



Intelligent Energy  Europe



Energy Efficiency Policies and Measures in Bulgaria

**Monitoring of Energy Efficiency in EU 27,
Norway and Croatia (ODYSSEE-MURE)**

**ENERGY EFFICIENCY AGENCY
MINISTRY OF ECONOMY AND ENERGY**

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1 Executive Summary

This National Report “Energy Efficiency Policies and Measures in Bulgaria” is analysing the progress achieved in energy efficiency between 1997 and 2007 at the level of the Bulgarian economy as a whole and by sectors. It is prepared in the frame of the Project “Monitoring of energy demand trends and energy efficiency in the EU (ODYSSEE-MURE EU-27).

The objectives of this project are:

- monitoring energy efficiency progress and energy demand trends;
- comparing differences between countries in their relative performance;
- evaluation of national energy efficiency policy measures and EU Directives

These objectives will contribute to the monitoring and measurement of energy savings in the framework of the Energy Service Directive.

The report describes the economic growth and energy demand trends in the country and gives an overview of the improvement of energy efficiency on the base of indicators for whole economy and by sectors.

After 7 years of economic depression followed a period of relatively fast growth. From 1997 to 2007 the average annual rate of GDP growth was 5 %. In the 2008 the growth was 6 %. The effect of the global economic crisis was noticed first in 2009 and the forecast is for recession of 6 % in 2009 and 1 % in 2010.

In the same period the energy demand remained practically constant. The primary energy consumption (PEC) changed from 20 549 ktoe to 20 163 toe and the final energy consumption (FEC) from 9471 ktoe to 9 528 ktoe from 1997 to 2007.

The rate of reduction of primary energy intensity was 5 %/year and of the final energy intensity 4,7 %/year.

The global energy efficiency index (ODEX) decreased by 19 % over the period and this improvement is due, largely, to the manufacturing. In this sector 52 % reduction of the ODEX index was achieved. The ODEX of the household improved by 18 % in the period under consideration (1997 – 2007).

Transport is the only sector where the energy efficiency deteriorated. During the period 1997 to 2007, the energy efficiency index in the transport sector increased by 29 %.

The Kyoto target for GHG emissions for Bulgaria is equal to 130,5 Mt CO₂ eq. (i.e. 8 % reduction of emissions compared to the base year 1988 which was 141,8 Mt CO₂ eq.).

The GHG emissions from energy use decreased from 59.0 Mt CO₂ eq in 1997 to 52.2 Mt CO₂ eq in 2006.

The analysis of the emissions during the First Kyoto period shows that according to the base scenario Bulgaria will have 79,0 Mton CO₂ Eq. When looking at the period 2013-2020 being the Second Kyoto period the average annual forecasted emissions volumes for the Base scenario are 84,8 Mton CO₂ Eq. or 60% of the base year.

This quantitative assessment for the GHG emissions in the Base scenario are based on the expected economic growth figures for the country before the impact of the economic crisis. The actual growth figures will be lower and the expected total GHG emissions will as a consequence be lower as well.

A new Energy Efficiency Act (EEAct) was adopted at 14.11.2008. This Act defines:

- The national indicative target for energy savings and its distribution between retail energy sales companies, owners of buildings and producers of goods and services.
- Energy investigation and certification mandatory for all new buildings no later than 6 years after the start of operation and for all existing (including all state municipal and privately owned buildings in the service sector) with useful area over 1000 sq. m. The implementation of the energy efficiency measures prescribed in the energy investigation is obligatory for the owners of the buildings in 3 years period.
- Mandatory periodical inspection for energy efficiency of water heating boilers with more than 20 kW and air conditioners with more than 12 kW capacity.

2 The Background to Energy Efficiency

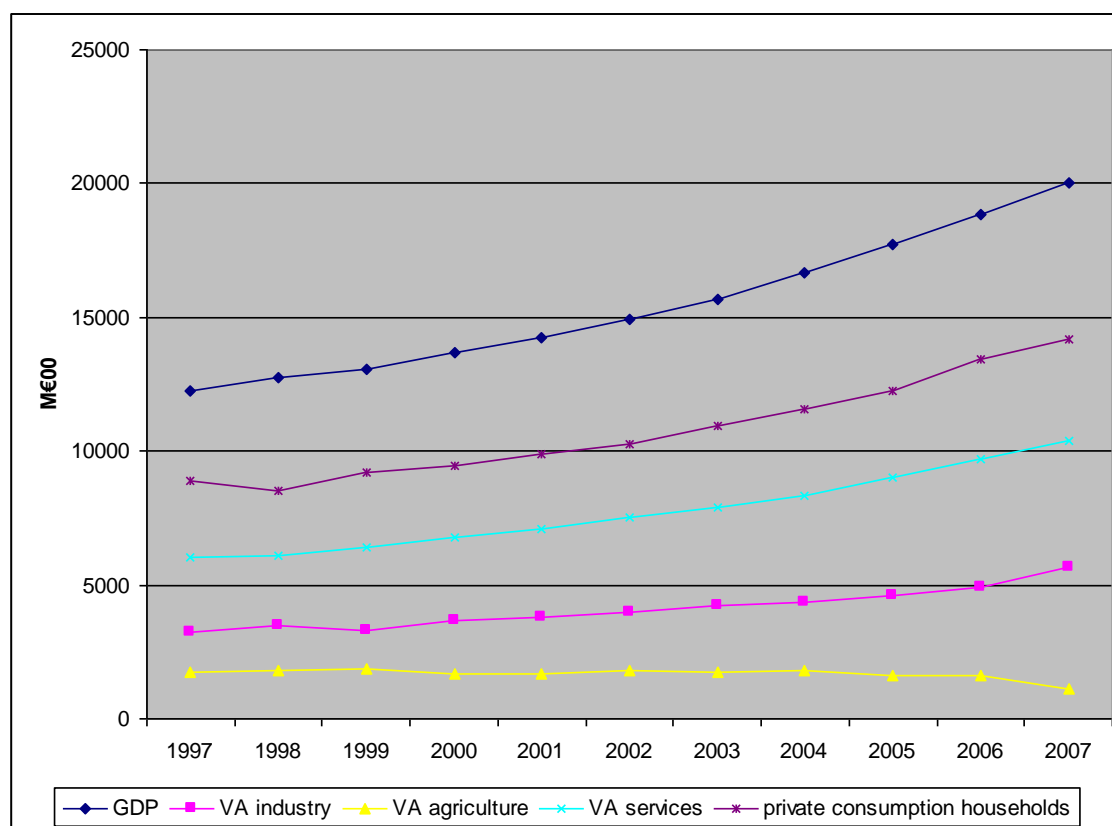
2.1 Overall economic context

The development of economy from 1990 to 1997 is characterized with GDP reduction, due to the process of transformation towards market oriented economy. The lowest level of GDP was registered in 1997 (70 % of the 1990 level) as result of severe financial and economic crisis.

In the following years 1997–2008 Bulgaria experienced relatively rapid and sustained economic growth. The average growth rate from 1997 to 2007 is 5 %/year and 6 % in 2008. On 1 January 2007 Bulgaria became full member of EU, but is amongst the poorest of the member states.

The impact of the global economic crisis was felt first in the 2009 and the forecast is for GDP reduction of 6 % in 2009 and 1 % in 2010.

Chart 2.1: Macro-economic development (prices 2000)



The growth in the sectors of Industry and Services was relatively fast with average annual growth rates of VA of Industry 5.7 % and of VA of Services 5.6 %.

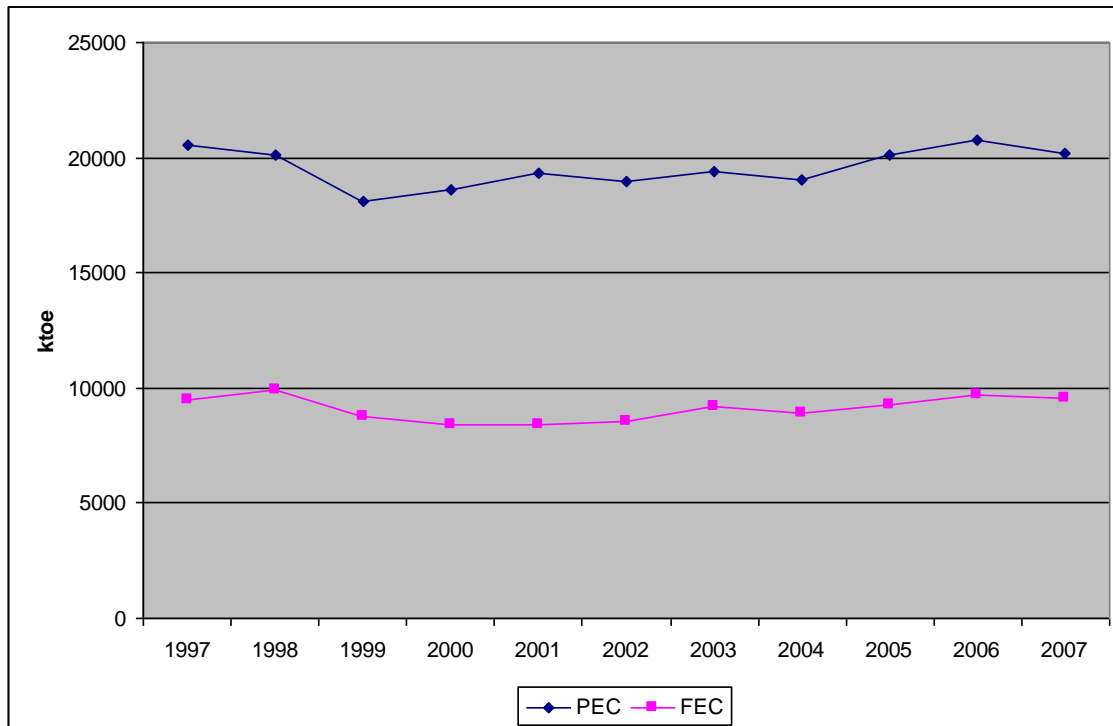
The private consumption experienced average annual real growth of 4,8 % in the same period and standards of living started to rise.

2.2 Energy consumption trends : by fuel and by sector

The primary energy consumption(PEC) remained at around 19-20 Mtoe annually and the final energy consumption (FEC) at 9-10 Mtoe over the period 1997-2007. The economic growth was achieved without significant rise in the energy demand. After 1999 the primary and after 2001 the final energy consumption starts slowly to increase, mainly due to the growth of the energy demand of the transport sector.

The changes in primary and final energy consumption in Bulgaria in the period 1997 – 2007 are shown in chart 2.2.1

Chart 2.2.1: Primary and Final energy consumption in Bulgaria 1997 - 2007



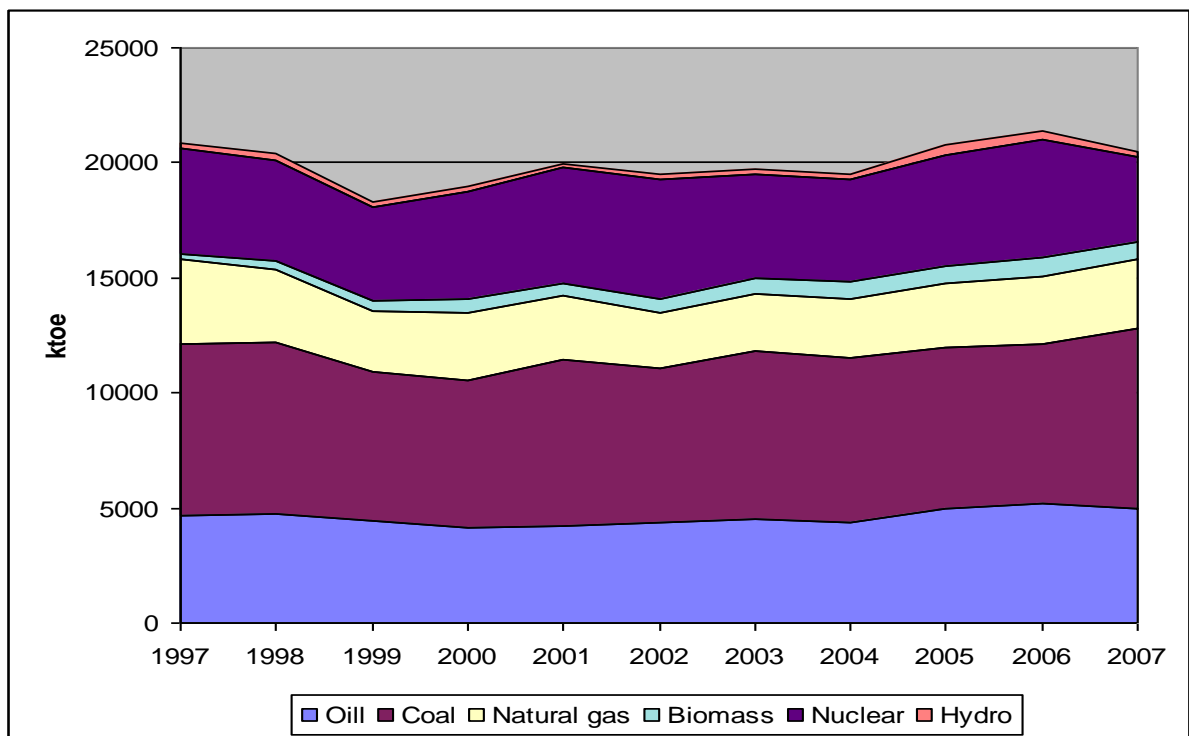
Bulgaria has substantial reserves of very low quality lignite (around 2,3 billion tones, equivalent to 80 years at current production rate). The sulphur content of this coal is 2 % and the calorific value only about 1500 kcal/kg.

Bulgaria has no domestic oil and very limited natural gas reserves. 100 % of the oil and 88 % of the gas are imported. Russia is the main supplier of oil and the only supplier of natural gas and also no alternative way and supplier of natural gas is possible in the near future. After the crisis with the supply of the natural gas in January 2009 the natural gas is the main problem for the security of the energy supply.

From the RES the wind energy potential is concentrated in the Black Sea coast and in the mountains over 1000 m. above sea level. Solar energy potential is significant but the solar electricity is 10-15 times more expensive than the electricity from coal, hydro or nuclear energy. From the hydroelectric resources about 40 % are used. The potential of biomass is large. The firewood is used for heating in the households but often in inefficient stoves. Only small part of agricultural wastes (straw) are used for energy production. Bulgaria has significant reserves of low temperature geothermal water which can be used for low temperature heating.

The primary energy consumption by fuels in the period 1997-2007 is shown in Chart 2.2.2

Chart 2.2.2: Primary energy consumption by fuels 1997-2007

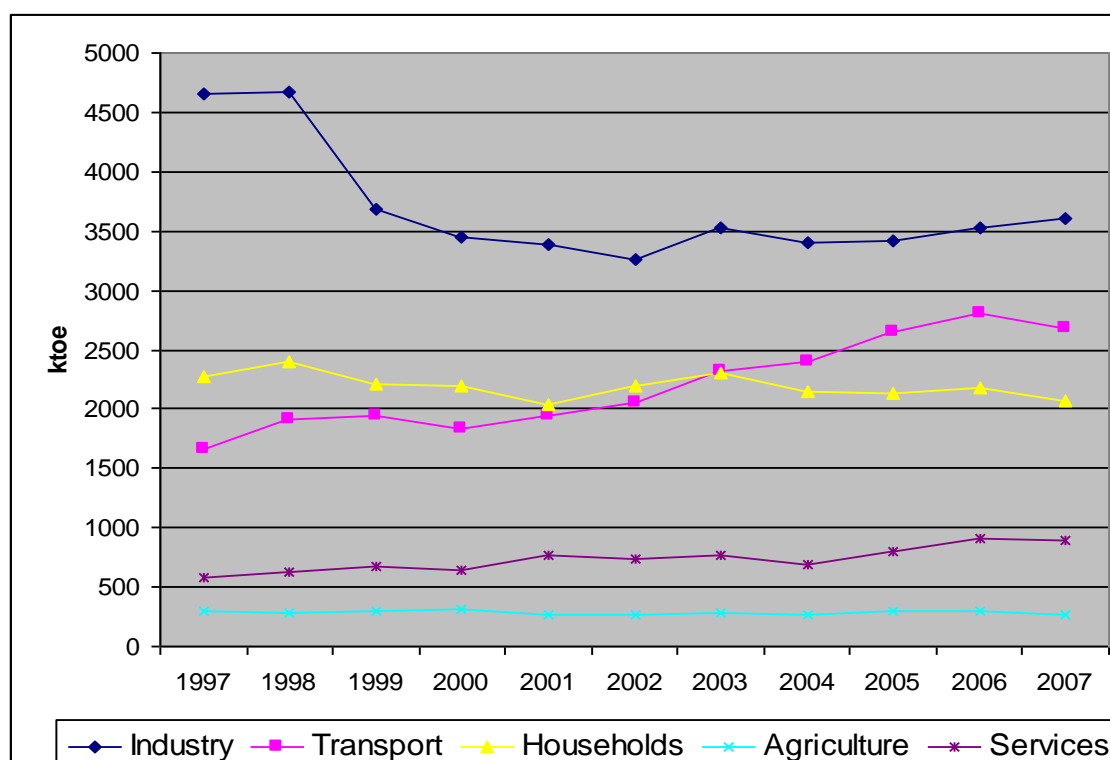


From 1997 to 2007 the Primary energy consumption decreased from 20 549 ktoe do 20 163 toe. By fuels the changes are as follows:

- The primary consumption of coal from 7 452 ktoe to 7 835 ktoe. The share of coal in the PEC increased from 35.7 % in 1997 to 38.1 %;
- Consumption of oil and oil products increased from 4 646 ktoe to 4 946 ktoe and the share of oil in PEC increased from 22.3 % to 24.1 %;
- Natural gas consumption decreased from 3 700 ktoe to 3010 ktoe or with 19 % (2 %/year) and the share of natural gas in PEC decreased from 17.7 % to 14.6 %;
- Nuclear energy increased from 4 579 ktoe in 1997 to 5 216 ktoe in 2002. After the shut down of the Units 1 and 2 of NPP at the end of 2002 the production was reduced to 4 457 ktoe in 2003 and increased again to 5 162 ktoe in 2006 with full use of the capacity of the remaining units. In 2007 after the shut down of the Units 3 and 4 on 31.12.2006, the nuclear energy was reduced with 28 % to 3 728 ktoe in 2007. The share of the nuclear energy decreased from 22.0 % in 1997 to 18.1 % in 2007. After the shut down of the Units 1-4 of NPP the local coal replaced nuclear energy for the electricity production with the corresponding growth of GHG emissions;
- Hydroelectricity production is dependent of the climatic conditions. The maximal production was 406 ktoe in 2005 and the minimal only 149 ktoe in 2001. In 1997 the production was 238 ktoe and 247 ktoe in 2007 and the share in the PEC 1.1 % and 1.2 % respectively;
- The most spectacular is the growth of the consumption of biomass (firewood) from 240 to 743 ktoe (12 %/year) and the share of the biomass in PEC rised from 1.1 to 3.6 %. The firewood used in stoves with low efficiency replaced in first place coal for heating in households.

