.4°C during the current century. This scenario is largely confirmed by global climate models used today to simulate the increase in average temperature in the surface layer from 1.4 to 5.8°C by the end of the century compared to 1990.

Sea levels are expected to rise by 18 to 59 cm between 1990 and 2100 because ice melts and oceans expand at these rates of global warming. According to recent research on the geographic distribution of population the rise in sea level by 50 cm would put at risk (due to floods, hurricane storms and other extreme phenomena) the lives of 92 million people worldwide

Experts predict further increase in the intensity and frequency of extreme weather phenomena like droughts and hurricanes. The damages to infrastructure and the loss of property impose heavy costs on the economy and society. The sectors whose development depends largely on specific temperature and precipitation levels, such as agriculture, forestry, energy and tourism will be significantly affected.

The problem with access to drinking water, which has now affected more than 1 billion people worldwide, will be deepened by the impact of climate change on the frequency and intensity of precipitation.

It is very likely for some diseases that are currently limited to particular tropical areas to spread to other areas of the globe.

Climate change takes place so fast that many plant and animal species may be unable to adapt. Scientists predict that warming by about 1.5°C-2.5°C above the current levels will put 20-30% of plant and animal species at risk of extinction.

According to the estimates in the EEA report “The European environment - State and outlook 2010” most vulnerable to climate change are the following European regions: Southern Europe and Mediterranean basin (exposed to heat and drought), the Alps (due to rapid melting of snow and ice); the coastal areas and deltas (exposed to risk of flooding due to rising sea level); the northernmost and Arctic regions (exposed to increasing global warming).

1.5 SCENARIOS FOR BULGARIA⁸

Most climate models simulate an increase in air temperature in Bulgaria from 2 to 5°C by the end of the century (the scenarios vary according to model simulations used). Winters classified as cold under the current climate will occur less often in the 2020s and will probably disappear by 2080s. In contrast, hot summers will occur more often and almost every summer is expected to be unusually hot in the 2080s. According to most climate scenarios winter precipitation will increase in Bulgaria by the end of this century but rainfall during the warm half of the year and especially during the summer is expected to decrease.

The results from the studies of water resources in Bulgaria, based on current trends of air temperature and precipitation as well as on simulation models and climate scenarios show that the annual river runoff is likely to decrease during this century. The

⁸ Source: NIMH, BAS

main reasons for this - the observed trends of warming and rainfall deficit - are expected to persist over the coming decades as well.

The expected global warming will be accompanied by an increase in the frequency of the hot air waves combined with increased humidity and urban air pollution. The result will probably lead to a large number of heat strokes.

Besides the risk of further limitation of water resources, more forest fires, landslides and floods, the global warming means also a possible outbreak of infectious diseases (including diseases, such as malaria, that are not typical for our latitudes).

Since approximately 61% of forests in Bulgaria are in the zone below 800 m altitude, the majority of Bulgarian forests would be affected by drastic climate changes. Increasingly vulnerable in the future will be the spring crops sown on infertile soils and the arable land in southeastern Bulgaria where the precipitations even under the current climate conditions are insufficient to ensure normal growth, development and yield of crops.

1.6 ECONOMIC, FINANCIAL AND SOCIAL CONSEQUENCES

Large-scale problems like water shortage, migration of millions of so-called “environmental refugees” and growing need for disaster relief, loss of biodiversity and arable land, and financial shocks from the effects of these problems on global markets, will torment the world community until it is able to adapt to the changes.

The analytical report of the British economist Nicholas Stern, published in October 2006⁹ is the first attempt at making a summary economic assessment “*in figures*” of the threats of climate change. Although it was not the first economic analysis on climate change, it is recognized to be the largest, the most comprehensive and, of course, the most discussed contemporary work in this area. The report examines the data and the facts showing the economic impacts of climate change and the economic effect of stabilizing the greenhouse gas levels in the atmosphere. The Stern Review analyzed also the complex challenges to global politics related to the construction of low-carbon economy and the adaptation to the consequences of climate change that cannot be avoided.

One of the key conclusions in the economic analysis is the summary that inaction with respect to climate change would cost humanity 5% of global Gross Domestic Product (GDP) per year, and the accumulated damage may consume up to 20% of the global GDP. Compared to this scenario, the action undertaken to reduce greenhouse gases and to mitigate the consequences of global warming is estimated at 1% of global GDP. The positive effect of a shift towards a low-carbon economy would cost 2.5 trillion U.S. dollars while the turnover on the markets of low carbon technologies can be worth around 500 billion dollars by 2050.

A year after the publication of the Stern Review, IPCC confirmed to a large extent and elaborated further the main findings and the recommendations in its Fourth Assessment Report.

⁹ „Stern Review on the Economics of Climate Change“, Cambridge University Press, 2006:
http://webarchive.nationalarchives.gov.uk/+http://www.hm-treasury.gov.uk/Independent_Reviews/stern_review_economics_climate_change/sternreview_index.cfm

To stabilize the current concentrations of GHG in the atmosphere, **the global emissions must be reduced by at least 50% by 2050 compared to their levels in 1990.** IPCC points out in its Fourth Assessment Report that in order **to limit global warming at 2°C** it is necessary to reduce the emissions in developed countries by 25-40% by 2020 and by 80-95% by 2050 compared to their levels in 1990. On the other hand, the GHG emissions in developing countries are growing rapidly and, if no measures are taken, this increase could exceed the reductions achieved by developed economies. Accordingly, to achieve the global target developing countries as a whole must reduce their GHG emissions through appropriate national activities by 15% to 30% compared to baseline levels (*business as usual*) for 2020. The “appropriate actions” should include reduction of emissions due to deforestation in tropical areas. The gross deforestation in these areas should be reduced by at least 50% by 2020 compared to the current situation and the global reduction of forest areas should be stopped by 2030.

This concept of global action is now widely accepted not only by the world scientific elite but also by the Parties to the UN Framework Convention on Climate Change (UNFCCC) which confirmed it in the political agreement adopted at the 15th Conference of the Parties to UNFCCC (the so called “Copenhagen Accord”) and in the agreements adopted at the 16th Climate Conference in Cancun.

Despite the ongoing attempts of the so-called “climate skeptics” to challenge the findings and analyzes of IPCC reports since its establishment in 1988 until now, the Intergovernmental Panel recommendations lie at the core of modern climate policy both at global and at European levels. These recommendations are mainly focused on measures to reduce greenhouse gases emitted by *human activity* as the only parameter which humanity can actually influence.

Climate change is a global problem that requires global action at all levels (national, regional and local) – by governments, business and each individual in order to be overcome. Choice is our right and duty – to act and grasp the opportunities for low-carbon development or to be idle witnesses to the changing life on the planet that we will bequeath to the future generations.

2 INTERNATIONAL ASPECT OF CLIMATE POLICY

2.1 AGREEMENTS, OBJECTIVES, OBLIGATIONS

2.1.1 United Nations Framework Convention on Climate Change (UNFCCC)

In 1992 at the Global Earth Summit in Rio de Janeiro, countries from all over the world commit to reduce the greenhouse gas emissions to a level “*that would not lead to a dangerous climate change*”. This global decision was the basis of the adopted **United Nations Framework Convention on Climate Change (UNFCCC)**, which frames the international efforts at dealing with the challenges posed by climate change. The Convention recognized that the climate system is a shared resource whose sustainability might be affected by the excessive levels of carbon dioxide and other greenhouse gases in the atmosphere. Currently UNFCCC has been ratified by 194 countries (actually all the internationally recognized sovereign states).

The Convention became effective on 21 March 1994. According to its provisions, the Parties shall:

- collect and share information on greenhouse gas emissions, their national policies and best practices through the so called National Communications and National Greenhouse Gas Inventories;
- develop national strategies to mitigate and adapt to the expected consequences from climate change;
- cooperate in the preparation to adapt to the consequences from climate change, also by providing financial and technological assistance to developing countries.

UNFCCC established the principle of “*common but differentiated responsibilities*” whereby the developed countries have the largest share of past and present global greenhouse gas emissions therefore they must undertake binding commitments to their reduction. The share of global emissions originating from developing countries is expected to increase in accordance with their needs related to economic growth and social development therefore they must be supported by developed countries through the provision of technologies and capacity building.

2.1.2 The Kyoto Protocol (KP) to UNFCCC

The Kyoto Protocol, adopted in December 1997, is also based on the principle of “*common but differentiated responsibilities*”. It is the first legally binding global instrument, committing developed countries with specific quantitative reduction of their greenhouse gas emissions. According to the Protocol the industrialized countries must reduce as a whole their emissions of six greenhouse gases¹⁰ by about 5% compared to 1990 levels in the so-called “first commitment period” from 2008 to 2012. No targets were set for the emissions of developing countries. The Implementing Rules of the KP were adopted at the 7th Conference of the Parties to UNFCCC in 2001 in Marrakesh and are known as the “Marrakesh Accords”.

¹⁰ Carbon dioxide (CO₂); methane (CH₄); nitrous oxide (N₂O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆).

The Protocol entered into force on 16 February 2005 after ratification by the countries emitting 55% of greenhouse gases in the atmosphere. It is now ratified by 192 countries. Bulgaria ratified the Kyoto Protocol with a law passed by the National Assembly on 17 July 2002.¹¹

The targets of individual countries to reduce emissions are set out in Annex B of the Protocol and refer to the countries listed in Annex I of the Convention (so-called “Annex I Parties”). They vary depending on the share in global level of emissions, the projections of economic growth, the potential to reduce emissions and possibilities to cover the costs. The commitment of the European Union is to reduce its emissions by 8%, the USA - 7%, Japan - 6%, while for Russia it is 0%, and Australia and Iceland are allowed to increase their emissions respectively by 8% and 10 %. The USA is the only country included in Annex I of the Convention (with specific commitments to reduce emissions) which has not ratified the KP.

According to the Protocol the reductions are to be achieved both by reducing emissions domestically and through investments in “clean” or more environmentally friendly technologies in other countries (so-called *flexible mechanisms* under the Kyoto Protocol).

- *The Clean Development Mechanism (CDM)* is a flexibility mechanism through which developing countries receive investments to build new low-carbon capacities and investors receive the so called “project credits” which can be used to fulfill some of their obligations under the KP.
- “*Joint Implementation*” (JI) is a mechanism through which the developed countries which cannot reduce their own greenhouse gas emissions, invest in economies of countries in transition. In return the donors receive a share of the reduced emissions which may cover some of their own obligations.
- Another market mechanism to relieve the efforts under the Protocol is greenhouse gas emissions trading. *International emissions trading* is a financial mechanism for sale of that part of the reduction of greenhouse gas emissions that exceeds the undertaken commitments (so-called “surplus of assigned amount units”). Using this mechanism, countries that have failed to reduce their emissions by the percentages specified in the KP can purchase some of the “surplus” of assigned amount units of countries which have reduced their greenhouse gas emissions below the required levels.

The European Union (EU) has chosen a collective approach to the implementation of its obligation (so called “*bubble approach*”) where the commitment of 8% under the KP applies to the Community as a whole, but it is internally divided in accordance with the principle of “*common but differentiated responsibilities*”. The individual commitments of Member States (15 in 2002) are regulated by Council Decision 2002/358/EC of 25 April 2002¹² and vary from -21% for Denmark and Germany to +27% for Portugal. Ten of the twelve Member States that joined the EU in 2004 and 2007 implement individual commitments under KP. Five of these countries have taken

¹¹ SG 72/2002, in force as of 16 February 2005.

¹² Council Decision 2002/358/EC concerning the approval, on behalf of the European Community, of the Kyoto Protocol to the United Nations Framework Convention on Climate Change and the joint fulfilment of commitments thereunder (*OJ, L 130/1, 15.5.2002*).

commitments under a base year other than 1990¹³. Malta and Cyprus are not bound by commitments under the Protocol.

In 2011, Parties to the Kyoto Protocol entered a decisive phase for the implementation of commitments. According to data published by the European Commission¹⁴ the total GHG emissions of the EU-27¹⁵ in 2009 were by 17,4% below base year level for the EU (1990), not considering emissions and removals by land use, land use changes and forestry. Emissions were 7.1% lower compared to 2008 while during the same period the gross domestic product (GDP) of the EU-27 economy decreased by 4% as a result of the economic recession. The total GDP growth for the period 1990-2010 is 39% for EU-15¹⁶ and 40% for EU-27.

According to the provisional data for 2010 the emissions in the countries of EU-27 stand approximately 15.5% below the 1990 level. Increase in emissions by around 2,3% was observed in 2010 as a result of the shifting back to economic growth in a number of EU countries, as well as of the colder winter – a reason for higher energy demands for heating. The GDP of EU-27 grew by about 1,8% in 2010.

It is envisaged that the total greenhouse gas emissions in EU-27 will be by 17.9% lower than base year levels during the period of commitment.

It is expected that the emissions in most Member States of EU-12¹⁷, that joined the EU in 2004 and in 2007, will slightly increase between 2009 and 2012. However, it is forecasted that nine of the countries that have targets under the Kyoto Protocol (including Bulgaria) will overachieve their targets by using only existing policies and measures. Slovenia expects that it will achieve its target by taking into account all existing and planned measures, including the purchase of credits under the Kyoto “flexible mechanisms”. According to recent data from the National GHG Inventory, **Bulgaria has achieved 52.2% reduction compared to its base year under KP (1988)** by 2009 and the country is expected to overachieve its target of the first commitment period under the Protocol.

Projections indicate that the EU-15 will also meet their common target under the Kyoto Protocol. These forecasts that take into account also the economic recession show that it is very likely that the target will be even overachieved. Considering the projected use of the Kyoto flexible mechanisms¹⁸, as well as the use of unutilized allowances from the EU ETS new entrant reserve and of carbon sinks¹⁹, only three Member States (Austria, Italy and Luxembourg) may be unable to achieve their targets, though not undermining the overall EU-15 capacity to meet its Kyoto target of -8%.

According to an analysis of the recent national emission inventories, presented by the Parties to the KP, made by the Netherlands Environmental Assessment Agency (PBL, 2009)²⁰, in 2009 the Annex I countries with commitments under the Kyoto Protocol have achieved a total reduction of GHG emissions (CO₂eq.) of 10% compared to the base year

¹³ Bulgaria (1988), Hungary (average 1985-1987), Poland (1988), Romania (1989) and Slovenia (1986).

¹⁴ Report from the Commission to the European Parliament and the Council on the progress towards achieving the kyoto objective; *COM(2011) 624 final; Brussels, 7.10.2011.*

¹⁵ Number of Member States after the last EU enlargement in 2007.

¹⁶ Number of EU Member States at the time the KP was ratified by the Community (2002)

¹⁷ Number of Member States that joined the EU with the enlargement in 2004 and 2007.

¹⁸ Expected contribution to achieving the target – 2,5%.

¹⁹ Expected contribution to achieving the target – 0,9%

²⁰ Source: <http://www.rivm.nl/bibliotheek/rapporten/500212001.pdf>

1990. Industrialized countries such as Australia, Canada and New Zealand, where emissions have increased significantly since 1990 will be able to meet their targets primarily through the purchase of CDM credits or emissions from countries with economies in transition.

The significant reduction of emissions in 2008 and 2009 will clearly help industrialized countries meet their national targets under the Kyoto Protocol. With the exception of the USA (which are not legally bound by the KP) these countries are committed to a total reduction of emissions of at least 5% below the 1990 levels by 2012. It should be noted, however, that a large part amount of the reductions in 2008-2009 is due to freezing or decline of economic activity as a result of the global financial and credit crisis. In this respect, a rapid increase in greenhouse gas emissions can be expected by 2012 up to their pre-recession levels in industrialized countries.

It is a fact that the global map of international development and economic growth over the last decade has considerably changed. Fast developing countries like China and India (the so-called “emerging economies”) are achieving significant demographic and economic growth placing them outside the established definition of “developing” countries. This development has had its inevitable impact on greenhouse gas emissions resulting from human activities in these countries. Statistically, China has been the largest emitter of greenhouse gases in the world since 2007 (after the USA and the EU) which necessitated therefore a shift in the focus of international negotiations on climate change in recent years.

Considering the emissions per capita, however, the emission contribution of China on a global scale still accounts for about one sixth of that of the USA and one third of that of Britain. Furthermore, it cannot be denied that the drastic increase in emissions over the last century is due to the industrialization in developed countries, which (in the context of negotiations on climate change) requires them to take “historical responsibility” for it. In this regard the developed countries that have greater financial resources for mitigation and adaptation to the impacts of climate change are not only obliged to take steps to reduce their own emissions but also to assist developing countries in introducing low carbon technologies and in the implementation of projects for building a sustainable, environmentally friendly infrastructure. Only this approach can ensure growth on global scale without associating it with proportional increase of environmental pollution (including the inevitable growth of emissions)

In view of the global development dynamics outlined above and the lack of international agreements on actions related to climate change after the first commitment period under the Kyoto Protocol, there is need to develop and conclude a new global climate agreement for the period after 2012.

2.1.3 Bali Action Plan

The international fight against global warming entered a new phase after the successful outcome of the **13th UN Conference on Climate Change held in Bali in December 2007**. After two years of informal discussions the Parties to UNFCCC reached consensus on the elaboration of a new global agreement on climate change . They agreed a “roadmap” and a strategy for negotiations outlining the main issues for discussion and set an ambitious deadline for conclusion of the agreement by the end of 2009 (at the 15th Climate Conference in Copenhagen).

The **Bali Action Plan** provides a good starting point. It covers all the key issues that should underlie a new global agreement on climate by grouping them into four main categories:

- reducing emissions (climate change mitigation);
- adapting to climate change;
- transfer and introduction of “clean” technologies, and
- mobilizing additional funds to combat climate change.

A key element in the Bali Action Plan is the recognition that all industrialized countries (including the USA) need to take measures to reduce greenhouse gas emissions and that these efforts should be equivalent. Furthermore, it was noted for the first time that developing countries have accepted the need to take action as part of the global efforts.

Slowing and eventually halting deforestation was also outlined as a main priority since it accounts for about 20% of global emissions (more than all modes of transport). The Conference in Bali recognized the need to develop incentives to support governments, particularly in tropical regions, to reduce deforestation and the related emissions.

An emphasis was placed on the importance of strengthening and expanding the global carbon market in order to ensure the necessary drastic reduction in the most cost effective way and to mobilize additional investments in “clean” energy projects especially in developing countries.

One of the key issues in international negotiations is *how ambitious the future agreement should be*. The Action Plan has confirmed the scientifically grounded thesis of IPCC that in order to limit global warming to 2°C the developed countries will have to reduce their emissions by 2020 by 25-40% compared to the 1990 levels. Nevertheless, , due to some opposition by a number of industrialized countries, the document contains no explicit level although the need to “*drastically reduce global emissions*” was recognized.

Bali’s outcomes provide a solid basis for the upcoming international negotiations but it is clear that the conclusion of an effective new global climate agreement that will satisfy the sometimes quite diverging interests and aspirations of 194 countries will require serious efforts at all levels.

2.1.4 The Copenhagen Accord

In the end of 2009, the 192 (then) Parties to the UNFCCC met in Copenhagen at historic meeting, attended by 130 Heads of state and government. A *political agreement* was reached on 19 December, after two weeks of negotiations, including on the highest level, regarding the actions to be undertaken in the short term by the developed and the developing countries in order to meet the challenges of climate change on a global scale.

The delegates at the **15th Conference of the Parties to the Convention** agreed to “*take note*” of the Copenhagen Accord, which means in practice that it has not been formally approved by consensus and that the countries that have not ratified it remains free to join it at a later stage or not (so far 138 countries have associated with it). The political agreement, better known as the Copenhagen Accord, is not the end but rather a first and significant step towards a legally binding agreement

The Copenhagen Accord:

- envisages extension of the Kyoto Protocol and UNFCCC beyond 2012;
- confirms the target established by science on limiting the increase of global temperature up to 2°C compared to its preindustrial levels;
- envisages a review of this target by 2016, and in the context of new scientific data, if necessary, a limit of global warming to 1,5°C might be considered;
- the developed countries undertake to apply *quantitative targets* to reduce their emissions by 2020, and the specific figures for that purpose are set out in an Annex to the Accord at the end of January 2010
- the developing countries (including the fast-growing economies like China and India) commit to *take actions* at national level to mitigate climate change through implementation of programs for low-carbon development;
- these actions will be subject to monitoring, reporting and verification in accordance with internationally agreed rules, and will be reported to the Convention every two years.

The Accord includes also specific **financial commitments**:

- on the part of developed countries - to gradually provide \$100 bln. a year until 2020 in order to meet the needs of developing countries for adaptation to and mitigation of climate change (including building administrative capacity, introducing new environmentally friendly technologies and halting deforestation);
- developed countries commit also to provide a total of 30 billion dollars as new and additional funds for developing countries for the period 2010-2012 (so called “Fast Start Financing” or FSF);
- outline of the financial management of the resources allocated to activities on climate change in developing countries.

As a whole, the Copenhagen Accord might not be what the global community aims for (according to the Bali Action Plan) but it lays the foundations for inherently unprecedented measures on a global scale. It should receive full credit and be implemented in practice in the subsequent years when the legally binding text of the global agreement on climate change for the period beyond 2012 will be formulated.

2.1.5 The Cancun Agreements

The next significant step forward in the negotiations on a new global agreement on climate change was made at the **16th Conference of the Parties to the UNFCCC**, held in Cancun, Mexico (29 November – 10 December 2010). The balanced and important package of decisions approved at the Conference and known as the Cancun Agreements is a key step towards a comprehensive and legally binding framework for climate-related measures after 2012.

The **Cancun Agreements** develop further the decisions taken a year earlier in Copenhagen, and clarify the process to achieve progress in the future. The package of decisions is a well-balanced compromise between the diverging interests of the Parties. Its main elements include:

- recognition for the first time in a UN document that global warming must be kept below 2°C compared to the pre-industrial temperature and that joint efforts to reduce emissions should be increased to keep the ceiling of 2°C ;

- agreeing on a process to determine a long-term target for reducing global emissions by 2050 and a year by which global emissions reach their peak (after that a trend of continuous decrease is to follow);
- formulation of the both the developed and developing countries' commitments concerning climate change mitigation measures (reduction of emissions);
- reaffirming the commitment of developed countries to mobilize funding of \$100 bln. a year for climate actions in developing countries until 2020;
- setting up a Green Climate Fund as the main institutional framework for the management of funding;
- agreement on the framework for adaptation to climate change in order to enhance the activities in this area;
- launching the REDD+²¹ mechanism to support actions to reduce emissions from deforestation and forest degradation in developing countries;
- agreement in principle to strengthen and improve the carbon emission market through the introduction of mechanisms to ensure a more comprehensive approach than the current project-based approach;
- establishing a Technology Mechanism (including a Technology Executive Committee and a Climate Technology Centre and Network) to stimulate the development of new technologies and their transfer;
- establishing a process to revise the target of limiting global warming to 2°C (including consideration of a more ambitious target of 1,5°C) that should be completed in 2015.

2.1.6 The Durban platform

After the progress achieved with the Cancun Agreements, as key priorities of the **17th Conference on Climate Change** held in Durban, South Africa (28 November – 11 December 2011) emerged the consensus to be reached on the *legal form* of the future global climate agreement, as well as the decision to be taken on the adoption of a *second commitment period under the Kyoto Protocol* after 2012 as a transitional measure until the conclusion of a new global legally binding climate agreement engaging all major economies.

After 13 days of intensive negotiations, early in the morning on 11 December 2011 the participants in the Conference reached an agreement and adopted decisions on the key issues identified as priority issues for the 17th meeting of the Parties to the UNFCCC:

- a roadmap for concluding a new legally binding agreement on climate change with obligations for all major economies;
- a second commitment period under the KP until the entry into force of the new agreement;
- a framework for the management of the Green Fund.

The Parties to the Convention agreed to start negotiations on a new *instrument with legal force* that will bind all major economies with obligations to reduce greenhouse gas emissions. The new instrument is to come into force by the end of 2020 and the work on this instrument will begin in 2012 and is to be completed by the end of 2015 in order to allow for time for ratification. The new agreement is to take into account the recent scientific data and studies of IPCC whose fifth analytical report will be published in 2015.

²¹ Reduction of Emissions from Deforestation and Forest Degradation

In order to avoid a “gap” prior to the entry into force of the new legally binding agreement the Parties to the Kyoto Protocol (whose first commitment period expires at the end of 2012) agreed to pursue their obligations under it for another five or eight years (from 1 January 2013 until the end of 2017, or until the end of 2020 depending on the progress on the new global legally binding agreement). Japan, Russia and Canada will not participate in the second period of the Protocol as they refused to be bound by its extension without the participation of the economies responsible for over 50% of the global emissions - USA and China.

In accordance with its position to accept a second period under the Kyoto Protocol if the Parties to the Convention agree on a clear roadmap for a new legally binding global agreement on climate change, **the European Union and its 27 Member States** engaged with a collective target of 20% cut in emissions by 2020 compared to their level in 1990. The EU confirmed its commitment for 30% emissions reduction *provided* that the other major economies take on comparable obligations. The EU Member States have set legally binding targets for reducing their emissions by 2020 in the “Climate and Energy” legislative package, but now these targets will be enshrined in the framework of the Kyoto Protocol (Annex B). Norway, New Zealand, Switzerland, Australia, Ukraine, Monaco and Liechtenstein will also participate in the second period of the Protocol.

The Conference reached an agreement also on the management of the Green Fund to support developing countries in combating climate change. A Standing Committee of the Fund was set up to distribute funds amounting at \$ 100 bln. a year, however the document adopted at the meeting in Durban does not specify how the funds will be raised. This question remains open until the next climate conference at the end of 2012.

The set of decisions adopted in Durban, called **Durban platform**, is considered a breakthrough in the so far hardline position of the three major economic powers – USA, China and India, which opposed to be bound by a legal instrument of international nature. As a result of the successful negotiations at the Conference, however, they agreed to join the future agreement.

Despite the undeniable progress in international negotiations from Bali to Durban, **the key issues of the future global agreement on climate change remain open:**

- taking sufficiently ambitious commitments to reduce emissions that will ensure limitation of global warming to 2°C compared to pre-industrial levels;
- agreeing on mechanisms to ensure a sustainable long-term financing of the activities related to climate change mitigation and adaptation (capitalization of the Green Climate Fund);
- adoption of accounting rules for the activities in the sector of land use, land use change and forestry (LULUCF) and for dealing with the surplus of Assigned Amount Units (AAUs), on which depends the environmental integrity of the future agreement;
- further development and reform of the market mechanisms with the aim of accomplishing the targets in an environmentally sound and cost effective way;
- agreeing on global targets for the reduction of emissions from the international aviation and shipping.

The negotiating parties attach different importance and weight to each issue, but the key ones remain those related to taking up of more ambitious climate mitigation commitments (reduction of emissions) and to the funding of long-term climate actions. The decisions on these issues are closely related to those regarding the development and

improvement of market mechanisms, the rules for the management of the AAUs surplus and for accounting the LULUCF activities, as well as the inclusion of the international aviation and shipping in the global efforts.

The main challenges in the preparation of the 18th Climate Conference in Doha, Qatar (26 November – 7 December 2012) will be the practical implementation of the decisions from Cancun and Durban, and the progress in addressing the above open key issues.

2.2 EU POSITION ON THE MAIN OPEN ISSUES RELATED TO THE FUTURE GLOBAL AGREEMENT ON CLIMATE CHANGE

Before each Conference of the Parties to the UNFCCC, the European Union formulates a position regarding the key negotiation issues which is adopted through Council conclusions by the Environment and the ECOFIN (regarding financial aspects) Council formations. The main elements of this position are confirmed at the highest political level – by the European Council. The EU position evolves accordingly in the course of international negotiations. Its main aspects as of November 2011 are outlined below.

2.2.1 Obligations/targets

The Communication of the European Commission (EC) from 2005 “Winning the battle against global climate change” outlines the challenges in the fight against climate change. The European Council and the European Parliament unanimously adopted the target of limiting global warming to 2°C compared to pre-industrial levels. There is international consensus on this issue confirmed on the 15th and the 16th Conference on Climate Change, respectively, in Copenhagen and in Cancun

The Commission Communication of January 2009 “Towards a comprehensive climate change agreement in Copenhagen” contains specific proposals for the adoption of a sufficiently ambitious agreement on climate change for the period beyond 2012 with a view to achieving the common goal of limiting global warming to 2°C. In order to achieve this target the developed countries as a group must reduce their emissions by 2020 with about 25 - 40% (30% on average) compared to the 1990 levels. On their side the developing countries as a whole should by 2020 limit the growth in their emissions to the range of 15-30% compared to the levels that would result from a *business as usual* scenario. The EU has set an example in this respect by undertaking a commitment to reduce its emissions by 2020 by 20% compared to 1990 levels irrespective of whether an international agreement will be concluded or not. This is the most ambitious commitment undertaken by any country or a group of countries in the world for the period after 2012. The EU wants to go even further by committing to cut emissions by 30% within the context of a sufficiently ambitious and comprehensive international agreement that would require comparable reductions by the other developed countries and relevant actions in developing countries.

The scientific and technical analyzes (of IPCC) show that to achieve the global goal in the long run the developed countries need to reduce their emissions as a whole by 2050 by 80-95% compared to their levels of 1990. This is the long-term target set by the EU and confirmed at the highest political level by the European Council.

From the start of the negotiations on a new international climate agreement the EU has maintained the position that its taking up of a more ambitious target would not be *unconditional* and would be subject to adequate and comparable commitments undertaken by

the other developed countries. “Adequate” and “comparable” are considered to be the commitments binding the developed countries as a group to reduce emissions by 2020 by 25-40% compared to 1990 levels (i.e. by at least 25%). In view of what other negotiating partners have pledged so far, such a result can hardly be expected by the end of 2012.

Regarding the developing countries as a group all Member States share the view that they should take respective commitments to reduce their emissions by about 15-30% by 2020 compared to the levels on a *business as usual* scenario. The most developed among them should undertake specific quantitative targets, while the least developed countries and the small island states should develop strategies for low-carbon development.

The applicable criteria for assessing comparability of efforts are:

- an indicator of the country’s economic situation (GDP per capita);
- greenhouse gas (GHG) emissions per GDP unit, considering the potential to reduce greenhouse gas emissions in the respective country;
- trend in the GHG emissions between 1990 and 2005 – recognizing the early national actions to reduce emissions;
- population growth over the period 1990-2005 taking into account the relation between population and total GHG emissions.

These criteria are outlined in the Council Conclusions of March 2007 and supported by all Member States.

It should be noted that the **commitments proposed so far (so called *pledges*) are far below what is needed to limit global warming to 2°C**. 89 countries (representing 80% of global emissions and over 90% of the global economy) have submitted proposals for commitments in Cancun. Their analysis shows that the collective commitment of developed industrialized countries (Annex I Parties) to reduce the emissions by 2020 is **18%** at best (and **12%** in the most unfavorable scenario) compared to 1990 levels. Moreover, the proposals are hardly comparable because they are oriented to different base years (*for instance the reduction of 17% proposed by the USA relates to the emission levels of 2005, which is equal to approximately 5% compared to those of 1990*). On the other hand, some of the more advanced developing countries have committed to targets for reducing their emissions below the *business as usual* levels by 2020: Mexico (20%), South Korea (30%), South Africa and Indonesia (40%), Brazil (36-39% reduction in emissions from deforestation through afforestation and others forestry practices). China and India have announced plans for national low carbon development where the measures are directed at reducing carbon intensity. These commitments, however, require adequate financing of the measures which is still an open question in international negotiations.²²

In this context, the **European Union continues its efforts to engage all major economies with sufficiently ambitious targets** in order to achieve the common goal of limiting global warming to 2°C and this is one of the conditions that the Union puts to the conclusion of a comprehensive legally binding climate agreement for the period after 2012.

As regards taking a target beyond 20% by 2020 – with the publication of the Commission’s Communication “Analysis of options to move beyond 20% greenhouse

²² Sources: European Commission: Commission Staff working document II to the Communication „Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage”, may 2010.; Stockholm environment institute: “Comparison of Annex I and non-Annex I pledges under the Cancun Agreements”, 2011; World Resources Institute: “Comparability of Annex I Emission Reduction Pledges”, 2010.

gas emission reductions and assessing the risk of carbon leakage” the debate on EU level is virtually “separated” from the one concerning the “conditionality” in the international negotiations and it is now driven by the cost-benefit analysis of an eventual move towards more ambitious commitment, provided in the Communication.

2.2.2 Financing activities on climate change

According to the EC’s Communication of 2005 “Winning the battle against global climate change” a significant increase in financial resources will be needed to support the necessary actions in developing countries. These resources should come both from local sources and the global carbon market of emission reductions under the KP, as well as from contributions by the developed countries. A large part of these investments will incur both immediate and long-term benefits with relation to climate change; they will favour economic recovery and, by all means, will be less than the losses which would result from the lack of timely appropriate actions.

The European Union has repeatedly confirmed in its conclusions that in case a comprehensive international climate agreement is reached, EU is ready to give its fair contribution to international assistance, including through international public finance and offset credits on the basis of the Kyoto Protocol’s “flexible mechanisms”.

The EC’s Communication published on 10 September 2009 regarding the financial aspects of the future international climate agreement:

- makes an assessment of the necessary funding of actions for adaptation to and mitigation of climate change;
- defines the different funding sources and the ways for their organization and management;
- suggests a concept of EU’s “fair” contribution to international support.

In the course of negotiations on the future climate agreement this is one of the main issues, which is closely linked to the taking of specific commitments for emission reductions by developing countries. There is a general consensus in the EU that the provision of financial support to developing countries should be based on certain conditions related to the progress achieved in the fight against climate change. In this respect the most important condition for the effective use of the provided support should be the development and implementation of national strategies for reduction of harmful emissions.

With the Copenhagen Accord developed countries took a collective commitment to fund actions amounting to **\$ 30 bln.** for the period between 2010 and 2012 (the so called “fast start finance” or short term funding) and a target for a long-term funding in the amount **\$ 100 bln. annually** to be reached by 2020. These resources should be additional to those provided to developing countries as official development aid (ODA), and they should be mobilized by various funding sources – private and public, including innovative sources such as market and non-market mechanisms. These commitments were confirmed in the Cancun Agreements.

⇒ ***Short-term funding (“Fast Start Finance”)***

EU’s commitment taken by the European Council in 2009 for the short term funding amounts to **€7,2 bln.**, which is approximately 1/3 of the total amount stated by developed countries. Among the other large donors are USA, Canada, Australia, New Zealand, Japan, Norway, Switzerland, Iceland and Lichtenstein. At the climate conferences in Cancun and Durban EU presented detailed reports on the FSF it has provided. In 2010 and 2011 the EU Member States undertook bilateral and multilateral

initiatives amounting in total to **€4,68 bln.**, 31% of which are for adaptation, 13% - for the REDD+ mechanism related to reduction of deforestation and forest degradation in developing countries and 41% - for mitigating climate change.

Bulgaria has committed to a voluntary contribution of €20 000 per year for 2011 and 2012 that will be provided to support a project under the UN Development programme (UNDP) for strengthening the capacity for inventory, monitoring, verification and reporting of greenhouse gases in the Republic of Macedonia.

⇒ *Long-term funding*

Pursuant to the Cancun agreements the Transitional Committee began its work in 2011 with a view to develop the framework for actions and the structure of the **Green Climate Fund**, and to propose a decision for its establishment. The Fund's Standing Committee was established at the 17th Conference of the Parties to the UNFCCC in Durban. The Green Climate fund will manage and channel the resources for long-term financing of measures for climate change mitigation and adaptation in developing countries, using all the existing funding mechanisms under the UNFCCC and other international ones aimed at supporting developing countries.

Possible sources of long-term funding are still to be specified and developed – such as public, private, bilateral and multilateral, including alternative sources, while at the same time using existing institutions and channels (multilateral development supporting banks, the official development aid provided so far, etc.). Due to the need to identify alternative and new sources, the continuation of the existing market mechanisms and the establishment of new ones will be of outmost importance and a condition to mobilize the support by the developed countries. The respective commitments made by the countries outside the group of developed ones (by the fast developing economies) will also play a vital role. Funding of climate-related actions in developing countries will be bound to the development of specific programmes of measures for climate change mitigation.

Despite the progress achieved with respect to the management architecture of the financial resources for climate change mitigation, it should be noted that **the main issue regarding funding sources remains open**. It will be subject of debate at the Doha Conference, but it's quite possible that no mutually acceptable solution is found again, because it is closely linked to the decisions still to be taken on other open issues such as the reform of the international market mechanisms and the contribution of sectors as aviation and maritime transport to global funding.

Three are the identified so far main sources of meeting the developing countries' financial needs:

- 1) national public and private funding, which according to preliminary estimations can cover approximately 20-40% of the needs;
- 2) development of international carbon market – with the potential to cover about 40% of the needs; and
- 3) international public financing which is envisaged to cover the remaining 20-40%.

According to preliminary evaluations the necessary means from international public funding for climate measures in developing countries amount to approximately € 9-13 bln. annually in 2013, and the amount will increase to € 22-50 bln. annually by 2020. With a well-organized and enlarged carbon market by 2020, a financial flow of approximately €38 bln. per year could be generated for the developing countries. However such a scenario suggests that most advanced of the developing countries should

agree on the implementation of a sectoral mechanism instead of the current project-based CDM. Furthermore, the introduction of a global emission trading scheme for the international aviation and maritime transport, or of emission-based taxes for these sectors would contribute to the generation of a significant international funding resource. That issue however, also remains unsolved on a global level.

Out of the suggestions for **international public funding sources**, presented for discussions in the course of international negotiations so far, most attention has been paid to the following two options:

- a share approach, whereby the countries agree to annually make contributions according to a formula which shall be defined on the basis of criteria such as GDP and emission levels; and
- auctioning whereby a small percentage of the national emission allowances – the so called assigned amount units (AAU) – should be retained and auctioned in order to raise funds for actions on climate change mitigating and/ or adaptation in developing countries. The two options can be combined somehow, and also other alternatives might be considered (however, no such alternatives have been proposed so far).

A possible charge for transactions in trading with offset credits from projects under the KP's "flexible mechanisms" was also considered, but this option does not meet much support at this stage of negotiations.

Two main criteria have been defined on the basis of which the countries' individual contributions to the future international climate agreement's financial architecture shall be defined:

- ability to pay, i.e. to cover the costs (based on GDP per capita); and
- responsibility for emissions and potential for their reduction (measured as a percentage of global emissions and consistent with the countries' reduction potential).

Key in the negotiations on the financial aspects of a future climate agreement is the decision to be taken on the *weight* of the two criteria when determining individual financial commitments.

The European Union is actively involved in the establishment of the Green Climate Fund and stands ready to commit for a long-term funding in the context of a commensurate contribution by the other countries. EU is of the position that the contribution for meeting the financial needs should not be provided only by the developed countries, but also by the more advanced developing ones – on the basis of a common scale in accordance with the two main criteria. When applying these criteria, depending on the weight attributed to each of them in the common formula, EU's share in the overall international public funding is assessed to approximately 10% –30%. This leads to the presumption that the EU's contribution shall be between €900 mln. and €9 bln. as of 2013 r. and between €2 and €15 bln. per year by 2020.²³ When distributing the burden (commitments) between the 27 EU Member States, the same criteria having the same weight shall be used, as in the context of international negotiations.

Internationally, EU holds the position that the "*responsibility for emissions*" criterion should have bigger weight. Besides its being environmentally expedient, if it has

²³ Source: EC Communication regarding the financial aspects of the future international climate agreement, September 2009.

a larger weight, EU's individual commitment in global funding would be significantly smaller than in the case where a bigger weight is attributed to the “*ability to pay / GDP*” criterion (respectively between €1 bln. a year in case of 100% weight of the “*responsibility for emissions*” criterion and €3 bln. in case of 100% weight of the *GDP criterion*). A more realistic scenario in international negotiations however would be for the countries to agree on a larger weight for the “*ability to pay*” criterion.

Bulgaria adheres to the EU's common position that the contribution to meet the developing countries' needs must be provided not only by developed countries, but also by the more economically advanced developing ones. Regarding the distribution of commitments to global funding Bulgaria supports the EU's position on attributing a bigger weight to the “*responsibility for emissions*” criterion. With respect to the “internal burden sharing” our country is of the principal view that EU should apply a specific approach towards a certain group of Member States that have both the lowest levels of GDP in the Community, and highly emission-intensive economies (Bulgaria is one of them). Their share in the EU funding for developing countries must be considerably lower, so that these Member States can focus on reducing the emissions in their own economies.

2.2.3 Treatment of AAUs surplus and accounting rules for LULUCF activities

Article 3, paragraph 13 of the Kyoto Protocol provides for the option of “banking” (carry over) the surplus of assigned amount units (*i.e. the countries' saved emission allowances for total aggregated greenhouse gas emissions*) from the first period of implementing the Protocol (2008 – 2012) to the following commitment periods. In the course of negotiations so far no consensus has been reached on the option of “banking” the AAU surplus for the following commitment period (2013-2020) – neither internationally, nor on EU level.

The issue is crucial to the future climate change agreement, since it is in direct relation to the countries' quantifiable and comparable commitments for the period following 2012, as well as with the regime during the second commitment period under the KP. Due to the large volume of expected AAU surplus, unlimited carry over might pose a serious risk to the efficiency of efforts for achieving the common target of limiting global warming to 2°C.

The Commission's Communication “Analysis of options to move beyond 20% greenhouse gas emission reductions and assessing the risk of carbon leakage” of 2010 contains the assumption that eventual full banking of the AAU surplus and the adoption of not strict enough LULUCF accounting rules will reduce the targets down to 0%, or even lead to an increase in emissions by up to 3% compared to their levels of 1990 (when applying the lower scale of the pledges)²⁴.

The quantity of AAUs which is expected to be carried over to the period between 2013 and 2020 is estimated at 10 bln. tonnes of CO₂eq.²⁵. This would reduce the ambition of the target for 2020 by 6% to 11% and would question the integrity of the carbon market. Furthermore, if the existing KP rules for LULUCF accounting are retained (*i.e. using historical data as a basis for accounting*), the countries will be able to issue credits for LULUCF activities amounting to 1% of the total emission levels in 1990, which would further reduce the ambition of the 2020 target by 5% to 10%. As regards forestry – if rules to stimulate *business as usual* instead of *real additional* actions are introduced,

²⁴ Section 2.2. of the Commission Staff Working Paper II to the Communication.

²⁵ Russia – 5,6 bln.; Ukraine – 2,4 bln.; 9 EU Member States (including Bulgaria), having AAU surplus – 2,6 bln.

the level of ambition of the 2020 target would drop with further 8%. The conclusion is that the level of ambition of the future global climate change agreement for the period following 2012 to a large extent depends on the accounting rules for the LULUCF sector to be adopted and on the decision to be taken on banking of the AAU surplus.

Several options are subject of discussions in the international negotiations. They include extreme options such as *full restrictions* and *full (100%) carry over*, as well as *intermediate (“middle ground”)* options. The latest proposal by the African group is to limit the carry over to 1% of every country’s total Assigned Amount Units. This 1% can be sold, but 50% of the revenues must be used for emissions reduction on national level and the remaining 50% should be provided to the Climate Adaptation Fund. Russia still insists on maintaining the status quo (full carryover of the whole unused quantity of AAUs).

The issue is controversial also **within the European Union**. The majority of Member States are strongly against the carryover of AAUs to future commitment periods under the KP and uphold the position that even 1% banking would render pointless the EU’s target of 20% emissions reduction by 2020. On their side, the nine countries that have achieved significant cut in their emissions since 1990 (including Bulgaria) have reason to insist these past efforts to be accounted for and to use their right of full banking as provided for in the KP. These countries are against restrictions in *carry over*, but are inclined to accept reasonable restrictions on the *use* of AAU surplus.

According to the Environment Council conclusions of October 2011, EU shall present within the negotiations under UNFCCC options for banking agreed by all Member States. Such options are still under discussion at expert and political level in the search of acceptable compromise. The most realistic outcome of these discussions is the choice of the so called “middle ground” options that exclude unlimited (100%) banking and use of the AAU surplus, as well as full restriction (0%) to banking and use thereof. The middle ground options are directed towards *limited* carry over (the amount is still under consideration) and *regulation of their use* – in national green investment schemes, for reaching the renewable energy and energy efficiency targets etc.

For **Bulgaria** that issue is crucial, considering the significant emission reductions achieved so far and, respectively, the AAU surplus with which our country will dispose in the end of 2012 as a result of these reductions. It should be noted however that the AAU market is a market driven by the “buyers” and not by the “sellers” (*i.e. supply significantly exceeds demand, which virtually renders the “goods” unmarketable or marketable at insignificant price*); seen from this perspective the limitation of quantities might have only a positive effect on their market value. With this regard our country is inclined to consider the options of *restricted use* of the AAU surplus by focusing on the options of its use for the purposes of the national Green Investment Scheme and other projects in the field of environment and climate change.

2.2.4 Reforming the existing market mechanisms under KP

The issue of extending and reforming the so called “flexible mechanisms” under the Kyoto Protocol (“Clean Development” and “Joint Implementation”) as well as that of the international emission trading remain crucial in the negotiations on a new global comprehensive climate change agreement for the period following 2012. They are connected both with the possibilities for achieving the KP targets in a cost-effective way, and with providing part of the necessary additional means for long-term funding of climate change actions.

The majority of countries having commitments under the KP for the period between 2008 and 2012 support the retaining of market mechanisms but also insist on their reformation and optimization. **The European Union** also supports their reform. As regards “Clean Development” – it implicates the introduction of a *sectoral credit mechanism* to replace the current, project-based one. Regarding the “Joint Implementation” however – there is no unanimous decision yet on EU level for its extension after 2012, since it is on the one hand bound with the commitment periods under the KP, and on the other – with the implementation of the European emissions trading scheme, and the Efforts Sharing Decision²⁶ with the view of achieving the 2020 emissions reduction targets.

For **Bulgaria** it is important to retain the “Joint Implementation” mechanism, with which it has a long-term experience (26 registered projects, most of which are currently being implemented). Our country is of the position that the mechanism should be extended after 2012 with a view to encourage the private sector’s involvement in the national emissions reduction efforts, as well as to support the projects started between 2008 and 2012 that will continue generating emission reductions after that period.

2.2.5 Adoption of global targets for reduction of emissions from international aviation and shipping

The share of CO₂ emissions from air transport currently accounts for 2-3% of their global level, but the sector is quickly growing and it is expected that its emissions will increase as well, unless respective measures are taken. Globally, shipping is also a significant and growing source of greenhouse gases (mainly CO₂) that cause climate change. The greenhouse gas emissions from this transport activity currently amount to 900 mln. tonnes a year, and it is forecasted that they will increase more than the double by 2050 in case of a lack of adequate actions to reduce them. In order to deal with global challenges of climate change, *all Parties* and *all sectors* must take proportionate measures.

For more than 15 years **EU has been seeking to reach a global agreement** within the UN for taking measures to reduce greenhouse gas emissions from the aviation and maritime transport, in particular via the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO). To date, progress in international negotiations on the imposition of binding global targets and measures for the aviation and maritime transport is rather limited. EU remains committed to reaching a global agreement on this issue within ICAO and IMO, but if there is no progress in negotiations, it intends to take measures in 2012 to include shipping in the European Emissions Trading scheme (ETS), as it did with aviation in the end of 2008²⁷.

The issue is crucial and related to the potential contribution that both sectors will make to funding climate actions in developing countries by participating in market mechanisms such as the Emissions Trading Scheme.

²⁶ Decision No 406/2009/EC of the European Parliament and of the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community’s greenhouse gas emission reduction commitments up to 2020.

²⁷ By amending Directive 2003/87/EC on the EU Emissions Trading System (ETS), in November 2008 the scheme was enlarged with a view to include emissions from the aviation sector. As of January 1st, 2012 all flights that land in or departure from the EU, are included in the ETS.

3 EUROPEAN ASPECT OF CLIMATE POLICY

3.1 EU LEGISLATIVE PACKAGE ON CLIMATE AND ENERGY

At the Spring European Council in 2007, the EU Heads of State and Government adopted a plan and reached an agreement on the European Union's energy policy and climate change policy up to 2020.

The strategic plan is known as "*the three 20 up to 2020*" (20/20/20 by 2020) and is aimed at:

- 20% increase in energy efficiency;
- 20% decrease in greenhouse gas emissions compared to their levels of 1990;
- 20% share of renewable sources energy in EU's total energy consumption up to 2020, including 10% share of biofuels in transport.

Following its consistent position in the context of international negotiations for reaching a new global legally binding climate agreement, the European Union committed to a target of 30% reduction of greenhouse gas emissions by 2020 compared to 1990 *on the condition* that the other developed countries commit themselves to a similar reduction of emissions and that developing countries pay their own contribution according to their responsibilities and respective capabilities. It was confirmed that to limit global warming to 2°C in the long run the developed countries should, as a whole, reduce their emissions by 2050 in the range of 80-95% compared to their levels of 1990 and that the EU will give its contribution.

In response to the undertaken political commitments the European Commission developed a package of legislative measures relating to: the revision of the existing Emissions Trading Scheme at Community level; the establishment of differentiated ceilings on greenhouse gas emissions for the sectors outside the scheme (transport, construction, agriculture, waste), the formulation of binding national targets for increasing the share of renewables in the energy balance and the introduction of rules to encourage the new technologies for carbon capture and storage.

