Republic of Bulgaria

Second National Action Plan on Climate Change

2005 - 2008

SUMMARY

Purpose and Scope of the Second National Action Plan on Climate Change

The Bulgarian Government has clearly demonstrated strong commitment and willingness to join the international efforts in mitigating climate change by ratifying the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol to the Convention (KP). The Second National Plan on Climate Change (Second NAPCC) is a governmental plan to streamline and guide the efforts of the Bulgarian government in mitigating climate change. It is the continuation of the First National Action Plan on Climate Change, which was developed in the period 1996 – 1997 and approved in 2000. The first plan contained a coherent set of actions to help the country fulfill its commitments assumed by the ratification of the UNFCCC (1995) and the signing of the Kyoto Protocol. The economic growth of Bulgaria after the year 2000 along with changes in the international and domestic policy and the respective regulatory framework (most of which are driven by the upcoming accession to the European Union) required an update and extension of the First NAPCC. This resulted in the Second National Action Plan on Climate Change, which will be implemented in the period 2005 – 2008.

In the process of updating the plan various stakeholders were consulted. These include mostly governmental institutions. In addition, representatives of business sector, NGOs and academia were also invited to provide input and feedback on proposed policies and measures. This approach secured transparency in drafting the NAPCC and the adequate consideration of the current political and economic conditions in the country.

The Second NAPCC includes mainly measures that do not require significant financial support from the state because the present economic situation in Bulgaria does not allow for the allocation of extensive government funding for implementing climate change related policies and measures.

In the short run the implementation of climate change policies and measures is hardly needed. According to the target of Kyoto Protocol, the country has significant reserve of emission reduction. The advantages of adopting the NAPCC however are numerous. It contributes to:

1. Meeting the requirements from UNFCCC and the Kyoto Protocol in regard to greenhouse gas emissions monitoring, evaluation and reporting;
2. Preparing for a situation of increased economic growth above the expected trend, making sure that the GHG emissions growth trend can be decreased compared to the economic growth rate;
3. Enabling Bulgaria to benefit from taking part in the so-called 'Kyoto flexible mechanisms' – a set of market-driven tools enabling countries to fulfill their obligations with minimization of costs. Attracting financing from those sources will stimulate investments in the country and increase the competitiveness of the Bulgarian economy;
4. Meeting the requirements of the Acquis Communautaire for EU accession;
5. Anticipating the requirements of a future international climate regime, which is likely to include emission reduction obligations beyond the first commitment period 2008-2012. Having a proper climate change strategy in place will put Bulgaria in a better starting position regardless what form this regime will take.

Structure of the Second National Action Plan on Climate Change

The Second NAPCC starts with an introduction, explaining the purpose and scope of the NAPCC. This is placed in the light of the international efforts to combat climate change. To sketch the current setting and relevance, the historical trend in the change of greenhouse gas emissions in Bulgaria and the baseline scenario for future emissions development are presented, along with Bulgaria's vulnerability to climate change. Because the EU accession is an important driver for climate change policies, the relevant EU policies and legislation in the different sectors of the economy are described. Furthermore, a description of the conditions and starting points for the implementation of climate change policy is given, including a discussion of the roles of the governmental institutions, and other stakeholders and target groups.

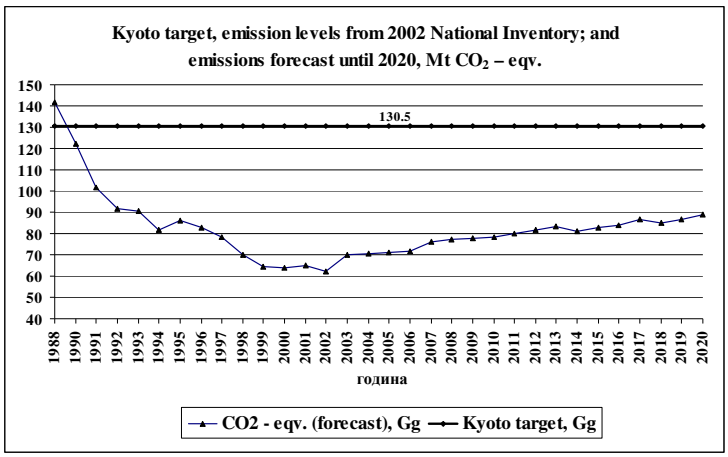
In the NAPCC, the individual sector mitigation policies and measures are described in detail, including the estimation of the emission reduction and requirements for implementation. Since financing from flexible mechanisms is important for the realization of these measures, a special chapter is dedicated to the

implementation of the Kyoto mechanisms Joint Implementation and International Emissions Trading, as well as to the introduction of the EU Emissions Trading Scheme for large industrial emitters in Bulgaria.

In the final part, the effect of the policies and measures proposed in the plan are evaluated for the first commitment period under the Kyoto Protocol (2008-2012). Also an outlook until the year 2020 is provided to explore the long-term development of emissions. This development will be taken into account in establishing Bulgaria's position in the upcoming negotiations on the post-2012 international climate regime.

Scenarios for the change of greenhouse gas emissions in Bulgaria

Greenhouse gas emissions substantially decreased in Bulgaria in the period 1988 – 2002. This decrease occurred mostly due to the characteristics of the economic development driven by market forces, resulting in the closure and downsizing of a large share of the energy-intensive industry as well as the transition into the market driven economy, industry reconstruction and cutting the subsidies. The result is that Bulgaria can confidently expect to comply with the emission target for the first commitment period.



The most likely scenario for the greenhouse gas emissions development of the policies and measures from the First NAPCC will be continued. Furthermore, the scenario considers those pre-accession policies that are already approved by the Bulgarian government. According to UNFCCC terminology, it is called the "with measures scenario", and in the Second NAPCC it is presented as *"baseline scenario"*. This scenario foresees that the expected GHG emission levels during the first commitment period will stay around 80 Mton CO_2 Eq. (See figure: historic emissions are presented till 2002. Emissions from 2002 and onwards till 2020 are projected). This is about 60% of the maximum level according to the Bulgarian Kyoto target. This means that Bulgaria can comply for this period to the Kyoto target with minimal efforts.

Policies and measures for reduction of greenhouse gas emissions

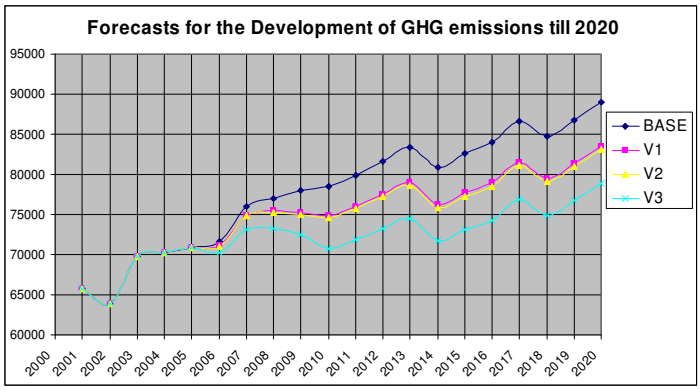
Bulgaria has a substantial potential for further decreasing the carbon intensity of the economy. This potential can be realized with the implementation of the targeted policies and measures. For the economic sectors reviewed in the Second NAPCC, a total of 24 policies and measures are included that are additional to those included in the baseline scenario. These policies and measures use one or more policy instruments, such as:

- Legal instruments: implementation of a certain EU Directive; implementation of different law's acts, privatization, etc.
- Market-based instruments: participation in International Emission Trading, EU Emission Trading Scheme;
- Financial instruments: funds and different investment sources like Green Investment Scheme, Energy Efficiency funds, etc. and state loan guarantees.
- Scientific and research activity;
- Voluntary agreements, etc.

The table below shows the additional estimated reduction that can be expected from implementing these sectoral measures.

Sector	Additional annual reduction in 2010 (Mton)
Energy	4.1 (without measure E2, see chapter 6)
Industry	0.7
Residential and commercial/institutional buildings	2.4
Transport	0.1 (without measures T4 and T5, see chapter 6)
Agriculture	0.2
Waste	0.9

The implementation of these additional measures results in different greenhouse gas emissions levels from what was estimated in the baseline scenario. These levels will vary depending on which of the measures (or group of these measures) would be given priority. To estimate the effect of implementation on the emissions levels, three additional scenarios were developed. The three scenarios are described below. The estimated effects on greenhouse gas emissions are depicted in the figure below.



- *Scenario 1 (S1). Implementation of measures to improve energy efficiency in the demand-side sectors* (industry, services, transport and households). Under this scenario, the aggregated emissions for the period of 2007-2010 remain at the level of 75 Mton followed by an increase up to 81 Mton in 2017 and 83.5 Mton in 2020.
- *Scenario 2 (S2). Implementation of measures promoting energy from renewable energy sources*. This projection includes all additional policies and measures already included in S1, plus those related to renewable energy sources. Under this scenario, the decrease in GHG emissions in addition to the S1 projected levels: 0.28 Mton in 2010, 0.39 in 2015 and 0.46 Mton in 2020.
- *Scenario 3(S3). Implementation of measures affecting conventional energy production.* This projection includes all policies and measures in S1 and S2 plus those resulting from implementation of policies and measures in the energy production sector. The additional decrease of GHG emissions compared to S1 is 3.8 Mton in 2010, 4.2 Mton in 2015 and 4.2 Mton in 2020.

Actions for promoting the implementation of GHG policies and measures

The Bulgarian government will implement several actions to benefit from participation in the international climate change mitigation process. In addition, these actions will help further and more extensive implementation of climate change related policies and measures, especially when it comes to securing financing for implementation.

For the implementation of Joint Implementation (JI) in Bulgaria the operational guidelines for JI will be further developed, as well as the governmental capacity to control and monitor JI projects. Also, the legal framework for JI and Emissions Trading needs further elaboration and the dissemination of information and training for project proponents and funding bodies can be improved.

The implementation of the EU Emissions Trading Scheme will also require considerable attention in the coming years. Tasks that will be completed include the evaluation of experiences in the new Member States of the EU and clarification of the functions and management of the emissions trading system and the necessary amendments of financial, tax, environmental and other legislation. Furthermore, a national allocation plan needs to be made to distribute emission quotas over the participating installations and a monitoring and reporting mechanism needs to be developed based on the EU requirements. To facilitate the actual trading, an emission registry needs to be set up. Finally, in order to prepare both the future participants in industry and the energy sector, as well as the governmental organizations that will play a role in the implementation of these measures, they will be informed and trained as specialists.

In order to improve the financing of the policies and measures, it is planed an establishment of the Green Investment Scheme (GIS) that will require further elaboration of the basic conditions and of the design of the GIS. For this purpose a fund will accumulate the revenues from international emissions trading and rules for

spending these revenues will be prepared. Similar to EU ETS, this instrument also requires training of emissions trading specialists in the responsible agencies. To use the fund, negotiations with potential investors/buyers of Bulgarian excess GHG emissions need to be finalized.

Financing of measures

Bulgaria at present cannot dedicate extensive funding from the state budget for implementation of climate change policies and measures. Subsidies are not envisaged at all. When it comes to financing investments, the sources will come mostly from funds outside the government. Such funds can be either domestic or international.

Donor funds from multilateral financing institutions such as EBRD and the World Bank can be instrumental in financing credit lines for investments in energy efficiency or renewable energy. In addition, funds for general improvements in infrastructure can be obtained from EU structural funds such as ISPA. Also the EU ETS can provide a financial stimulus for larger industrial emitters to reduce their emissions. Other financial sources will be directly linked to the Kyoto mechanisms. This can be either on a national scale by establishing a Green Investment Scheme filled by earnings from selling excess emissions through International Emissions Scheme.

Conclusion

GHG emissions in Bulgaria are well below the target for the first commitment period. The country now faces the challenge to control and limit the expected future increase in emissions resulting from economic growth. Reducing or maintaining CO_2 emissions may be done as "no regret" at minimal costs now because in the years to come the marginal costs of future reduction measures will increase. The best approach for Bulgaria to maintain GHG emissions levels low is by avoiding carbon-intensive economic growth to the extent possible. Furthermore, climate change issues need to be considered when formulating and implementing the national economic development policies. The Second NAPCC will, therefore, provide elaborated guidance on the opportunities for the various sectors of the economy.

In light of the upcoming accession to the EU, Bulgaria is currently transposing EU Directives that are directly or indirectly related to climate change policies, for instance the Directive on CO_2 emissions trading. Although the transposition mainly requires legislative changes, the actual implementation of the climate change mitigation measures under the Directives will involve several new stakeholders outside the government. These stakeholders will be informed and their capacity expanded under the Second NAPCC.

The Second NAPCC shows the importance of the Kyoto instruments for the realization of Bulgaria’s objectives in climate change. The NAPCC provides the key elements and defines the actions to be taken to further increase the use of these instruments in Bulgaria. It sets the basic preconditions to bring additional investments and economic benefits to the country, decreasing the carbon intensity of the Bulgarian economy, while increasing its competitiveness. Simultaneously, the NAPCC is instrumental in providing Bulgaria with a favorable starting position now and for the post-2012 international climate change policy.

CONTENTS

LIST OF ABBREVIATIONS

AAU	Assigned Amount Unit
BAT	Best Available Technique
BGN	Bulgarian currency
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CHP	Combined Heat Power (cogeneration)
CM	Council of Ministers
CMS	Candidate Member States
ECCP	European Climate Change Program
EBRD	European Bank for Reconstruction & Development
EMEA	Enterprise for Management of Environmental Activities
ERU	Emission Reduction Unit
ESPD	Environmental Strategies and Programs Department
ETS	Emissions Trading Scheme
EU	European Union
FEC	Final Energy Consumption
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GIS	Green Investment Scheme
GWh	Giga Watt hour: unit of electricity (giga = 1 billion)
HPP	Hydropower Plant
IET	International Emissions Trading
IMCCC	Inter-Ministerial Committee on Climate Change
IPCC	Inter-governmental Panel on Climate Change
IPPC	Integrated Pollution Prevention and Control
ISPA	Instrument for Structural Policies for Pre-accession
JI	Joint Implementation
kWh	kilo Watt hour: unit of electricity
LULUCF	Land Use / Land Use Change and Forestry
MAF	Ministry of Agriculture and Forestry
ME	Ministry of Economy
MEER	Ministry of Energy and Energy Resources
MF	Ministry of Finance
MIA	Ministry of Internal Affairs
MoEW	Ministry of Environment and Water
MRDPW	Ministry of Regional Development and Public Works
MS	Member States
MTC	Ministry of Transport and Communication
Mton	Mega ton (Mega = 1 million)
MW	Mega Watt: unit of power
NAPCC	National Action Plan on Climate Change
NGO	Non-Governmental Organization
NPP(-K)	Nuclear Power Plant (-Kozloduy)
NRA	Nuclear Regulatory Agency
PEC	Primary Energy Consumption
PJ	Petajoules (10^{15})
R&D	Research and Development
RES	Renewable Energy Sources
SAF	State Agricultural Fund
SAVE	Specific Actions for Vigorous Energy Efficiency
SC	Steering Committee
SERC	State Energy Regulatory Commission
SME	Small and Medium-sized Enterprise
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
VA	Voluntary Agreement

1. INTRODUCTION

1.1. PURPOSE AND SCOPE OF THE NATIONAL ACTION PLAN ON CLIMATE CHANGE

Bulgaria has clearly demonstrated strong commitment and willingness to join the international efforts for mitigating climate change by ratifying the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol to the Convention (KP)

Resulting from this political commitment, a National Action Plan on Climate Change (NAPCC) for Bulgaria was developed in the period 1996 – 1997, and approved by the Government in 2000. It contained a coherent set of actions for the period 2000 – 2005 in line with Bulgaria's international obligations in the context of UNFCCC as well as with the Climate Change Program of the European Union.

The economic growth of Bulgaria after the year 2000 along with changes in the international and domestic policy and regulatory framework required an update to the original NAPCC. The updated action plan (referred to as Second National Action Plan on Climate Change) will be implemented in the period 2005 – 2008, although the effects of the measures in terms of greenhouse gas (GHG) emission reduction are assessed up to year 2012, when the First Commitment Period under the Kyoto Protocol ends, i.e. till 2020.

The following four categories of actions are included in the updated Plan:

- Actions to implement mitigation policies and measures that result in GHG emission reductions in the different economic sectors in Bulgaria;
- Actions to create the necessary conditions for implementation of the mitigation measures, for instance institutional arrangements and awareness raising;
- Actions related to the monitoring and registration of GHG gases and the systematic evaluation of emission trends and projections, including the evaluation of policies and measures;
- Actions for the implementation of the Joint Implementation and Emissions Trading schemes.

The NAPCC comprises mainly measures that do not require budget funding/financing, as the economic situation in Bulgaria does not allow for the allocation of significant funding and other public resources to implementing climate change policies and measures. Although the plan indicates set of "reserve"/"additional" policies and measures which can be applied in case if there is observed/evident accelerated increase of the GHG emissions more than the expected one or when the financial situation in Bulgaria allows more active cooperation/partnership of the Government in this field.

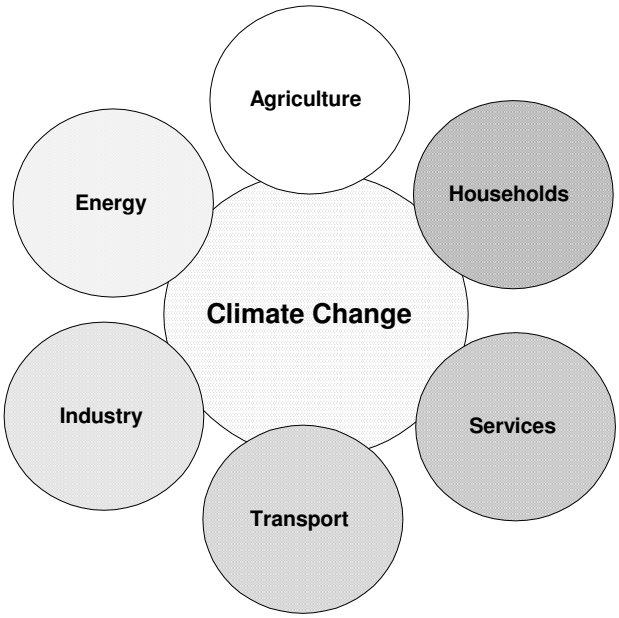
1.2. THE RELEVANCE OF NAPCC TO OTHER POLICY PROGRAMS AND STRATEGIES

The policies and measures in this Action Plan are to be implemented in all sectors of the Bulgarian economy, i.e. in the energy sector, industry, transport, agriculture, households and services. It is because the climate change impacts all these sectors (see Figure 1 below). This implies that the Action Plan has to take into account other policy programs and strategies for these sectors. These include, for example, the National Environmental Strategy, the National Development Programs, the National Transport Policy and policies in the energy sector, such as the Energy Law and the Energy Efficiency Law (State Gazette №71/23.07.2002).

Moreover, the strong interaction of these policy fields with climate change policy requires the active involvement of the Ministries responsible for these policy fields in the development and implementation of the NAPCC, particularly through the Inter-Ministerial Committee on Climate Change (IMCCC). Members of IMCCC are:

Ministry of Environment and Water	Ministry of Education and Science
Ministry of Economy	Ministry of Foreign Affairs
Ministry of Finance	Ministry of Agriculture and Forests
Ministry of Justice	Ministry of Internal Affairs
Ministry of Transport and Communications	Ministry of Energy and Energy Resources
Ministry of Regional Development and Public Works	Executive Energy Efficiency Agency
Municipality of Sofia (as observer)	

Figure 1.1 – Connection between climate change and economic sectors



1.3. INSTITUTIONAL FRAMEWORK FOR UPDATING THE NAPCC

The Ministry of Environment and Water (MoEW) is the governmental institution authorized to develop and carry out the state policy related to protection of the environment and climate change. The Ministry has the leading role in the updating and implementation of the National Action Plan on Climate Change.

The Inter-ministerial Committee on Climate Change (IMCCC) was set up in year 2000 to facilitate the communications among ministries and other institutions, and to ensure the control and coordination of their activities on climate change. The Committee consists of representatives from a majority of the Ministries and is chaired by Deputy Minister of MoEW. The IMCCC has contributed to the updating of the Action Plan. Through the IMCCC, other Ministries have been involved as well.

The process of updating the NAPCC was supported by the Government of the Netherlands through the PSO Pre-accession Program (2003-2004). The consortium consisted of three Dutch consultancies - DHV Environment and Transportation, Energy Research Center (ECN) and CAP SD - and the Bulgarian Energy Institute JSCo. The Bulgarian NGO Bluelink participated as a network NGO informing environmental NGOs in Bulgaria about the progress on the NAPCC and climate related news. For this purpose Bluelink has established a website containing information, a discussion forum and news items on climate change and the NAPCC. The Internet address of Bluelink is www.bluelink.net

With the support of the Dutch Government, the update and extension of the NAPCC has benefited from a transparent process with a clear stakeholder involvement. The process was tailor-made to the Bulgarian situation and based on the experiences in the Netherlands. This has resulted in different phases in the process:

- Assessment of the institutional situation relevant for the update of the NAPCC;
- Assessment of the stakeholders in the field of climate change;
- Training and awareness raising of the members of the IMCCC on climate change aspects and the NAPCC through various workshops and a study visit to the Netherlands;

- Establishment of formats for the description of measures;
- Training on the formulation and selection of measures, identification and selection of instruments and availability of government budget, funds or other funding sources.

1.4. MONITORING AND EVALUATION OF THE NAPCC

The implementation of the policies and measures presented in this Action Plan and their impact on GHG emissions will be monitored and evaluated according to the following framework:

1. For each policy and/or measure, a respective governmental organization has been designated.
2. The responsible Ministries and other institutions report on an annual basis (by March 31st) through the members of the IMCCC to MoEW on the progress and implementation of the policies and measures. MoEW will define the reporting format and provide indicators for monitoring and initiate the monitoring process to the members of the IMCCC.
3. On the basis of the implementation reports an estimation of the impact on emissions will be made using the national system for GHG inventories.
4. Actual GDP growth figures are to be incorporated in the monitoring of the NAPCC to periodically update the GHG emission trend; the responsible Ministries should provide the figures and MoEW has to assign an institute for updating the scenarios;
5. The IMCCC coordinates the contributions of the Ministries and institutions in the monitoring and evaluation of the NAPCC.
6. MoEW comprises a National Report with the results of the evaluation and determines need for additional policies and measures. Annually, MoEW sends the National Report with the results of the evaluation to the IMCCC and determines the need for additional policies and measures. In 2009, MoEW will perform and report a complete evaluation of the NAPCC for 2005 – 2008 to the Council of Ministers.