The Final energy consumption by sectors 1997 - 2007 can be seen in chart 2.2.3.

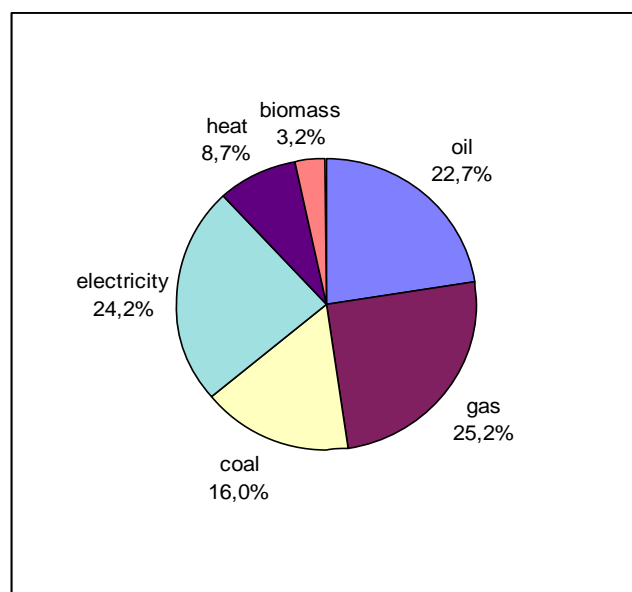
Chart 2.2.3: Final energy consumption by sectors 1997-2007



Industry

Although the final energy consumption of the Industry has been reduced by from 4661 ktOE to 3611 ktOE (with 23 %) it is still the largest energy consumer. Its share, however, has decreased from 49.2 % in 1997 to 38 % in 2007. With 73 % real growth of value added produced by the industry (5,7 %/year), the energy demand not only did not increase but even showed a substantial **decrease by absolute value** with average rate 2,5 %/year. The industry consumption by fuels i1997-2007 is shown on chart 2.2.4.

Chart 2.2.4: Final energy consumption of industry by fuels 2007



Transport

The energy consumption of transport is constantly growing from 1663 to 2678 ktoe (4,9 %/year) and the sector share reached 28 % in 2007 from 17.6 % in 1997. More than 97 % of the energy consumption are oil products (including LPG) and the crude oil is entirely imported in Bulgaria. The road transport is responsible for 90% of fuel consumption in the sector. There has been a strong modal shift from rail to road transport and from public urban transport to private cars and growth of urban traffic congestions.

Services

This sector provides 58 % of the VA and has very low energy intensity. However, the energy consumption of the services increased with 53 % from 1997 to 2007 (4.4 %/year) and its share from 6,2 to 9,4 %. The sector consume a considerable amount of electricity (the share of electricity is 68 % of the energy demand) and has a substantial potential for implementation of energy saving measures.

Households

The energy consumption decreased from 2 265 in 1997 to 2 073 ktoe in 2007. The sector share also decreased from 23.9 % to 21.8 %. The share of electricity is 39 % and that of natural gas is only 1.6 % in 2007, which shows the low level of residential gasification but the district heating with 18.2 % share use almost entirely natural gas. After 1997, a rapid growth has been observed of firewood consumption and its amount risen from 180 to 607 ktoe (19,5 %/year). The share of firewood reached 29.3 % of the total energy consumption in households. At the same period the consumption of coal has been reduced from 602 to 224 ktoe, and of heat from 621 to 377 ktoe. Firewood and coal are burned into primitive stoves with low efficiency; thus, the really produced useful heat from these fuels is much less than their share.

Agriculture

The share of agriculture in the FEC has been constantly decreasing for the last years and is only 2.8 % in 2007. The energy consumption remained practically constant in the period 1997 – 2007. 77 % of the energy consumed in the sector consists of oil products.

2.3 The policy background to energy efficiency

During the last years the process of harmonization of the energy efficiency framework created in our country with the European legislation was a priority .

The years before the reception of the Republic of Bulgaria in the European Union were full of different in kind, scale and scope preparatory activities for all national authorities and organizations, which as well is true for the Energy Efficiency Agency.

The aim of the actions undertaken was to come as close as possible to the requirements of the Energy Policy in Europe, as it has been formulated many times in all European strategic energy documents and Directives.

Energy efficiency activity is a matter of high priority of the policy at national level and increased attention to the energy efficiency issues in our country is paid by the national authorities.

The most recent legislation in the field of energy efficiency and RES include:

Energy Efficiency Act – new Energy Efficiency Act was adopted by the Parliament in November 2008.

In relation to the major priorities set in the energy policy in Europe and to the ongoing harmonisation of the Bulgarian legislation a new Energy Efficiency Act was adopted.

The new provisions include:

- The National Assembly shall adopt National Strategy on energy efficiency, which shall designate the national indicative target for energy savings, the stages, the means and measures for its achievement. The National Strategy shall be updated every 5 years.
- National action plans related for energy efficiency shall be worked out on the basis of national strategy and they shall contain:
 1. analysis and evaluation of the fulfillment of the preceding national action plan;
 2. intermediate indicative and individual goals for energy savings;
 3. stipulated activities and measures for raising the energy efficiency;
 4. obligations of the bodies of state power and the bodies of the local self-government related to the fulfillment of the stipulated measures;
 5. obligations for fulfillment of the individual goals for energy savings;
 6. terms for fulfillment;
 7. sources for financing;
 8. indicators for accounting of the results, as well as other necessary information.
- The national indicative target, as defined in the action plans is distributed as individual targets for energy savings between:
 1. traders of energy who sell more than 75 GWh energy annually;
 2. owners of buildings with more than 1000 sq. m. floor area;
 3. owners of industrial systems with more than 3000 MWh annual energy consumption.

The obliged persons can provide energy services to their clients at competitive prices, or to make payments in the Energy Efficiency Fund or in other already existing or newly established energy efficiency funds.

- Mandatory certification of all new buildings no later than 6 years after the commission of the building.
- Mandatory certification of all existing buildings with more than 1000 sq.m. floor

area.

- Mandatory periodical inspections for energy efficiency of all water heating boilers with rated power more than 20 kW and air conditioners with more than 12 kW power.
- Requirement to appoint energy managers in large energy consumers.
- Voluntary agreements can be concluded between the Executive Director of the Agency and:

1. owners of buildings with more than 1000 sq.m. floor area with exception of buildings which are state and/or municipality property;

2. owners of industry systems with more than 3000 MWh annual consumption;

3. traders of energy.

The Voluntary agreements contain:

1. specific obligations for achieving of the energy saving targets;

2. specific obligations of the Energy Efficiency Agency;

3. mechanisms for monitoring and control of fulfillment the obligations;

4. methods for evaluation of achieved energy savings;

- Certificates for achieved energy savings are issued by the Executive Director of the Agency to the obliged persons and are used for proving the fulfillment of the individual indicative targets for energy savings.

First National Energy Efficiency Action Plan

This action plan was prepared according to Energy Services Directive and in order to achieve the EU energy saving target. The action plan was adopted by the Government in October 2007.

The national energy saving target is 627 ktoe to 2016 – 9 % of average FEC in the scope of the ESD in the period 2001-2005.

Renewable and Alternative energy and biofuels Act – adopted in 2007

The main provisions of this Act are as follows:

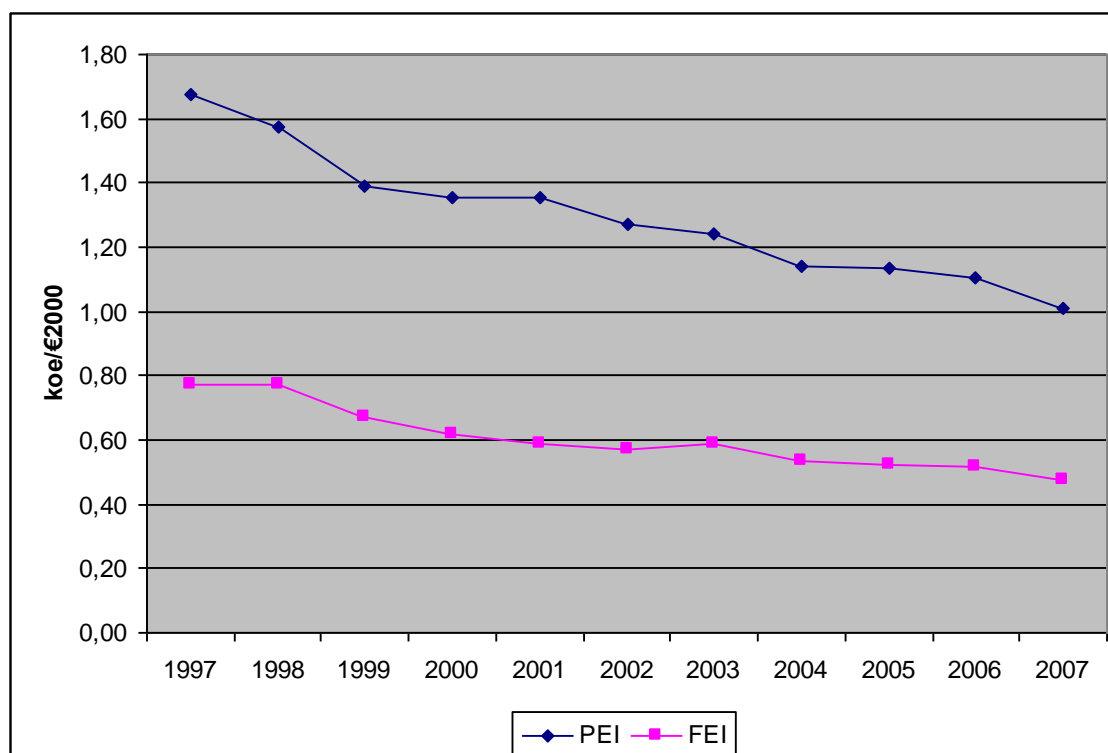
- Preferential connection to the grid of power plants generating electricity from RES;
- The public provider or the suppliers are obliged to purchase the entire quantity of electricity generated from RES, except the energy generated by hydroelectric power plants with capacity over 10 MW, at preferential prices.
- Each year the State Energy and Water Regulatory Commission determine preferential prices for the electricity generated from RES;
- Zero excise tax for pure biofuels for transport and from 2008 introduction of proportional excise tax reduction for the blends of biofuels and other fuels for transport.
- Mandatory blending of fuels for transport with biofuels.

3 Overall Assessment of Energy Efficiency Trends

3.1 Overall trends in energy intensity

The changes in primary (PEI) and final energy intensity (FEI) over the period 1997 – 2007 are shown in Chart 3.1.1.

Chart 3.1.1: Primary and Final energy intensity 1997-2007



The primary energy intensity improved with average rate 5.0 %/year, from 1,673 koe/€2000 to 1,008 koe/€2000.

The final energy intensity has been reduced by average rate of 4,7 %/year and the ratio final/primary intensity increased slowly from 0,46 to 0,47.

The ratio final/primary energy intensity and energy consumption in Bulgaria is low compared to the EU average ratio of 0,65.

The principal reasons are:

- The fuel mix used in Bulgaria with high share of local low quality coal and nuclear energy. The nuclear energy and low quality local coal replace imported expensive fuels, like crude oil and natural gas, improving security of

supply and reducing substantially energy prices, but the efficiency of energy transformation to electricity of these fuels is relatively low (32-34 %). With the corrections for the EU average fuel mix the ratio of the FEI/PEI in Bulgaria will be about 0,56 (2007).

- With correction for export of electricity the ratio FEI/PEI will increase to about 0,62.
- With corrections for the EU average non energy uses of fuels the ratio FEI/PEI will be reduced to 0,61.
- The rest to 0,65 EU average is a result of higher distribution losses of electricity and derived heat in Bulgaria.

The effect of the structural changes of the value added on the energy intensity is not significant and negative. At constant 1997 structure of the value added (with climatic corrections) the final energy intensity in 2007 will be reduced by only about 1.4 %.

When comparing the energy intensity in Bulgaria with the average in the EU states and in order to recognize the difference in price levels, an adjustment is made of GDP through the purchasing power parity calculated by Eurostat.

After this adjustment the ratio between the primary energy intensity in Bulgaria and the average for EU 27 in 1995 was 2.5 and was reduced to 1.9 in 2007, and the ratio between final energy intensity in Bulgaria and the average for EU 27, for the same period, was reduced from 1.9 to 1.43.

The comparison with EU 27 displays the obvious trend of decreasing the energy intensity of Bulgarian economy and approaching the average European level, as well as the significant difference still kept. The final intensity is more than 40% higher than EU average and 60 % from EU best practice and this shows an overall, long term potential, for energy saving to reach the EU average level.

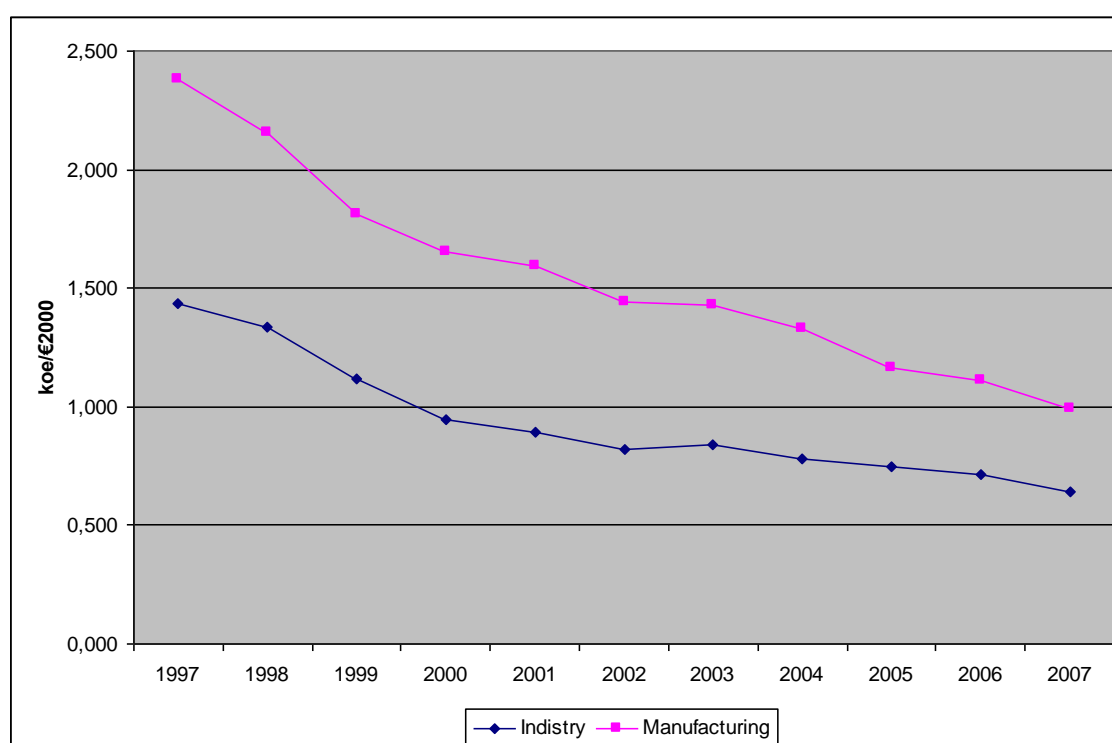
Energy consumption per capita in households and transport in Bulgaria is considerably lower in comparison to the average EU level, which is due to lower thermal comfort and use of electrical appliances in households, lower number and distances of travels in transport etc. All these factors now reduce the energy intensity in Bulgaria but as a result of the economic growth and the rise in incomes, there will be a natural trend of getting closer to average European levels of comfort in households and mobility in transport and increased share of the improvement of energy efficiency in households

and transport may be used to improve the comfort and not to reduce energy consumption and intensity.