The "Climate and Energy" legislative package outlines the framework of the active EU policy on climate change for the period 2013-2020 and was adopted by the European Parliament and the Council at the end of 2008. The package includes four key pieces of legislation as follows:

- Directive 2009/29/EC of the European Parliament and of the Council, amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community²⁸;
- Decision 406/2009/EC of the European Parliament and of the Council on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020²⁹;
- Directive 2009/28/EC of the European Parliament and of the Council on the promotion of the use of energy from renewable sources³⁰;

²⁸ OJ L 140/63 of 5.6.2009

²⁹ OJ L 140/136 of 5.6.2009

³⁰ OJ L 140/16 of 5.6.2009

- Directive 2009/31/EC of the European Parliament and of the Council on the geological storage of carbon dioxide³¹.

The package is supplemented by another two legislative acts that were adopted at the same time and are intended to stimulate the measures in the transport sector:

- Directive 2009/30/EC amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions³²;
- Regulation (EC) 443/2009 setting emission performance standards for new passenger cars³³.

The “Energy and Climate” package is expected to play a key role in achieving the ambitious goals that the EU set itself in 2007. Given that by 2005 the greenhouse gas emissions of the Union as a whole were reduced by 6.5% compared to 1990, and the share of renewable energy in the total consumption was 8.5% in 2005 the proposed legal acts provide for measures to achieve **reduction of greenhouse gas emissions by 14% compared to 2005 levels and to increase the share of renewable energy by 11.5% compared to 2005**. This year was chosen as a reference year in determining the goals by 2020, because the first verified data on greenhouse gas emissions for the 25 Member States were issued in 2005 (*the first verified data for Bulgaria and Romania in the Emissions Trading Scheme date back to 2007*).

3.1.1 Main elements of Directive 2009/29/EC (The ETS Directive)

The European greenhouse gas emission allowance trading scheme is a Community market mechanism established in 2005 in order to encourage investments in low carbon production. The scheme is based on the „*cap and trade*” principle and the first two trading periods (2005-2007 and 2008-2012) are regulated by Directive 2003/87/EC.³⁴ It functions at Member State level on the basis of National Allocation Plans (NAPs) developed by each country and approved by decisions of the European Commission.

Currently the ETS covers over 11000 installations in 30 countries (EU27, Norway, Iceland and Liechtenstein). Pursuant to Directive 2008/101/EC³⁵, the scope of the ETS is enlarged to cover also aviation activities as of 1 January 2012.

Bulgaria was *de jure* included in ETS after it joined the EU in 2007, but *de facto* its actual participation started after the NAP was approved for the second trading period (2008-2012) by decision of the Commission from April 2010. At the time of the approval of the NAP Emissions Trading Scheme in Bulgaria covers 132 installations. The total amount of allowances for allocation is determined at just under 206 mln. (205,892,286) and includes the allowances for the installations covered by the scheme, as well as those reserved for new entrants and projects under the Joint Implementation mechanisms of the Kyoto Protocol.

³¹ OJ L 140/114 of 5.6.2009

³² OJ L 140/88 of 5.6.2009

³³ OJ L 140/1 of 5.6.2009

³⁴ Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275/32 of 25.10.2003).

³⁵ Directive 2008/101/EC of the European Parliament and of the Council amending Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community (OJ L 8/3 of 13.01.2009).

Directive 2009/29/EC on ETS provides for the **reduction of greenhouse gas emissions from sources covered by the scheme by 21 % compared to their 2005 levels**. The new elements compared to the current provisions can be summarized as follows:

- inclusion of new sectors and gases;
- harmonized approach – a common cap on emission instead of 27 national limits;
- reserve for new entrants set at EU level (5% of the total allocation);
- a single register;
- gradual increase of traded allowances at the expense of free allocation;
- harmonized rules for free allocation based on ambitious indicators;
- 100% auctioning of allowances for electricity generation.

⇒ *New sectors and gases*

Since its establishment in 2005 the ETS has covered the emissions of carbon dioxide (CO₂) from power stations and other combustion plants, oil refineries, coke ovens, iron and steel mills and plants producing cement, glass, lime, bricks, ceramics, pulp, paper and cardboard. From 2013 the scope of the ETS will be extended to include additional sectors and greenhouse gases. The measure will lead to expansion of the scheme to cover installations producing organic chemicals, hydrogen, ammonia and aluminum. Besides CO₂, the nitrous oxide (N₂O) emissions from the production of nitrogen, adipic, glyoxal and glyoxylic acid and perfluorocarbons from the aluminium sector will also be counted.

⇒ *Common emissions ceiling*

A **common cap on emission allowances will be introduced in 2013 across the EU** instead of 27 separate allowance caps for each Member State, i.e. the obligation to develop national allocation plans will be revoked. There will be a reserve of 5% of the total amount of allowances for allocation to new entrants to the scheme. It is also envisaged to centralize all operations performed in the ETS (*allocation, reallocation, transfer, auctioning of allowances*) into a **single European registry** which will replace those currently administered by the individual Member States and will be managed by the Commission.

The EU cap for the first year of trading (2013) is fixed **at 2.04 bln.**³⁶ on the basis of the authorized allowances for the 27 Member States for 2008-2012. This amount will cover also the new installations to be included in ETS as of 2013 following the extension of the scheme. The annual ceiling on emission allowances decreases linearly – by 1.74% a year compared to the average level for 2008-2012. In absolute terms, this means that **the amount of allowances authorized for allocation will decrease on an annual basis by about 37.4 million**. This annual decrease will continue also beyond 2020 and is subject to review not later than 2025. The allowances within this cap at EU level will subsequently be distributed to individual installations covered by the scheme during the second trading period (2008-2012) on the basis of their allocation for this period reduced by the linear factor of 1.74%.

⇒ *Allocation of allowances – harmonized rules for free allocation and auctioning*

According to the new Directive **the auctioning of allowances will be rather the rule than the exception as of 2013** which is a fundamental change in the third ETS

³⁶ By Commission Decision № 2010/634/EU adjusting the Union-wide quantity of allowances to be issued under the Union Scheme for 2013 and repealing Decision 2010/384/EU under the European Emissions Trading Scheme

trading period. There will be 100% auctioning of emission rights in the **electricity generation sector** from the very beginning of the period.

Free allocation of allowances will gradually decrease - from 80% in 2013 to 30% in 2020 in order to reach 0% in 2027. Free allocation will benefit industrial sectors, district heating and highly efficient cogeneration of energy, and the distribution will be based on criteria and ambitious indicators harmonized at European level³⁷. The criteria and the indicators are oriented towards *products* rather towards sectors as a whole. They are based on the principle “*one product = one indicator*” and during their development no distinction was made on the basis of technology, raw materials or fuels used, nor in terms of size or geographic location of installations producing the same type of products. The starting point was the arithmetical mean of the greenhouse gas emissions data in 2007 and 2008 of the *10% most emission-effective* installations in the scheme. Those which meet the criteria (i.e. which are amongst the most effective in the EU) will obtain for free the full amount of allowances allocated to them for the respective year. Installations which do not meet the indicators will have a shortage of allowance and the option to either take measures (incl. investment ones) to reduce emissions, or to purchase the insufficient amount of allowances.

As a result of the application of these rules it is expected that **from 2013 at least half of the total amount of ETS allowances will be auctioned** (their exact amount will be determined after identifying all installations that will benefit from free allocation and the allowances necessary for this purpose).

Auctioning will take place through a common *auction platform* in accordance with harmonized rules adopted with a Commission Regulation³⁸. An option is provided whereby the Member States may prefer not to participate in the common platform, but instead choose their own one on the condition that it is listed under an Annex to the Regulation and that it conforms to the harmonized rules. Each Member State should appoint an *auctioneer* to be responsible for auctioning allowances on its behalf within the auction platform (it is possible for one and the same auctioneer to be chosen by more than one Member State). The auctioneer is also responsible for receiving and disbursing the auction proceeds pertaining to each appointing Member State.

⇒ ***Distribution of allowance auctioning rights***

The EU applies the principles of *joint efforts* to the distribution of allowance auctioning rights:

- **88%** of the total amount of allowances to be auctioned are distributed among the Member States according to their relative share of allowances in 2005³⁹ or in the period 2005-2007 (where the higher value shall be selected);
- **10%** are redistributed in favor of 19 Member States (as listed in Annex IIa of the Directive) on the basis of two criteria related to GDP:
 - (1) income per capita in 2005 under 20% of EU average, and

³⁷ Established by Commission Decision No. 2011/278/EC determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council.

³⁸ Commission Regulation (EU) No. 1031/2010 on the timing, administration and other aspects of auctioning of greenhouse gas emission allowances pursuant to Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowances trading within the Community.

³⁹ For **Bulgaria** and Romania the reference year is 2007, since when the accounted emissions have been verified.

- (2) estimated direct costs of implementing the “Climate and Energy” package exceeding 0.7% of GDP;
- **2%** are redistributed in favor of 9 Member States (as listed in Annex IIb of the Directive) on the basis of the criterion “*past efforts*” – to the countries that reduced their CO₂ emissions by more than 20% in the period 1990-2005.

Bulgaria is a beneficiary under both criteria (*GDP and “past efforts”*). This implies auctioning **rights to trade more than 43 mln. allowances** or in terms of potential budget revenues as of 2020 – **€1.3 bln. a year with estimated allowance price of €30**.

The so called “early auction” for the sale of 120 million allowances will be held in 2012⁴⁰. **Bulgaria** is entitled to auction approximately **3.3 mln.** of them.

⇒ *Spending of auctioning revenues*

Member States decide how to use the revenues from the auctioning of allowances on the basis of the subsidiarity principle. According to the provisions of the ETS Directive, **at least 50% of these revenues should be earmarked for:**

- reducing the greenhouse gas emissions and adapting to climate change;
- funding research and development related to emissions reduction and to climate change adaptation;
- development of renewable energy sources (RES) and increasing energy efficiency;
- encouraging a transition to low-emission types of transport and development of public transport;
- overcoming social consequences from the applied measures (such as possible increase in electricity prices) – for households with low and medium income;
- supporting measures for prevention of deforestation and climate change adaptation in developing countries.

⇒ *Flexibility mechanisms*

To achieve the targets for reducing emissions from sectors covered by the ETS in a cost-effective way the Directive provides a number of flexibility mechanisms and derogations as follows:

- Possibility for small and medium-sized installations emitting less than 25000 tonnes of CO₂eq. to be excluded from the scheme provided that Member States apply equivalent measures to reduce emissions from the excluded installations (*e.g. eco-taxes or voluntary agreements with the relevant sectors*).
- 100% free allowances for sectors at significant risk of carbon leakage⁴¹ - the *harmonized criteria and indicators* for free allocation pursuant to Commission Decision № 2011/278/EU are applied for this purpose; only the installations that meet these criteria receive the full amount of the free allowances due;
- Possibility for additional compensation (*e.g. in the form of tax relief or other types of support*) for energy-intensive installations that are exposed to risk of “carbon leakage” for *indirect costs* related to higher electricity prices passed on in the

⁴⁰ According to Commission Regulation (EC) No. 1210/2011 amending Regulation (EU) No 1031/2010 in particular to determine the volume of greenhouse gas emission allowances to be auctioned prior to 2013

⁴¹ Determined on the basis of the quantitative and qualitative criteria laid down in the Directive by Commission Decision № 2010/2/EU on sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage as amended and supplemented by Decision 2011/278/EU and Decision 2011/745/EU.

- price of the product as a result of the implementation of the Directive - such support is granted by Member States temporarily where *it is proven to be necessary and proportionate* and after ensuring that the ETS scheme incentives to save energy and to stimulate a shift to low-emission electricity are maintained
- Use of credits from projects under the flexibility mechanisms of the Kyoto Protocol (JI and CDM) - all operators under the scheme can use credits for the period 2008-2020 either up to their authorized quantity for the period 2008 - 2012, or up to a quantity corresponding to a certain percentage of their allocation for the period 2008-2012 (taking the higher of the two values). These measures are not yet regulated by an implementing act of the Commission, because they will be tailored to the course of international negotiations on the future global climate agreement and the conditions in the second commitment period under the Kyoto Protocol. In general, the *total use of credits allowed under the scheme* should not exceed 50% of emission reductions in the Community below their 2005 levels for the period 2008-2020.
 - Possibility to negotiate derogations from 100% auctioning of allowances of the electricity generation sector under certain criteria - according to the criteria laid down in the Directive **Bulgaria has the right to negotiate a derogation** allowing the country to introduce only 30% auctioning of allowances in the electricity generation sector in 2013 (instead of the mandatory 100%). The criterion on the basis of which such derogation may be negotiated is: more than 30% of the electricity was produced from one type of fossil fuel in 2006 and the GDP per capita at market prices did not exceed 50% of the average GDP per capita at market prices of the Community.

In September 2011 Bulgaria submitted to the Commission a request for derogation with a national plan envisaging **investments of over €800 mln. for retrofitting and improving the infrastructure, and for clean technologies.**

Some of the flexibility mechanisms set out in the Directive (*derogations from full auctioning of allowances for electricity, measures for sectors at risk of “carbon leakage” and exclusion of small emitters of greenhouse gases from the scheme*) are subject to judgment on the admissibility of planned state aid. Therefore, the European Commission has prepared specific guidelines⁴² to be published in spring 2012 (*see section 3.2.3*).

3.1.2 Main elements of Decision 406/2009/EC (The Effort Sharing Decision)

The Decision lays down rules for determining the contribution of Member States in the implementation of the commitments undertaken by the Community for the period 2013-2020 to reduce greenhouse gas emissions from sources outside the Emission Trading Scheme (construction, agriculture, transport, waste). **Individual targets are set for each Member State regarding the sectors outside the scheme**, which would lead to an overall reduction in EU emissions from the sectors outside the ETS by 10% compared to their 2005 level.

With a contribution of **21%** reduction compared to 2005, set for the sectors in the scheme under Directive 2009/29/EC, and **10%** reduction compared to 2005 for the sectors outside the scheme – by 2020 the EU will achieve its target of **20%** reduction of

⁴² Guidelines on specific state aid measures in the context of the Emissions Trading Scheme post 2012.

the total greenhouse gas emissions compared to their levels in 1990 (equivalent to **14%** reduction compared to 2005 levels).

The GDP per capita is the main criterion for the distribution of individual commitments of Member States for the sectors outside the ETS. The individual targets range from +20% to -20% compared to emission data of 2005.⁴³ The countries with high GDP per capita should make greater efforts to reduce their greenhouse gas emissions in sectors outside the Emissions Trading Scheme. 15 are the Member States with “*negative*” targets, i.e. with an individual commitment to *reduce* their emissions from sectors outside the ETS by 2020.

Bulgaria has an individual commitment allowing an increase of emissions from sectors outside the scheme by 20% compared to their 2005 level.

In absolute terms - considering the numbers from the most recent national inventory of greenhouse gas emissions and the verified emission data of sectors covered by ETS in 2007 - **Bulgaria's target concerning the emissions from sectors outside the scheme in 2020 is equal to about 33.5 mln. tonnes of CO₂ eq.**⁴⁴

Taking into account the data from the latest national inventory and the provisional target of 33.5 mln. tonnes CO₂ eq. – for the period between 2010 and 2020 Bulgaria has the right to increase its emissions from sectors outside the scheme to about **6.5 mln. tonnes CO₂ eq.**

⇒ ***Flexibility mechanisms***

With a view to achieving the targets set for reducing the emissions from sectors outside the scope of the ETS in a cost-effective way, the Effort Sharing Decision provides for the following flexibility mechanisms:

- possibility to carry forward up to 5% of a Member State’s emission rights from the following year into the current year;
- possibility to carry over a part of or the whole amount of “saved” emission rights from the current year to the following year;
- possibility to *ex ante* transfer (sale) a part (up to 5%) of emission rights between Member States under bilateral arrangement;
- possibility to *ex post* transfer (sale) of the “saved” emission rights between Member states under bilateral arrangement.

3.1.3 Main elements of Directive 2009/28/EC (The RES Directive)

The Directive outlines a common framework to encourage production and consumption of energy from renewable sources (RES), including in the transport sector, with the aim of reducing both the greenhouse gas emissions from the energy sector and the EU’s dependence on energy import. The Directive sets **binding national targets for a share of renewable energy in the final consumption in Member States** that shall contribute to the achievement of the of EU’s collective commitment of 20% RES share in final energy consumption by 2020.

⁴³ According to Annex II to the Decision.

⁴⁴ It should be noted that this absolute value for 2020 is not final and will be updated according to national inventory data for the years 2005, 2008-2010, reported in 2012.

The national targets range from 10% share of RES for Malta to 49% for Sweden⁴⁵. They are determined on the basis of the RES share in energy consumption in 2005, to which a flat rate of 5,75% and an additional rate based on GDP per capita are added.

Using the above formula **Bulgaria's target is set at 16% share of renewables in the final consumption in 2020** (9.4% based on 2005 data + 5.75% fixed rate + 0.85% based on GDP/capita).

The achievement of the RES target is to be facilitated by an increase in **the share of biofuels in the final consumption of transport fuels**, which should reach **10% by 2020**. There is no effort sharing for this target, i.e. it applies to all Member States.

With regard to the target related to transport fuels, the Directive considers both biofuels, and other bioliquids. In order to be accounted for the targets, they should contribute to the **reduction of greenhouse gases by at least 35%** and their share in emission savings will increase to 50% as of 1 January 2017. The Directive introduces also certain **sustainability criteria** that biofuels and other bioliquids must meet so that their contribution towards meeting the 10% share in the final consumption is taken into account. One of the main criteria for sustainability is the requirement that the fuels are not made from raw materials obtained from land with high level of carbon stocks or with high biodiversity value.

The Directive provides for the Member States to develop **national action plans** which define the share of RES used in transport, and in the production of electricity and heating up to 2020. These plans should take into account the effect of the nationally planned measures for energy efficiency on the final energy consumption, and should also define procedures for a reform in pricing schemes and for access to electricity networks with a view to encourage the production of energy from renewable sources.

Bulgaria submitted its national RES plan to the Commission within the deadline defined in the Directive (June 2010), however, as a dynamic strategic document it undergoes changes as a result of the relevant environmental assessments and the consultations with the public and with the Commission.

⇒ *Flexibility mechanisms*

With a view to achieving the set targets in a cost-effective way the RES Directive provides for the following flexibility mechanisms:

- schemes for support and trading of “green certificates”;
- exchange of renewable energy between the MS through “statistical transfers”;
- possibility of joint projects between MS and joint support schemes.

Each Member State should be able to guarantee the origin of electricity and the energy for heating and cooling produced from renewable sources. The information contained in these *guarantees of origin* is to be accepted by all Member States and may be used to inform consumers about the different sources of electricity in the energy mix.

3.1.4 Main elements of Directive 2009/31/EC on the geological storage of carbon dioxide (Directive on carbon capture and storage /CCS/)

The Directive outlines the framework for managing environmental risks and removing the barriers in existing legislation to the introduction of a relatively new

⁴⁵ According to Annex I of the Directive.

technology for CCS. Its main purpose is to reduce CO₂ emissions from power plants firing fossil fuels (mainly coal) and from some industrial processes.

According to the impact assessment of the Directive, CCS could contribute to achieve about 15% of the required reduction of CO₂ emissions in the EU by 2030. The Member States have the potential to capture and store 7 mln. tonnes of CO₂ by 2020 and 160 mln. tonnes CO₂ by 2030.

The use of this potential involves, however, a significant amount of investments and the need to prove that the technology is safe for the environment. For this purpose the new ETS Directive provides for the set aside of 300 mln. allowances of the scheme's New Entrant Reserve (NER) to support the construction and operation of pilot CCS plants, as well as the implementation of demonstration projects for introducing innovative renewable energy technologies (the so called NER 300 program⁴⁶). It is envisaged to construct at least 8 pilot CCS installations, as well as to implement at least 30 innovative RES projects with the program's resource which would amount to €4,5 bln. at an average allowance price of €15. NER 300 is regulated by a Commission Decision of 2010⁴⁷. It is administered by the Commission and managed by the European Investment Bank. By the end of 2011, 78 co-financing project proposals have been received (13 of which related to CCS).

The Member States are fully entitled to define the locations on their territory where the CCS technology can be implemented, as well as to choose not to allow storage on the whole of their territory or parts of it.

3.1.5 Main elements of Directive 2009/30/EC amending the Fuel Quality Directive

The amendment of the Fuel Quality Directive introduce a requirement for fuel producers and suppliers to reduce by 2020 the greenhouse gas emissions throughout the fuel production chain by 6% and to realize additional reductions of 4% by applying new technologies (for instance CCS) and by using credits from projects under the "Clean Development" mechanism (CDM) in developing countries. Thus the target of **10% reduction of greenhouse gas emissions from transport fuels** is distributed as follows:

- **6%** reduction in greenhouse gas intensity of fuels (*with interim indicative targets of 2% in 2014 and 4% in 2017*); and additional
- **2%** reduction of greenhouse gas intensity by applying new technologies (such as CCS) – depending on their level of development;
- **2%** reduction by obtaining CDM credits.

Reaching this target **depends directly on achieving 10% share of biofuels in transport fuel consumption** as laid down in the RES Directive.

The achievement of the target is **directly dependent on achieving a 10% share of biofuels in transport fuel consumption** laid down in the Renewable Energy Directive.

⁴⁶ <http://www.ner300.com/>

⁴⁷ Decision 2010/670/EO laying down criteria and measures for the financing of commercial demonstration projects that aim at the environmentally safe capture and geological storage of CO₂ as well as demonstration projects of innovative renewable energy technologies under the Scheme for greenhouse gas emission allowance trading within the Community established by Directive 2003/87/EC of the European Parliament and of the Council.

The Fuel Quality Directive introduces the same *requirements for biofuels* as for renewable energy – in order to be taken into account their greenhouse gas emission indicators should be at least 35% lower than those of conventional fossil fuels (respectively - 50% from 2017 and 60% from 2018). They must also meet the *sustainability criteria* which are identical with those set out in the Renewable Energy Directive (for instance in order to recognize the targets, the raw material must not have been produced on a land with high biodiversity value or within Natura 2000 network).

3.1.6 Main elements of Regulation (EC) No 443/2009 setting emission performance standards for new passenger cars

The regulation applies to motor vehicles type *passenger cars* registered for the first time in the Community. It sets the average CO₂ emissions for new passenger cars, registered on the territory of the EU, at **130 g CO₂/km** by 2015 and the medium-term target is reduction of emissions to **95 CO₂/km** by 2020. This should be achieved through improvements in the technology of vehicle engines in accordance with Regulation (EC) No 715/2007⁴⁸ on type approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6). The so called *specific emissions* are calculated by a formula as a function of vehicle's mass.

The requirements are to enter into effect gradually by 2015 and the new emission limit values will be applied as follows:

- in 2012 – for 65% of the vehicles manufactured in the year;
- in 2013 – for 75% of the manufactured vehicles;
- in 2014 – for 80% of the manufactured vehicles;
- from 2015 emission limits will apply to 100% of the fleet of vehicles manufactured in a year.

The Regulation provides a **possibility for derogation** for the so-called *niche manufacturers*. It can benefit all manufacturers that register less than 10 000 new cars per year in the EU or manufacturers that account for 10 000 to 300 000 new passenger cars registered in the EU per calendar year *together with all their affiliates*. It should be noted that the derogation does not provide full exemption from the requirements of the legal act. Upon application the manufacturer must determine its specific emission target that corresponds to its potential to reduce emissions (including economic and technological potential to reduce its specific emissions of CO₂) and that is consistent with the characteristics of the market for the relevant type of car. The derogation is granted by the Commission for a maximum period of 5 years.

A similar approach is applied to the *new light-commercial vehicles (vans)* with the adoption in 2011 of **Regulation (EO) No 510/2011** of the European Parliament and of the Council setting emission performance standards for new light commercial vehicles⁴⁹. It sets the average CO₂ emissions for new light commercial vehicles at **175 g CO₂ /km** by 2015 and at **147 g CO₂/km** by 2020.

The application of this measure in the transport sector is expected to have a **considerable contribution (according to estimates up to one third of the share) to emission reductions** in sectors not covered by the European Trading Scheme.

⁴⁸ OJ L 171/1 of 29.6.2007.

⁴⁹ OJ L 145/1 of 31.5.2011

3.1.7 Energy efficiency

The above shows that the “*three 20*” are closely linked to each other and interdependent. Achieving the target of 20% reduction of greenhouse gas emissions would be impossible without progress in the other two, related to promoting renewable energy and energy efficiency. It is also evident that the “**Climate and Energy**” package **does not contain direct binding measures for improving energy efficiency**, although it indirectly may have an effect thereon.

Although a number of legal provisions for energy efficiency are operational on EU level (*such as the Energy Services Directive, Directive on energy performance of buildings, the Eco-design Directive, energy labeling, etc.*), none of them is directly targeted at limiting energy consumption which is one of the targets of the current EU climate and energy policy. The Member States’ individual commitments in the area of energy efficiency are still voluntary and have a rather political than a legally binding character. They are defined in the context of the “Europe 2020” strategy, where resource (incl. energy) efficiency is a flagship initiative.

According to the commitment undertaken within “Europe 2020” strategy **Bulgaria aims to reduce the energy intensity of GDP by 50%** by 2020 and to reach a value of this indicator of 456 toe⁵⁰/M€05 compared to its level of 913.3 toe/M€05 in 2005.

The implementation of energy efficiency measures and policies defined in the National Energy Strategy by 2020 aims to lead to **improvement of energy efficiency by approximately 25%** or saving more than 5 mln.toe primary energy compared to baseline scenario for development by 2020.⁵¹

The absence of legally binding measures for Member States is the reason for the slower progress in achieving the politically declared target of 20% increase in energy efficiency in the EU. According to the latest data of the European Commission – with the current pace of action, by 2020 the EU will achieve only *half* of the final target. Besides that it will have a significant effect on the energy sector as a whole (e.g., excessive growth of electricity demand and inability to respond adequately to demand), such a scenario may also threaten the achievement of other targets related to climate and energy. At the same time recent estimates of the European Commission⁵² show that if the commitment of 20% increase in energy efficiency is implemented *in full* the EU will be able to overachieve its target for reducing greenhouse gas emissions, reaching 25% (instead of 20%) reduction by 2020 *without additional efforts*.

Experience shows that Europe’s (and the world’s) most reliable “energy resource” today is energy efficiency and every economy, aiming at sustainable low-carbon growth, must focus its efforts in this direction.

With the adoption of the **Energy Efficiency Plan** in March 2011 and the proposed legislative act (**draft energy efficiency directive**) the Commission seeks to address that particular challenge.

⁵⁰ toe – tones of oil equivalent.

⁵¹ PRIMES Baseline, 2007, EUROSTAT

⁵² In the Communication on a Roadmap for moving to a competitive low carbon economy in 2050.

⇒ ***The Energy Efficiency Plan envisages:***

- reducing energy *consumption* through retrofitting/upgrading 3% of public buildings a year;
- energy efficiency should become a condition for all purchases of goods and services performed by public authorities (*public procurement*);
- increasing the efficiency of electricity and heat *generation*;
- introduction of energy efficiency requirements for *industrial equipment*;
- reducing the energy consumption of *household appliances*;
- conducting *energy audits and management* of large companies;
- introduction of “*smart*” *energy networks and devices* allowing users to reduce energy consumption and to calculate their savings.

⇒ ***The proposal for an energy efficiency directive includes:***

- measures for more rational use of energy along the entire chain - from transformation and supply to its final consumption;
- obligation for establishment of energy saving schemes in all Member States.

The *full* implementation of existing and new measures related to energy efficiency will have the following positive **economic, social and environmental consequences** for the EU:

- financial savings of around €1000 per household per year;
- improving the competitiveness of the European industry;
- creation of up to 2 million new jobs;
- greenhouse gas emissions reduction of around 740 million tonnes.

To meet the objectives set out in the “Climate and energy” package, the period 2013-2020 will be crucial as regards investments and measures in the sectors *outside of the emission trading scheme*, particularly in transport and energy infrastructures.

A number of financial mechanisms to support the achievement of these targets are provided at European level. Implementing a climate change policy that is integrated and well-coordinated at all governance levels is a precondition for the adequate and full use of these mechanisms.

3.2 FINANCIAL MECHANISMS TO ACHIEVE THE OBJECTIVES

The targets set in 2007 at the highest political level, for EU’s energy and climate change policies to be achieved by 2020, presuppose restructuring of key economy sectors and significant investments. Mitigating climate change and adapting to its effects is not a policy that can be implemented on its own. The only possible way to effectively apply it is to integrate the measures to combat climate change into other economic policies such as energy, transport, agriculture, forestry, waste management, industrial production. This concept of *integrated approach* is the basis of the financial mechanisms provided on European level to support the achievement of the targets related to climate change.

3.2.1 Multiannual financial framework 2014-2020

The new EU multiannual financial framework (MFF) proposed by the Commission⁵³ for the period between 2014 and 2020 provides ample possibilities for co-financing climate change mitigation and adaptation activities. EC has planned to allocate 20% of the European budget in the course of the forthcoming financial perspective to achieve sustainable economic growth with low emission levels in the context of Europe 2020 strategy, which means possibility for investments in the EU's low-carbon future of approximately **€200 bln.**

The contribution should come from **different financial instruments** – the Cohesion Fund and the European Regional Development Fund; the program for building sustainable energy and transport networks called *Connecting Europe Facility*; the measures for implementing the Common Agricultural Policy; the *Horizon 2020* program for scientific research and innovation; the revised financial instrument for environment *LIFE*.

Although the negotiations within the Council on the MMF instruments will be completed no sooner than 2013, and that the conditions for each Member State have not been defined yet, it is already clear that the **key to the proper use and absorption of these funds** will be the *early planning* and the *integrated approach* in the formulation of national priorities.

3.2.2 Guidelines on State aid for environmental protection

To achieve the ambitious measures set out in the “Climate and Energy” package in a cost-effective way the European Commission published revised Community Guidelines on state aid for environmental protection⁵⁴ in 2008 that are regarded as *an integral part of the package*. These guidelines regulate the conditions for permitting state aid aimed at addressing market failures which lead to sub-optimal level of environmental protection and to non-compliance with the “polluter pays” principle embedded in the European environmental policy. At the same time, the application of the guidelines guarantees that the flexibility mechanisms introduced with the package will not lead to distortions of the competition and the internal market rules in the EU.

⇒ *Eligible measures according to the Guidelines*

- Aid for undertakings *going beyond Community standards* or increasing the degree of environmental protection in the absence of Community standards - individual incentives are provided to the companies for the achievement of greater degree of environmental protection.
- Aid for the acquisition of *new transport vehicles going beyond Community standards* or increasing the degree of environmental protection in the absence of Community standards
- Aid for *early adaptation to future Community standards* – it is permitted only in case of quicker implementation of newly adopted Community standards which are not yet in force (but not to support bringing into compliance with standards already in force)

⁵³ COM(2011)500/I and II

⁵⁴ Official Journal 2008/C 82/01

- Aid for *environmental research* – aid to undertakings for studies on investments aimed at achieving a level of environmental protection going beyond Community standards or increasing the level of environmental protection in the absence of Community standards, as well as studies on energy saving and production of renewable energy.
- Aid for *energy saving* - this type of aid is aimed at creating individual incentives to attain environmental targets for energy saving and for the reduction of greenhouse gas emissions. This type of state aid may be appropriate where the investments resulting in energy savings are not compulsory pursuant to applicable Community standards and where they are not profitable, that is to say where the cost of energy saving is higher than the related economic benefit. In these cases the small and medium-size enterprises may need more support to take into account the fact that these undertakings often under-estimate the benefits related to energy savings in long term, which leads to their under-investment in energy-saving measures.
- Aid for *renewable energy sources* – this type state aid may be justified if the cost of production of renewable energy is higher than the cost of production based on less environmentally friendly sources that would prevent the entry of renewable energy on the market. An express condition for permission of state aid for biofuels is that they meet the sustainability criteria of Directive 2009/28/EC on the promotion of the use of energy from renewable sources.
- Aid for *cogeneration* and aid for *district heating* – individual incentives are provided to meet environmental targets in the field of energy saving. Cogeneration of heat and electricity is the most efficient way of producing electricity and heat simultaneously because less energy is wasted in production and therefore production can be stimulated by targeted state aid. Furthermore, district heating may be more energy-efficient than individual heating and may provide a significant improvement in urban air quality. State aid can be granted provided the process of generation and distribution of heat is proven as a less polluting and more energy efficient but also more expensive than individual heating.
- Aid for *waste management* - waste prevention and environmentally sound management is a major priority of the Community identified in the Sixth Environment Action Programme. Its primary objective is to separate waste generation from economic growth. In this context, state aid may be granted to the waste producer for prevention and recycling as well as to undertakings recycling waste or investing in measures for environmentally sound waste treatment.
- Aid for *remediation of contaminated sites* – permitted in the cases where it is not possible to identify a polluter to be obliged to pay for rehabilitation of the caused environmental damages. State aid may be justified if the cost of remediation is higher than the resulting increase in the value of the site.
- Aid for *relocation of undertakings* - it is intended for relocating undertakings that create major pollution to areas where the same contamination would have a less harmful effect (for instance undertakings within the scope of SEVESO II Directive on the control of major-accident hazards involving dangerous substances, for which

it is proven that location is crucial both in terms of prevention, and in terms of consequences for people and the environment in case of accidents).

- Aid in the form of *reductions of* or *exemptions from environmental taxes* – such relief can be introduced for certain sectors or categories of undertakings/production (e.g. exempting biofuels from excise duty) and lead as a result to the adoption of higher taxes for other sectors or production types, thus creating further incentives to improve environmental protection⁵⁵.

⇒ ***Amount and intensity of aid***

The amount of the eligible state aid is based on the *additional* investment costs necessary to achieve a higher level of environmental protection compared to equipment or technologies that meet the mandatory standards or that are less harmful to the environment in the absence of standards. Moreover, the aid intensity for investment usually is not 100% of the extra costs because they cannot be precisely calculated (e.g. operating profits are not taken into account during the period of depreciation of equipment).

Compared with the Guidelines from 2001, however, the aid intensity has been significantly increased - from 30-40% to 50-60% for large undertakings and from 50-60% to 70-80% for small enterprises. In addition, if the proposed investment includes support for the introduction of eco-innovation, a bonus of 10% may be granted. The new Guidelines also provide for an opportunity to grant aid amounting to 100% as a result of a tender procedure. The aid for renewable energy production and cogeneration could reach 100% of extra costs and *operational support* may be provided in addition to the investment in order to fully cover the difference between the production costs and the market value of the energy.

⁵⁵ Such aid was approved for Bulgaria by the Commission at the end of 2009. The aid is granted in the form of reduced excise duty on biofuel blends and full excise exemption for pure biofuels for two years. It is intended to partly cover the difference between biofuel production costs and the market price of fossil fuels on the market, thus stimulating the production of biofuels and, respectively, the achievement of a 10% share of sustainable renewable fuels in the total fuel consumption in the transport sector.

The table below shows state aid intensity as part of eligible costs in different cases:

Table 1. Intensity of state aid for environmental protection

Type of aid	Small enterprise	Medium enterprise	Large enterprise
<i>For going beyond Community standards</i>	70% 80% * 100% **	60% 70% * 100% **	50% 60% * 100% **
<i>For adaptation to future Community standards</i> - more than 3 years before entry into force - 1 to 3 years before entry into force	25% 20%	20% 15%	15% 10%
<i>For environmental research</i>	70%	60%	50%
<i>For waste management</i>	70%	60%	50%
<i>For renewable energy</i>	80% 100% **	70% 100% **	60% 100% **
<i>For cogeneration and other energy saving measures</i>	80% 100% **	70% 100% **	60% 100% **
<i>For district heating</i>	70% 100% **	60% 100% **	50% 100% **
<i>For remediation of contaminated sites</i>	100%	100%	100%
<i>For relocation of undertakings</i>	70%	60%	50%
* In case it includes introduction of eco-innovation ** In tender procedures			

Source: *Community Guidelines on state aid for environmental protection, 2008*

⇒ *Notification to the Commission*

Regarding the amount of aid the Guidelines contain provisions for a standard assessment and a detailed assessment. Larger amounts of aid are associated with a higher risk of distortion of competition and will be subject to detailed assessment. In this connection, an individual notification should be sent to the Commission regarding large amounts of aid intended for individual beneficiaries even if they are granted under an already approved scheme. The detailed assessment does not mean that the planned aid would not be allowed but that the Commission will examine whether the aid is necessary and actually contributes to better environmental protection without undue distortion of competition.

The following types of state aid must be individually notified to the EC:

- investment aid: where the aid amount exceeds €7,5 mln. per undertaking;
- operating aid for energy saving: where the aid amount exceeds 5 million EUR per undertaking for five years;
- operating aid for the production of renewable electricity: when the aid is granted to renewable electricity installations in sites where the resulting renewable electricity generation capacity exceeds 125 MW;
- operating aid for the production of biofuels: when the aid is granted to a biofuel production installation in sites where the resulting production exceeds 150000 t per year;
- operating aid for cogeneration: where aid is granted to cogeneration installation with the resulting cogeneration electricity capacity exceeding 200 MW (aid for the production of heat from cogeneration will be assessed in the context of notification based on electricity capacity).

3.2.3 State aid guidelines in the context of the Emission Trading Scheme post 2012⁵⁶

The specific and temporary measures (flexibility mechanisms) provided for in Directive 2009/29/EC in order to reduce the burden of its implementation include state aid within the meaning of Article 107, paragraph 1 of the Treaty on the Functioning of the European Union (TFEU), which is **subject to compulsory notification to the Commission** and cannot be implemented without approval by the EC.

Since the provisions introduced by the Directive will apply as of 1 January 2013, state aid is not considered necessary before this date. Appropriate measures may be allowed only for **expenses incurred after 1 January 2013** except for transitional allocation for modernization of the electricity sector which, under certain conditions, may include investments made by 25 June 2009 and included in the national plan.

⇒ *Eligible measures according to the Guidelines*

- Aid for enterprises in sectors exposed to significant risk of “carbon leakage” due to the passing of emission allowances costs on in electricity prices (*aid for indirect emission costs*)⁵⁷ – the purpose of aid is to avoid an increase in global greenhouse gas emissions due to outsourcing of production outside the EU in the

⁵⁶ The Guidelines will be published in the first half of 2012 and will apply as of 2013.

⁵⁷ According to article 10a, paragraph 6 of the ETS Directive.

absence of a binding international agreement on climate change. However, such aid may have a negative impact on the efficiency of the ETS and may lead to significant distortions of competition on the EU internal market, especially when undertakings in the same sector are treated differently in other Member States. In order to avoid these negative impacts the maximum amount of aid will be calculated using a formula that guarantees its proportionality and maintains the incentives for transition to low carbon electricity. Moreover, even the maximum amount of permitted aid will not fully offset the indirect costs of emissions passed on in electricity prices and it will decrease over time – respectively 85% of eligible costs in 2013, 2014 and 2015, 80% of eligible costs in 2016, 2017 and 2018, and 75% of eligible costs in 2019 and 2020.

- Investment aid for *high efficiency electric power plants*, including *new power plants that are prepared for carbon capture and storage of CO₂*⁵⁸ - the aid intensity will vary (between 15% and 5%) depending on the contribution of the new powerplant to environmental protection and reduction of emissions compared to the most advanced technologies. The eligible costs will be limited to the total cost of investment in equipment and land that are absolutely necessary for the construction of the new plant.
- Aid for *transitional free allocation* for the modernisation of electricity generation⁵⁹ - the derogations from the principle of full auctioning of allowances in the electricity generation sector are subjected to rigorous scrutiny by the Commission since by free allocation Member States give a selective advantage to energy producers competing with those in other Member States that may affect the trade in the internal market and distort the principles of fair competition. The eligible costs under this type of aid are limited to the annual investment costs listed in the national investment plan, which correspond to the market value of free allocations. The aid must not exceed 100% of eligible costs.
- Aid for exclusion of *small installations and hospitals* from the ETS⁶⁰ - it is allowed provided that the excluded installations are subject to measures leading to emission reductions equivalent to what would be realized within the ETS.

⁵⁸ In connection with article 10, paragraph 3 of the ETS Directive regarding the use of revenues from the auctioning of allowances.

⁵⁹ According to article 10c of the ETS Directive.

⁶⁰ According to article 27 of the ETS Directive.

4 LEGISLATION AND POLICY ON CLIMATE CHANGE IN BULGARIA

All of the above shows that the actions on climate change are diverse. They are generally defined as actions in the field of environment, but, at the same time, they fall into numerous sectors of economy and social life – energy, agriculture, forestry, transport and others. Therefore, the regulations applying to them vary as well as the competent authorities charged with the administration of existing social relations.

The present information on the climate change legislation and policies aims to describe the existing legal mechanisms and to indicate how the measures related to different sectors in NAPCC can be legally regulated.

4.1 ENVIRONMENTAL PROTECTION ACT (EPA)

(SG 91/2002, last amended SG 42/2011)

EPA is a framework law that regulates the basic conditions and principles of the management of the public relations related to environmental protection. It defines the competent authorities within the meaning of the act: the Minister of Environment and Water and the Director of the Executive Environment Agency are among the bodies holding powers with regard to EPA and the measures related to climate change, however all competent authorities under EPA may be involved with actions of other competent authorities under other laws - for example in the sectors “Energy”, “Land use, land use change and forestry” (LULUCF).

EPA establishes a scheme for trading greenhouse gas emissions. It regulates the existence of a National Plan for allocation of greenhouse gas allowances. EPA introduces a requirement for issue of greenhouse gas emission permits as a condition for execution of certain activities. The conditions and the procedures for issuing and revising a greenhouse gas emission permit and the consequences of this issuing are described in detail. A national register for reporting the issuance, holding, transfer and cancellation of greenhouse gas emission allowances is created. The Council of Ministers is delegated powers to issue bylaws detailing the management of activities related to greenhouse gas emissions. The obligations of aircraft operators and suppliers of transport liquid fuels are regulated. EPA designates the competent authorities in the field of environment responsible for Bulgaria’s relations with international and European institutions in this area as well as for the established administrative relationships. It specifies the boundaries of the competence of national authorities and EU bodies in the field of environment.

The bylaws applying to greenhouse gas inventory and activities related to greenhouse gas allowances are:

- Ordinance on the procedure and methodology of organization of national inventories of hazardous substances and greenhouse gases in the atmosphere – SG 76/2010;
- Ordinance on the procedure and method of issuing and reviewing permits for greenhouse gas emissions from installations and monitoring by the operators of installations and aircraft operators participating in the greenhouse gas emissions trading scheme – SG 99/2010;

- Ordinance on the conditions, procedure and methodology of reporting and verification of reports prepared by operators and aircraft operators – SG 99/2010;
- Ordinance on procedure and method of functioning of the national register for reporting the issuance, holding, surrendering, transfer and cancellation of greenhouse gas emission allowances – SG 102/2010.

In addition, EPA regulates three of the most important horizontal mechanisms for management of activities related to environmental impacts and the effects of greenhouse gases – Environmental Impact Assessment (EIA) of specific investment proposals, environmental assessment (EA) of plans and programmes and access to information (AI) on the environment. The preparation of an environmental assessment is part of the procedure for preparation of all major plans, programmes and strategies in the fields related to activities that are sources of greenhouse gases – energy, agriculture, transport, waste management, etc. The purpose of EA and EIA is to integrate the considerations related to the environment in the process of development as a whole and the introduction of the sustainable development principle.

Relevant bylaws:

- Ordinance on the conditions and procedure for carrying out environmental impact assessment – SG 25/2003, last amended SG 3/2011;
- Ordinance on the conditions and the procedure for carrying out environmental assessment of plans and programmes – SG57/2004, last amended by SG 3/2011.

The EPA and the ordinances issued thereunder transpose and apply the international obligations under the Kyoto Protocol, Directive 2003/87/EC establishing a greenhouse gas emission allowance trading scheme within the Community and Directive 2004/101/EC amending Directive 2003/87/EC in respect of the Kyoto Protocol's project mechanisms. The provisions of Directive 2008/101/EC amending Directive 2003/87/EC to include aviation activities in the greenhouse gas emission allowance trading scheme within the Community have also been introduced.

Directive 2009/29/EC of the European Parliament and the Council of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community should also be transposed in the EPA. The deadline for transposition of this Directive into the national legislation of Member States is 31.12.2012.

4.2 ENERGY ACT (EA)

(SG 107/2003, last amended SG 47/2011)

The Energy Act settles the public relations associated with the activities of production, import and export, transmission, transit, distribution of electricity, heat and natural gas, transmission of oil and oil products by pipelines, trade in electricity, heat and natural gas, and the powers of state bodies to define energy policy, to regulate and to exercise control. It designates the bodies carrying out the energy policy as well as the instruments underlying the energy policy.

The Council of Ministers proposes and the National Assembly adopts the Energy Strategy of Bulgaria on the basis of the EA.

The Energy Act lays down rules and principles for energy pricing - it regulates the prices of the produced electricity. The costs of energy companies arising from public obligations for environmental protection and energy efficiency are compensated by administrative measures determined by the State Energy and Water Regulatory Commission (SEWRC) – a specialized state authority regulating the activities in the field of energy. The obligation to purchase electricity produced from renewable sources is also considered as such a cost.

The activities related to electricity production and connection to the energy transmission network may be effected only after issuance of the relevant license/permit.

The Energy Act regulates the production of electricity from thermal power plants using a combined mode of production. The entire quantity of electricity from highly efficient cogeneration of heat and electricity, registered with a certificate of origin, is subject to purchase at preferential prices.

A bylaw issued on the basis of EA:

- Ordinance on the issue of certificates of origin for electricity produced by cogeneration – SG 41/2007, last amended SG 85/2010.

The EA is the law where the proposals for legislative amendments in the energy sector as well as the proposals for establishment of regulatory mechanisms promoting the renovation and expansion of district heating networks formulated in the NAPCC should be included.

4.3 RENEWABLE ENERGY ACT (REA)

(SG 35/2011)

The Renewable Energy Act regulates the public relations associated with the production and consumption of electricity, thermal energy and cooling energy from renewable sources, gas from renewable sources, biofuels and energy from renewable sources in transport. The main purpose of this Act is to promote and support the production and consumption of energy and fuels from renewable sources. This is to be effected through the introduction of support schemes, by raising the awareness and by encouraging research.

It regulates the adoption of a National Action Plan for Renewable Energy (NAPRE) and national support schemes to promote the use of energy from renewable sources. The main focus is on joint projects and schemes for production of energy from renewable sources with other EU Member States. The municipal councils approve long term and short term programs to promote the use of energy from renewable sources and biofuels.

The Renewable Energy Act takes into account the need for interaction between several different bodies of central executive authorities and local government in order to achieve the objectives of the law. The implementing powers are divided between the Minister of Economy, Energy and Tourism, the Minister of Environment and Water, SEWRC, the Sustainable Energy Development Agency (SEDA), the district governor, the city council and the mayor of the municipality.

REA contains also specific measures to support the production of energy from renewable sources and biofuels.

Bylaws issued on the basis of REA are:

- Ordinance on the calculation of the total share of energy from renewable sources in the gross final energy consumption and the use of biofuels and renewable energy in transport (№ RD-16-869) SG 70/2011;
- Ordinance on the conditions and procedure for issuance, transfer, cancellation and recognition of guarantees of origin of the energy from renewable sources (№RD - 16-1117) SG 84/2011.

4.4 ENERGY EFFICIENCY ACT (EEA)

(SG 98/2008, last amended SG 35/2011)

EEA regulates the public relations relevant to the state policy for improving energy efficiency of final energy consumption and the provision of energy services.

The National Assembly adopts a **National Energy Efficiency Strategy of the Republic of Bulgaria** that determines the national indicative target of energy savings, as well as the stages, the tools and the measures for its achievement. The National Strategy is updated every five years. The Council of Ministers adopts national action plans on energy efficiency and annual reports on the implementation of these plans. The Minister of Economy, Energy and Tourism prepares draft programmes on improvement of energy efficiency in final energy consumption and on the provision of energy services and submits them for approval by the Council of Ministers. The Executive Director of SEDA is responsible for the activities related to the implementation of the state policy for improvement of energy efficiency in final energy consumption and the provision of energy services. The local governments adopt energy efficiency programmes.

EEA contains detailed requirements to the content of the national action plans on energy efficiency. It establishes the legislative basis to link the different actions and steps for achievement of energy efficiency in the final energy consumption – setting individual and intermediate indicative energy saving targets, formulating specific actions to achieve energy efficiency, defining time frames for implementation, financing, division of obligations. The plans are reported on annual basis.

The national indicative targets determined in the action plans on energy efficiency are allocated as individual targets for energy savings to energy traders, owners of buildings with a total floor area over 1000 m² and owners of industrial systems with annual energy consumption over 3000 MWh.

The operated buildings with a total floor area over 1000 m² are subject to mandatory certification.

Air conditioning installations in buildings and hot water boilers with specific power according to the used fuel type are subject to energy efficiency checks. SEDA maintains a database of the inspected systems.

The industrial systems with annual energy consumption over 3000 MWh are subject to mandatory energy efficiency audits, conducted at least once every three years.