1.5. STRUCTURE OF THE DOCUMENT

The Action Plan consists of eight chapters. **Chapter 1** gives an introduction, explaining the purpose and scope of the NAPCC as well as the relation to other policy programs and strategies.

Chapter 2 describes the international efforts to combat climate change, summarizing the causes and impact of climate change, and introducing the United Nations Framework Convention on Climate Change and the Kyoto Protocol.

The historical trend in GHG emissions in Bulgaria and the baseline scenario for future emissions development are presented in **Chapter 3**. Furthermore, this chapter discusses Bulgaria's vulnerability to climate change.

Chapter 4 presents an overview per sector of EU policies and legislation that are related to climate change policy.

Chapter 5 presents the environment for climate change policy in Bulgaria. This includes the policy framework and the institutional arrangements. In the chapter the financial resources, capacity building, the municipal policies and the raising of public awareness, education and research are discussed. The roles of different government institutions, media, Non-Governmental Organizations (NGOs) and individual citizens are discussed as well.

Chapter 6 describes individual mitigation policies and measures in detail. As such, this section is the core of the Action Plan. More than 20 policies and measures have been selected from a long-list of options. In general terms, higher priority was given to low-cost measures with limited investment requirements and to the obligatory measures as well.

Chapter 7 is dedicated to the implementation of the Kyoto mechanisms Joint Implementation and International Emissions Trading, as well as to the introduction of the EU Emissions Trading Scheme for large industrial emitters in Bulgaria.

Finally, **Chapter 8** presents an evaluation of the effect of policies and measures of the present plan for the first commitment period under the Kyoto Protocol 2008-2012. It also provides a long-term outlook until year 2020 – the expected end of the Second Commitment Period.

1.6. THE PROCESS OF UPDATE AND EXTENDING OF THE NATIONAL ACTION PLAN

Figure 1.2 below depicts the process through which the National Action Plan has been updated and extended. To avoid confusions, the old action plan is referred to as The First National Action Plan, whilst the current updated and extended plan is titled The Second National Action Plan.

Figure 1.2 – Process for update and extension of the National Action Plan

2. CLIMATE CHANGE: A GLOBAL CONCERN

2.1. CAUSES FOR AND IMPACT OF CLIMATE CHANGE

Climate change is caused directly or indirectly by human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).

The majority of the world scientific community agrees that climate change resulting from the anthropogenic activities emitting greenhouses gases (CO_2, CH_4, N_2O and fluoride compounds) can already be witnessed. Effects are visible in the average temperature of the earth that has risen by 0.3-0.6 $^{\circ}$C since the time it has been monitored (the year 1860). Other indicators are the increased melting of the ice during summers and a 10-20 cm rise of the sea level during the 20th century. [1]

Although these occurrences might seem insignificant at first sight, the effects on every day life will be very large. Climate change is believed to lead to a further sea level rise endangering coastal areas all over the world with erosion and floods. It will also result in more extreme weather and changes of precipitation patterns on global scale, causing floods and droughts. Furthermore, local ecosystems might change because of changed circumstances and global water cycles might be disturbed. These impacts will eventually affect all sectors of the economy, natural resources and social life.

2.2. THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC)

In 1992 world leaders and environmental experts from more than 200 countries convened at the Earth Summit in Rio de Janeiro to confront the global environmental crises. Bulgaria joined many other countries in signing the United Nations Framework Convention on Climate Change, which was the first international accord on climate change. In this summit the Convention was ratified by more than 160 countries.

The objective of the Convention is

> *"to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."*

Bulgaria ratified the Convention in March 1995, thus committing to keep its GHG emissions below those in the base year. Pursuant to article 4 of the UNFCCC, Bulgaria used its right to choose as a base year different from the commonly accepted 1990, i.e. 1988.

By signing the UNFCCC and adopting a reduction target, Bulgaria had clearly manifested its concern for the global climate change and political will to fulfill the commitments under the Convention.

2.3. THE KYOTO PROTOCOL TO THE UNFCCC

The Conference of the Parties held in December 1997 in Kyoto, Japan, was a further step in addressing climate change from a global perspective. The emerging scientific evidences had indicated the necessity for more stringent measures for GHG mitigation. Parties to the Convention were asked to go beyond stabilizing their

[1] Third Assessment Report of IPCC approved with Decision 25/COP 7, 2001, Marrakech

emissions (as agreed in 1992) and reduce their emissions by a negotiated share until the end of First Commitment Period (2008-2012). Bulgaria ratified the Kyoto Protocol to the UNFCCC on August 15th, 2002. The target adopted by Bulgaria is 8% reduction compared to the base year 1988.

By August 2004, the Kyoto Protocol has been ratified by 159 countries. Whether or not it will enter into force depends entirely on ratification by Russia. There are some indicators that the Protocol will come into force by the end of 2004 or during 2005 at latest, however this cannot be assured at the time being.

This Action Plan addresses Bulgaria's commitment under the Kyoto Protocol for the First Commitment Period up to year 2012. This is, however, only the first step to address the human-induced part of climate change. Further action will be needed beyond 2012 to reach the ultimate objective of the UNFCCC, namely "the stabilization of greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

Currently, post-2012 obligations are not yet on the UNFCCC agenda. In an eventual post-2012 commitment it is possible that the EU-25 (or EU 25+ by then) will have again a common reduction target and an enlarged EU-bubble. Bulgaria needs to prepare for the informal discussions on EU and UNFCCC level and establish its initial position for the negotiations that will follow. This includes determining the key elements of a long-term national climate policy (mitigation and adaptation, including setting viable and achievable reduction targets).Chapter 7.6 describes the necessary actions.

3. CLIMATE CHANGE IN BULGARIA

3.1. INTRODUCTION

This chapter provides an overview of the GHG-emission trends in Bulgaria as well as the policies that contributed to historic GHG emission reduction. Furthermore, the baseline emissions scenario (future emissions trend with existing policies and measures) is presented along with analysis of Bulgaria's vulnerability to climate change.

3.2. GHG EMISSION TRENDS AND POLICIES TO REDUCE GHG EMISSIONS

3.2.1. HISTORIC OVERVIEW OF GHG EMISSIONS

The 2002 GHG emission inventory revealed that the overall GHG emission expressed in CO_2 Eq. amounts to 62.4 million ton, not taking into account sequestration. The net emission (including sequestration) amounts to 54.1 million ton. **Table 3.1** shows the emission levels of the six greenhouse gases, the total GHG emission and the relative share of the overall emission level compared to the base year 1988.[2]

Table 3.1 - Overall GHG emissions (without sequestration in Mton CO_2 Eq.)[3]

GHGs/ year	1988	1990	1992	1994	1996	1998	2000	2002
CO_2	102.5	82.8	58.7	58.3	59.7	51.6	46.7	46.8
CH_4	24.4	25.6	23.6	15.4	15.0	11.8	10.2	9.4
N_2O	14.9	13.7	9.2	7.7	8.2	6.6	6.7	6.3
HFCs/PFCs/SF_6	n.a.	n.a.	n.a.	n.a.	>0	0.1	>0	>0
TOTAL	141 .8	122 .1	91.6	81.4	83.0	70.0	63.6	62.4
Compared to 1988, %	100	86.1	64.6	57.41	58.5	49.4	44.9	44.0

The Bulgarian 1988 – 2002 GHG-emission trends reflect the main course in the economic development of the country. The period is characterized by a process of transition to the market economy (liberalization), restructuring of industry (privatization), removal of subsidies and stable decrease of the production of energy intensive industries at the expense of the non-energy intensive ones.

As a result of the structural changes the share of industry in the Gross Domestic Product (GDP) has decreased from 61% in 1987 to 29% in 2002, while the share of services has increased from 22% to 50%. The trends of the GDP, GHG emissions, primary energy consumption (PEC) and final energy consumption (FEC)[4] are given in **Figure 3.1** below.[5]

The structural changes of the economy have resulted in a drastic decrease of the final energy consumption by about 55%, whereas, in the same period, the primary energy demand has decreased by 45% only. The final energy consumption per unit GDP has decreased by 42%, compared to 28% for the primary energy consumption per unit GDP.

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[2] In this Chapter are used data for GHG emissions from Bulgaria's National GHG Inventory – 2002 and National Inventory Report

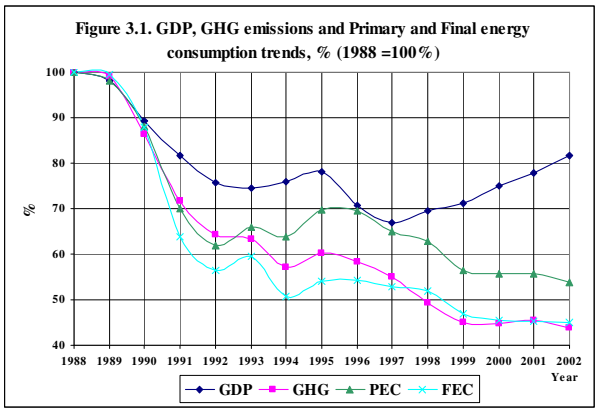
[3] The total GHG emissions indicated in Table 3.1 are calculated in CO_2 Eq. with the following Global Warming Potential coefficients for the main GHGs: CO_2=1, CH_4=21 and N_2O=310.

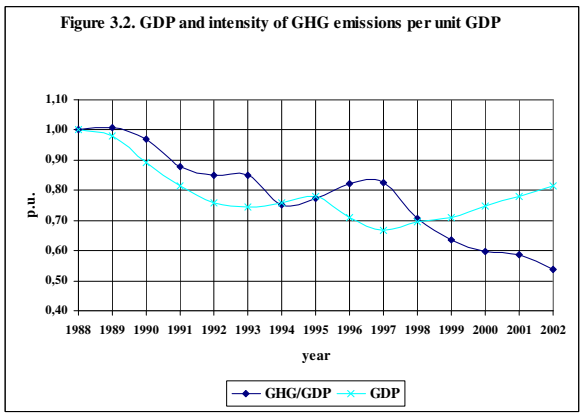
[4] Primary energy consumption is the consumption of energy as it occurs naturally as coal, crude oil, natural gas, wood and others, as well as the import of energy resources, transformed electricity, gasoline and others. Final energy consumption is the consumption of energy for and useful effect at which other forms of energy are not obtained. The final energy consumption is equal to the primary energy reduced by the converted energy, consumption by energy producers, loses in transportation and distribution and final non-energy consumption.

[5] The data that are used for production and consumption of fuels and energy, for the industry, agriculture and other productions, as well as GDP are taken from the Statistical Year Book of NSI

The main reason for the smaller decrease of the primary energy consumption is that in 1988 Bulgaria was a net importer of electricity (4.2 TWh electricity imports from the former Soviet Union), while in 2001 it was a net exporter (about 7 TWh electricity exports to the neighboring countries) The difference of 11.2 TWh electricity production equalizes more than 12 million ton CO_2.

Figure 3.1 shows a stable decrease of FEC and PEC as well as the GHG emissions during the period 1988 – 2002. Contrasting with the trend of decreasing GHG, PEC and FEC, a significant increase of GDP can be observed after 1997, when its levels reached 67% of the base year value. In 2002 the GDP reached 82% of the base year level. Since 1997 growth of energy consumption and GHG emissions is no longer linked to GDP growth (see **Figure 3.2**).





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3.2.2. POLICIES TO REDUCE GHG EMISSIONS

Energy production

The production of heat, electricity, briquettes and oil products is the most important GHG emission source in the country. In 2002 the energy sector accounted for 48% of total emissions.

The GHG intensity decreased because of lower consumption of solid fuels. This lower consumption has been the result of the following policies pursued by the Ministry of Energy and Energy Resources (MEER):

- The liberalization of the coal market and removal of subsidies has resulted in a substantial decrease in the usage of local coal in the district heating plants, thermal power plants and industrial boilers, as well as in the local heating of households and services (see next section). Instead of local coal, imported coal, natural gas and firewood are being used;
- Decrease of the consumption of local coals with 18,8% for electric and heat power production which is the result from the increasing consumption of nuclear power for the period 1997-2002 (from the NSI's data).
- Improvement of hydropower plants. Measures were implemented to improve the hydropower plants efficiency through rehabilitation of turbines and pipes;
- Improved operation of the nuclear facilities at Kozloduy during 2002 in comparison to 2001:
    - Units 1 and 2 – increased electricity production (1 - 3% per year) due to improved load factor. In 2002 they produced 5 GWh compared to 3.9 GWh in 1997 (both units were shut down in December 2002);
    - Units 3 and 4 - increased electricity production (5 - 10% per year) due to improved load factor. In 2003 they produced 5.4 GWh compared to 4.3 GWh in 1997;
    - Units 5 and 6 - increased electricity production (5 - 10% per year) from improved load factor. In 2003 they produced 11.8 GWh, compared to 8.3 GWh in 1998.
    - In 2002 there have been done a lot of actions for improving the secure of the exploitation of the nuclear facilities of the NPP "Kozloduy" and the increase of the technological term/cycle's efficiency.

As a result the electricity production of the nuclear units has increased from about 15.8 GWh in 1999 to 20 GWh in 2002 (i.e. + 25%). Nuclear power therefore significantly contributes to lower GHG emissions, estimated at 4.8 Mton CO_2 Eq.[6]

The following measures are mentioned in the First Action Plan, but were only partly implemented or not at all:

- Accelerated development of hydropower energy; from all the stations envisaged to be constructed only Sredna Vatcha hydro-cascade is at the stage of contracting and detailed design (status 2004), while the cascades Mesta and Gorna Arda are at the stage of feasibility studies (status 2004). The measure to commission 20 MW micro hydropower stations per year (starting in the year 2000) has not been implemented yet (status 2004);
- Postponed privatization of the power sector has led to delay in the rehabilitation and modernization of thermal power plants, including improvement of the auxiliaries and the heat rate;
- According to the Energy Strategy of Bulgaria, MEER pursues policies for secure of the energy supplies as well as the development of natural gas supply, development of RES and measures for improving the energy efficiency. In 2002 the gas consumption from the authorized gas distribution companies increased by 37% compared to the year 2001. Until 2003, 34 private distribution companies have been established. Distribution networks are being planned or under construction.
- Introduction of natural gas turbines to upgrade district heating and industrial plants has been delayed due to the lack of investments;
- The reconstruction of the National Electric Company in 2002 leaded to the establishing of 7 electric distribution companies on territorial basis and the division of actions for transmission and distribution of the energy has been realized. The applied measures for the reduction of losses in electricity and heat transmission and distribution networks will show results after 2003.

Residential and commercial/institutional buildings

In percentage, the reduction that the residential and commercial/institutional buildings have achieved is the most significant decrease of emissions (minus 78%, which equals about 6 Mton CO_2 Eq.) compared to the base year. Responsible factors for this reduction are liberalization of energy market and removal of subsidies. They resulted in a decreasing consumption of liquid fuels and coal and an increased use of natural gas, firewood and other biomass sources (the latter being almost tripled). Partial result of the emission reduction is due to:

- Rehabilitation of the district heating companies;
- Introduction of system for heat audits which will allow control and accounting of the real consumed heat;
- Undertaken measures for improving the efficiency of the district heating companies.

It is estimated that only 70% of the heat demand that is necessary to meet the desired temperatures in the buildings is covered.

Industry

The Governmental policy for accelerated privatization has resulted in almost total privatization of the manufacturing industries. For cost efficiency reasons, the new owners of the enterprises have implemented numerous cost-saving measures to improve energy efficiency. The implementation of these measures resulted in significant decrease of the GHG emissions for the period 1997 - 2001. While the GHG emissions, estimated at 6 Mton CO_2 Eq. (42 % compared to the 1997 level) decreased, production output stabilized.

Transport

The First Action Plan did not envisage policy instruments to support GHG emission reduction in the transport sector. Privatization of road transport, significant cut of the subsidies for railway transport and the closure of economically inefficient railway routes resulted in a modal shift from rail to road and resulted in a relative growth of CO_2-emissions. The GHG emissions of the transport sector decreased by 43.5% compared to the base year. The emission decrease follows the drastic reduction of transportation activities (in km). The reduction in

[6] It is based on the average quantity of the emissions from 1.2 kg CO2/kWh (from imported coals 1.0 kg CO2/kWh, from lignite coals 1.6 kg CO2 /kWh.

transported goods (in tons) for the period 1990-2001 is 75%. The significant difference between the emissions decrease and decrease of the transportation activities reflects the modal shift from rail to road. While the transportation activities in the railway decreased 65% the activities in road transport decreased 45% only. The main conclusion is that the GHG emissions from the transport sector have decreased slower than the total GHG emissions in the country.

Agriculture

In 1988 the share of agriculture in total GHG emissions amounted to 9.3%. In the period 1988-2001 a GHG emission reduction of 65% has been achieved.

Measures to reduce emissions in the sector were not applied. This is a direct consequence of the overall decline in agricultural activities since 1988. The decrease in the animals breeding follows the reduction of the number of animals. The enteric fermentation emissions have decreased by 68%, and manure management by 72%. Due to reduced use of mineral fertilizers the GHG emission level of agricultural soils (responsible for 5.8% of Bulgarian GHG emissions in 1988) has considerably decreased.

The decrease of GHG emissions is due to the governmental policy, which focused on shifting the property rights of agricultural lands and the reorganization of the production process in private farms.

Waste

The First National Action Plan and the Governmental Waste Management Programs, approved in 1997, aimed at significant decrease of the waste generation. A decrease of the generated waste by 70% was achieved in the period 1988-2002, resulting in a comparable reduction in GHG emissions (especially methane). The decline was a result of reduced production of waste, separation of the waste and recycling.

Summary

1. In 2002 Bulgaria has achieved 79 million ton GHG emission reduction (minus 56%) compared to the base year 1988. The main reasons for this reduction were:
   - Governmental policies for transition to the market economy, restructuring of industry, privatization and liberalization;
   - Energy policy towards liberalization of the energy market and removal of subsidies;
   - Decrease of the population;
   - Decrease of the GDP.
2. The GHG emission intensity (GHG/GDP) of the Bulgarian economy decreased by 46% from 3.63 kg CO_2 Eq./ BGN[7](2002) in 1988 to 1.95 kg CO_2 Eq. / BGN(2002) in 2002.
3. The accounted emission reduction of 79 million ton results from two factors:
   - GDP and population decrease: 26 million ton (33%);
   - Economic and energy policies: 53 million ton (67%).
4. If a correction for the net electricity import (1988) and net electricity export (2001) is accounted for, the emission reduction would exceed 91 million ton.
5. Due to the early termination of the operation of two nuclear facilities at the end of 2002 and the expected economic development (see next section), an increase of the emissions can be expected. The emissions growth rate will partly depend on the climate change policy of the government.

3.3. BASELINE GHG EMISSION SCENARIO

Here an assessment of the GHG emissions projection is presented as “base scenario”. According to UNFCCC terminology this is called the “with measures scenario”.

[7] BG Leva - 2002

For this scenario it is assumed that existing policies will be continued, i.e. the forecast for the development of the GHG emissions is based on the assumption that the policies and measures formulated in the First Action Plan will be implemented as well as all European pre-accession policies, which are already approved by the Bulgarian Government.

Economic and demographic developments as well as general economic policies have caused a significant decrease of the GHG emissions in Bulgaria in the period 1988-2002. The development of the country in the latest period was based on purely market principle, without preferences and restrictions. All subsidies for fuel and energy, with the exception of heat energy for house holds, were abolished, and the energy, the energy efficiency and the renewable energy sources were developed on the basis of the economical efficiency. A theoretical possibility exists for an option for future development of the country – to keep in line with the current policy, i.e. to continue implementation of the above mentioned principles following the First Action Plan.

The assessment of the GHG emissions projection is presented here as "base scenario". There are no any policies and measures additional to the already adopted Governmental policy there in the projection assumptions. The forecast for the development of the GHG emissions for the period up to 2020 is based on the assumption that the First Action Plan on Climate Change will continue to be implemented at the level of undertaken measures. This means country development will be based on purely market principle, without preferences and restrictions. All subsidies for fuel and energy are terminated, and the energy, the energy efficiency and the renewable energy sources develop on the basis of the economical efficiency. All European pre-accession programmes of the Government, currently approved, are implemented.

The GHG emission forecast is based on projections for the following indicators:

- Demographic development;
- GDP development of sectors and sub-sectors;
- Change in the energy-intensity of the industries and services as a result of improved energy efficiency / production technologies;
- Changes in the energy-intensity of households as a result of the development of income and improved energy-efficiency of dwellings and appliances.

For the demographic development official projections of the Government are used. According to these figures the population size will further decline with 0.8% per year in the period 2003-2009, followed by an annual reduction of 0.6% in the period 2010-2020. As a result, it is projected that in 2020 the country population will reach 6.9 million people.

The GDP forecast assumes a 5.25% growth for 2004-2005 and 5.5% for the 2006-2016 periods. After then, the growth gradually declines to 3.5% in 2020. These growth figures are the official projections of the Agency of Economic Development to the Council of Ministers taken into account the positive impact of the EU pre-accession programs and the EU accession itself. The potential for accelerated growth exhausts by 2017. After then, it is assumed that the growth stabilizes at the average EU growth level.

The forecast of total GHG emissions are based on the cumulative forecast for each sector.