3.2 Industry

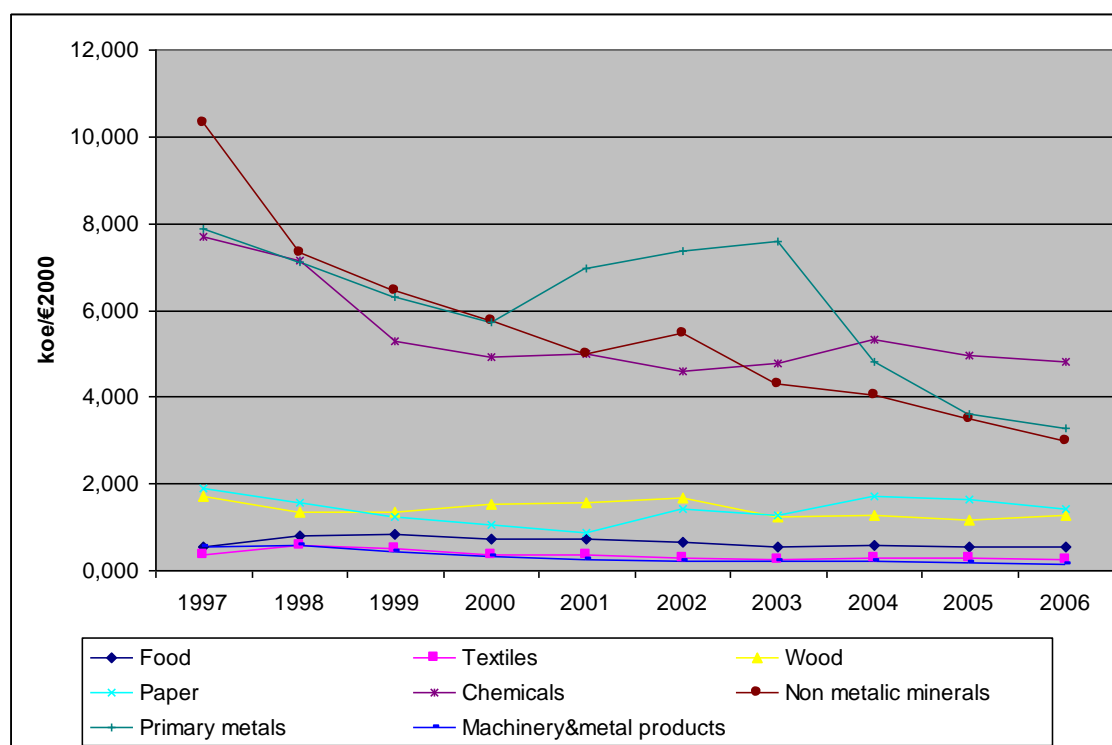
The final energy intensity of the industry and the manufacturing over the period 1997 – 2007 are shown in Chart 3.2.1.

Chart 3.2.1: Energy intensity of Industry and Manufacturing 1997-2007



The energy intensities of the Industry and manufacturing improved rapidly with rate 7.7 %/year and 8.3 %/year respectively. The absolute value of the energy intensity of industry was reduced from 1.435 koe/€2000 in 1997 to 0.641 koe/€2000 in 2007.

The final energy intensity of the principal branches of the manufacturing over the period 1997 – 2007 are shown in Chart 3.2.2.

Chart 3.2.2: Energy intensity of manufacturing by branches 1997-2007

The chart shows the large difference of the energy intensity by branches.

The fast improvement of the energy intensity of manufacturing is a result of the reduced energy intensity of the branches with high intensity (chemicals, primary metals and non metallic minerals).

The rate of improvement of the energy intensity by high intensive branches from 1997 to 2007 is:

- Chemicals – 5,6 %/year;
- Non metallic minerals – 8,8 %/year;
- Primary metals – 9,7 %/year;
- Paper and printing – 4,7 %/year;
- Wood – 5,5 %/year.

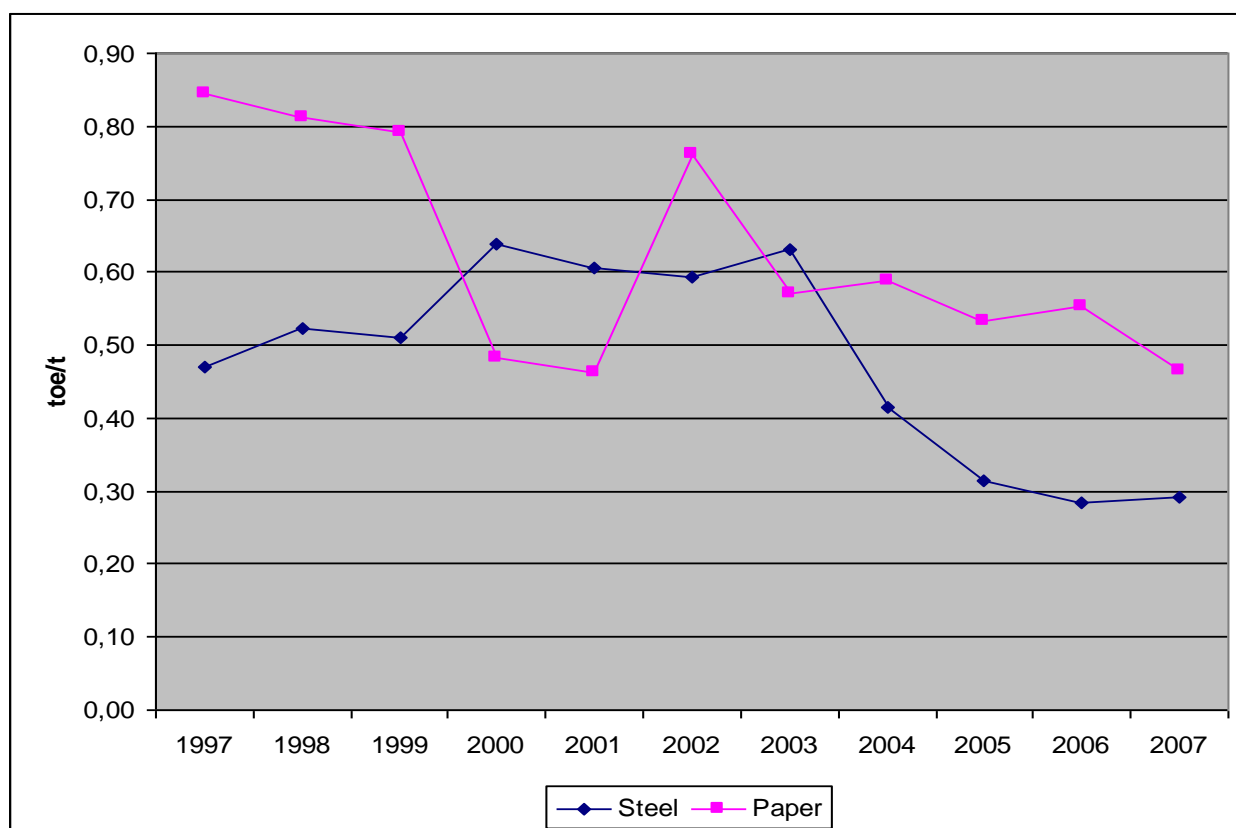
The energy intensity reduction of the branches with low intensity (food, textiles, machinery) is also fast but the impact on the energy intensity of manufacturing is limited.

The role of the structural changes in the industry is not significant.

At constant 1997 structure the energy intensity of manufacturing is practically the unchanged and the energy intensity of the whole industry is about 1,7 % better .

The specific energy consumption for the production of steel and paper are shown shown in Chart 3.2.3.

Chart 3.2.3: Specific energy consumption for the production of steel and paper 1997-2007



The improvement of the unit consumption in the steel production is 4,7 %/year and in the production of paper 5.7 %/year over the period 1997-2007.

But for the steel production very important information like the share of imported coke, pig iron, scrap and steel produced in electric converters and for the paper production the share of the imported pulp, waste paper and types of produced paper are not available. So this unit consumptions are of limited value for the evaluation of the improvements of energy efficiency.

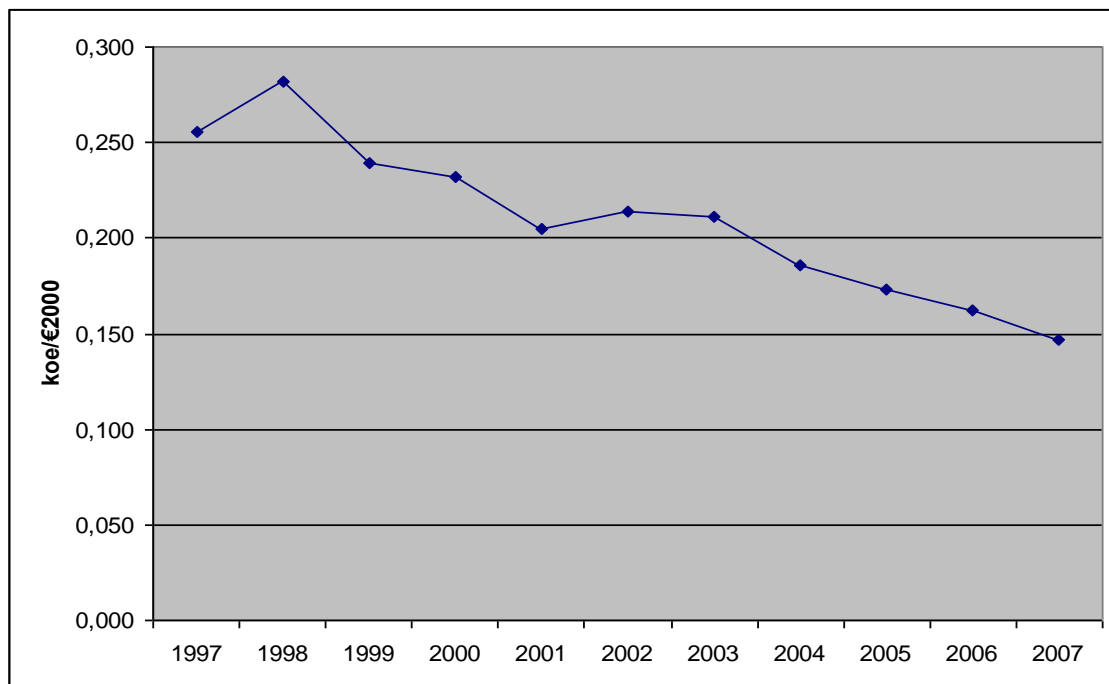
No statistical data are available on the specific energy consumption for the production of other energy intensive products like non ferrous metals, chemicals, cement, glass.

The fast improvement of the energy intensity of industry over the period 1997 to 2007, indicates that significant energy savings have been made in the sector. The raising prices of fuels are the main reason and incentive for energy savings. The growth of production that started in 1997 allowed for increasing the load factor of existing production capacity, which becomes a favorable factor for improvement of energy efficiency. The improvement of energy intensity of the Bulgarian economy as a whole is due to a great extent to the large improvement of the energy intensity in industry. However after exhausting the potential of economically most effective energy saving measures, the improvement of energy efficiency will require implementation of projects with longer payback periods. These projects usually are related to renovation and modernization of the basic technological equipment and have great potential for energy savings but they need considerable investments.

3.3 Households

The energy intensity of households to private consumption is shown in Chart 3.3.1.

Chart 3.3.1: Energy intensity of the private consumption of households 1997-2007

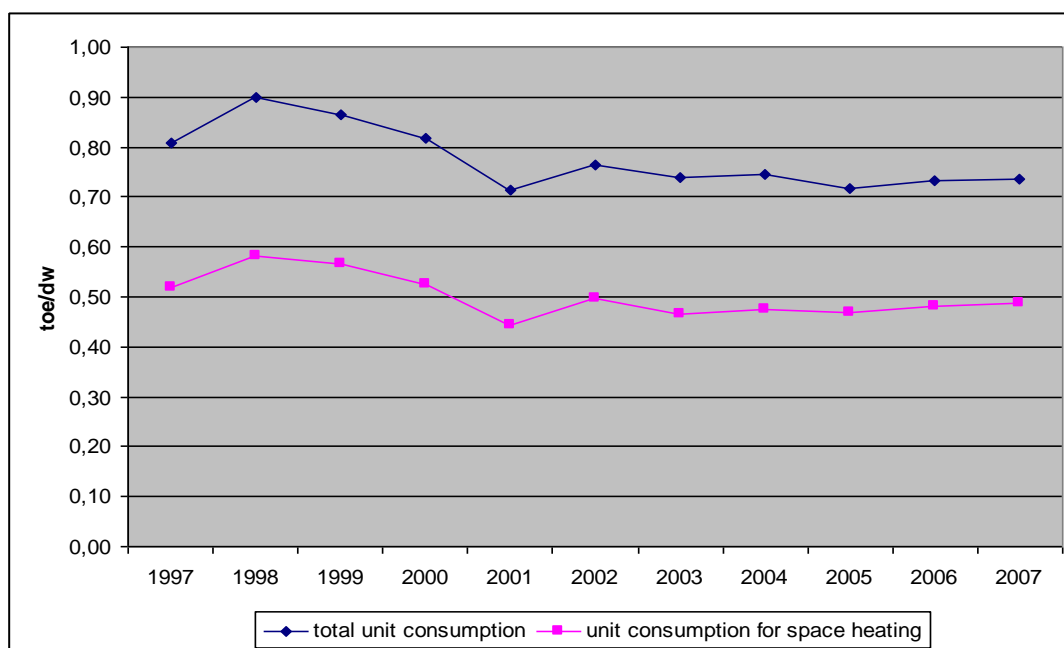


In the period of 4,7 %/year growth of the private households consumption the energy consumption of households decreased by absolute value. The rate of improvement of the energy intensity of the private consumption is 5.4 %/year.

In households the rapidly raising prices of energy, like in industry, but also individual billing in multi family houses with district heating, are the main reasons for energy savings.

The unit energy consumption of households per dwelling with climatis corrections - total and only for space heating, are shown in Chart 3.3.2.

Chart 3.3.2: Unit energy consumption of households per dwelling – total and for space heating 1997-2007



The share of the space heating in the total energy consumption of households is 65-66 %. Now, the Bulgarian households utilise less energy per dwelling than the average in the EU, but this is result of:

- Large share of households with room temperatures below the norms in winter.
- Limited use of air conditioning in summer.
- Use of electrical appliances below the average EU level.
- Floor area of dwellings below EU average.
- Use of wood and coal for heating in primitive stoves with low efficiency.

From 1997 to 2007 the unit energy consumption per dwelling has been reduced with about 1%/year, and the unit energy consumption for heating with 0,6 %/year.

But the real improvement of the energy efficiency in households, from 1997-2007, was better. The effect of the higher thermal comfort and wider use of electrical appliances, as result from the growth of the private consumption of household, is not measured by the unit energy consumption per dwelling.

As a result of the economic growth and the rise in incomes, there will be a natural trend of getting closer to average European levels of comfort in bulgarian households which will be related to increased energy consumption.

The potential for improvement of energy efficiency in Bulgarian households is considerable and includes already applied regulation of district heating, improvement of buildings insulation, more efficient household appliances, etc., as well as the important problem of increasing the efficiency of burning solid fuels (firewood and coal) in stoves, but the effect energy efficiency improvements, in a period of economic growth, will be used entirely to improve the quality of life and level of comfort with a minimal possible increase in the energy consumption.

3.4 Services

The energy intensity of services is shown in Chart 3.4.1. This sector is with lower energy intensity from all sectors, but the rate of improvement over the period 1997-2007 has been only 1,2 %/year. With climatic corrections however the energy consumption, increased not 53 % but more than 71 % from 1997 to 2007 and the energy consumption growth is almost equal to the 72 % growth of the value added in the sector . This growth of the energy consumption can be compared with only 2 % energy consumption growth with climatic corrections in the households in the same period.

The specific energy consumption per employee, with climatic corrections, increased with 40 % from 0,360 toe/emp in 1997 to 0,500 toe/emp in 2007 as shown in Chart 3.4.2.