EEA provides for the implementation of energy efficiency management which is responsibility of the owners of the audited industrial systems and the installations inspected for energy efficiency. The management activities are specifically defined in the

act. The administrative authority may impose fines or property sanctions in case of violations of the activities related to the energy efficiency management.

SEDA establishes and maintains a national information system on the state of energy efficiency in Bulgaria.

EEA defines the term “energy services” and the scope of entities that may provide energy services. The energy services include implementation of one or more activities and measures to improve energy efficiency.

The financial mechanisms for improving energy efficiency are: voluntary agreements, performance contracting and financing from the Energy Efficiency and Renewable Sources Fund. The Fund supports the implementation of actions and measures for increasing energy efficiency and promoting the production and consumption of energy from renewable sources, except for those activities that are funded by the state budget. The Fund operates under the Energy Efficiency Act and the donor agreements and it is not part of the consolidated state budget.

Bylaws related to energy efficiency:

- Ordinance on labeling requirements and the provision of standard information on products related to energy consumption with respect to energy and other resources consumption - SG 41/2011, last amended SG 93/2011;
- Ordinance № RD-16-267 of 2008 on estimation of the amount of electricity produced by cogeneration of thermal and electric energy – SG 37/2008, last amended SG 77/2010;
- Ordinance № 7 of 2004 on energy efficiency, heat and energy savings in buildings – SG 5/2005, last amended SG 2/2010;
- Ordinance on methodologies for setting national targets, the procedure for allocation of these targets as individual energy saving targets between the persons under art. 10, para. 1 of the Energy Efficiency Act, eligible energy efficiency measures, assessment methodologies and methods of verification of energy savings and for approval of the tariff for fees collected by the Energy Efficiency Agency for issuing energy savings certificates under art. 51 para. 1 of the Energy Efficiency Act – SG 27/2009, last amended SG 88/2011;
- Tariff of the fees collected by the Sustainable Energy Development Agency under the Energy Efficiency Act and the Renewable Energy Act - SG 14/2012;
- Ordinance on the conditions and the procedures for determining the amount and the payment of funds under performance contracts leading to energy savings in public and/or municipal buildings (№ RD-16-347) - SG 28/2009;
- Ordinance on energy consumption indicators, energy performance of industrial systems, on the conditions and the procedures for performing energy efficiency audits of industrial systems (№ RD-16-346) - SG 28/2009;
- Ordinance on the circumstances subject to entry in the register of persons carrying out certification of buildings and energy efficiency audits, on the procedure for receiving information from the register, the terms and conditions for acquiring qualification and the required technical facilities for performing audits and certification (№ RD-16-348) – SG 28/2009

- Ordinance on the conditions and the procedure for auditing the energy efficiency of hot water boilers and air conditioning systems pursuant to art. 27, para. 1 and art. 28, para. 1 of the Energy Efficiency Act and on the creation, maintenance and use of a database for these systems (№ RD-16-932) – SG 89/2009;
- Ordinance on the conditions and the procedure for energy efficiency auditing and certification of buildings, on issuing energy performance certificates and the categories of certificates (№ RD-16-1057) – SG 103/2009;
- Ordinance on indicators for energy consumption and energy performance of buildings (№ RD-16-1058) – SG 103/2009;
- Statutes of the Sustainable Energy Development Agency - SG 88/2011.

The requirements of Directive 2002/91/EC of the European Parliament and the Council of 16 December 2002 on the energy performance of buildings and of Directive 2006/32/EC of the European Parliament and the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC have been transposed in the EEA.

The provisions of Directive 2010/31/EC of the European Parliament and the Council on the energy performance of buildings that must be transposed into the national legislation of the Member States no later than 9 July 2012 will also be introduced through the EEA.

4.5 CLEAN AMBIENT AIR ACT (CAAA)

(SG 45/1996, last amended SG 42/2011)

Clean Ambient Air Act regulates the limitation of emissions into the air from stationary sources and the quality requirements for liquid fuels – activities directly related to greenhouse gas emissions.

The marketing of liquid fuels that do not meet the quality requirements has been forbidden.

The Minister of Environment and Water jointly with the relevant ministers issues regulations that set emission limit values of harmful substances (pollutants) emitted into the atmosphere by facilities and activities with stationary emission sources. These standards are mandatory for all sites in Bulgaria. Exceptions are allowed for sites related to the national fuel and energy balance.

In addition, programmes to gradually reduce the total annual emissions of certain pollutants: sulphur dioxide, nitrogen oxides and other pollutants released into the air by certain operating facilities and activities such as large combustion plants and others, are also adopted.

Another approach in the Clean Ambient Air Act used to reduce air pollution is setting norms for harmful substances in exhaust gases from internal combustion engines. These norms are approved by the Minister of Transport, Information Technologies and Communications, jointly with the Minister of Environment and Water and the Minister of Health.

The Council of Ministers determines the measures for implementation of Regulation (EC) № 842/2006 of the European Parliament and the Council of 17 May

2006 on certain fluorinated greenhouse gases. The Minister of Environment and Water, the directors of the regional inspectorates for environment and water or their authorized officials monitor the application of the measures specified for stationary refrigerating and air conditioning systems, thermal pumps, high voltage switchgear, air conditioning systems in motor vehicles and other equipment containing fluorinated greenhouse gases.

The Clean Ambient Air Act defines the powers of the supervisory authorities to enforce the set standards, as well as the obligations of other government bodies such as the Customs Agency and the Directorate General of Fire Safety and Population Protection under the Ministry of Interior, to provide information to the Ministry of Environment and Water.

Bylaws issued on the basis of the CAAA:

- Regulation on the requirements to the quality of liquid fuels, the procedure and method for their control - SG 66/2003, last amended SG 36/2011;
- Ordinance № 10 of 2003 on emission limit values (concentrations in waste gases) of sulphur dioxide, nitrogen oxides and dust emitted in the air from large combustion plants – SG 93/2003, last amended SG 19/2011;
- Ordinance № 6 of 1999 on the procedure and method for measuring emissions of harmful substances emitted into the ambient air by stationary sources – SG 31/1999, last amended SG 34/2011;
- Ordinance establishing measures for implementing Regulation (EC) № 842/2006 on certain fluorinated greenhouse gases - SG 3/2009, last amended SG 7/2011.

4.6 FORESTRY ACT (FA)

(SG 19/2011, last amended SG 43/2011)

Forestry activities are subject to planning. Forest planning is carried out at three levels and includes a National Strategy for Forest Development and a Strategic Plan for Forest Development, regional development plans for woodlands and forestry plans and programmes.

The forestry management plans and programmes determine the admissible level of use of forest resources and the guidelines to achieve the goals of forest management for a period of 10 years.

FA prohibits the reduction of the total percentage of forest land in the country. The change of land use in forest areas is possible only in certain specified cases.

Some of the activities planned in the NAPCC for the Land Use, Land Use Change and Forestry sector should be implemented through the planning mechanisms of the FA. An example of such activity is the support for increasing the share of certified forests which aims to increase the carbon capture potential of forests.

4.7 LOCAL GOVERNMENT AND LOCAL ADMINISTRATION ACT (LGLAA)

(SG 77/1991, last amended SG 57/2011)

Local governments take decisions on the establishment and approval of spatial development plans and their amendments for the territory of the municipalities under the

Spatial Planning Act as well as strategies, forecasts, plans and programs for development of the municipalities that take into account also the European local community development policies.

Local governments set requirements to the activity of natural and legal persons on the territory of the municipalities arising from the environmental, social and other characteristics of the settlements.

The activities to combat climate change have a local dimension in almost all sectors – either because they are related to plans and programs adopted at municipal level, or because they are implemented through local projects. Therefore a reasonable and transparent regulation of these activities and projects at local level can benefit greatly those municipalities that take advantage of the powers delegated to them.

4.8 SPATIAL PLANNING ACT (SPA)

(SG 1/2001, last amended SG 80/2011)

SPA regulates the procedures for preparation, approval and amendment of general and detailed spatial development plans of settlements. The bylaws issued on the basis of the SPA lay down the standards of urban planning and development of land.

The standards for planning and construction regulated at governmental level, as well as the specific management decisions taken at local level are directly related to the activities for sector Land Use, Land Use Change and Forestry proposed in the NAPCC.

4.9 AGRICULTURAL LAND PROTECTION ACT (ALPA)

(SG 35/1996, last amended SG 39/2011)

ALPA allows land use change of agricultural land only in certain specific cases.

Burning of stubbles and other plant residues in agricultural lands is prohibited. The users of agricultural land are held responsible for the burning of stubble and other plant waste on the agricultural land and must participate in their extinguishing.

The owners and the users of agricultural land are entitled to tax and credit preferences when implementing the mandatory limitation on agricultural land use as well as when implementing projects to restore and improve the fertility of agricultural land.

ALPA contains a legal framework covering some of the activities envisaged for the Agriculture sector in the NAPCC, such as counteracting the burning of stubble and plant waste and promoting agricultural practices aimed at reducing greenhouse gas emissions.

4.10 AGRICULTURAL PRODUCERS SUPPORT ACT (APSA)

(SG 58/1998, last amended SG 8/2011)

APSA regulates state support to farmers with regard to the implementation of the measures included in the National Plan for Agricultural and Rural Development. Support is provided to farmers that operate and are registered in disadvantaged areas or in areas covered by Natura 2000 network.

APSA envisages development and approval of a National Strategic Plan for Rural Development and a Rural Development Programme.

A bylaw issued on the basis of APSA is:

- Ordinance on the terms and conditions for providing support to producers of energy crops – SG 37/2007, last amended SG 4/2008.

APSA regulates some of the activities through which the measures envisaged for the Agriculture sector of the NAPCC can be implemented, as well as the activities related to biofuel production. APSA is the law regulating the key financial mechanism for management of agricultural activities. Most of the proposals – whether introduction of best practices for rice production or for encouragement of crop rotation, especially with nitrogen-fixing crops, for restoration of degraded agricultural lands, or the introduction of water saving irrigation technologies – can be applied using the financial mechanisms regulated by APSA.

4.11 WASTE MANAGEMENT ACT (WMA)

(SG 86/2003, last amended SG 99/2011)

WMA lays down the requirements for the establishment of regional waste management systems. They are set up by municipalities, on a regional basis, and consists of a regional landfill and/or other waste treatment facilities.

Bylaws issued under the WMA:

- *Ordinance № 6 of 28 July 2004 on the conditions and requirements for construction and operation of waste incineration and co-incineration plants – SG 78/2004, last amended SG 98/2004;*
- *Ordinance № 8 of 24 August 2004 on the conditions and requirements for construction and operation of landfills and other facilities and installations for waste recovery and disposal – SG 83/2004, last amended SG 27/2011;*
- *Ordinance on packaging and packaging waste – SG 19/2004, last amended SG 29/2011;*
- *Ordinance establishing the terms and conditions for payment of product fees for products after the use of which wide spread waste is generated – SG 53/2008, last amended SG 29/2011;*
- *Ordinance on the way of utilization of sludge deriving from wastewater treatment through its use in agriculture – SG 112/2004, last amended SG 29/2011.*

The Council of Ministers adopts a **National Waste Management Programme (NWMP)**. Waste Management Programmes (WMPs) are developed and implemented by the mayors on the territory of the respective municipality.

The measures envisaged for the Waste sector in the NAPCC are directly related to the requirements of the WMA, NWMP and WMAP.

4.12 STATISTICS ACT (SA)

(SG 57/1999, last amended SG 97/2010)

The National Statistical Institute collects and processes information that is used for decision making related to climate change.

4.13 GEOLOGICAL STORAGE OF CARBON DIOXIDE ACT (GSCDA)

(SG 14/2012)

This act regulates public relations relevant to the storage of carbon dioxide in suitable underground geological formations.

It formulates the assessment criteria and the conditions to be met by the geological formations for storage of carbon dioxide. The right to explore the earth for geological formations that are suitable to store carbon dioxide is provided through an **exploration permit. A permit is required also for underground storage of carbon dioxide.** The permits are issued by the Minister of Economy, Energy and Tourism. The permitting procedure is defined in the GSCDA.

The Council of Ministers determines the state policy on storage of carbon dioxide in geological formations by approving a programme for exploration of sites for storage of carbon dioxide.

GSCDA lays down obligations related to the periods of operation, closure and post-closure of carbon dioxide storage sites.

This law transposes Directive 2009/31/EC of the European Parliament and the Council of 23 April 2009 on the storage of carbon dioxide in geological formations into the Bulgarian legislation.

4.14 DRAFT CLIMATE ACT (DCA)

This act is to govern the public relations relevant to the implementation of the European greenhouse gas emission trading scheme. It will regulate the activities related to the allocation of greenhouse gas emission allowances and the issue and modification of greenhouse gas emission permits. The law will also regulate: the relations involving plans for monitoring and reporting of greenhouse gas emissions; the operation of the national registry of greenhouse gas emission allowances and the activity of the national registry administrator; the issuance, surrendering and cancellation of allowances; the terms and conditions for closure of stationary installations; and the emission allowances trading.

Subject to regulation by DCA will be the implementation of joint implementation projects and voluntary schemes, the reduction of greenhouse gas emissions from the liquid fuels supplied to the transport sector, as well as the implementation of the obligations under Decision 406/2009/EC on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020.

DCA will consolidate the numerous provisions relating to its subject that are currently found in various regulatory acts. It will settle the connections between national legislation and EU standards in the field of the regulated matter. It will also provide for the mechanisms to fulfill the obligations of Bulgaria under the Kyoto Protocol.

4.15 PROGRAMME FOR PROMOTION OF BIOFUELS USE IN THE TRANSPORT SECTOR 2008-2020

The program makes an overview of the relevant European and national legal regulations. The national indicative targets on biofuel consumption are set. The instruments for meeting the fixed indicative targets are also indicated. The possibilities of growing energy crops and producing biofuels in Bulgaria are considered.

4.16 ENERGY STRATEGY OF THE REPUBLIC OF BULGARIA UNTIL 2020

The strategy covers four main areas: tackling adverse climate changes; reducing the energy intensity of economy and increasing energy efficiency; reducing the external dependency of the European Union on imported energy resources; promoting economic growth and employment; and provision of secure and affordable energy to users. The availability of a well-developed internal energy market is indicated as both an objective and a means of achieving the goals.

A number of steps are planned in the Medium-term Programme till 2013 of the Energy Strategy including adoption of strategies, plans and programmes in various sectors of energy management: Programme for Stabilization and Development of the District Heating Sector, Updated Strategy for Management of Spent Nuclear Fuel and Radioactive Waste; National Action Plan for Renewable Energy till 2020, National Energy Efficiency Strategy of the Republic of Bulgaria till 2020 – with an emphasis on promoting energy efficiency measures in housing, public buildings, transport and industry. Similar documents are the second National Action Plan for Energy Efficiency, Programme for Accelerated Gasification of the Republic of Bulgaria and Programme for Accelerated Development of the Electricity Market. There are also plans to set up a power exchange and to develop Programme for Effective Use of Local Energy Resources.

4.17 NATIONAL ENERGY EFFICIENCY PROGRAMME TILL 2015

The program was adopted under the repealed EEA (2004) and will be implemented until the adoption of a National Energy Efficiency Strategy of the Republic of Bulgaria till 2020 and a National Action Plan on Energy Efficiency, as provided in the Energy Strategy from 2011.

4.18 NATIONAL ACTION PLAN ON RENEWABLE ENERGY SOURCES

The plan is based on the projected final (end-use) consumption of energy in the period 2010-2020. A common national and sectoral targets are set. The measures to achieve the targets are foreseen in the light of the requirements of Articles 13, 14, 16 and 17 - 21 of Directive 2009/28/EC. Various aid schemes to support the production and use of renewable energy sources in the electricity sector, in the production of energy for heating and cooling, in the transport sector and in the use of biomass are considered and taken into account. The expected contribution of each technology for production of energy from renewable sources was assessed in the view of meeting the binding targets set for 2020.

5 ASSESSMENT OF THE STATE AND TRENDS OF GHG EMISSIONS. SCENARIOS AND PROJECTIONS OF EMISSIONS.

5.1 ASSESSMENT OF THE STATE AND GHG EMISSIONS TREND IN BULGARIA BY 2009.

The following two figures show the emissions of greenhouse gases (GHG) in Bulgaria in the period 1988-2009 by gases and by sectors of the national GHG inventory, excluding the sector “Land Use, Land Use Changes and Forestry” (LULUCF):

Figure 1

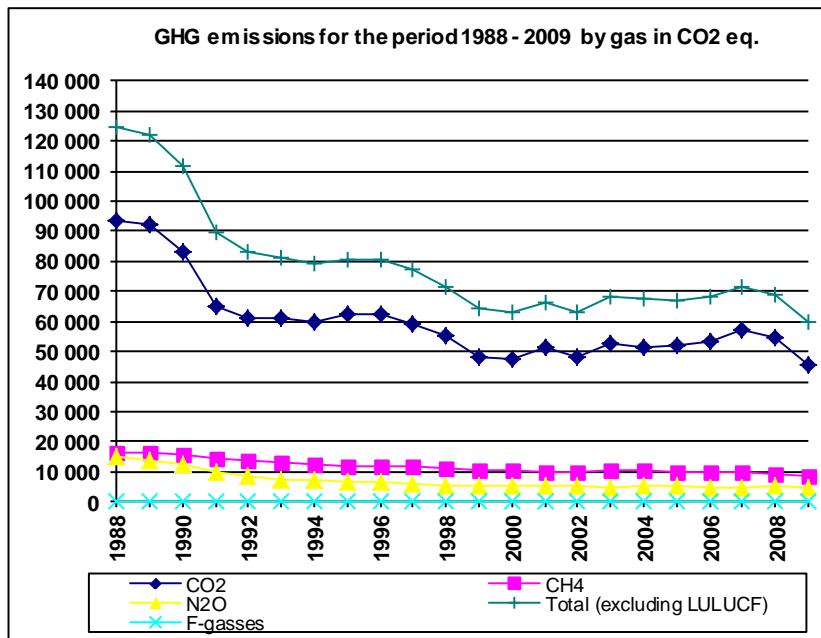
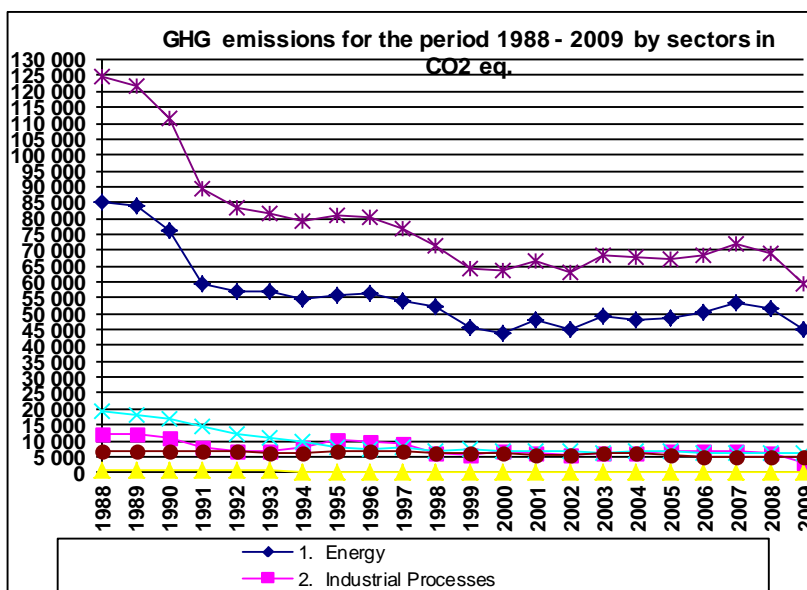


Figure 2



The main reasons for the observed reduction of GHG emissions in Bulgaria in the period until 2000 were the structural changes in the economy due to the radical economic transition process from centrally planned to market economy. This led to lower production of energy from thermal power stations (and increased share of hydro- and nuclear energy), structural changes in the industry (including reduction of energy-intensive production and improvement of energy efficiency), better insulation of buildings and transition from solid and liquid fuels to natural gas.

The considerable increase (10%) of emissions in 2007 is due to the premature decommissioning of nuclear power generation facilities (Units 3 and 4) at Kozloduy nuclear power plant which led to increase of emissions from electricity production by almost 5 Tg despite the generation of less electricity. A similar increase was observed in 2003 after the premature decommissioning of nuclear power generation facilities (Units 1 and 2) at Kozloduy nuclear power plant.

The main reasons for the reduction of GHG emissions from the agricultural and waste sectors are respectively the reduction in cattle and sheep stocks and the reduction of landfilled municipal waste.

5.1.1 Energy Sector

The biggest source of greenhouse gases in the country are the power companies for production of electric and thermal energy.

The reason for the decrease in GHG emission intensity is the reduced consumption of coal by households. This lower consumption is the result of policies and measures implemented by the Ministry of Economy and Energy that partially compensated the significant increase in emissions caused by the early decommissioning of nuclear facilities.

An essential part of the emission reduction was due to improved operation of Units 5 and 6 at Kozloduy NPP and improved operation of district heating companies through the following measures:

- conducted rehabilitation, reduction of losses from transmission of thermal energy and replacement of the subscriber stations;
- introduction of the thermal energy accounting system that allows for regulation and reporting of the actually consumed thermal energy.

The Energy Strategy of Bulgaria outlines the framework of the national energy policy and the planned major reforms in this sector. The Bulgarian energy sector will continue to be based on two main foundations: nuclear energy and local lignite coal that will be given priority in the development of a competitive energy market in the future. All other priorities are directly related to the following:

- security of supplies;
- competition between energy market operators;
- environmental protection.

In the course of its development the energy sector in Bulgaria has implemented various measures that lead to stabilization and reduction of GHG emissions. Following the earlier decommissioning of Units 3 and 4 of NPP Kozloduy, the emissions from the energy sector have been growing. This is due to the development plans introduced by the energy plants using local and imported coal with high GHG emission potential. The production of local coal only has already reached 32 mln. tonnes in 2011.

5.1.2 Industry Sector

The governmental policy of rapid privatization led to almost complete privatization of industrial installations. As a result, the most inefficient enterprises were closed. The new owners introduce various measures to save energy which are mainly of organizational nature and “*no cost*” or “*low cost*” measures.

5.1.3 Household and Services Sector

This sector has achieved the most significant reductions in GHG emissions compared to the base inventory year. The reduction is achieved through liberalization of the energy market and, above all - by removing subsidies. The emission decrease is due to reduced consumption of liquid fuels and coal and increased consumption of natural gas, as well as to tripling the use of renewable energy (wood and other biomass).

Significant progress in energy savings is achieved with the national programs for improvement of thermal insulation of existing buildings, replacement of incandescent bulbs with energy saving lamps and introduction of automatic control of street lighting. One of the priorities of the Government is to ensure conditions for widespread introduction of energy saving technologies in practice.

The analysis of the possibilities to use renewable sources in households and services shows viable potential to reduce GHG emissions by implementation of measures in the following fields (reported by the Energy Efficiency Agency and the municipalities):

- solar panels for public buildings;
- introduction of hybrid systems for hot water in kindergartens, schools and hospitals.

5.1.4 Transport Sector

The privatization of the road transport, the significant reduction of subsidies for the railway transport and the closure of railway routes lead to a shift in the transport structure – from rail to road – which is a reason for the registered relative growth in GHG emissions.

The GHG emissions from the sector have decreased compared to the base year. The reduction follows the dramatic decline in transport activity (measured in ton-kilometers). The significant difference between emissions reduction and the reduction of cargo flow reflects the changed structure of transportation - from rail to road - which leads to an increase of the specific emissions.

The governmental investment policy in the transport sector is based on the development of the country’s transport infrastructure as an integral part of the common European transport network.

The transport infrastructure was rehabilitated and reconstructed in the period 2007-2009 in accordance with international requirements and standards. The most important objectives of the Government are the transport market liberalization, the completion of legislative and institutional restructuring in the transport sector, as well as the introduction of favorable conditions for development of private transport companies and retrofitting.

It should be noted that the share of railway transport in Bulgaria is not relatively high. The clear tendency for further increase of the share of road transport will lead to a significant increase in passenger and goods flows as well as in GHG emissions.

5.1.5 Agricultural Sector

This sector has not implemented significant measures to reduce emissions. The reduction is a direct consequence of the overall decline of farming since 1988. The reduction of emissions from stock-breeding follows the decrease in the number of livestock.

An important element of the governmental policy is the utilization of EU funds targeted to support rural organizations in order to increase their role in achieving market protection in the purchase of agricultural products. The technological restructuring and the new investment policy of the Ministry of Agriculture and Food and the Forestry Agency will ensure the food supply and a positive trade balance. This will increase the competitiveness of the Bulgarian agricultural produce. Special attention will be focused on the preservation of soil fertility through the introduction of anti-corrosion activities, new methods of soil cultivation and discontinuation of the practice of burning crop residues in the fields.

5.1.6 Waste Sector

The governmental programmes have set targets and have already achieved tangible reduction of waste generation.

The measures for reduction of GHG emissions that are planned in this sector are related, most of all, to the management of solid municipal waste.

The analysis of the GHG inventories over the past few years indicates that the landfills for solid municipal waste are the largest source of methane (CH₄) among all other sources of CH₄ that are reported in the national inventory. The capture and recovery of landfill gas is not a common practice in Bulgaria and the whole amount of gas from the landfills is emitted into the atmosphere or (in rare cases) it is burnt.

The use of landfills is widespread in the country. The policy in this area foresees building of a system of 54 regional landfills and closing of all landfills that are not compliant with the legal requirements. The construction of these regional landfills will ensure environmentally sound waste disposal in the country.

The projected emissions from the sector in the scenario with measures suggest implementation of programs for reduction of the amount of biodegradable waste for landfilling, as well as capture and flaring of the landfill methane. The best practices can ensure capture and flaring of only about 50% of the generated gas.

Electricity can be generated from landfills where methane is captured and the amount of the generated methane is sufficient. It is seen as a supplementary measure to the scenario with measures.

It is technologically feasible and economically viable to produce thermal and electric energy from the biogas emitted during the stabilization of sludge in methane tanks of the large wastewater treatment plants (for more than 50 000 PE) in order to cover the main share of the installations' energy needs. Currently, this is performed only in 4 WWTP in the country.

5.1.7 Conclusions

By 2009 Bulgaria achieved GHG emissions reduction of 65.014 Mt (about 52.22%) compared to the base year 1988. Key drivers of this decrease are:

- the governmental policies and measures for transition to a market economy, industrial restructuring, privatization and liberalization;
- energy policy towards liberalization of the energy markets and removal of subsidies;
- decrease of the population;
- drop in the GDP.

Increase in emissions was observed due to the premature decommissioning of nuclear facilities at the end of 2002 and 2006 and the economic recovery during the period 2002 - 2008. The rate of growth of emissions, however, is much lower than the rates of economic growth (about 4-5 times) which is the result of the implemented policies and measures.

The closure of the metallurgical plant of Kremikovtzi and the onset of the financial and economic crisis led to a significant decrease in the emissions of the country – mainly due to drastic reduction in the output of metallurgy and industry, in the transportation activities and in the production of building materials.

5.2 SCENARIOS AND PROJECTIONS OF GHG EMISSIONS BY 2030

5.2.1 Total GHG emissions

5.2.1.1 Scenario with measures – WM

The scenario with measures reflects all approved and implemented policies and measures to reduce GHG emissions in the country by the end of 2009.

Table 1. Aggregate GHG emissions of Bulgaria – Gg CO₂ eq. - scenario with measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 - 2005), %	Δ (2020 - 1988), %
Aggregate emissions in CO ₂ eq	124 510	63 351	67 115	59 496	59 030	58 882	61 864	60 943	-7.8	-50.3

5.2.1.2 Scenario with additional measures – WAM

The scenario with additional measures reflects all adopted policies and measures to reduce GHG emissions in the country after 2009 and includes the impact of policies and measures presented in this Plan that have a quantitative assessment at this stage.

Table 2. Aggregate GHG emissions of Bulgaria - Gg CO₂ eq. - scenario with additional measures

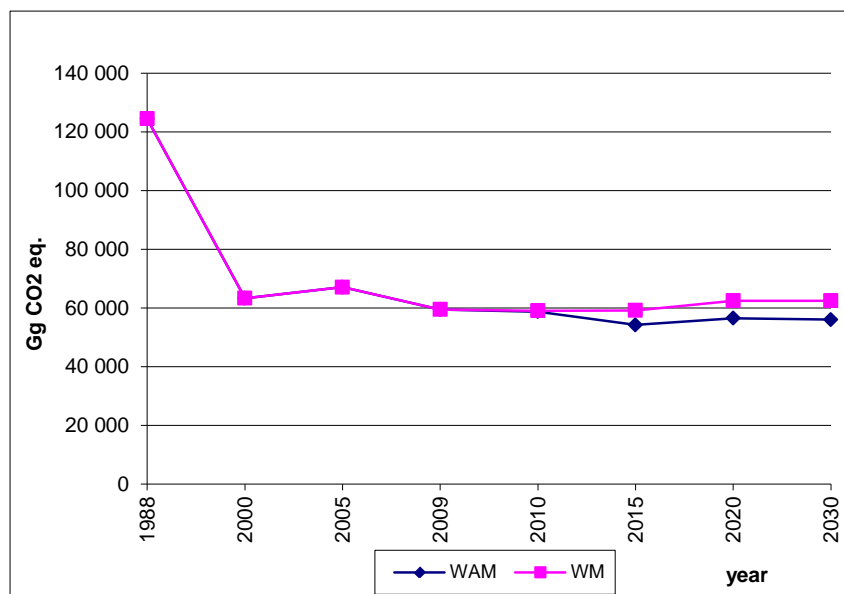
	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 - 2005), %	Δ (2020 - 1988), %
Aggregate emissions in CO ₂ eq	124 510	63 351	67 115	59 496	58 730	54 032	54 578	52 642	-18.7	-56.2

5.2.1.3 Comparison between the two scenarios

Table 3. Comparison between GHG emissions, aggregated for Bulgaria under the two scenarios

	2010	2015	2020	2030
Aggregate emissions in Gg CO ₂ eq Δ WAM - WM	-300	-4 850	-7 287	-8 301
Δ WAM - WM, %	-0,5	-8.2	-11.8	-13.6

Figure 3 GHG emissions, aggregated for Bulgaria, under the two scenarios



5.2.2 Energy industries – Energy Sector

This sector includes emissions from burning fuel for generation of electricity and heat, from production and processing of fuels and from other energy industries in Bulgaria.

The facilities for generation of electricity and thermal energy in this sector represent the foundations of the energy sector in the country. They form an energy mix that includes the large lignite-fired thermal power plants in the Maritsa East basin, NPP Kozloduy, the power plants with co-generation of electricity and thermal energy for public needs and power plants operating on the same principle for the factory needs. The prevalent fuel used in the process of co-generation in Bulgaria is natural gas.

As a whole this sector accounts for 90% of domestically produced energy. Therefore it is representative for the Energy Sector and its essential characteristics.

5.2.2.1 Scenario with measures – WM

Table 4. Energy industries– scenario with measures, Gg CO₂ eq.

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 - 2005), %	Δ (2020 - 1988), %
Aggregate emissions in CO ₂ eq	40 278	24 123	27 134	29 673	29 155	26 581	24 007	11 887	-11,5	-40,4

It is difficult to forecast the energy mix because such forecast would require combination of opposite trends in the development of its elements. This is determined by the differences in technologies and their historical development which depends on:

- the development of fuel prices;
- the safety in operation and the impact of large accidents on the decisions taken by the competent authorities;
- economic indicators and energy efficiency;
- reduction of GHG emissions.

Leading criterion in the present Plan is the reduction of GHG emissions. Therefore, this scenario with measures provides for development of the subsector that ensures a smooth transition from the development until 2009. From a methodological point of view this scenario does not contain the measures outlined in the country's Energy Strategy from 2011. It assumes that the subsector develops by implementing already existing measures, as well as guidelines and policies adopted by the EU. Table 4 above provides the projections of the aggregate GHG emissions under the scenario with measures as well as the changes over two main periods – 2005-2020 and 1988-2020. The analysis shows:

- in both periods GHG emissions decrease, especially so after 2020;
- obviously this scenario combines circumstances related to the overall development of the country where the level of GHG emissions in 2020 is equal to that in 2000.

This fact is assessed by the authors of the Energy Strategy as a negative one and motivated the development of the scenario with additional measures.

5.2.2.2 Scenario with additional measures – WAM

The scenario with additional measures reflects all adopted policies and measures for reduction of GHG emissions in the country after 2009 with respect to this sector and includes the impact of policies and measures presented in this Plan that have a quantitative assessment at this stage.

Table 5. Aggregate GHG emissions from the Energy Industries Sector, Gg CO₂ eq. – scenario with additional measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 – 2005), %	Δ (2020 - 1988), %
Aggregate emissions in CO ₂ eq	40 278	24 123	27 134	29 673	28 855	24 779	20 704	8 584	-23,7	-48,6

The proposed scenario with additional measures served as a basis of the country's Energy Strategy adopted in 2011. It contains measures along several priority axes or directions and the following directions refer to this sector:

- cleaner production of electricity from coal-fired plants and
- reduction of carbon intensity in the energy mix.

Currently, the average emission intensity of electricity generation from coal-fired power plants is 1.2 t CO₂ eq. per MWh. Through measures to **improve the production**

efficiency this factor can be reduced by about 5-7% or in terms of emissions reduction – 1.3 mln. tonnes CO₂ per year from existing coal-fired power plants by 2020.

The European Emissions Trading Scheme and the competition on the electricity generation market provide incentives for transition to **low-carbon technologies and fuels** such as natural gas. Every 100 MW coal-based generating capacity substituted with capacity based on natural gas will lead to a reduction of 450000 t of CO₂ per year.

The Energy Strategy of the Republic of Bulgaria 2020 provides for 9.2 million t CO₂ from the GHG emissions emitted by the Energy Sector to be captured and stored in geological formations by 2030. Besides the legislative framework that is currently being adopted, an important factor for the implementation of this goal is the quality of the related geological surveys, environmental impact assessments and activities to inform and acquaint the public with the technology.

Institutional support and monitoring of projects is envisaged for building new capacities and/or substituting capacities based on local coal with mandatory use of highly efficient and low-emission modern technologies involving capture and storage of CO₂. Proactive measures undertaken by the state and consisting in provision of financial support for preparation of and participation in joint international projects will contribute substantially to low-carbon development of the coal-fired power generating facilities.

A key feature of the second priority axis in the Strategy is the support to the **nuclear energy** not only as a promising resource for the production of low carbon electricity, but also because of the accumulated successful experience and professional capacity for operation of nuclear facilities. The support will be accompanied by strict requirements to the security, safety, nuclear waste management and decommissioning. According to the projected electricity generation balance the share of nuclear energy in the electricity generation mix will rise by 45% by 2020 and will contribute to reducing the carbon intensity in electricity production.

The production of electricity from **renewable energy sources** will contribute significantly to reducing the carbon intensity of the country's electricity generation mix. The national policy in this area is well developed in the adopted National Action Plan for Renewable Energy by 2020 and the Renewable Energy Act. The production of electricity from renewable sources is expected to grow to 7.5 TWh by 2020 and to account for 15% in the electricity generation mix of the country.

The Energy Strategy of the Republic of Bulgaria envisages that the **co-generation** of electric energy will account for 15% in the electric energy mix by 2020. The co-generation of heat and electric energy improves the overall efficiency of fuel use and saves primary energy. The increased share of electricity produced by co-generation and the saved primary energy will be reflected as a reduction in the carbon intensity of the electricity generation mix.

The analysis of Table 5 shows changes of GHG emissions similarly to those in the scenario WM but one step further towards reduction.

5.2.2.3 Comparison between the two scenarios

Table 6. Comparison between GHG emissions under the two scenarios, Energy Industries Sector

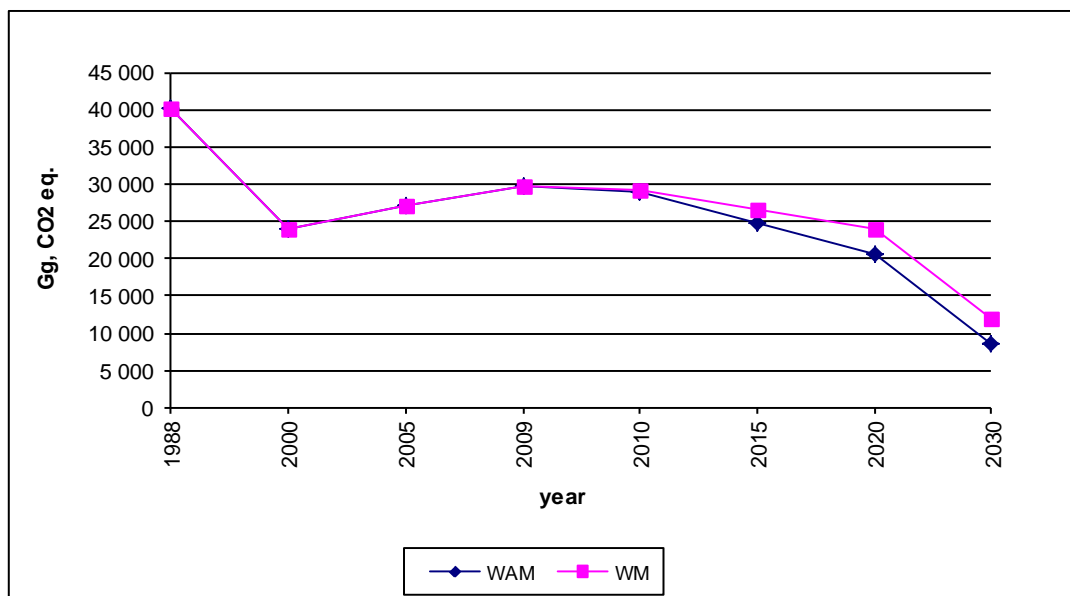
	2010	2015	2020	2030
Aggregate emissions in Gg CO ₂ eq Δ WAM - WM	-300	-1 802	-3 303	-3 303
Δ WAM - WM, %	-1,0	-6,8	-13,8	-27,8

Table 6 shows the comparison between the two scenarios. A typical feature here is:

- almost twice as much difference between the emissions under the scenarios in the period by 2015 and in the period by 2020;
- equal changes in the emissions under the scenarios for the period 2020-2030 – i.e. they decrease at the same rate;
- the implementation of the measures under the scenario WAM also has a multiplier effect that leads to permanent reduction of emissions over the entire projected period 2015-2030, from 6.8% in 2015 to 27.8% at the end of the period. In relative terms, this makes about 4 times.

Figure 4 shows a comparison between projections of the aggregate emissions from the sector, expressed in CO₂ eq. The nature of the curve remains unchanged compared to the curves of different GHGs. The relative peak in 2009 that marks the end of a period of rising economic development, followed by a collapse as a result of the global economic crisis, is also preserved. In fact, due to a number of country-specific manifestations of the crisis this subsector is characterized by delay and shift of the negative results in time. This is observed mainly after 2008-2009 when the industry was hardest hit.

Figure 4. GHG emissions, Energy Industries Sector under the two scenarios



5.2.3 Industry Sector

This sector includes emissions from burning fuel for generation of electricity and thermal energy for the industry and the construction sector in Bulgaria. The variety of combustion and transformation processes of primary fuels is too large and is determined

by different technologies in mining, metallurgy, mechanical and electrical engineering, light industry, printing, chemical industry, construction, etc.

Historically, the development of this subsector underwent two dramatic changes - in 2000 and in 2009 - characterized by different driving forces, preconditions and results.

5.2.3.1 Scenario with measures – WM

Table 7. Aggregate GHG emissions from the Industry Sector (fuel emissions), Gg CO₂ eq. – scenario with measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 – 2005), %	Δ(2020 – 1988), %
Aggregate emissions in CO ₂ eq	20 380	10 058	9 512	3 625	3 637	4 294	5 312	7 353	-44,2	-73,9

The findings of the experts indicate that the decrease of activity in the sector in the period by 2000 is mainly due to domestic reasons – collapse of management, restitution of property, changes in the domestic and foreign markets and restructuring involving shifts in priorities. This period is followed by some revival in 2008 characterized by sustained annual growth of 5-6%. A new downturn occurred in 2009 caused by external factors - the global financial crisis. It reached Bulgaria as an economic crisis, affecting mainly the industry.

This is reflected in the scenario with measures that is developed on the precondition that this sector would not be fully recovered during the entire period of the forecast. This means projections of lower production volumes leading to lower GHG emissions that remain under the level of 2005. The reduction in 2020 compared to 2005 is 44,2 % for the aggregate emissions of the sector (**Error! Reference source not found.** 7).

5.2.3.2 Scenario with additional measures – WAM

The scenario with additional measures reflects all adopted policies and measures to reduce GHG emissions in the country after 2009 and includes the impact of policies and the measures presented in this Plan that have a quantitative assessment at this stage.

Table 8. Aggregate GHG emissions from the Industry Sector (fuel emissions), Gg CO₂ eq. – scenario with additional measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 – 2005), %	Δ(2020 – 1988), %
Aggregate emissions in CO ₂ eq	20 380	10 058	9 512	3 625	3 637	3 655	4 870	6 742	-48,8	-76,1

Measures from the following priority axes of the Energy Strategy which are directly related to the optimization of the fuel base and the reduction of GHG emissions were applied to the development of the scenario with additional measures – WAM:

- audit of industrial systems and implementation of the recommended measures;
- change of the fuel base;
- introduction of renewable energy sources in the industrial installations;
- introduction of co-generation modules in the enterprises.

Table shows GHG projections under the scenario WAM. The nature of emission changes compared to the scenario with measures remains unchanged and the implementation of the above measures leads to additional decrease of the total emissions in CO₂ eq. between 8-15% for the period 2010-2020.

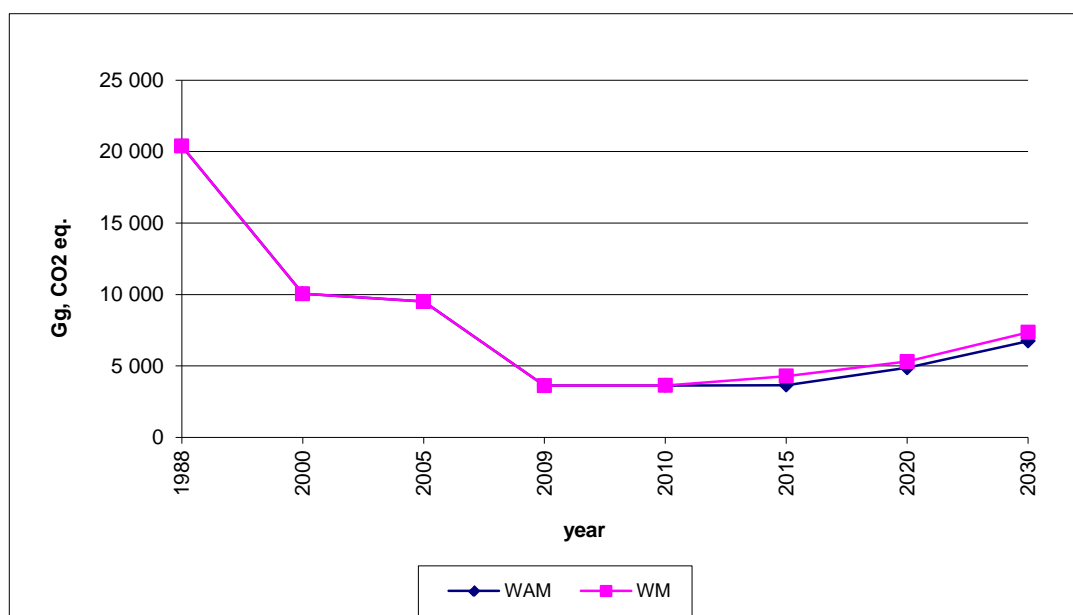
5.2.3.3 Comparison between the two scenarios

Table 9. Comparison between GHG emissions under the two scenarios, Industry Sector (fuel emissions)

	2010	2015	2020	2030
Aggregate emissions in Gg CO ₂ eq Δ WAM - WM	0	-639	-442	-612
Δ WAM - WM, %	0,0	-14,9	-8,3	-8,3

Table shows the comparative evaluations between the two scenarios. There is a clear trend of emission reduction in the scenario WAM compared to the scenario with measures.

Figure 5. GHG emissions, Industry Sector (fuel emissions), under the two scenarios



5.2.4 Transport Sector

The Transport Sector includes emissions from road, rail, sea and air transport. In accordance with the IPCC Guidelines the emissions from the sea and air transport are not included in the aggregate emissions.

The development of this sector has always been a priority due to its special position as part of the country's infrastructure.

The present Action plan provides for measures oriented towards the following main areas:

- reduction of transport emissions;
- reduction of consumption (decrease in transportations);
- diversification of transport;
- information and training of consumers.

5.2.4.1 Scenario with measures - WM

Table 10. Aggregate GHG emissions from the Transport Sector, Gg CO₂ eq. – scenario with measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 - 2005), %	Δ (2020 - 1988), %
Aggregate emissions in CO ₂ eq	7 252	5 602	7 681	8 222	8 477	9 956	12 743	19 757	65,9	75,7

5.2.4.2 Scenario with additional measures – WAM

The scenario with additional measures reflects all adopted policies and measures to reduce GHG emissions in the country after 2009 with respect to this sector and includes the impact of policies and measures presented in this Plan that have a quantitative assessment at this stage.

Table 11. Aggregate GHG emissions from Transport Subsector, Gg CO₂ eq. – scenario with additional measures

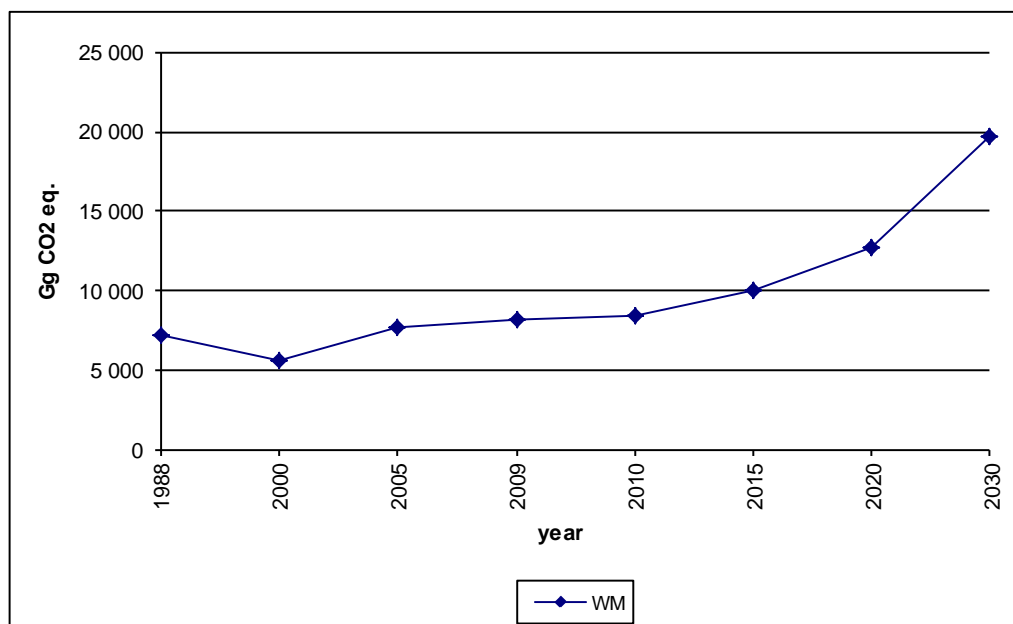
	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 - 2005), %	Δ (2020 - 1988), %
Aggregate emissions in CO ₂ eq	7 252	5 602	7 681	8 222	8 477	9 390	11 307	17 530	47,2	55,9

5.2.4.3 Comparison between the two scenarios

Table 12. Comparison between GHG emissions under the two scenarios, Transport Sector

	2010	2015	2020	2030
Aggregate emissions in CO ₂ eq Δ WAM - WM	0	-566	-1 436	-2 227
Δ WAM - WM, %	0,0	-5,7	-11,3	-11,3

Figure 6. CO₂ emissions, Transport Sector under the two scenarios



5.2.5 Households and Services Sector

5.2.5.1 Scenario with measures - WM

Table 13. Aggregate GHG emissions from the Households and Services Sector, Gg CO₂ eq. – scenario with measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 – 2005), %	Δ (2020 – 1988), %
Aggregate emissions in CO ₂ eq.	6 528	2 396	2 380	1 841	1 864	2 027	2 374	3 002	-0,3	-63,6

5.2.5.2 Scenario with additional measures – WAM

The scenario with additional measures reflects all adopted policies and measures to reduce GHG emissions in the country after 2009 in this sector and includes the impact of policies and measures presented in this Plan that have a quantitative assessment at this stage.

Table 14. Aggregate GHG emissions from the Households and Services Sector, Gg CO₂ eq. – scenario with additional measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 – 2005), %	Δ (2020 – 1988), %
Aggregate emissions in CO ₂ eq.	6 528	2 396	2 380	1 841	1 864	1 644	1 851	2 341	-22,2	-71,6

5.2.5.3 Comparison between the two scenarios

Table 15. Comparison between GHG emissions under the two scenarios for the Households and Services Sector

	2010	2015	2020	2030
Aggregate emissions in Gg CO ₂ eq. Δ WAM - WM	0	-383	-523	-661
Δ WAM - WM, %	0,0	-18,9	-22,0	-22,0

Figure 7. GHG emissions, Households and Services Sector under the two scenarios



5.2.6 Waste Sector

This sector includes emissions from landfills for municipal solid waste, treatment of municipal and industrial water and incineration of various types of waste.