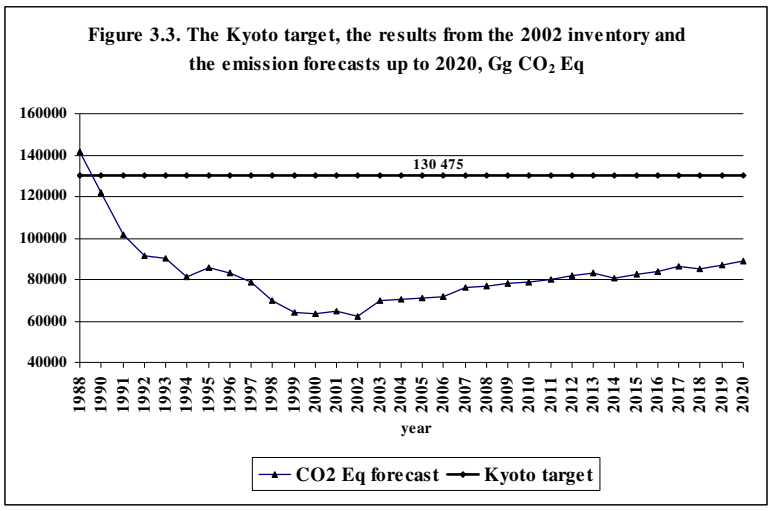
The **Table 3.2** below presents an overview of the measures included in the baseline scenario. The effect on GHG emission reduction is indicated with a plus or a minus:

Table 3.2 Overview of the measures included in the baseline scenario

Energy production
- Decommissioning of units 3-4 in NPP Kozloduy (-) - New nuclear unit in 2014 and 2018 (+) - No new large scale hydropower projects (-)
Industry
- Maintenance of liberalization and market principles without subsidies and preferences (+) - Energy efficiency measures with pay-back period less than 2 years (+)
Residential and commercial/institutional buildings
- Efficiency improvement of district heating (+) - Efficiency improvement of street lightning (+)
Transport
- Minimizing of subsidies (-)
Agriculture/forestry

- None
Waste
- Reduction of waste generation (+) - Introduction of methane capture at all new landfills (+)

Figure 3.3 presents the Kyoto target together with the results from the 1988-2002 inventories plus the baseline emission forecasts up to 2020. The Kyoto target recalculated in the 2002 inventory amounts to 130.5 Mton CO_2 Eq. According to the projection emissions maintain well below the Kyoto target.



Although in the baseline scenario the Bulgarian GHG emissions are much lower than the Kyoto target, there is significant potential for further reduction of GHG emissions. This potential may be realized when conducting targeted policies for emission reduction expressed in accelerated introduction of additional policies and measures. Here, integration of climate change policies and general economic policies (industry policies, development of infrastructure) would be necessary. Careful selection of policy decisions would help avoid part of the projected increase of the GHG emissions.

3.4. VULNERABILITY TO CLIMATE CHANGE

The DDC[8] of the IPCC[9] provides 30-year averaged meteorological data for the periods 1961–1990, 2010–2039, 2040–2069, and 2070–2099 (the latter three periods are referred to as 2020s, 2050s, and 2080s).

Studies for Bulgaria used GCM[10] data from the four nearest grid points to interpolate observed data for the 2020s, 2050s and 2080s to a specific point, e.g. weather station.

Different models predict different changes in local climate. Generally, temperatures are expected to increase by 0.7 to 1.8 ºC in the 2020s. A warmer climate is also predicted for the 2050s and 2080s, with an annual temperature increase ranging from 1.6 to 3.1 ºC in the 2050s, and 2.9 to 4.1 ºC in the 2080s. The expected changes in precipitation are adverse, but still most models simulated a decrease in monthly, seasonal and annual precipitation in the 2080s. The changes in monthly solar radiation are expected to vary between –10 and +10% during the next century.

Agriculture

As a consequence, in **agriculture** there will be shifts of harvest maturity dates for different crops, decrease in growing seasons, changes in the yield (increase of some crops, decrease of others), etc.

For the majority of scenarios a decrease in maize yield for the next century is expected due to a shorter growing season and a reduction in precipitation. Despite an expected increase of temperature and reduction of precipitation during spring season in the 2080s, projected increases in wheat yield vary between 12-49% due to the fertilization effect of the increased CO_2 level.

Forests

Analysis of the condition of the **forest vegetation** during the last decade in Bulgaria shows that the coniferous forest vegetation, which was widely introduced during the last decades under 800 m, i.e. out of its natural habitats, forms very unstable forest ecosystems. The main reason is the discrepancy between the ecological

[8] Data Distribution Center (DDC)
[9] Intergovernmental Panel on Climate Change
[10] Global Circulation Models

conditions and the requirements of the coniferous tree species. Due to this reason these forests are physiologically in a chronic water deficit and in drought periods like in the period 1983-1994 they began to disintegrate.

As 60.6% of the Bulgarian forests grow below 800 m, it is clear, that most of them would be vulnerable to the drastic climate change. When temperatures rise, a moving of the species composition from South to North could be expected, which means shifting tree and shrub vegetation from the South-Bulgarian into the North-Bulgarian and from the South-Bulgarian border-side into the South-Bulgarian forest vegetation area respectively. That means that probably the South-Bulgarian border-side area will be settled by typical Mediterranean vegetation, a part of which can already be found there.

The GAP model results show that in case of climate warming over the next 90 years, the following consequences could be expected.

Lowlands – Tree species diversity reduction.

Mountains – Increased tree biodiversity could be expected. It could be realized by means of the natural shifting of tree vegetation from lower to higher sides in the mountains. The process would be combined with biomass production increase.

Lowlands and mountains – Increased biomass productivity due to increased CO_2 absorption.

Soils

Soils have different characteristics, fertility and, thus, vulnerability to climate change. The temperature rise will increase the water deficit in soils with low precipitation rates that are prone to droughts. The most serious impacts will be observed for soils with light mechanical content and bad water characteristics and partly for heavy clay soils. About 30% of the soils in Bulgaria are prone to wind erosion.

The variability of Bulgarian climate requires **irrigation activity** during the growing period (June – September) to compensate the water deficit. Projected temperature rise will impact water reserves: precipitation will increase by 5% over next 30 years; winter precipitation will increase particularly in the southern part of the country; summer precipitation will decrease in the southern part and increase in the northern part; evaporation losses will increase; river flows will increase in autumn and winter and decrease in summer months. The underground water could possibly decrease as well.

Conclusion

Because the above vulnerability assessment was carried out in the 1990s using numerous models available at that time, its results are to some extent adverse. Continuous progress is made in predicting the effects of climate change. Therefore actions should be undertaken to finance new research for Bulgaria. Since the Ministry of Education and Science and the Bulgarian Academy of Science are the responsible institutions for the research activities in the country, they should pay closer attention and allocate some funding for further developments in this important field.

4. EU POLICIES RELATED TO CLIMATE CHANGE

4.1. INTRODUCTION

Bulgaria intends to complete the process of becoming European Union member by January 1st 2007. To this purpose, Bulgaria is in the process of harmonizing its policies in line with the European Union and transposing EU laws. Climate change policy has high priority in the EU and covers therefore a wide range of measures aiming at the reduction of GHG emissions. The European Climate Change Program (ECCP) consists of policies and regulations at EU level that directly or indirectly contribute to achieving the EU's GHG emission reduction target of minus 8% compared to 1990.[11]The progress towards this aim is evaluated and confirms its achievement in the Commission's report[12].

This chapter provides an overview of main EU policies and legal instruments that directly or indirectly reduce GHG emissions. The implementation in Bulgaria is described and an assessment is made of the impact on GHG emissions. Finally, reference is made to the specific Bulgarian policies and measures in this Action Plan, which are based on these EU policies and legislation described in details in Chapter 5 and 6. EU policies and legislation related to the implementation of the Kyoto Protocol, particularly the EU Emission Trading Scheme and the Kyoto Mechanisms will be dealt with separately in Chapter 7 of this Action Plan.

4.2. ENERGY PRODUCTION SECTOR AND MANUFACTURING INDUSTRY

Liberalization of the energy market

Bulgaria has implemented the EU Directives on the liberalization of the electricity market, which will substantially influence the way the Bulgarian Government can manage environmental emissions from the energy sector and will induce a shift from "command and control" type of policy instruments to market-based instruments, such as ETS and GIS.

Renewable electricity

Renewable energy is strongly promoted at the EU level, although most of the measures are to be taken on the level of the Member States (MS). For renewable electricity production, the Renewable Electricity Directive (Council Directive 2001/77/EC on the Promotion of Electricity from Renewable Energy Sources in the Internal Electricity Market) is the most important law. The Directive addresses electricity produced from renewable energy sources (RES), such as wind, solar, geothermal, hydro, landfill gas, sewage treatment and biogas. The Directive does not aim to harmonize the support schemes in the MS. It contains:

1. An obligation for MS to adopt **indicative** targets for future electricity production from RES and to show how these targets should be achieved;
2. The introduction of a system concerning the guarantee of origin of electricity from RES (Green Certificates). Fixing an obligatory share for production of electricity from RES and cogeneration for each electricity producer will trigger the establishment of a market for these securities;
3. An obligation for MS to review the current legislative and regulatory frameworks in order to reduce the administrative burden for small-scale producers;
4. An obligation for MS to adopt standard, transparent and non-discriminatory rules on the responsibility for the costs of grid connection, grid strengthening and grid use for new renewable electricity producers;

The adopted Energy Law incorporates the measures listed above and provides the framework for Green Certificates. In 2004 the Government started with the preparations of the implementation of the Green Certificates Scheme in Bulgaria. The system is planned to become operational in 2006.

[11] European Climate Change Programme EPCC 2nd Progress Report "Can we meet the Kyoto target?", April 2003.
[12] Report from the Commission under Council Decision 93/389/EEC as amended by decision 99/296/EC for a monitoring mechanism of Community greenhouse gas emissions. November 2003.

CHP (combined heat and power) Directive[13]

The objective of the CHP Directive is to increase energy efficiency and improve security of supply by creating a framework for promotion and development of high efficiency cogeneration of heat and power, based on useful heat demand and primary energy savings in the internal market, taking into account the specific national circumstances, especially concerning climatic conditions. In the short term the intention of the Directive is to support existing CHP installations and create a level playing field in the market. The Directive provides harmonization of definitions of CHP, efficiencies, micro/small scale CHP etc. and it establishes a framework for a scheme for a guarantee of origin of CHP electricity. Furthermore, the Member States are obliged to ensure objective, transparent and non-discriminatory procedures for grid access, tariff criteria and administration (following Directive 2003/54/EC). In the medium and long term the intention of the Directive is to ensure that high efficiency cogeneration is taken into consideration whenever new capacity is planned. It sets a number of criteria for an obligatory analysis of the national potential for high efficiency CHP in each Member State. Support schemes based on useful heat demand and primary energy savings may be continued or established to support the realization of the potential. For the purpose of guarantee of origin and statistics, the quantity of CHP electricity has to be determined according to Annex 2 of the Directive.

The adopted Energy Law introduces GIS for cogeneration.

Large Combustion Plants

The Revised Large Combustion Plants Directive[14] applies to combustion plants with a thermal input over 50 MW. The Directive aims to reduce acidification, ground level ozone, and particles throughout Europe by controlling emissions of sulphur dioxide (SO_2), nitrogen oxides (NO_x), and dust from large combustion plants. These plants include power stations, petroleum refineries, steelworks, and other industrial processes running on solid, liquid or gaseous fuel. The Directive states a maximum level of SO_2, NOx-emissions and dust for large combustion plants. The coal-fired power plants in Bulgaria do not yet comply and large investments in desulphurization equipment are necessary.

The Bulgarian legislation is harmonized with this Directive. MEER and MoEW developed the Implementation Programme for achieving the Directive requirements. The implementation of the measures from this programme will lead to decommissioning of some inefficient outdated generation capacities and to the introduction of new replacing capacities with lower emissions. This may influence the role of coal in the energy mix on the longer term and, consequently, the GHG emissions from the power sector.

EU Emissions Trading Scheme

The EU Emissions Trading Scheme (ETS)[15] is intended to be the main instrument for controlling GHG from large emitters in industry and the energy sector. This scheme will become obligatory as soon as Bulgaria enters the EU. It covers the following installations:

Energy activities:

- Combustion installations with a rated thermal input exceeding 20 MW (except hazardous or municipal waste installations);
- Mineral oil refineries;
- Coke ovens;

Production and processing of ferrous metals:

- Metal ore (including sulphur ore) roasting or sintering installations;
- Installations for the production of pig iron or steel (primary or secondary fusion) including continuous casting, with a capacity exceeding 2.5 tons per hour.

Mineral industry:

[13] Council Directive 2004/8/EC of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market and amending Directive 92/42/EEC.
[14] Council Directive 2001/80/EC.
[15] Directive 2003/87/EC for establishing a scheme for GHG emission allowance trading within the Community

- Installations for the production of cement clinker in rotary kilns with a production capacity exceeding 500 tons per day or lime in rotary kilns with a production capacity exceeding 50 tons per day or in other furnaces with a production capacity exceeding 50 tons per day;
- Installations for the manufacture of glass including glass fiber with a melting capacity exceeding 20 tons per day;
- Installations for the manufacture of ceramic products by firing, in particular roofing tiles, bricks, refractory bricks, tiles, stoneware or porcelain, with a production capacity exceeding 75 tons per day / a kiln capacity exceeding 4 m^3 / setting density per kiln exceeding 300 kg/m^3.

Other activities

Industrial plants for the production of:
- Pulp from timber or other fibrous materials;
- Paper and board with a production capacity exceeding 20 tons per day.

Emission caps are fixed for each participating installation and the relevant allowances are allocated. The cap can be lower than the real emissions of the site. Therefore, the site should either reduce its emissions (by implementing measures or reduction of production) or buy allowances for the excessive emissions. The company should also pay a fine if it still does not comply with its emissions gap.

It is considered that emissions trading leads to emission reduction at the lowest possible price and the implementation of ETS leads to emission reduction by a previously fixed percentage.

Chapter 7 will describe the implementation requirements of ETS as well as its relation with the Kyoto instruments.

IPPC (Integrated Pollution Prevention and Control)

The IPPC Directive[16] is a regulatory system that employs an integrated approach to control the environment impacts of certain industrial activities. The requirements under IPPC are based on the application of Best Available Technique (BAT). IPPC does not cover GHG emissions, although energy efficiency criteria are often part of the permitting process, which will indirectly effect GHG emissions.

In Bulgaria, IPPC regulation is in force. A framework for implementation has been set up and the issuing of permits has started from January 2003.

4.3. RESIDENTIAL SECTOR AND COMMERCIAL AND INSTITUTIONAL BUILDINGS

4.3.1. BUILDINGS

SAVE (Specific Action for Vigorous Energy Efficiency)

The *SAVE* Directive[17] calls for six actions:
1. Energy certification of buildings;
2. Billing of heating, hot water and air-conditioning on the basis of actual consumption;
3. Third party financing for energy efficiency investments in the public sector;
4. Thermal insulation of building;
5. Regular inspection of boilers with a thermal capacity over 15 kW;
6. Energy audits of undertakings with high-energy consumption.

The way these actions are carried out is sole responsibility of the individual Member States. The Directive only contains an obligation for Member States to evaluate their programs and report to the European Commission.

The Bulgarian legislation has been adjusted to the requirements of the SAVE Directive.

[16] Council Directive 96/61/EEC.
[17] Council Directive 93/76/EEC.

Building materials

Under the *Construction Products Directive*[18] Member States are obliged to enforce laws, regulations and administrative provisions that will ensure that *construction products*[19] will satisfy the so-called *essential requirements*[20] as listed in the Directive. These essential requirements provide the basis for the preparation of harmonized standards at European level for construction products. In most countries, the essential requirements are incorporated into laws on construction and related secondary legislation and regulation (norms and standards).

Energy performance of buildings

The Council *Directive on the Energy Performance of Buildings*[21] can be regarded as follow-up of the SAVE Directive. It considers that residential, public and commercial buildings provide a very large potential for energy efficiency improvement in the EU. The Directive requires Member States to apply an integrated calculation of the energy performance of buildings replacing approaches aiming at individual components of the building envelope and the installations. In addition, the Directive includes provisions about the regular inspection of boilers and central cooling and air-conditioning systems.

Based on the Buildings Directive the following amendment of the Energy Performance Standards for existing buildings is scheduled: improvement of thermal insulation of the existing buildings; introduction of systems for metering and control of heat consumption in the buildings; optimization of the fuel types used in households and introducing gas supply; conduction of energy audits at existing residential buildings and facilitation of penetration of modern technologies in individual construction.

The Directive is reflected in the Bulgarian legislation as newly adopted Law on Energy Efficiency.

4.3.2. ENERGY EFFICIENCY OF APPLIANCES

Appliance Labeling

Labeling provides information to consumers on the energy performance of new appliances. Mandatory labeling for several electric appliances exists in all EU countries based on EU regulations. In 1992, a Framework Directive "on the indication by labeling and standard product information of the consumption of energy and other resources by household appliances" was introduced (Council Directive 92/55/EEC). This piece of legislation specified which products should be covered under the labeling program. The following appliances are included to date:

1. Freezers, refrigerators and their combinations (94/2/EC);
2. Washing machines (95/12/EC);
3. Tumble dryers (95/13/EC);
4. Washer dryers (96/60/EC);
5. Dishwashers (97/17/EC);
6. Lamps (97/11/EC);
7. Air conditioners (2002/31/EC);
8. Electric ovens (2002/40/EC).

The Appliance Labeling issue in Bulgaria is settled by the Regulation to the Law on consumer's protection and trading rules.

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[18] Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products, OJ L40/12, as amended by Council Directive 93/68/EEC of 22 July 1993, OJ L220e/1.

[19] Defined as any product which is produced for incorporation in a permanent manner in construction works, including both buildings and civil engineering works.

[20] These essential requirements re: mechanical resistance and stability, safety in case of fire, hygiene, health and environment, safety in use, protection against noise and energy economy and heat retention. The `heat retention' requirement is a general requirement that the `construction works and its heating, cooling and ventilation installations must be designed and built in such a way that the amount of energy required in use shall be low, having regard to the climatic conditions of the location and to the occupants'.

[21] Council Directive 2002/91/EC.

Appliance efficiency standards

Efficiency standards for electric appliances, usually known as Minimum Efficiency Performance Standards, impose a minimum energy efficiency standard for products manufactured domestically and imported. A framework Directive has not been adopted for appliance standards (as opposed to labeling). Standardization, therefore, requires a case-by-case approval from Council and Parliament. Voluntary agreements with industry are used as the main instrument for increasing appliance efficiency.

4.4. TRANSPORT

GHG emissions from transport have proven difficult to address in the EU. The EC strongly focuses on voluntary agreements with car manufacturers. Some documents addressing the problem with GHG emissions from the transport are:

The 2001 EU White Paper on Transport (EU (2001) European transport policy for 2010: time to decide) specifically addresses the strong economic development, which is expected for the Candidate Member States (CMS) and the related increase of transport flows, in particular road haulage traffic. At the EU level and at the level of CMS actions should be taken to shift (or keep) the balance between modes in favor of rail transport, while at the same time negative repercussions on the economies of the CMS as a result of these policies should be avoided. The increase of transportation and related GHG emissions is for many EU Member States and probably on the longer term for CMS as well the main problem for achieving overall national emission reductions. Measures proposed by the EU are revitalizing railways, increasing competition by opening-up markets, supporting transport of good services and creating the Trans European Transport Network by solving bottlenecks, all striking a balance between growth in air transport and the environment, developing high-quality urban transport and R&D programs at the service of clean and efficient transport. Without additional funding from sources such as EU structural funds, Bulgaria will face difficulties to undertake the proposed measures.

The Directive on the Promotion of the Use of Biofuels and other Renewable Fuels in Transport (2003)[22] mandates that Member States adopt an indicative target for the minimum share of biofuels and other renewable transport fuels. National policies should be adopted accordingly. The Bulgarian Ministry of Finance will introduce a lower excise duty for alternative fuels as soon as the production of the fuel starts.

4.5. WASTE MANAGEMENT. LANDFILL DIRECTIVE 1999/31/EEC

4.5.1. LANDFILL

The aim of the Directive is by way of stringent operational and technical requirements on the waste and landfills to provide for measures, procedures and guidance to prevent or reduce as far as possible negative effects on the environment. In particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from land filling of waste, during the whole life-cycle of the landfill.

The Directive is transposed into the Bulgarian Legislation.

Overview

In the **Table 4.1** below an overview of the EU policies and measures presented in this chapter is provided. It is indicated whether the EU Directives have been implemented by the Bulgarian Government (status 2004) and if they have been taken into account in the baseline scenario presented in section 3.3.

[22] Council Directive 2003/30/EC.

Table 4.1 Overview of the EU policies and measures

EU Policy:	Status 2004	Included in the baseline scenario?
Directives on Liberalisation of the electricity market	Implemented	No
Directive on Renewable electricity	Implemented	The system of Green Certificates is not included in the baseline scenario as indicative targets for RES and cogeneration have not been set.
CHP Directive	Implemented	The Green Investment Scheme is not included in the base scenario because the indicative targets for energy production from cogeneration were not implemented.
Directive on Large combustion plants	Implemented	In the baseline scenario it is assumed that most of the plants will meet with the requirements after the transitional period in 2008. Four plants have an extended transitional period till the year 2015 at the latest.
IPPC Directive	Implemented	The baseline scenario assumes that the IPCC requirements are met before the end of the transitional period in 2011. Until the year 2011 this instrument is considered as additional.
ETS Directive	Not implemented	No
SAVE Directive	Implemented	No
Directive on Construction Products	Implemented	Yes (German standards)
Directive on the Energy Performance of Buildings	Implemented	No
Directive on Appliance labeling and efficiency standards	Implemented	No
White Paper on Transport	-	The EU initiatives related to the transport sector are considered to be additional to the baseline scenario.
Directive on biofuels	Not implemented	No
Landfill Directive	Implemented	The capture of methane in combination with flaring is included in the baseline scenario. Electricity production from captured methane forms an additional measure to the baseline.

5. CLIMATE CHANGE POLICY FRAMEWORK IN BULGARIA

5.1. INTRODUCTION

This chapter provides an overview of general climate change policy in Bulgaria. The first part of the chapter deals with the national policy framework and institutional arrangements in climate policy. It describes the roles and responsibilities of Governmental and non-governmental stakeholders. In addition, the capacities of the actors are evaluated and, where needed, appropriate actions for enhancing capacity are defined.

In the second part of the chapter different types of policy instruments are described. A distinction is made between the following six types of instruments:

- Command-and-control;
- Market-based mechanisms (funds, fiscal such as tax breaks, ETS)
- International instruments for financing;
- Voluntary agreements;
- Education and R&D;
- Awareness raising and public information.

For each of these is described to what extent it is currently used as a climate change policy instrument in Bulgaria, to what extent the baseline scenario assumes its use, and to what extent it can be implemented to stimulate additional greenhouse gas reduction measures.

5.2. NATIONAL POLICY FRAMEWORK AND INSTITUTIONAL ARRANGEMENTS

5.2.1. POLICY FRAMEWORK

The Bulgarian Government, the supreme body for exercising the executive power in the country, is represented by the Council of Ministers and chaired by the Prime Minister. Bulgaria has 18 Ministries, a few of which are involved in climate change-related activities.

The Government has to formulate, adopt, implement and evaluate the national policy on climate change. Regarding this role, the Government has to take the steps for assuring the development and adoption of policy instruments, as well as to create the necessary conditions for successful application of the instruments (i.e. providing resources and building the capacity).