Chart 3.4.1: Energy intensity of services 1997-2007

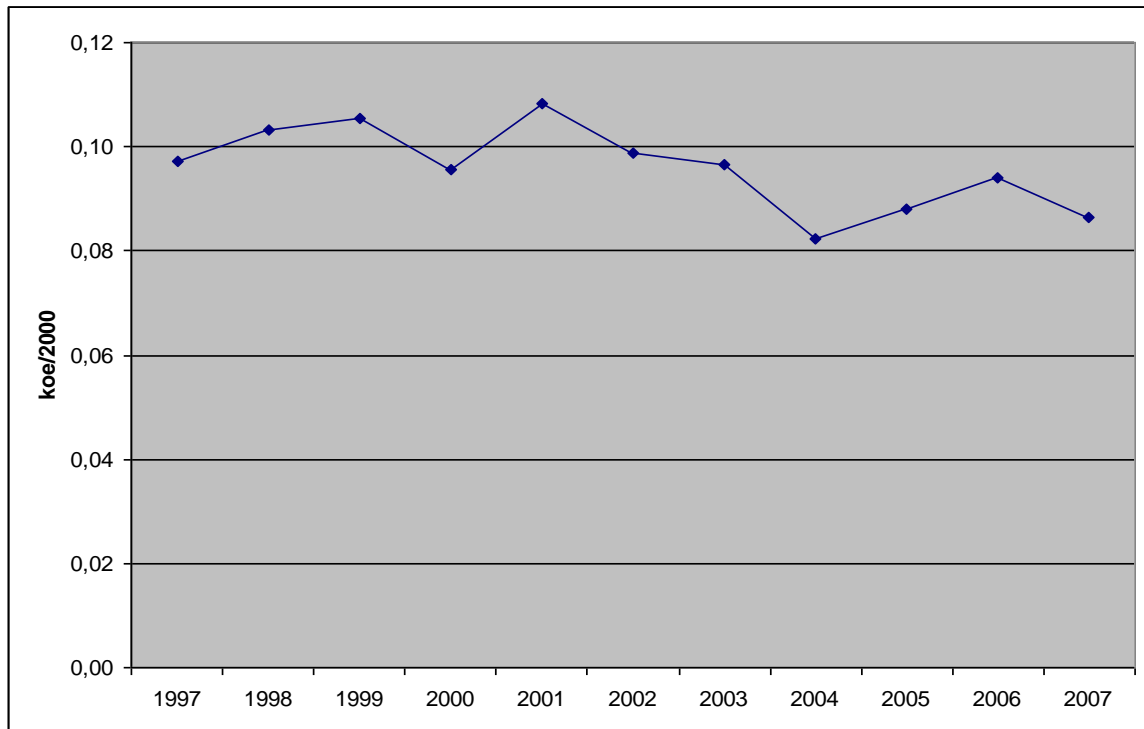
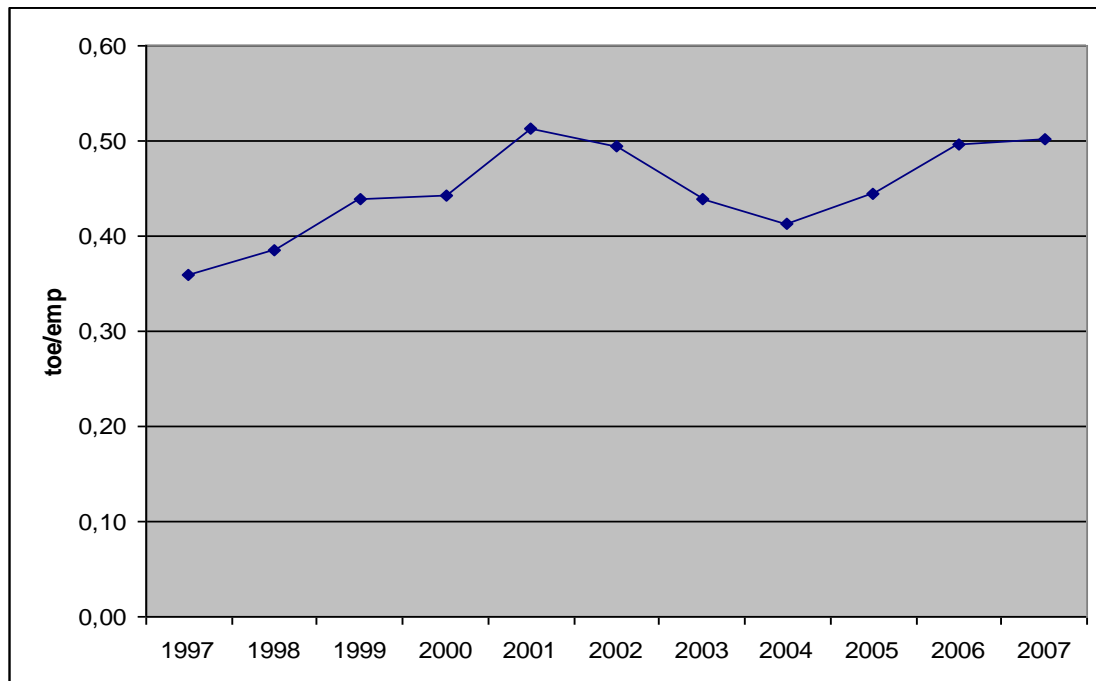


Chart 3.4.2: Specific energy consumption per employee in services 1997-2007



The effect of the high energy prices, as incentive for energy savings, is limited in this sector and for this reason mandatory measures are appropriate.

3.5 Transport

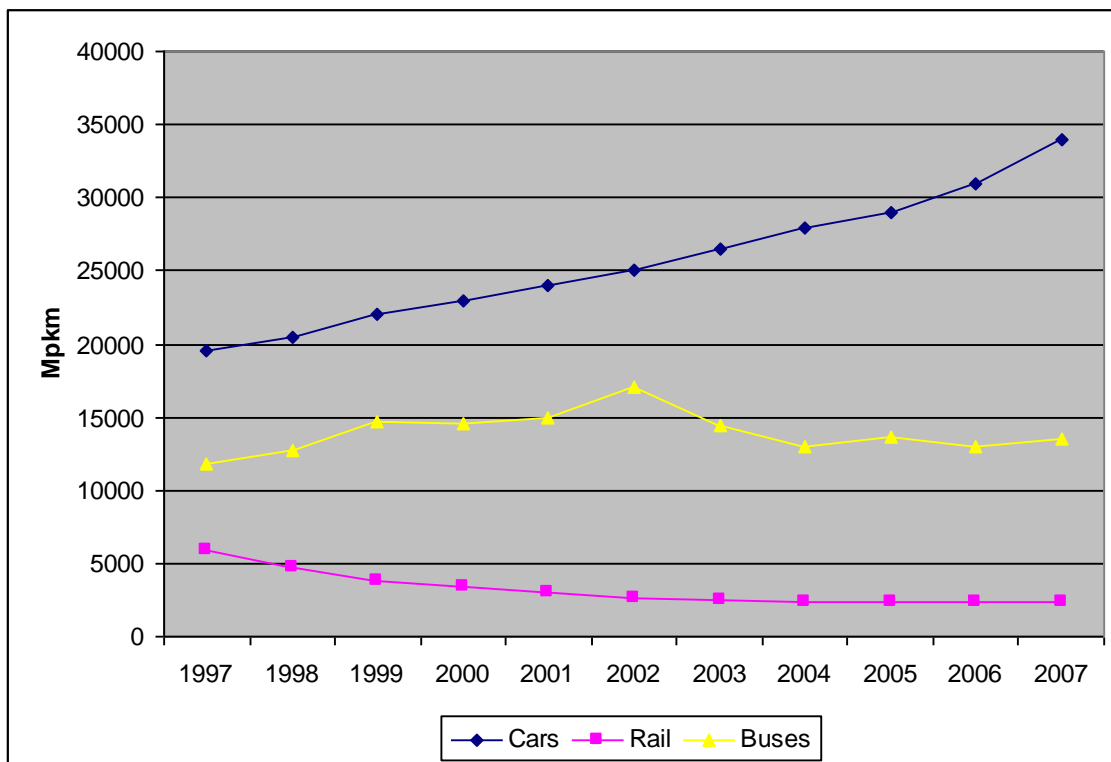
The transport is a sector with high growth (61 %) of the energy consumption from 1997 to 2007.

The most significant drivers of the deterioration of energy efficiency in transport over the period 1997 – 2007 has been:

- The strong modal shift from rail to road transport

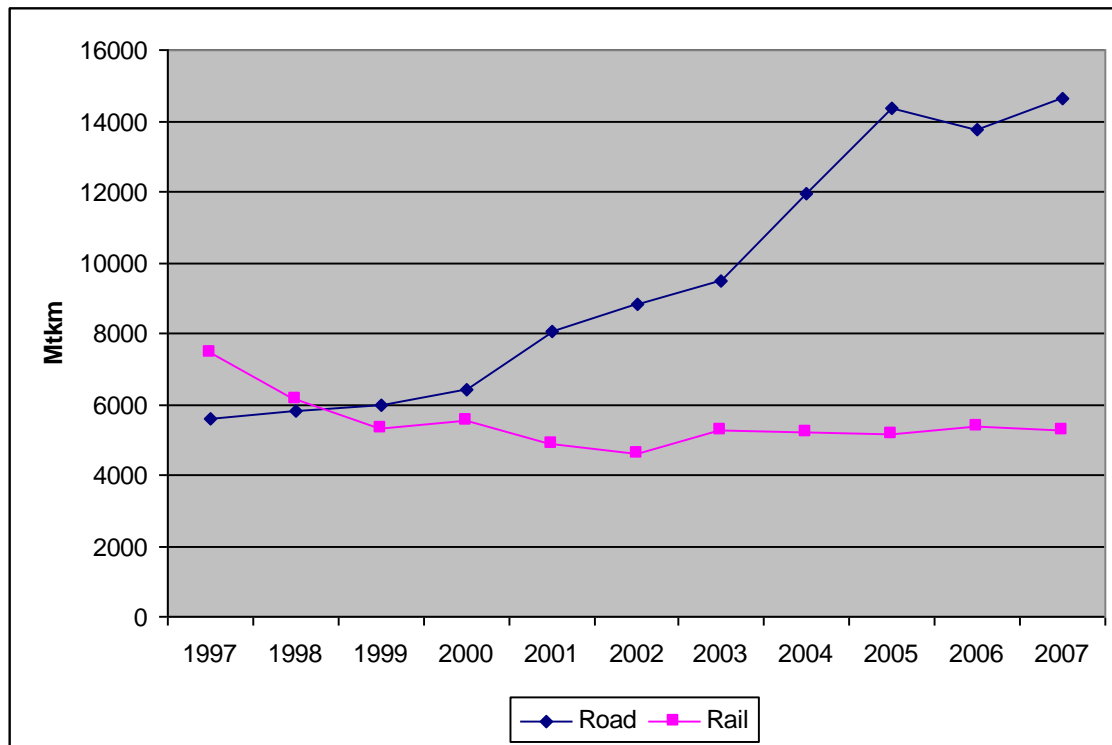
On Charts 3.5.1 and 3.5.2 is shown the modal shift from rail to road for the passenger and freight transport respectively

Chart 3.5.1: Passenger transport performance by mode of transport 1997-2007



The passenger traffic of cars (evaluation by Eurostat) increased from 19500 Mpkm in 1997 to 34000 Mpkm in 2007 with 5,7 %/year average rate, of buses with 1,4 %/year and of rail transport decreased with 8,5 %/year. The share of rail in the land freight transport decreased from 57 % to only 26 % over the same period.

Chart 3.5.2: Freight transport performance by mode of transport 1997-2007



The freight traffic of road transport increased from 5600 Mtkm to 14600 Mtkm with 10 %/year and the traffic of the rail decreased from 7400 Mtkm to 5200 Mtkm with 3,4 %/year.

- the city congestions and the high average age of the Bulgarian vehicles stock (cars, light duty vehicles, buses, trucks).

The stocks of passenger cars increased from 1,5 millions in 1997 to 2,1 millions in 2007 but the car ownership is around 280 cars per 1000 inhabitants, still well below the EU 15 average of more than 500.

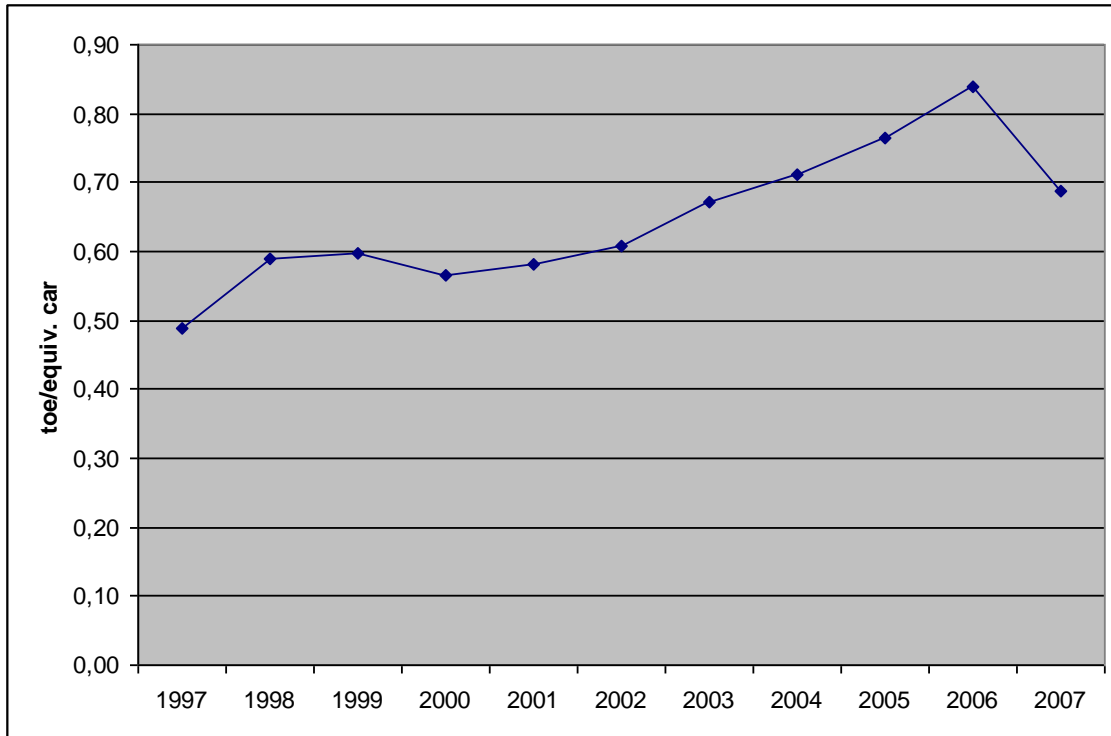
The age of more than 90 % of the passenger cars is over 10 years. But also the new cars are more large and with air conditioners.

The problems of energy efficiency are focused in the road transport which is responsible for 90% of fuel consumption in the sector. Moreover the road transport utilizes almost entirely expensive fuels produced from imported crude oil. The air transport also has a considerable consumption of oil products. Generally the transport is responsible for about 70% of final energy consumption of oil products in Bulgaria.

The statistical data for the energy consumption separately for cars, buses and freight road transport are not available and the unit consumption per pkm and tkm is not calculated.

Only the unit consumption per equivalent car is available and shown on Chart 3.5.3.

Chart 3.5.3: Unit consumption of road transport per equivalent car 1997-2007



The unit consumption per car equivalent increased by more than 40 % in 10 years (3,5 %/year).

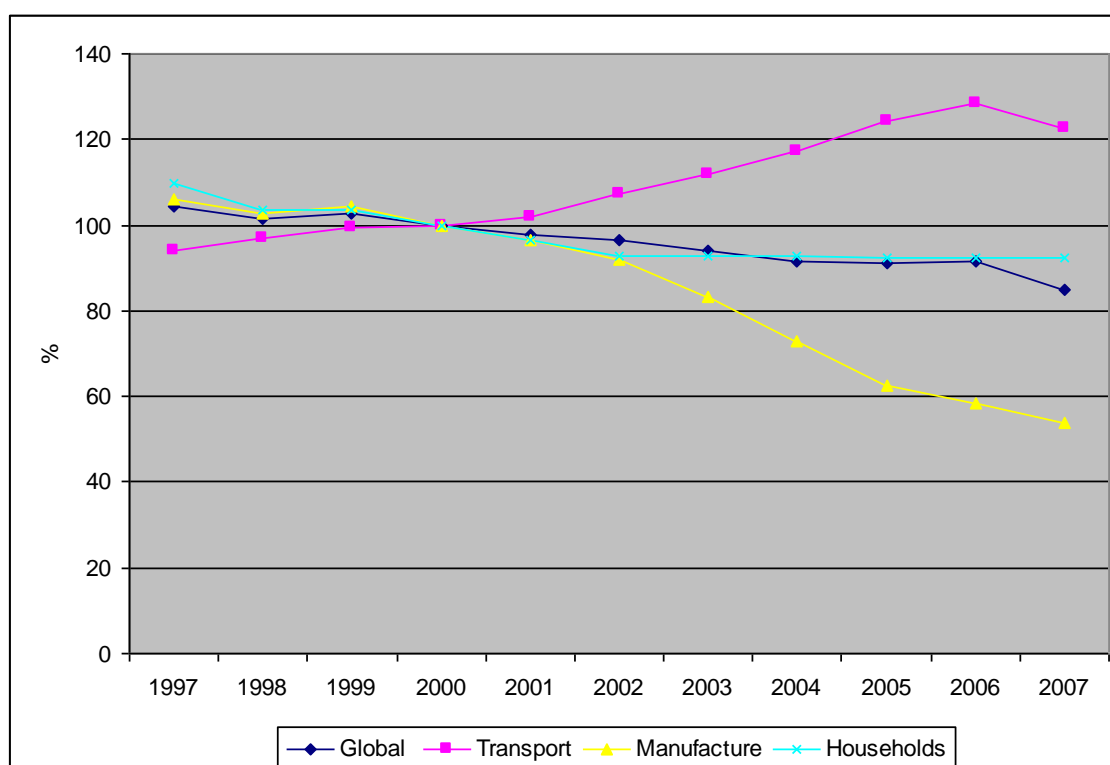
The use of fuels for transportation per capita of population in our country is still considerably below of the average in EU. This is due to the greater mobility of population and much wider use of road and air transport in the EU countries. As a result of the economic growth, the trend towards more and faster travels is inevitable in our country. For that reason if there is no specific attention and energy saving measures the owing consumption of fuels in this sector will become a serious problem for the economic development of the country and the environment.