5.2.6.1 Scenario with measures – WM

Table 16. Aggregate GHG emissions from the Waste Sector, Gg CO₂ eq. – scenario with measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 – 2005), %	Δ (2020 – 1988), %
Aggregate emissions in CO ₂ eq	6 846	5 969	5 294	4 755	4 791	4 522	4 335	4 082	-18,1	-36,7

5.2.6.2 Scenario with additional measures – WAM

The scenario with additional measures reflects all adopted policies and measures to reduce GHG emissions in the country after 2009 in this sector and includes the impact of policies and measures presented in this Plan that have a quantitative assessment at this stage.

Table 17. Aggregate GHG emissions from the Waste Sector, Gg CO₂ eq. – scenario with additional measures

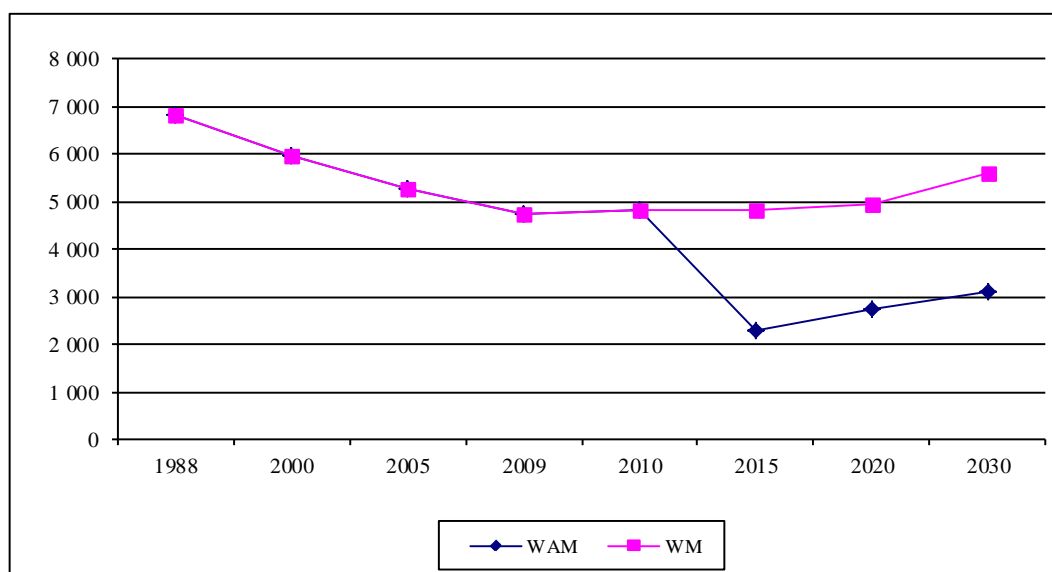
	1988	2000	2005	2009	2010	2015	2020	2030	$\Delta_{(2020-2005)}$, %	$\Delta_{(2020-1988)}$, %
Aggregate emissions in CO ₂ eq	6 846	5 969	5 294	4 755	4 791	3 065	2 755	2 587	-48,0	-59,8

5.2.6.3 Comparison between the two scenarios

Table 18. Comparison between GHG emissions under the two scenarios, Waste Sector

	2010	2015	2020	2030
Aggregate emissions in Gg CO ₂ eq Δ_{WAM-WM}	0	-1 458	-1 580	-1 495
Δ_{WAM-WM} , %	0,0	-32,2	-36,4	-36,6

Figure 8. GHG emissions, Waste Sector under the two scenarios



5.2.7 Agriculture Sector

5.2.7.1 Scenario with measures – WM

Table 19. Aggregate GHG emissions from the Agriculture Sector, Gg CO₂ eq. – scenario with measures

	1988	2000	2005	2009	2010	2015	2020	2030	$\Delta_{(2020-2005)}$, %	$\Delta_{(2020-1988)}$, %
Aggregate emissions in CO ₂ eq	19 012	6 796,45	6 538	6 181	6 126	6 119	6 675	7 250	2,1	-64,9

5.2.7.2 Scenario with additional measures – WAM

The scenario with additional measures reflects all adopted policies and measures to reduce GHG emissions in the country after 2009 in this sector and includes the impact of policies and measures presented in this Plan that have a quantitative assessment at this stage.

Table 20. Aggregate GHG emissions from the Agriculture Sector Gg CO₂ eq. – scenario with additional measures

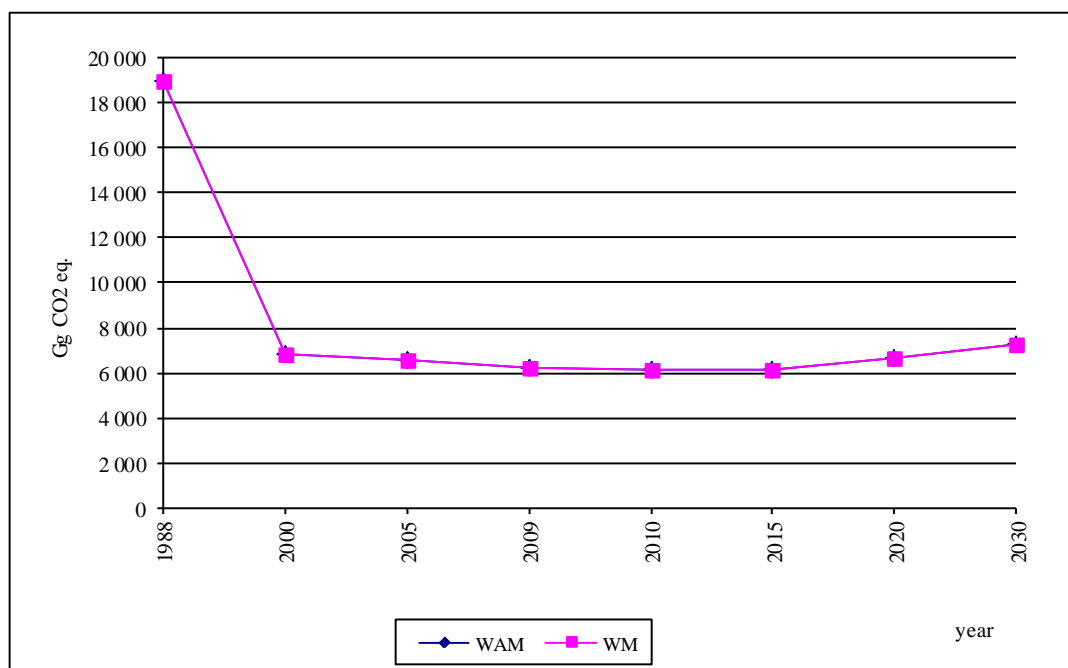
	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 - 2005), %	Δ (2020 - 1988), %
Aggregate emissions in CO ₂ eq	19 012	6 796,45	6 538	6 181	6 126	6 116	6 672	7 246	2,1	-64,9

5.2.7.3 Comparison between the two scenarios

Table 21. Comparison between GHG emissions under the two scenarios, Agriculture Sector

	2010	2015	2020	2030
Aggregate emissions in Gg CO ₂ eq Δ WAM - WM	0,00	-3.16	-3.29	-3.57
Δ WAM - WM, %	0,00	0.05	0.05	0.05

Figure 9. GHG emissions, Agriculture Sector under the two scenarios



5.2.8 Land Use, Land Use Change and Forestry (LULUCF)

5.2.8.1 Scenario with measures - WM

Table 22. Aggregate GHG emissions from the Land Use, Land Use Change and Forestry Sector – scenario with measures

	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 - 2005), %	Δ (2020 - 1988), %
Reduced CO ₂ , Gg	-14141	-10276,31	-11336	-11782	-11784	-11795	-11806	-11828	4,1	-16,5

5.2.8.2 Scenario with additional measures – WM

The scenario with additional measures reflects all adopted policies and measures to reduce GHG emissions in the country after 2009 in this sector and includes the impact of policies and measures presented in this Plan.

Table 23. Aggregate GHG emissions from the Land Use, Land Use Change and Forestry Sector – scenario with additional measures

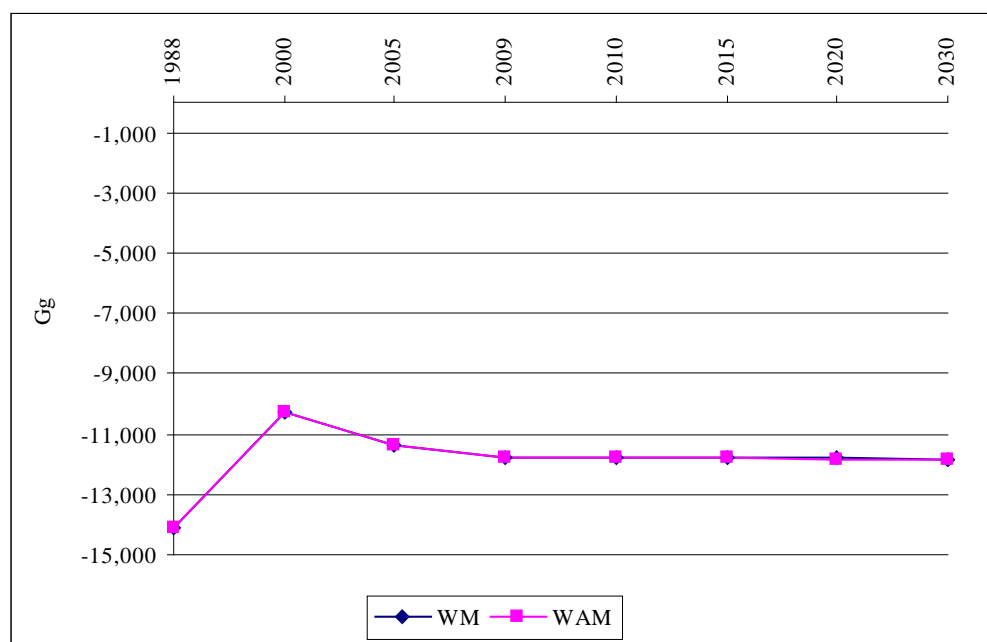
	1988	2000	2005	2009	2010	2015	2020	2030	Δ (2020 – 2005), %	Δ (2020 – 1988), %
Reduced CO ₂ , Gg	-14 141	-10 276,31	-11 336	-11 782	-11 784	-11 805	-11 817	-11 839	4,2	-16,4

5.2.8.3 Comparison between the two scenarios

Table 24. Comparison between GHG emissions under the two scenarios, from the Land Use, Land Use Change and Forestry Sector

	2010	2015	2020	2030
Reduced CO ₂ , Gg Δ WM - WOM	0,00	10,08	11,19	11,21
Δ WAM - WM, %	0,00	0,09	0,09	0,09

Figure 10. Reduction of CO₂ from the Land Use, Land Use Change and Forestry Sector under the two scenarios



6 SECTORAL MEASURES FOR IMPLEMENTATION OF THE NAPCC OBJECTIVES

The policies and measures presented by sectors contribute to the reduction of greenhouse gas emissions in Bulgaria. The overall effect of their implementation will ensure the achievement of the legally binding targets for our country under the Climate and Energy package as well as the energy efficiency goals. The measures are summarized for each sector and the total effect of their implementation is reflected in section 5.2. *Scenarios and projections of GHG emissions by 2020.*

These measures are selected from a larger number of proposed actions after coordination with governmental and non-governmental stakeholders. They are formulated so as to meet the main goal of the current Plan – reduction of greenhouse gas emissions in Bulgaria and implementation of the existing EU legislation on climate change. Various tools were proposed to support their implementation. The measures are grouped in two directions - those with a measurable effect on the reduction of greenhouse gases and those with indirect effect. A performance indicator was set that is directly or indirectly related to the calculation of the expected effect, as well as target values by year.

6.1. Energy sector

6.1.1 General information on the Energy sector

The Energy Sector covers the following activities for the purposes of this Plan:

- production and transmission of electricity, including cogeneration;
- production and transmission of heat for public needs;
- transmission of natural gas (maintenance of the pressure of compressor stations).

About 92-93% of the total aggregated greenhouse gas emissions in the sector are emitted in the production of electric energy due to the burning of fuels, 6-7% come from the production of thermal energy and about 1% is emitted by the transmission of natural gas.

6.1.2 Greenhouse gas emissions – state and trends

The greenhouse gases for which the Energy sector is responsible hold the largest and growing share in the total emissions, which determines their key importance for the implementation of the national emission reduction targets. This is due to the stable production of electricity in recent years, a growing proportion of which is intended for export, on the one hand, and to the larger share of electricity produced from coal after the decommissioning of nuclear power units and the commissioning of new coal power, on the other hand.

Table 1. Trends and structure of GHG emissions

	2000	2005	2009
Total emission, mln.t CO ₂ eq., including:	63,3	67,1	59,5
Energy Sector (production of electric and thermal energy)	24,1	27,1	29,7
Share of the Energy Sector, %	38,1	40,4	50,0

The analysis of GHG emissions by sources in the sector leads to the conclusion that the main reduction potential is concentrated in the generation of electric and thermal energy from coal because this production is responsible for over 90% of the emitted greenhouse gases. On the other hand, about 70% of the total emissions from electricity generation (excluding factory plants) come from the three large power plants burning local lignite coal - TPP “AES Galabovo”, TPP “Maritza East 2” TPP, “Enel Maritsa East - 3”. They are in the spotlight because their potential to reduce emissions by 2020 predetermines to a large extent the emissions trend for the sector as a whole.

6.1.3 Priority axes for development of the sector

The priority axes result from the current energy policy that is conditionally divided into two periods corresponding to the elaborated scenarios, namely:

⇒ *Until 2009 (baseline scenario)*

The key policies and measures with a direct and significant impact on the behavior of operators and investors in the energy sector, respectively – on the trends of GHG emissions – are the following:

- the requirements to reduce the emissions of sulphur dioxide, nitrogen dioxide and dust in accordance with the Implementation Programme for Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants and the integrated permits issued to the operators of individual installations pursuant to art. 117, para. 1 and 2 of Chapter 7, Section II of the EPA;
- policy to encourage investment in modernizing existing and building new coal power stations by signing long term contracts between power plants and NEC for buying energy.

⇒ *From 2009 until now (scenario with measures)*

The key policies and measures adopted/planned/implemented since 2009, which will have significant and positive impact on the GHG emissions from the Energy sector are:

- contained in the Energy Strategy of Bulgaria until 2020, approved by Decision № 133 of the Council of Ministers of 9 March 2011 and by the National Assembly by decision of 01.06.2011;
- contained in the provisions of the Renewable Energy Act, as well as in the National Action Plan for Renewable Energy, developed on the basis of the requirements of Directive 2009/28/EC with a view of achieving the binding national target of 16% share of renewable energy in the total energy consumption by 2020, including 10% renewable energy in the energy consumption of transport.

The measures aimed at reducing GHG emissions in the Energy sector are grouped into **five priority axes** as follows:

- Priority 1: Cleaner production of electricity from existing coal-fired plants;
- Priority 2: Transition to a low-carbon electricity mix;
- Priority 3: The district heating system – an instrument for low-carbon energy;
- Priority 4: Accelerated penetration of decentralized energy production;
- Priority 5: Development of low-carbon networks for transmission and distribution of electricity and natural gas.

Depending on the nature of their impact on the level of GHG emissions, the measures are grouped in two directions - measures with measurable/direct effect and measures with indirect effect. The measures with direct impact include those that lead to reduction of the total GHG emissions resulting from the production of heat and electricity by 2020. A number of measures included in the priority axes will not lead to reduction of GHG emissions in the Energy sector by 2020, but they are a step towards a low-carbon development of the sector and will have a multiplier effect in the coming decades. These include:

- measures leading to reduction of the carbon intensity of the electricity generation mix (emissions per generated MWh) by additional production of decarbonized electricity);
- measures leading to reduction of the carbon intensity of the supplied electricity by decreasing network losses and development of decentralized energy production (emissions per supplied MWh);
- measures undertaken by energy companies with effect redirected to other sectors – to energy consumers.

6.1.4 Scenarios and projected outcomes

The two scenarios for reducing GHG emissions in the Energy sector by 2020, used in the development of the NAPCC and related to different assumptions of the current/planned policies and implemented measures, lead to the following results:

- *baseline scenario (in the policy and measures by the reference year 2009)* – reduction of emissions by 3.1 mln.t CO₂ eq. or by **11,5% compared to 2005**;
- *scenario “with measures”* – reduction of GHG emissions by 7.5 mln.t CO₂ eq. or by **27,7% compared to 2005**.

This scenario is consistent with the target scenario of the Energy Strategy until 2020 in terms of policies and measures and in terms of their quantitative indicators, with analyses and assessments of the current implementation of the binding national target of 16% RES, as well as with the country's application for transitional free allocation of emission allowances in the energy sector and the accompanying draft National Investment Plan, which provides for over €800 mln. grants for projects to modernize the national energy system by 2020.

A large number of the measures with indirect effect, included in this Plan, will contribute significantly to the reduction of GHG emissions over the next decade (2020-2030). Furthermore, if the Energy Strategy is successfully implemented in terms of development and application of technologies for capture and storage of carbon dioxide and construction of new nuclear capacity, the cumulative reductions in 2030 will reach 18.5 mln.t CO₂ eq. or **68% less GHG emissions compared to 2005**.

6.1.5 Measures in the Energy Sector

PRIORITY AXIS 1: LOW-CARBON PRODUCTION OF ELECTRIC ENERGY FROM COAL-FIRED POWER PLANTS

Measures with direct impact on the reduction of GHG emissions

Measure 1		IMPROVEMENT OF PRODUCTION EFFICIENCY IN EXISTING COAL-FIRED POWER PLANTS					
Instruments		European Emission Trading Scheme/National investment plan according to Art. 10c of Directive 2003/87/EC and legislative changes related to their implementation					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Energy companies	MEET MEW	2013-2020	240 mln. BGN – depending on technological solutions	Private financing International projects European programs National investment plan according to Art. 10c of Directive 2003/87/EC	Ton reduced CO ₂ per MWh	520 000 tonnes reduced CO ₂ by the end of 2014. 1 300 000 tonnes reduced CO ₂ by the end of 2016. 2 800 000 tonnes reduced CO ₂ by the end of 2018. 4 680 000 tonnes reduced CO ₂ by the end of 2020.	4 680 000
Additional information		In 2007-2009 the average carbon intensity of electricity generation from coal-fired power plants is 1.2 t CO ₂ equivalent per MWh. Measures to increase the efficiency of production in a cost effective way can lead to reduction of this factor by approximately 5% -7% which is equal to 1.3 mln. tonnes annual reduction of carbon dioxide emissions from existing coal-fired power plants by 2020 or cumulatively 4.68 mln. tonnes of CO ₂ eq. for the entire period . The expected reductions in greenhouse gases is calculated on the basis of estimates as follows: 20% of the potential to be realized by 2014; additional 30% to be realized by 2016, 30% – by 2018, and 100% of the potential for reducing emissions as a result of the modernization of coal-fired plants within the period by 2020. These targets are cumulative respectively for the period until 2014 - the first two-year period, until 2016 – for a four-year period, until 2018 – for a six-year period and until 2020 - for the entire period by 2020.					

Measure 2		FUEL SUBSTITUTION – FROM COAL TO NATURAL GAS					
Instruments		European Emission Trading Scheme/National investment plan according to Art. 10c of Directive 2003/87/EC					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Investors/ Energy companies	MEET; MEW	2013-2020	720 mln. BGN	Private investments/income under Art. 10c of Directive 2003/87/EC	MWh energy, produced with substituted fuel	700 000 MWh annually with substituted fuel by the end of 2014. 1 400 000 MWh annually with substituted fuel by the end of 2016. 2 800 000 MWh annually with substituted fuel by the end of 2018. 4 200 000 MWh annually with substituted fuel by the end of 2020.	11 700 000
Additional information		The European Emission Trading Scheme and the competition on the electricity market encourage the transition to low-carbon technologies and fuels such as natural gas. Every 100 MW coal-based generating capacity substituted with natural gas will be reflected as a reduction of 450 thousand tonnes of CO ₂ per year. The target values are calculated by years and the commissioning of 100 MW is envisaged for the period by 2014; additional 100 MW are envisaged by 2016, another 200 MW - for the period until 2018 and additional 200 MW until 2020, or a total of 600 MW new, substituting gas capacity for the period 2012-2020.					
TOTAL EFFECT FROM THE MEASURES UNDER AXIS 1						16 380 000	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		PILOT PROJECTS WITH CLEAN COAL TECHNOLOGIES				
Instruments		National programmes supporting innovations and clean energy technologies				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Energy enterprises/Scientific institutes	MEET/MEYS	2013-2020	Not applicable	International projects/Income from emission trading/Private financing, etc.	Number of projects	1 project
Additional information		<p>The Energy Strategy of the Republic of Bulgaria until 2020 envisages institutional support and monitoring of projects for building new and/or substituting capacities based on local coal with mandatory use of highly efficient and low-emission modern technologies with capture and storage of CO₂, including technologies for development and improvement of the energy system. The active measures undertaken by the state and consisting in the provision of financial support for training, participation in joint international projects and/or implementation of demonstration projects will contribute substantially to low-carbon developments of coal-fired power generating facilities. According to the projected energy balance the first project with installation for capturing and storing carbon dioxide will be commissioned in the period 2020-2025.</p> <p>The preparation phase, subject to the proposed measure, will not lead to reduction of the GHG emissions in the period by 2020. The needed financial resources cannot be estimated at this stage given the lack of clarity regarding the potential for implementation of such projects during the new financial period 2013-2020 and the scientific research programmes and demonstrations in the Energy sector.</p>				

Measure 2		GEOLOGIC STUDIES FOR CO₂ STORAGE SITES				
Instruments		Law on the Geological Storage of Carbon Dioxide				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Investors /Society	MEET/MEW	2013-2020	Not applicable	International projects and programmes/ Private financing	Geologic studies Information campaigns	2 geologic studies to be completed by 2018. 20 information campaigns by 2020.
Additional information		The Energy Strategy of the Republic of Bulgaria 2020 has set a target of 9.2 mln. tonnes CO ₂ from the GHG emissions emitted by the Energy sector to be captured and stored in geological formations by 2030. Besides the already existing legislative framework, an important factor for the implementation of this goal is the timely conducting of the necessary geological surveys, environmental impact assessments and activities to acquaint the public with the technology. The prompt actions of the governmental (municipal) authorities and private investors would create a good basis for the achievement of the targets set in the Energy Strategy of the Republic of Bulgaria. The state does not intend to use budget funds to finance the studies. The measure contributes to reducing greenhouse gas emissions after 2020.				

Measure 3		INTRODUCTION OF MANDATORY REQUIREMENTS TO THE EFFICIENCY OF NEW COAL-FIRED POWER STATIONS				
Instruments		Legislative changes				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Energy enterprises/ investors	MEW; MEET; SEWRC	2013 -2015	Not applicable	Not applicable	Approved regulatory act	Approved regulatory act by 2015
Additional information		The measure envisages a legally binding requirement to use the best available technologies in the building of new coal-fired power plants. By this measure a lower emission factor of electricity generation from coal-fired power plants is achieved.				

PRIORITY AXIS 2: REDUCTION OF THE CARBON INTENSITY OF THE ELECTRICITY GENERATION MIX

Measures with direct impact on the reduction of GHG emissions

Measure 1		INCREASE OF HIGHLY EFFICIENT CO-GENERATION					
Instruments	European Emission Trading Scheme and system of preferential prices for electricity produced with highly efficient methods						
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Investors/Energy companies	MEET; SEWRC	2013-2020	790 mln. BGN	Private financing/ Public support through preferential prices/ Other international and national projects and programmes	MWh generated energy	3 839 000 MWh energy generated by the end of 2014 13 563 000 MWh energy generated by the end of 2016 27 053 000 MWh energy generated by the end of 2018 42 173 000 MWh energy generated by the end of 2020	1 600 000
Additional information		The Energy Strategy of the Republic of Bulgaria envisages that the co-generation of electric energy will account for 15% in the electric energy mix by 2020. The co-generation of heat and electric energy improves the overall efficiency of fuel use and saves the primary energy needed to produce the two types of energy separately. The increased share of electricity produced by co-generation and the saved primary energy will be reflected as a reduction in the carbon intensity of the electricity generation mix.					
TOTAL EFFECT FROM THE MEASURES UNDER AXIS 2						1 600 000	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		INSTITUTIONAL SUPPORT FOR INVESTMENTS IN DECARBONISED ELECTRICITY GENERATION CAPACITIES – NUCLEAR ENERGY				
Instruments		Institutional support				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Investors/Energy companies	MEET	Launched	Not applicable	Not applicable	Share of nuclear energy in the electricity generation mix	45% share of nuclear energy in the electricity generation mix
Additional information		<p>The measure stimulates the production of electricity from low-carbon and decarbonised sources. The Energy Strategy of the Republic of Bulgaria envisages provision of support to the nuclear energy not only as a promising resource for the production of decarbonised electricity, but also because of the accumulated successful experience and professional capacity for the operation of nuclear facilities. The support will be accompanied with strict requirements to the security, safety, nuclear waste management and decommissioning. According to the projected electricity generation balance the share of nuclear energy in the electricity generation mix will grow from 42% in 2005 to 45% in 2020 and will contribute to reducing the carbon intensity in the production of electricity.</p>				

Measure 2		INCREASING THE SHARE OF ELECTRIC ENERGY FROM RENEWABLE ENERGY SOURCES IN THE ELECTRICITY GENERATION MIX				
Instruments		National action plan in the field of renewable energy				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Investors	MEET; SEDA	2013-2020	4 183 mln. BGN	Private financing/Public support through a system of purchase at preferential prices	% of the energy mix	15% share of electricity from renewable sources in the electricity generation mix and achievement of the national target for the share of electricity from RS in the gross energy end-use consumption
Additional information		The production of electricity from renewable sources will contribute significantly to reducing the carbon intensity of the country's electricity generation mix. The national policy in this area is well developed in the adopted National Action Plan for Renewable Energy by 2020 and the Renewable Energy Act. The production of electricity from renewable sources is expected to increase to 7.5 TWh by 2020 or to account for 15% in the electricity generation mix of the country which is equivalent approximately to 20% implementation of the national target for renewable energy share in the gross energy consumption in 2020. It will further contribute to reducing carbon intensity in the production of electric energy.				

Measure 3		INCREASING THE CAPACITY FOR GENERATION OF PUMPED-STORAGE HYDROELECTRICITY				
Instruments		National action plan in the field of renewable energy. National investment plan according to Art. 10c of Directive 2003/87/EC				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Energy companies	MEET	2013-2020	246 mln.BGN	Private financing/ National investment plan according to Art. 10c of Directive 2003/87/EC/ International programmes, etc.	MW additionally installed capacities	Technical opportunity for achievement of the national target of renewable energy share
Additional information		The measure is necessary to balance the production of electricity from wind farms that are expected to contribute to achieving 30% of the national target in the Energy sector by 2020. It will lead to further reduction of the carbon intensity of the electricity generation mix due to increased production and consumption of decarbonised energy.				

PRIORITY AXIS 3: MODERNIZED DEVELOPMENT OF THE DISTRICT HEATING SYSTEM

Measures with direct impact on the reduction of GHG emissions

Measure 1		INCREASING THE SHARE OF HEATING AND COOLING BASED ON RENEWABLE ENERGY SOURCES					
Instruments		Stable legislative environment/ National action plan in the field of renewable energy/Support schemes					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Investors/ Energy companies	MEET; SEDA	Started - 2020	Depending on the investors' interest and the selection of technologies	Private financing/ Income from international emission trading and within the European Emission Trading Scheme/ Operational programmes/Other international and national projects and programmes	MWh generated thermal energy	70 000 MWh energy generated by 2014. 256 000 MWh energy generated by 2016. 556 000 MWh energy generated by 2018. 976 000 MWh energy generated by 2020.	488 000
Additional information		The measure is intended to create conditions for sustainable development of the district heating sector in Bulgaria and for substitution of conventional fuel for production of thermal energy with renewable sources. The introduction of renewable thermal energy will be gradual and will start with generation of 2% thermal energy from renewable sources in 2014 reaching 10% of the generated thermal energy, mainly from biomass. The cumulative effect of the measure will lead to reduction of greenhouse gases emitted by the district heating systems by 488 000 t until 2020. The contribution of the measure towards the national target in the field of renewable energy sources is relatively small - about 1%.					
TOTAL EFFECT FROM THE MEASURES UNDER AXIS 3						488 000	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		REHABILITATION OF EXISTING AND BUILDING OF NEW LOW-CARBON DISTRICT HEATING NETWORKS				
Instruments		Development of a national programme for stabilization and development of the district heating sector in the Republic of Bulgaria by 2020				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected effect
Municipalities/ Investors/ District heating companies	MEET; MRDPW; MEW	2013-2020	Not applicable	Not applicable	Approved national programme	Approved national programme
Additional information		One of the barriers to the development of new district heating companies is the costly start-up investment in district heating networks. At the same time, the technological losses of existing heating networks account for about 23%. Well-targeted financial support is needed for rehabilitation of existing and construction of new heating networks in order to ensure the sustainable development of the sector and to reduce emissions of greenhouse gases associated with the consumption of thermal energy. Therefore, a national program to stabilize and to develop the district heating sector in Bulgaria should be developed in accordance with the Energy Strategy of the Republic Bulgaria by 2020. The funds required for implementation of the programme as well as the GHG emission savings will be estimated in the process of its development.				

PRIORITY AXIS 4: ACCELERATED INTRODUCTION OF DECENTRALIZED ENERGY PRODUCTION

Measures with indirect impact on the reduction of GHG emissions

Measure 1		PROVISION OF PUBLIC INFORMATION REGARDING RESOURCES, STATE AND PLANS FOR DEVELOPMENT OF THE ELECTRICITY GENERATION NETWORKS				
Instruments		Public information system				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected outcome
Investors/ Energy companies/ Public	MEET	2013-2020	3 mln. BGN	State budget	Public information system	Functioning public information system in 2014
Additional information		The provision of updated information on existing resources, the condition and the plans for development of the networks will support taking of investment decisions and the development of projects for decentralized sustainable production and consumption with low levels of GHG emissions.				

PRIORITY AXIS 5: DEVELOPMENT OF LOW-CARBON NETWORKS FOR TRANSMISSION AND DISTRIBUTION OF ELECTRIC ENERGY AND NATURAL GAS

Measures with indirect impact on the reduction of GHG emissions

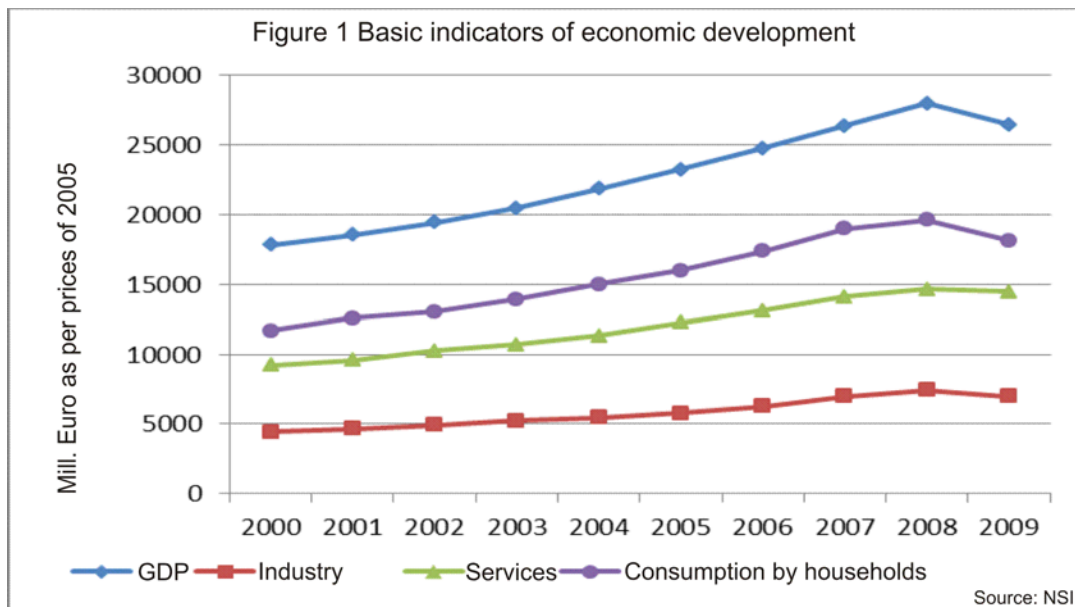
Measure 1		ENERGY EFFICIENCY IN THE TRANSPORTATION OF ENERGY AND INTRODUCTION OF “SMART” ENERGY STORAGE NETWORKS AND FACILITIES				
Instruments		Regulatory incentives for energy network operators				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected outcome
Energy network operators	MEET/ SEWRC	2013-2020	Not applicable	Not applicable	% of energy loss reduction	30% fewer losses in energy transportation
Additional information						

6.2 ENERGY EFFICIENCY AND RES – HOUSEHOLD AND SERVICES SECTOR

6.2.1 General information on the Households and Services Sector

6.2.1.1 Economic environment

In the period 2000-2008 the Bulgarian economy shows a constant average annual growth rate of 5.8%, with GDP rising from €17.8 bln. in 2000 to €28 bln. in 2008 at constant prices of 2005. The global economic crisis hit the Bulgarian economy in 2009, when a drop in GDP to €26.5 bln. (at constant prices of 2005) was recorded.



- GDP grew by 5.8% on average until 2008 and in 2009 dropped by 5.5%.
- Industry grew by 67% until 2008 (6.6% per year), and in 2009 decreased by 5.7%.
- The services sector grew by 59% until 2008 (6% on an annual basis), in 2009 dropped by 1.3%.
- Household consumption increased by 68% (6,7% on an annual basis) until 2008, in 2009 dropped by 7,5%, but remained by 55,4% above its levels from 2000.

Despite the economic crisis, the natural social development leads towards higher living standards which, in turn, lead to a steady trend of growing household consumption. This factor is important as it directly affects the consumption of fuel and energy.

6.2.1.2 Energy consumption

⇒ Primary energy consumption (PEC)

The PEC decreases in absolute value from 19 218 ktoe in 2000 to 17 482 ktoe in 2009. The changes in PEC by fuel type over the same period is shown in Figure 1.

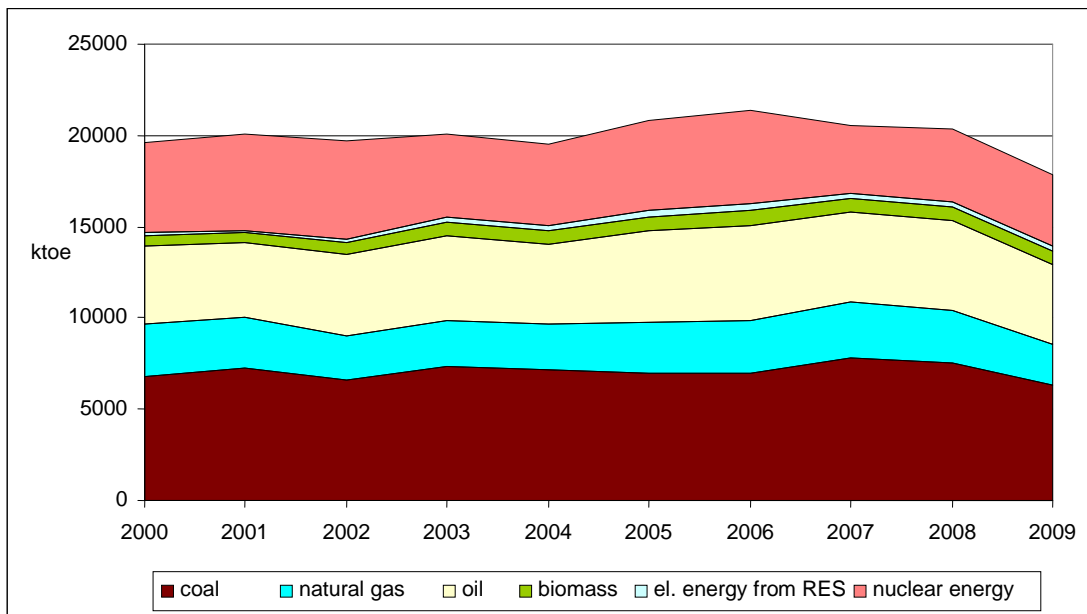


Figure 1. Primary energy consumption by fuel type 2000-2009. Source: NSI

⇒ End-use energy consumption

End-use energy consumption in 2009 was 8.475 Mtoe which represents a negligible growth compared to the consumption of 8.436 Mtoe in 2000.

Changes in final energy consumption in Bulgaria by economic sectors over the period 2000-2009 is shown in Figure 2.

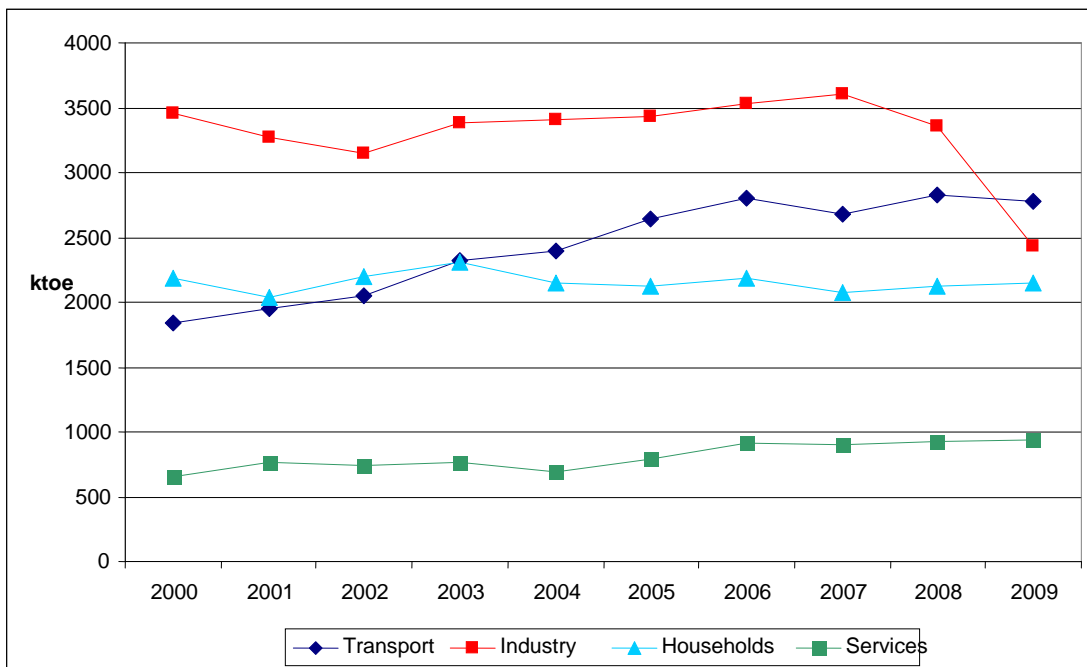


Figure 2. Final energy consumption by sectors 2000- 2009. Source: NSI

Households are the third most important energy consumer after transport and industry as their consumption remains practically unchanged at about 2.1-2.2 Mtoe per year. The share of the sector in final energy consumption remains also unchanged at 25-26%.

Unlike households the consumption in the services sector grew by nearly 45% in the period 2000-2009, while the share of the sector in the end-use energy consumption increased from 8% to 11%.

6.2.1.3 Energy intensity

Final energy intensity is the main indicator of energy efficiency consumption by end users and it decreases by over 5% on average per year during the period 2000-2009.

Only in the last two years the end-use energy intensity decreased from 0.235 koe/BGN 00 in 2007 to 0.208 in 2009 koe/BGN 00. This reduction of end-use energy intensity corresponds to annual energy savings by end-use of 1,1 Mtoe. Respectively, the decrease of end-use energy intensity leads to direct reduction of GHG emissions. It should be noted that the downward trend of end-use energy intensity is independent of the economic development which is a step towards a “low-carbon economy”.

- Services

This is the sector with the lowest energy intensity (6.4 times lower than that of the industry in 2009), but in the period 2000-2009 the energy intensity of the sector decreased by only 10%, and has remained unchanged over the last two years. The impact of energy prices in this sector is weaker and therefore binding measures such as audits and certification, compulsory measures prescribed in audits, inspections of boilers and air conditioning installations, higher requirements to the energy performance of public buildings and others must be taken.

- Households

The energy consumption by housing increases over the last two years from 0.553 toe/dwelling in 2007 to 0.567 toe/dwelling in 2009, *where the growth of electricity consumption is especially rapid*. The main factors affecting the growth of energy consumption are: growing size of new homes, higher levels of thermal comfort, of lighting, development of air conditioning and increasing use of household appliances and electronics. A significant barrier to the reduction of end-use energy intensity of households is the low efficiency of electricity generating facilities and the underdeveloped gasification of households.

6.2.1.4 Preconditions of the intended measures (policies, plans and programmes)

⇒ ***Energy Strategy of Bulgaria 2020***

The target for saving primary energy is set out in the *Energy Strategy of Bulgaria until 2020*. The target proposed in this document is reduction of the primary energy intensity (PEI) by 50% by 2020 as compared to 2005. The achievement of this target will save 5.8 Mtoe primary energy compared to the baseline scenario of development by 2020.

The result achieved so far is reduction of PEI from 0.563 koe/BGN00 in 2005 to 0.429 koe/BGN00 in 2009, or by more than 23%.

BENCHMARK INDICATORS	2005	BASELINE SCENARIO	TARGET SCENARIO
		2020	2020
Gross domestic product (000 M€05)	21.9	34.7	34.7
Gross domestic consumption (Mtoe)	20	21.6	15.8
Dependence on import of oil and natural gas (%)	38	36.7	48
End-use consumption (Mtoe)	9.6	11.1	9.16
Ration end-use/total (%)	48	51	58
Energy intensity (toe/M€05)	913.3	623.6	456
Energy from renewable sources (Mtoe)	1.1	1.71	1.96
Share of RES (%)	9.4	13	18.8

Source: Energy Strategy of Bulgaria by 2020

⇒ ***National indicative target for end-use consumption***

The national indicative target under Directive 2006/32/EC is indicated in FNAPEE⁶¹. This target is aimed at saving 7 291 GWh (627 ktoe) energy from the end-use energy consumption (within the scope of the Directive) by 2016 and the interim target is to save 2 430 GWh (209 ktoe) by 2010.

The report on the implementation of FNAPEE shows that the results surpassed considerably the set target. The energy saved until 2009 (only within the scope of the Energy Services Directive), calculated using the “top-down” method are not less than 5 168 GWh/year (444.3 ktoe) thus considerably exceeding the interim target of 2 430 GWh (209 ktoe).

SNAPEE⁶² was developed in accordance with the provisions of the Directive. It foresees activities that continue the current policy while taking into account the development of the European policy, respectively the new regulatory acts that are to be transposed into the national legislation. The SNAPEE was approved by the Council of Ministers on 28.11.2011. It covers the period 2011-2016 and contains projections until 2020. Its implementation will lead to the achievement of the national energy saving target set out in the FNAPEE (7.291 GWh annual savings). The evaluation of the possible savings show that the national target will be overachieved by 2016 reaching the value of 13.693 GWh.

According to preliminary estimates the achievement of such level of annual savings will lead to reduction of greenhouse gas emissions by more than 600 000 tonnes of CO₂ eq. (by 2016) and the sectors of Household and Services alone will contribute to the reduction by more than 295 190 tonnes CO₂ (by 2016). The projections made in SNAPEE on the impact of the measures by 2020 show that the total effect of the energy consumption reduction in these sectors will be 555 800 tonnes CO₂⁶³ (by 2020).

⁶¹ FNAPEE – First National Action Plan on Energy Efficiency

⁶² SNAPEE – Second National Action Plan on Energy Efficiency

⁶³ In view of the crucial importance of the implementation of the measures under SNAPEE to mitigate climate change, this estimate is reflected in the calculations of the *total* expected emission reductions by 2020 in this Plan.

The estimates of possible savings show:

	Targeted energy savings		Achieved energy savings	
	Value	Share of end-use energy consumption in the scope of the Directive	Value	Share of end-use energy consumption in the scope of the Directive
	GWh	%	GWh	%
2010 (interim period)	2 430	3	5 168	6.3
2016 (ultimate objective)	7 291	9	13 693 (projected)	16.9

6.2.2 Measures in the Household and Services Sector

PRIORITY AXIS 1: PROACTIVE NATIONAL POLICY TO STIMULATE THE EFFICIENT USE OF ENERGY RESOURCES AND THE COST EFFECTIVE DEVELOPMENT OF RES

Measure 1	IMPLEMENTATION OF THE MEASURES IN THE PROGRAMME FOR ACCELERATED GASIFICATION (PAG) OF REPUBLIC OF BULGARIA
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Measures with direct impact on the reduction of GHG emissions

Instruments		Introduction of institutional and fiscal incentives. Creating a competitive environment for the used energy resources ⁶⁴ . Introduction and promotion of flexible financial schemes - contracts for sale of energy. Incentives in case of combined and integrated solutions to reduce energy consumption.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
End users/ state and municipal administrations/ investors	MEET MEW SEWRC	2013-2020	Minimum investment 774 mln.BGN	Structural Funds/ Rural Development Programme/ EBRD credit lines (aimed at EE and RES)/ Kozloduy Fund/ Green Investment Scheme/ Financing under the scheme „Energy Performance Contract“ etc. / Private investments of citizens and companies	Reduced final consumption /minimum/ of households as a result of gasification, GWh	144.3GWh (2014) 144.3GWh (2016) 216.5GWh (2018) 216.5GWh (2020)	2 476 427

⁶⁴ At the current price of electricity and fossil fuels and taking into account two preconditions – the relative competitive price of natural gas and the need for private investments for substitution of the fuel/energy – increase in the number of gasified households could not be achieved without functioning under normal/competitive market conditions and without the introduction of incentives.

Additional information	<p>The Energy Strategy of Bulgaria envisages creation of conditions for access to the gas distribution system to 30% of households in 2020 and substitution of electricity used for heating purposes which would save households more than 1 bln. BGN of energy costs.</p> <p>The use of natural gas instead of electricity for heating and domestic purposes can save about 100kWh/year at least, and up to 1800 kWh/year per household.</p> <p>The evaluation of the potential decrease of emissions was made with the following assumptions: a household with 3 members, an apartment with 70 m² of heated area, without energy saving measures, using electricity for heating and household needs. The average annual consumption of energy for heating is about 11 188 kWh. In view of the delayed implementation of policies in this area a conservative scenario with 15% gasified domestic needs was considered when assessing this measure. An emission factor was adopted with regard to electric energy as in the National Programme for Renovation of Residential Buildings in the Republic of Bulgaria. In the absence of reliable data and projections a scenario of even development was used for a period of 7 years until the total percentage rate of gasified households is reached in 2020. The analysis assumes that 430 050 households will be gasified by 2020.</p> <p>The effect of fuel substitution and the use of natural gas can be divided into <i>direct</i> effect – related to the efficiency of transformation, and <i>additional</i> effect – related to an environmentally cleaner fuel. The direct impact is related to immediate reduction of fuel and energy consumption, with the assumption that the energy consumption is reduced by 15% (pessimistic scenario) over the entire assessed period. It is assumed in this case that the old inefficient equipment (with higher coefficient of energy transformation) will be replaced by new one, while the different calorific value of fuels is not taken into account.</p> <p>In this case the substitution of the fuel base will lead to direct fuel and energy savings of 721.7GWh or 492.9ktCO₂. The indirect effect is estimated at about 1983.4ktCO₂.⁶⁵ The total amount of reduced emissions will be 2476.4 ktCO₂.</p> <p>With the achievement of the 30% target set in the Strategy, the minimum savings of households will be 1443.5 GWh – direct savings resulting from the improvement of transformation efficiency, or 985.9ktCO₂. In addition, the effect on the reduction of GHG emission will be a result of the use of an environmentally cleaner fuel and the total cumulative effect will be 4952.8ktCO₂⁶⁶.</p> <p>Main instrument for implementation of the measure is the introduction of institutional and fiscal incentives aimed at increasing the share of households using natural gas: creation of a competitive environment with respect to the used energy resources⁶⁷;introduction and promotion of flexible financial plans – contracts for sale of energy; incentives for combined and integrated solutions to reduce the energy consumption.</p> <p>In case of 30% gasification in 2020, the investments of households for switching to natural gas are estimated at approximately 5000 BGN (<i>between 1800 and 7000 BGN depending on the technological solutions</i>) - according to a</p>
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⁶⁵ The value is determined on the basis of emission factor 0.055ktCO₂eq/TJ

⁶⁶ Determined on the basis of eliminated emissions from electric energy.

⁶⁷ With the current price of electricity and fossil fuels and taking into account two preconditions – relatively competitive gas prices and the need for private investment to change the used fuel/energy – it would be impossible to increase the level of consumption of domestic gas without functioning normal/competitive market conditions and the introduction of incentives .