The backbone for the environmental policy in the country is the National Environmental Strategy, which functions as a kind of 'umbrella' for environmental policy areas, including climate change. The National Action Plan on Climate Change fulfils the role of elaborating the goals set out in this strategy, by identifying concrete policies and measures, including actions to implement these policies and measures.

The Action Plan encompasses policies and measures for all sectors and has therefore strong relations with sectoral policies, such as policy and implementation plans for the energy sector, industry, transport, households and services and forestry and agriculture. Both existing and new policy plans should be in line with the NAPCC. In addition, the NAPCC can identify new measures to be included in sectoral plans. The proper implementation of the NAPCC depends to a large extent on the strong cooperation and communication among the ministries and other bodies related to climate change policy making and implementation.

5.2.2. INSTITUTIONAL ORGANIZATION

Responsibility of the Ministry of Environment and Water

The Ministry of Environment and Water (MoEW) is the Governmental institution authorized to develop and carry out the state policy related to protection of the environment. Within the Ministry's authority is the power to conduct activities pertaining to the implementation, coordination, control and evaluation of policies and measures aimed at reduction of or adaptation to the climate change impact on national level. MoEW is responsible for the preparation and reporting of the annual inventories of GHG emissions, as well as for the

formulation and implementation of the policies and measures to mitigate climate change. It plays a leading role in the application, control, update and adaptation of the National Climate Change Action Plan.
The Ministry does not have a designated department or unit with sole responsibility for climate change. However, there are altogether four units that are involved in climate change activities: **The Environmental Strategies and Programs Department (ESPD** where the National Focal Point on Climate Change and the Joint Implementation Unit (JI) are located. Responsible for organization of the development and coordination of the implementation of the technical aspects of the legal regulations, national and sectoral programs and/or action plans related to fulfillment of the obligations under UNFCCC and the EU requirements. Organizes and coordinates the preparation of the national GHG inventories; **Directorate "Clean Air Protection"**, which cooperates with the ESPD on the implementation of the aforementioned activities; **The Executive Environmental Agency; The Enterprise for Management of Environmental Activities (EMEA).**

The latter two units have the status of separate organizations subordinated to MoEW. The Executive Environmental Agency is entitled to coordinate the preparation of the National GHG Inventories. The Agency is the management body of the National System for Environmental Monitoring. EMEA provides financing for projects such as the preparation of the National Communications and the National GHG Inventories.

The Steering Committee (SC) for JI projects is an evaluation body for Clean Development Mechanism (CDM) and Joint Implementation projects. It consists of representatives from MoEW, the Ministry of Economy, the Ministry of Finance, the Ministry of Regional Development and Public Works, the Ministry of Agriculture and Forestry, the Executive Energy Efficiency Agency, the Foreign Investments Agency and the Technical University. Chairperson of the Committee is the Deputy Minister of MoEW. The SC evaluates proposed JI projects according to the existing national criteria for JI projects on the basis of a PDD[23]. If necessary, additional expert opinions and statements from the relevant ministries and organizations are requested. The SC advises the Minister of the Environment and Water in issuing a Letter of Approval for each particular proposal.

Responsibilities of the other Ministries

Other Ministries with significant responsibilities for the mitigation of or adaptation to climate change are:

- Ministry of Energy and Energy Resources (MEER) – introduction and implementation of policies and measures for improvement of energy efficiency in energy transformation, as well as for improved efficiency in transmission, distribution and consumption of energy; implementation of policies and measures for fuel substitution; stimulation of electricity and heat generation from RES and co-generation; prevention of the negative impact on the environment from the energy production through improved technologies; and preparation and implementation of infrastructural plans on national and regional level;
- Ministry of Agriculture and Forests (MAF) – coordination, implementation and evaluation of policies and measures for improving the methods for plant growing and cattle breeding as well as forestry management in relation to adaptation to climate change;
- Ministry of Regional Development and Public Works (MRDPW) – elaboration of plans for development of the regional infrastructure as well as regional programs for development of transport and communications infrastructure; ensuring the conditions for applying of the energy efficiency principles and environmental protection in the field of residential system, construction and building industry;
- Ministry of Transport and Communications (MTC) – implementation of policies and measures for restructuring of transport as well as improvement of the cargo management (centralized load control);
- Ministry of Economy (ME) – elaboration of policies and measures affecting the industry, tourism and services as well as programs for monitoring of implementation and encouragement for application of energy efficiency measures;
- Ministry of Finance (MF) – implementation of fiscal and financial instruments related to taxes, duties and concessions for encouragement of measure implementation.

Role of the Inter-Ministerial Committee on Climate Change (IMCCC)

The IMCCC was set up under the recommendations from the First Action Plan on Climate Change in July 2000. It was intended to facilitate the communications among institutions and to ensure the control and

[23] Project Design Document

coordination of their activities in relation to the climate change process in the country. The Committee consists of representatives from a majority of the ministries, the Energy Efficiency Agency and an observer from Sofia Municipality, and is chaired by Deputy Minister of MoEW.

Role of implementing agencies and other institutes

- Energy Efficiency Agency within MEER – organizes the implementation of projects and measures in accordance with the national long- and short-term energy efficiency programs; approves projects for energy efficiency and controls their implementation; participates in the preparation of legal regulations in the field of energy efficiency: proposes development and improvement of energy efficiency standards in order to achieve approximation to the EU norms and to encourage energy efficiency at the consumption end; cooperates with central and regional governmental institutions, employers' associations, branch organizations, consumer associations and NGOs on implementation of energy efficiency policies and measures; maintains the national information system on energy efficiency, develops guidelines for establishments and maintenance of EE information systems for central and regional governmental institutions; supports national and regional governmental institutions in complying with the Energy Efficiency law; develops programs for implementation and control of EE measures and programs for EE awareness rising; develops programs for implementation of EE on local (municipal) level; cooperates in implementing EE training;
- Executive Environmental Agency within MoEW – elaboration, implementation and control of climate change-related measures. The agency deals with water and air quality control and receives data from the monitoring stations nationwide. It also issues permits under the IPPC Directive. The Agency is responsible for the preparation of the GHG inventories, projections and registers;
- EMEA within MoEW – it manages the Environmental Protection Fund and provides funding for environmental projects (in particular – for projections regarding climate change);
- Executive Agency for Economic Analyses and Forecasts within MF – this institution will have to develop and propose the most appropriate fiscal instruments and to assess the influence of their implementation upon the country's economy.

5.2.3. EVALUATION OF THE CAPACITY OF THE NATIONAL GOVERNMENT

The capacity of the national Government to perform it responsibilities in climate policy, is characterized by the following:

- Climate change is not among the priorities of the national Government. Due to the lack of political priority, ministries and other governmental bodies face difficulties in performing their tasks and responsibilities related to climate change;
- The awareness of climate change issues within the Government is low;
- The national Government and its related institutions suffer from a serious lack of organizational, human and financial resources. This hinders the development, implementation and enforcement of climate policies;
- The coordination between different stakeholders is insufficient. This hinders the development and implementation of a solid climate policy framework. It also impedes the incorporation of climate policies into the activities in other policy fields such as energy policy;
- Information flows are not efficiently organized. Ministries, agencies and institutions have limited access to adequate sector information sources, which makes it difficult to perform the tasks and responsibilities properly.

5.2.4. ACTIONS TO ENHANCE THE CAPACITY OF THE NATIONAL GOVERNMENT

The **Table 5.1** presents on overview of the actions, which enhance the capacity of the governmental sector in climate policy making in Bulgaria. These actions are in line with the findings of the Bulgarian National Capacity Self-Assessment for Global Environmental Management

Table 5.1 Overview of the actions, which enhance the capacity of the governmental sector in climate policy making in Bulgaria

Code	Action	Responsible	Time
1	Improve the capacity of IMCCC members in climate change policy development and implementation through training	MoEW	2005-2008
2	Form a subsidiary body to the IMCCC involving a wider scope of organizations (i.e. municipal representatives; business representatives; NGO representative).	MoEW	2005
3	Increase capacity (by means of training) of ministries and related agencies and institutions involved in climate change policy making to improve formulation, preparation, presentation, reporting, implementation and evaluation of the national and foreign climate-change policy	MoEW	2005-2008
4	Creation of capacity for development and implementation of national system for the estimation of anthropogenic greenhouse emissions, in line with the requirements and decisions of UNFCCC authorities	MoEW, MEER	2005-2006
5	Creation of capacity for development and implementation of national greenhouse gas emission register, in line with the requirements and decisions of UNFCCC authorities	MoEW, MEER and EEA	2005-2006
6	Creation of capacity for further development and implementation of emission trading and Joint Implementation system in compliance with the Kyoto Protocol	MoEW	2005-2008
7	Creation of capacity for development and implementation of EU ETS in line with Directive 2003/87/EU of the European Union	MoEW	2005-2007

5.3. THE ROLES OF OTHER STAKEHOLDERS

5.3.1. MUNICIPALITIES

Municipalities are constantly being entitled to more important functions in energy management. This results from the decentralization of the power sector and widening of local self-government. The efficiency of extraction and utilization of energy resources becomes a first-grade duty of municipal authorities. Therefore the planning of energy resources has become a basic component of policy to sustainable development at each municipality.

The major responsibility of municipal energy management is imposed upon local authorities. The rational use of energy as well as its production and supply at local level, became responsibility of municipal authorities. The basic instrument for energy management in municipalities is the local (municipal) energy planning.

In their strive to conduct energy efficiency policy, municipalities face a lot of obstacles such as lack of proper knowledge and skills, legislative and financial restrictions in investing, absence of any mechanisms for quick and easy access to information. The relevant energy-efficiency structures and particular regulatory basis were also absent. These problems evoked the adoption of the following strategic aims in conduction the energy efficiency policy and overcoming the existing obstacles:

- Capacity building at municipalities to develop knowledge and skills on improvement of energy efficiency;
- Establishment of sustainable local policy for reduction of GHG emissions through energy efficiency;
- Improvement of the awareness of directors, experts and public at municipal level;
- Development of pilot projects at specific municipal sites (administrative buildings, schools, hospitals) to demonstrate the possibilities for energy savings and reduction of GHG emissions.

Municipal energy efficiency planning is obligatory according to the new Energy Efficiency Law[24]. Therefore, the Municipal administration has to adopt the following programmes:

[24]Chapter 2, Section I, Article 9

- Refurbishment of the housings, administrative and utility buildings throughout the municipal territory aiming to carry out measures for energy efficiency;
- Introduction of energy-saving appliances for street lighting in settlements and in public buildings;
- Other measures for improvement of energy efficiency.

In 2004 the Center for Energy Efficiency EnEffect issued a Manual for Municipal energy planning in collaboration with Global Environmental Facility (GEF) and the United Nations Development Program (UNDP). This manual is designated for managing staff and experts at municipalities to help them with the preparation of Municipal Energy Efficiency programs.

5.3.2. PRIVATE SECTORS AND BUSINESS NGOS

Business organizations show limited interest in climate change at present. However, either because of upcoming EU obligations and possibilities for financial and economic benefits (through participation in the flexible mechanisms) they are expected to become more actively involved. The most pressing need is for qualified and experienced personnel, as well as for better information. Many businesses, in their strife to survive the transitional period, are reluctant to earmark resources (financial, human, etc.) in order to improve their own capacity on climate change issues.

Business NGOs (mostly in the form of branch organizations) are becoming increasingly interested in climate change, as they feel a need to be in the forefront of the climate change process in the country. Drawing financial and economic benefits from the opportunities presented by the flexible mechanisms trigger a substantial interest and will be reason to further stimulate the capacity building and improvement necessary to participate in these mechanisms.

One additional problem is the highly insufficient availability of qualified independent consultants on climate change issues. For a large part this can be explained by the low level of climate change-related activities going on in the country.

5.3.3. ENVIRONMENTAL NGOS

Bulgaria has a low level of public awareness about climate change in general. This is most of all due to other problems on the public agenda, which are considered as more urgent. It is believed that the low public awareness will hinder the implementation of the measures for mitigation of climate change impact in the households and other target groups.

Environmental NGOs can help turn the current trend around. However, the studies conducted for this and other projects indicate a very low capacity of the NGOs to carry out successful and continuous work related to climate change. While many environmental NGOs are active in Bulgaria, only a few of them have enough knowledge in the field of climate change. Another problem is that most of the NGOs are fairly small (which implies they have limited capacity to work successfully). When it comes to the problems with capacity faced by the NGOs, most severe one is perhaps the limited amount of well-qualified experts, especially on energy efficiency, renewable energy and similar topics related to climate change. Lack or limited access to dedicated financing for climate change-related projects are another problem with crucial impact on the NGOs' ability to build and maintain the needed capacity. Furthermore, cooperation of the governmental institutions needed to encourage and stimulate NGOs' work in the field of climate change is inadequate.

- NGOs could participate more actively in building additional capacity to work on climate change issues by:
  - Attracting experts with knowledge on the UNFCCC and EU policies on climate change;
  - Elaborating projects that support directly the implementation of the convention;
  - Active lobbying for financing of activities related to the Convention.
  - NGOs must develop activities for rising public awareness.
- The existing NGOs could also develop programs and activities aimed at fulfilling their role of public guardian against illegal economic pressure and corruption that influence directly or indirectly the implementation of the UN Convention, especially in such sectors as forestry, energy, transportation, etc. Such programs and activities could for example include:
  - Mapping of the regions with illegal timbering with information on the destroyed forest areas, the companies involved in illegal timbering, prices of the wood material and the years necessary for its

recovery, etc. These activities can combine with the efforts for implementation of the two other UN Conventions (Preserving Biodiversity and Struggle against Desertification).

- Elaboration of charts of the large industrial enterprises according to their energy efficiency, efficiency of water consumption and efficient utilization of other raw materials, related to the GHG emissions reduction.
- Carting of municipalities according to their energy efficiency and utilization of other materials related to GHG emissions reduction (recycled paper, toner disposal practices, etc.).

5.3.4. ACTIONS TO ENHANCE THE CAPACITY OF OTHER STAKEHOLDERS

The table below presents an overview of actions, which enhance the capacity of other stakeholders to develop, implement and evaluate climate policy in Bulgaria.

Code	Action	Responsible	Time
1	Increase capacity of municipalities and business/environmental NGOs through training and active involvement in the policy process	MoEW	2005-2008
2	Include representatives of municipalities and business/environmental NGOs in subsidiary IMCCC body	MoEW	2005
3	Actively involve municipalities and business/environmental NGOs in implementation and monitoring of climate policies and projects	MoEW and other ministries	2005-2008
4	Inform stakeholders on the possibilities for financing energy efficiency projects and provide assistance with the preparation of project documentation (for JI, Green Investment Scheme, Energy Efficiency fund, etc).	MoEW in cooperation with municipalities and NGOs	2005-2008
5	Facilitate the exchange experience and information of different activities and networks (e.g municipal energy efficiency network)	MoEW in cooperation with the Ministry of Education	2005-2008

5.4. POLICY INSTRUMENTS

This section presents set of political instruments which could be applied in the Climate Change Policy

5.4.1. LEGAL INSTRUMENTS AND REGULATION

In most countries laws and regulation are important instruments in climate policy. Many such instruments in Bulgaria directly of indirectly influences the emission of greenhouse gases. The most important laws related to climate change are:

- **The Energy Law** (State Gazette 107/9.12.2003) in its part on renewable energy and combined heat and power generation introduces the requirements of the two related EU Directives and the use of instruments such as green certificates; defines indicative target for energy production from RES and mandates the state regulations to the licensed activities in the power sector and purchase obligations for district heating companies to buy utilized waste thermal energy (State Gazette 107, 18.12.2003);
- **The Energy Efficiency Law** and related secondary legislation (State Gazzete, 5.03.2004), including obligation to adopt municipal energy efficiency programs, requirements for energy efficiency libeling, the use of minimum standards resulting from the EU Directive on energy efficient appliances, regulations for energy efficiency libeling of various types of products (appliances, cars), obligatory audits and amendments of the Energy Performance Standards for existing buildings;
- **The Environmental Protection Act and Clean Air Act** and related secondary legislation, including a permit system for meeting minimum standards in accordance with EU regulation on IPPC, large combustion plants, the introduction of the EU ETS and technical inspection (e.g. for cars);
- **The Law on Waste Management** (State Gazette, 30.09.2004) and the related secondary legislation including the obligation for collecting, management and usage (or combustion) of the omitted gases from the new waste deposits;

- **The Law on Statistics** including national and international monitoring and reporting obligations of GHG emissions.

5.4.2. MARKET-BASED INSTRUMENTS

In many EU countries fiscal policies are important instruments to stimulate measures that reduce emissions of greenhouse gases and/or save energy. The advantage of the fiscal incentives is that they are equally available to all investors and make better use of the market mechanisms. When introducing such policies in Bulgaria it is necessary to remember that they have to be in harmony with EU legislation (especially in relation to competitiveness) and to be implemented in such way that minimizes or eliminates the "free riders".

Examples of fiscal policy instruments are:

- Accelerated depreciation of environmental investments. This constitutes a corporate tax advantage to companies that invest in specific energy saving measures that need a strong market introduction.
- Income tax exemption on the interest received from a 'green' fund, compensating for the fact that the interest rate usually is lower than that offered by other accounts.
- Decrease in VAT on equipment which leads to the reduction of GHG emissions.

At present none of these policies are in place in Bulgaria. Given the economic situation of the country fiscal instruments are not considered as additional instruments for climate policy in Bulgaria. As soon as the financial situation will improve this category of policy instruments can be further explored. Furthermore, they can be implemented if rapid growth of GHG emissions occurs.

5.4.3. FINANCING EMISSION REDUCTION PROJECTS

The evaluation of the First Action Plan pointed out that the implementation of several mitigation measures was hindered by a lack of financial resources, mainly caused by the economic situation of the country during the 1990s. Both private and public sector lack adequate financial resources to finance climate measures. It is expected that this situation will not significantly change in the period 2005-2008. Mitigation measures that heavily depend on the state budget are therefore not likely to be implemented. In addition, state guarantees for project loans will not be applicable to Bulgaria in the period 2005-2008 as well.

The implementation of measures can, however, be funded by other financing schemes. Below some of the options are listed.

Energy efficiency funds

In the year 2004 the Energy Efficiency Fund has been established. The fund, which will become operational by January 2005, is supported by the World Bank and GEF. US$17 million will be available for energy efficiency projects.

At the same time the European Bank for Regional Development (EBRD) established an energy efficiency credit line of € 60 million, which will be used to improve energy efficiency at small and medium-sized enterprises (SMEs). Both funds will provide loans for energy efficiency activities.
It is envisaged that the Energy Efficiency Fund will only be funding EE project, while the EBRD credit line will fund both EE and green energy production projects.

State Agricultural Fund (SAF)

The State Agricultural Fund has been established with support of the EU (SAPARD). Subsidies from this fund are granted only for agricultural activities. The fund gives priority to projects that lead to reduction of emissions from agricultural activities, such as manure treatment and storage, soil fertilizing and agricultural residue burning.

The fund provides, for example, subsidies for introduction of new methods for retaining of soil fertility. These subsidies are meant for expansion and intensification of the research studies on soils.

The restructuring of agricultural sector resulted in changes in land use. Subsidies should be allocated to research organizations that have authority and experience in the field of soil science and also work on the issues for GHG emissions reduction.

The fund also provides low interest loans for the construction and rehabilitation of irrigation systems in the country.

Joint Implementation, International Emissions Trading and Green Investment Scheme

Kyoto Protocol defines the flexible instruments that can contribute to the reduction of GHG emissions. These instruments include International Emissions Trading (IET). Also a fund or Green Investment Scheme (GIS) is considered to be set up with revenues generated by the sale of emission quotas to other countries and Joint Implementation (JI). They are described in Chapter 7 along with the conditions under which these instruments can be used by Bulgaria to attract financing for emission reduction projects.

EU structural funds

The 6th Environmental Action Program of the EU emphasized the need to further integrate environmental objectives in other policy areas and mentions specifically to review the subsidies applied under the Cohesion and Structural funds. In the framework of General Direction/Department "Environment" preparations of an environmental strategy for the Structural Funds post-2006, climate change has been proposed as one of the key priorities for integration in the Structural and Cohesion Funds.[25] The expected economic and social welfare growth in the accession countries are also expected to be accompanied by important increases in transport and electricity demand, for instance in the household and services sectors. The extent to which long-term growth will be coupled with increases in greenhouse gas emissions will be influenced by infrastructure investment decisions taken in the coming years. The integration of climate change policies in the structural funds should therefore be seen in a long-term post-Kyoto perspective.

ISPA and SAPARD are the main sources of EU financing the agricultural and infrastructural development of Bulgaria.

5.4.4. VOLUNTARY AGREEMENT

The Bulgarian government expects to introduce voluntary agreements in the period 2005-2008.

The voluntary agreement is juridical committed agreement between two or more parts. In general, the voluntary agreement is a contract between main/central body of the executive power and business NGO from industry sector. The voluntary agreement is also concluded between the Government and the regional bodies of the power.

The aim of the voluntary agreement is to achieve a certain goal in accordance with governmental policy. Environmental voluntary agreements are used to improve the energy efficiency. The business NGOs which are established, registered, managed, transformed and ceased according to the law on juridical person with non-profit aim, and they perform/act as a representative and defender of the interests of a group of associations from certain sector from the industry. The voluntary agreement describes in some points what exactly the aim is, the obligations of the different parts, how, what and by whom this will be monitored/controlled/inspected, to whom it will be reported, when is the term/dead-line of the execution, etc. If the different parts agree, the managing/ruling group may observe/inspect the execution/implementation of the voluntary agreement. A common practice is the Government to help in facilitating the execution of the voluntary agreement meanwhile the enterprises carry out or try to achieve the goal. The voluntary agreement determines the procedures in case of not fulfilment of the tasks. For example, if the enterprises could not succeed, the Government may withdraw and introduce/adopt a new legislation.

The voluntary agreements for the achievement of efficiency improvement are meant to stimulate industrial enterprises to implement measures with pay back periods over 2 years. Through benchmarking and good practices energy efficiency could be improved. The agreements could ensure that the average growth of energy consumption is significant lower than the growth of generated gross added value. Voluntary agreements are applicable to all the industrial sub-branches: ferrous and non-ferrous metallurgy, chemical industry, light industry, food-and-beverage industry, construction, building materials, machine building, electrical engineering

[25] Second ECCP Progress Report. Can we meet our Kyoto targets? DG Environment, April 2003.

and others. Especially companies, which are not included in the Emissions Trading Scheme, could fall under this new policy instrument.