3.6 Assessment of energy efficiency/savings through ODEX

Progress in energy efficiency and/or energy savings for final consumers are measured within ODYSSEE through indicators that are as much as possible cleaned from all factors that have nothing to do with energy efficiency. Energy efficiency trends are evaluated with the indicators ODEX (ODYSSEE energy efficiency index) at the level of the main end-use sectors (industry, transport, households) by aggregation of unit consumption indices by sub-sector (or end-use, subsector, mode of transport) in one index for the sector on the basis of the current weight of each sub-sector in the sector's energy consumption.

The energy efficiency progress in Bulgaria in the period 1997 – 2007 measured with the ODEX is shown on Chart 3.6.1.

Chart 3.6.1: Energy efficiency in Bulgaria measured with ODEX (2000 = 100 %)



Over the period 1997 to 2007 the energy efficiency index (ODEX) for the whole economy decreased by 19 % which indicates an substantial energy efficiency improvement. This improvement is due, largely, to the increased energy efficiency of industry and in

first place of the manufacturing. From 1997 to 2007 the index of manufacturing has been reduced with the spectacular 52 %.

The index of households decreased with 18 %.

An only the index of transport deteriorated with 29 %.

Conclusions

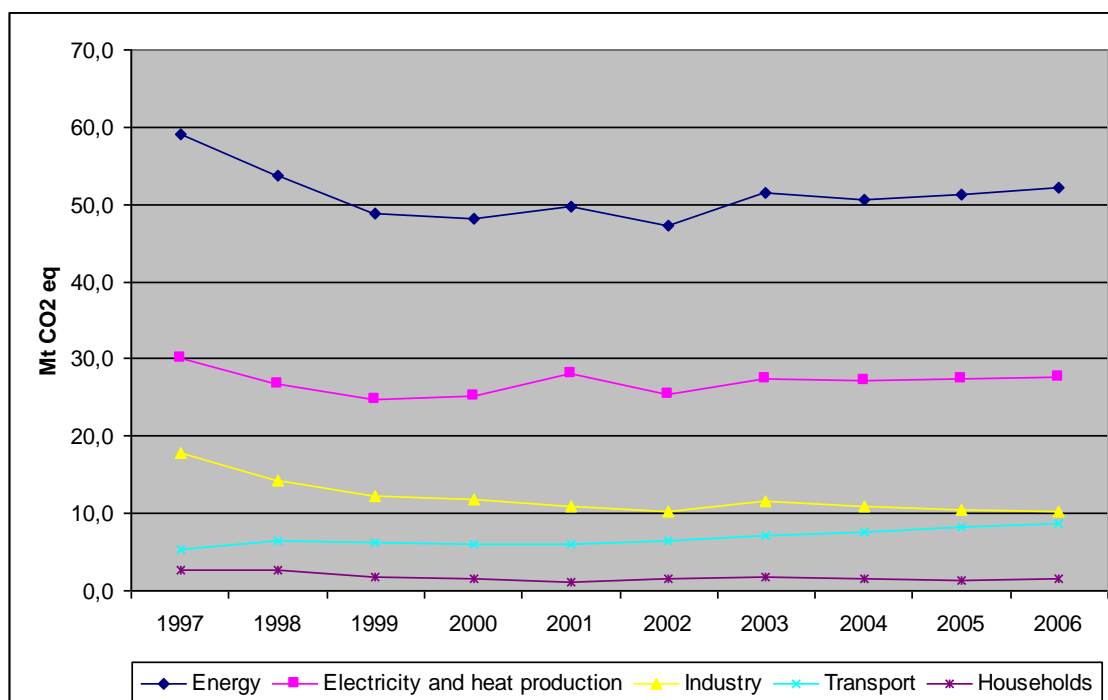
- The final energy intensity decreased rapidly with more than 5 %/year in last ten years, but the initial level was high and is still about 40 % higher at ppp than the EU average.
- Evaluation of energy efficiency progress over the period 1997 – 2007 with ODEX index shows average improvement of 19 %. This is due largely to the improved energy efficiency of industry.
- The potential of low cost energy saving measures in Industry, with short pay-back periods, is partly exhausted during the last ten years.
- In the coming years, the importance of the measures with middle and even long payback period will increase. The potential for energy saving of these measures is high, but the financial abilities of the Bulgarian companies and households to implement them are still limited.
- The structural changes of the economy as a whole and within the sectors, which lead to a reduction of the energy intensity (for example, an increase in the share of sector “Services” in the GDP), have already been completed before 1997 to a large extent.
- The strong modal shift from rail to road transport is the most significant driver of the deterioration of energy efficiency in transport.
- Energy consumption per capita in the sectors of households and transport in our country are considerably lower in comparison to the average EU level, and the thermal comfort in households, number of cars and distance of travels in transport is well below the EU average. As a result of the economic growth and the incomes growth, there will be a natural trend of getting closer to average European levels, which will be related to increased energy consumption.
- The European technologies can contribute to a large improvement of energy efficiency in all sectors of the Bulgarian economy. On the other hand, the prices of modern energy-efficient equipment, cars and appliances imported from the

EU in Bulgaria are comparatively high for the local price levels and this leads to longer payback periods.

3.7 CO₂-emissions trends

The GHG emissions trends, only from energy consumption, total and by sector, in Bulgaria are shown on Chart 3.7.1.

Chart 3.7.1: GHG emissions in Bulgaria by sector 1997-2006



The GHG emissions from energy use has been reduced from 59.0 Mt CO₂ eq. in 1997 to 52.2 Mt CO₂ eq. in 2006 including following changes by sectors (in CO₂ eq):

- Public electricity and heat production – reduction from 30.2 Mt to 27.7 Mt.
- Industry (only energy use) – reduction from 17.7 Mt to 10.3 Mt.
- Transport – growth from 5.3 Mt to 8.7 Mt.
- Households - reduction from 2.7 Mt to 1.5 Mt.

The GHG intensity of the primary energy consumption decreased from 2.87 tCO₂ eq/toe in 1997 to 2.51 tCO₂ eq/toe in 2006 (with 12.5 %) as result of substitution of fossil fuels. The changes in the primary fuel mix to 2006, that contributed to this reduction of the GHG intensity, are the increased use of biomass (wood) from 240 to 795 ktoe, nuclear energy from 4579 ktoe to 5162 ktoe and hydroenergy from 238 to 366 ktoe.

But in 2007 the use of biomass has been reduced to 743 ktoe, of nuclear energy to 3 728 ktoe (after the shut down of Units 3 and 4 of NPP) and of hydroenergy to 247 ktoe. The electricity from nuclear and the hydroenergy is replaced almost entirely with low quality local coal. The annual electricity production of Units 3 and 4 of the NPP is about 6 000 GWh. The substitution of this nuclear electricity with coal increased the GHG emissions by more than 6.6 Mt CO₂ eq.

In the period 1997-2006 the GHG intensity of the GDP decreased from 4.8 kg CO₂ eq/€2000 to 2.8 CO₂ eq/€2000 (with 42 %).

Of this 42 % reduction of the GHG intensity about 34 % is the contribution of the improved energy intensity and the contribution of the fuel substitutions is about 8 %.

4 Energy efficiency measures

4.1 Recent Energy Efficiency Measures

Residential Sector

BG 1: National Program for Renovation of Residential Buildings in Republic of Bulgaria, 2006-2020

On January 20th, 2005, the Government adopted the National Programme for renovation of the residential buildings in Republic of Bulgaria. The Program priority is the multi-families residential buildings. The Programme foresees within the 2006 – 2020 period 684 683 dwellings to be renovated, of which 362 792 are Panel, 152 686 – Ferro-concrete and 169 205 – Massive. The total value of the Programme implementation needed financial resources is amounting to 4 150 000 thousand BGN. The State will support the panel dwelling proprietors by means of direct subsidy of 20% from the renovation total value. The direct State subsidy increases smoothly from 13 000 thousand BGN in 2006, to 130 000 thousand BGN in 2020.

The Programme implementation is assigned to the Minister of Regional Development and Public Works who coordinates the relevant activity among all Administrations and other interested parties. Every year the Minister of Regional Development and Public Works proposes, within the framework of the budget procedure, planning of the needed Programme implementation direct State subsidies. Municipalities actively participate in the residential buildings renovation process. With decision by the respective Municipal Council is created Municipal Association (MA) as a legal person, to support methodically and technically the activity on the organization and implementation of investment projects for residential buildings renovation, with participation of: the Municipality, Condominiums – legal persons, energy service companies, banks and other interested persons. MA elaborates proposals for project areas (districts in the residential complexes) for implementation on the Municipality territory of investment projects for residential buildings renovation; assigns projects by means of competition; finances the project implementation and is responsible for spending the State subsidy for every specific project.

BG3: Residential Energy Efficiency Credit Facility (REEECL)

To help Bulgarian households reduce their energy bills and consumption the European

Commission, the European Bank for Reconstruction and Development, and the Bulgarian Energy Efficiency Agency have developed a € 50 million Residential Energy Efficiency Credit (REECL) Facility to provide credit lines to reputable Bulgarian banks to make loans to householders for specific energy efficiency measures including double-glazing; wall, floor, and roof insulation; efficient biomass stoves and boilers; solar water heaters; efficient gas boilers; and heat pump systems.

To help stimulate the uptake of residential energy efficiency projects, an additional € 10 million in grant financing is earmarked in support of project development and incentive grants paid to REECL borrowers after verification by independent consultant that each eligible residential energy efficiency project has been completed. Each borrowing household will benefit from a 20% incentive towards the cost of the energy savings projects (to a maximum of € 850). The grant financing comes from the Kozloduy International Decommissioning Support Fund (KIDSF), set up in 2000 with contributions from the European Commission, EU member countries, and Switzerland. KIDSF financially supports the early decommissioning of units 1-4 of Kozloduy Nuclear Power Plant. KIDSF also supports energy sector initiatives associated with the decommissioning effort, such as improving energy efficiency in Bulgaria.

BG7: Energy Performance Standard for buildings

Energy Performance Standard is regulated by Ordinance № 18 of 12.11.2004 for energy performances of buildings, issued by Ministry of energy and Ministry of regional development and also via Ordinance № 7 of 15.12.2004 for heat conservation and energy saving in buildings, issued by Ministry of regional development.

Ordinance № 18 regulated the order and conditions for determine the indicators for heat consumption and energy performances of buildings, as well as standards for annual consumption in a building. It also gives an unified methodology to determine the energy costs indicators and technical rules and methods for their comparison.

Regulation № 7 regulates the technical requirements for energy saving and gives a method for determine the energy consumption for heating and other specific requirements to the buildings.

BG8: Control Systems for heating regulation

The control on heating systems is regulated in the Ordinance № 15/28.07.2007 for technical rules and standards for design, installation and operation of sites for

generation, transmission and distribution of thermal energy. This ordinance include rules for regulation of district heating plants, transmission networks, subscriber substations and systems with local boilers for hot water and steam.

BG9: Minimum efficiency standards for boilers

The minimum efficiency standards for boilers are introduced in Ordinance for essential requirements and evaluation of the compliance for hot water boilers, firing liquid or gaseous fuels regarding the efficiency coefficient – in force since 30/06/2005. With the ordinance are determined:

1. the essential requirements to the hot water boilers, firing liquid or gaseous fuels, named further "boilers", with regards to the efficiency coefficient;
2. procedures for evaluation and ways for verification of compliances with essential requirements;
3. the order for issuing of permissions of persons for carrying out of evaluation of compliance with and checks for keeping the conditions, at which the permission is issued.

The ordinance is applied to the following products:

1. boilers with nominal power from 4 to 400 kW;
2. separately market released boilers projected to be combined with burner and burners, projected to be installed to boilers called "boiler elements".

BG13: Individual billing (multi-family houses)

Individual billing and payment of heating energy costs in multi-family residential buildings connected to district heating is stipulated in the:

1. Energy Act, adopted by the Bulgarian parliament on 26 November 2003
2. Ordinance on regulating the prices of heat supply since 25.06.2004
3. Ordinance № 16-334 since 06.04.2007 for district heating.

The distribution of heat energy in multi-flatt buildings shall be carried out on the basis of share distribution system if the consumers have installed devices for share distribution – individual allocators on the radiators. If devices for share distribution are not installed by the consumers the heating energy is calculated on the base of the installed capacity of the radiators multiplied by the maximum specific consumption for the building. If devices for share distribution and regulation valves for every individual heating radiator are not installed the bill for the consumer is 2-3 or more times higher and coupled with

the fast increase of the prices of heat energy from district heating practically all consumers were compelled to install distribution devices and regulation valves or not to use district heating. The impact of this measure is not evaluated but its efficiency is very high and the average savings of heat energy from district heating are above 20 % without deterioration of the thermal comfort. This measure is particularly effective coupled with measures for the thermal insulation of the building.

BG15: Minimum Thermal Insulation in Buildings

Requirements for minimum isolation for buildings is regulated in this Ordinance № 7 since 15.12.2004 for heat conservation of energy in buildings. There is a methodology for calculation of minimum width of the isolation depending on type and characteristics of elements of the construction – external walls, glazing, roves, floors etc.

BG17: Mandatory energy efficiency control for boilers and air conditioning systems - Households

The mandatory energy efficiency control for water heating boilers and air-conditioning systems is specified in the New Energy Efficiency Act (EEAct). EEAct was adopted at 14.11.2008. According to the Act:

- All water heating boilers, firing liquid or solid fuel, with nominal capacity between 20 kW and 100 kW are subject of obligatory control at every 3 years and boilers with nominal capacity more than 100 kW – at every 2 years.
- All boilers, firing natural gas, with nominal capacity more than 100 kW are subject of the energy efficiency control at every 4 years.
- All air-conditioning systems with nominal capacity more than 12 kW are subjects of obligatory energy efficiency control at every 4 years.

BG18: Mandatory energy efficiency certificates and labels for buildings – Households

New Energy Efficiency Act (EEAct) was adopted at 14.11.2008. The new EE Act stipulates:

- Certification of buildings.

Energy investigation and certification is mandatory for all new buildings no later than 6 years after the commissioning and for all existing buildings with useful area over 1000

sq. m. The implementation of the energy efficiency measures prescribed in the energy investigation is obligatory for the owners of the buildings in 3 years period.

- Energy labels of the new buildings.

For all new buildings built after March 2005, the evaluation for energy efficiency is performed already with the building design under the Spatial Planning Act (SPAct) and it's Regulation N7 for heat conservation and energy saving in buildings.

The amendments and supplements in the Law of the Spatial Planning (LSP) and in the secondary legislation define the **technical passportisation (labeling) of the buildings or the construction works. The energy passport (label) of the building is inseparable part of the technical passport** and the investigation for energy efficiency is a part of the general investigation of the construction works. The provisions for the energy passport (label) are that it shall include data for the energy characteristics – during the design and at the start of the building exploitation. The energy efficiency class is to be indicated, shown on a scale with grade from A++ to G.

Transport Sector

BG2: Excise tax relief for biofuels and other clean fuels

In the new Excise Duties and Tax Warehouses Act (02.11.2005) biofuels and other clean fuels for transport profit from an excise tax relief as incentive. The excise taxes on biofuels and other clean motor fuels are:

1. Biodiesel and Bioethanol – 0 BGN/1000 l;
2. Natural gas – 0 BGN/GJ;
3. LPG - 340 BGN/1000 kg

The tax of 0 BGN is practically a tax exemption allowed for not determined period.

Zero excise tax has been valide only for pure biofuels for transport but from 2008 was introduced also a proportional excise tax reduction for the blends of biofuels and other fuels for transport.

Value added tax is 20 %.