	<p>study carried out by the Strategic Consultant of the Ministry of Economy, Energy and Tourism, selected at the end of 2011 under International Fund Kozloduy. The analysis is based on information provided by gas distribution companies and covers the households on the territory of Bulgaria that use natural gas for heating purposes.</p> <p>The required investments are estimated at 774 mln. BGN as a minimum, depending on the technological solutions. The implementation of this measure will have long-term effect on the amount of GHG emissions also after 2020. It is expected that at least 2476.4 kt CO₂ will be reduced cumulatively by 2020.</p>
TOTAL EFFECT FROM THE MEASURES UNDER AXIS 1	2 476 427

PRIORITY AXIS 2: IMPROVEMENT OF THE ENERGY PERFORMANCE OF BUILDINGS. IMPROVEMENT OF THE EFFICIENCY AND SAVINGS IN THE FINAL CONSUMPTION OF FUEL AND ENERGY.

Measures with direct impact on the reduction of GHG emissions

Measure 1		AFTER ENTRY INTO FORCE OF THE NEW ENERGY EFFICIENCY DIRECTIVE - SANITATION OF COMMUNAL, PUBLIC AND STATE BUILDINGS AT THE PERCENTAGE RATE REQUIRED BY THE DIRECTIVE (built up area over 250m ²)					
Instruments		Energy audits of buildings. Registry of state-owned and municipal buildings with total floor space over 250 m ² .					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
State and municipal administrations	MEET	2015-2020	34 200 000 BGN	Structural Funds/ Green Investment Scheme/ Financing under the scheme „Energy Performance Contract“, etc./ Bulgarian Energy Efficiency Fund/ State budget	Number of retrofitted state-owned and municipal buildings	2015-2016 - 1614 retrofitted state-owned and municipal buildings; 2017-2018 - 1519 retrofitted state-owned and municipal buildings; 2019 – 2020 – 1429 retrofitted state-owned and municipal buildings	204 135
Additional information		<p>The measure will come into effect after adoption of the new Energy Efficiency Directive (EED) expected by the end of 2012. At this stage of negotiations within the EU legislative bodies the percentage of buildings that are to be retrofitted per year laid down in the draft directive is 3%, which is acceptable for our country according to the Bulgarian position on the proposal. State-owned and municipal dwellings⁶⁸ account for 3,1% of the total number of buildings in the country according to data from the National Statistical Institute. 64% of them are two-room and three-room dwellings, while another 22,9% have four or more rooms (we assume that they fall into this group). Assuming 3% annual sanitation means that 4562 buildings are to be retrofitted by 2020 (their number will be revised according to the scope and percentage laid down in the EED).</p> <p>Pursuant to thematic objective 4 "Support for the transition to a low carbon economy" of the draft financial regulations for the period 2014 - 2020 it is envisaged for the next programming period OP Regional Development to support energy efficiency measures in buildings. Measures will be implemented in both public and residential buildings and their cost is estimated at about 950 mln.BGN. In addition, the operational program for the next programming period will provide for energy efficiency measures to be applied horizontally to the public health, social, cultural, educational and sports infrastructures, along with the envisaged construction and repair activities.</p>					

⁶⁸ According to the definitions and the methodology of NSI.

Measure 2		INTRODUCTION OF MANDATORY ENERGY EFFICIENCY SCHEME (REDUCTION OF FUEL AND ENERGY CONSUMPTION IN THE FINAL ENERGY CONSUMPTION)					
Instruments		Draft Energy Efficiency Directive.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Traders in fuel and energy, end-use consumption	MEET; SEDA	2014-2020		Structural Funds/ Financing under the scheme „Energy Performance Contract“, etc./ Bulgarian Energy Efficiency Fund/ State budget	Reduction of fuel and energy consumption on an annual basis compared to the consumption over the previous year in the Household and Services Sector	34.4GWh (by 2016) 34.34GWh (by 2018) 34.64GWh (by 2020)	105 173
Additional information		<p>This measure is proactive and is consistent with the announced direction and actions of the EC aiming at reducing fuel and energy consumption.</p> <p>Precondition for achieving the estimated effect are the regulatory changes with the view of introducing a requirement for specific (proportional) annual reduction of the amount of energy provided on the market by distribution companies and traders in energy (end-use consumption). Market mechanisms and incentives to reduce fuel and energy consumption need to be established along with mandatory schemes and market of energy services (market of “white” certificates/ certificates of energy savings).</p> <p>The measure is consistent with the new policy proposed by the EC to improve the energy efficiency in end-use consumption by saving annually fuel and energy equivalent to 1.5% of the energy provided by distribution companies and traders in energy on the market for the previous year (excluding energy in transport). The annual energy savings, respectively obligations, will be constant value (expressed in percentage) until 2020. To introduce such a scheme it is necessary to undertake appropriate legislative changes and to prepare its structure and operation. The responsible persons will be determined in the course of development of the scheme.</p> <p>These can be both traders in fuel and energy or end consumers. The actual reduction of fuel and energy consumption occurs in end-use consumption and should be a result of implemented measures.</p> <p>The anticipated effect is determined on the basis of projected fuel and energy consumption in the Industry and Household sectors where the consumption is expected to decrease by 1,5% on an annual basis. The decrease in final fuel and energy consumption according to the objectives will lead to reduction of emissions as follows: 40.5ktCO₂eq. (by 2016); 41.4 ktCO₂eq. (by 2020).</p>					
TOTAL EFFECT FROM THE MEASURES UNDER AXIS 2						309 308	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		DEVELOPING A NATIONAL PLAN TO INCREASE THE NUMBER OF NEARLY ZERO ENERGY BUILDINGS				
Instruments		Creation of interinstitutional working group with participation of all stakeholders (trade associations, branch organizations, etc.). Preparation of analytical reports. Setting new standards. Introduction of market mechanisms to promote certain energy services and market mechanisms encouraging energy efficiency.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State administration/ energy traders/ construction sector	MEET/ SEDA	2013-2014	Not applicable	Not applicable	Developed national plan – by the end of 2014	National plan to increase the number of nearly zero energy buildings – in effect as of 2015. Two pilot projects for new nearly zero energy public buildings.
Additional information		The measure involves introduction of the requirements of Directive 2010/31/EC on the energy performance of buildings. The main objective is to increase the number of buildings with nearly zero net energy consumption. The plan will contain the necessary parameters, including financial ones, and will specify the effect consisting in GHG emissions reduction. The detailed plan for implementation of the Directive is described in SNAPEE and draft National Strategy on Energy Efficiency.				

Measure 2		INTRODUCTION OF STANDARDS FOR SUSTAINABLE BUILDINGS AND ENERGY MANAGEMENT				
Instruments		Encouraging and planning targeted resources for implementation of some standards for sustainable buildings - BREEAM, LEED or DNGB for public and state-owned buildings..				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State and public administration	MEET/ SEDA	2013-2020	Not applicable		Number of certified buildings	11 200 buildings by 2020
Additional information		Certification under these standards is voluntary. The introduction and application of the standards has an indirect effect on the overall reduction of greenhouse gas emissions. It impacts both energy consumption and the overall compliance of buildings with the regulations - safety, access, waste treatment, etc.				

Measure 3		INCREASING AWARENESS REGARDING THE REQUIREMENTS TO NEARLY ZERO ENERGY BUILDINGS, NEW MATERIALS, PRACTICES AND TECHNOLOGIES				
Instruments		Information campaigns/trainings aimed at specialists in construction and building engineering and household consumers.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Construction sector/ universities and R&D technical enterprises/ end users	SEDA/ branch organizations	2013-2020	300 000 BGN	International programmes and projects; Own capital	Number of seminars/trainings per year until 2020	4 seminars/trainings per year until 2020 Increased awareness; Increased awareness, knowledge and expertise in the construction sector and among consumers
Additional information		This measure aims to increase the awareness, as well as the knowledge and skills of the industry. There will be no direct impact on reducing emissions, but it will support the implementation of energy efficiency measures in the construction sector.				

Measure 4		INTRODUCTION OF A PUBLIC REGISTRY OF ENERGY EFFICIENCY CERTIFICATES AND TECHNICAL PASSPORTS OF BUILDINGS				
Instruments		Certification of buildings for energy efficiency and issuance of technical passports. It is possible to adapt the existing register in SEDA and to make it publicly accessible.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
End users/ MRDPW/ SEDA	SEDA MRDPW	2013-2015		State budget/ international programmes and projects (including bilateral)	Operational public registry	Operational publicly accessible registry by the end of 2015
Additional information		The measure has no direct effect on reducing emissions, but will ensure transparency and accessibility of data on the state and energy performance of buildings.				

PRIORITY AXIS 3: INCREASING EFFICIENCY OF TRANSFORMATION OF PRIMARY ENERGY CARRIER

Measures with direct impact on the reduction of GHG emissions

Measure 1		REPLACEMENT OF THE OBSOLETE AND INEFFICIENT EQUIPMENT FOR PRODUCTION OF ENERGY WITH NEW EQUIPMENT					
Instruments		Introducing mechanisms - financial and administrative - to replace old inefficient equipment for energy production with new one. Development of standards and requirements to primary energy transformation facilities.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
End-use consumption – energy for heating and cooling	MEET/ SEDA/ SAMTS	2013-2020	Depends on the selected implementing instruments and the facilities for transformation of primary energy	Income from auctions of emission allowances/Green Investment Scheme/EBRD credit lines/Performance Contracts	Reduced consumption as a result of improvement of the efficiency in fuel and energy conversion GWh	261.2GWh by the end of 2016 175.1GWh by the end of 2018 176.8GWh by the end of 2020	72 383
Additional information		The process should be linked to the activities for control and inspection of heating and air conditioning installations. The financial incentives should combine existing schemes with mandatory co-financing by the beneficiary. The measure is linked also to the activities provided in SNAPEE in accordance with the Regulation adopted pursuant to Art. 15 of Directive 2009/125/EC establishing a framework for the setting of ecodesign requirements for energy-related products . The measure applies to the end-use consumption of fuels, their conversion into energy for heating, cooling and domestic hot water and to energy consumption. The assessment of the impact is made on the basis of the projected consumption of fuels in the Households and Services sector taking into account also other related measures.					
TOTAL EFFECT FROM THE MEASURES UNDER AXIS 3						72 383	

PRIORITY AXIS 4: ENCOURAGING DECENTRALIZED PRODUCTION OF ENERGY, INCLUDING ENERGY FROM RENEWABLE SOURCES

Measures with direct impact on the reduction of GHG emissions

Measure 1		DEVELOPMENT AND PHASED IMPLEMENTATION OF NATIONAL PROGRAMME “1000 SUNNY ROOFS”					
Instruments		Report – analysis for selection of beneficiaries. Development of concept designs.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
End-use consumption – domestic hot water	MEET, SEDA, municipal administration	2015-2020	140 500 000 ⁶⁹ BGN	Energy Efficiency Fund/ private investments/ ESCO/ specialized credit lines	Implemented and commissioned installations by 2020	200 commissioned installations by 2016 400 commissioned installations by 2018 400 commissioned installations by 2018	107 200
Additional information		Commissioning of a bivalent system for preparation of hot water for domestic needs - evacuated tube solar collectors and heat pump units (air) for 1000 multi-family buildings (46 apartments, households with 3 members). The effect was evaluated on the basis of electricity, taking into account the consumption of the heat pump units. This program is not laid down in a national strategic document, however it is in line with the national RES policy and encourages the production of heat from RES. 164.9 GWh of electricity can be saved per year (by 2020) as a result of the development and implementation of this programme.					
Total effect from the measures under axis 4						107 200	

⁶⁹ The assessment is made at the current market prices of the equipment. The prices follow a downward trend.

6.3 INDUSTRY SECTOR

6.3.1 General information on the Industry Sector

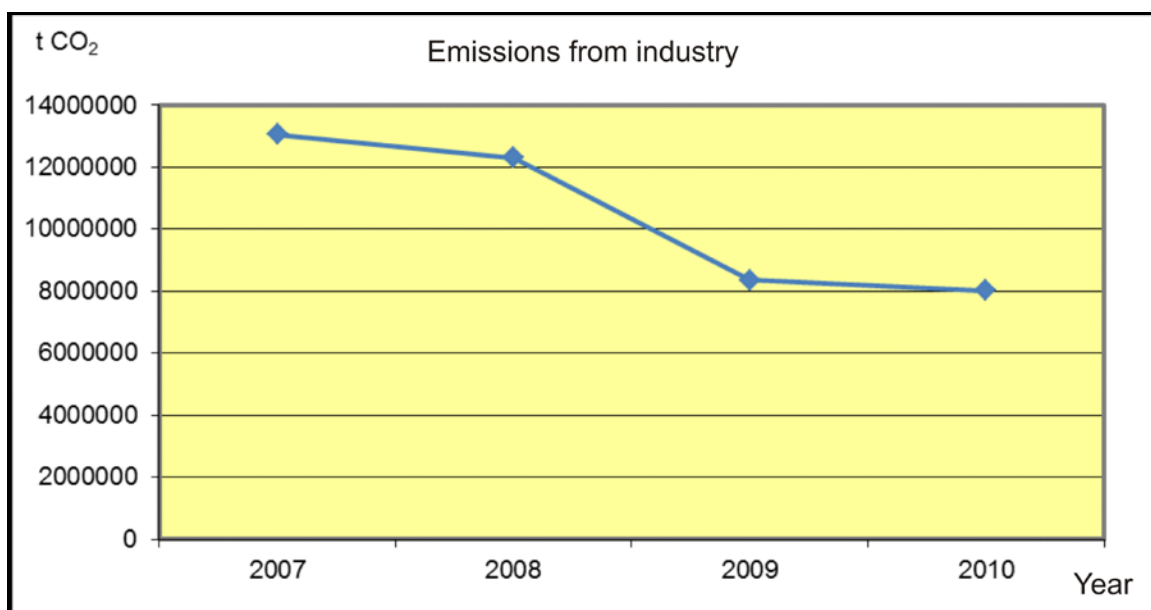
6.3.1.1 Current situation

A trend towards reduction of greenhouse gas emissions has been observed in the Industry sector over the past few years. There are two reasons for that. One of the reasons is negative: the decrease is due to the crisis in some sub-sectors and is related to lower production, e.g. in the sub-sector of construction and respectively in the production of construction materials. The other is positive and is associated with increased energy efficiency in the use of energy resources in some enterprises. This is evident from the data obtained from the Sustainable Energy Development Agency (SEDA) following the audits of industrial systems completed so far.

Review of the total emissions of the audited industrial systems in the sector by years

Year	Combustion plants ¹ t CO ₂	Process emissions t CO ₂	Total emissions t CO ₂
2007	7 952 426	5 099 583	13 052 009
2008	7 477 168	5 818 436	12 295 604
2009	6 706 823	1 640 887	8 347 710
2010	6 498 278	1 522 289	8 020 567

1 This sector is characterized by two sources of greenhouse gases: combustion plants and the so called process emissions emitted by some technological processes



Summarized results from the audits of industrial systems (IS)⁷⁰

- IS subject to audits – 281
- Audited IS – 154
- Annual consumption - 2 927.3 GWh/y.

⁷⁰ Source: SEDA

- Projected annual savings – 378.3 GWh/y.
- Equivalence in BGN – 52.1 mln. BGN/y.
- Required investments – 183.4 mln. BGN
- Equivalent emission savings – 187 700 tonnes CO₂/y,
- Share of economy – 12.6%
- Term of redemption – 3.5 years

6.3.1.2 Development of the sector in the period 2000-2009

- Reduction of the energy intensity of industry over 2 times (a key indicator of energy efficiency);
- Reduction of final energy consumption by 28.6% compared to 2000 as a result of which the sector **conceded the first rank** to the Transport sector;
- Increase in the sector's added value to the GDP from 6.2 to 9.5 bln. BGN in 2009, or an overall growth of 53%;
- Energy audits are conducted on industrial systems with annual consumption equal to or higher than 3000 MWh. The owners are required to implement the measures within 2 years after the energy audit;
- €87 900 were invested in 79 small and medium-sized enterprises within the period 2007-2009 under the existing grant schemes.

During the period 2013-2020 the main instrument for reducing CO₂ emissions from industry is the European emission trading scheme. The following is envisaged for the industrial installations:

- A common cap for the emissions of the entire Community decreasing by a linear factor of 1.74%. Thus the EU's commitment to reduce its emissions by 2020 by 21% below 2005 levels will be met.
- Larger amount of allowances to be traded – at least 50% of allowances will be auctioned from 2013 on in contrast to 3% in 2008-2012. This will increase the environmental integrity and the economic efficiency of the system.
- As of 1 January 2013 the free allocation for installations covered by the ETS will be performed on the basis of *ex ante* parameters valid for the entire Community. The parameters are set on the basis of the 10% most efficient installations in the EU in terms of greenhouse gases. This seeks to promote the reduction of greenhouse gas emissions and the use of energy efficient technologies.

6.3.1.3 Priority axes for reduction of GHG in the industry

- Higher energy efficiency in the industry;
- Use of alternative fuels;
- Establishment of a technology park and a business incubator.

The expected effect (aggregate reduction in tonnes CO₂ eq. by 2020) from the measures in the sector is estimated at **5 658 000 tonnes CO₂ eq.**

6.3.2 Measures in the Industry Sector

PRIORITY AXIS 1: IMPROVEMENT OF ENERGY EFFICIENCY IN THE INDUSTRY

Measures with direct impact on the reduction of GHG emissions

Measure 1		AUDITS FOR ENERGY EFFICIENCY AND IMPLEMENTATION OF THE PRESCRIBED MEASURES					
Instruments		Energy Efficiency Act					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Industrial systems with annual energy consumption over 3000 MWh.	MEET; MRDPW; SEDA	2008-2016	183.4 mln. BGN	Energy Efficiency for Competitive Industry Programme, own funding; financing from the European Regional Development Fund	Tonne CO ₂ saved a year	1 260 000 tonnes CO ₂ by the end of 2016. 280 000 tonnes CO ₂ by the end of 2018. 238 000 tonnes CO ₂ by the end of 2020.	1 778 000

Additional information	<p>Industrial systems with annual energy consumption over 3 000 MWh are required to have their energy efficiency audited every three years. The prescribed measures are mandatory. Energy Efficiency for Competitive Industry is a new programme that provides low-interest loans to small and medium-sized enterprises. The total amount of funds under the programme is €300 mln.. €150 million of this amount will be provided by Operational Program Competitiveness and the remaining amount -from EBRD credit lines through the Bulgarian commercial banks.</p> <p>Eligible projects for funding are, for example:</p> <ul style="list-style-type: none"> • New co-generation plants for thermal and electric energy; • Rehabilitation of boiler aggregates/boilers, improved thermal insulation, etc.; • Replacement of old boiler aggregates with condensing boilers; • Switching from electricity heating to heating based on direct burning of fuels; • Improvement of technological processes, including improved control and management; • Reconstruction of steam distribution systems, installation of steam traps, increasing the efficiency of the condensate recovery process, etc.; • Building of new or reconstruction of existing plants for heat recovery from processes – so called “utilizators”; • Installation of absorption chillers; • Installation of variable speed drive motors; • Reconstruction of compressed air systems - so called compressor installations; • Reconstruction of power distribution systems; • Introduction of systems for energy management of production or of offices and other buildings, etc. <p>Large industrial enterprises will be financed under the green industry procedure of Operational Program Competitiveness.</p>	
TOTAL EFFECT OF THE MEASURES UNDER AXIS 1	1 778 000	

PRIORITY AXIS 2: USE OF ALTERNATIVE FUELS

Measures with direct impact on the reduction of GHG emissions

Measure 1		USE OF BIOMASS IN THE COMBUSTION UNITS OF INSTALLATIONS					
Instruments		One of the priorities in the current and in the next programming period; Waste Management Act					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Large companies with net revenues of at least 5 mln.BGN for the last financial year	MEET; MEW	2014-2018	78.2 mln. BGN	Green Industry Procedure under Operational Programme Competitiveness	Tonne reduced CO ₂ per year	1 940 000 tonnes reduced CO ₂ by the end of 2014. 647 000 tonnes reduced CO ₂ by the end of 2016. 647 000 tonnes reduced CO ₂ by the end of 2018. 646 000 tonnes reduced CO ₂ by the end of 2020.	3 880 000
Additional information		<p>The aim is to increase the use of waste as an alternative fuel such as: separately collected household waste (RDF); sludge from domestic sewage water; agricultural waste and waste from the food industry; industrial waste mixed with biomass. It is related to the ban on landfilling of biodegradable waste.</p> <p>The procedure for a green industry is intended to attain more efficient use of waste products.</p> <p>It is proposed to finance in the next programming period facilities that enable the utilization of sludge from urban wastewater treatment plants in industrial installations.</p>					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 2						3 880 000	

PRIORITY AXIS 3: ESTABLISHMENT OF A TECHNOLOGY PARK AND A BUSINESS INCUBATOR

Measures with indirect impact on the reduction of GHG emissions

Measure 1		ESTABLISHMENT OF A TECHNOLOGY PARK AND A BUSINESS INCUBATOR				
Instruments		Operational Programme Competitiveness				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Industrial enterprises/Research institutes	MEET/MEYS	2013-2015	100 mln. BGN	Operational Programme Competitiveness, Priority axis 1 Development of economy based on knowledge and innovation activities	Established technology park	Scientific research realized on the market
Additional information		The technology park will bring together the scientific developments with marketing potential, the business that needs them and the financial institutions that will support this process. From 2013 on the beneficiaries under OP Competitiveness will have access to funding for further development and introduction of innovations purchased by them.				

6.4 WASTE SECTOR

6.4.1 General information on the Waste sector

Waste management and in particular waste treatment is a source of greenhouse gases.

According to the National GHG inventory the Waste sector includes the following sub-sectors:

- Emissions from landfill of waste;
- Emissions from wastewater treatment;
- Emissions from waste incineration.

The sector is one of the major sources of GHGs. The main GHGs emitted into the atmosphere as a result of waste treatment are methane and nitrous oxide emitted during the process of waste disposal and wastewater treatment. Worldwide, about 5-20% of the total methane is released during the anaerobic processes of waste decomposition.

According to the national inventory report of 2011 (representing data from base year 1988 to 2009) the contribution of the Waste sector to the total amount of GHG emissions (without taking into account LULUCF) is 10% thus ranking it after the Energy sector - 76% and the Agriculture sector - 13% and before the Industry sector - 6%.

During the period 1988-2009 the share of emissions from the Waste sector has grown from 5% to 9%, but in the last five years it has stabilized at 7-8%. In absolute terms the GHG emissions from the Waste sector have decreased by 27.7% compared to the base year. The reduction is significant in view of the fact that changes in the quantities of municipal waste and wastewater is a conservative value, a function of the number of inhabitants, the living standards and the public attitudes towards measures to reduce waste generation. Sudden changes in input values from year to year cannot be expected.

The emissions from the Waste Sector are summarized and aggregated for the period 1988-2009 in CO₂ eq. and are presented in the following table.

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Gg	6 846	6 770	6 643	6 462	6 470	6 393	6 378	6 640	6 583	6 439	6 260

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Gg	6 056	5 969	5 739	5 593	6 253	6 174	5 294	5 219	5 105	4 951	4755

The GHG emissions from landfilled waste represent about 77% of the total amount of waste from this sector, the emissions from waste water treatment - about 22.19% and the GHG emissions from waste incineration - less than 0.79% (National Inventory Report 2011 for Greenhouse Gas Emissions).

Taking into account the share of the three sub-sectors in the emitted GHG it is evident that a substantial amount of the emissions from the Waste sector can be reduced primarily by implementing measures in subsector Landfill of waste and to a lesser extent in subsector Wastewater treatment.

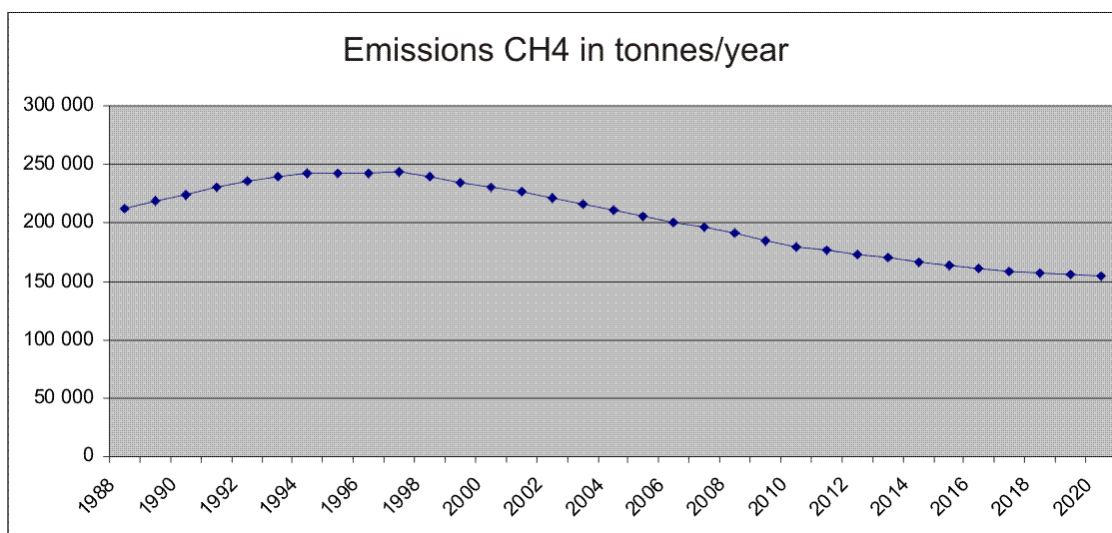
6.4.1.1 Landfill of waste

The emissions of methane emitted during the anaerobic degradation processes due to methanogenic bacteria in landfilled waste are estimated in this sub-sector.

The waste management policies carried out in the EU and in Bulgaria contribute to reducing GHG emissions. A priority is the prevention of waste which will reduce the amount of waste going to landfills.

Another major line in the waste policy in Bulgaria is the building of waste treatment infrastructure with the financial support of Operational Programme Environment (OPE) 2007-2013. The waste in the country is mainly disposed at the so-called “controlled” and “uncontrolled” landfills. The proportion of waste disposed of in the relevant landfills is distributed according to the population whose waste is disposed there. The implementation of the measures under OPE will allow all municipal waste to be covered by the systems for controlled treatment and all waste to be disposed of in controlled landfills.

The diagram below shows the emissions of methane emitted from landfilled waste in the period 1988-2008 and the projected emissions for the period 2009-2020 taking into account the construction of controlled regional landfills in time.

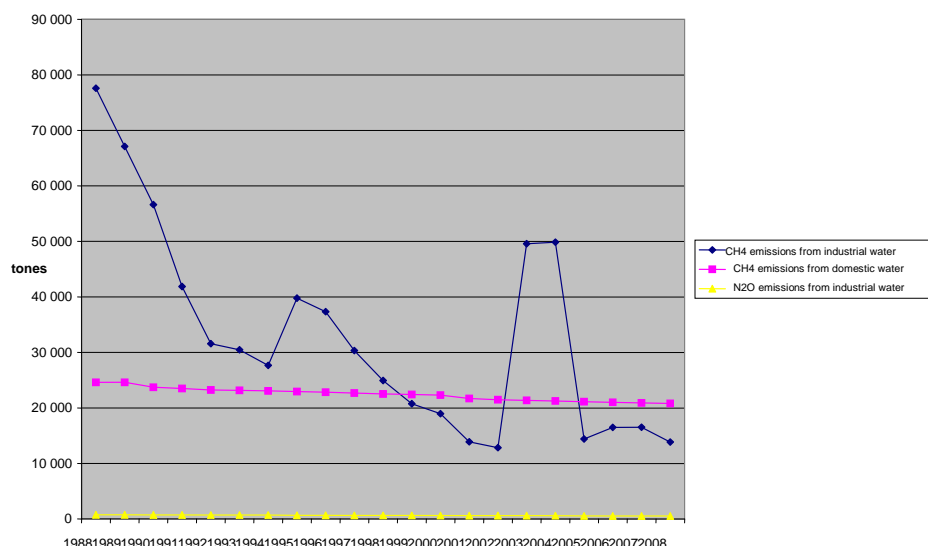


The measures to reduce GHG emissions from landfilled waste include:

- Prevention of waste for disposal by promoting the efficient use of resources, further development of the collective systems for separate waste collection, linking the amount of the municipal waste charge to the quantities of generated waste, creation of stable conditions for marketing of materials obtained from recycled waste, reducing the amount of biodegradable waste going to landfills;
- Reducing biogas emitted from landfilled waste by: introducing capture and flaring of biogas in all new and existing regional landfills for waste, as well as in the old municipal landfills that are to be closed; studying the energy potential of biogas generated in landfills that are to be closed; measuring the amount (flow) of the captured biogas in the combustion systems in order to meet the requirement for measuring and recording for the purpose of recognizing the recovery of methane.

6.4.1.2 Wastewater treatment

Methane and indirect N₂O emissions are emitted into the atmosphere during the treatment of domestic and industrial wastewater under anaerobic conditions. The emission levels are shown in the following graph.



Methane emissions from industrial water show a consistent and significant decline over the years. The peak in 2003-2004 was due to release of water after its stay in tailing ponds of mining enterprises.

Methane emissions from the treatment of domestic sewage water in the last 20 years show a steady trend of decline.

The emissions of nitrous oxide also mark a steady decrease following the decrease of the population.

In 2008 emissions of methane from domestic wastewater represented about 60% of the GHG emissions from wastewater in Bulgaria.

The treatment of sludge that is the main generator of methane emissions is taken into consideration in the National Programme for Priority Construction of Urban Wastewater Treatment Plants (NPPCUWWTP) and the National Waste Management Programme .

Table 13 in the report on the implementation of the requirements of Directive 91/271/EEC concerning urban wastewater (2011) provides the following data and projections for the recovery and disposal of sludge from UWWTP in tonnes of dry matter per year:

Year	Recovery in agriculture	Other recovery	Disposal at landfill	Incineration	Other disposal
31/12/2010	13 644	11 850	12 031	0	20 508
2014	43 587	-	34 863	8 718	-
2015	47 546	-	38 030	9 509	-

Practice has shown that it is technologically feasible and economically viable to produce electricity from the biogas generated in the methane tanks of large wastewater

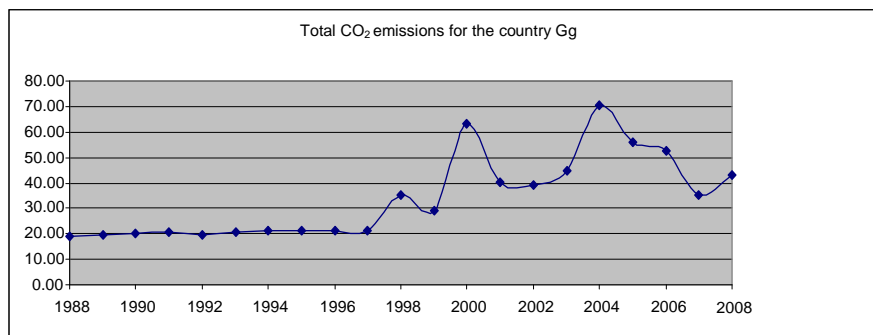
treatment plants (more than 50 000 PE) in order to cover the main share of the energy needs of the plants. The energy balance of small and medium-sized wastewater treatment plants (less than 20 000 PE) is negative (from -27 to -32 W/PE) thus making the capture and utilization of biogas economically inexpedient.

In 2008 the WWTPs treated approximately 58 000 tonnes of sludge. According to the NPPCUWWTP around 94 500 tonnes of sludge will be generated in the country by the end of the programme period (2014), 72% of which will be treated in WWTP for over 20 000 PE. This means that the methane from about 60% of the wastewater may be captured and treated. The measures for reduction of GHG emissions envisage introduction of capture and treatment of biogas from urban wastewater treatment plants for over 20 000 PE by introducing anaerobic stabilization of sludge with capture and combustion of biogas in new and renovated plants, repair, reconstruction and commissioning of methane tanks in existing plants completed with an installation for controlled combustion of the gas and for measuring the quantity (flow) of the captured biogas in the combustion systems in order to meet the requirement for measuring and recording the recovery of methane for recognition purposes.

6.4.1.3 *Incineration of waste*

This subsector includes only emissions from combustion processes without energy recovery while the emissions from waste incineration with energy recovery are included in the Energy sector. Incineration of waste is seen as a source of emissions of CO₂, CH₄ and N₂O.

Currently, the GHG inventory includes emissions from incineration of hospital waste and hazardous waste. The trends in emissions from burning waste in incinerators without energy recovery are presented in the following chart.



The NWMP envisages construction of only two new incinerators for hospital waste. No substantial changes in the amount of emissions from this sector are expected and no special measures for their reduction are planned.

6.4.2 Measures at the Waste Sector

PRIORITY AXIS 1: REDUCTION AND PREVENTION OF QUANTITIES OF WASTE THE DISPOSAL OF WHICH CAUSES GREENHOUSE GAS EMISSIONS OF

Measures with direct impact on the reduction of GHG emissions

Measure 1		CONSTRUCTION OF INSTALLATIONS FOR MECHANICAL AND BIOLOGICAL TREATMENT (MBT) AND INSTALLATIONS FOR TREATMENT AND RECOVERY OF COMPOST AND BIOGAS					
Instruments		National Programme for Waste Management Activities 2009-2013 National strategic plan for the phased reduction of the amount of biodegradable waste intended for disposal at landfills 2010-2020					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Municipalities	Municipalities, MEW	2013-2020	221 mln. BGN	OP Environment, municipal budget, state budget, private investments	Number of installations built	2013-2014 - 12 installations built 2014-2016 - 32 installations built 2016-2018 - 42 installations built 2018-2020 - 54 installations built	5 823 763
Additional information		The measure is incorporated into the National strategic plan for gradual reduction of biodegradable waste intended for landfilling 2010-2020. As a result of its implementation for the period 2013-2020 5 289 000 tonnes of biodegradable waste will be diverted from landfills. An additional impact of the measure will be the substitution of phosphate fertilizers in agriculture with compost produced at waste treatment installations.					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 1						5 823 763	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		FUTHER DEVELOPMENT OF COLLECTIVE SYSTEMS FOR SEPARATE COLLECTION OF WASTE FROM THE POPULATION				
Instruments		Revision of the Ordinance on Packaging and Packaging Waste and of the voluntary agreements with the organizations for recovery of packaging waste in order to expand and improve the schemes for separate collection and treatment of packaging waste (including from paper and cardboard)				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Organizations for recovery of packaging waste; municipalities	MEW	2013-2020	80 mln. BGN	Own funding of recovery organizations and EMEPA	Amended ordinance; Concluded voluntary agreements	Adopted amendment to the ordinance; Revision of voluntary agreements in 2013 to cover the systems for separate collection for 6 300 000 residents
Additional information		The measure is included also in the National Waste Management Programme 2009-2013. It aims to increase the efficiency and the scope of separate collection systems among the population, the enterprises and the governmental institutions at all levels. 130 000 tonnes/year are expected to be diverted from disposal at landfills as a result of separate collection and recycling of waste paper and cardboard.				

Measure 2		INTRODUCTION OF DIFFERENTIATED CHARGES FOR THE GENERATED WASTE				
Instruments		Methodological guidelines for determining the amount of municipal waste charges with introduction of differentiated fees for waste disposal.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Population and companies	MEW, MF, municipalities	2013-2014	30 000 BGN	EMEPA	Approval of methodological guidelines	Methodological guidelines approved in 2013 and implemented in municipalities from 2015 on.
Additional information		The measure is laid down in the National Waste Management Programme 2009-2013. Methodological guidelines will be developed to determine the amount of household waste charge and to introduce differentiated charge for landfilling of waste where the recyclable waste delivered for landfilling will be charged at the highest rate. Linking the amount of discharged waste to the amount of the charges and fees for household waste will motivate citizens and companies to reduce the quantities of waste and to re-orient towards various schemes for separate collection and recycling of waste.				

Measure 3		DEVELOPING STABLE MARKETS FOR THE MATERIALS OBTAINED FROM RECYCLED WASTE				
Instruments		Development of a set of documents for recycled materials and compost				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Companies and organizations for recovery of waste	MEW	2010-2013	110 000 BGN	EMEPA	Developed and approved set of documents	Developed and approved documents by the end of 2013
Additional information		The measure is included in the National Waste Management Programme 2009-2013 and the National strategic plan for gradual reduction of biodegradable waste intended for landfilling 2010-2020. It will introduce charges for use of new raw materials in order to stimulate the reuse and recycling of waste, as well as standards for recycled materials and compost in order to guarantee their quality and to make them competitive on the market. This measure will have double effect – on one hand it will reduce GHG by reducing the landfilled waste and, on the other hand, it will preserve natural resources.				
Measure 4		INTRODUCTION OF SEPARATE COLLECTION OF “GREEN” WASTE IN MUNICIPALITIES				
Instruments		Updated municipal regulations and waste management programmes.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Population, municipalities	MEW	2010-2020 г.	Not applicable	Not applicable	Number of municipalities with separate collection	264 municipalities with separate collection by the end of 2020
Additional information		The measure is included in the National strategic plan for gradual reduction of biodegradable waste intended for landfilling 2010-2020. The municipal ordinances are to regulate the method of separate collection of “green” waste, while the programmes should include more specific measures regarding: prevention of biodegradable waste; recycling of waste paper and cardboard; composting of “green” waste; introduction of home composting. At a subsequent stage, after adoption of a national plan for waste prevention, the programmes will be expanded to cover biodegradable waste from food (catering establishments, markets, shops, etc.)				

PRIORITY AXIS 2: CAPTURE AND FLARING OF BIOGAS FROM LANDFILLED WASTE

Measures with direct impact on the reduction of GHG emissions

Measure 1		CAPTURE AND FLARING OF BIOGAS IN ALL NEW AND EXISTING REGIONAL LANDFILLS					
Instruments		Integrated permits Training programmes					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
MEW, municipalities, landfill operators	MEW	2013-2016	24 mln. BGN	OP Environment, municipal budgets	By 2020 all regional landfills for municipal waste will be equipped with installations for biogas capture and flaring	Built installations for biogas capture and flaring: By 2014 – 6 inst. By 2016. – 22 inst. By 2016. – 30 inst. By 2020 – 54 inst.	5 070 122
Additional information		The requirement for design and operation of landfills is provided for in Ordinance №8/2004. It is necessary to improve the control over its implementation. 360 mln. Nm ³ methane will be burned by 2020 with the introduction of systems for capture and flaring of biogas in all regional landfills.					

Measure 2		CAPTURE AND FLARING OF BIOGAS IN OLD MUNICIPAL LANDFILLS TO BE CLOSED					
Instruments		Control by RIEW over the projects and the closure of old landfills.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
RIEW, municipalities	MEW	Launched – until 2016	36 mln. BGN	EMEPA, state budget, OP Environment	Number of closed landfills with constructed installations for biogas capture and flaring	5 landfills by the end of 2014. 31 landfills by the end of 2016.	The effect is calculated in Measure 1
Additional information		The mechanism for development of waste management infrastructure with the support of Operational Programme Environment 2007-2013 and Decree № 209/2009 of the Council of Ministers on the provision of funding for the construction of regional systems for household waste management, regional pre-treatment facilities for household waste and closure of municipal landfills envisages allocation of funds for the closure of old municipal landfills and the cost is determined on the basis of €14 000 per decare. The assessment whether a facility to capture and burn biogas is necessary is made on a case-by-case basis.					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 2						5 070 122	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		EVALUATION OF THE ENERGY POTENTIAL OF THE BIOGAS FROM LANDFILLS THAT ARE PLANNED TO BE CLOSED				
Instruments		Project to evaluate the energy potential of the old (closed) landfills.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Municipalities	MEW	2013-2014	200 000 BGN	National Trust Eco Fund, EMEPA	Investigation of 20 landfills Audits of 5 landfills	Project to be completed in 2014 with final report on the audit of 5 closed landfills with potential for energy recovery of the biogas
Additional information		There was interest in the energy potential of the landfills and it was studied in the landfills of Sofia (Suhodol), Plovdiv (Tzalapitza), Burgas and Ruse after 1999, and before that - in Sliven and Gabrovo. Municipal landfills are to be closed and the largest of them (20 landfills) will be inspected in order to select 5 where significant amount of generated methane may be expected. Audits will be carried out to identify their energy potential with a view to its possible utilization.				

Measure 2		MEASURING THE AMOUNT (FLOW) OF BIOGAS CAPTURED IN COMBUSTION SYSTEMS				
Instruments		Amendment to the technical requirements in Ordinance № 8/2004 on the condition and requirements to the construction and operation of landfills and other facilities and installations for recovery and disposal of waste.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Municipalities, landfill operators	MEW	2013-2015	340 000 BGN	EMEPA, municipal budgets	Ordinance №8/2004 is amended and supplemented	Regulation of the technical requirements to the measurement of biogas from landfills in 2015
Additional information		The effect from the introduction of measurement of the amount of recovered methane gas will be reflected in the reporting of GHG emissions. The <i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i> (IPCC GPG, 2000) requires measurement and documentation for the purpose of recognition of the methane recovery.				

PRIORITY AXIS 3: CAPTURE OF BIOGAS FROM URBAN WASTEWATER TREATMENT PLANTS (UWWTP) AND ITS BURNING

Measures with direct impact on the reduction of GHG emissions

Measure 1		INTRODUCTION OF ANAEROBIC STABILIZATION OF SLUDGE WITH CAPTURE AND BURNING OF BIOGAS IN NEW PLANTS AND PLANTS UNDER RECONSTRUCTION IN SETTLEMENTS WITH OVER 20000 POPULATION EQUIVALENT					
Instruments		Adoption of an ordinance on the conditions and the requirements to the treatment of sludge at wastewater treatment plants					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Municipalities, Owners and operators of UWWTP	MEW	2013-2015	174 mln. BGN (in the part concerning methane tanks)	OP Environment	Number of plants with anaerobic stabilization of sludge	8 WWTP with anaerobic stabilization of sludge – by the end of 2015 20 WWTP - by the end 2020	1 025 589
Additional information		A cost-benefit analysis for each project should justify or discourage the recovery of methane. Practice has shown that it is technologically feasible and economically viable to produce electricity from the biogas emitted from the methane tanks of large wastewater treatment plants (more than 50 000 PE) in order to cover the main share of the energy needs of the plants. An additional effect of the stabilization of sludge at UWWTP will be achieved as a result of the possibility to use the stabilized sludge in agriculture so as to recycle the nutritional substances, to preserve the fertile soils and to limit the use of agricultural chemicals and synthetic fertilizers.					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 3						1 025 589	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		INTRODUCTION OF MEASUREMENT OF THE QUANTITY (FLOW RATE) OF THE BIOGAS CAPTURED IN THE COMBUSTION SYSTEMS				
Instruments		Adoption of an ordinance on the conditions and the requirements to the treatment of sludge at wastewater treatment plants including on the measuring of the flow rate of the recovered methane gas.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Owners and operators of UWWTP	MEW	2014-2020	580 000 BGN	OP Environment, own funds	Number of systems for measurement of quantity	20 measurement systems by the end of 2020
Additional information		The effect from the activity will be reflected in the reporting of GHG emissions. The <i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i> (IPCC GPG, 2000) requires measurement and documentation for the purpose of recognition of the methane recovery.				

6.5 AGRICULTURE SECTOR

6.5.1 General information of the Agriculture sector

In 2009 the GHG emissions from the Agriculture Sector were 10.4% of the total GHG emissions in Bulgaria. A decrease of 67.45% was reported for the period 1988-2009 – mainly due to reduced production and structural changes in the sector. According to the National GHG Inventory (2011) the emissions of methane (CH₄) account for 36% of the emissions in the sector (CO₂ eq./2009). The emissions of nitrous oxide were 64% in 2009.

Three are the main sources of greenhouse gas emissions from agriculture in Bulgaria:

- agricultural soil - 56.08%;
- biological fermentation in animal husbandry - 21.78%;
- management of manure - 19.34%.

The remaining 2.8% are due to burning of stubble (1.68%) and rice production (1.13%).

6.5.1.1 Overview of the state of the Agriculture sector

After Bulgaria's accession to the EU there were significant structural changes in the field of agriculture involving mainly reduction of the number of farms and increase in the average size of the land used by them.

In 2010 the farms in Bulgaria were 371 100, according to preliminary data from the farming census⁷¹. This represents a decrease of 44% compared to the number of farms in 2003. The agricultural holdings of individuals are 363 700 or 98% of all farms. They are followed by those of companies - 1%, sole traders - 0.6%, cooperatives - about 0.3% and other holdings - about 0.1%.

One farm holding operates an average of 10.1 ha of utilized agricultural area (UAA). Individuals manage 33.8% of UAA, companies manage 31.6% of UAA of the country, cooperatives - 17.7%, sole traders - 14.9%, and other holdings - 2%.

The farms with UAA from 0.00 to 1.99 ha in 2010 are 83.2% of all farms, but manage only 144 300 ha. Over 78.2% of the UAA (2 830 300 ha) is in farms with area of 100ha or more, and the average UAA of these holdings is 534 ha.

The agricultural soils remain the major source of emissions in agriculture, although direct emissions from agricultural soil decreased during the period 1988-2008 more than 2 times as a result of the structural changes in agricultural enterprises and the overall reduction of agricultural activities in the country.

The agricultural land (AL) in 2011 is 5 486 572 ha and occupies 49.4% of the country's territory. In 2011 it decreased by 0.1% compared to the previous year. The utilized agricultural area (UAA) is 5 087 948 ha, or 45.8% of the country's territory. In 2011 it increased by 0.7% compared to the previous year. The utilized land in 2011 occupied an area of 3 227 237 ha, which was 63.4% of the utilized agricultural area in the country and 29.1% of total area of the country. The area of arable land increased by 2.0% compared to 2010. In 2011, the area with grain crops was 1 804 933 ha, which represents an increase of 2,8% compared to 2010. Their share is still the largest in the

⁷¹ Ministry of agriculture and food, Department of Agrostatics – Census of Agricultural Farms in the Republic of Bulgaria in 2010, 170/May 2011.

country's arable land – 55.9%. In 2011 the areas with wheat were 1 152 999 ha or an increase of 5.2% compared to 2010. Wheat occupies 63.9% of the area with grain crops in the country, 35.7% of the arable land and 22.7% of UAA. In 2011 the area with barley was 174 010 ha or 30.6% less than in 2010. The share of barley is 9.6% of the area with grain crops, 5.4% of the arable land and 3.4 % of UAA in the country. In 2011 the area with maize was 430 914 ha and increased by 19.7% compared to 2010. This crop occupies 23.9% of the area with grain crops, 13.4% of the arable land and 8.5% of the UAA in the country. The areas with oil seed crops are 1 029 253 ha. Sunflower crops occupy 795 319 ha, which is 8,3% more compared to 2010. In 2011, sunflower crops held 24.6% of the arable land, 77.3% of oil seed crops and 15.6% of UAA in the country.

In 2011 the fallow land occupies 174 110 ha – down by 16.1% compared to 2010. The share of fallow land is 5.4% of arable land and 3.4% of the UAA of the country. Temporary meadows with legumes and cereals in 2011 occupy 84 804 ha, or 2.6% of the arable land and 1.7% of the UAA of the country. These areas have decreased by 4.6% compared to 2010.

The continuously productive meadows, alpine meadows, grasslands with low productive potential and meadow orchards in 2011 occupy an area of 1 678 308 ha or 33% of the country's UAA, which represents a decrease by 1.4% compared to 2010.

The vineyards in 2011 occupied 78 468 ha, which is a decrease by 5.1% compared to 2010. The orchards cover 1.4% of the UAA (69 478 ha), and they have decreased by 4.7% compared to the previous year. The mixed perennial plantations occupy 8628 ha, there was an increase of 7.6% compared to 2010. Their size is 0.2% of the country's UAA. The family gardens in 2011 occupied 22 517 ha and this area is 0.4% of the UAA of the country. They increase by 4.1% compared to 2010.

The natural land in 2011 is 7.3% of agricultural land. Some of this land is included in UAA in 2011 and decreased by 9.6% compared to the previous year.