5.4.5. EDUCATION, RESEARCH AND DEVELOPMENT (R&D)

Education and R&D are important for the future development of climate change activities and environmentally-friendly behavior of future generations. Below the needs of Bulgaria in this field are described. Due to a lack of finance only limited actions have been undertaken.

Curriculum schools and university

Climate change issues are hardly incorporated in the curriculum of primary and secondary schools and universities. The most urgent actions for improvement are:

- Elaboration of training and information materials in Bulgarian language;
- Elaboration of specific training programmes on climate change for teachers and tutors;
- Textbooks on natural sciences and arts that reflect the climate change issue and its effect upon the relevant scientific field;
- Development of a national strategy for education, training and public awareness on climate change issues.

Local R&D programs

Scientific research and development in the field of climate change in Bulgaria is behind international developments. Increased efforts are required in the following areas:

- Development of methodologies for assessment of the impact of climate policies and measures.
- Evaluation and forecast of the resources consumption trends.
- Experts researches to define clearly the structure, management and function of the National system for:
  - Assessment of anthropogenic emissions and GHG Inventories
  - National Register and Emissions trading
  - Participations in the flexible mechanisms
- Vulnerability Assessment – initiating new research on Bulgaria's vulnerability to the climate change and the possible measures for adaptation.
- Improvement of methodologies for emission trend forecasting.
- Improvement of methodologies for GHG Inventories from the anthropogenic sources.

EU Research programs (6th Framework program)

Bulgarian universities and research institutes should increase their involvement in EU research programmes such as the 6th Framework Program.

The Sixth Framework Program runs from 2002-2006 with a budget of €17.5 billion. A number of thematic strategies have sustainable development as a direct or indirect objective (e.g. global change, energy and transport). Much of the research carried out under the Sixth Framework Program will have both environmental benefits and will promote innovation, therefore improving the cost-effectiveness of production processes and creating new market and employment opportunities. Research will continue to contribute to our understanding of the climate change phenomena, prediction of future CO2 concentration, assessment of impacts, adaptation techniques and mitigation measures. Topics included are among others: capture and storage of CO2, non-polluting ways of transport and alternative fuels and life cycle analysis in the industrial sector. In the area of renewable, the degree of maturity of the various technologies varies considerably, from wind energy which is currently viable commercially, to more long-term options such as photovoltaic, wave or ocean energy. Research is concentrated on a) developing cost-effective integrated approaches from sustainable biomass procurement to efficient fuel production and use, b) reducing costs and improving efficiency and reliability of photovoltaic, and c) reducing costs and improving efficiency and reliability with industry taking an increasingly leading role in coordinating pan-European projects on wind, geothermal, ocean and solar energy.

Research units within the Bulgarian Academy of Sciences (BAS), universities and companies need to increase and better coordinate their involvement in this program. In this regard, the following governmental institutions may cooperate as follows:

- Ministry of Education and Science will have to ensure the participation of lead experts from universities, BAS and the National Agricultural Sciences center for development of certain projects, including trans-boundary ones;

- MEER as coordinator of the theme "Sustainable Energy Systems" will have to provide support and information to the project proposal developers;
- Intelligent Energy for Europe program

This program is approved with decision of the European Parliament and the Council EC/1230/2003 from 26 June 2003. Within the framework of this program are the successors of the programs SAVE (energy efficiency) and ALTENER (renewable energy sources). Possible areas for financing under ALTENER II are related to the implementation of the EU strategy and experience for utilization of RES as primary energy source through infrastructure building, preparation and update of national, regional and local market strategies; changes in the legislation and other measures for overcoming the non-technical barriers to better utilization of RES for energy production.

SAVE II could provide financing for projects aimed at implementing the EU strategies and experience in energy efficiency.

Legal entities from the EU member states as well as associated members and international organizations can apply for financing under ALTENER II and SAVE II. It is a prerequisite that in each project at least one representative from EU member states is present. Project proposals are to be prepared using standard format and send directly to Brussels.

5.4.6. AWARENESS RAISING AND PUBLIC INFORMATION

Many countries have introduced public awareness raising campaigns on climate change. In Bulgaria such activities are desirable too. In these activities different stakeholders such as the national Government, the business community, environmental NGOs and the media could play an important role. Activities, which could be undertaken in Bulgaria, are:

- Development of leaflets and textbooks in Bulgarian language;
- Establishment of informal group of journalists and experts which should regularly prepare and present information on climate change;
- Training of journalists on climate change;
- Information support and training of business stakeholders on the participation in Joint Implementation mechanism according to the requirements of the Kyoto Protocol;
- Permanent exchange of information among stakeholders on the implementation and the results from policies and measures implementation;
- Dissemination of adapted scientific findings and information on climate change; popularized through integrating them in various specialized information flows.

In Bulgaria various environmental NGOs are active in the field of climate change. Their actions vary from lobbying for energy efficiency, carrying out campaigns on energy saving and energy efficiency and educating the general public on environmental issues and climate change in particular.

The Bulgarian Government has the intention to perform Public Information Campaigns for the residential sector. These campaigns include: Periodical carrying out of sociological surveys on public awareness for the global warming risk; Public informing and education at national, regional and local level through media; preparation and dissemination of printed materials; Accent in the schools curriculum; Public campaigns for different target groups for participation in practical activities on energy saving and GHG emissions reduction, including branch NGOs in informing and supporting their members regarding/about the policies and measures in energy saving and the projects for implementation with the aim of GHG emissions reduction. MEER is leading in the organization and funding of campaigns with the support of MoEW.

For awareness raising and public information activities Bulgaria will also depend on foreign funding opportunities. SAPARD (EU) has provided a budget for awareness raising activities in the agricultural sector in the period 2005-2006.

5.5. CONCLUSIONS

In this chapter an overview was given of the different policy instruments, which could be used in climate change policy development and implementation. In the period 2005-2008 Bulgarian climate policy will be

based mainly on legal and new financing instruments. In case of an unexpected fast growth of GHG emissions other instruments such as taxation policy can be further developed and implemented.

6. POLICIES AND MEASURES FOR REDUCING GHG EMISSIONS IN BULGARIA

6.1. INTRODUCTION

This chapter presents sector policies and measures, which contribute to a reduction of (the growth of) greenhouse gas emissions in Bulgaria. As discussed in chapter 3, the need for Bulgaria to undertake mitigation measures is limited given the current GHG emission level and the expected emission trend. Implementing climate change measures are, however, also driven by other factors. Firstly, the commitments under the Climate Convention, the Kyoto Protocol and the EU accession require an active attitude of the country to mitigate greenhouse gas emissions. Progress needs to be reported on a regular basis. Secondly, national and EU regulation require specific actions such as the implementation of standards under the IPPC Directive or the development of a Green Certificate Scheme under the renewable energy Directive. Finally various climate change measures will lead to an efficiency improvement and contribute to long-term cost savings.

Chapter 6 presents 24 policies and measures. The measures have been selected from a long-list of options. Both Government and non-government stakeholders were actively involved in the selection process. Low costs measures with limited investment requirements together with the obligatory measures gained high priority.

All measures presented in this chapter are additional to the baseline scenario presented in section 3.3.

This chapter is structured as follows. Policies and measures are presented per sector. Each subsection will start with a brief introduction followed by a discussion of the general sector policies. Next, the specific climate change policies and measures will be presented. For each sector the policies and measures will be summarized. The following categorization of reduction costs per ton CO_2 Eq. is used:

- Low: up to 10 Euro per ton CO_2 Eq.
- Medium: 10-50 Euros per ton CO_2 Eq.
- High: more than 50 Euro per ton CO_2 Eq.

6.2. ENERGY SECTOR

6.2.1. OVERVIEW

The Energy strategy for Bulgaria is elaborated for the accelerated reformation of the Energy sector. The Bulgarian Energy Strategy was adopted by the Council of Ministers on May, 11th, 2002 and the National Assembly adopted it with Decision №39/2002. The strategy represents the national energy policy and the main reforms envisaged for this sector. The Bulgarian energy sector will pursue two major pillars in the future: nuclear energy and local extraction of lignite coal as a leading priority for the development of a competitive energy market. All other priorities are directly related to this:

- Security of supply;
- Competition at the energy market;
- Environmental protection.

These priorities fully match the priorities of the EU energy policy.

The preparations for liberalization of the Bulgarian energy market have reached an advanced stage and the new Energy Law incorporated the EU requirements of the Electricity and Natural Gas Directives regarding the establishment of an electricity market and a natural gas market. Implementation programs for the Directives on Large combustion plants and Waste disposal sites respectively have been adopted. Before 2005 the electricity and thermal energy prices for the population will be adjusted to the production costs. The state subsidies for the power sector will gradually be abolished and will be redirected to the low-income population groups.

Practically Bulgaria is the energy center of South-East Europe due to its geographic location on one hand, and on the other – the country covers 45% of the permanent deficit in the common energy balance of South-East Europe. From major electricity importer (up to 4.5 TWh per annum) now Bulgaria is a major electricity exporter (5-7TWh per annum)[26].

In the process of its development in the last few years, the Bulgarian energy sector has implemented numerous measures that led to stabilization and reduction of the GHG emissions. While the total GHG emissions in the country have decreased by 56%, the emissions from the energy sector have decreased by 20%. After the decommissioning of units 3 and 4 from NPP Kozloduy, there is a possibility that the emissions from the energy sector will actually exceed the levels from the base 1988 year. This is because the development plans envisage deployment of electricity production units[27] utilizing imported and local coal with high GHG emission potential (the production of local coal alone is expected to exceed 25-30M tons per annum). One way to offset this is to deploy also electricity production capacities with low or no emission potential (hydro or nuclear) or use technologies that will allow for better use of the energy sources (such as co-generation).

6.2.2. SECTOR POLICY INSTRUMENTS

Measures for reduction of GHG emissions envisaged in this National Action Plan on Climate Change are amongst the major priorities for development of the power sector. These measures will be additional to the measures in the baseline scenario presented in section 3.3.

Climate policy instruments have been described in chapter 5. The applicable instruments for mitigation measures in the energy sector in Bulgaria are presented in the **Table 6.1**.

Table 6.1 The applicable instruments for mitigation measures in the energy sector

Legal
Implementation of the Directive on Large Combustion Plants Implementation of the IPPC Directive Regulations of the State Energy Regulatory Commission (SERC) Purchase obligations for waste heat Privatization
Market based instruments
EU Emissions Trading Scheme Green Certificates Green Investment Scheme
International Finance
Funds or sources for investments in emission reduction projects (energy efficiency funds, JI, GIS, structural EU funds such as ISPA) State guarantees for loans
R&D
-
Awareness / information
-
Voluntary agreements
-

6.2.3. POLICIES AND MEASURES FOR ENERGY SECTOR

Below the different policies and measures, which result in a reduction of GHG emissions from the Bulgarian energy sector, are presented.

[26] The data are used from Statistical Books of NSI

[27] (For the elaboration of Second NAPCC it is used "Plan for development of the Energy Sector in Bulgaria with minimal expenditure for the period 2002-2020) of NEC

Improvement of the operation of nuclear power plant Kozloduy (NPP-K)

One of the most important branches of Bulgarian energy sector is nuclear energy, which does not release any GHG emissions during the production of electricity. Kozloduy units 1-4 will gradually be put out of operation (units 1 and 2 in 2002, and units 3 and 4 in 2006). Decommissioning of units 1 to 4 is in accordance with the EU requirements. To preserve the share of nuclear energy in the overall production of electricity in the country measures have to be implemented to further improve the operation of units 5 en 6 and modernize them. The introduction of new methods for control and planned repairs leads to reduction of the planned demurrage and fuel recharge. In this way, an effective load up to 7200 hours per year can be achieved as well as an increase of electricity production of 1.28 TWh per year. After 2010 commissioning of a new unit at NPP Belene is envisaged. The forecasted electricity production at NPP-K for 2010 is 12.4 TWh.

Measure code	**E1**
Name	Improvement of the operation of NPP-K
Annual reduction in 2010	946 kt from substitution of electricity generated in power system
Costs per ton CO_2	Low
Investment requirements	High
Expected year of implementation	2007
Instruments	State guarantees for loans
Government contribution	None
Actions	MEER has secured state guarantees for loans from international financial institutions NPP-K has started initial preparations for technical study SERC – adoption of higher loading NRA – adoption of the operation mode

Accelerated development of hydro energy

Hydropower is important to the energy sector in Bulgaria. The existing hydropower plants (HPPs) have been rehabilitated as a considerable part of them had outdated equipment. New automation and control systems were introduced. 70% of the hydro potential is already utilized. New capacities of 400 MW could be built for an annual operation of 2000 to 3000 hours.

Measure code	**E2**
Name	Construction of hydro cascade Gorna Arda and Sredna Vucha (expected start up 2012)
Annual reduction after 2012	408 kt from substitution of electricity generated in power system after year 2012
Costs per ton CO_2	High
Investment requirements	Substantial
Expected year of implementation	Depending on implementation of Green Certificate Scheme and additional funding opportunities
Instruments	JI Green Certificate Scheme
Government contribution	None
Actions	CM speeds up the allocation of obligations for electricity production from RES and the introduction of a Green Certificate Scheme MoEW and MEER support JI projects

Hydropower stations with capacity up to 10 MW are classified as small or micro HPPs. The total installed capacity of micro HPPs amounted to 63 MW in 2004. The potential for electricity production from MHPPs is thoroughly studied and is assessed at 0.7 TWh per year.[28] MHPPs could be constructed at locations with artificial lakes or fast-flowing water. So far, high investments costs and the low annual utilization of the installed capacity (app. 2500 hours per year) impede the installation of new capacities.

[28] Bulgarian country study to address climate change, US country study programme, 1996.

Measure code	**E3**
Name	Construction of small and micro HPP in different country regions
Annual reduction in 2010	0.2 Mton from substitution of electricity generated from fossil fuels in power system (+69 MW until 2010)
Costs per ton CO_2	High
Investment requirements	Substantial
Expected year of implementation	Depending on implementation of Green Certificate Scheme and options for additional funding
Instruments	Green Certificate Scheme JI Green Investment Scheme
Government contribution	None
Actions	MoEW, MF and municipalities attract foreign investors for Joint implementation projects CM speeds up the implementation of the Green Certificate System MoEW will collaborate in financing of JI and GIS projects

Upgrading of cogeneration plants and district heating boilers

Natural gas fired gas turbines or natural gas fired combined cycle units in cogeneration mode have considerable potential to increase the efficiency of electricity and heat production. The overall efficiency could be increased to 90%, which is much higher than that of existing cogeneration units or heat boilers. The introduction of new natural-gas combined cycle for replacing capacities at some of the existing thermal power plants and district heating plants forms part of the Implementation Programme for the Directive on Large power combustion plants for the period after 2007.

Measure code	**E4**
Name	Upgrading of cogeneration plants and district heating boilers by natural gas turbines.
Annual reduction in 2010	867.5 kt from substitution of electricity generated from coal and liquid fuels in power system
Costs per ton CO_2	Medium
Investment requirements	Substantial
Expected year of implementation	Depending on green certificates scheme and additional funding for implementation of the Directive on Large combustion plants (2007)
Instruments	EU ETS JI Green Certificate Scheme Green Investment Scheme Implementation Directive on Large combustion plants Implementation IPPC Directive Purchase obligations for waste heat
Government contribution	None
Actions	MEER ensures conditions for improvement of gas-supply reliability MEER and MoEW control the timely execution of the Implementation programme for the Directive on Large Combustion Plants MoEW assists to include projects in JI and GIS MEER elaborates regulations fixing the obligatory amounts for electricity production from cogeneration SERC introduces the Green Certificate Scheme

Electricity transmission and distribution losses

Losses of electricity can be reduced through rehabilitation, modernisation and improving the exploitation of the transmission and distribution networks. A reduction of the electricity losses will lead to fewer GHG emissions as a result of lower electricity production in coal-fired plants. According to experts' assessment these are about 20-30 % of the losses in transmission networks and 30-40% of the losses in distribution networks.

Measure code	**E5**
Name	Decreasing of losses in the distribution and transmission networks
Annual reduction in 2010	1100 kt from decreasing of electricity losses in power system
Costs per ton CO_2	Low
Investment requirements	Limited
Expected year of implementation	2005
Instruments	Regulation by SERC Privatization of distribution networks
Government contribution	None
Actions	SERC establishes regulations for stimulating the reduction of electricity losses SERC stimulates the owners of power distributing companies to implement measures for reduction of losses MEER makes sure to include the reduction of energy losses as an obligation of the new owners in the privatization contracts

Heat transmission and distribution losses

Losses of heat can be reduced through rehabilitation, modernisation and improving the exploitation of the transmission and distribution networks. A reduction of the heat losses will lead to fewer GHG emissions as a result of lower heat production in heat boilers.

Measure code	**E6**
Name	Decreasing of losses in the heat transmission networks
Annual reduction in 2010	900 kt from decreasing of heat losses in distribution network and sub-stations
Costs per ton CO_2	Low
Investment requirements	Limited
Expected year of implementation	Gradually (depending on approval for financial resources State Regulatory Commission)
Instruments	Regulation by SERC JI
Government contribution	None
Actions	SERC establishes regulations to stimulate the reduction of heat losses MoEW assists for contracting of JI projects

Renewable energy sources

The analysis of the possibilities for utilisation of the renewable energy sources (RES) show a real potential for GHG emission reduction with 0.283 Mt CO_2 Eq. in 2010. Measures (additional to the base scenario) will be applied in the following aspects:

- Building of small-scale Hydropower plants;
- Utilization of the geothermal resources;
- Utilization of the biomass and biogas for heating and electricity production;
- Solar panels/collectors in public buildings;
- Implementation of solar installations for hot water in nurseries, schools and hospitals.

The measures in the last two aspects – solar collectors and installations for hot water will be presented and analysed in Residential sector.

The measure for building of small-sale and micro Hydro power plants are mentioned above at the part of Accelerated development of hydro energy

Biomass for electricity and heat production

Biomass includes firewood, waste wood, agricultural solid waste (vegetal residues), agricultural liquid waste (liquid manure and others), combustible industrial waste (paper, chips) and municipal solid and liquid waste.

Fire wood and agricultural waste (vegetal residues) are traditionally used as energy source in Bulgaria. The potential for biomass utilization is high.

The assessment of the theoretical potential resulted in the following figures: firewood – 7.7 PJ per year; waste paper - 0.3 PJ per year; agricultural solid waste - 77.1 PJ per year; waste from live-stock breeding -11.3 PJ per year; municipal solid waste - 12.5 PJ per year and industrial waste wood - 0.4 PJ per year.

There are several ways for biomass conversion (e.g. combustion, pyrolysis and gasification), but combustion of biomass for production of electricity and thermal energy seem to be the most promising for Bulgaria.

Measure code	**E7**
Name	Biomass for electricity and heat production
Annual reduction in 2010	0.05 Mton from: Introduction of heating installations on wood-fired boilers 40 MW installation on biomass for production of electricity and thermal energy Combined production of electricity and heat with biogas from the waste disposal sites
Costs per ton CO_2	Medium
Investment requirements	Substantial
Expected year of implementation	Depending on implementation of Green Certificate Scheme and options for additional funding
Instruments	JI Green Certificate Scheme GIS Allowances
Government contribution	None
Actions	CM speeds up the allocation of green certificates for electricity production from RES MEER speeds up the allocation of obligatory shares on electricity production from cogeneration MoEW will support JI and GIS projects

6.2.4. OVERVIEW OF POLICIES AND MEASURES FOR ENERGY SECTOR

The **Table 6.2** below presents the overview of policies and measures, which will contribute to a reduction of GHG emission in the Bulgarian energy sector. Taken together, these measures (except E2) will lead to an annual total reduction of 4 Mton CO_2 Eq. in 2010.

Table 6.2 Policies and measures, which will contribute to a reduction of GHG emission in the Bulgarian energy sector

Measure	Sub-sector	Activity	Instruments	Annual GHG reduction in 2010 (Mton)	Year of implementation
E1	Nuclear	Improvement existing power plant	Finance	0.9	2007
E2	Hydro	New capacity	Legal Finance	0.4 (after 2012)	Depending on implementation GC and additional finance
E3	Small and micro hydro	New capacity	Legal Finance	0.2	Depending on implementation GC and additional finance
E4	Cogeneration and district heating	Upgrading	Legal Finance	0.9	Depending on implementation GC, Large Combustion Plant Directive and additional finance
E5	T&D networks	Reduce losses	Legal	1.1	2005
E6	Heat transmission networks	Reduce losses	Legal Finance	0.9	Gradually (depending on regulation SERC and additional funding)
E7	Biomass	Combustion	Legal Finance	0.05	Depending on implementation GC and additional finance

6.3. INDUSTRY

6.3.1. OVERVIEW

The state policy towards transition to market economy, abolishment of subsidies and liberalization of the energy market has led to sharp reduction of the share of industry in GDP – from 61% in 1987 to 29% in 2002[29]. The policy towards fast privatization resulted in almost complete privatization of the industrial plants. As a consequence, the most inefficient industries were closed.

New owners immediately implemented a number of energy saving measures. These were mainly organizational measures and "no-cost" or "low cost" measures with pay back periods of less than 1 year.

In 2002, the reduction of GHG emissions reached 70% of the 1988 base-year emissions[30]. The potential for improvement of energy efficiency without or with small investments has almost completely been exhausted during this period.

The growth of industrial production that tended lately is quite unsteady. At some enterprises the years of production growth are followed by years of reduction. Under these conditions and at the absence of special policy aimed at energy efficiency the baseline development scenario for industry include maintenance of liberalization and market principles without subsides and preferences. Energy efficiency measures with pay-back period less than 2 years are also included in the baseline scenario. The implementation of these measures is possible at own expenses and limited loans from bank institutions at the conditions of unstable production programme. These measures will result in an average annual growth of energy consumption in industry of 1.7% at 3.9% GDP growth. This corresponds to a comparatively good rate of increase of efficiency at the absence of designated state policy in this field.

[29] The data are from Statistical Year Books of NSI

[30] In this chapter data for GHG are used from Bulgarian's Inventory of GHG 2002 and National Inventory Report

6.3.2. SECTOR POLICY INSTRUMENTS

The applicable instruments for the manufacturing industry sector in Bulgaria are presented in the **Table 6.3**.