BG5: Taxes on motor vehicle fuels

The new Excise Duties and Tax Warehouses Act (02.11.2005 r) is harmonised with the EU Directives 92/79, 92/80, 92/12 and 2003/96. The excise taxes for motor vehicle fuels after the last amendments, from 01.01.2007 are as follow:

1. Automotive gasoline (unleaded) A-95H and A-98H - 635 leva/1000 l;
2. Diesel oil – 535 leva/1000 l;
3. Turbine fuel Jet A-1 – 485 leva/1000 l;
4. LPG - 340 leva/1000 kg;

Value added tax is 20 % for all fuels. The fuel taxes are the most effective measure for limitation of fuel consumption and fuel saving in transport. The taxes are about 50 % of the consumers prices of gasoline and diesel oil.

Industrial Sector

BG1: Energy Efficiency Act (EEA) – Mandatory Industrial Audits for Energy Efficiency

The Energy Auditing of Industrial Facilities in Bulgaria requirements are grounded in the Energy Efficiency Act (EEAct) of March'2004 and in its four Regulations.

According to the Regulation № 21, every energy consumer could be audited for energy efficiency. The Regulation stipulates obligatory energy investigation & auditing of all producers of goods and services in the country, with overall annual energy consumption over 3 000 MWh. They are subject to energy auditing every 3 years.

BG3: Energy Efficiency and Renewable Energy Credit Line

The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) has been developed by the European Bank for Reconstruction and Development (EBRD) in 2004 in close co-operation with the Bulgarian Government and the European Union. The facility extends loans to participating banks for on-lending to private sector companies for industrial energy efficiency and small renewable energy projects.

BG4: Voluntary long term agreements

The Ministry of Economy and energy has signed in July 2006, initial voluntary long term agreements with 5 branch associations in energy-intensive sectors of industry as part of Bulgarian energy policy. The voluntary agreements, or LTA's, are aimed at promoting energy savings in Bulgaria mainly in Medium-sized (and sometimes smaller) enterprises. These initial agreements are aimed to improve the capacity for cooperation between the Ministry and the branch associations, management of energy demand and energy efficiency at level of branch associations and experience in this

new, for Bulgaria, measure. If initial agreements are successful, their scale and scope will be expanded.

Tertiary Sector

BG6: National expedient annual program in buildings

According to this measure 631 municipal (1,79 million m²) and 76 state owned buildings (0,38 million m²) have to be certified until the end of 2007.

Total number of public buildings to be certified – 707 with 2,17 million m² ; state subsidies – 1,1 million €.

BG8: Mandatory energy efficiency control for boilers and air-conditioning systems

The mandatory energy efficiency control for water heating boilers and air-conditioning systems is specified in the New Energy Efficiency Act (EEAct). EEAct was adopted at 14.11.2008. According to the Act:

- All water heating boilers, firing liquid or solid fuel, with nominal capacity between 20 kW and 100 kW are subject of obligatory control at every 3 years and boilers with nominal capacity more than 100 kW – at every 2 years.
- All boilers, firing natural gas, with nominal capacity more than 100 kW are subject of the energy efficiency control at every 4 years.
- All air-conditioning systems with nominal capacity more than 12 kW are subjects of obligatory energy efficiency control at every 4 years.

BG9: Mandatory energy efficiency certificates and labels for buildings - services

New Energy Efficiency Act (EEAct) was adopted at 14.11.2008. The new EE Act stipulates:

- Certification of buildings.

Energy investigation and certification is mandatory for all new buildings no later than 6 years after the commissioning and for all existing buildings with useful area over 1000 sq. m. The implementation of the energy efficiency measures prescribed in the energy investigation is obligatory for the owners of the buildings in 3 years period.

- Energy labels of the new buildings.

For all new buildings built after March 2005, the evaluation for energy efficiency is performed already with the building design under the Spatial Planning Act (SPAct) and its Regulation N7 for heat conservation and energy saving in buildings.

The amendments and supplements in the Law of the Spatial Planning (LSP) and in the secondary legislation define the technical passportisation (labeling) of the buildings or the construction works. The energy passport (label) of the building is inseparable part of the technical passport and the investigation for energy efficiency is a part of the general investigation of the construction works. The provisions for the energy passport (label) are that it shall include data for the energy characteristics – during the design and at the start of the building exploitation. The energy efficiency class is to be indicated, shown on a scale with grade from A++ to G.

Cross-cutting measures

BG3: National Strategy for Building Insulation Financing, 2006-2020

According to this measure, during the next 15 years (2006 – 2020) have to be thermo-insulated at least:

- 508 State owned buildings;
- 3 454 Municipal owned buildings;
- 651 000 private flats in multi-family buildings.
- The Strategy' priority buildings are audited & certified, based on adopted annual Target EE Programs (TEEPs), following adopted pre-determined common criteria for selection.

STATE SUBSIDIES

(By type of property)

- State owned buildings - M€75, including M€1.3 for audits and certification;
- Municipal owned buildings – M€5 for audits and certification;
- Private owned multi-family residential panel buildings – M€250 for insulation (20% of the sum for building renovation), including M€25 for audits

For the implementation of the NATIONAL STRATEGY FOR FINANCING THE BUILDING INSULATION FOR ENERGY EFFICIENCY AND ACTION PLAN FOR ITS IMPLEMENTATION, 2006-2020 during the next 15 years the State Budget shall provide the Total sum of M€330.

BG7: National Long term program for RES

The National long term program for supporting RES 2005-2015 was elaborated in 2005 from the Energy Efficiency Agency and adopted by the council of Ministers on 26.10.2006. Main task on the program is to reach the indicative target of 11 % for gross inland consumption of electricity from RES in 2010.

BG8: Preferential feed-in tariffs for renewables

The preferential prices of electric energy from RES are determined in the Renewable and Alternative energy and biofuels Act – adopted in 2007

This Act stipulates the mandatory purchase of the entire volume of electricity generated in a power plant using RES and registered with certificate of origin at preferential prices. The methodology and rules for price formation are given the Ordinance for electric energy price formation, adopted by a decision of Council of ministers 35/20.02.2004 and is enforced since 02.03.2004 .

BG10: Priority access of CHP to the electricity grids

The priority access of CHP installations to the national grid is regulated in the amendments of the Energy Law, of 08.09.2006 . The obligation for mandatory access of installations, generating electric energy under CHP is stipulated in Art. 162 a of this Law.

The cost of connecting the power plant to the respective network shall be covered by the producer and the extension and reconstruction of the transmission/or distribution network shall be the responsibility of the transmission and respective distributor company.

BG11: Priority access of renewables to the electricity grids

The priority access of RES generating electricity to the grid is regulated in Renewable and Alternative energy and biofuels Act – adopted in 2007.

This Law assigns to the transmission and distribution companies to connect by priority all power plants generating electricity from RES.

The cost of connecting the power plant to the respective network shall be covered by the producer and the extension and reconstruction of the transmission/or distribution network shall be the responsibility of the transmission and respective distributor company.

BG12: Preferential prices for CHP generated energy

Art.162 from the Energy Law stipulates the mandatory purchase of the entire volume of electric energy from CHP power plants with a certificate of origin at preferential prices with the exception of volumes used by the producer to meet its own needs.

The methodology and rules for price formation are given the The preferential prices of electric energy from CHP plants are determined in the regulations to the Energy Law adopted by the Bulgarian parliament on November 2003 with amendments since 2006. Ordinance for electric energy price formation, adopted by a decision of Council of ministers 35/20.02.2004 and is enforced since 02.03.2004 .

BG15: Bulgarian energy efficiency fund

The Bulgarian Energy Efficiency Fund (BgEEF) was established through the Energy Efficiency Act adopted by the Bulgarian Parliament in February 2004. BgEEF is initially capitalized entirely through grant financing - the main donors being the Global Environment Facility (GEF) through the IBRD (World Bank), the Government of Austria, the Bulgarian Government and private Bulgarian enterprises.

The main objective of establishing BgEEF is to facilitate energy efficiency investments and promote the development of an energy efficiency market in Bulgaria. To this end, BgEEF will support the identification, development, and financing of viable energy efficiency projects, implemented by Bulgarian private enterprises, municipalities and households, resulting in substantial reduction of greenhouse gases (GHGs), .

The underlying principle of BgEEF's operations is a public-private partnership.

The Bulgarian Energy Efficiency Fund (BgEEF) provides three main categories of financial products: loans, partial credit guarantees, portfolio guarantees.

BG16: Mandatory energy efficiency control for boilers and air-conditioning systems

The mandatory energy efficiency control for water heating boilers and air-conditioning systems is specified in the New Energy Efficiency Act (EEAct). EEAct was adopted at 14.11.2008. According to the Act:

- All water heating boilers, firing liquid or solid fuel, with nominal capacity between 20 kW and 100 kW are subject of obligatory control at every 3 years and boilers with nominal capacity more than 100 kW – at every 2 years.

- All boilers, firing natural gas, with nominal capacity more than 100 kW are subject of the energy efficiency control at every 4 years.
- All air-conditioning systems with nominal capacity more than 12 kW are subjects of obligatory energy efficiency control at every 4 years.

BG17: Individual energy saving targets

The New Energy Efficiency Act (EEAct) was adopted at 14.11.2008. This Act defines the national indicative targets for energy savings. The national energy saving target is distributed as individual targets between:

- retail energy sales companies that sells more than the equivalent 75 GWh of energy per year;
- owners of buildings with more than 1000 sq. m. useful area for which the certification and energy audit are obligatory;
- producers of goods and services with more than 3000 MWh annual energy consumption for which the energy investigation is obligatory.

The evaluation and verification of the achieved individual energy savings is performed by energy audits after implementation of the energy saving measures or by national or EU harmonised bottom-up measurement methods.

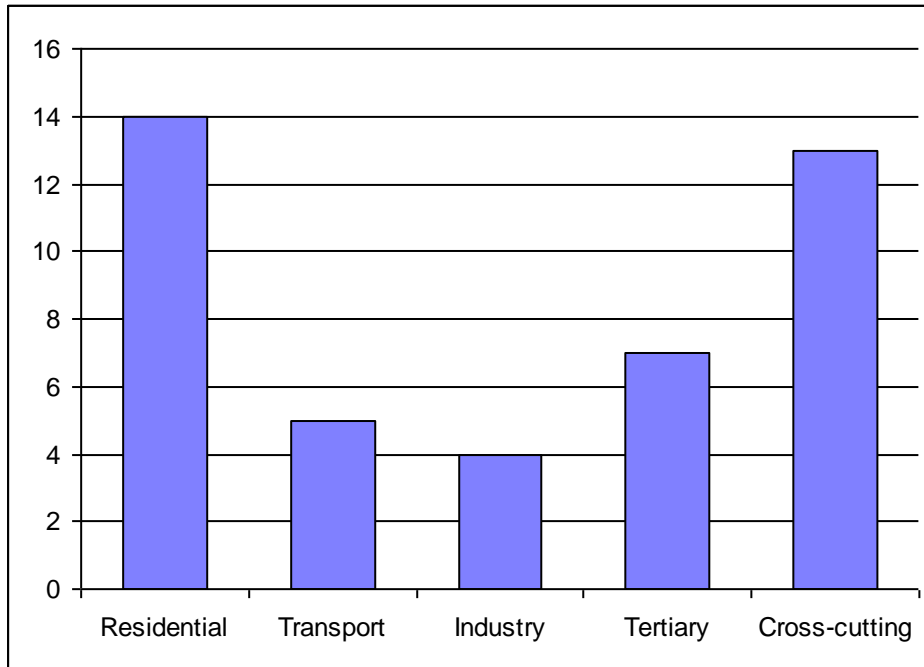
For all verified energy savings the companies and owners with individual targets receive energy saving certificates.

4.2 Patterns and Dynamics of Energy Efficiency Measures

The years after the reception of the Republic of Bulgaria in the European Union the harmonisation of the energy efficiency framework in our country with the European legislation and the impletention of the European directives concerning energy efficiency and RES, was a first priority. A new Energy Efficiency Act was adopted at the end of 2008 and the content of a number of old measures also was changed significantly.

Up to may 2009 the total number of energy efficiency measures introduced in Bulgaria is 43. The number of measures by sector is shown on the Chart 4.2.1.

Chart 4.2.1 Distribution by sector of all energy efficiency measures in Bulgaria

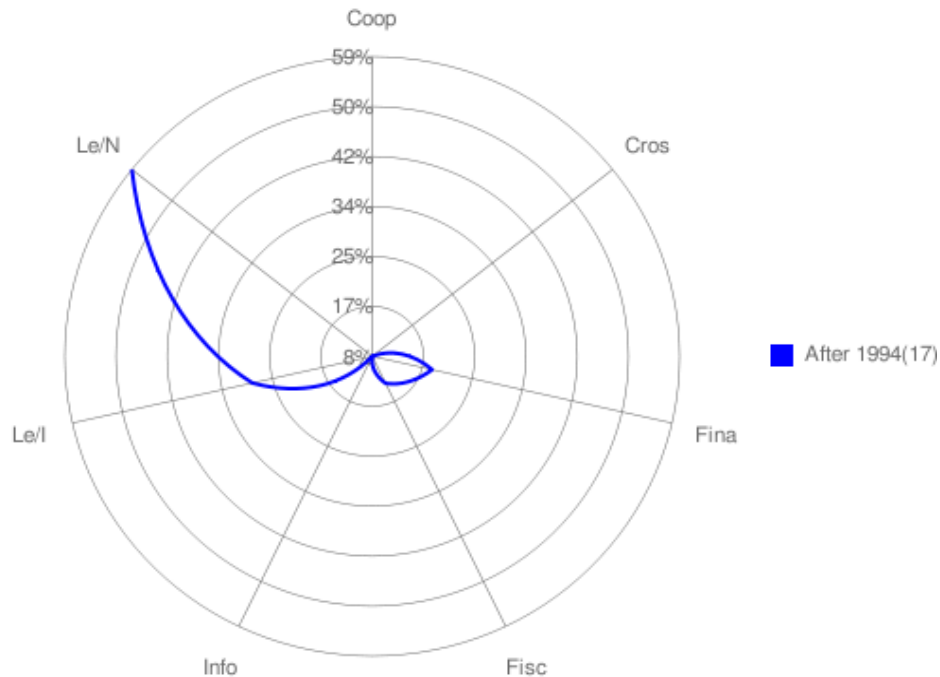


Residential Sector

The number of measures in the residential sector is 14. In the spider graphs below, (Chart 4.2.2.) is clearly visible the residential sector focus on legislative/normative measures.

National and EU measures are in the majority of cases overlapped and national measures include EU requirements, e.g. labelling for domestic appliances, minimum efficiency standards for electrical appliances, households energy performance standard, minimum efficiency standards for small boilers (below 400 kW) etc.

Chart 4.2.2: Measures in residential sector



Transport Sector

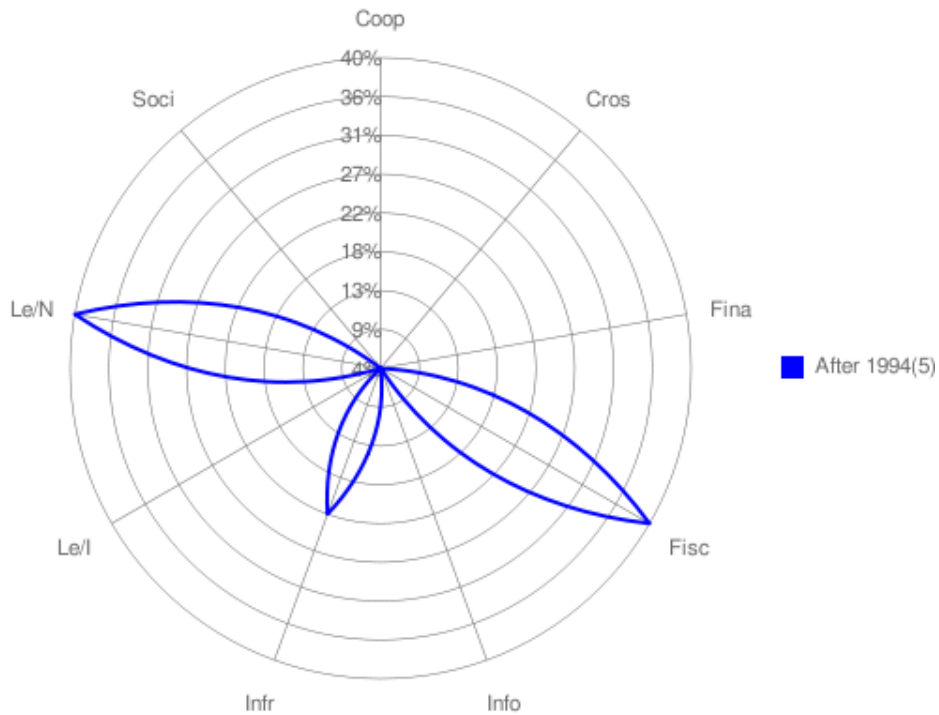
The number of measures is only 5. The impact of these 5 measures is inadequate to the growing energy consumption and energy inefficiency of the transport sector.

Two measures are legislative/normative and two fiscal.