Use of agricultural land

Category	2011		2009		2008		1990	
	area (ha)	% of the area of the country	area (ha)	% of the area of the country	area (ha)	% of the area of the country	area (ha)	% of the area of the country
Agricultural land	5 486 572	49,4	5 490 113	49,5	5 648 206	50,9	6 159 000	55,7
Utilized agricultural land	5 087 948	45,8	5 029 585	45,3	5 100 825	46	No data	No data
Natural land	398 624	3,6	460 528	4,1	547 381	4,9	No data	No data
of which	area (ha)	% of UAA	area (ha)	% of UAA	area (ha)	% of UAA	area (ha)	% of UAA
Arable land	3 227 237	63,4	3 122 516	62,1	3 060 543	60	4 347 000	70,6
Permanent crops	156 574	3,1	164 536	3,3	183 525	3,7	296 000	4,8
Pastures and meadows	1 678 308	32,9	1 719 028	34,1	1 828 865	35,8	1 516 000	24,6

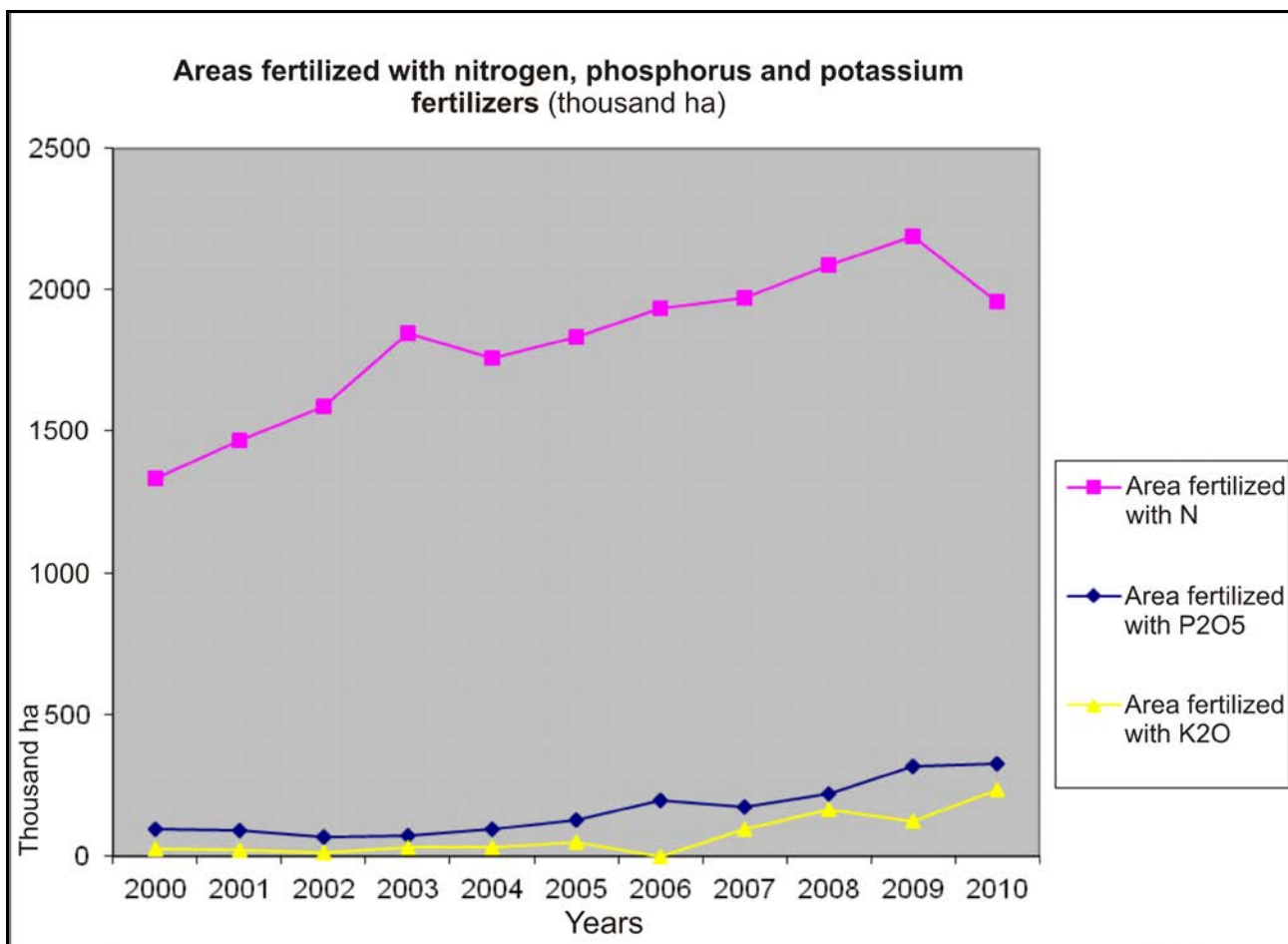
Source: MAF, BANSIK 2011, 182/October 2011

Fertilization of agricultural soils is a source of emissions of the greenhouse gas nitrous oxide (N₂O). Over the recent years data have shown that the amount of applied mineral fertilizers constantly grows as well as the areas (until 2009) treated with mineral fertilizers, mainly unilateral nitrogen fertilization.

Used amounts of mineral fertilizers – tonnes of active substance

Year	Total NPK	N	P ₂ O ₅	K ₂ O
	<i>tonnes</i>			
2000	163 569	144 928	16 104	2 537
2001	178 734	167 962	8 474	2 298
2002	177 935	155 411	21 400	1 124
2003	167 607	140 930	23 874	2 803
2004	197 980	164 958	29 904	3 118
2005	188 452	159 506	25 113	3 833
2006	185 847	152 766	25 278	7 803
2007	221 059	177 936	29 607	13 516
2008	217 425	173 917	30 558	12 950
2009	220 037	177 553	30 661	11 823
2010	258 916	199 083	39 034	20 799

Source: MAF, Agrarian reports



Another major source of emissions in the sector is animal husbandry. The amount of emissions therefrom has decreased as well, mainly due to reduction in the number of animals in the country as a consequence of the crisis in the sector and the structural changes in agriculture.

There are 280 300 animal farms in the country at the end of 2010⁷². 91.5% of these farms occupy agricultural area up to 10 ha (excluding municipal and state commons and pastures). Overall, there was continuous downward trend in the number of animal farms. In 2009⁷³ the reduction primarily affected the farms which grow from 1 to 9 breeding females, as follows: dairy cows (-15.3%); ewes and ewe lambs put to the ram (- 14.6%); goats which have already kidded and goats which have been mated (- 18.3%). Farms with 1 to 9 female breeding pigs over 50 kg also decreased (- 21.4%). Although the farms with 10 or more breeding female animals decrease, the number of their animals either slightly decreases or increases.

The number of cattle in 2009 is 539 555, of which 312 695 cows over 2 years. The number of cattle decreased in half over the period 1988-2008. In 2009 the number of cattle decreased by 4.5% compared to 2008.

The number of buffaloes in the country in 2009 is 8311 declined more than twice over the period 1988-2008. In 2009 the number of buffaloes decreased by 9.9% compared to 2008.

⁷² MAF, Department of Agrostatistics – Census of Agricultural Farms in the Republic of Bulgaria in 2010 – preliminary data 170/May 2011.

⁷³ MAF, Department of Agrostatistics – Farm animals in Bulgaria as at 1 November 2009,154/March 2010.

In 2009 the sheep were 1 400 252, and their number decreased 6 times over the period 1988-2008 which is due to lower interest in sheep's milk and the low prices of imported wool. The number of sheep in 2009 decreased by 5% compared to 2008.

The number of goats substantially increased in the period 1988-1999, and then declined again to nearly reach in 2008 the number of 1988. In 2009 the goats are 360 822 and decreased by 16.1% compared to 2008.

The number of pigs in 2009 was 729 798 and decreased almost 5 times over the period 1988-2008 due to the high costs of cultivation and the low prices of imported pork.

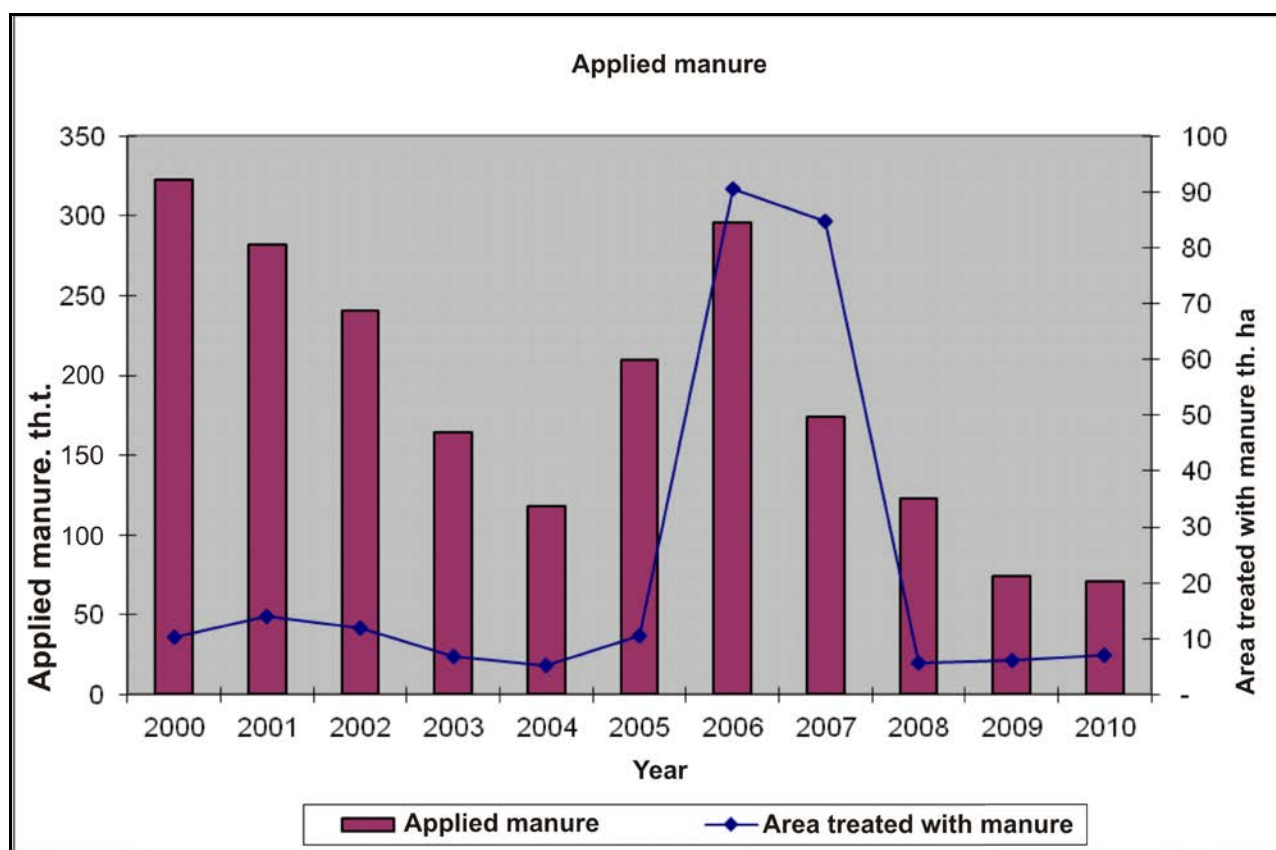
The number of horses in the country is relatively constant over the period 1988-2008. The numbers of mules and donkeys decreased almost 2 times over the period 1988-2008 due to the increasing degree of mechanization of agriculture and decreasing rural population in the country.

The production, the processing, the storage and the management of manure is a major source of emissions of the greenhouse gas CH₄ in agriculture. Apart from the decrease of the total number of farm animals in recent years, there is also reduction of the amount of used manure and the treated areas. Manure is used mainly for vegetables, potatoes, fruit and vineyards and for organic farming.

Used manure

Year	Used Manure	Average for the period	Area fertilized with manure
	(thousand tonnes)		(thousand ha)
2000	323.0	2000-2003:	10.40
2001	282.0	252.5 thousand tonnes	13.90
2002	240.5		11.90
2003	164.4		6.90
2004	118.2	2004-2007:	5.08
2005	209.4	200 thousand tonnes	10.60
2006	296.0		90.50
2007	173.9		84.70
2008	122.9	2008 -2010	5.60
2009	74.4	83.5 thousand tonnes	6.18
2010	71.3		6.96

Source: Agrarian reports



Measure 121 “Modernization of agricultural holdings” of the Rural Development Programme (RDP) for 2007-2013 allocated over €70 million for investment projects in animal farms involving construction of facilities for storage of manure and purchase of equipment for its proper use (Council Directive 91/676/EEC). In 2010 the interest in these investments increased sharply - 353 projects were approved (62 in 2009) totaling €45,6 mln., which is the result of both increased EU requirements and of the significantly higher subsidy (up to 85% for such projects)⁷⁴.

6.5.1.2 Objectives and priorities in the Agriculture sector

To achieve the objectives of the National Action Plan on Climate Change for the Agriculture sector 25 measures were developed and grouped in 2 priority goals and 6 priority axis. The proposed measures are aimed at reducing emissions from the major sources in the sector. The measures are consistent with the condition of the sector and the main priorities of the CAP for the period 2014-2020. One of the main challenges facing CAP is finding a solution to the increasingly aggravated production conditions in agriculture due to climate change and the need for farmers to reduce their share of greenhouse gases, to play an active role in mitigating climate change and to provide energy from renewable sources. In this regard there is an opportunity to promote the implementation of a number of measures in the field of direct payments, market support and rural development in order to mitigate climate change.

Based on the analysis of the major sources of emissions the following two main objectives are defined in the Agriculture sector:

⁷⁴MAF, Annual Report on the Implementation of RDP (2007-2013) in the Republic of Bulgaria for the period 01.01.2010 – 31.12.2010.

- Reduction and/or optimization of emissions from the agricultural sector;
- Increasing the awareness and the knowledge of both farmers and the administration in terms of actions and their effect on climate change.

The following priorities refer to these main objectives:

1. Reduction of emissions from agricultural land;
2. Reduction of methane emissions from the biological fermentation in animal husbandry;
3. Improving the management of manure;
4. Optimization of the use of plant residues in agriculture;
5. Improving the management of rice fields and technology for rice production;
6. Improving the knowledge of farmers and the administration regarding reduction of emissions from the Agriculture sector.

6.5.2 Measures in the Agriculture Sector

PRIORITY AXIS 1: REDUCTION OF EMISSIONS FROM AGRICULTURAL LAND

Measures with direct impact on the reduction of GHG emissions

Measure 1		ENCOURAGING THE USE OF SUITABLE CROP ROTATION, ESPECIALLY WITH NITROGEN FIXING CROPS					
Instruments		Development and implementation of RDP measures to stimulate the use of crop rotation and erosion control activities (agri-environment measures)					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Farmers	MAF	2013-2020	5 400 000 BGN	EU Funds/State budget – to be proposed for financing by RDP 2014-2020	8000 ha with improved crop rotation 12 000 ha treated biologically	2000 ha with improved crop rotation by the end of 2014 5000 ha with improved crop rotation by the end of 2016 6000 ha with improved crop rotation by the end of 2018 8000 ha with improved crop rotation by the end of 2020	6 356
Additional information		<p>Rotation means science-based successive rotation of crops in time and place on a farmland. The period required for all crops to pass through all fields following the order of the crop rotation scheme is called rotation period or rotation. The introduction of sustainable crop rotations that include plant cover in winter and legumes (beans, soybeans, alfalfa, clover) will prevent soil erosion and will retain organic carbon (carbon sequestration), which is a potential tool for reducing greenhouse gases.</p> <p>The proposed budget for the measure is based on: 350 BGN/ha is the current payment for biological field crops under Measure 214 of RDP 2007-2013; 150 BGN/ha is the current payment for the introduction of rotation under Measure 214 of RDP 2007-2013. This measure covers: 20 000 ha, of which 60% in organic production. Organic production: 12 000 ha X 350 BGN/ha = <u>4 200 000 BGN</u> Crop rotation: 8000 ha x 150 BGN/ha = <u>1 200 000 BGN</u></p>					

Measure 2		MANAGEMENT OF DEGRADED AGRICULTURAL LAND THROUGH: 1. BIOLOGICAL RECLAMATION WITH TYPICAL FOR THE REGION GRASS SPECIES 2.IMPLEMENTATION OF EROSION CONTROL MEASURES AND SOIL TREATMENT METHODS					
Instruments		Development of investment measures under RDP 2014-2020 for management of degraded agricultural land					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Farmers	MAF MEW	2014-2020	1 312 500 BGN	EU Funds/State budget – to be proposed for financing by RDP 2014-2020	2500 ha with implemented control erosion practices 2500 ha recultivated agricultural land	500 ha biologically recultivated agricultural land by 2014 1000 ha biologically recultivated agricultural land by 2016 2000 ha biologically recultivated agricultural land by 2018 2500 ha biologically recultivated agricultural land by 2020 500 ha agricultural land with implemented control erosion measures at the end of 2014	20 000

						1000 ha agricultural land with implemented control erosion measures at the end of 2016 2000 ha agricultural land with implemented control erosion measures at the end of 2018 2500 ha agricultural land with implemented control erosion measures at the end of 2020	
Additional information		<p>Soil erosion is a process of mechanical destruction and weathering of soil by the action of water and wind. It gradually reduces the amount of nutrients and the humus in soil. Erosion aggravates the structure, as well as the water and air regime of soil. The combination of the specific natural and economic conditions in Bulgaria is a reason for the high risk of degradation processes in agricultural soils. The most common processes of soil degradation include water and wind erosion, pollution, reduction of organic matter stocks (humus), compaction, acidification, salinisation, loss of biodiversity. More than 60% of the country is affected by varying degrees of erosion. 11.8 % of the country's territory is severely eroded. 65% of agricultural land is threatened by water erosion and 24% is threatened by wind erosion. The average annual intensity of soil erosion varies according to land use, but soil loss in agricultural lands is estimated at 12.256 tonnes/ha a year on average. The water erosion of soil controls the stocks of organic carbon and their distribution on the landscape which affects the circulation of carbon, the content of carbon dioxide in the atmosphere and the global warming.</p> <p>The proposed budget for the measure is based on reclamation of 2500 ha:</p> <ul style="list-style-type: none"> • 2500 ha x 380 BGN/ha = <u>950 000 BGN</u> <p>Erosion control practices for 2500 ha</p> <ul style="list-style-type: none"> • 2500 ha x 145 BGN/ha = <u>362 500 BGN</u> <p>The amounts used are under the current Measure 214 Agri-environmental payments under RDP 2007-2013</p>					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 1						26 356	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		IMPROVING THE KNOWLEDGE OF FARMERS REGARDING HUMUS CONSERVATION ACTIVITIES (FERTILIZATION - PRECISE FERTILIZATION, GREEN MANURE, LIMING, SOIL CULTIVATION, PREVENTION OF STUBBLE BURNING, ANTI-EROSION MEASURES, ETC.)				
Instruments		Training programs for farmers; Information campaigns; Consultation.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
National Agricultural Advisory Service (NAAS), Farmers, NGOs	MAF	2014-2020	4 000 000 BGN	EU Funds/State budget – to be proposed for financing by RDP 2014-2020	Number of trained farmers	5000 trained farmers by 2020 2000 consulted farms by 2020
Additional information		<p>By improving carbon storage ability of soils carbon dioxide can be removed from the atmosphere, and will have at the same time an important role in improving the long-term quality and fertility of soils.</p> <p>It is necessary to improve the knowledge of farmers regarding the most appropriate tilling methods in terms of maintaining and improving the humus layer as well as the overall decrease in the number of soil treatments. They are determined at regional and even local level depending on the specific characteristics of the area. Namely these specific characteristics and their relation to reducing carbon emissions should be subject to consultation and training of farmers.</p> <p>The proposed budget for the measure is based on: 410 BGN is the current amount for training through information activities under Measure 111 of RDP 2007-2013. 975 BGN is the amount paid to NAAS for provision of consultations under Measure 214 Agri-environmental payments of RDP 2007-2013. 5000 trained farmers by 2020 X 410 BGN = <u>2 050 000 BGN</u> Consultations: 2000 farms x 975 BGN = <u>1 950 000 BGN</u></p>				

Measure 2		INTRODUCTION OF WATER SAVING AND ENERGY SAVING IRRIGATION TECHNOLOGIES				
Instruments		Training programs for farmers Development of investment measures under RDP 2014-2020 for introduction of water saving and energy saving irrigation technologies				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
NAAS, Farmers	MAF	2014-2020 r.	200 trained farmers x 690 BGN = <u>138 000 BGN</u> 50 investment projects	EU Funds/State budget – to be proposed for financing by RDP 2014-2020	Number of trained farmers; Number of developed investment projects	200 trained farmers and 50 developed investment projects by the end of 2020
Additional information		<p>The irrigation of agricultural land will have an increasingly important role in the parallel impacts of the agricultural sector development on one hand, and the effects of climate change on the other hand. The efficient and rational use of water is essential for the good condition of soil and for the reduction of the need to use extra energy in irrigation.</p> <p>The proposed budget for the measure is based on: 690 BGN is the current amount for training up to 30 hours under Measure 111 of RDP 2007-2013</p>				

PRIORITY AXIS 2: REDUCTION OF METHANE EMISSIONS FROM THE BIOLOGICAL FERMENTATION IN ANIMAL HUSBANDRY

Measures with indirect impact on the reduction of GHG emissions

Measure 1		ENCOURAGEMENT OF THE EXTENSIVE GRASSLAND HUSBANDRY				
Instruments		Trainings; Establishment of model farms; Development of measures under RDP 2014-2020 for investment support of extensive grassland husbandry; Introduction of payment per ha for preservation of permanent pastures.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Farmers – breeders; NGOs; NAAS	MAF	2013-2020 г.	34 190 000 BGN	EU Funds/State budget – to be proposed for financing by RDP 2014-2020	Number of trained breeders Hectares of permanent pastures	1000 trained breeders by 2020 100 000 ha of permanent pastures
Additional information		<p>The extensive livestock farming and the maintenance of optimum density of livestock units depending on environmental, climatic and soil conditions ensure the good ecological condition of meadows and pastures and permanent grass cover thus leading to preservation of carbon stocks in soil.</p> <p>The proposed budget for the measure is based on: <u>Funds for training: 690 000 BGN</u> <u>Funds for pastures: 100 000 ha by 2020 x 335 BGN/ha = 33 500 000 BGN</u></p>				

PRIORITY AXIS 3: IMPROVEMENT OF THE MANAGEMENT OF MANURE

Measures with direct impact on the reduction of GHG emissions

Measure 1		IMPROVEMENT OF THE MANAGEMENT AND USE OF MANURE					
Instruments		Trainings; Model farms; Development and implementation of measures under RDP 2014-2020 for building manure storage facilities.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Farmers/ NGOs/NAAS	MAF	2013-2020	130 207 000 BGN	EU Funds/State budget – to be proposed for financing by RDP 2014-2020	Number of livestock holdings with improved storage; Number of investment projects	50 livestock holdings by the end of 2014 100 livestock holdings by the end of 2016 200 livestock holdings by the end of 2018 300 livestock holdings by the end of 2020 300 investment projects by the end of 2014 600 investment projects by the end of 2016 800 investment projects by the end of 2018 100 investment projects by the end of 2020	1 171
Additional information		<p>Production, processing and management of manure is one of the most significant sources of the greenhouse gas CH₄ in agriculture. All activities aimed at storage and handling of manure should take into account both the type of manure - solid or liquid - and the technologies for gathering and processing.</p> <p>The investment support is crucial to motivate the farmers to build such expensive facilities.</p> <p>The proposed budget for the measure is based on: The average cost of building facilities for storage of manure for one farm with 50 cows is 130 000 BGN. 1000 x 130 000 BGN = <u>130 000 000 BGN</u> For training: 300 livestock holdings x 690 BGN = <u>207 000 BGN</u></p>					

Measure 2		INTRODUCTION OF LOW-CARBON PRACTICES FOR PROCESSING MANURE, E.G. COMPOSTING, TRANSFORMATION OF MANURE INTO BIOGAS UNDER ANAEROBIC CONDITIONS					
Instruments		Trainings; Model farms; Development of measures under RDP 2014-2020 for processing of manure.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Farmers/ NGOs/NAAS	MAF	2014-2020	1 138 000 BGN	To be proposed for financing by EU Funds/State budget	Number of trained livestock holdings Model farms with introduced low-carbon practices	200 trained livestock holdings by the end of 2020 2 model pig farms with average number of animals 150 by 2018 2 model cattle farms with average number of cows 50 by 2018	753
Additional information		<p>The introduction of low carbon practices for the processing of manure can reduce the emissions from its storage. This requires considerable accumulation of knowledge and experience at regional level, since the efficiency of the implementation of the measure depends on the conditions under which it is implemented. It is therefore advisable to establish model farms in different production areas of the country in order to accumulate practical experience that can be presented to the farmers.</p> <p>Given the resources required by such investments and the need for changes in the production process it is advisable to provide also investment support.</p> <p>The reduction of emissions depends on the type of animals:</p> <ul style="list-style-type: none"> - holdings that breed pigs: 811 kg CO₂ eq. per head - holdings that breed cattle: 78 kg CO₂ eq. per head - holdings that breed sheep: 4 kg CO₂ eq. per head - holdings that breed birds: 18.4 kg CO₂ eq. per head <p>The proposed budget for the measure is based on: <u>For training: 200 livestock holdings x 690 BGN = 138 000 BGN</u> <u>For model farms – 1 000 000 BGN</u></p>					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 3						1 924	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		ESTABLISHMENT OF A RESOURCE CENTER FOR LOW-CARBON PRACTICES IN PROCESSING MANURE				
Instruments		Applied studies; Trainings; Model farms.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Institutes and NGOs, farmers	MAF and MEW	2014	250 000 BGN	To be proposed for financing by EU Funds/State budget	Functioning resource center	Functioning resource center at the end of 2014
Additional information		The resource center is an independent specialized unit under research institutions or NGOs that creates, collects and disseminates the results of applied research and publications, good practices and experience with low carbon practices for processing manure adapted to Bulgarian conditions and the needs of farmers. It should specify the main topics and approaches for training farmers, as well as provide recommendations regarding the measures to be developed and promoted.				

PRIORITY AXIS 4: OPTIMIZATION OF THE USE OF PLANT RESIDUE IN AGRICULTURE

Measures with direct impact on the reduction of GHG emissions

Measure 1		TECHNICAL SUPPORT FOR FARMERS FOR TILLING SOIL/ STUBBLE					
Instruments		Targeted financing of investments in small and medium-sized farms. A possibility to develop such thematic programmes exists in the draft Regulation on rural development 2014-2020					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Small and medium-sized farmers	MAF	2014-2020	225 000 000 BGN	To be proposed for financing by EU Funds/State budget	Number of technically prepared holdings	1000 holdings x 10 ha at the end of 2016 3000 holdings x 10 ha at the end of 2018 5000 holdings x 10 ha at the end of 2020 50000 ha in 2020	655
Additional information		<p>The use of plant residues in agriculture requires both a change or adjustment of the production processes as well as investment in new equipment and machinery. This requires substantial financial resources and supporting them is appropriate.</p> <p>The efficient recovery of waste will reduce the need for burning stubble.</p> <p>The reduction of emissions is estimated at 3.62 kg CO₂ eq. per tonne production.</p> <p>The proposed budget for the measure is based on: 5000 holdings x 45 000 BGN = <u>225 000 000 BGN</u></p>					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 4						655	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		IMPROVEMENT OF THE AWARENESS AND THE KNOWLEDGE OF FARMERS REGARDING THE POSSIBLE USE OF PLANT RESIDUES AND THE THREATS POSED BY STUBBLE BURNING				
Instruments		Trainings; Information campaigns before peak harvest periods; Information materials.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Farmers	MAF -NAAS	2014-2020	4 865 000 BGN	State budget	Number of information campaigns and materials; Number of trainings	7 information campaigns completed at the end of 2020 1 500 trained farmers/year 10 500 trained farmers by the end of 2020
Additional information		<p>Knowledge and Understanding of the problem on the part of farmers is one of the key elements related to reduction of the burning of stubble.</p> <p>The proposed budget for the measure is based on:</p> <p>Information campaigns : 7 years x 80 000 BGN = <u>560 000 BGN</u> Trainings: 7 years x 1500 farmers x 410 BGN = <u>4 305 000 BGN</u></p>				

PRIORITY AXIS 5: IMPROVEMENT OF THE MANAGEMENT OF PADDY FIELDS AND TECHNOLOGIES FOR PRODUCTION OF RICE

Measures with direct impact on the reduction of GHG emissions

Measure 1		FINANCIAL SUPPORT FOR IMPROVING THE EQUIPMENT AND THE TECHNOLOGY OF PRODUCTION					
Instruments		Development of measures for targeted support of investments in rice fields					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Rice producers	MAF	2014-2020	250 000 BGN	To be proposed for financing by EU Funds/State budget	Number of supported rice producers	10 supported producers x 10 ha at the end of 2016 20 supported producers x 10 ha at the end of 2018 50 supported producers x 10 ha at the end of 2020	10
Additional information		In recent years, rice production in the country has been gradually recovering its potential. The introduction of low carbon technologies and methods is necessary, feasible and appropriate in this specific period.					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 5						10	

PRIORITY AXIS 6: RAISING THE AWARENESS AND IMPROVING THE KNOWLEDGE OF FARMERS AND ADMINISTRATION REGARDING THE ACTIONS AND THEIR EFFECT ON CLIMATE CHANGE

Measures with indirect impact on the reduction of GHG emissions

Measure 1		ESTABLISHMENT OF A SPECIALIZED UNIT AT MAF RESPONSIBLE FOR IMPLEMENTATION OF THE POLICY ON CLIMATE CHANGE MITIGATION RELATED TO AGRICULTURE				
Instruments		Changes in the statutory rules of MAF.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
MAF	MAF	2013	Not applicable	State budget	Amended statutory rules of MAF	Amended statutory rules of MAF in 2013
Additional information		The interaction between climate change and agriculture is mutual and two-way. A number of policies and official documents have been adopted and are currently being adopted that require action by the national administration. It is therefore necessary to establish a specialized unit under MAF that will not only follow the adopted policies and programmes of the other sectors pertaining to agriculture, but will also develop policies and a programme for mitigation and adaptation to climate change with respect to the agricultural sector.				

Measure 2		CREATING AND PROMOTING AN ONLINE MECHANISM FOR MEASURING EMISSIONS AT FARM LEVEL/MODEL FOR SIMULATION OF EMISSIONS				
Instruments		National survey of emissions from typical farms in the country; Setting up an infrastructure-based online mechanism.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Farmers	MAF MEW	2015-2020	250 000 BGN	To be proposed for financing by EU Funds/State budget	Functioning online mechanism	Functioning online mechanism at the end of 2015
Additional information		The mechanism for measuring the emissions from farms will help farmers understand what aspects of their activities generate most emissions and which type of emissions. National survey of emissions from typical farms in the country: 200 000 BGN; Setting up the infrastructure for the online mechanism: 50 000 BGN				

Measure 3		TRAINING MAF ADMINISTRATION AT NATIONAL, DISTRICT AND MUNICIPAL LEVEL				
Instruments		Targeted trainings on the impact of climate change and the role of MAF.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
MAF at national, district and municipal level	MAF; MEW	2013-2020	410 000 BGN	EU Funds/State budget	Number of trained employees	1000 trained employees at the end of 2020
Additional information		<p>The knowledge and the understanding of the problems related to the need to reduce emissions from the agricultural sector on the part of responsible administration is a key precondition for the development, implementation, supervision and monitoring of policies and measures in this field.</p> <p>The proposed budget for the measure is based on: 1000 x 410 BGN = <u>410 000 BGN</u></p>				

Measure 4		TRAINING OF FARMERS BY SUBSECTORS IN AGRICULTURE – PLANT GROWING AND LIVESTOCK BREEDING				
Instruments		Targeted trainings				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Farmers	MAF	2013-2020	1 380 000 BGN	EU Funds/State budget	Number of trained farmers	2000 trained farmers by the end of 2020
Additional information		<p>The knowledge and understanding of the problems related to the need of reducing emissions from the agricultural sector on the part of farmers is a key precondition for the motivations, participation and adequate implementation of the policies and the measures in this field.</p> <p>The proposed budget for the measure is based on: Training of 2000 farmers x 690 BGN = <u>1 380 000 BGN</u></p>				

Measure 5		TRAINING OF NAAS AT NATIONAL AND DISTRICT LEVEL				
Instruments		Targeted trainings				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
NAAS and district level	MAF	2013-2020	3 000 000 BGN	To be proposed for financing by EU Funds/State budget	Number of trained experts	200 trained experts at the end of 2020
Additional information		<p>NAAS is the main national body providing advice, consultations and training to farmers from all districts of the country. The development and the implementation of targeted trainings for experts from the district offices and the head office should be a key priority.</p> <p>The proposed budget for the measure is based on: 200 experts x 1500 BGN = <u>3 000 000 BGN</u></p>				

6.6 LAND USE, LAND USE CHANGE AND FORESTRY SECTOR

6.6.1 General information on the sector

The sector of Land Use, Land Use Change and Forestry (LULUCF) is not addressed and no measures are proposed to reduce emissions or to increase the absorption of greenhouse gases in the previous two Action Plans on Climate Change (2000, 2005). Accounting for the activities in the sector is necessary in order to make a comprehensive analysis of the carbon balance in the country.

In the national reports on greenhouse gas inventories sector LULUCF is presented in accordance with the requirements of the Good Practice Guidance (IPCC GPG, 2003) only for the last two years of inventory (2008 and 2009). The present analysis is based on data from the last inventory that covers the period from 1988 (base year for Bulgaria) to 2009.

According to the Good Practice Guidance the sector covers six major categories of land: “Forests”, “Arable land”, “Pastures and meadows”, “Wetlands”, “Settlements” and “Other land”. Each of these categories is divided into subcategories: “Land remaining in the same category of land use” and “Lands converted to other land uses”. The determination of removals or emissions of greenhouse gases is based on carbon stocks in soil and plant biomass on the area covered by the relevant category of land use.

The analysis of the structure and the changes in land use for the period 1988-2009 shows a positive trend with regard to forest areas. Although the area of pastures decreases the values show that most of them have become forest areas (fig. 1).

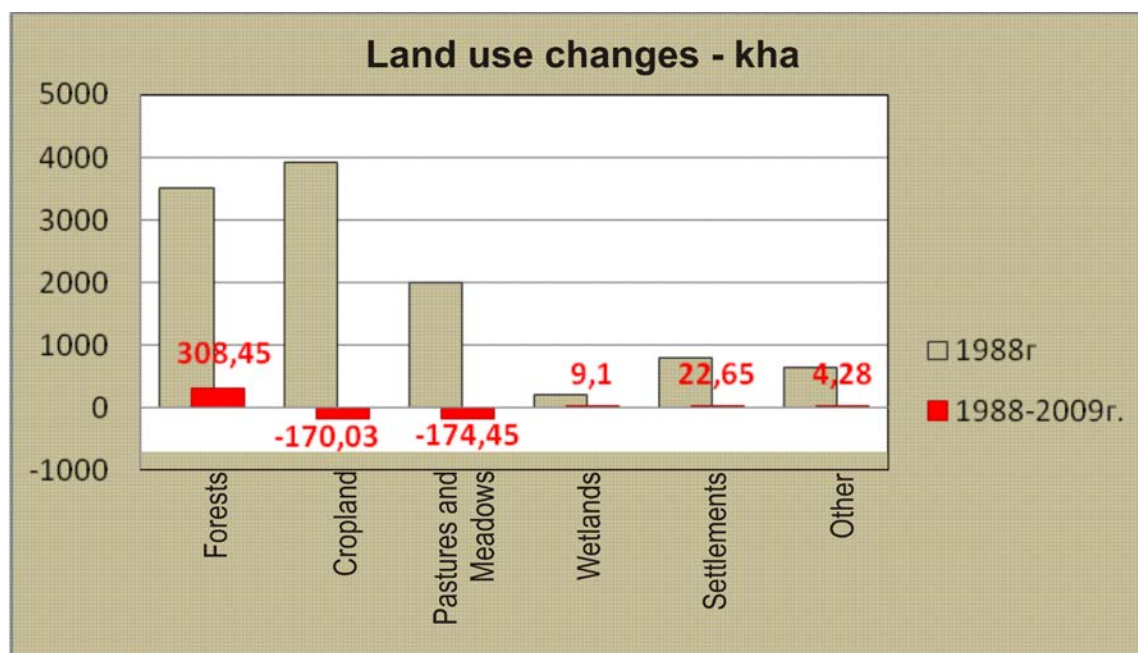


Fig.1. Change in the surface area of different categories land use (1988-2009)

The balance between emissions and removal of greenhouse gases in the LULUCF sector is in favor of the sequestration. Sinks are territories occupied by forests, grasslands and meadows. A major source of emissions in the sector is the change in land use and the conversion of forests, grassland into cropland and urban areas.

Over the past 21 years the absorption of greenhouse gases in the sector compensated between 11.35% -19.9% of the total greenhouse gas emissions in Bulgaria. Biggest role in the sequestration and storage of carbon (94-95% of the total absorption in the sector) have the territories occupied by forests (fig. 2).

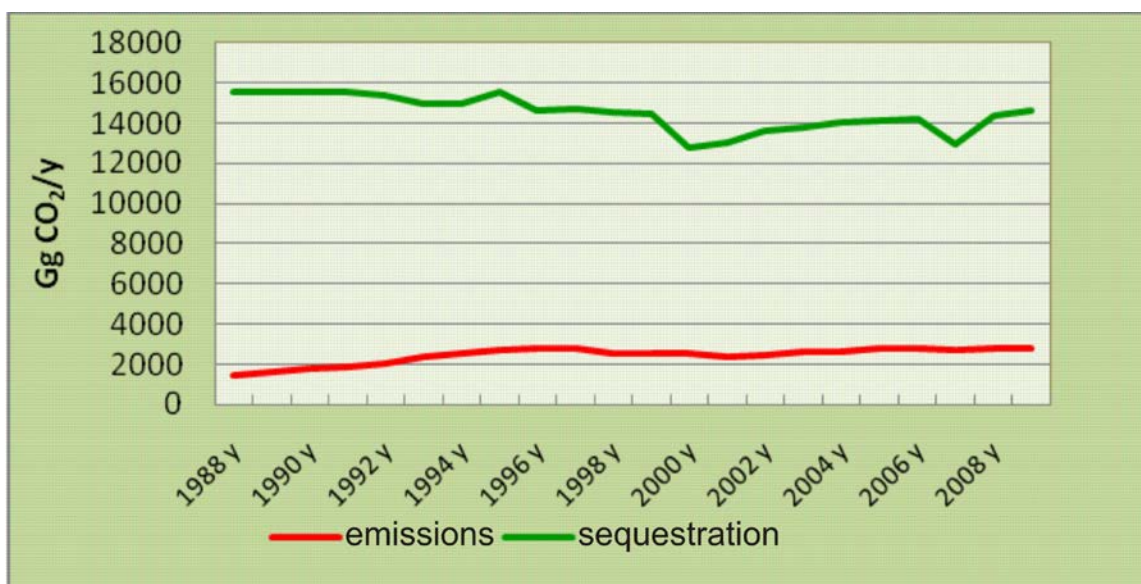


Fig.2. Annual emissions and sequestration of greenhouse gases by the LULUCF sector (1988-2009)

Forests are a major sink of carbon dioxide (CO₂) and play a key role in the absorption of carbon through photosynthesis. They are an important link in the global carbon cycle due to their ability to capture CO₂ from the atmosphere and store it in their biomass, forest litter (dead matter on the forest floor) and forest soil. The growth of tree species represents to a large extent net carbon stocks and with this respect evaluation and projections related to the state and the productivity of forests are essential to the analysis of the development of carbon emissions. Furthermore, the growth of woody biomass in forests plays a role in reducing greenhouse gas concentrations in the atmosphere. For these reasons, the analysis of forest ecosystems and the methods of managing forest resources are important for the possibility of increasing the potential of forests as sinks. To develop the measures in this NAPCC the current status of Bulgarian forests, as well as the possibilities provided by this resource for managing carbon emissions in the future were analyzed.

Bulgaria has a significant forest resource and its sustainable management and development is important for reducing greenhouse gases. Forested areas in the country occupy one third of its territory, amounting to 4.138 mln. ha, of which 3.761 mln. hectares are forests. The distribution of woodlands in groups of forests is as follows: coniferous - 30.5 % and deciduous - 69.5%. The total stock of forests is estimated at 644 mln. m³ of standing volume, including: conifers - 287 mln. m³ (44.6%) and deciduous trees - 357 mln. m³ (55.4%). The average annual growth is 14.4 mln. m³ of wood, and the average annual yield is less than 50% of the average annual growth. The projections of the forest resources dynamics for the period 2015-2030 is prepared according to the European Forest Information Scenario Model (EFISCEN) which is a matrix model based on the area occupied by tree species or by forest types and is suitable for policy analysis for large territories (D. Kostov, 2009). The following results for the stock of standing timber in Bulgarian forests and the average annual growth were estimated using the simulations with this model in the baseline scenario: 2015 – 705.3 mln. m³ of stock and growth of 16.763 mln. m³; 2020 – 743.5 mln. m³ of stock and growth of 16.734 mln. m³; 2025 – 780.3 mln. m³ of stock and growth of 16.669 mln. m³; 2030 - 812 mln. m³ of stock and growth of 16.195 mln. m³. This analysis shows that Bulgarian forests are now a reservoir of 229 mln. tonnes of carbon that will reach 264 mln. tonnes of C in 2020, and in 2030 - 288 mln. tonnes of C. EU forests, including

Bulgarian forests, absorb a total of 0.5 bln. tons of CO₂ eq. per year, while greenhouse gas emissions from the industry in the EU-27 amount to 5 bln. tons of CO₂ eq. per year.⁷⁵

In the long term it is necessary to continue the development of the concept for sustainable and multifunctional forest management aimed at maintaining or increasing the supplies of timber and respectively of carbon in forests, while ensuring, at the same time, a sustainable annual yield of timber and timber products. The current National Strategy “Sustainable Development of Forestry in Bulgaria 2006-2015” points out the need of overall improvement of the role and contribution of forests to climate change mitigation by increasing the carbon stocks in existing and in new forests. The increase in the use of wood as a resource that can substitute other energy-intensive materials and as a renewable energy source will have a positive impact on the carbon balance and will contribute to reducing the use of fossil fuels. The expansion of forest areas through afforestation of abandoned agricultural land, barren and deforested areas, eroded and threatened by erosion land, and the acceleration of measures for cultivation of forests and improvement of forest health will allow forests to better perform their productive, environmental and preservation functions that also will have, on the other hand, a positive effect on the growing accumulation of carbon in forest areas. The significant adverse effect of forest fires on the gas composition of the atmosphere can be minimized by anticipating and taking appropriate measures, activities and campaigns aimed both at the forestry sector and the related persons and organizations as well as at the general public.

Sixteen measures were developed to achieve the objectives of the National Action Plan on Climate Change for the Land Use, Land Use Change and Forestry sector and were grouped into four priority axes, comprising several popular approaches to managing the carbon balance.

The first priority axis combines measures to increase the sequestration of greenhouse gases and the necessary measures are associated with increase of the areas of land use categories - sinks of greenhouse gases - forests, pastures and meadows, and measures for their sustainable maintenance in order to increase the amount of biomass. The increase of green areas in urban territories is also a measure with positive impact on carbon balance. This axis reflects the need for additional legislative and administrative measures to regulate the changes in the designation of areas of land use categories that are sinks of greenhouse gases.

Another group of measures is aimed at conservation of carbon stocks in forests. This priority axis comprises activities aimed primarily at maintaining and improving the condition of forests as a carbon pool.

The third priority axis contains measures related to increasing the potential of forests for carbon sequestration. There are administrative, regulatory and financial measures aimed at increasing the country's forest resources and improving their condition and potential as a major carbon sink.

The last priority axis includes measures aimed at the long-term retention of carbon in wood products through the expansion of their use at the expense of other non-renewable materials with high carbon content which can be achieved by raising the awareness and the interest of society.

⁷⁵ Green Paper on Forest Protection and Information in the EU.

6.6.2 Measures in the Land Use, Land Use Change and Forestry Sector

PRIORITY AXIS 1: INCREASING GREENHOUSE GAS SEQUESTRATION

Measures with direct impact on the reduction of GHG emissions

Measure 1		UTILIZATION OF „NON-WOODED AREAS INTENDED FOR AFFORESTATION “ IN FOREST AREAS					
Instruments		Development of a programme for afforestation of non-wooded areas intended for afforestation in forest areas; Organization of afforestation campaigns; Publishing and distribution of explanatory leaflets.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
MAF, Executive Forest Agency (EFA), state enterprises, municipalities and other forest owners; NGOs, universities, schools, interested legal entities and individuals.	MAF	2013-2020	2 450 000 BGN	Rural Development Programme and other EU programmes; funds from interested legal entities and individuals.	490 ha utilized areas	120 ha utilized areas at the end of 2014 130 ha utilized areas at the end of 2016 120 ha utilized areas at the end of 2018 120 ha utilized areas at the end of 2020	13 378
Additional information		The measure is consistent with the requirements set out in the Forestry Act (2011). The needed financial resources are estimated on the basis of the accepted mean values of investments. The implementation of the measure is important for achieving the goals of NAPCC because forests are a major carbon sink and a reservoir of 90-95% of the total amount of sequestered carbon in the LULUCF sector. Increasing forest area has an important role in offsetting the greenhouse gas emissions from other sectors. The afforestation of non-wooded areas in the long term will increase the capacity of the forests as sinks of greenhouse gases.					

Measure 2		AFFORESTATION OF ABANDONED AGRICULTURAL LAND, BARREN AND DEFORESTED AREAS, ERODED AND THREATENED BY EROSION LAND OUTSIDE FOREST AREAS					
Instruments		Inventory of the areas; Applied scientific studies to assess their suitability for and possibility of afforestation; Development of projects for financing.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
EFA, municipalities and other land owners	MAF, MRDPW and municipalities	2013-2020	7 000 000 BGN	RDP and other EU programmes	1400 ha afforested areas	300 ha afforested areas at the end of 2014 300 ha afforested areas at the end of 2016 400 ha afforested areas at the end of 2018 400 ha afforested areas at the end of 2020	35 112
Additional information		The proposed measure corresponds to those with codes 223 and 226 under the Rural Development Programme. It is possible to apply under this programme with projects and to obtain appropriate funding. The needed financial resources are estimated on the basis of accepted mean values of investments. There is a potential for creating new forests outside the forested areas especially over the last two decades, when large territories of the agricultural land is not cultivated. The implementation of the measure will increase the absorption of greenhouse gases and thus contribute to climate change mitigation, to the protection of biodiversity and of the soil against erosion. To achieve the objective of the measure it is necessary, before undertaking afforestation activities, to make an inventory of the areas that are suitable for afforestation and to conduct applied scientific studies to evaluate their suitability and possibility for afforestation; appropriate recommendations for suitable species should be provided on the basis of the conditions of the places where they grow.					

Measure 3		INCREASE OF AREAS FOR URBAN AND SUBURBAN PARKS AND GREEN ZONES					
Instruments		Municipal development programmes; General development plans; Development of projects.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Municipalities	MRDPW, Municipalities	2013-2020	1 000 000 BGN	EU programmes and municipal budgets	100 ha increased areas	20 ha increased areas at the end of 2014 30 ha increased areas at the end of 2016 30 ha increased areas at the end of 2018 20 ha increased areas at the end of 2020	2 508
Additional information		<p>The proposed measure corresponds in part to measure with code 322 from the Rural Development Programme that provides funding opportunities. The measure is also related to Ordinance № 5 on Spatial Planning Rules and Standards, setting standards for the surface area of public green areas in cities. The needed financial resources are estimated on the basis of the accepted mean values of investments.</p> <p>The expansion of urban areas and the intensive building in recent years is a prerequisite for significant emissions of greenhouse gases. Increasing the areas of urban and suburban parks and green zones and keeping them in good condition will contribute to increased absorption of greenhouse gases and to better quality of the living environment. The measure will contribute also to the gradual achievement of the standards for green areas laid down in the General Development Plans.</p>					

Measure 4		RESTORATION AND SUSTAINABLE MANAGEMENT OF WETLANDS. PROTECTION AND PRESERVATION OF WETLANDS IN FOREST AREAS, PEATLANDS, MARSHLANDS					
Instruments		Development of programmes for restoration and protection of wetlands in forest areas Applied Research					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Administration Research institutes and universities, NGOs	MEW	2013-2020	For restoration of floodplain forests - 10 mln. BGN; Inventory and assessment of peatlands in forest areas - 5 mln. BGN	LIFE+, Operational Programme Environment, other EU programmes	200 ha restored / preserved wetlands; inventory and assessment of 1300 ha peatlands in forest areas	30 ha restored/ preserved wetlands at the end of 2014 50 ha restored / preserved wetlands at the end of 2016 60 ha restored / preserved wetlands at the end of 2018 60 ha restored / preserved wetlands at the end of 2020	4 681
Additional information		<p>The main instrument for the protection of wetlands is the Convention on Wetlands which is transposed in the Biological Diversity Act. The wetlands are designated as protected areas with priority or are included in Natura 2000. They will be subject to management plans that are currently being developed and that will be supplemented by special programmes for management in view of climate change.</p> <p>The needed financial resources are estimated on the basis of the accepted mean values of investments.</p> <p>Wetlands are characterized by great biological diversity and play an important role in carbon retention because they are among the most productive ecosystems. The restoration and the conservation of wetlands and woodlands and their proper management will enhance their efficiency as carbon stores.</p>					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 1						55 679	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		DEVELOPMENT OF A FINANCIAL MECHANISM TO SUPPORT THE ACTIVITIES FOR CREATION OF NEW FORESTS				
Instruments		Administrative capacity				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
MAF/EFA, state enterprises, municipalities and other owners of land and forests	MAF, EFA	2013-2020	30 000 BGN	RDP and other EU programmes, owners of forests	Developed financial mechanism	Functioning financial mechanism at the end of 2015
Additional information		<p>The aim is to build administrative capacity for provision of financial resources to support afforestation activities in order to increase the areas covered by forests. The needed financial resources are estimated by experts.</p> <p>The setting up of a functioning financial mechanism will improve the conditions for management and expansion of activities to increase the forested areas in woodlands. The measure will also support the implementation of activities for afforestation of non-wooded areas designated for afforestation in woodlands (Measure 1 with direct effect).</p>				

Measure 2		ANALYSIS OF THE EFFECTIVENESS OF THE EXISTING LEGAL FRAMEWORK FOR REGULATION OF LAND USE CHANGE OF DIFFERENT TYPES OF LAND AND RECOMMENDATIONS FOR ITS IMPROVEMENT				
Instruments		Applied scientific studies				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State and scientific institutions, NGOs	MEW, MRDPW, MAF, EFA	2013-2020	50 000 BGN	EU programmes, state budget	Analyses and recommendations regarding the improvement of the legislative framework	Performed analysis by 2016
Additional information		<p>The aim is to produce an analysis of the effectiveness of the legislative framework regulating the changes in the land use of different types of land and to provide recommendations for improvement.</p> <p>The financial resources are defined by experts.</p> <p>The existing regulations and their practical application facilitate, in many cases, land use change towards increasing the urban areas that are sources of greenhouse gas emissions. The implementation of this measure will identify the problems and the effectiveness of the legislative framework and its implementation and will propose specific actions and measures for its improvement.</p>				

PRIORITY AXIS 2: PRESERVATION OF CARBON STOCKS IN FORESTS

Measures with direct impact on the reduction of GHG emissions

Measure 1		RESTORATION AND MAINTENANCE OF PROTECTIVE FOREST BELTS AND NEW ANTI-EROSION AFFORESTATION					
Instruments		Updating the programme for restoration of shelter belts and provision of funding for related investments					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
State enterprises, municipalities and other owners of forests, owners and users of agricultural land	MAF, EFA	2013-2020	1 750 000 BGN (5000 BGN/1 ha)	RDP and other European or donor programmes	350 restored forest belts	50 ha restored forest belts at the end of 2014 150 ha restored forest belts at the end of 2016 250 ha restored forest belts at the end of 2018 350 ha restored forest belts at the end of 2020	8 360
Additional information		The first step is to update the programme for restoration of shelter belts and the specific activities will commence after its approval. Besides the direct effect for absorption of carbon by the new forests in these zones, there are also significant indirect effects associated with preventing wind erosion after the restoration of belts. The information on the areas and the funds necessary for the restoration is provided by EFA.					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 2						8 360	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		SUPPORTING PRESERVATION AND MAINTENANCE OF FORESTS OF HIGH CONSERVATION VALUE AND EXTENSIVE APPROACH FOR THEIR USE				
Instruments		Development and implementation of a national methodology for determination, management and monitoring of forest areas of high conservation value				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State enterprises, National parks, Natural parks, municipalities and other owners of forests, NGOs	MEW, EFA	2013-2020	40 000 BGN	EMEPA	Developed and adopted national methodology	Developed and adopted national methodology by the end of 2013
Additional information		Such approved national methodology will play a role in the spatial determination of such forests with high conservation value. Relevant standards and norms for their management will be developed.				