Table 6.3 The applicable instruments for the manufacturing industry sector

Legal
Implementation of IPPC Directive Obligatory energy audits for consumers with load over 10 MW Obligatory implementation of recommendations resulting from the energy audits, related to measures with less than 2-year pay-back period Energy and environmental standards Annual technical inspections
Fiscal
EU Emission Trading Scheme Green Certificate Scheme Green Investment Scheme
Finance
Funds or sources for investments in emission reduction projects (energy efficiency funds, JI, GIS, structural EU funds such as ISPA) Support for energy audits at SME
R&D
-
Awareness / information
Providing pubic access to the statement of the operator and the project for IPPC permits
Voluntary agreements
Voluntary agreements to improve energy efficiency

6.3.3. POLICIES AND MEASURES FOR INDUSTRIAL SECTOR

In this section are presented polices and measures for Climate Change in Industry Sector.

Reduction of thermal losses in industry

The use of heat in the form of steam and hot water is an important part of the industrial energy consumption. Heat losses are associated with transmission and distribution of heat, especially at high pressure and high temperatures. Reduction of heat losses can be realized through thermal insulation, redesign and replacement or updating of heat exchangers leading to reduction of fuel consumption for its production.

Measure code	**I1**
Name	Reduction of thermal losses in industry
Annual reduction in 2010	0.12 Mton from: Improvement of heat insulation of pipelines, taps, user stations and water heaters Chemical industry heat exchanges and losses Installation of utilizations for outlet gases of industrial boilers operating on natural gas Revision and replacement of steam-condense pots in the steam-condense systems at enterprises
Costs per ton CO_2	Medium
Investment requirements	Limited
Expected year of implementation	Depending on financing source for energy efficiency investments
Instruments	Obligatory audits for consumer with capacity over 10 MW Voluntary agreements Support for energy audits in SMEs Obligatory implementation of audit recommendations Complex Allowances
Government contribution	
Actions	MoEW and Energy Efficiency Agency to agree with EBRD and World bank on applicability of energy efficiency fund for audits in SMEs Energy Efficiency Agency to prepare Act/amendment including obligation to follow up on recommended measures for pay-back period less than 2 year MoEW to include requirements for energy efficiency in issuing of complex allowances ME to inform SMEs and large consumers on new possibilities/obligations Environmental Inspectorates to monitor obligation for auditing with inspections for environmental permits ME, Energy Efficiency Agency and MoEW to establish contacts with branch organizations on concluding voluntary agreement.

Natural gas supply to the industry by development of gas infrastructure

Industry is a large consumer of energy. Substituting liquid fuels with natural gas is profitable for industry when infrastructure is available. Fuel switch contributes to lower emissions of GHG emission and higher efficiency. One of the main obstacles to the fuel switch, however, is the high investment costs for developing distribution networks.

Measure code	**I2**
Name	Increased use of natural gas in industry by new gas infrastructure
Annual reduction in 2010	0.05 Mton from heavy fuel oil and other liquid fuels switch to natural gas (10% replacement of liquid fuels in 2010)
Costs per ton CO_2	Medium
Investment requirements	High
Expected year of implementation	Dependent on the availability of funding from foreign sources for the construction of networks.
Instruments	JI Funding from structural and cohesion funds EU
Government contribution	None
Actions	MF and MEER to ensure funding from structural and cohesion funds for gas distribution networks construction for the regions with energy intensive industries like non-ferrous, chemicals, food processing, and others SERC to accelerate gas distribution licenses issuing in cases of ensured financing MoEW to consider JI projects for natural gas network construction SERC to account for state guarantees and JI when regulating distribution fees

Introduction of monitoring systems for energy consumption.

The management of industrial companies in the private sector is strongly interested in improvement of the efficiency of production processes. One way to achieve this is the establishment of systems for monitoring and control of energy consumption at different technological stages. This enables companies to have more insight in their energy consumption in various parts of the process, showing where measures could be taken for increase of efficiency. This would lead to a lower amount of energy used per unit product. Savings can be made both in electricity and heat use, as well as natural gas, residual and gas oil consumption.

Measure code	**I3**
Name	Monitoring systems for energy use in industry
Annual reduction in 2010	Mton from: Establishment of 60 monitoring systems Establishment of 200 energy consumption information systems
Costs per ton CO_2	Low
Investment requirements	Limited
Expected year of implementation	Gradual implementation from 2006
Instruments	Voluntary agreements Complex Allowances
Government contribution	None
Actions	ME negotiates voluntary agreements with branch organizations (2005) Monitoring implementation on voluntary agreements by ME The IPPC permits issued by the Minister of the Environment to present conditions for their control of the consumed energy by the installations – heat and electricity. The proper Regional Inspectorate for Environment and Water to control the execution of its observations of the consumed energy in the frame of the issued complex permits

Upgrading of steam and heat generation and compressed-air plants

In the light industry, food processing industry, machine building and metalworking, electrical and electronic industry can all reduce about 20% of the energy consumption. This can be done through modernization of steam and compressed-air installations, regulation of the heat energy systems, energy management and control and introduction of small-scale co-generation at the relevant enterprises.

Measure code	**I4**
Name	Updating of the steam generation and compressed air plants and reduction of energy consumption
Annual reduction in 2010	Mton from: Upgrading of steam generation technology Introduction of infrared ceiling heater Reduction of losses in compressed-air systems Introduction of small scale cogeneration
Costs per ton CO_2	Medium
Investment requirements	Substantial
Expected year of implementation	Obligatory from 2007, but gradual penetration due to grace period till 2011 for IPPC permits
Instruments	Implementation of IPPC Directive JI GIS Green Certificate Scheme (for cogeneration) Voluntary agreements Support for energy audits in SMEs (from energy efficiency funds) and obligatory implementation of the recommendations coinciding from the audits
Government contribution	None
Actions	MoEW, ME, MEER and branch organizations to confirm the agreement with the primary objective of energy saving MoEW to support JI and GIS application to these industries ME and branch organizations to elaborate programmes for modernization at sub-branch level

Renovation of construction machines

Construction is an industrial branch of which emissions from residual oil consumed in road-transportation machines represents a considerable share in the overall GHG emissions of the country. Defining standards for efficiency of those machines and strengthening inspections would lead to the gradual phase out of these machines, increasing the average efficiency of the remaining machine park.

Measure code	**I5**
Name	Introduction of highly-efficient construction machines using diesel fuel (25 % replacement)
Annual reduction in 2010	0.07 Mton from diesel fuel savings after 25 % replacement
Costs per ton CO_2	High
Investment requirements	High
Expected year of implementation	Gradual penetration from 2006
Instruments	Annual technical inspections Energy and environmental standards
Government contribution	None
Actions	MIA/MoEW/MTC/ MAF and MRDPW to set standards MRDPW to strengthen the inspections and control including in-operation inspection checks of fuel consumption.

Reduction of fuel consumption in production of building materials

Cement industry is a key GHG emissions source. Production of structural ceramics and quicklime consume large amounts of fuels (both liquid and solid) as well. The energy use in this sector can be reduced by replacing part of the fuel by combustible waste such as car tyres.

Measure code	**I6**
Name	Replacement of part of the fuel by motor-car tyres and other combustible waste
Annual reduction in 2010	Mton from: Replacement of imported coal by combustible waste saving in cement industry Combustible waste utilization in ceramics and quicklime production (substitutes 20 % of the main fuel)
Costs per ton CO_2	Medium
Investment requirements	Limited
Expected year of implementation	2005/2006, depending on the success of pilot projects
Instruments	Voluntary agreements EU ETS Complex Allowances
Government contribution	None
Actions	MoEW to cooperate with branch organization in the voluntary agreement When issuing IPPC permit, the utilization of the solid waste is stated in the conditions of the permit MoEW to prepare background for ETS implementation MoEW pays for collected car tyres utilization

6.3.4. OVERVIEW OF POLICIES AND MEASURES FOR INDUSTRIAL SECTOR

To total effect of implementation of measures in the industrial sector is assessed at an annual reduction of **0.7 Mton CO_2 Eq.** annually in 2010. An overview of the policies and measures is shown in the **Table 6.4**.

Table 6.4 Overview of the policies and measures in Industry Sector

Measure	Sub-sector	Activity	Instruments	Annual GHG reduction in 2010 (Mton)	Year of implementation
I1	All sub-sectors	Reduction of thermal losses in industry	Legal Finance VA	0.12	Depending on source of financing
I2	All sub-sectors	Increased use of natural gas industry	Finance	0.05	Dependent on funding for network construction
I3	Non-ferrous metallurgy Light industry Machine building, electrical and electronic industry	Monitoring systems of energy use in industry	VA	0.11	Gradual implementation from 2006
I4	Light industry Food industry Machine building electrical and electronic industry	Updating of the steam generation and compressed air plants	Legal Finance VA	0.02	Gradually from 2007
I5	Construction	Introduction of highly-efficient construction machines using diesel fuel	Legal	0.07	Gradual penetration from 2006
I6	Building materials industry	Replacement of part of the fuel by motor-car tyres and other combustible waste	Legal VA	0.34	Gradually from 2005

6.4. RESIDENTIAL SECTOR AND COMMERCIAL/INSTITUTIONAL BUILDINGS

6.4.1. OVERVIEW

A wide variety of options exist for reduction of GHG emissions from this sector. In the First Action Plan some measures were proposed for GHG emissions reduction at district heating companies and for the improvement of the efficiency of lighting in streets and public buildings. The effect of these measures was taken into account in the baseline scenario for development up to 2015-2020.

Considerable progress in energy saving was achieved by national programmes on the improvement of thermal insulation of the existing buildings, on the replacement of incandescent lamps with compact luminescent lamps, and on the introduction of automated control of street lighting.

One of the priorities for the Government, which at the same time forms an important factor for the EU accession process, is to provide conditions for wider introduction of RES and energy-saving technologies and practices.

The analysis of options for RES utilization in households and services revealed a practicable potential for GHG emissions reduction through implementation of measures in the following directions (reported by the Energy Efficiency Agency and municipalities):

- Solar panels at public buildings;
- Introduction of hybrid installations for hot water at nurseries, schools and hospitals.

The above two RES measures will be implemented depending on the climatic features of the region (such as the number of sunny days) and on the functions of relevant public buildings (hospitals, schools, nurseries, orphanages, asylums, etc). These measures are of importance for GHG emissions reduction as they limit and in some cases fully eliminate the use of liquid fuel for space heating (which is currently a common practice in Bulgaria).

6.4.2. SECTOR POLICY INSTRUMENTS

The **Table 6.5** below present climate policy instruments which are applicable to the residential sector and commercial/institutional buildings in Bulgaria:

Table 6.5 Policy instruments applicable in the residential sector and commercial/institutional buildings

Legal
Amended Energy Performance Standards for existing buildings
Fiscal
-
Finance
Funds or sources for investments in emission reduction projects (energy efficiency funds, JI, GIS, EU Funds)
R&D
-
Awareness / information
Public Information Campaigns to be financed by MEER, MoEW
Voluntary agreements
-

6.4.3. POLICIES AND MEASURES FOR RESIDENTIAL AND COMMERCIAL/INSTITUTIONAL BUILDINGS

Gas supply to Households

The Residential Gasification has the following advantages in comparison with the central heating:

- there is no necessity for construction of huge thermal plants
- investments in gas distribution networks are much lower
- heat losses during distribution of heat are eliminated
- it is favorable for the work of the energy system.

The Gas Supply Program for Residential and Servicing sector of MEER plans for 720000 additional households to be connected towards 2020, which should lead to a reduction of 6.9 Mton CO_2 Eq. Assuming annual new connections varying between 20.000 households in 2004 till 60.000 in 2010, about 290 thousand additional households will be supplied towards 2010, leading to an emission reduction of 2.3 Mton.

Measure code	**H1**
Name	Gas supply to households
Annual reduction in 2010	2.3 Mton from gas supply to 290 000 households (replacement of electricity)
Costs per ton CO_2	High
Investment requirements	Substantial for development of distribution network Substantial for households to purchase boiler equipment (€ 1500)
Expected year of implementation	Gradually Strongly dependent on availability of financing for: Distribution networks Subsidies for households
Instruments	GIS to introduce premiums and discounts for purchasing of gas appliances Public campaigns
Government contribution	None
Actions	MoEW and MEER propose IMCCC to decide if GIS can be instrument to stimulate use of gas in households MEER and MoEW to secure – external – financing for public campaigns

Solar collection systems

The geographical situation of the country provides for a substantial solar energy potential. The solar collectors transform solar energy in useful thermal energy. Due to the relatively low single capacities these panels are suitable for installation at institutional buildings and private homes.

Measure code	**H2**
Name	Installation of solar collectors
Annual reduction in 2010	0.02 Mton from substitution of light industrial fuel (gas oil) for heating
Costs per ton CO_2	High
Investment requirements	Substantial per building
Expected year of implementation	From 2006, depending on the availability of funds
Instruments	GIS EU funds or new EBRD Fund when established
Government contribution	None
Actions	MoEW/MEER to secure financing for this type of projects within foreign funds MOEW and MEER propose to IMCCC to decide on applicability of GIS for this type of measures Municipalities to cooperate for more effective utilization of the potential for introduction of solar installations at public buildings of their property

Hybrid and other hot water installations

RES *potential* studies have shown a potential for hot water installations using renewable energy. This can be hybrid systems combining solar panels and biomass boilers, as well as hot water installations using only biomass.

Measure code	**H3**
Name	Hybrid and other RES hot water installations
Annual reduction in 2010	0.04 Mton from: 72 hot water installations in hospitals, schools and other public buildings; Hybrid solar installations and pyrolysis boilers in nurseries
Costs per ton CO_2	High
Investment requirements	High
Expected year of implementation	Dependent on available resources for financing of projects
Instruments	GIS EBRD Fund, if it is establish
Government contribution	None
Actions	Municipalities cooperate for more effective utilization of the potential for introduction of hybrid solar installation and boilers at nurseries of their property MRDPW informs the municipalities on the possibilities for participation in GIS projects and collaborates in securing funding

6.4.4. OVERVIEW POLICIES AND MEASURES FOR RESIDENTIAL SECTOR AND COMMERCIAL/INSTITUTIONAL BUILDINGS

The total effect of implementation of these measures in the Residential and Services sector is assessed **at 2.4 Mton CO_2 Eq**. in 2010. The **Table 6.6** below lists the policies and measures for the residential sector and commercial and institutional buildings.

Table 6.6 Policies and measures for the residential sector and commercial and institutional buildings

Measure	Sub-sector	Activity	Instruments	Annual GHG reduction in 2010 (Mton)	Year of implementation
H1	Households	Gas supply to households	Finance Awareness/Information	2.3	Gradually, but strongly depending on available financing
H2	Municipal and Public	Installation of solar collectors	Finance	0.02	2006, depending on availability of finance
H3	Municipal and Public	Hybrid and other RES hot water installations	Finance	0.04	Dependent on availability of financing

6.5. TRANSPORT

6.5.1. OVERVIEW

The governmental investment policy in transportation is based on development of the country's transport infrastructure as an integrated part of the overall European transport network. The transport infrastructure will be reconstructed and updated in accordance with the international requirements and standards. The most important objectives of the national government are the liberalization of the transport market, finalization of the legislative and institutional restructuring of the transportation sector and the provision of beneficial conditions for development of private transport companies and renewing of the transport/mobile park.

It should be noted that the share of railway transportation in Bulgaria used to be relatively high. A further shift to road transport could result into a significant increase in transportation flows and GHG emissions.

6.5.2. SECTOR POLICY INSTRUMENTS

Policy instruments have been described in Chapter 5. The applicable instruments for the transportation sector in Bulgaria are presented in the **Table 6.7** below.

Table 6.7 Applicable instruments for the transportation sector

Legal
Restructuring of the railway and state railway company Establishment of special road lines for public transport Targets for use of biofuels
Fiscal
Taxes and charges for highways Reduced excise duties for biofuels
Finance
ISPA funding Program for enlargement of the trans-European network TEN-T Subsidies for public transport JI Projects
R&D
-
Awareness / information
Campaigns
Voluntary agreements
-

6.5.3. POLICIES AND MEASURES FOR TRANSPORTATION SECTOR

This section describes policies and measures or climate change in Transport sector which are additional to the base scenario.

Transports dispatching system

A considerable part of the return trips of freight vehicles is done without cargo. Both from an economic and environmental point of view, this is not very efficient. The implementation of central information dispatching system for the loads will lead to a decrease of empty or semi-loaded return trips of lorries and trains.

Measure code	**T1**
Name	Transports cargo dispatching system
Annual reduction in 2010	0.03 Mton from introduction of a cargo dispatching system
Costs per ton CO_2	Low
Investment requirements	Limited
Expected year of implementation	Depending on private sector initiative
Instruments	Taxes and charges for highways Campaign
Government contribution	None
Actions	MRDPW implements taxes for using highways in 2005 In 2005 MTC together with the branch organisations organises campaigns on the benefits from introduction of an automated dispatching systems for cargoes of the road and railway transportation

Transport railway power dispatching system

Supply of electricity to the electrified sections of the railway network and reduction of electricity losses require introduction of an automated system for collecting information and dispatching control. It will lead to an increase of the security of the electricity supply and, as a consequence, to a decrease of the emissions.

Measure code	**T2**
Name	Transport railway power dispatching system
Annual reduction in 2010	0.09 Mton from automated dispatching system for Bulgarian Railways power facilities
Costs per ton CO_2	Low
Investment requirements	Limited
Expected year of implementation	2005
Instruments	ISPA funding Campaign Restructuring of the railways Program for enlargement of the trans-European network TEN-T
Government contribution	
Actions	In 2005 MTC together with the branch organisations organises campaigns on the benefits from introduction of an automated dispatching systems for cargoes and energy system of the road and railway transportation MTC implements a program for restructuring of railway network in accordance with the EU standards MTC ensures the participation of Bulgarian experts to work on program TEN-T

Modernization of Railways

The consumption of residual oil and electricity for transportation of one cargo unit or passenger at a given distance is much lower that that in the road transportation. There are technical solutions that can lead, if applied, to additional reduction of the consumption of oil and electricity. The proposed measures have direct and indirect effects on the increase of the passengers and load flows in the railway transport as well as on GHG emissions reduction.

Measure code	**T3**
Name	Modernization of Railway
Annual reduction in 2010	0.04 Mton from: Avoiding unnecessary speed changes in railway by improving railway conditions Developing new electrified sections of the railway Recuperation of new electricity trains Implementation of new diesel oil trains
Costs per ton CO_2	High
Investment requirements	Substantial
Expected year of implementation	Depending on ongoing improvements in the railway sector
Instruments	Restructuring of the state railway company BDZ Plc
Government contribution	None
Actions	MTC implements strategy and rules for restructuring of the state railway company BDZ

Improving the public transportation, reducing transportation flows in cities and renewing the transport park

The improvement of public transportation and the reduction of transportation flows in cities might contribute to lower GHG emissions from transportation. An increasing share of public transport in total transportation activities can however only is reached when policies are accompanied with instruments which make the use of cars less attractive (e.g. increased fuel or road taxes, introduction of parking taxes, introduction of car-free zones in city centers). The strengthening of the control and quality in the accomplishment of the periodical technical examinations will lead to the renewing of the transport park.

Measure code	**T4**
Name	Improving public transportation, reducing transportation flows in cities and renewing the transportation park.
Annual reduction in 2010	Not estimated
Costs per ton CO_2	Low
Investment requirements	Limited
Expected year of implementation	Depending on availability of subsidies and regulation
Instruments	Subsidies for public transport Establishment of special road lines for public transport Campaigns Introduction of parking taxes and car-free zones Improvement of the quality of the accomplishment of the technical examinations
Government contribution	Not estimated
Actions	MRDPW and municipalities encourage and enforce actions for restructuring and reforming the public transportation MRDPW and municipalities together with the branch organizations organizes public campaigns on the benefits from introduction of above mentioned instruments Municipalities with the help of the Government and branch organizations to implement these instruments The Government to subsidize public transportation

Introduction of biofuels

The implementation of this measure will lead to reduction of GHG emissions. Bulgaria has the possibility to produce a substantial amount of biomass. Production of biofuels has a positive effect on employment in the agricultural sector.

Measure code	**T5**
Name	Introduction biofuels
Annual reduction in 2010	Not estimated
Costs per ton CO_2	Medium
Investment requirements	Limited
Expected year of implementation	Depending on private initiative regarding the production of biofuels
Instruments	Lower excise for bio fuels Indicative targets for use of biofuels JI Projects Campaign
Government contribution	None
Actions	• MEER prepares the transposing of the Directive 2003/30/EC into the Bulgarian legislation • MF offers excise on biofuels • MAF and ME cooperate for the organization of biofuels production. • MTC together with the branch organizations organizes public campaigns on the benefits from introduction of biofuels • Municipalities with the help of the branch organizations to implement biofuels in public transport • MoEW supports JI projects on biofuel production

6.5.4. OVERVIEW OF POLICIES AND MEASURES FOR TRANSPORTATION SECTOR

The **Table 6.8** below presents the overview policies and measures which will lead to a reduction of greenhouse gas emission in the Bulgarian transportation sector.

Table 6.8 policies and measures in Transport sector

Measure	Sub-sector	Activity	Instruments	Annual GHG reduction in 2010 (Mton)	Year of implementation
T1	Road/railway	Introduce cargo dispatch system	Fiscal Awareness and campaign	0.03	Depending on private sector initiative
T2	Railway	Introduce railway power dispatch system	Finance Legal Awareness and campaign	0.09	2005
T3	Railway	Modernization	Legal	0.04	Depending on ongoing improvements in the railway sector
T4	City transport	Improving public transportation and reducing transportation in cities	Legal Fiscal Finance Awareness and campaign Strict/strong control	n.e.	Depending on availability of subsidies and regulation
T5	Road transport	Increasing the use of biofuels	Legal Fiscal Finance Awareness and campaign	n.e.	Depending on the production of biofuels

6.6. AGRICULTURE

6.6.1. OVERVIEW

The Government will carry out a uniform national strategy focusing on sustainable development of the agricultural sector in compliance with the general agricultural EU policy, taking the specific natural circumstances in Bulgaria into account.

The technological restructuring and new investment policy of the Ministry of Agriculture and Forestry will guarantee the food supplies and the positive agricultural trade balance. This will also ensure the competitiveness of the Bulgarian agricultural production. Agricultural organizations will be supported and their role - strengthened in order to achieve market protection at buying up of agricultural production.

An important task in the EU accession process is to create conditions for wide implementation of ecological practices. Special attention should be paid to retaining of soil fertility through introduction of anti-erosion activities, new methods for soil cultivation, ceased practice of field burning.