From the 5 measures in the sector two measures are old (mandatory speed limits and mandatory inspection of vehicles). The origin of two other measures (excise tax relief for biofuels and the taxes on oil motor vehicle fuels) is in the frame of the EU policies. The fuel taxes are the only measure with high impact. The taxes (excise and VAT) are about 50 % of the consumer prices of gasoline and diesel oil.

In the Chart 4.2.3 is shown the distribution of all measures in transport

Chart 4.2.3: Measures in Transport

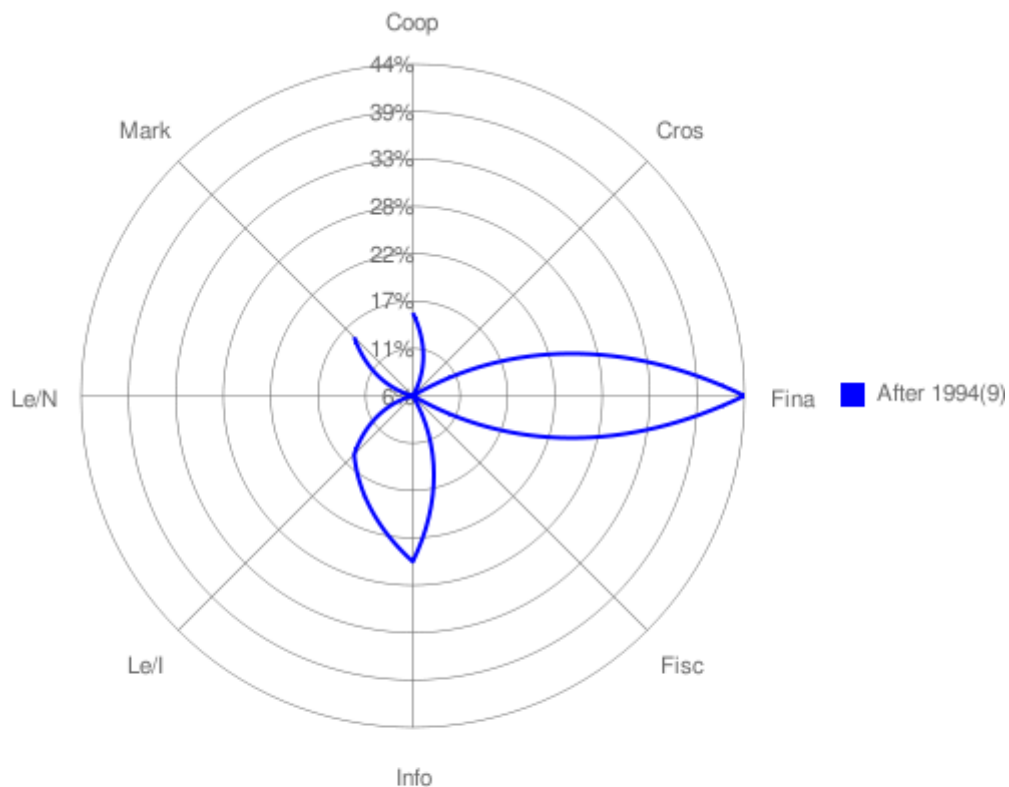


Industrial Sector

The Industry is the sector with large improvements of energy efficiency in the past 10 years. The decrease of energy intensity of the Bulgarian economy as a whole is due to a great extent to the industry. But the main reason for this achievement are the raising prices of energy. Only 4 measures are implemented in this sector (all since 2003). Two measures are financial (Grants for energy audits in SME and Energy Efficiency and Renewable Energy Credit Line). One measure is legislative/informative (Mandatory energy efficiency audits in industrial companies with more than 3000 MWh annual

energy consumption) and one experimental measure (Voluntary long term agreements) is cooperative.

Chart 4.2.4: Measures in Industry



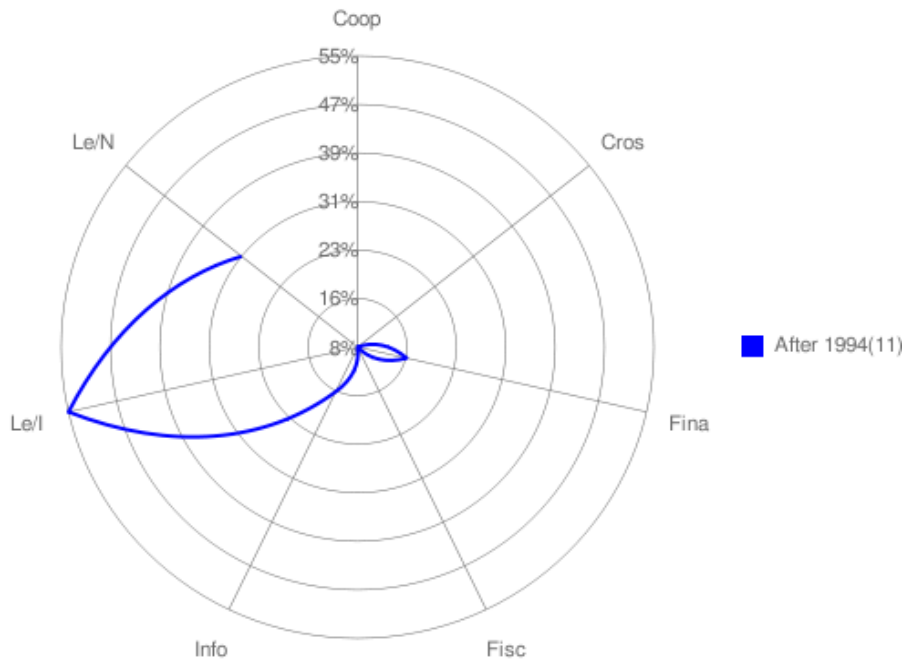
One should bear in mind however that Industry is still the sector with the highest energy consumption and after exhausting the potential of low cost energy saving projects, the improvement of energy efficiency will require implementation of high cost projects. The continual improvement of the energy efficiency in the near future will need increased number and scale of financial measures and new legislative/normative, market based, information, education, training and cooperative measures.

Tertiary Sector

The ongoing measures in the sector are 7. 4 of them are legislative/informative, 1 legislative/normative, 1 legislative/normative and financial and 1 informative.

The tertiary sector share many common measures with the residential sector (efficient lighting, thermal insulation, energy performance standard for buildings, heating regulation, efficiency standards for boilers etc.).

Chart 4.2.5 : Measures in tertiary

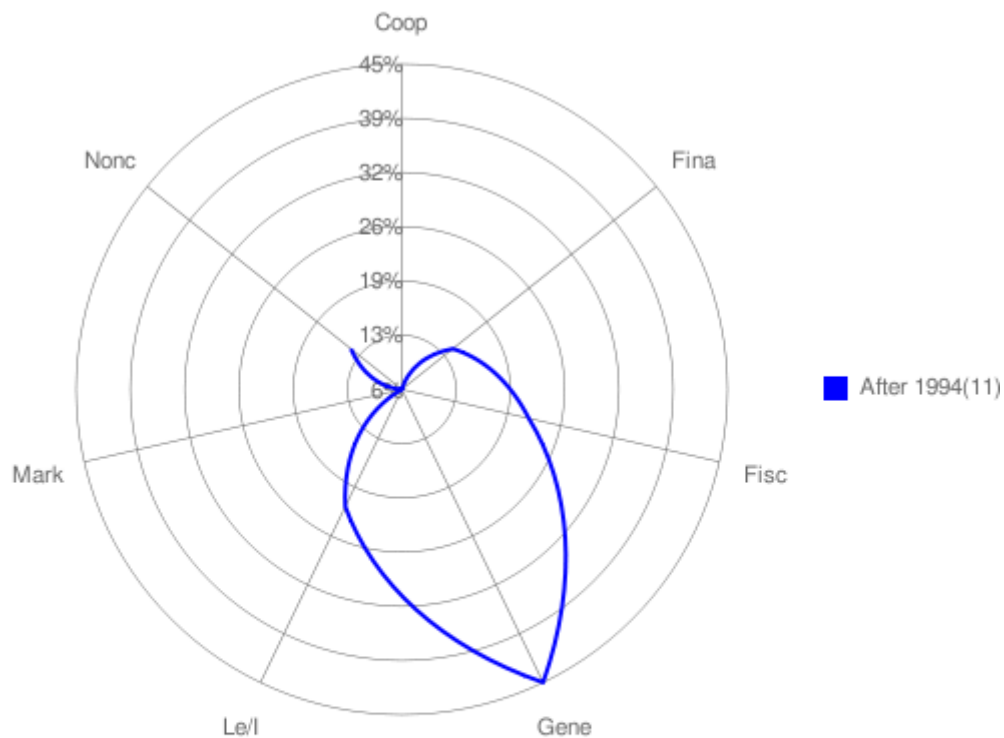


Cross-cutting measures

The number of cross-cutting measures is 13. The distribution is shown on the Chart 4.2.6. The focus is on general EE/RES programmes. The origin of 2 legislative/normative (priority access of RES and CHP to electricity grid) and 2 fiscal measures (preferential prices for RES and CHP generated electricity) is in the EU policies and directives.

In perspective the implementation of market-based instruments, as white and green certificates, is evaluated.

Chart 4.2.6 : Cross- cutting measures



4.3 Innovative Energy Efficiency Measures

Bulgarian energy efficiency fund

- The Energy Efficiency Fund (EEF) is a legal entity established pursuant to Chapter 4, Section I, of the Energy Efficiency Act (EEA). EEF manages financial resources provided by Republic of Bulgaria, the Global Ecological Fund (GEF) with mediation by the International Bank for Reconstruction and Development (IBRD), and by other donors. The Fund is an independent entity and carries out its activities in accordance with EEA, the applicable Bulgarian legislation and following agreements with the donors. EEF's main goal is to assist and to promote the development of a market for energy efficiency projects in

Bulgaria. The EEF identifies, develops, and provides credits for investments in energy efficiency, with priority given to projects implemented by private Bulgarian companies and by municipalities. The fund is organized as a revolving fund and functions as a corporate structure. The EEF divides its customers into three strategic groups: municipalities, corporate customers and physical persons and applies individual approach to the assessment of their projects. The Fund offers financial products in three main categories: credits, partial guarantees, portfolio guarantees.

Energy Efficiency and Renewable Energy Credit Line

The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) has been developed by the European Bank for Reconstruction and Development (EBRD) in 2004 in close co-operation with the Bulgarian Government and the European Union. The facility extends loans to participating banks for on-lending to private sector companies for industrial energy efficiency and small renewable projects.

The Bulgarian banks participating in the BEERECL include: Bulbank, Bulgarian Postbank, DSK Bank, HVB BankBiochim, Unionbank, United Bulgarian Bank, Raiffeisen Bank.

The BEERECL helps to significantly reduce emissions. The facility is also supported by the Kozloduy International Decommissioning Support Fund (KIDSF), which undertakes safety and decommissioning activities related to the closure of the Kozloduy nuclear power plant. The European Union, a number of member countries and Switzerland have contributed to the Fund that also promotes energy efficiency and renewable energy.

An incentive, is a grant up to 7.5% for energy efficiency and 20% for renewable energy of the loan given to the developer under the BEERECL facility.

Achieved results (up to the June 2008):

- Energy savings only from implemented EE projects – 28.1 ktoe/year.
- GHG emissions reduction – 101 kt CO₂ eq/year.

Residential Energy Efficiency Credit Facility (REECL)

To help Bulgarian households reduce their energy bills and consumption the European Commission, the European Bank for Reconstruction and Development, and the Bulga-

rian Energy Efficiency Agency have developed a € 50 million Residential Energy Efficiency Credit Line (REECL) Facility to provide credit lines to reputable Bulgarian banks to make loans to householders for specific energy efficiency measures including new glazing, insulation, efficient biomass stoves and boilers, solar water heaters, efficient gas boilers and heat pump systems.

To help stimulate the uptake of residential energy efficiency projects, an additional € 10 million in grant financing is earmarked in support of project development and incentive grants paid to REECL borrowers after verification by independent consultant that each eligible residential energy efficiency project has been completed. Each borrowing household will benefit from a 20% incentive grants from the cost of the energy savings projects (to a maximum of € 850).

The grant financing comes from the Kozloduy International Decommissioning Support Fund (KIDSF), set up in 2000 with contributions from the European Commission, EU member countries, and Switzerland. KIDSF financially supports the early decommissioning of units 1-4 of Kozloduy Nuclear Power Plant.

To the end of 2008, the REECL Programme has financed 7335 energy efficiency home improvement projects, with personal loans totalling 20 165 031 BGN and incentive grants amounting to 3 437 937 BGN.

Achieved results (only from implemented projects up to June 2008):

- Energy savings – 11.8 ktoe/year;
- GHG emissions reduction –49 kt CO₂ eq/year.

Individual energy saving targets

The New Energy Efficiency Act (EEAct) was adopted at 14.11.2008. This Act defines the national indicative targets for energy savings and its distribution between retail energy sales companies, owners of buildings and producers of goods and services. In the new “Ordinance for methodology of calculating the national indicative target for energy savings, distribution of this target as individual target, evaluation and verification of energy savings” promulgated in the State Gazette issue № 27 from 10 April 2009. The methodology for calculating the national indicative energy saving target is the same as the methodology described in Annex 1 of the ESD and consist a fixed percent of the annual average amount of the final inland energy consumption off all energy users within the scope of the ESD.

The national energy saving target is distributed as individual targets between:

- retail energy sales companies that sell more than the equivalent 75 GWh of energy per year;
- owners of buildings with more than 1000 sq. m. useful area for which the certification and energy audit are obligatory;
- producers of goods and services with more than 3000 MWh annual energy consumption for which the energy investigation is obligatory.

The methodology for the calculation of the individual energy saving targets of energy sales companies include:

- Distribution of the national indicative energy saving target between all energy products (coal, oil, natural gas, electricity, district heat), as energy product saving target, on the basis of the share of the respective energy product in the final energy consumption;
- Distribution of the energy product saving target between energy sales companies as individual energy saving target on the basis of the respective company share in the sales of this energy product.

For the owners of buildings with more than 1000 sq. m. useful area the individual energy saving target is not less than 50 % of energy saving potential identified in the performed obligatory energy study.

For the producers of goods and services with more than 3000 MWh annual energy consumption the individual energy saving target is not less than 50 % of energy saving potential identified in the performed obligatory energy audits.

The evaluation and verification of the achieved individual energy savings is performed by energy audits after implementation of the energy saving measures or by national or EU harmonised bottom-up measurement methods.

For all verified energy savings the companies and owners with individual targets receive energy saving certificates.

4.4 Energy efficiency measure evaluations

4.4.1 Semi-quantitative Impact Estimates of Energy Efficiency Measures

Residential Sector

Table 4.4.1. Impact estimates of EE measures in the Residential sector

Measure title	Semi-quantitative Impact
National Program for Renovation of Residential Buildings 2006-2020	Medium
Residential Energy Efficiency Credit Facility	High
Building tax exemption	Medium
Energy performance standard for buildings	Medium
Control systems for heating regulation	Medium
Minimum efficiency standard for boilers	Medium
Mandatory measures for efficient lighting	Medium
Mandatory energy labeling of electrical appliances	Low
Minimum efficiency standards for electrical appliances	Medium
Individual billing (multi-family houses connected to DH)	High
Minimum thermal insulation in buildings	High
Mandatory heating pipes insulation in buildings	Medium
Mandatory energy efficiency control for boilers and air-conditioning	High
Mandatory energy efficiency certificates and labels for buildings	High

The measures with expected highest impact on energy efficiency are:

- The National Programme for renovation of the residential buildings. The Program foresees within the 2006 – 2020 period 684 683 Multi Flat Buildings to be renovated, including improved insulation. The total value of the Programme implementation needed financial resources is amounting to 4 150 000 thousand BGN.
- Individual billing in multi-family buildings connected to DH. This Program is with highest impact in the sector. No official evaluation of the impact is performed but the real improvement of the energy efficiency of heating in multi-family connected to DH is not less than 20 %.
- The new measure for mandatory regular control of boilers and air-conditioning and mandatory certification of buildings.

Transport Sector

Table 4.4.2. Impact estimates of EE measures in the Transport

Measure title	Semi-quantitative Impact
Program for Energy Efficiency in Transport sector	Medium
Excise tax relief for biofuels and other clean fuels	High
Taxes on motor vehicle fuels	High
Mandatory inspection of vehicles	High
Mandatory speed limits	Medium

The measures with high impact on energy efficiency are the the two fiscal measures: tax on motor vehicle fuels, tax relief for biofuels and clean fuels and the mandatory regular inspection of vehicles.

But the fast growth of the consumption of mineral oil fuels in transport is indication that additional measures are necessary and in first place measures to reduce the traffic congestions and to slow the modal shift from rail to road.

Industrial Sector

Table 4.4.3. Impact estimates of EE measures in the Industry

Measure title	Semi-quantitative Impact
Mandatory energy efficiency industrial audits	High
Grants for energy audits in SME	Medium
Energy efficiency and renewable energy credit line	Medium
Voluntary long term agreements in industry	Medium

The only measure with potential high impact is the obligatory energy efficiency audits if the proposed in the audits measures. The other measures in the industry sector are with limited potential and the voluntary agreements are in experimental stage.