Measure 2		PRESERVATION AND IMPROVEMENT OF THE CONDITION OF URBAN AND SUBURBAN PARKS				
Instruments		Development of measures in municipal development plans. Possibilities will be sought on the basis of the measures in these plans to finance activities aimed at protecting and improving the urban and suburban parks.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Municipalities	MRDPW	2013-2020	Not applicable	Budget of municipalities, European projects and programmes, PPP	Changes in legislation (RDA) in a direction that guarantees the existence of such measures in municipal development plans with criteria and indicators for their implementation	Building capacity in municipalities for development of activities related to preservation and improvement of parks in the country
Additional information		The measure should include all urban and suburban parks regardless of ownership. Given the large number and area of these parks the improved condition of the ecosystems will have a positive impact on the uptake and retention of carbon. Amendments need to be made to RDA.				

Measure 3		PREVENTION OF FOREST FIRES THROUGH INTRODUCTION OF EARLY WARNING SYSTEMS				
Instruments		Development of a prevention programme including modern equipment and fighting fire technologies, training of forest owners and the local population in regions exposed to risk of fires; information campaigns.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State enterprises, municipalities and other owners of forests, local population	MAF, MI, EFA	2013-2020	25 000 000 BGN	Own funds of state enterprises, municipalities and other owners of forest areas; RDP, and other and other European or donor programmes and projects	Approved programme; Conducted trainings; Conducted information campaigns; Updated equipment	Adopted programme by the end of 2013. The needed equipment is purchased. Conducted trainings in all municipalities by the end of 2020. Conducted annual information campaigns.
Additional information		The data of the required funding to implement such prevention programme is estimated by EFA.				

PRIORITY AXIS 3: INCREASING THE POTENTIAL OF FORESTS TO CAPTURE CARBON

Measures with direct impact on the reduction of GHG emissions

Measure 1		INCREASING THE DENSITY IN THE LISTED NATURAL AND ARTIFICIAL PLANTATIONS					
Instruments		Changes in the regulations to the FA concerning afforestation and planning after consultation with stakeholders					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
State enterprises, municipalities, forest owners, NGOs	EFA/MAF	2013-2020	700 000 BGN	Budget of EFA/MAF	3500 ha plantations with density increased by at least 20 %	500 ha plantations with increased density at the end of 2014 1500 ha plantations with increased density at the end of 2016 2500 ha plantations with increased density at the end of 2018 3500 ha plantations with increased density at the end of 2020 r.	16 720
Additional information		A first step can be the assignment of scientific studies followed by amendments to the regulations. Activities will commence on this basis with the view of increasing the density in the listed plantations by supporting their natural regeneration or using other methods. The information on the areas and the necessary funding is provided by EFA.					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 3						16 720	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		INTRODUCTION OF APPROPRIATE SYSTEMS TO MANAGE FOREST PLANTATIONS UNDER CHANGING WEATHER CONDITIONS AIMED TO CREATE HIGHLY PRODUCTIVE AND SUSTAINABLE MIXED FORESTS				
Instruments		Assignment of a scientific task to be implemented into practice. Pilot implementation of modern silvicultural systems to maintain highly productive mixed forests.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State enterprises, municipalities, owners of forests, NGOs	EFA/MAF	2013-2020	50 000 BGN	State enterprises, EFA/MAF, municipalities	Performed scientific tasks; Number and area of implemented pilot systems	Performed scientific task by the end of 2015. Implemented systems on an area of at least 50 000 ha by the end of 2020.
Additional information		The scientific task may be assigned in connection with article 4 of Ordinance № 8 of 5 August 2011 on forest logging.				

Measure 2		SUPPORTING THE INCREASE OF THE PERCENTAGE OF CERTIFIED FORESTS				
Instruments		Development of opportunities to fund the certification of state and non-state forests – guidelines and preparation of documentation for application under EU and donor programmes. Development of PES schemes and projects for carbon capture and storage.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State enterprises, municipalities, forest owners, NGOs	EFA/MAF	2013-2020	750 000 BGN	International projects and programmes financed by state enterprises, donors	New certified forests (ha)	Group certification under FSC 2 159 000 ha forests
Additional information		The measure aims to improve forest potential to capture carbon through implementation of the criteria for certification of forests - sustainable management of forest ecosystems, preservation of forest litter and old trees, independent monitoring and control over forest management processes, minimization of opportunities for illegal logging. The information of the areas and the necessary funding is provided by the EFA.				

Measure 3		DEVELOPMENT OF GOOD PRACTICES FOR THE ESTABLISHMENT AND MANAGEMENT OF INTENSIVE FOREST CROPS FOR BIOMASS PRODUCTION AND ESTABLISHMENT OF STANDARDS FOR RESIDUAL BIOMASS AFTER LOGGING				
Instruments		Assignment of a scientific task to be implemented into practice				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
State enterprises, municipalities, forest owners, NGOs	EFA/MAF	2013-2020	50 000 BGN	State enterprises, EFA/MAF	Performed scientific task	Performed scientific task by the end of 2015 as a result of which the developed guidelines will be applied into practice
Additional information		The plantations for accelerated production are not managed as a forest under the Forestry Act, so the environmentally sound management of such cultures requires relevant methodological guidelines in the form of guidance or “best practices”. The development may be assigned pursuant to art. 4 of Ordinance № 8 of 5 August 2011 on forest logging.				

Measure 4		DEVELOPMENT OF A PART IN THE NEW STRATEGIC DOCUMENTS CONCERNING THE FORESTRY SECTOR THAT INVOLVES MEASURES AIMED AT IMPROVING THE ROLE AND THE CONTRIBUTION OF FORESTS TO CARBON ACCUMULATION				
Instruments		Setting up working groups with broad participation of NGOs, interested organizations and individuals in the process of developing a National Strategy for Development of the Forestry Sector and a Strategic Plan for Development of the Forestry Sector; linking the documents with the measures provided for in the third NAPCC.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Institutions, individuals and organizations related to the forestry sector	MAF, EFA	2013-2015	100 000	MAF, international projects and donor programmes	Developed part in a National Strategy for Development of the Forestry Sector and a Strategic Plan for Development of the Forestry Sector	Streamlining between NAPCC and the future National Strategy for Development of the Forestry Sector and a Strategic Plan for Development of the Forestry Sector
Additional information		The strategic documents are prepared pursuant to art. 9 of the Forestry Act as an essential element of forestry planning.				

PRIORITY AXIS 4: LONG-TERM CARBON STORAGE IN WOOD PRODUCTS

Measures with indirect impact on the reduction of GHG emissions

Measure 1		EXTEND THE USE OF WOOD PRODUCTS AS SUBSTITUTES FOR PRODUCTS FROM NON-RENEWABLE, POLLUTING AND ENERGY-INTENSIVE MATERIALS				
Instruments		Promotion campaigns on the substitution of fossil fuels and replacement of concrete, steel and other construction materials with wood. Initiatives to explain the benefits of using wood products, including the recovery of used furniture and other wood products.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
The community, traders of wood and wood products; Sectors: construction, energy, trade in wood and wood products	MEW, MAF /EFA	2013-2020	100 000 BGN a year	Raising funds from the sale of timber marketed by state enterprises; funding under EU and donor programmes	Number of conducted campaigns and initiatives	Conducted annual campaigns to raise the awareness and the engagement of the community and the business regarding the benefits from increased use of wood products
Additional information		Initiatives by stakeholders in the forestry sector – state and scientific institutions, representatives of the forestry business, branch organisations and NGOs – concerning the advantages of wood products. The measure is related to training and awareness raising of citizens, including with respect to the effective use of wood products.				

6.7 TRANSPORT SECTOR

6.7.1 General information on the Transport sector

The analysis of the development of the Bulgarian transport sector over the recent years shows significant structural changes and a tendency for growing share of road transport in the overall transport activity.

According to the latest inventory of GHG emissions in Bulgaria road transport in 2009 accounted for 98% of total energy consumption in the sector. For the period of the inventory (1988-2009) the share of diesel fuel and gasoline in the amount of consumed fuels is respectively 46.3% and 43.9%. The share of diesel fuel sharply increased after 2000 until 2007 due to its use by private cars and trucks. The upward trend of the amount of consumed gasoline is maintained throughout the period.

The greenhouse gas emissions in the sector also show a steady upward trend after 2000. In 2009, compared to base year 1988, the emissions from road transport increased by 6.8%.

Private cars have the most significant contribution to greenhouse gas emissions followed by heavy duty vehicles. In 2009 private cars and trucks are a source of respectively 60% and 21% of total emissions in the sector.

The White Paper “Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system” (COM (2011) 144 final) refers to the Commission’s analysis⁷⁶ which shows that while other sectors can achieve greater reductions, the transport sector is expected to reduce its greenhouse gases (GHG) by at least 60% by 2050 compared to 1990 levels, however it remains a significant and growing source of GHG. The aim of the transport sector is to reduce GHG emissions by about 20% below their level in 2008 by 2030. Given the significant increase of transport emissions over the past two decades, this reduction would nevertheless lead them to a level higher by 8 % than the level in 1990.

According to Decision 406/2009/EC (Efforts Sharing Decision) Bulgaria is assigned an individual target allowing it to increase the emissions from sectors outside the ETS, such as the transport sector, with 20% by 2020 compared to their level in 2005. Although this individual commitment facilitates the national objectives in the course of time the Transport sector undoubtedly requires drastic changes in order to achieve stability. One of the biggest challenges is to reduce dependence of the transport system and the Bulgarian economy on oil.

In this regard, the main measures in the sector should be directed at achieving an optimal balance in the use of the potential of different types of transport.

The main measures in the sector are divided into four priority axes as follows:

⁷⁶ Communication from the Commission “A Roadmap for moving to a competitive low carbon economy in 2050”, (COM (2011)112).

Priority axis 1: Reduction of transport emissions

Measures with direct effect

- Measure 1.** Rehabilitation and modernization of the existing road infrastructure to ensure optimum speed and optimum driving modes of automobile engines;
- Measure 2.** Introduction of intelligent transport systems along the national and the urban road network;
- Measure 3.** Increasing the share of biofuels;

Measures with indirect effect

- Measure 1.** Developing and promoting the use of “hybrid” and electric vehicles.

Priority axis 2: Reduction of fuel consumption

Measures with direct effect

- Measure 1.** Reduction of the relative share of trips with private motor vehicles through improvement and development of urban public transport and development of non-motorized transport;
- Measure 2.** Developing and promoting the use of bicycles.

Measures with indirect effect

Measure 1. Fiscal policy to encourage economies and to limit consumption of conventional fuels through:

- tax incentives to manufacturers and users of electromobiles;
- more efficient implementation of the “polluter pays” and “consumer pays” principles.

Measure 2. Reduction in half (50%) of the motor vehicles using conventional fuels in urban transport.

Priority axis 3: Diversification of transport

Measures with direct effect

- Measure 1.** increasing the share of public electric transport - rail, trolley, tram, metro;
- Measure 2.** Development and construction of intermodal terminals for combined transport.

Measures with indirect effect

Measure 1. Reduction of cargo intended for transportation by motor vehicles at a distance of more than 300 km by redirecting the cargo to more environmentally friendly types of transport, e.g. railway transport.

Measure 2. Connecting the central network airports – Sofia, Varna, Burgas, Plovdiv and G. Oryahovitzha with railway lines.

Priority axis 4: Informing and training consumers

Measures with indirect effect

- Measure 1.** Sustainable transport statistics;
- Measure 2.** Informed selection of a transport vehicle;
- Measure 3.** Instruction in economic driving.

6.7.2 Measures in the Transport Sector

PRIORITY AXIS 1: REDUCTION OF TRANSPORT EMISSIONS

Measures with direct impact on the reduction of GHG emissions

Measure 1		REHABILITATION AND MODERNIZATION OF THE EXISTING ROAD INFRASTRUCTURE TO ENSURE OPTIMUM SPEED AND OPTIMUM DRIVING MODES OF AUTOMOBILE ENGINES					
Instruments		<ol style="list-style-type: none"> 1. Updating the regulatory basis on design 2. Development and implementation of specific projects 					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020) ⁷⁷
Automobile transport	MF MTITC MRDPW Road Infrastructure Agency	2014-2020	<ol style="list-style-type: none"> 1. 200 000 BGN 2. 240 million BGN 	European funds with state and municipal co-financing; State and municipal budget	Emission savings from km. rehabilitated infrastructure		542 496
Additional information		Assessment of the emission saving potential of projects for rehabilitation and modernization – within the EIA. Existing methodology of the European Investment Bank. (http://www.eib.org/attachments/strategies/footprint_summary_of_the_methodologies_en.pdf)					

⁷⁷ Greenhouse gas emissions from transport activities represent the aggregated emissions of carbon dioxide, methane and nitrous oxide depending on certain assessment coefficients.

Measure 2		INTRODUCTION OF INTELLIGENT TRANSPORT SYSTEMS ALONG THE NATIONAL AND THE URBAN ROAD NETWORK					
Instruments		Project-oriented approach – specific implementation Financial policy					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Automobile transport	MF MTITC MRDPW Road Infrastructure Agency Municipal governments	2014-2020	410 mln. BGN	European funds with state and municipal co-financing; State and municipal budget	Number of introduced ITS		1 017 180
Additional information		<p>Intelligent Transport Systems (ITS) encompass a wide range of technical solutions designed to improve transport by improving mobility and increasing the safety of road traffic. Telematics (a combination of telecommunications and informatics) uses advanced technologies to meet transport needs.</p> <p>Intelligent transport systems and telematic solutions help improve road safety, promote the efficiency of the used existing infrastructure and contribute to the reduction of environmental pollution through control over traffic flows and management of traffic volume.</p> <p>The intelligent transport systems in urban settings can include integrated management of public transport charges, enhanced management of customer relationships, traffic forecasts, improved traffic management, traveler information and toll collection. These systems apply advanced technologies to collect more and better data, to make a precise analysis of these data and to link them through more effective networks. The result: more effective, more efficient and better oriented towards <i>citizens on the move</i> services.</p>					

Measure 3		INCREASING THE SHARE OF BIOFUELS					
Instruments		Renewable Energy Sources Act					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ equivalents by 2020)
Automobile transport	MEET, SEDA MEW	2012-2015	150 000 BGN	State and municipal budget	% content of biofuel	According to art. 47 of RESA	406 872
Additional information		<p>Biofuels are fuels produced from biomass and used in transport. They diversify the energy mix and reduce the dependence on fossil fuels.</p> <p>The main types of biofuels are bioethanol, biodiesel, biogas, synthetic biofuels, bio-hydrogen, pure vegetable oils. The most promising projects in Bulgaria are the projects for production of ethanol and biodiesel. The consumption of biodiesel in Bulgaria in 2010 amounted to 38 911.13 tonnes. In the previous two years these amounts were respectively 4260 t and 6566 t.</p> <p>The Renewable Energy Sources Act (Art. 47(1)) introduces stages for the introduction of certain percentages of biodiesel and bioethanol content in the relevant fuel, as well as requirements to the types of biofuels and sustainability criteria which they must meet.</p>					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 1, INCLUDING THE ASSESSMENT OF MEASURE 1 WITH INDIRECT EFFECT						2 102 172	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		DEVELOPING AND PROMOTING THE USE OF “HYBRID” AND ELECTRIC VEHICLES				
Instruments		Financial policy – tax reliefs upon the initial registration of electric vehicles and others. Adoption of an act to promote Green Public Procurement. Incentives for granting permits for placing charging stations for electric vehicles,, streamlined procedures for the provision of transit capacity and points for connection and power. Building infrastructure for charging and operation of electric vehicles.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Automobile transport	MF MTITC	2013 – 2020	600 000 BGN	Green Investment Scheme; private investments	Number of purchased hybrid and electrical motor vehicles	Increase of the number of purchased hybrid motor vehicles
Additional information		The indirect effect from the introduction of the measures is estimated at 135 624 tCO ₂ eq. On 14.12.2010 a Memorandum of Understanding – “Electric Mobility” – for development and use of electric vehicles was signed by Sofia Municipality and CEZ Bulgaria. The purpose of the Memorandum is the development of a common strategy and an action plan for electric vehicles. CEZ and Sofia Municipality agreed to promote the introduction of electric vehicles on the streets of Sofia. The Municipality is committed to establishing alleviated procedures for granting permits for installation of charging stations for electric cars. The electricity distribution company, on its part, will apply alleviated procedures for the provision of transit capacity, connection points and power. The first 7 electric stations were installed at the end of 2011 in Sofia. The initiative is part of the pilot project that the company Full Charger - Bulgaria, developed together with CEZ Bulgaria and Sofia Municipality. The charging stations are located in the “Blue Zone” in central city areas. Cars will be charged through prepaid vouchers. Activation through contactless debit and credit cards will be introduced later. Full Charger - Bulgaria plans to build a network of 150-200 charging stations by the end of 2012 in Sofia and in other big cities. After that stations will be built along motorways and inter-city roads. The factory of "Litex Motors" in Lovech will be ready to produce electric cars in the spring of 2012.				

PRIORITY AXIS 2: REDUCTION OF FUEL CONSUMPTION

Measures with direct impact on the reduction of GHG emissions

Measure 1		REDUCTION OF THE RELATIVE SHARE OF TRIPS WITH PRIVATE MOTOR VEHICLES THROUGH IMPROVEMENT AND DEVELOPMENT OF URBAN PUBLIC TRANSPORT AND DEVELOPMENT OF NON-MOTORIZED TRANSPORT					
Instruments		Project-oriented approach – specific implementation					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Automobile transport and non-motorized transport	MF; MRDPW; Municipal authorities	2012 -2020	1. 200 mln. BGN 2. See Measure 2	European funds with state and municipal co-financing; State and municipal budget	Change in the share of private and public transport		678 120
Additional information							

Measure 2		DEVELOPING AND PROMOTING THE USE OF BICYCLES FOR TRANSPORT					
Instruments		Project-oriented approach – specific implementation <ol style="list-style-type: none"> 1. Design and construction of new cycling infrastructure 2. Developing systems for use of municipal bicycles Trainings and campaigns					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ equivalents by 2020)
Non-motorized transport and automobile transport	MF; MRDPW; MEW; Municipal authorities; NGOs	2013-2020	1. 100 mln. BGN 2. 50 mln. BGN	European funds with state and municipal co-financing; State and municipal budget	Km of bicycle alleys		1 017 180
Additional information							
TOTAL EFFECT OF THE MEASURES UNDER AXIS 2, INCLUDING THE ASSESSMENT OF MEASURE 1 WITH INDIRECT EFFECT						1 695 300	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		FISCAL POLICY TO STIMULATE ECONOMIES AND TO LIMIT CONSUMPTION OF CONVENTIONAL FUELS				
Instruments		Financial policy through: <ul style="list-style-type: none"> • tax incentives to manufacturers and users of electromobility; • more efficient implementation of the “polluter pays” and “consumer pays” principles. 				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Automobile transport and non-motorized transport	MF; MRDPW; MEW; Municipal authorities	2013-2015	360 000 BGN	Tax incentives and fees set out in state and municipal budgets	Developed financial instruments	Introduction of 3 financial mechanisms by the end of 2015
Additional information		<p>The indirect effect from the introduction of this measure is estimated at 406 872 tCO₂ eq.</p> <p>The measure is proposed in the White Paper “Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system” (COM (2011) 144 final).</p>				

Measure 2		REDUCTION OF THE NUMBER OF MOTOR VEHICLES USING CONVENTIONAL FUELS IN PUBLIC TRANSPORT BY 2020				
Instruments		Green public procurement				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Public transport companies	Municipalities MTITC	2012-2020		EU Funds; Municipal budgets	Number of purchased and commissioned motor vehicles using environmentally friendly fuel	Reduction in half (50%) of motor vehicles using conventional fuel in public transport
Additional information		<p>The measure is proposed in the White Paper “Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system” (COM (2011) 144 final).</p> <p>National action plan to encourage green public procurement for the period 2012-2014 – one of the Plan’s objectives is to reduce GHG emissions and one of the major product groups are the clean and energy efficient transport vehicles.</p>				

PRIORITY AXIS 3: DIVERSIFICATION OF TRANSPORT

Measures with direct impact on the reduction of GHG emissions

Measure 1		INCREASING THE SHARE OF PUBLIC ELECTRIC TRANSPORT – RAILWAY, METRO, TROLLEY, TRAM AND METRO					
Instruments		Project-oriented approach – specific implementation 1.Increasing the share of electric railway transport - infrastructure improvements; 2. Increasing the share of electric railway transport - renovation of vehicles; 3.Increasing the share of electric mass public transport - infrastructure improvements; 4.Increasing the share of electric mass public transport - renovation of vehicles.					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO₂ eq. by 2020)
Railway and other electrical transport	MF; MTITC; MRDPW; National Railway Infrastructure Company, municipal governments	2014-2020	1. 60 mln.BGN 2. 500 mln.BGN 3. 30 mln.BGN 4. 250 mln. BGN	European funds with state and municipal co-financing; State and municipal budget	Share of public electric transport		1 017 180
Additional information		<p>OP “Transport” 2007-2013, Priority axis 1 “Development of railway infrastructure along the major national and Pan-European transport axes” provides for: modernization of the railway line Sofia – Plovdiv; reconstruction and electrification of railway line Svilengrad - Turkish border; renewal of sections of railway infrastructure on the railway line Plovdiv - Burgas (along Trans-European Transport Network); modernization of railway line Sofia - Dragoman (along TEN-T); design of the construction of railway line Vidin - Sofia.</p> <p>Given the crucial importance of the central section of Line 2, it is currently a separate Sofia Metro Expansion Project which is included in Operational Programme Transport, with financing by the European Regional Development Fund, with national and local co-financing. This stretch covers the section: “Road junction Nadezhda - Central Railway Station – Sv. Nedelya Square - Cherny Vrah Blvd.” International tender procedures were conducted in 2007-2008 for selection of contractors of this project and the contracts entered into force in December 2008 with a time limit for completion - autumn 2012.</p> <p>The expected effect of the implementation of such measures is reduction of hazardous and greenhouse gases – 90 500 tonnes CO₂ per year.</p>					

Measure 2		DEVELOPMENT AND CONSTRUCTION OF INTERMODAL TERMINALS FOR COMBINED TRANSPORT					
Instruments		Project-oriented approach – specific implementation					
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Target value by year	Expected effect (total reduction in tonnes CO ₂ eq. by 2020)
Railway and other transport	MF; MTITC; National Railway Infrastructure Company	2014 - 2020	30 mln. BGN (5 intermodal terminals x 6 mln. BGN)	European funds with state and municipal co-financing; State and municipal budget	Construction of 5 intermodal terminals by 2020	1 term. by the end of 2016; 2 term. by the end of 2018; 2 term. by the end of 2020	406 872
Additional information		<p>The measure aims to achieve a two-sided effect, consisting, on one side, in increase of the degree of utilization of more environmentally friendly modes of transport and, on the other side, in the creation of favorable conditions for increasing the added value of transport activity with overall reduction of transport costs per unit of GDP.</p> <p>The expected results of its implementation are:</p> <ul style="list-style-type: none"> • more efficient use of rail and water transport; • development of transport schemes and technologies meeting contemporary requirements with regard to environment and climate; • increased coordination and integration of different transport modes; • lower cost for passenger and cargo transport; • integration of the Bulgarian transport system with that of the EU and increasing its competitiveness. 					
TOTAL EFFECT OF THE MEASURES UNDER AXIS 3						1 424 052	

Measures with indirect impact on the reduction of GHG emissions

Measure 1		REDUCTION OF CARGO INTENDED FOR TRANSPORTATION BY MOTOR VEHICLES AT A DISTANCE OF MORE THAN 300 KM BY REDIRECTING IT TO MORE ENVIRONMENTALLY SOUND MODES OF TRANSPORT, E.G. RAILWAY				
Instruments		Strategic documents				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
Truck companies	MEW; MTITC	2012-2020	The measure does not require additional financial resources apart from the already planned investments in the railway transport to increase its efficiency and appeal.		Cargo transported by railway at a distance over 300 km: Sofia – Burgas; Sofia – Varna; Sofia – Ruse; Vidin – Kulata; Vidin – Svilengrad	30% or cargoes in motor transport are redirected to more environmentally friendly types of transport
Additional information		The measures is proposed in this format in the White Paper - Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system (COM (2011) 144 final).				

Measure 2		CONNECTING THE CENTRAL NETWORK AIRPORTS – SOFIA, VARNA, BURGAS, PLOVDIV AND G. ORYAHOVITZA WITH RAILWAY LINES				
Instruments						
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
National Railway Infrastructure Company (NRIC) Airports	MTITC	2012-2020.	Large investments will not be needed because the railway infrastructure is in place.	Financing from the European Funds 2014-2020 and national co-financing	Number of airports with operating railway connection for transportation of cargoes and passengers	Connection of the 5 central network airports with railway lines
Additional information		The measures is proposed in this format in the White Paper - Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system (COM (2011) 144 final).				

PRIORITY AXIS 4: INFORMING AND TRAINING CONSUMERS

Measures with indirect impact on the reduction of GHG emissions

Measure 1		SUSTAINABLE TRANSPORT STATISTICS				
Instruments		Legislation 1. Developing an ordinance on the collection, analysis and reporting of data and submission to NSI 2. Monitoring and evaluating performance.				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
All types of transport	MTITC; MRDPW; MI; MEW; NSI	2013-2015	1. 100 000 BGN 2. 50 000 BGN	State and municipal budgets	Adopted ordinance	Ordinance in force
Additional information						
Measure 2		INFORMED SELECTION OF A TRANSPORT VEHICLE				
Instruments		1. Campaigns 2014 2. Campaigns 2016				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
All types of transport	MTITC; MRDPW; MI; MEW; NSI	2014 -2016	1. 100 000 BGN 2. 100 000 BGN	State and municipal budgets	Number of purchased vehicles with a lower emission level (corresponding to Euro IV, V or VI)	Increasing the number of purchased motor vehicles corresponding to Euro IV, V or VI
Additional information						

Measure 3		INSTRUCTION IN ECONOMIC DRIVING				
Instruments		1. Training 2013 2. Training and campaign 2014 3. Training 2015				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results
All types of transport	MTITC MRDPW MI MEW NSI	2013-2015	1. 100 000 BGN 2. 200 000 BGN 3. 100 000 BGN	State and municipal budgets; Auctioning of allowances; “Green” investments	1. Number of trained drivers 2013 2. Number of trained drivers 2014 3. Number of trained drivers 2015	1500 trained drivers by the end of 2015
Additional information						

6.8 MEASURES IN THE FIELD OF EDUCATION AND SCIENCE

6.8.1 Objective and direction of the measures in the field of science and education

The measures in the field of science and education are consistent, on the one hand, with the needs of the relevant sectors and, on the other hand, with the National Strategy of Scientific Research by 2020 and with the Programme for Development of Education, Science and Youth Policies in Bulgaria. Those two documents contain several leading national research priorities that are focused on areas closely related to the possibilities to reduce greenhouse gas emissions - energy sources and energy saving technologies; addressing and control of harmful and hazardous municipal and industrial waste; new raw materials and other materials.

The main objective of the measures is to focus the research and development activities and the educational activity on the issue of reducing greenhouse gas emissions, the identification and the study of the natural and the anthropogenic factors in order to ensure their sustainable management on the basis of practical experience and within a more competent administrative and organizational, technological, information and financial environment.

The contribution of science and education to the achievement of the national targets for reducing greenhouse gas emissions is in two directions:

⇒ **Establishing the condition:**

- contribution to the definition of the mechanisms and the specifics of the origin and the generation of greenhouse gases in the relevant sectors;
- contribution to the monitoring of the implementation of the plan;
- involvement in fundamental research that contributes to the identification of problems at global level.

⇒ **Building the capacity of human resources and institutions to contribute to the reduction of the anthropogenic impact on climate change:**

- Establishment of general knowledge and understanding of the anthropogenic impact on climate change at all levels of the educational system and setting up strategies to reduce this impact (through the system of general secondary education)
- Preparation of specialists for the different sectors.

In the first two National Action Plans on Climate Change (NAPCC) education and science are included in the package of measures at national level (respectively in the first NAPCC) as well as an important tool in the policy of the Government of Bulgaria on Climate Change (in the second NAPCC). No specific measures on science and education are identified in the second action plan.

The national policy in the field of research and education is conducted by the Ministry of Education and Science (Ministry of Education), and in the field of innovation - the Ministry of Economy, Energy and Tourism (MEET). The ministries are supported by the National Council for Scientific Research (NCSR) and the National Council for Innovation. The other ministries are also actively involved in the implementation of the state policy to encourage research and innovation by supporting, performing or financing/co-financing specific tasks in that sphere.

Some specific features of the sector should be taken into account in order to identify measures in the field of science and education that will contribute to meeting the national targets for reducing greenhouse gases as follows:

- Although specific research institutes, departments or educational institutions are directly involved with measures to reduce greenhouse gases the manner of functioning of the whole educational system determines the possible contribution of these departments;
- The priorities in the "Education and Science" Sector are essential for the analysis of the trends and the direction of the proposed measures related to reducing GHG emissions.

The current environment for conducting research and educational activities in this field is characterized by the following capacity.

6.8.1.1 Institutional and expert capacity

School education in the country has 2700 schools and 64000 teachers. (Programme for Development of Education, Science and Youth Policies in the Republic of Bulgaria (2009-2013). The decreasing number of school-age children in recent years was a precondition for significant optimization of the number of the staff employed in school education. On the other hand, there was also observed a negative trend of decreasing number of young people that are interested and motivated to become teachers. They account for 11% of the total number of school teachers. (*Public Expenditure Review: Education - condition, problems and opportunities. Ministry of Finance. www.minfin.bg/document/2892:1*). These people usually bring new thinking and initiatives of innovations, new technologies and topics to school.

Higher education includes 53 higher schools (37 state and 16 private), including 43 universities and specialized higher schools and 10 independent colleges. The teaching staff includes over 22 000 people.

According to the Programme for Development of Education, Science and Youth Policies in the Republic of Bulgaria (2009-2013) the academic staff in Bulgaria is marked by poor motivation and inadequate social status, lack of interest in academic career and shortage of adequately trained human resources in priority areas, little research work in the preparation of students, lack of innovation and inadequate links between higher educational institutions and science. Another serious problem is the age of the faculty. It features a large structural imbalance - 69% of professors are aged over 60 years and only 4% are aged up to 49 years. 47.06% of the total number of teachers are aged over 50 years (*Public Expenditure Review: Education - condition, problems and opportunities. Ministry of Finances. www.minfin.bg/document/2892:1*).

The R&D system includes human resources and institutions. According to statistical data about 17 000 scientists are involved in research work most of whom are concentrated in public R&D organizations. Very few researchers (about 13% of their total number) are concentrated in business structures. For comparison, in some of the new EU countries this figure is over 30% and in others - over 60%. (*Programme for Development of Education, Science and Youth Policies in the Republic of Bulgaria (2009-2013)*). In European countries the predominant share of people employed in research

and development (R & D) works in the private sector and in the system of higher education. In Bulgaria almost 60% of the people engaged in R&D are in the public sector and paid from the budget, compared an average level of 13% in the EU (*National Strategy for R&D Development 2020*).

The aim of patenting and licensing activities is to provide links to practice and to encourage the search and implementation of new and/or updated products, technologies and services. The number of applications from European and world patent organizations is low, while the number of applications and patents granted to foreign organizations is higher than the number of national applicants. In our Bulgaria there is no coordinated policy of activities concerning the relationship between science and innovation (*Programme for Development of Education, Science and Youth Policies in the Republic of Bulgaria (2009-2013)*). The existing offices are inefficient and there is an insufficient number of transfer offices to provide a link with industry and to encourage the demand and implementation of new and/or updated products, technologies and services (*Programme for Development of Education, Science and Youth Policies in the Republic of Bulgaria (2009-2013)*). Less than 10% of the active innovation companies have links with R&D organizations (*National Strategy for R&D Development 2020*). The different elements of the Bulgarian innovation system are not connected – the fundamental and sectoral studies develop separately.

According to Eurostat data for 2008 the share of high technology products in total export is 3.57%, while the figures of other new Member States are between 4 and 6.5%, and an average rate of 15% for EU 27. According to the European map of innovations, Bulgaria together with Romania, Latvia and Lithuania, are defined as “humble innovators” (*European Innovation Scoreboard 2010*, <http://www.proinno-europe.eu/inno-metrics/page/innovation-union-scoreboard-2010>), yet the country is one of the rapidly advancing Member States in the field of innovation. The Bulgarian summary innovation index (SII) for 2010 is 0.226, with an average index for EU27 - 0.516.

6.8.1.2 Infrastructural capacity

According to data provided by MEYS regarding the financing of the purchased scientific equipment for the period 2005-2008 there is no funding for the infrastructure in the field of energy sources. The share of scientific equipment in the field of environmental and marine sciences and in engineering sciences. A single purchase of expensive equipment without ensuring the necessary conditions for conducting research and an available long-term scientific program leads to its inefficient use and therefore to increase in the cost of the services for the business. This leads to a paradox in some cases where Bulgaria disposes of unique scientific equipment, but research organizations and companies send samples for research in other EU Member States due to lower prices.

A National Roadmap for R&D Infrastructure, developed by MEYS was approved in September 2010 by decision of the Council of Ministers. The map covers major scientific centers serving specific economic and social needs of the country, the region of Southeastern Europe and Pan-European infrastructures in which Bulgaria will participate. The main priority of the scientific infrastructure is in the field of energy, marine research, new materials for various applications, information and communication technologies, social studies. (*National Strategy for R&D Development 2020*).

6.8.1.3 Financial capacity

Since 2006 the total expenditure on R&D in Bulgaria is about 0.45% of the GDP without a significant upward trend. The structure of R&D financing is inversely proportional to that in EU countries. The largest percentage is paid from the state budget – more than 2/3, and 1/3 – by the business. This ratio has remained steady over the past 10 years.

The Research and Development Fund is a national instrument supporting research projects on competitive basis. Another instrument is the National Innovation Fund that finances applied scientific research projects and technical and economic projects that introduce new products, processes and services or improve existing ones. These two national funds are potential sources of financing also for the measures proposed under this action plan.

With regard to international scientific programs, Bulgaria is presented in the Seventh Framework Programme and the Programme COST. The country is represented also in the programme Intelligent Energy for Europe which includes the extension of the programmes SAVE - energy efficiency and ALTENER - renewable energy. The revenues from international scientific programs are currently allocated as follows: 40% for the business, 35% for universities and about 25% for BAS and the Agricultural Academy.

6.8.1.4 Main fields of scientific research

For the purposes of the National Action Plan a study and research was conducted on the main topics covered by the Bulgarian educational and scientific institutions, the NGOs and the other organizations.

The main fields of research and educational activities are:

- *Meteorology, climatology and hydrology*

These activities study the basic climate elements (air temperature, precipitation, atmospheric circulation) in Bulgaria and more specifically in its mountainous areas which are particularly sensitive to climate change.

The studies focus also on the climatic changes in the geological history of Earth in order to assess the effects of astronomical factors, earth's internal forces and environmental factors on climate formation. The analysis of time series and extreme events is improved and models are created of nonlinear systems, including climatic systems. The wind-solar renewable energy sources are studied with a view to establishing the wind and the solar energy potential on the territory of the country in meso- and macro-climatic aspects. The methods of monitoring climatic elements are automated.

- *Air pollution*

A single methodology for inventory of emissions of harmful substances was developed. Different scale models of atmospheric components were made in order to assess the quality of air environment and the origin/transportation of pollution on a large and on a small scale. A methodology was developed for calculating emissions and sinks of greenhouse gases from the plant cover. Research is conducted on the optimization of waste management in order to reduce

greenhouse gases. Ground, oceanographic and space systems for monitoring of various objects in the environment, including in the air environment, are being improved.

- *Technologies*

Mathematical and computer models are created of the transportation of air pollutants and tested with model and real meteorological and emission data on the first Bulgarian supercomputer IBM Blue Gene/P. The possibilities and the costs of implementing Directive 97/68/EC on emissions of gaseous and particulate pollutants from non-road mobile machinery are studied. Materials, technologies and devices for efficient transformation of solar energy in two main areas - photovoltaic and photothermal – are developed and tested. Technologies involving the use of biomass and hydrogen raw materials as renewable energy sources are investigated. Unmanned flying systems for monitoring and GIS-interpretation of meteorological are introduced that determine the pollution of air. Energy saving and water saving technologies for production of good agricultural produce are being developed.

- *Forests, Forestry and Agriculture; Land Use*

Good agricultural practices leading to minimization of greenhouse gas emissions are being developed. The role of underground plant biomass in the annual fixation of CO₂ by forest ecosystems is studied. The bio- and the energy potential of non-traditional plant species is examined. The applicability of the principles of forest management as a means of entering the carbon market is investigated; the amount of carbon dioxide presently stored in forest ecosystems in some areas is being estimated.

- *Territorial structure*

- The Climate Friendly Cities Project aims to assist the development of a spatial structure of cities that is favourable for the climate through planning and zoning.

- An index of regional “climate security” was established under the Regions for Sustainable Change Project based on data of greenhouse gas emissions, energy data, policy framework, institutional capacity, socio-political situation, financial instruments. The index is adjusted to Bulgaria and applied to the monitoring system of regional development plans.

- *Transport*

The Green Corridor Development Programme ensures the development of pedestrian and bicycle routes both for tourism and transport. An online tool is currently being developed for planning a bicycle journey in Sofia as a measure to reduce the emissions in the city. The project “One Planet Mobility” aims to reduce CO₂ emissions from transport under which several computer models were developed to project the reduction of emissions from transport in Sofia.

6.8.2 Measures in the sphere of science and education

PRIORITY AXIS 1: INTRODUCTION OF THE TOPIC OF CLIMATE CHANGE AND REDUCTION OF GREENHOUSE GAS EMISSIONS IN THE EDUCATIONAL PROCESS

Measure 1		DEVELOPMENT AND IMPLEMENTATION OF STATE REQUIREMENTS/EDUCATIONAL STANDARDS FOR PRIMARY, SECONDARY AND HIGHER EDUCATION				
Instruments		European and national legislation on education				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results by years
Secondary schools and higher educational institutions	MEYS; MEET; MEW	2013-2017	10 000 000 BGN	- State budget; - Scientific Research Fund; - European programmes for the next programming period; - Private investments	Defined standards for each educational level and subject; Developed course units and training modules	By 2015 – approved and established state requirements/standards By 2017 – developed course units or elements, modules, in accordance with state requirements
Additional information		<p>– In accordance with the Bulgarian legislation specific aspects of knowledge can be introduced as a mandatory element in the field of preschool, school and higher education through the establishment of state requirements/educational standards for every specific subject or discipline</p> <p>– Since the topic of climate change and the anthropogenic factors leading to climate change covers several disciplines the requirements should be developed for different subjects in each educational level.</p> <p>The development of requirements involves the following:</p> <ul style="list-style-type: none"> • analysis of European and world experience, of existing curricula and the relevant tools, identification of appropriate places and elements for the introduction of the corresponding climatic aspects - analytical work of teams of experts; • experimental introduction of elements into existing curricula; • development of proposals for requirements based on analysis and experiments with extensive use of the experience of European and other countries; • a series of discussions and a consultation process; • shaping and proposing the introduction of the developed requirements. 				

Additional information	<ul style="list-style-type: none"> – Due to the interdisciplinary nature of the issue of climate change (respectively the reduction of the greenhouse effect), it is reasonable to develop and introduce new thematic lesson units or elements of existing course units in almost all secondary school subjects, respectively - academic disciplines. Furthermore, the content of this subject can be enhanced by extracurricular activities. – The thematic lecture modules (or their individual units and elements) in higher education should be introduced in undergraduate, graduate, qualifications and doctoral programmes concerning the sectoral aspects of greenhouse gas pollution and the methods for its reduction. Wherever possible – the same should be done in secondary education. The following more specific topics are relevant: <ul style="list-style-type: none"> - RES, exploration, production and utilization of unconventional energy resources; modern systems for management of electricity networks; energy management; energy economics; energy saving, low carbon and innovative technologies in the energy sector; small-scale energy production; post low carbon technologies including in the field of conventional energy; nuclear energy, fuel cells and installations for the capture, use, transportation and storage of carbon dioxide; <ul style="list-style-type: none"> • Specialized installation of boilers and stoves operating with biomass, photovoltaic and solar thermal systems, geothermal systems and heat pumps, etc. • energy-saving, low carbon and innovation technologies in the field of waste management; • energy-saving, low carbon and innovation technologies in the industry – cement industry, chemical industry, metallurgy, wood processing, etc. • energy-efficient design, construction and spatial planning; • low-emission transport, including electric vehicles; • economics of climate change; • low-carbon and carbon-absorbing technologies in land use, agriculture and forestry; • high resolution weather and emission monitoring and databases; • effective climate legislation, energy/climate diplomacy; social and individual determinants of low-carbon society, etc. <p>The extramural activities should be enhanced by:</p> <ul style="list-style-type: none"> • course projects and graduation theses in the system of higher education dealing with the issue of reducing greenhouse gases; • doctoral competitions/trainings on the mechanisms of the anthropogenic impact on climate and possibilities to reduce the impact; • conducting an annual national forum (meeting, seminar, conference) on the topic, etc.
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Measure 2		UPGRADING THE KNOWLEDGE AND THE QUALIFICATION OF THE FACULTY AND THE TEACHING STAFF ON ISSUES RELATED TO CLIMATE CHANGE				
Instruments		NOT APPLICABLE				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results by years
Secondary schools, centers for upgrading qualifications and higher educational institutions (HEI)	MEYS MEW	2013-2020	10 000 000 BGN	<ul style="list-style-type: none"> - State budget; - Scientific Research Fund; - European programmes for the next programming period; - Private investments 	<ul style="list-style-type: none"> - Percentage of teachers and lecturers from schools and HEI attracted to upgrade their knowledge and qualification; - Percentage of teachers and lecturers with access to information on the subjects; 	<p>By 2014 – 20% By 2016 – 50% By 2020 – 70%</p> <p>By 2020 – access to the relevant information provided to 100% of the relevant teachers and lecturers</p>
Additional information		<p>Good teaching competence and qualification can be achieved through the following actions:</p> <ul style="list-style-type: none"> • High requirements to the qualification of candidates in the subject in order to be appointed to teaching positions; • Topical qualification training of teachers from primary and secondary schools; • Specialization and meetings for exchange of experience (including international) between teachers from higher educational levels - bachelor, master and doctorate degree; • Regular attestation control of the professional training of teachers; • Provision of information on climate change and the possibilities for mitigation; • Systems for feedback from the trainees concerning the quality of the teaching in the relevant topic. 				

PRIORITY AXIS 2: FOCUSING R&D ON THE TOPIC OF GREENHOUSE GAS EMISSION REDUCTION AND ITS SECTORAL ASPECTS

Measure 1		APPLIED PRACTICAL SCIENTIFIC RESEARCH				
Instruments		Development of projects, cameral and field research, analysis and synthesis of results				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results by years
Research institutions, HEI, R&D units in the industry	MEYS MEW MEET	2013-2020	40 000 000 BGN	<ul style="list-style-type: none"> - Financing from the business; - International projects; - European programmes; - Scientific Research Fund; - National Innovation Fund; - State budget 	Number of research projects by sectors	By 2016 – one completed project by sector; By 2020 – two completed projects by sector.
Additional information		<p>Scientific research directed at the Energy Sector</p> <ul style="list-style-type: none"> • RES: Resources – assessment of the potential of geothermal, bioenergy, ocean-wave energy resources in Bulgaria; • RES: Technology, facilities for the utilization of the above resources; • Geological potential in Bulgaria for storage of CO₂-emissions; • Low carbon parameters of energy production and supply. <p>Scientific research directed at the Industry Sector</p> <ul style="list-style-type: none"> • Modeling the effects of various anthropogenic and natural factors on greenhouse gases and pollution/purification of the air basin; • New technologies, materials, instruments, approaches, raw materials: low carbon, high-energy, energy efficient, emission absorbing/storing; 				

Additional information	<ul style="list-style-type: none"> - RES in the industry; - Utilization of waste heat at treatment stations; - Efficiency in heat economy and reduction of losses in condensation economy; - Efficiency of electricity consumption; - Reduction of losses of compressed air; - A system for monitoring energy flows in industrial systems; - Co-generation installations with a guaranteed and fixed consumption of thermal energy; - Use of waste as fuel in the cement industry; - Energy efficiency of industrial activities <ul style="list-style-type: none"> • Optimal development solutions for the production area according to the topo-climatic conditions with regard to pollution/self-cleaning of the air basin. <p>Scientific research directed at the Household and Services Sector</p> <ul style="list-style-type: none"> • Efficient conversion of the primary energy carrier; • Reduction of final energy consumption; • National standards for energy efficiency in buildings (zero-net energy consumption); • RES in households and services; • Index of regional climate security - optimization and high resolution territorial application; • Software and online instruments to calculate the private carbon footprint. <p>Scientific research directed at the Transport Sector</p> <ul style="list-style-type: none"> • Low Carbon Transport / Intelligent Transport Systems / intermodal transportation: - RES in transport/biofuel and other technologies; - Models for simulation of traffic and transport emissions; - Movement optimization software (Mobility Plans). On-line instruments for planning and optimization of individual mobility; • Inter- and multi-modal transport; • Environmentally sound development of transport infrastructure; • Improvement of conventional transport infrastructure. <p>Scientific research directed at the Agricultural Sector</p> <ul style="list-style-type: none"> • Reduction of soil and agricultural emissions - improved practices: fertilization; soil treatments; increasing soil's carbon absorption properties; protection of soil against erosion; management of organic waste and biomass; selection of crops; • Model for simulating soil emission/absorption characteristics; • Water and energy saving irrigation technologies; • Reduction of methane emissions from the biological fermentation in animal husbandry/improvement of the quality of animal feed/improvement of the genetic characteristics and the reproductive abilities; • Low carbon practices for manure processing; • Bioenergy resources
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<p>Additional information</p>	<p>Scientific research directed at the Land Use and Forestry Sector</p> <ul style="list-style-type: none"> • Inventory of land use in Bulgaria and possibilities for reforestation; • Improving the legal framework to regulate changes in land use; • Regional planning and territorial planning to reduce greenhouse gas emissions; • Forests as a source of renewable energy sources; • Restoration of wetlands; • Preservation and maintenance of mature forests/keeping carbon stocks in forests. Conservation of the forest genetic resources. Assessment of the CO₂-absorption potential of forests in Bulgaria; • Intensive forest crops for biomass production. <p>Scientific research directed at the Waste Sector</p> <ul style="list-style-type: none"> • Energy potential of biogas from landfills; • Reduction of emissions from landfills; <p>Scientific research directed at the social and economic aspects of a low carbon society</p> <ul style="list-style-type: none"> • Climate-effective: legislation, domestic policy, international law and diplomacy of the country in the international negotiation process; • Society and the reduction of greenhouse gas emissions: Social determinants of a low-carbon society; • Man and the reduction of greenhouse gas emissions: personal attitude to the transition to low carbon lifestyle; • Reduction of greenhouse gas emissions and economic innovations in the context of a “green economy”.
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Measure 2		FUNDAMENTAL RESEARCH RELATED TO THE REDUCTION OF GREENHOUSE GAS EMISSIONS				
Instruments		Development of projects, cameral, experimental and field research, analysis and synthesis of results				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results by years
BAS, research centers and HEI	MEET; MEYS; MEW	2013-2020	20 000 000 BGN	State budget; Scientific Research Fund; European scientific research programmes;	Number of research projects	3 completed projects by 2020
Additional information		<p>The main directions of fundamental research are:</p> <ul style="list-style-type: none"> • New methods for thorough utilization of renewable sources of raw materials; • Modeling nonlinear dynamic systems and micro-/meso-scale processes in the atmosphere; • Improvement of the integrated methodology of inventory of emissions of harmful substances in the atmosphere; • Modelling local climate changes in Bulgaria under various scenarios of global climate change; • Ecosystem studies and reduction of greenhouse gas emissions; • Global navigation systems for meteorological and climate purposes; • Differentiating the contributions of natural and anthropogenic factors to climate change; • Sectoral monitoring and statistical databases of emission and meteorological parameters. 				