The baseline scenario does not envisage implementation of measures for GHG emissions reduction in the agricultural sector.

6.6.2. SECTOR POLICY INSTRUMENTS

The applicable climate policy instruments for the agricultural sector in Bulgaria are presented in the **Table 6.9** below.

Table 6.9 Applicable policy instruments for the Agricultural sector

Legal
Setting new standards on nitrogen contents in agricultural products
Fiscal
-
Finance
State Agricultural Fund (SAF): subsidies for the introduction of new methods for retaining of soil fertility SAF: low interest loans for construction and rehabilitation of irrigation systems SAPARD
R&D
Education and training to be financed by SAPARD
Awareness / information
-
Voluntary agreements
-

6.6.3. POLICIES AND MEASURES IN THE AGRICULTURAL SECTOR

Manure management

Manure is one of the most considerable methane sources in agriculture. Therefore all the activities related to manure storage and treatment should take into account the manure type – liquid or solid as well as the technologies for collection and treatment.

The modern manure management practices, not applied in Bulgaria, include: engineering of standardized construction elements for manure disposal facilities, introduction of bulldozer cleaning and transportation of the dry manure in containers and others.

In liquid manure management are used transportation tanks, underground disposal at cattle-breeding farms and poultry-farming sites, separation of manure into liquid and solid fraction at pig-breeding farms, etc.

Measure code	**A1**
Name	Manure management
Annual reduction in 2010	0.07 Mton from composting, alternation of practices and technologies for collection and storage of liquid and solid manure
Costs per ton CO_2	Medium
Investment requirements	Low
Expected year of implementation	Gradually from 2005
Instruments	Investment subsides from the SAF and SAPARD Education and training of agricultural producers on correct composting of manure (SAPARD)
Government contribution	None
Actions	• MAF develops training programs for agricultural producers on methods and approaches in manure composting; • MAF elaborates criteria and rules for granting of subsidies from the SAF on manure management projects; • In financing and subsidizing MAF should set priority to projects for emissions reduction; • MAF informs the farmers on the possibilities for financing of activities related to introduction of new technologies for manure management under the SAPARD program • NAAS to participate in the training of the farmers on correct composing and usage of the manure; • NAAS to cooperate in creation of pilot projects for conservation and composing of the manure and plant's waste • NAAS to participate in elaboration of information material for manure management and plant's wastes in the agricultural farms.

Fertilization and irrigation

Soil fertilization is a source of N_2O emissions. During the last years fertilization was conducted in an uncontrolled manner. The amounts of nitrous fertilizers applied to soils often exceeded the recommended ones. The requirements for quality of production and lower prime costs grew strict due to expanded import of agricultural goods from the neighbouring countries. These products compete successfully with some local productions both for their quality and price. The appropriate fertilization and irrigation are preconditions for competitiveness of local agricultural production and reduction of N_2O emissions.

Measure code	**A2**
Name	Improved fertilization and irrigation practices
Annual reduction in 2010	0.17 Mton CO_2 Eq. from optimization of the fertilization;
Costs per ton CO_2	Medium
Investment requirements	Medium
Expected year of implementation	Gradually from 2005
Instruments	Setting standards on nitrogen contents in agricultural production; Low interest loans for construction and rehabilitation of irrigation systems by SAF Education and training of experts on optimization of fertilization (SAPARD)
Government contribution	None
Actions	• MAF organizes financing on elaboration and updating of standards • MAF informs agricultural producers on training courses • MAF organizes low interest bans for irrigation systems • NAAS to give analysis for soils and advise for balanced fertilization with organic and mineral fertilizers and set rules on the technique of the fertilization; • NAAS to follow up the status of the soils in the agricultural farms; • NAAS to participate in training of the farmers on the arise of their qualification for correct fertilization according to the climate conditions and the type of the cultivated crop.

6.6.4. OVERVIEW OF POLICIES AND MEASURES FOR AGRICULTURE

The total effect of measure implementation in the agricultural sector is assessed at **0.232 Mton CO_2 Eq**. in 2010. The **Table 6.10** below presents the policies and measures of the agriculture sector.

Table 6.10 Policies and measures in agriculture sector

Measure	Sub-sector	Activity	Instruments	Annual GHG reduction in 2010 (Mton)	Year of implementation
A1	Animal's breeding	Manure management	Finance R&D	0.07	Gradually from 2005
A2	Agricultural fertilization and Irrigation	Improved fertilization practices Improving the irrigating technologies in order to reduction of the water consumption	Legal Finance R&D SAPARD and State Fund "Agriculture"	0.17	Gradually from 2005

6.7. WASTE MANAGEMENT

6.7.1. OVERVIEW

The measures for reduction of GHG emissions to be implemented in this sector are related to management of municipal solid waste.

Landfill sites are widely used in the country. The typical amount of waste to be disposed at regional landfill sites varies between 50,000 and 100,000 ton per year[31]. The Governmental policy in this field is directed towards building up a system of 54 regional landfill sites and closing down this landfills which do not meet the legal requirements. With the setting up of these regional landfill sites the environmental friendly waste treatment of all waste generated in the country will be secured.

As a result of anaerobic and aerobic decomposition of the organic components in the municipal solid waste the greenhouse gas methane is released. The analysis of GHG inventory for the last few years shows that the municipal solid waste landfills are the biggest source of methane among all sources of CH_4 that are covered by the inventory. For example in 2001 4.119 Mton CO_2 Eq. methane is released. As extraction and utilization of landfill gas is not practiced in Bulgaria, all the generated landfill gas is being released in atmosphere.

The baseline emission projection envisages implementation of programs for methane capture and methane flaring. The best practices implementation will allow capture and flaring of 50% of the methane generated. The energy generated during flaring is not utilized.

Electricity generation option is applicable at sites, where methane is captured. It is considered as an additional measure to the baseline.

6.7.2. SECTOR POLICY INSTRUMENTS

The applicable policy instruments for the waste sector in Bulgaria are presented in the **Table 6.11** below.

Table 6.11 The applicable policy instruments for the Waste sector

Legal
Green Certificate Scheme Purchase obligation for electricity generated from captured methane (SERC)
Fiscal
-
Finance
Funds or sources for investments in emission reduction projects (JI, GIS, ISPA)
R&D
-
Awareness / information
-
Voluntary agreements
-

6.7.3. POLICIES AND MEASURES FOR WASTE MANAGEMENT SECTOR

<u>Utilization of the captured methane for production of electricity</u>

At this moment the energy generated during the flaring of the captured methane is not utilized. The electricity generation from landfill methane is subject to special treatment by the National Electricity Grid. According the Energy Law the Grid operator should purchase all the renewable electricity at preferential prices. As far as methane from the landfills is considered as renewable energy source the selling of electricity is ensured.

[31] Statistical Year Books of NSI

The captured methane can be utilized in piston gas motors where electricity is generated. Because of the presence of **mixtures** in methane, a comparatively low efficiency is accepted for this type of machines (30%). The received electrical energy from the burning of one ton captured methane will be about 4.2 MWh under the assumption that the diesel-generators operate 6 000 hours per year. This utilization of equipment for electricity production means an installed capacity of 19.517 kW.

Measure code	**W1**
Name	Utilization of the captured methane for production of electricity
Annual reduction in 2010	0.09 Mton from substitution of the electricity production in power system
Costs per ton CO_2	Low
Investment requirements	Limited
Expected year of implementation	After 2007, depending on the implementation of methane capture and green certificates schema and/or available additional funding
Instruments	Green Certificate Scheme Purchase obligation (SERC) JI ISPA Green Investment Scheme
Government contribution	None
Actions	Municipalities assist for the introduction of methane capture installations MoEW informs the municipalities on possibilities for participation in JI projects and GIS and collaborates in securing their financing SERC issues green certificates and ensure purchase of the generated electricity CM speeds up the allocation of obligatory shares on electricity production from RES

6.7.4. OVERVIEW OF POLICIES AND MEASURES FOR WASTE MANAGEMENT

The **Table 6.12** below presents the overview actions in the Bulgarian waste management sector, which will result in an annual reduction of **0.9 Mton CO_2 Eq.** in 2010.

Table 6.12 Policies and measures in Waste sector

Measure	Sub-sector	Activity	Instruments	Annual GHG reduction in 2010 (Mton)	Year of implementation
W1	Landfills	Electricity production from methane capture	Legal Finance	0.09	Depending on GC and/or additional funding

6.8. ADAPTATION TO CLIMATE CHANGE

According to vulnerability assessment for Bulgaria (see section 3.4) the climate is expected to change. It is important to undertake action to overcome changes in climate in order to secure a sustainable development. This section contains adaptation measures, which are not obligatory at this stage but should be introduced in the future.

Agriculture

Results from the adaptation assessments suggest that possible changes in sowing date and hybrid selection can reduce the negative impact of potential warming on maize yield. Changes in cropping mixtures, irrigation, and agricultural land use can be additional alternative options for adaptation in agriculture. Some economic adaptation measures, such as substitution possibilities for other crops, availability, and costs of alternative production techniques, are recommended for evaluation in the future. Below some adaptation measures, which could be considered in the future are listed:

- **New zoning of the agro climatic resources and agricultural crops**

- Expanding areas of the most important agricultural crops over new regions characterized by improved thermal and moisture conditions;
- Utilization of a variety of cultivars and hybrids, especially long-maturing, high-productive cultivars and hybrids with better industrial qualities;
- Cultivation of new agricultural crops grown with Mediterranean origin.

- **New cultivars and hybrids to be adapted to climate change**
  - The new cultivars of winter agricultural crops to pass through the winter season organo-genesis under higher temperatures without deviations from the normal crop growth and development;
  - The new cultivars and hybrids to be with higher dry-resistance, especially at the end of the vegetative period and at the beginning of the reproductive period;
  - Higher maximal air temperatures not to provoke thermal stress effects, especially during crop flowering and formation of the reproductive organs;
  - The new cultivars and hybrids to grow and photosynthesis under an increased concentration of carbon dioxide.
- **Optimization of soil treatment**
  - Optimal dates and terms of sowing of main crops;
  - Soil monitoring;
  - Measures for improvement of the water content in soils;
  - Measures to improve the soil structure and performance;
  - Actions against erosion and for better nutrition mode;
  - Up-to-date technologies in soil treatment to keep soil water and structure;
  - Melioration of soils with low fertility;
  - Effective use of mineral fertilizers relevant to the soils diversity;
  - Overcoming of the misbalance of the main nutrients and normalization of the mineral /organic fertilizers ratio.
- **Measures for increase of the irrigation effectiveness**
  - Introduction of irrigation technologies with decreased water charges and without losses during water transportation and distribution;
  - Reconstruction and building of new test-pits for utilization of groundwater;
  - Utilization of river water and precipitation for moisture storing irrigation during the winter season;
  - Utilization of wastewater and drainage system water.
- **Adaptation phyto-sanitary measures**
  - Development of special sub-models incorporated into models of agro-ecosystems which simulate plant-protection situations, related to climate change;
  - Assessment of already used pesticides and the way of their utilization and potential effectiveness of the chemical method against crop diseases and pests;
  - Improving technologies for plant protection and priority development of non-chemical methods against crop diseases and pests;
  - Improving the monitoring for the phyto-sanitary situation in the country.

Forestry

For the forests in the low part of the country (up to 800 m), where most significant climate changes can be expected, the strategic task in the forests' management should be adaptation of forests to the aridisation of the climate and improving the steadiness of forests.

For the forests in the higher parts of the country, i.e. over 800 m a.s.l. where the expected changes probably will not be drastic, the aims are: preserving the biodiversity; resistance of the ecosystems; multifunctional utilization; system of protected natural territories.

The natural and introduced forest tree and shrub species in Bulgaria have great capacity for good adaptation to the eventual climate change in the next century. *Cercis siliquastrum L., Olea europea L., Pinus brutia Ten., P. halepensis Mill., P. pinaster Ait., P. pinea L., Quercus aegilops L., Q. ilex L., Q. suber L., Q. trojana Webb, Cedrus sp.* are some representatives of the conifer species which could be recommended as appropriate in the future afforestation in the conditions of climate changes.

Through thinning out of the young stands, the living space of the rest of the specimen is increased, and the light and water regime is improved. In that manner the adaptation possibilities of the tree stands are increased and as a result the biomass increases too. The forestry management projects about 120 thousand ha to be cultivated annually with average timber output of 2.8 million m^3.

7. IMPLEMENTING THE UNFCCC, THE KYOTO PROTOCOL AND THE EU EMISSION TRADING SCHEME IN BULGARIA

7.1. REQUIREMENTS FOR COMPLIANCE WITH THE UNFCCC AND THE KYOTO PROTOCOL

The United Nations Framework Convention on Climate Change was adopted in New York on May 9th, 1992. It was signed by Bulgaria on June 5th, 1992 through the Law for Ratification of the United Nations Framework Convention on Climate Change published in the State Gazette No 28/28.03.1995. The 1997 Kyoto Protocol introduces obligatory rules and requirements towards the Parties, related to the principles and obligations introduced by the Convention. The Protocol was signed by Bulgaria on September 18th, 1998 and ratified through the Law for ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

The Bulgarian National Capacity Self-Assessment for Improved Global Environmental Management has identified the following three strategic objectives for compliance with the UNFCCC, the Kyoto Protocol and the EU Emission Trading Directive[32]:

1. **Inventory:** Functional national system for assessment of anthropogenic green-house emissions not later than December 31st, 2006, created in keeping with the requirements and decisions of UNFCCC authorities and Decision 280/2004/EC;
2. **Registry:** Functional national green-house gas emission register, established not later than December 31st, 2006, created in keeping with the requirements and decisions of UNFCCC authorities;
3. **Emissions trading**: Functional emissions trading and joint implementation system in compliance with the Kyoto Protocol requirements and with the relevant decisions of the UNFCCC authorities, and with Directive 2003/87/EC of the European Parliament establishing a scheme for greenhouse gas emission allowances trading within the Community and amending Council Directive 96/61/EC.

The first strategic objective is addressed in Section 7.2; the second and third objective in Section 7.3 and 7.4.

7.2. NATIONAL GHG ASSESSMENT SYSTEM

Article 5 of the Kyoto Protocol mandates that all parties included in Annex-I should establish a national system for estimation of anthropogenic emissions for all GHG not covered by the Montreal Protocol. The following objectives and tasks are required to establish a national system:

Administration

Objective**:** Adopted legislative or administrative decision on the building of a national system for evaluation of the emissions of GHGs.

The tasks required for this particular objective are:

1. Expert study on the structure, management and functioning of a national emission inventory system;
2. Inclusion in the Environment Protection Strategy of the decision to construct the system;
3. Ruling on the administration of the system.

Data Collection System

Objective: Established and regulated system for collection, formatting and presentation of data and information required for the planning and preparation of the national inventory

The tasks needed for this particular objective require:

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[32] Thematic Assessment Report Climate Change; English Summary, January 2004.

1. Legislative amendments allowing the provision of required information (the Environment Protection Act and/or the Statistics Act);
2. Administrative ruling on the construction of this system;
3. Creation of rules and regulations for coordination of the collection and presentation of information and data from the emission sources in ministries and agencies;
4. Elaboration and introduction of a certification system for verification and quality management of information and data;
5. Training of information gathering, checking and verification specialists;
6. Strengthening of the capacity of the National focal point for the anthropogenic emission assessment system – the Executive environmental agency and ministries and departments, which collect information.

Capacity and Implementation

Objective: Timely implementation of inventories in keeping with the IPCC requirements.

The tasks to be implemented in achieving this particular objective include:

1. Formation and accreditation of a permanent team conducting the main emission assessment activities;
2. Ensuring of a suitable inventory commissioning procedure;
3. Securing of funds for regular implementation of greenhouse emission assessments.

The direct assets that can be used in the achieving of this objective are:

- Team from Energy Institute that has elaborated 12 national inventories and reports;
- Team experienced in national inventories and reports;
- Inventory coordination unit (2 persons), as well as the National Registry of the Executive Environmental Agency at the MoEW.

Emission Monitoring

Objective**:** Established mechanism and practice for annual analysis and evaluation of the causes of the trends in emission quantities.

The tasks to be fulfilled in achieving this particular objective include:

1. Cause assessment training of sector experts;
2. Creation of sector expert teams and implementation of procedures and practices at the relevant ministries and executive and governmental agencies for analysis of the generated volumes and of the fuel and energy consumption;
3. Forming a team for analyses of trends and causes at national level.

To achieve this goal, it is preferable to use the experience of the team for prognosis of emissions of GHG at the Energy Institute, which has elaborated the prognosis of the emissions in the three National Communications on Climate Change and the present document.

Planning and Deadlines for the National System

Article 5 of the Kyoto Protocol mandates that all parties included in Annex-I should have in place a national system for estimation for estimation of anthropogenic emissions not later than January 1st, 2007.

The recent EU Council Decision of February 11th, 2004 concerning a mechanism for monitoring Community greenhouse gas emissions and for implementing the Kyoto Protocol has updated the timeframe for reporting and inventory obligations of the Community and its member states as follows: [33]

1. The Commission shall adopt by June 30th, 2006 at the latest a Community inventory system for securing the accuracy, comparability, consistency, completeness and timelines of national inventories with regard to the Community greenhouse gas inventory;

[33] Decision No 280/2004/EC, 11.02.2004. The decision replaces Council Decision 93/389/EEC on a monitoring mechanism for Community CO_2 and other GHG emissions.

2. Member States shall by December 31st, 2005 at the latest establish national inventory systems under the Kyoto Protocol.

Bulgaria has to comply with the latter deadline, which will be very difficult to meet. A proposal is currently being prepared for the Phare Program on establishing the national system. This project assuming a start by January 1st, 2005 could be finalized by mid 2006 at the earliest and the National System to be forced on the date of joining.

7.3. EMISSIONS TRADING AND JOINT IMPLEMENTATION

In achieving a functional system for emissions trading and JI, the following objectives can be distinguished:

1. Establish position on the participation in the 'Joint Implementation' mechanism in compliance with the Kyoto Protocol;
2. Established position and adopted decision on the manner of introduction and implementation in Bulgaria of the EU Emissions Trading Directive after the accession to the European Union;
3. Determined emissions trading state policy in compliance with the Kyoto Protocol, Article 17;
4. Development of an overall strategy considering all three instruments and the links between them.

These four objectives are discussed below.

7.3.1. JOINT IMPLEMENTATION

In article 6 to the Kyoto Protocol the possibility is laid down for the Annex-I countries to decrease their greenhouse gas emissions by investing in emission reduction projects in other Annex-I countries, in practice economies in transition, so called "Joint implementation" (JI).

Experiences with JI in Bulgaria

Bulgaria has already gained substantial experience with JI projects development and approval. An increasing number of investing countries and project are interested in developing JI projects in Bulgaria. The **Table 7.1** describes the situation at present.

Countries signed Memorandum of Understanding with Bulgaria:

1. Austria
2. Switzerland
3. Netherlands
4. Denmark
5. Prototype Carbon Fund

It will be signed a Memorandum of Understanding with Germany, Italy, Sweden and Spain in the future.

Table 7.1 Experience with JI projects in Bulgaria

Projects that have been approved by the Bulgarian Government and the Investor country		
	Total number of Emission Reduction Units (ERUs) per project:	**Type of projects**
Hydro power plant	1 140 000 tons	Renewable energy Hydropower
Reduction of greenhouse gas by gasification of the towns	400 000 tons	Gasification
Biomass utilization	250 000 tons	Biomass
Reduction of greenhouse gas emissions by gasification (municipality of Sofia)	500 000 tons	Gasification
Cogeneration power station Private industrial company	372 539 tons	Cogeneration
DHC cogeneration project	629 047 tons	Cogeneration
N2O reduction Fertilizer production plant	2 015 000 tons	N2O
Industrial energy efficiency and cogeneration	339 000 tons	Energy efficiency/Cogeneration
Rehabilitation of district heating systems	901 469 tons	Energy efficiency
Biomass utilization	514 119 tons	Renewables/biomass
Total	**7 061 174 tons**	
Projects that have been submitted to the Bulgarian Government		
	Total number of ERUs per project:	**Type of projects**
Improving energy efficiency in schools and kindergartens	21 385 tons	Energy efficiency
Total	**7 082 559 tons**	

Bulgaria has based its JI Policy on the following principles and assumptions:

1. The potential for JI projects in Bulgaria is substantial, but limited. The majority of potential is in small-scale projects, which face disadvantages in JI;
2. The greatest potential for JI projects is in the field of energy efficiency (including cogeneration) and renewable energy;
3. Bulgaria has an advantage compared to the accession countries regarding the additionality of JI projects and makes use of it;
4. The emissions reduced by the project before 2008 can be rewarded in the form of Assigned Amount Units (AAUs) only through the Bulgarian Green Investment Scheme which is currently under development;
5. The implementation of the EU ETS in Bulgaria in combination with the Directive linking the EU emissions trading scheme to other trading systems and CO2 reduction projects ("Linking Directive") is expected to have a large impact on the demand for ERUs;
6. Accession to the EU will reduce the additionality of a large share of potential JI projects.

As a result, Bulgaria sees Joint Implementation in its current form as a temporary instrument for the promotion of emission reduction projects. At a later stage, a Green Investment Scheme is regarded as a potentially more effective instrument because of the larger flexibility in the condition for supporting GHG reduction projects (see section 7.3.3).

JI will continue to be implemented in Bulgaria in the coming years. The number of proposed JI projects is continuously growing and the interest is increasing. There are clear procedures and institutional set-up for assessment and approval of JI projects. Consequently, there is still a need to further elaborate and strengthen the national system for JI.

Actions for Joint Implementation

The following actions need to be taken to secure the effective and efficient implementation of JI in Bulgaria:

1. Further development of operational guidelines for JI;
2. Developing the legal framework for JI and Emissions Trading;
3. Strengthening of MoEW's capacity to implement and manage JI;
4. Further dissemination of information and training for project proponents and financing.

Part of these tasks has been covered by the project "JI Capacity Building", supported by the Danish Government through DANCEE[34]. Its objectives are:

1. To introduce Bulgarian Joint Implementation guidelines for project JI;
2. To enhance the process for preparation of national emissions of greenhouse gas inventories;
3. To prepare institutional and legal structures for JI and Emissions Trading.

7.3.2. IMPLEMENTATION OF THE EU EMISSIONS TRADING DIRECTIVE

Requirements EU ET Directive

In article 17 of the Kyoto Protocol, the Parties to Annex I could exchange AAUs[35]. Two types of emissions trading are possible: international emissions trading (IET) and national emissions trading within the framework of the European Union Emissions Trading Scheme (EU ETS). In the first model, IET, the Parties keep the rights for international trading. The legal base of this principle is laid down in article 17 to the Kyoto Protocol declaring that the Parties to Annex B can trade among themselves. In the second model, the Parties distribute permissions to entities within countries and authorize them to trade at the international market within the European Union (see 7.3.3. section).

The Directive on emissions trading was adopted in 2003. It establishes an entity-based domestic cap-and-trade system for GHG gases, starting with CO_2, governed by Community Law. Implementation of the EU ETS requires the following components in the state members:

1. Allocation plan approved by EC;
2. Monitoring guidelines;
3. Legal framework;
4. Institutional arrangements for implementation;
5. Setting up an emission registry.

Start of implementation in Bulgaria

The upcoming accession to the EU mandates the implementation of the EU Directive on Emissions Trading in Bulgaria by January 1st, 2007.

Starting January 1st, 2007 during the first phase would allow Bulgaria to gain experience as soon as possible. If preparation for the ETS could effectively start per January 1st, 2005, two years will be sufficient to be ready for a starting date of January 1st, 2007, especially considering that Bulgaria could benefit from the experiences in other new Member States of the EU, that have implemented the ETS starting January 1st, 2005.

The market developments and the demand for allowances are at the date of writing of the Action Plan difficult to predict. Allocation plans are being prepared and will be subject to the evaluation of the Commission. The Bulgarian Government will, therefore, carefully evaluate the market developments and experiences in the new EU Member States that have joined the EU ETS in 2005 before starting the preparation for implementation of the EU ETS.

Actions for EU Emissions Trading Scheme With Allowances

The following actions need to be taken to implement the EU ETS in Bulgaria:

1. Evaluation of market developments and experiences in the other new Member States of the EU;
2. Study to clarify the structure, functions and management of the emissions trading system and the necessary amendments of the financial, tax and other legislation;

[34] Danish Environment Cooperation in Eastern Europe
[35] Assigned Amounts Unit

3. Transposition of Directive 2003/87/EU in the Bulgarian legislation;
4. Establishing and approving an allocation plan for distribution of emission quotas and approval by the EC;
5. Adopting and implementing the monitoring guidelines;
6. Selection of an institution or method for distribution and monitoring of emission quotas/permits;
7. Setting up an emission registry;
8. Training of emissions trading experts according to the requirements of the Directive;
9. Information dissemination to (future) participants in industry and the energy sector;
10. Permit's issuing for GHG emissions

7.3.3. INTERNATIONAL EMISSIONS TRADING "GREEN INVESTMENT SCHEME"

Article 17 of the Kyoto Protocol allows the trading of AAU among Parties, International Emissions Trading (IET). The Bulgarian Government is currently investigating the possibilities of allocating the revenues of IET to promote green investments in Bulgaria. The revenues will go directly to support emission reduction projects (i.e. AAUs are matched by quantifiable GHG emission reduction), so-called "Green Investment Scheme (GIS)". In addition, revenues could also be used to support green policies and programs, which lead indirectly to emission reductions), as well as capacity building.

A decision on GIS has to be taken by the Government at end of 2004.

Actions for Green Investment Scheme

The tasks to be implemented in establishing the GIS are:

1. Decision on the establishment of a Green Investment Fund and its basic conditions;
2. Elaboration of the design of the GIS;
3. Training of emissions trading specialists in the responsible agencies;
4. Creation of a fund accumulating the revenues from emission trading and rules for their spending;
5. Negotiations with potential investors/buyers of green AAUs.

7.3.4. NATIONAL REGISTRY

As a Party included in Annex 1 to the Kyoto Protocol, Bulgaria has to establish a national registry to ensure the accurate accounting of the issue, holding, transfer, acquisition, cancellation and withdrawal of AAUs, RMUs[36], emission reduction units ERUs, and CER[37] and the carry over of these units.

In order to establish a national registry, one institution or organization will be selected, accredited and equipped with hardware and software to act as the National Register Administrator.

1. The tasks in support of this particular objective are:
2. Selection of the most suitable institution or organization;
3. Accreditation of the selected institution or organization with an act of law;
4. Securing of sufficient financial and technical resources and qualified human resources for efficient functioning of the National Register;
5. Training of staff;
6. Creation of a temporary form of registration of agreed emissions by the 'Joint Implementation' and 'Emissions Trading' projects (until the Register is created);
7. Implementation of register.

7.3.5. LINKS BETWEEN THE KYOTO MECHANISMS AND THE EU ETS

Several links can be distinguished for the three mechanisms (JI, IET/Green Investment Scheme, EU ETS) in Bulgaria. They need to be addressed to secure the effective implementation and to provide a clear and stable policy framework for investors and project proponents:

1. The status of the baseline GHG emission forecasts and the gap with the Kyoto target. On the basis of this status overall targets and ceilings on trade in emission credits can be established;
2. The incorporation of JI in the EU ETS with accounting the possible restrictions;
3. The expectations on the costs and benefits of the (alternatives) mechanisms, including pricing policy;
4. The development in time of EU ETS: parallel of sequential to the Kyoto mechanisms.

The EU Linking Directive

The Linking Directive amends the Directive establishing a scheme for green house gas emission allowance trading within the Community in respect of the Kyoto Protocol mechanisms. It aims to recognize JI and CDM[38] credits for allowing their use within the Community emission allowance scheme. The Directive includes the following conditions:

1. The amount of converted CERs and ERUs will be restricted by the Member State.
2. LULUCF and nuclear projects are excluded.

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[36] Removal Units
[37] Certified Emission Reductions
[38] Clean Development Mechanism

Table 7.2 below lists all actions required to implement the requirements from the Kyoto Protocol and the EU ETS in a tentative time schedule.

National Climate Change Action Plan NAPCC
Implementation of the Kyoto Protocol and and the EU Emission Trading Scheme

List of actions

Planning
X implementation **D** official deadline

Nr	Actions	4/2004	1/2005	2/2005	3/2005	4/2005	1/2006	2/2006	3/2006	4/2006	1/2007	2/2007	3/2007	4/2007	**Projects for implementation** World Bank study GIS	DANCEE JI Capacity building	Proposal Phare Establishment National GHG System
	National system					D											
1	Expert study on the structure, management and functioning of a national emission inventory system	x	x	x												x	x
2	Inclusion in the Environment Protection Strategy of the decision to construct the system				x											?	x
3	Ruling on the administration of the system			x													
4	Legislative amendments allowing the provision of required information					x	x										x
5	Administrative ruling on the construction of the data collection system,					x											
6	Creation of rules and regulations for coordination of the data collection		x	x												x	x
7	Elaboration and introduction of a certification system for verification and quality management of data				x	x										?	x
8	Training of information gathering, checking and verification specialists,			x	x	x	x										x
9	Strengthening of the capacity of the Executive environmental agency.			x	x	x	x									x	x
10	Formation and accreditation of a permanent team conducting the main emission assessment activities,						x	x								?	x
11	Ensuring of a suitable inventory commissioning procedure,					x										x	x
12	Securing of funds for regular implementation of green-house emission assessments.				x	x	x	x									
	Joint Implementation																
1	Further development of operational guidelines for JI	x	x													x	
2	Developing the legal framework for JI and Emission Trading		x	x												x	
3	Strengthening of the MOEW's capacity to implement and manage JI,	x	x													x	
4	Further dissemination of information and training for project proponents and financiers.	x	x	x	x	x											
	International Emission Trading / Green Investment Scheme																
1	Decision on the establishment of a Green Investment Fund and its basic conditions				x												
2	Elaboration of the design of the GIS	x			x	x									x		
3	Training of emissions trading specialists in the responsible agencies						x	x									
4	Creation of a fund accumulating the revenues from emission trading						x	x					D				
5	Negotiations with potential investors/buyers of AAUs.					x	x	x	x				D				
	EU Emission Trading Scheme																
1	Transposition of Directive 2003/87/EU in the Bulgarian legislation.								x	D							
2	Establishing and approving the national allocation plan			x	x	x	D										
3	Adopting and implementing the monitoring guidelines						x	x	x	D							
4	Selection of an institution or method for distribution and monitoring of emission quotas/permits					x											
5	Training of emission trading experts according to the requirements of the Directive,						x	x	x								
7	Information dissemination to (future) participants in industry and the energy sector						x	x	x	x							
	National registry									D							
1	Selection of the most suitable institution or organization,		x														
2	Developing of the methodology and software		x	x													
3	Accreditation of the selected institution or organization with an act of law,				x												
4	Securing of sufficient financial and technical resources and qualified human resources		x	x													
5	Training of staff				x	x											

7.4. GENERAL STRATEGY

Depending on the readiness for participation in the Kyoto Mechanisms and EU emission trading, Bulgaria will elaborate a general strategy for their implementation. The strategy should take into account:

- The forecast for the development of the emissions of GHG during the first period of Kyoto Protocol and afterwards; evaluation of an eventual increase in the emissions due to higher growth of GDP than currently expected.
- The price development of the emissions and the forecast for these prices during the first period and afterwards;
- The possibility of banking between the first and second commitment period.
- The expected impact of the strategy on new investments in Bulgaria, particularly in the energy sector.

The analysis of the macroeconomic consequences, financial benefits and losses; and the social problems arising from the thorough application of the Flexible Mechanisms allows defining of a strategy for:

- country's optimum behavior on the Flexible Mechanisms market;
- allocation of the available emission quotes and distribution of the incomes from their assignment.

The strategy will also establish Bulgaria's initial position in the informal discussions and following negotiations on post-2012 regimes and targets under the Kyoto Protocol. at the EU and UNFCCC level.

The strategy will be developed in 2005 and its completion and approval must precede the accession of Bulgaria to the EU.

7.5. POST-2012 OBLIGATIONS AND TARGETS

Bulgaria needs to prepare for the informal discussions on EU and UNFCCC level on post-2012 regimes and targets and start establishing its position for the negotiations that will follow. This includes determining the key elements of a long-term national climate policy (mitigation and adaptation, including setting viable and achievable reduction targets. The following questions need to be addressed:

- Baseline trends and projections for future trends (policy scenarios) in GHG emissions in Bulgaria for the 2nd Commitment Period.
- Potential for future emission reduction.
- Costs and benefits of emission reduction
- Ancillary benefits to GHG emission reduction
- Adaptation challenges
- Viable and achievable reduction targets for Bulgaria

The questions should be addressed through research activities, national stakeholder consultations and a policy-making process involving key government representatives. This work can partly be carried out within the framework of an EC funded project "Capacity-building in new Member States and Accession Countries on Further Climate Change Action Post-12" due to start in 2005.

8. FUTURE IMPACT OF GHG REDUCTION POLICIES AND MEASURES

8.1. INTRODUCTION

In chapter 6, 24 GHG emission reduction measures additional to the baseline scenario have been identified and form the basis of three additional emission projects projections:

- S1. Energy efficiency: projection including all additional policies and measures related to energy efficiency in the demand side sectors (industry, services, transport, households);
- S2. Renewables: projection including all additional policies and measures related of the energy efficiency scenario plus those related to renewable energy sources;
- S3. Energy supply: projection including all additional policies and measures related to the renewables scenario plus those related to the supply side sectors (energy production).

Table 8.1 provides an overview of the measures and indicates to which additional projection they belong.

Table 8.1 Overview of additional measures

Number	Description	Additional projection
E1	Improvement NPP-K	S3
E2	Construction of Hydro cascade Gorna Arda and Sredna Vacha (expected startup in 2012)	S3
E3	New small-scale and micro Hydropower in different regions of the country	S2
E4	Upgrading CHP and district heating	S3
E5	Reduction of transmission and distribution losses electricity	S3
E6	Reduction of distribution losses heat	S3
E7	Biomass combustion	S3
I1	Reduction of thermal losses in industry	S1
I2	Increased natural gas use in industry	S1
I3	Introduction of energy monitoring systems in industry	S1
I4	Upgrading of steam generation and compresses air plants	S1
I5	Introduction of highly - efficient construction machines on diesel fuel (renewing 25 % of the car park)	S1
I6	Replacement of part of the fuel used for producing building materials by motor-car tyres and other combustible waste	S2
H1	Increased natural gas supply to households	S1
H2	Implementation of solar panels	S2
H3	Implementation of hybrid (RES)and other hot water systems	S2
T1	Introduction of cargo dispatch system	S1
T2	Introduction of power dispatch system (railway)	S1
T3	Modernization of railway	S1
T4	Improvement of public transport and reduction of traffic flows in cities	S1
T5	Introduction of biofuels	S2
A1	Improved manure management	S1
A2	Improved fertilization and irrigation	S1
W1	Electricity from methane capture	S1

The GHG emissions trend forecast correspond to the baseline scenario for the country's emission development during the period 2002 – 2020, which has been presented in section 3.3.

In preparing forecasts for the GHG emissions reduction resulting from measure implementation at national level, there are certain risks of overrating the effects of the measures. GHG emission growth can be lower or higher as a result of (not) accounting factors related to the economical development. The implementation of the measures and their actual contribution to emission reductions is uncertain due to the following reasons:

- Influence of and strong dependency on political decisions;
- Need for large investments for their realization;
- Dependency on the situation at international fuel markets;
- Dependency on variable natural factors (wind, solar energy, river runoff and others).

8.2. PROJECTION S1: ENERGY EFFICIENCY

The forecasted GHG emissions expressed in CO_2 Eq. result from implementation of policies and measures in the demand side sectors of economy – industry, transportation, agriculture, waste management, as well as in households and services, so called ***Action 1***.

This scenario includes measures that lead to reduction of fuel consumption in energy production or the substitution of high-emission fuels with such that emit less CO_2 (such as natural gas and biomass).

The implementation of energy efficiency measures is assumed to be relatively certain because it is in compliance with the basic priorities for the country's development. These priorities are as follows:

- Liberalization of markets;
- Accession to the EU;
- Updating and renovation of the producing capacities;
- Improvement and updating of the transport infrastructure;
- Increasing of the productivity and efficiency in agriculture;
- Expanding and updating of services;
- Increasing of the efficiency of energy and fuel consumption in households;
- Modernization, improvement and renewing of the energy infrastructure.

Since the uncertainty of actual implementation of these energy efficiency measures is relatively low, this projection represents the most probable achievable level of GHG emissions reduction in this Action Plan. The basic characteristic features of this scenario compared to the baseline scenario are:

- The aggregated emissions for the period 2007-2010 remain stable at the level of 75 Mton (77.0-81.7 Mton in the baseline)
- Followed by an increase up to 81 Mton in 2017 and 83.5 Mton in 2020 (respectively 86.7 and 89.0 in the baseline).

8.3. PROJECTION S2: RENEWABLE ENERGY RESOURCES (RES)

In Projection S2 the GHG emission reduction RES measures are included and are so called ***Action 2***. These measures are related to the following renewable sources:

- Solar installations for hot water in social institutions;
- Small and micro Hydro power projects in different regions of the country;
- Installations for production of electricity and thermal energy from biomass and biogas from the solid waste disposal sites;
- Wind energy, geothermal sources and others.

The implementation of RES measures is relatively limited since no other RES measures are envisaged in the Action Plan, because of lack of political support.

The implementation of RES measures is stimulated through the issuing of green certificates, green investment schemes and joint implementation. The additionality of the RES-measure implementation to projection S1 is still relatively small:

- in 2010 – 0.28 Mton CO_2 Eq.
- in 2015 – 0.39 Mton CO_2 Eq.
- in 2020 – 0.46 Mton CO_2 Eq.

The decreased growth of the emission savings after 2015 is due to the exhausted (economic) potential of this type of measures. Additional policies are needed to realize extra emissions reductions.
The forecast for GHG emissions reduction under scenario S2 (curve S2 in **Figure 8.1**) includes the emission reduction under Action 1 plus the reduction of emissions from implementation of RES-measures- Action 2.
The curves of these two scenarios (S1 and S2) are too close because the additional reduction from the proposed RES-measures alone is within the range of 0.3-0.6% from the total GHG emissions.

8.4. PROJECTION S3: EMISSION REDUCTION IN THE ENERGY PRODUCTION SECTOR

The **S3** GHG emission projection includes the GHG emissions reduction resulting from implementation of policies and measures in the Energy production sector and the implementation of policies and measures in the field of energy efficiency (projection S1) and renewables (projection S2).

The potential for GHG emission reduction in the energy production sector is significant.

The GHG emission reduction in 2010 constitutes 7.8 Mton (after implementation of all measures in this Action Plan) from which 3.8 Mton (49%) comes from measures in the energy sector.

The implementation of measures in this sector is relatively uncertain. This uncertainty is due to the characteristic features of most of the measures in the energy sector: large plants that require huge investments and political support.

Therefore it is assumed that the GHG emission savings according to the forecast under this scenario (curve S3 from **Figure 8.1**) will be the most uncertain and have a lower degree of reliability than the assessments of Projection S1.

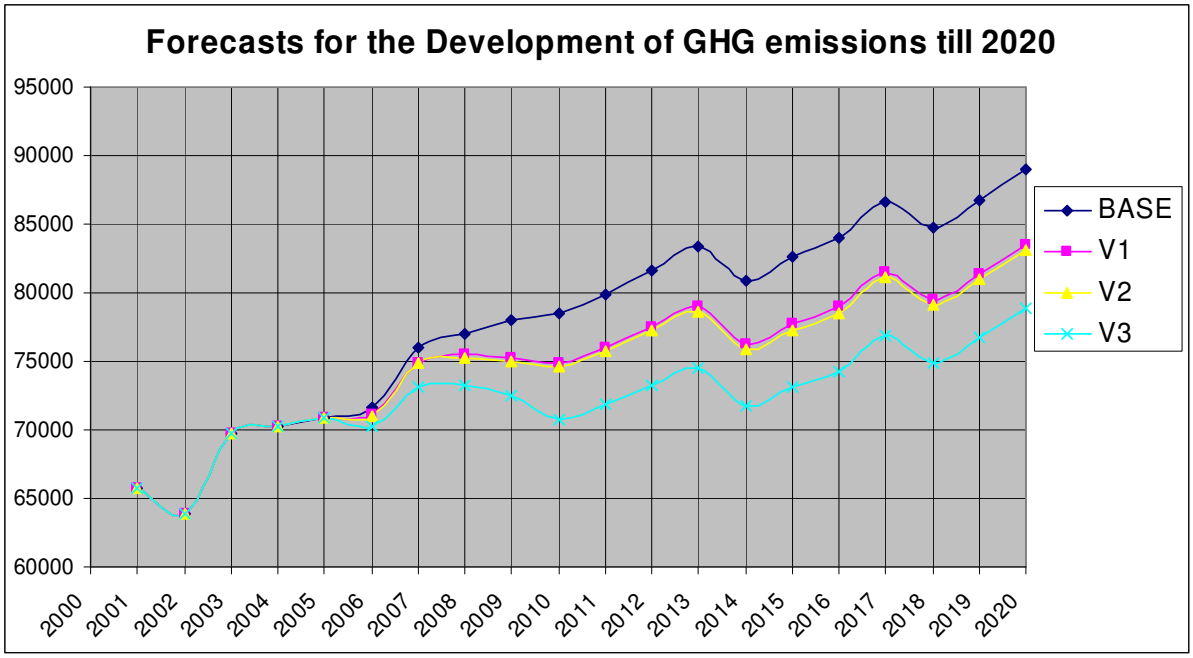
The additionality of implementation of the energy production measures to projection S2 is as follows:

- in 2010 – 3.8 Mton CO_2 Eq.
- in 2015 – 4.2 Mton CO_2 Eq.
- in 2020 – 4.2 Mton CO_2 Eq.

8.5. ANALYSIS OF THE GHG EMISSIONS FORECAST AND THE KYOTO TARGET

Figure 8.1 provides an overview of the baseline projection and the three (cumulative) additional policies projections.

Figure 8.1



The results of the latest GHG emissions inventory in 2002 indicate that the Kyoto target will equal to 130.4 Mton CO_2 Eq. (i.e. 8 % reduction of emissions compared to the base year 1988 which equaled 141.8 Mton CO_2 Eq.).

According to the elaborated GHG emissions forecasts with implementation of additional policies and measures for GHG emission reduction presented in this Action Plan, the emission volumes for the First and Second Kyoto period can be estimated.

Scenario S1 of the forecast could be provisionally called a minimum scenario because it includes only the measures for GHG emissions reduction in industry, households and services from Action 1.

Scenario S3 could be provisionally called a maximum scenario because it accounts for all the measures for GHG emissions reduction according Actions 1, 2 and 3 in industry, households, services, energy production sector and covers RES measures as well.

The presented overall emissions levels for the period 2008-2012, reviewed at average annual level equal to the following mean annual GHG emissions:

- Base scenario - 79.0 Mton CO_2 Eq.
- Minimum scenario - 75.8 Mton CO_2 Eq.
- Maximum scenario - 72.3 Mton CO_2 Eq.

The comparison of the above volumes with the Kyoto target reveals that there will remain the following free GHG emissions volumes:

- Base scenario - 51.5 Mton CO_2 Eq.
- Minimum scenario - 54.6 Mton CO_2 Eq.
- Maximum scenario - 58.2 Mton CO_2 Eq.

8.6. CONCLUSION

The analysis of the emissions during the First Kyoto period shows that according to the base scenario Bulgaria will thus have 51.5 Mton available for trading. After the implementation of measures in the Action Plan this amount could grow between 6 - 13%. If the uncertainty in measure implementation in the energy sector is accounted for, the most probable and realistic is a 10% increase of the free tradable emissions compared to the base scenario. This equals to 57 Mton CO_2 Eq.

When looking at the period 2013-2020 (8 years) being the Second Kyoto period the average annual forecasted emissions volumes are:

- Base scenario – 84.8 Mton CO_2 Eq. or 60% of the base year;
- Minimum scenario – 79.7 Mton CO_2 Eq. or 56% of the base year;
- Maximum scenario – 75.1 Mton CO_2 Eq. or 53% of the base year;

This shows that if these projected emissions are confirmed, then during the conditional Second Commitment Period the country will have emissions less than 60% of the base year.

The quantitative assessments for the reduction of GHG emissions do not account for eventual risks of non-fulfillment of the base scenario. The analysis of these risks will bring around a more realistic picture of the amounts of the free emissions for the First Kyoto Period.

The quantitative assessment for the reduction of GHG emissions are based on expected economic growth figures for the country (see section 3.3). When actual growth figures turn out to be lower or higher, total GHG emissions will as a consequence be lower or higher as well.