Measure 3		UPGRADING THE KNOWLEDGE AND THE QUALIFICATION OF THE RESEARCH STAFF ON ISSUES RELATED TO CLIMATE CHANGE				
Instruments		Accreditation of research institutes; Attestation of experts;				
Target group	Responsible institutions	Launch and time limit for implementation	Required financial resources	Sources of funding	Indicator of implementation	Expected results by years
Research institutes; HEI	MEYS; MEW; MEET	2013-2020	10 000 000 BGN	International projects; Income from emission trading; Private financing, etc.	Number of projects or events	Not applicable
Additional information		<p>Some actions to achieve and maintain good research expertise:</p> <ul style="list-style-type: none"> • High requirements to the candidates' competence on the subject in order to be appointed on research positions; • Specialization and meetings for exchange of experience (including international) on the topic; • Systems for feedback and practical evaluation of the quality of the research in the relevant topic; • Access to the databases of national and local governmental networks for monitoring of meteorological and emission parameters of the air environment; creating a national center for information and data; • Updating weather yearbooks and handbooks; • National coordination, coordination and control of the actions in the field of the science dedicated to reduction of greenhouse gas emissions; • Accreditation requirements to the target research institutions in order to include the subjects in their research programmes and their respective certification (this applies to the cases where the topic of climate change corresponds adequately to the profile of the R&D unit); • National support to the specialized research centers in the system of science dealing with the issue of reducing greenhouse gas emissions and achieving a low-carbon society (e.g. a technology park in the industrial sector). 				

7 ECONOMIC PROJECTIONS

7.1 PROJECTED DEVELOPMENT OF THE ECONOMY AND THE MAJOR SECTORS

The baseline scenario for the economic development by 2030 is based on the projections of the MF used for the elaboration of budget 2012 as key indicators, which were extended until 2030. Thus the scenario for economic development is conform to the main official document of the Bulgarian government in the period of preparation of the NAPCC.

Since the scope of projections of the Ministry of Finance are narrower than the needs of NAPCC, they are complemented with the necessary economic indicators the behavior of which corresponds to the proposed development scenario.

Table 1: Basic macroeconomic indicators (2005 prices)

Basic indicators	2010	2011	2012	2015	2020	2025	2030
GDP (billion euro)	26.5	27.2	28.0	31.1	38.5	45.6	52.2
GVA (billion euro)	23.0	23.2	23.9	26.4	32.9	40.1	47.2
Population (million)	7.50	7.36	7.35	7.14	6.91	6.68	6.45
Employment (15+, million)	3.05	3.06	3.07	3.08	3.14	3.01	2.93
Employment rate (15+, %)	47.2	47.8	48.5	50.2	52.8	51.8	51.6
GDP per capita (euro)	3 532	3 700	3 815	4 361	5 565	6 823	8 089
GVA per employee (euro)	7 539	7 605	7 782	8 546	10 468	13 304	16 124

Source: NSI, MF projections, own calculations

Table 2: Basic macroeconomic indicators - growth

Growth (average annual, %)	2011	2012	2010	2015	2015	2020	2020	2025	2025	2030	2010-2030
GDP	2.80	2.90		3.28		4.32		3.44		2.75	3.45
GVA	0.96	2.82		2.75		4.54		4.02		3.32	3.66
GDP per capita	4.76	3.12		4.31		5.00		4.16		3.46	4.23
GVA per employee	0.87	2.34		2.54		4.14		4.91		3.92	3.87
Population	-1.87	-0.21		-0.99		-0.65		-0.69		-0.69	-0.75
Employment	0.09	0.47		0.20		0.39		-0.85		-0.57	-0.21

Source: MF projections, own calculations

After the downturn and the slowdown as a result of the economic crisis in 2009 and 2010 it is expected that the economic growth will be recovered and accelerated in 2011. The GDP annual growth rate for the period 2010-2015 is projected at 3.3% and estimated to grow to 4.3% during 2015-2020. The gross value added (GVA) behaves in the same way and is estimated to reach a growth rate of 4.54% in the period 2015-2020. This accelerated economic growth is combined with growth of employment rates estimated to reach 52.8% by 2020. This behavior of employment allows for implementation of the national employment targets under the Strategy “Europe 2020”. However, the negative demographic trends in population decline will continue (by about 1.05 mln. for the period 2010-2030), which will lead to lower employment rates in the period 2020-2030 and will reduce the growth rates of GDP and GVA. The employment rate in 2030 will be sustained above the levels of 2010.

The GDP per capita is expected to grow by 4.23% and the GVA per employee - by 3.87% a year for the entire period until 2030 which suggests accelerated convergence of the economy to the average levels of the EU.

Table 3: GDP on the demand side – real growth (%)

	2011	2012	2010 2015	2015 2020	2020 2025	2025 2030	2010 2030
GDP	2.80	2.90	3.28	4.32	3.44	2.75	3.45
Consumption	1.28	1.90	2.36	4.11	2.70	3.61	3.19
Consumption of households	0.64	1.87	2.38	3.99	2.46	3.77	3.15
Domestic investments	-5.00	4.70	3.89	6.70	2.19	1.43	3.53
Export	11.72	5.36	6.80	4.75	4.00	1.63	4.28
Import	6.22	4.89	5.88	5.42	2.82	1.96	4.01

Source: MF projections, own calculations

The recovery of the Bulgarian economy after the recession of 2009 is due to the favorable developments in exports which is expected to be a major factor for economic growth until 2025. The exports will grow at accelerated rates in this period compared to the total GDP growth and its relative share in GDP will reach 75%. Investments will also recover from their downward trend in 2009-2011. The period by 2020 will be characterized by high rate of investment that will create the necessary conditions for improving economic competitiveness and export growth. The investments reach their maximum in the period after 2010 as a relative share of GDP (28.7%) in 2020. The high growth of investments is accompanied by increased imports of investment goods which boosts the high growth rate of import in the period by 2020. Consumption will be a key factor for growth at the end of the assessed period (after 2025) when its relative share will reach 79.2%.

Table 4: GDP on the production side – real growth (%)

	2011	2012	2010 2015	2015 2020	2020 2025	2025 2030	2010 2030
GVA	0.96	2.82	2.75	4.54	4.02	3.32	3.66
Agriculture	-1.82	2.26	-0.01	1.76	1.17	0.49	0.85
Industry	4.07	2.35	3.03	4.35	4.03	3.33	3.68
Mining industry	9.74	3.70	3.64	3.45	3.44	3.10	3.41
Processing industry	6.83	2.69	3.84	4.49	4.04	3.35	3.93
Generation and distribution of electric and thermal energy and of gaseous fuel	9.63	2.61	4.02	3.95	3.93	3.34	3.81
Water supply; sewerage services, waste management and recovery	9.82	9.33	7.54	6.15	6.53	5.01	6.30
Construction	-10.38	-0.50	-1.18	3.99	3.44	2.75	2.23
Services	-0.35	3.11	2.83	4.77	4.11	3.42	3.78
Trade; repair of motor vehicles and motor cycles	1.31	2.55	3.03	4.51	3.68	3.55	3.69
Transport, storage and posts	1.66	3.12	3.27	5.06	5.16	3.81	4.32

Source: MF projections, own calculations

The major industrial sectors except for agriculture and construction are expected to recover in 2011. The services sector will also be hesitant, however, its growth will speed up and overtake the growth of GVA in the coming years. The relative share of services will be increasing and will reach 59.3% of GDP in 2030.

The fluctuating performance of agriculture will continue throughout the period while the average annual economic growth will remain below the overall growth rate of GVA. This determines the reduction of its relative share which will reach 3.4% of GDP by 2030.

The high growth rates in the construction sector in the period before the crisis are not expected to be repeated. The period by 2015 will be characterized by a small average annual decline in construction. After 2015 the industry will have positive growth rates and after 2020 its relative share will stabilize at levels of 4.6% of GDP.

The industrial sector will be characterized by growth rates (3.68%) very close to those of GVA (3.66%) throughout the period, and its relative share will reach 26.6% in 2030. In 2011 the industry will begin to recover from the crisis at expected relatively high rates of growth.

Among the industrial sectors with highest expected rate of growth is the sector of “Water supply; sewerage, waste management and recovery”. This sector will mark the highest growth rates during the period. Waste management is a sector with the greatest potential for development and the relative share of the treated waste is expected to increase significantly at the expense of the untreated waste.

The mining industry will realize relatively lower growth rates than the overall growth of GVA, and its relative share in GDP at the end of the period will be 11.9%, which does not represent a significant change compared to 2010 when it was 12%.

The processing industry will grow at a faster pace than the overall growth of GVA and at the end of the period it will reach a relative share of 15.6% of GDP.

7.2 ECONOMIC ANALYSIS OF THE POSSIBILITY TO UNDERTAKE MEASURES BY SECTORS

The analysis is based on the scenario for economic development by 2030 proposed in Section 7.1 above. The goal is to assess the feasibility of measures by sectors in terms of economic development. In principle, the reduction of greenhouse gas emissions is assessed under stable and unchanged macroeconomic indicators. Thus the effective reduction of emissions is estimated without reducing the actual production and consumption.

The effects of the measures proposed to reduce the emissions may be assessed on the side of production (supply) by sectors – improvement of the quality of human capital, technologies and efficiency and on the demand side – through the investment required to implement the measures.

The assessment of investment possibilities should take into account that the total amount of investments for the entire economy for the period 2012-2020 is 214 bln. BGN at current prices of 2011 (because the investments proposed in individual sectors are also at current prices). **The total cost of the planned measures⁷⁸ is 10.575 bln. BGN or 4.9% of the total investments in the economy for that period. The expected reduction in emissions as a result of the intended measures is estimated at 44.832 mln. tonnes of CO₂ eq., which means that the cost of each saved tonne of emissions is estimated at 236 BGN.** It should be taken into account that measures in the Plan include implementation of both *existing* (in 2012) and *planned* (by 2020) strategies and sectoral policies.

⁷⁸ Measures with indicated cost estimations.

The conservation, the rational and responsible use of resources is essential not only for improving and protecting the environment, but for achieving sustainable economic growth and increasing the competitiveness of the Bulgarian economy. The introduction of low carbon, energy efficient and low waste technologies, as well as the recovery and recycling of greater amounts of waste contribute to improving productivity and resource efficiency. This creates opportunities for finding new sources of growth and jobs through cost savings, marketing of innovation and better management of resources throughout their life cycle.

7.2.1 Energy

The measures in the Energy Sector are consistent with the Energy Strategy of Bulgaria by 2020. This suggests security of resources as a prerequisite for the approval of the document. The main sources of financing are to be the Structural Funds, the green investment scheme, Kozloduy Fund, the state budget and private investments that would ensure high cost efficiency of projects. The planned investments⁷⁹ in direct and indirect measures are more than 6189 mln. BGN, which is a considerable resource and accounts for nearly 2.9% of the total investment in the economy over the entire period. The investments planned for direct measures are 1753 mln. BGN and will lead to saving 18 mln. tonnes of emissions at an average cost of 97.4 BGN per tonne of saved emissions.

According to the macroeconomic scenario in Section 7.1 the sector “Production and distribution of electric and thermal energy and gaseous fuels” will grow on average by 3.8% in the period by 2030 and its relative share in GDP will slightly rise from 3.3% to 3.6 %.

The specific measures are aimed at improving the efficiency of energy production and transition from coal to natural gas in some plants, improving the technologies used to produce energy from coal, including the use of “clean” coal technologies. Changes are to be effected also in the energy mix, aimed at increasing the target values of the shares of electricity from nuclear sources and from renewable sources – 15% of the electricity mix, as well as at increasing the use of high efficiency cogeneration.

In order to reduce the amount of greenhouse gas emissions, to use less resources and to achieve respectively lower cost of energy, concrete measures for more efficient production in existing plants amounting at 240 mln. BGN are envisaged for the period 2013-2020. In addition, replacement of technologies will be undertaken to allow transition from coal to natural gas, where the required investments worth 720 mln. BGN. The expected effect from these measures in terms of reduced emissions is respectively 4.68 mln. and 11.7 mln. tonnes of CO₂ eq. which means that the average cost of saved emissions is respectively 51 BGN/tonne and 62 BGN/tonne. This means that these measures have the lowest cost per tonne of saved emissions in the energy sector⁸⁰. In addition, the main sources of funding will be private investments, European programmes and revenues under art. 10c of Directive 2003/87/EC, which will significantly limit the use of public funds.

Another important tool for reducing emissions is the use of high efficiency cogeneration, where the investment is estimated at approximately 790 mln. BGN for the period 2013-2020 and will lead to emissions reduction of 1.6 mln. tonnes CO₂eq. The

⁷⁹ For which there are estimates.

⁸⁰ According to available data on the amount of investment needed and the expected reductions in greenhouse gas emissions by specific measures.

estimated average price of a tonne saved emissions is 494 BGN, which significantly exceeds the results of the previous two measures.

Immediate effect from an increased share of electricity from renewable sources is the reduction of greenhouse gas emissions as this production does not generate any emissions. Bulgaria has a significant potential of renewable energy sources and the encouragement of investments therein directly contributes to diversification of the energy mix and to slowing down the process of exhaustion of local energy resources. An important aspect here is the decentralized production of energy and the consumption of energy from renewable sources by households. The specific measure to be implemented is to increase the share of energy for heating and cooling from renewable sources which will contribute to reducing greenhouse gas emissions by 488000 tonnes by 2020.

The most prominent of the indirect measures is the one aimed at increasing the share of electricity from renewable sources in the electricity mix and that is related and contributes to the implementation of the national target with regard to the share of renewable energy in the gross final energy consumption by 2020. The investments required for this measure are estimated at 4183 mln. BGN.

7.2.2 Energy efficiency

The improvement of the efficiency of energy production and consumption will increase the competitiveness of enterprises and the possibilities to generate higher added value. The total amount of foreseen investment is about 950 mln. BGN⁸¹ that will lead to reduction of emissions by 3.5 mln. tonnes. The average cost per tone of saved emissions in the sector is 270 BGN⁸², and the main sources to finance these investments are the European funds, different financial schemes in this field, credit lines, the state budget and private investments.

The growing use of natural gas in households has a positive energy saving and environmental effect, but increases the dependency on imported energy resources. The supply of natural gas to 30% of households by 2020 will increase the import of natural gas and the dependence on imported oil and natural gas will rise from 36.7% in the baseline scenario to 48% in case of gasification. The risk of supply disruption will be managed through diversification of the sources of natural gas supply by building gas system interconnections with Greece, Romania, Turkey and Serbia, by participation in major international projects and expansion of the country's existing gas storage facilities.

Reducing the consumption of electricity by substituting it with natural gas will lead to more efficient use of resources, lower costs and better and healthier environment. The use of natural gas in households and in the provision of services is substantiated by the measure for accelerated gasification which is part of the Second National Action Plan for Energy Efficiency covering the period 2011-2016 and will probably be extended to the next action plan. According to this measure 430000 households will have access to natural gas, the investment needs are estimated at 774 mln. BGN and the expected reduction is respectively 2.4 mln. tonnes CO₂eq. The cost of this measure per saved tonne of greenhouse gas emissions is 322.5 BGN however without its application it would be impossible to secure access to natural gas for households by 2020, neither to achieve the

⁸¹ For the measures for which there is an estimate of the required financial resources.

⁸² This includes the measures for which there are estimates of the required financial resources and the emission savings.

results of the accompanying measures that are important in terms of efficiency of energy consumption and in terms of reducing emissions.

Improvement of the efficiency and savings in the final fuel and energy consumption will be carried out largely through sanitation of at least 3% of the public and state-owned buildings with total floor space of over 250m² per year in order to ensure the fulfillment of the minimum requirements to the energy performance of these buildings. The investments are estimated at 34.2 mln. BGN, and the reduced emissions are equivalent to 204000 tonnes of CO₂. Sources of financing the measure are the structural funds, the green investment scheme, the state budget. The cost of one tonne saved emissions is 168 BGN which makes the measure significantly more effective than the average level for the Energy efficiency sector as a whole.

Decentralization of production is to be realized through the national programme “1000 sunny roofs” that will be implemented during the period 2015-2020. The investment is estimated at 140.5 mln. BGN to be provided by the European funds, the Energy Efficiency Fund, private investments and other sources and will contribute to reducing emissions by 107 200 tonnes of CO₂ eq. The relative cost per tonne of saved emissions is 1308 BGN and is the highest one for all proposed measures in the sector.

7.2.3 Industry

The measures in the Industry Sector are aimed at improving the energy efficiency and at optimal utilization of resources. The main source of funding is the programme “Competitiveness” and its eventual extension in the next programming period. The planned investments amount to 361.6 mln. BGN, of which 261.6 mln. BGN have a direct effect and the remaining 100 mln. BGN have an indirect effect. The investments are relatively small in volume with respect to the total investments in the economy. The estimated savings in CO₂ emissions from the measures with direct impact amount to 5.6 mln. tonnes, i.e. the investment per reduced tonne of emissions is slightly more than 46 BGN which makes the measures relatively efficient.

The direct measures involve, on one hand, the technology used in the industry thus creating preconditions for increase in production competitiveness by reducing the energy intensity in the sector and the final energy consumption.

Other measures are aimed at the utilization of alternative fuels such as biodegradable waste, thus increasing resource efficiency, decreasing the dependence on imported fuels and meeting the requirements related to the prohibition of landfilling of biodegradable waste. The measure is consistent also with the estimates in the macroeconomic scenario in Section 7.1 according to which the value added in the industrial sector “Water supply, sewerage, waste management and remediation activities” grows by 94% in 2020 compared to 2009 due to waste management. Moreover, the added value in this sector is expected to increase by additional 75% by 2030 compared to 2020 as a result of the measures and the expectations for economic development.

The establishment of a technology park and a business incubator is a measure with indirect impact on the reduction of greenhouse gases. Its effects can be sought mainly in the following areas: introduction of incentives to encourage private sector investments in R&D and innovations of widely used production methods aiming at optimal efficiency of resources; development of market instruments to encourage environmentally friendly products through efficient use of resources; encouraging the exchange of good practice between enterprises with respect to the efficient use of raw materials in production.

7.2.4 Transport

Structure of the sector has been changing over the recent years towards increasing the share of road transport which accounted for 98% of the energy consumption in the sector in 2009. The share of diesel in fuel consumption significantly increased in the sector and reached 46.3%. Private cars in 2009 were a source of 60% of the total emissions in the sector. The analysis shows that the main objective of the measures in the sector is to achieve optimal balance in the use of different modes of transport. Measures will be taken to reduce transport emissions, fuel consumption, to diversify transportation services, to inform and to train the consumers.

According to the macroeconomic scenario presented in Section 7.1 there will be an increase in the relative share of transport services, where the share of the sector “Transport, storage and posts” will reach 5.6% of the GDP by 2030 and an average growth rate of 4.3% which indicates potential for growth and reinforces the need for optimization of the various transport modes.

The main sources of financing for the proposed measures are the European funds with state and municipal co-financing, the state budget and the municipal budgets. The planned investments amount to 2071.8 mln. BGN and seem feasible and justified in terms of implementation of the European and national priorities. 5.6 mln. tonnes of emissions will be saved at an average cost of 370 BGN per tonne.

With regard to the priority axis for reductions of transport emissions there are two direct measures which require substantial funding. The first measure involves rehabilitation and modernization of road infrastructure to reduce emissions with foreseen investments of 440 mln. BGN. The measure aims to ensure optimal speeds and optimal operation of motor vehicle engines. The second measure is aimed at the development and the construction of intelligent transport systems which requires financial resources of 410 mln. BGN. These systems will contribute to the enhancement of mobility and safety and the reduction of pollution. Another direct measure is the increase of the share of biofuels.

The rehabilitation and modernization of the road infrastructure is a key priority of the Government and is directly related to an increased growth potential through the development of transport connectivity and the improvement of access to markets. The intelligent transport systems increase efficiency in the use of existing infrastructure and help reduce environmental pollution through the prediction and management of traffic flows and volume. The increased share of biofuels will contribute to increasing resource efficiency.

The reduction of fuel consumption implies less travel by private cars and will be achieved mainly through two measures that require substantial financial resources. The first one provides for the development of non-motorized transport and improvement of the urban public transport which requires investments of 200 mln. BGN. The second measure envisages development of cycling through the construction of bicycle tracks and lanes and a system for using public bicycles, at estimated cost of 150 mln. BGN. The measures will lead to less travel by private cars, better traffic management, less traffic congestion, less noise and fewer emissions. This will improve transport connectivity and will increase the economic efficiency.

Diversification of transport will be achieved by increasing the share of public electrical transport (840 mln. BGN) and by establishing intermodal terminals for combined transport (30 mln. BGN). The increase of the share of public electrical transport includes both renovation and construction of the relevant infrastructure (railway and mass public

infrastructure, mainly metropolitan), as well as renewal of vehicles. The implementation of this measure will help Bulgaria implement its commitments related to the national and trans-European transport networks and to optimize its public transport. It will also improve traffic management, transport connectivity, access to markets, and thus increase the opportunities for international trade and will save time and costs of households and businesses.

It is envisaged that 30% of truck cargoes transported at a distance of over 300 km are to be redirected to more environmentally sound modes of transport such as railway. In order to make the combined modes of transport more efficient the central network airports in Sofia, Varna, Burgas, Plovdiv and Gorna Oryahovitsa will be connected to railway lines.

Measures for training and informing consumers with indirect effect on the reduction of emissions are planned under priority axis 4.

7.2.5 Agriculture

Emissions in the Agriculture sector are mainly due to several sources – agricultural soils (58%), biological fermentation in animal husbandry (21.8%), management of manure (19.3%), burning of stubble (1.7%) and rice production (1.1 %). After Bulgaria joined the EU the major structural changes in this sector consisted in reducing the number of farms and increasing their average area.

According to the macroeconomic scenario for development presented in section 7.1, the sector of agriculture, forestry and fisheries will grow at an annual rate of 0.85% by 2030 which will lead to reduction of its relative share in the GDP down to 3.4% at the end of the period.

The main sources of investment financing are the RDP and the state budget. The total planned investment is 411.8 mln. BGN, which corresponds to the scenario of economic development. The direct measures are worth 372.3 mln. BGN, the expected emission savings are 30 tonnes at an average cost above 12000 BGN per tonne thus making the measures relatively expensive. This is mainly due to the need for significant capital investment for restructuring and mechanization of farms, for building new installations and facilities and for purchase of equipment.

The direct measures under the priority axis for reducing emissions from agricultural soils include organic farming (12000 ha by 2020) and scientifically justified crop rotation (on 8000 ha by 2020); biological recultivation (2500 ha) and anti-erosion measures (2500 ha), with total investment of 6.7 mln. BGN. These measures will cover less than 1% of the arable land in the country. The expected effects are associated with the preservation of organic carbon in the soil, improvement of the quality of arable land and production and modernization of technologies and competitiveness. The expected amount of saved emissions is 26000 tonnes at an average cost of 258 BGN/tonne.

The indirect measures related to soils include enhancement of the competencies and skills of farmers to improve soil quality and to use energy and water saving irrigation technologies, which will increase the quality of human capital, the productivity and the efficiency of the used resources. The required investment amounts to 4.1 mln. BGN.

One indirect measure is planned under the priority axis for reduction of methane emissions in stock-breeding – encouragement of extensive grassland husbandry. Training of farmers is envisaged with the view of increasing the quality of human resources and

permanent pastures are to be maintained with payment per hectare. The financial resources required for the measure are estimated at 34 190 000 BGN.

The direct measures related to management of manure include construction of the necessary storage installations. The investments required for that purpose are the most significant amounting to 130 mln. BGN. These installations will cover 16% of the number of cows (over 2 years old) by 2009. Trainings will be conducted and model farms will be built to process manure that will cost 1.4 mln. BGN. The direct measures are expected to save 1924 tonnes which in terms of cost means 68400 BGN per tonne. The indirect measures involve building a resource center for scientific research, and development of training methods and practices. This would boost R&D expenses, improve the quality of human capital and technologies.

Substantial financial resources amounting to 230 mln. BGN are planned for the optimization of the use of crop residues/waste in agriculture. The direct measures are worth 225 mln. BGN and will save 655 tonnes of emissions at an average cost of 343 000 BGN per tonne which makes the measure the most expensive one in relative terms. Its implementation will address the problems with stubble burning. Investments are foreseen for equipment and machinery as well as for changes and adaptation of the production process. 5000 farms will be covered which is about 1.4% of their total number. The indirect measures are aimed at improving the awareness and knowledge of farmers and at strengthening the prevention of stubble burning. The resource efficiency will be enhanced, the technologies, as well as the human capital will improve as a result of the measures.

Other training measures besides those specified above are also envisaged for the farms and their staff in order to improve the quality of human capital, resource efficiency and productivity.

7.2.6 Land use, land use change and forestry

The balance between emission and absorption of greenhouse gases in the LULUCF sector is in favor of the absorption. Sinks are territories occupied by forests, grasslands and meadows. The main source of emissions in the sector is the change in land use and the conversion of forests, grassland and pastures into cropland and urban areas.

Over the past 21 years the absorption of greenhouse gases in the sector has been offsetting between 11.35% and 19.9% of the total greenhouse gas emissions in Bulgaria. The most important role in the uptake and storage of carbon (94-95% of the total absorption in the sector) have the areas occupied by forests, which explains the focus of many of the measures.

The main sources of investment financing are RDP, OP Environment, EMEPA, state and municipal budgets, interested private individuals and entities. The total proposed investment is 54.8 mln. BGN, justified by the importance and the impact of the measures. The direct measures worth 27.9 mln. BGN and will save 80800 tonnes of CO₂ emissions at an average cost of 345.3 BGN per tonne.

The first priority axis consists in increasing the absorption of greenhouse gases and with this respect part of the measures are aimed at afforestation in both existing forests and parks as well as in newly abandoned agricultural or eroded lands. The total value of these measures is estimated at 10.45mln. BGN. The effect is reduction of emissions by 51 000 tonnes at a cost of 205 BGN per tonne. The most expensive measure

is related to wetland management in forest areas, peatland and marshland – 15 mln. BGN with expected effect of emission reductions amounting to 4.7 tonnes, i.e. at a cost of 3200 BGN per tonne. This makes the measure relatively expensive, but it is important for preserving biodiversity and natural development of forest ecosystems. The envisaged indirect measures are related to the financial mechanism aimed at supporting the activities and the analysis of existing legislation. The implementation of these measures will contribute to the sustainable growth and development of the wooded forest areas, the maintenance of the ecosystems therein, the possibilities to develop tourism, to increase the share of wood pulp as energy source, and to increase the value of the forestry sector.

The second priority axis affects the storage of carbon stocks in forests and envisages restoration and maintenance of forest shelter belts and new anti-erosion afforestation. The needed financial resources are estimated at 1.75 mln. BGN with expected effect of 8360 tonnes CO₂ reduction, i.e. at a cost of 209 BGN per tonne, which is comparable to the cost of the afforestation measures in the first axis. Most important among the indirect measures is the prevention of forest fires through the establishment of an early warning system worth 25 million BGN, which includes the purchase of new equipment. The implementation of these measures will contribute to the protection, conservation, development and expansion of forest areas, to the improvement of the methods and technologies used, which will increase the efficiency and promote the growth and the added value of the forestry sector.

The third priority axis is focused on the potential of forests to capture carbon and plans increase of tree density worth 0.7 mln. BGN. The expected effect is reducing emissions by 16 720 tonnes, at cost of 42 BGN per tonne, which makes the measure highly effective. The indirect measures include the development of new systems, good practices, forest certification and updating strategic documents. The implementation of these measures will contribute to sustainable growth and development of forest areas as well as to increased value added in the sector.

The fourth priority axis is aimed at the long-term retention of carbon in wood products through campaigns and initiatives for expanding the use of wood products as substitutes for products from non-renewable, polluting and energy-intensive materials. This will increase resource efficiency and the value added in the sector.

7.2.7 Waste

The GHG emissions from landfilled waste is about 77% of the total amount in the sector, the emissions from waste water treatment are about 22% and from waste incineration – less than 1%. Therefore, the measures in the waste sector are targeted as a priority at the subsector of waste disposal and to a lesser extent at the subsector of wastewater treatment.

The main sources of funding are OP Environment, private investments, own funds of recovery organizations, EMEPA.

The planned investments in the sector amount to 536.3 mln. BGN, which is achievable from a financial standpoint. The investments and the measures undertaken in the sector correspond to the projections in the macroeconomic scenario in Section 7.1 according to which the value added in the industrial sector of “Water supply, sewerage, waste management and remediation activities” increases throughout the period 2010-2030 by 6.3% on average with total value added growth of 3.66%, while its relative share

in the value added grows from 0.86% in 2009 to 1.55% at the end of period. The direct measures will require investments of 455 mln. BGN and will save 12 mln. tonnes of emissions at an average cost of 38 BGN per tonne which makes the measures in this sector highly efficient.

With regard to the landfilling of waste the main efforts are directed towards the prevention of waste which will help reduce the amount of waste for disposal, as well as to build infrastructure for waste treatment. The measure “Development of systems for mechanical and biological treatment (MBT) plants for treatment and utilization of compost and biogas” has a relatively high effect and requires 221 mln. BGN (41.2% of the planned investments in the sector) however 5.8 mln. tonnes of emissions will be saved by 2020 at an average cost of 38 BGN which makes the measure highly efficiency. As an indirect measure is referred the further development of the collective schemes for separate waste collection worth 80 mln. BGN, which will increase the efficiency and the scope of the systems and will contribute to the diversion of 130000 tonnes of waste from landfills every year. Prevention of waste disposal will be effected also through market based incentives for households. The amount of the waste charges is to be bound to the quantities of generated waste thus encouraging households to reduce the amount of disposed waste, to use various waste collection schemes and waste recovery at home. Standards are to be introduced for the recycled materials and compost, which will allow the marketing of these materials, reduce transaction costs and increase the cost efficiency. Separate collection of “ green waste” is to be introduced in all municipalities through the updating of their regulations and waste management programmes.

The already landfilled waste also has a high potential to be used as energy and resource. Measures will be implemented to capture and use the biogas in both new and existing landfills and in landfills pending closure, which will improve resource efficiency, reduce dependence on imported energy resources and create added value that is currently being lost without the construction of these installations. The total cost of direct measures under this priority axis is 60 mln. BGN, the expected amount of saved emissions is 10.9 mln. tonnes at an average cost of 5.5 BGN per tonne which makes the measure very highly efficient. The indirect measures include measuring and estimation of the amount of biogas in landfilled waste.

Measures will be taken to capture and flare the biogas in urban waste water treatment plants, which will enable these plants to meet their own energy needs and to improve their profitability and efficiency. The cost of these measures is estimated at 174 mln. BGN and the expected amount of saved emissions is 1.025 mln. tonnes which makes an average cost of 170 BGN/tonne.

The measures in this sector will lead to increased resource efficiency and better management of resources throughout their life cycle, will increase the added value, reduce the dependence on imported energy resources thus reducing the costs of households and businesses and increasing the competitiveness of the economy.

7.2.8 Education and Science

Although they do not lead directly to measurable reductions in emissions NAPCC envisages measures in the field of education and science to promote targeting of R&D and educational activities on issues related to climate change.

The measures entail strengthening of this topic in the educational process (priority axis 1) and focus of research on its sectoral aspects (priority axis 2). 90 mln. BGN is foreseen for their implementation and the results thereof are to be considered in the long term and in the context of the flagship initiatives under the Strategy for Smart and Sustainable Growth “Europe 2020” related to promotion of innovations and transition to a more efficient use of resources and a low-carbon economy.

8 ADMINISTRATIVE CAPACITY

The main body for implementing the national policy on climate change in Bulgaria is the Ministry of Environment and Water which is empowered to implement, coordinate, monitor and evaluate the policies and the measures to mitigate the consequences of climate change on the environment at national level. The Climate Change Policy Directorate⁸³ holds the functional competence in activities related to the development and the implementation of national policies and measures in the field of climate change prevention; it is responsible for the preparation of bilateral memoranda, it coordinates and documents the implementation of Joint Implementation projects. The Directorate was set up relatively recently as an independent unit⁸⁴ and the positive direction of its administrative operation and strengthening should be maintained. The Directorate gradually builds up its expert potential and envisages further activities to strengthen its expertise and capacity. Specific functions related to climate change are entitled to other departments in the MEW as well – “Air Protection”, “Environmental Policies” and others – which also dispose of qualified expert potential. Moreover, many state institutions have a specific role and responsibilities in implementing measures related to climate change.⁸⁵ Some institutions bear more responsibilities related to climate and their specific functional responsibilities are clearly defined (e.g. MEW, the Executive Environment Agency, the Sustainable Energy Development Agency). Other institutions to which this activity is not a priority carry out some specific tasks, but they often lack prepared reference experts. It is therefore necessary the tasks and the responsibilities of the concerned agencies to be clearly specified, to be provided with the appropriate human resources in order to avoid overlapping of functions and use of excessive human and administrative resources.

As a first step, the capacity of public administration bodies, of other institutions and organizations related to climate policy, as well as the capacity of local authorities have to be reviewed in order to bring the relevant departments in compliance with the Climate Act that is currently being prepared. The functions and responsibilities of all institutions should be clearly defined in that act and enshrined in a regulation with a view to its full implementation.

⁸³ Art. 38 of the Rules of Procedure of the Ministry of Environment and Water

⁸⁴ Climate Change Policy Directorate – set up on 01.12.2009 as a specialized unit on the issues of climate change (initially a sector of three employees at Environmental Strategies and Programmes Directorate).

⁸⁵ Other ministries responsible for the implementation of the climate policy are: **Ministry of Economy, Energy and Tourism** – through development of policies and measures for the industry, tourism and services sectors, including promotion of energy efficiency measures, and establishment of programmes to monitor their implementation; introduction and implementation of policies and measures to improve energy efficiency in the process of energy conversion and for higher efficiency in the process of transmission, distribution and consumption of energy; policies and measures for transition to fuels with low or no carbon content; stimulation of the production of electric and thermal energy based on the available renewable energy sources in the country and cogeneration; prevention of the adverse impacts of energy activities on the environment by building the necessary environmentally sound equipment; development and implementation of energy infrastructure development plans, incl. at regional level. **Ministry of Agriculture and Food** – its duties are to coordinate, implement and evaluate policies and measures for improvement of the methods used in crop and animal production and to manage forests in the light of adaptation to climate change. **Ministry of Regional Development and Public Works** - through the elaboration of regional infrastructure development plans and regional programmes for development of transport infrastructure; creating conditions for applying the principles of energy efficiency and environmental protection in spatial and urban planning, construction and construction industry. **Ministry of Transport, Information Technologies and Communications** implements policies and measures for restructuring and improving transport cargo management (centralized cargo control). **Ministry of Finance** – through development and implementation of fiscal and financial instruments to encourage the implementation of the measures.

The evaluation of the implementation of the Second National Action Plan⁸⁶ has concluded that climate change was not among the top priorities of the Government. The public awareness of the problems related to climate change was rather low and government authorities encountered difficulties in performing their tasks and responsibilities with this regard. The lack of sufficient organizational, human and financial resources has prevented the development, application and implementation of actions on climate change and necessitated outsourcing of a substantial proportion of the activities to external consultancies.

The creation of specialized administration within the MEW and the establishment of a distinct directorate is a successful step towards overcoming the existing shortcomings and preparation of experts with specific knowledge in a very complex interdisciplinary field. The distinction of this directorate within the Ministry needs to be maintained while adequate financial and human resources should be provided to strengthen and make best use of the existing expertise.

Another major field for strengthening the existing institutional capacity is associated with better coordination between the competent authorities. The implementation of this plan requires both coordination of the activities between several ministries and government agencies, as well as coordinated monitoring and reporting of results, assessment of proposals for new measures and provision of funding for effective projects with proven potential to reduce emissions that represent elements of the measures defined in this plan.

To fully exploit the potential for reducing GHG emissions this Action Plan should be integrated with the plans and programmes developed by sectors and with other horizontal programmes for development. It is necessary to delegate rights and responsibilities for coordinating various activities related to climate to one body which has sufficiently trained expert and administrative resources to be able to perform this activity. On the other hand, better coordination would allow full use of already trained human resources in different sectors would prevent duplication of functions in various institutions and working groups competent in climate policy.

The coordination of various aspects of these activities through working groups and committees⁸⁷ that include representatives of different institutions involved in climate policy, as well as representatives of NGOs and professional organizations/associations was established as a good practice with regard to the effective implementation of policies and measures on climate change and the increase of the institutional capacity at national level. Following the recommendations of the first NAPCC an Interinstitutional Commission on Climate Change (ICCC) was created to facilitate the communication between institutions and to ensure the supervision and the coordination of their activities with regard to the national policy on climate change. The ICCC was useful as a body for coordination of interinstitutional efforts related to climate⁸⁸. This body, however, was not

⁸⁶ Assessment of the implementation of the Second National Action Plan on Climate Change 2005-2008 and recommendations to the Plan for 2009-2012.

⁸⁷ The following task forces were established by order of the Minister of Environment and Water: Interinstitutional Commission on Climate Change, Interinstitutional Working Group for Coordination of the Implementation of the National Allocation Plan for Greenhouse Gas Emission Allowances and a steering committee for evaluation of JI projects under the Kyoto Protocol.

⁸⁸ Other countries (e.g. Austria) also have similar interinstitutional commissions but they are institutionalized at a high political level.

convened on a regular basis, indicating that there was no real exchange of information between institutions and that the climate was not among the main priorities.

Since such commission already exists it is most appropriate to update its activities by reviewing its functions as an interinstitutional coordination unit on all issues and aspects of the management activities related to reducing greenhouse gas emissions across all sectors and the adaptation to climate change. The commission should have the presided by the MEW, while the Climate Change Policy Directorate at the Ministry can practically act as a coordinating unit that will keep the whole information, monitor the performance of the commission and initiate actions to implement these functions. Depending on the requirements of the regulations governing the national policy on climate change, and the corresponding needs of coordination between institutions and organizations, the commission may operate in different forms (sub-commissions), but remain a single body for interinstitutional coordination with a central executive unit – the Climate Change Policy Directorate at the MEW. The mode of operation, the specifics of the structure and the regulations of this commission will be defined in the Climate Change Act. One of its functions is intended to be the coordination of the reporting on the implementation of this Action Plan. The ICCC functions regarding the implementation of the Plan will be defined by Order of the Minister of Environment and Water until the Climate Change Act is developed and adopted.

An essential aspect in the coordination of activities on climate change is taking into account the specific role and functions of municipalities. The activities to combat climate change in almost all sectors have a local dimension – either because of their connection with plans and programmes adopted at municipal level, or because they are implemented through local projects. The Second National Action Plan on Climate Change assigned to municipalities strategic goals relating to: building capacity to acquire knowledge and skills related to the improvement of energy efficiency; establishing consistent local policy to reduce greenhouse gas emissions; increasing the level of knowledge of experts and the public at municipal level; development of pilot projects at municipal premises (administrative buildings, schools, hospitals) to demonstrate the possibilities for saving energy and reducing greenhouse gas emissions.

The primary responsibility for energy management at municipal level lies with the local authorities. Municipal planning of energy efficiency is compulsory under the new Energy Efficiency Act. The rational use of energy and its production and supply at local level is the responsibility of municipal authorities and local energy planning is the main tool for energy management at municipal level. The municipal administration is obliged to adopt programmes for renovation of residences, administrative and public buildings on the territory of the municipality for the purpose of energy efficiency measures. Its duties include introduction of more energy efficient street lighting facilities in settlements and public buildings, and other measures to improve energy efficiency. The management of landfills as part of municipal strategies and programmes for waste management is a major responsibility of municipalities⁸⁹.

The local authorities take decisions on the establishment and approval of plans and their amendments regarding the territory of the municipality under the Spatial Planning Act (SPA) as well as strategies, projections, plans and programmes for

⁸⁹ Some municipalities are very active in this direction and have developed projects for energy efficiency and waste management. Many of the strategic documents and plans are currently being elaborated.

development of the municipality that reflect also the European policies on local development. SPA regulates the procedures for preparation, approval and amendment of general and detailed spatial plans of settlements. According to the Forestry Act, one of the aspects of forestry planning includes regional development plans for woodlands and forestry plans and programmes.

It is necessary to analyze the gaps in the legislation at municipal level in order to assess its specific functions and better distribution of obligations with respect to climate change policy. Specific functions of municipalities can be provided for in the Climate Act as well.

The measures by sectors designed in this Action Plan have also a local dimension and should therefore be taken into account in the elaboration of municipal strategies. On the other hand, the opinion of municipalities should be taken into account in the coordination of the activities to implement the measures laid down in the Plan. The main problem with municipalities is their lack of capacity. This issue can be resolved by seeking capacity from other stakeholders⁹⁰ in the municipalities or at district level.

The different regions of the country design different climate scenarios depending on their geographic location, soil condition and altitude. The different municipalities are to comply with these scenarios in the development of appropriate measures. Specific mechanisms that can be taken into account when implementing the measures at municipal level are, for example, using the capacity of the available trained staff and experts at municipal and district level, organizing meetings between the planning regions (or other appropriate forms of interaction between municipalities with a similar structure, geographic location and problems) – to exchange experience and best practices, with participation of representatives of interested NGOs and the media. The local and district energy strategies, the environmental protection strategies, the waste management plans, the relevant regional development strategy, etc., should be considered in the elaboration of local action plans relating to climate change.

Another key aspect of the activities to improve the administrative capacity is related to the provision of adequate training to the available expert resources in all departments and institutions bearing responsibilities for the implementation of activities related to climate change. It is well understood that it is impossible and unnecessary to have a specialized unit in each of those institutions or organizations.

Each of these institutions should have defined responsibilities, capacity and duties in the descriptions of specific positions within the relevant institution or organization based on the functions set out in the legislation and in the rules of procedure. These job descriptions should be used as basis to elaborate plans and programmes for strengthening the expert and administrative capacity in the field of climate change and for ensuring participation in national and international forums and training with a view of acquiring the knowledge and experience needed to carry out the specific interdisciplinary climate policy.

Furthermore, it is necessary to plan and conduct regular targeted training both for MEW experts and for experts from all institutions with responsibilities in implementing the country's commitments in the field of climate change. The training will

⁹⁰ For example the Chamber of Industry, the municipal administration, the district administration, RIEW, Regional Health Inspectorates, interested NGOs, etc.

help expand the qualification of participating experts, raise their motivation to participate in working groups and to implement their specific duties related to climate policy, and as a result – it will contribute to the improvement of the overall activities related to climate change. Since some institutions dispose of substantial expert potential this work should start by compiling a database of experts having experience with climate change activities and by using the available capacity in trainings and meetings. This system should involve also the environmentalists in municipalities.

Another aspect of the activities related to the administrative capacity with the view of achieving the objectives of the Plan is to ensure the participation and support of many and diverse institutions and organizations, as well as of the citizens throughout the country.

Besides the coordination between institutions, it is necessary to achieve a high level of awareness and motivation for participation, contribution and support on the part of all institutions and organizations, businesses, farmers and households. The main channels of information and motivation of behavior contributing to the reduction of greenhouse gas emissions are the mass media – electronic and printed media, the educational institutions, the youth and children's organizations and clubs, the cultural institutions, etc.

It is necessary to plan and develop a comprehensive communication strategy to support the measures outlined in the Third National Action Plan on Climate Change 2013-2020, as well as effective actions that are interdependent and achieving measurable and genuine results. These actions should include, on one hand, various approaches and mechanisms, consistency with the attitudes and the needs of current generations, but, on the other hand, they should be economically feasible and their outcomes must be measurable.

When developing and implementing this set of measures for public information and motivation of participation and support it is important to coordinate the measures planned by sectors, aimed at improving the competence of different target groups for the implementation of specific tasks. In addition, it is necessary to provide for specific actions in order to ensure access to information regarding the implementation of measures under this Plan.

A specific feature of the particular actions to improve the administrative capacity for management of activities on climate change is that they cover a large number of institutions and bodies, both of the central and the local authorities, due to their horizontal and interdisciplinary nature. To achieve the objectives of the two main aspects defined above - effective coordination between the different responsible institutions and improvement of the expert capacity – an integrated approach should be applied both to planning and to implementation of the specific actions relating to coordination, regulation of duties and conducting training. That is the approach envisaged for the implementation of this Action Plan on Climate Change.

9 MONITORING AND REPORTING UNDER NAPCC

The current reporting under the National Plan on Climate Change 2013-2020 will be performed every two years, and the first report will be prepared in 2015.

The first official report on the implementation of the Plan will be drafted in 2017 and the second – in 2021.

During the first report in 2015 the interinstitutional working group (IWG), set up for that purpose, will assess the need for revision/update of the NAPCC and will make appropriate recommendations for updating (along with specific deadlines).

Method of reporting on the implementation of measures by sectors:

- The implementation of the measures by 2014/2016/2018/2020 is to be reported by the responsible institutions by sectors/measures.
- By 1 February 2015/2017/2019/2021 MEW is to send letters to the responsible institutions under the Plan requesting information on the progress of implementation of the measures within their competence.
- The responsible institutions provide the required information by 31 March 2015/2017/2019/2021.
- By 30 April 2015/2017/2019/2021 MEW is to prepare a current report on the basis of the information received and to convene a meeting of the Interinstitutional Working Group where the respective report is to be approved or returned for revision.
- After adoption by the IWG the official reports in 2017 and 2021 are to be submitted to the Council of Ministers by 30 June for approval.
- In case the current reports need to be amended and/or supplemented they are processed within 15 calendar days.
- The IWG is to adopt the amendments/additions at an additional meeting or through email confirmation by the principal members of the Working group.
- The report intended for approval by the Council of Ministers should contain the following information:
 - Brief information of NAPCC;
 - Brief information about the procedure of reporting on the implementation of the measures;
 - Brief assessment of the financial resources spent for implementation of the measures by sources;
 - Brief analysis of the implementation of the measures themselves – whether there are problematic sectors where measures were not implemented or the performance is significantly below the expected level and the reasons for this, as well as whether there is overachievement of measures;
 - Assessment whether changes in the process of reporting or update of the measures by sectors are needed with respect to various reports to the European Commission, new European requirements or expected new legislation;

- Brief information on the implementation of measures with indirect effect, including in the field of education and science and of administrative measures;
 - Total quantity of emission reductions as a result of the implemented measures.
- The reports are prepared in a format predefined by the MEW which includes the following columns:
 - Description of the measure;
 - Responsible institution;
 - Utilized financial resources by sources of funding;
 - Indicator for implementation of the measure;
 - Target value in 2014/2016/2018/2020;
 - Reporting value in 2014/2016/2018/2020;
 - Difference between target value and reporting value for each year.

The functions and the members of the existing Interinstitutional Working Group on the National Plan for Allocation of Greenhouse Gas Emission Allowances are to be extended in order to expand the existing coordination mechanism between the institutions concerned, including business organizations and NGOs, on issues related to the national climate change policy.

Main tasks of the IWG (within the context of NAPCC):

- Review of periodic reports under NAPCC within the relevant time limits and the approved format (defined by an Order of the Minister of Environment and Water);
- In case of non-performance of the interim objectives – provide recommendations for further actions/measures in order to achieve the ultimate goals of the Plan;
- Preparation of a summary report under NAPCC and submission to the IWG and then to the Council of Ministers for approval. In case of discrepancies between the planned and the reported figures this report should be accompanied by an assessment of the causes thereof and suggestions for further action;
- Assessment of the need for revision/update of the NAPCC and preparation of relevant recommendations for updating (with specific deadlines) – along with the first report in 2015;
- Opinions on various issues related to the national policy on climate change, including on draft legislation discussed in the EU working bodies, on elaborated national reports, plans, etc.
- Opinions on other issues/materials sent by the Secretariat or provided during meetings of the IWG.

**THIRD NATIONAL ACTION PLAN ON CLIMATE CHANGE
FOR THE PERIOD 2013-2020**

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