Tertiary Sector

Table 4.4.4. Impact estimates of EE measures in the Tertiary sector

Measure title	Semi-quantitative Impact
National Expedient Annual Program in Buildings 2006	Medium
Regional councils on energy efficiency	Medium
Mandatory energy action plan for Municipalities	Medium
National Expedient Annual Program in Buildings 2007	Medium
National strategy for financing building insulation	Medium
Mandatory energy efficiency control of boilers and air-conditioning	High
Mandatory energy efficiency certificates and labels for buildings	High

Measures with potential high impact are the new measure for mandatory regular control of boilers and air-conditioning and mandatory certification of buildings.

Cross-cutting measures

Table 4.4.5. Impact estimates of Cross-cutting EE measures

Measure title	Semi-quantitative Impact
Mandatory energy efficiency control of boilers and air-conditioning	High
Individual energy saving targets	High
National Long Term Energy Efficiency Program	Medium
National Short Term Energy Efficiency Program	Medium
National Strategy for Building Insulation	High
National Long Term Program for RES	Medium
Preferential feed-in tariffs for renewables	High
Priority access of CHP to electricity grids	High
Priority access of renewables to the electricity grids	High
Preferential price for CHP generated electricity	High
Joint Implementation Mechanism	Medium
Second National Plan on Climate Change	High
Bulgarian Energy Efficiency Fund	Medium

The most recent and efficient measures are: individual energy saving targets, mandatory control of boilers and air conditioning, priority access to the grid of the electricity produced from RES and in CHP and the obligation to purchase all the electricity produced from RES and CHP at preferential prices.

With high impact is also the National Strategy for building Insulation.

4.4.2 Lessons from Quantitative Energy Efficiency Measure Evaluations

Only for few measures in Bulgaria we can provide a quantitative evaluation. In the following are presented examples of the evaluation of the expected impact of some measures.

Obligatory audits and certification of buildings above 1000 sq.m

New EE Act was adopted at the end of 2008. In the new EE Act energy audit and certification is mandatory for:

- All existing buildings with overall useful area over 1000 sq. m.(in the old EE Act the certification was mandatory only for public buildings with more than 1000 sq.m. area).
- All new buildings no later than 6 years after commission.

The buildings in the country that are subject to obligatory certification are characterized by high specific energy consumption, namely, 150 - 270 kWh/m² per year. The reasons for this fact are rooted mainly in the bad condition of the external walls, roofs, floors, obsolete window frames inefficient building installations (heating and domestic hot-water supply, DHWS, ventilation and lighting).

The individual district heating stations (DHS) in most of the buildings are in very bad technical condition, with highly corroded heat exchangers and fittings. Due to the high energy losses, a large part of the buildings operate under conditions that are far from normal thermal comfort.

The obligatory energy audits and certification of buildings and industrial facilities are new measures for Bulgaria. The large amount of work related to energy auditing, certification and renovation of more than 5000 buildings (with total useful area above 1000 sq.m.) state and municipal property and more than 340 industrial facilities, with annual consumption of more than 3000 MWh/year, started in 2006 and the first practical results are available.

Up to June 2008 808 buildings with 5.68 millions sq.m. area has been audited.

Expected annual energy savings after implementatuion of the prescribed energy saving measures - 34 ktoe/year and reduction of GHG emmissions with 122.4 kt CO₂ eq/year.

Large part of the ESMs issued to buildings as a result of the detailed audits performed envisage improvements concerning insulation. Substantial number of ESMs are related to improvements in the operation of building installations for heating, DHWS and ventilation, as well as of lighting installations.

Some ESMs envisage improvement of operation of boiler installations and district heating stations through total replacement of installations or of some components.

For some of the buildings the measures include adjustment, replacement or mounting of devices for measurement and control of the energy consumption.

The state-owned and municipal buildings audited are of considerable social importance. These are predominantly hospitals, social care institutions, schools and universities, together with office buildings of central and local administrations. Many of them operate under conditions of seriously reduced thermal comfort. In this respect, bringing these buildings to conformance with the energy efficiency requirements would have a clear social effect.

National Strategy for Building Insulation Financing - 2006-2020

According to this measure, during the next 15 years (2006 – 2020) have to be thermo-insulated:

- 508 State owned building;
- 3 454 Municipal owned building;
- 651 000 Private flats in multy-family panel buildings.

The method, applied for all Strategy priority groups of buildings consists of implementation of energy audits under the EEAct and their respective reports, containing the recommended measures for improvement of energy efficiency with all necessary time, financial, energy and ecological parameters.

The new Bulgarian legislation, as for buildings, harmonises three key EU requirements, namely: introduces the 2002/91/EC Directive; complies with the 93/76/EEC Directive requirements to lessen CO₂ harmful emissions via Energy Efficiency, and introduces integrated methodology to assess their energy performances. With the EEAct adoption, the EN 832 standard becomes Bulgarian standard as well. The Norwegian methodolo-

gy “ENSI Key Numbers Software” - “Key values” software products are based on EN 832, so they could serve as a basis for the education and accreditation of building energy audit and certification experts in Bulgaria. The Bulgarian side already allocates this software and secures the education and registration of experts that perform energy audits and certification of buildings in the country, using this unified National methodology. Till 25.04.2007, 107 companies are trained following this methodology to perform building certification and have been entered in the respective EEA Public Register. This Methodology is applied both for new and existing buildings.

The improvement of building insulation is the main goal for the three priority building types (State and Municipality owned and Private Multi-family).

The preliminary impact evaluation is based on technical calculations and assessment of the expected average annual energy savings of 1 sq. m building floor area. This expected savings are for:

- Residential buildings - 30 kWh/sq.m/year
- State and Municipal buildings – 48 kWh/sq.m/year

And the expected savings of greenhouse gas emissions from 1 kWh saved energy are:

- District heating(average) - 272 gCO₂/kWh;
- Electricity heating (average) - 683 gCO₂/kWh;
- Firewood - 20 gCO₂/kWh;
- Coal - 445 gCO₂/kWh.

The number of residential, municipal and state flats or buildings included in the strategy, the respective floor area and energy savings are shown on Tables 4.4.6; 4.4.7 and 4.4.8.

Table 4.4.6: National Strategy for Building Insulation - expected energy savings and emissions reduction in Residential buildings

Year	Number flats	Floor area	Expected energy savings	Expected CO2 reduction
		sq. m	MWh/year	t CO2/year
2006	10510	788250	23648	8445
2007	10510	788250	23648	8445

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2008	21490	1611750	48353	17267
2009	23529	1764675	52940	18905
2010	25882	1941150	58235	20796
2011	28706	2152950	64589	23065
2012	32000	2400000	72000	25711
2013	35922	2694150	80825	28862
2014	40471	3035325	91060	32517
2015	45961	3447075	103412	36929
2016	52392	3929400	117882	42096
2017	61961	4647075	139412	49784
2018	73255	5494125	164824	58859
2019	86431	6482325	194470	69445
2020	101961	7647075	229412	81923
Total	650981	48823575	1464707	523047

Table 4.4.7: National Strategy for Building Insulation - expected energy savings and emissions reduction in Municipal buildings

Year	Number buildings	Floor area	Expected energy savings	Expected CO2 reduction
		sq. m	MWh/year	t CO2/year
2006	70	207060	9939	4970
2007	100	295800	14198	7101
2008	120	354960	17038	8521

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2009	130	384540	18458	9231
2010	160	473280	22717	11361
2011	180	532440	25557	12781
2012	200	591600	28397	14201
2013	230	680340	32656	16331
2014	250	739500	35496	17752
2015	280	828240	39756	19882
2016	310	916980	44015	22012
2017	330	976140	46855	23432
2018	348	1029384	49410	24710
2019	366	1082628	51966	25988
2020	380	1124040	53954	26982
Total	3454	10216932	490413	245255

Table 4.4.8: Expected energy savings and emissions reduction in State owned buildings

Year	Number buildings	Floor area	Expected energy savings	Expected CO2 reduction
		sq. m	MWh/year	t CO2/year
2006	10	49500	2376	1188
2007	10	49500	2376	1188
2008	15	74250	3564	1782
2009	15	74250	3564	1782

Energy Efficiency Policies and Measures in Bulgaria in 2007

2010	15	74250	3564	1782
2011	20	99000	4752	2376
2012	25	123750	5940	2971
2013	30	148500	7128	3565
2014	35	173250	8316	4159
2015	40	198000	9504	4753
2016	40	198000	9504	4753
2017	50	247500	11880	5941
2018	60	297000	14256	7129
2019	65	321750	15444	7724
2020	78	386100	18533	9268
Total	508	2514600	120701	60362

For the implementation of the Strategy for financing the building insulation during the next 15 years the State Budget shall provide the total sum of M€ 330.

Expected results:

Total annual energy savings - 2 075 821 MWh/year

Total annual CO₂ eq. reduction - 828 664 t/ год.

5 National Developments under the EU Energy Efficiency Directive and the 20% Energy Efficiency Target of the EU

The measures that Bulgaria is provided for energy efficiency increase and for achieving the targets for energy saving are set in The Energy Efficiency Act, adopted in the State Gazette at 14.11.2008.

EE Act regulated the conclusion of the ESCO contracts. These Contracts are aimed to execution of activities and measures for energy efficiency increase in buildings and industrial systems, which leads to energy saving at final energy consumers. The reimbursement of the investments and the paying of the recompense to the contract executor are at the expense of the realized energy savings.

The services in these contracts are being performed at guaranteed energy economy in the building or in the industrial system. The executors of the contracts carried all the financial risk, as well as the technical and the trade risk for implementation of the provided activities and measures for energy efficiency increase and for achieving the guaranteed in the contract result.

The circumstances and the order for the amount determination and payment of the planned resources at Contract with guaranteed result for energy savings in state and/or municipal properties are set in Ordinance of the Minister of economy and energy, adopted in the State Gazette at 14.04.2009.

The Voluntary Agreements are new measure in Bulgarian energy efficiency policy. The Voluntary Agreements have a purpose to encourage the energy consumption decrease through:

1. Granting of energy services and/or accomplishing of energy efficiency activities and measures by the energy dealers;
2. Energy efficiency audits and/or undertaking of the respective measures by the final energy consumers.

EE Act regulate the conclusion of Voluntary Agreements in Bulgaria between the EEA Executive director and buildings owners (with the exception of the state and/or municipal buildings), the owners of the industrial systems and the ener-

gy dealers.

The agreements contain the concrete obligations of the contract parts, as well as the mechanisms for implementation supervision and control, methodology for evaluation of the energy savings achieved the procedures for amendment and/or addition of the provided measures when the goals are not implemented or there are obstacles for their achieving.

The Energy Efficiency Act for the first time obliged building and industrial systems owners to perform **energy efficiency management**.

The energy efficiency management is being performed by:

1. annually preparation of plans and programs for improvement of energy efficiency.
2. realization of the measures, provided in these plans and programs.
3. submission of information for the effect from the executed measures and for the expected effect of the provided measures in the plans and programs. The information should be given to EEA.
4. nomination of at least one employee in which functionary record is included the obligations to implement abovementioned duties.

The industrial system owners are obliged to submit in EEA annual reports about implemented by them energy efficiency management. These reports contain description of the energy efficiency activities and measures and the amount of the achieved energy savings.

Another measure, provided for execution is **the control for energy efficiency for water heating boilers and air-conditioning installations in buildings**. This measure is aimed to determine the efficiency level of their exploitation and to identify the measures for its improvement. In term of six months from the date of introducing in exploitation the owners of the equipment, which is object of this measure are obliged to submit to EEA information about their status. This information is being used for creation and management of data base for the condition of the water heating boilers and air-conditioning installations.

For the boiler with exploitation term over 15 years the energy efficiency control includes evaluation of the heating installation and ends with recommendations to the owner for boiler substitution, heating installation modifications and/or other alternative decisions.

For the implementation of the targets and for ensuring accessibility and disposal of the information about the energy efficiency in the country it is necessary to be created and supported **National information system for the condition of the energy efficiency in Republic of Bulgaria**. This system will provide information about:

1. The national indicative goals
2. The implementation of the activities and measures, provided by the National Energy Efficiency Action Plans
3. The achieved annual energy savings.
4. The condition of the energy efficiency at national level and by economical sectors.
5. The energy efficiency plans and programs and the reports for their implementation.
6. The good practices in the energy efficiency field, etc.

The new Energy Efficiency Act defines the national indicative targets for energy savings. The national energy saving target is distributed as individual targets between:

- retail energy sales companies that sells more than the equivalent 75 GWh of energy per year;
- owners of buildings with more than 1000 sq. m. useful area for which the certification and energy audit are obligatory;
- producers of goods and services with more than 3000 MWh annual energy consumption for which the energy investigation is obligatory.

The evaluation and verification of the achieved individual energy savings is performed by energy audits after implementation of the energy saving measures or by national or EU harmonised bottom-up measurement methods.

For all verified energy savings the companies and owners with individual targets receive energy saving certificates.

Annex 1

Energy Efficiency Measure Summary

Households

Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
<u>BG1</u>	National Program for Renovation of Residential Buildings in the Republic of Bulgaria, 2006-2020	Ongoing	Financial	2007	2020	Medium
<u>BG3</u>	Residential Energy Efficiency Credit Facility REECL	Ongoing	Financial	2005		High
<u>BG6</u>	Building Tax Exemption	Ongoing	Fiscal/Tariffs	2005		Medium
<u>BG7</u>	Energy Performance Standard for Buildings	Ongoing	Legislative/Normative	2005		Medium
<u>BG8</u>	Control Systems for heating regulation	Ongoing	Legislative/Normative	2007		Medium
<u>BG9</u>	Minimum efficiency standards for boilers	Ongoing	Legislative/Normative	2005		Medium
<u>BG10</u>	Mandatory measures for efficient lighting	Ongoing	Legislative/Normative	2005		Medium
<u>BG11</u>	Mandatory energy labeling of electrical appliances	Ongoing	Legislative/Informative	2006		Low
<u>BG12</u>	Minimum efficiency	Ongoing	Legislative/Normative	2006		Medium

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	standards for electrical appliances					
<u>BG13</u>	Individual billing (multi-family houses)	Ongoing	Legislative/Normative	2007		High
<u>BG15</u>	Minimum Thermal Insulation in Buildings	Ongoing	Legislative/Normative	2004		High
<u>BG16</u>	Mandatory heating pipe insulation in Buildings	Ongoing	Legislative/Normative	2007		Medium
<u>BG17</u>	BG17: Mandatory energy efficiency control for boilers and air-conditioning systems - Households	Ongoing	Legislative/Normative	2008		High
<u>BG18</u>	Mandatory energy efficiency certificates and labels for buildings - Households	Ongoing	Legislative/Informative	2008		High

Transport

Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
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7 Energy Efficiency Policies and Measures in Bulgaria in 2007

<u>BG1</u>	Program for improvement of energy efficiency in the Transport sector 2006-2008	Proposed (advanced)	Infrastructure	2006	2008	Medium
<u>BG2</u>	Excise tax relief for biofuels and other clean fuels	Ongoing	Fiscal	2006		High
<u>BG3</u>	Mandatory inspections of vehicles	Ongoing	Legislative/Normative	1999		High
<u>BG5</u>	Taxes on motor vehicle fuels	Ongoing	Fiscal	2005		High
<u>BG6</u>	Mandatory speed limits	Ongoing	Legislative/Normative	1999		Medium

Industry

Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
<u>BG1</u>	Energy Efficiency Act (EEA) – Mandatory Industrial Audits for Energy Efficiency	Ongoing	Financial, Information/Education/Training, Legislative/Informative, New Market-based Instruments	2006		High
<u>BG2</u>	Grants for energy au-	Ongoing	Financial	2006		Medium

Energy Efficiency Policies and Measures in Bulgaria in 2007

	dits in SME					
<u>BG3</u>	Energy Efficiency and Renewable Energy Credit Line (BEERECL)	Ongoing	Financial	2004		Medium
<u>BG4</u>	Voluntary long term agreements in industry	Ongoing	Co-operative Measures	2006		Medium

Tertiary

Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
<u>BG2</u>	National Expedient Annual Program in Buildings, 2006	Completed	Legislative/Informative	2006	2006	Medium
<u>BG3</u>	Regional Councils on Energy Efficiency	Ongoing	Information/Education/Training	2005		Medium
<u>BG4</u>	Mandatory Energy Action Plan for Municipalities	Ongoing	Legislative/Informative	2005		Medium
<u>BG6</u>	National Expedient Annual Prog-	Completed	Legislative/Informative	2007	2007	Medium

7Energy Efficiency Policies and Measures in Bulgaria in 2007

	ram in Buildings, 2007					
<u>BG7</u>	National Strategy for financing the building insulation for energy efficiency 2006-2020 - services	Ongoing	Financial, Legislative/Informative, Legislative/Normative	2006	2020	High
<u>BG8</u>	BG8: Mandatory energy efficiency control for boilers and air-conditioning systems - Services	Ongoing	Legislative/Normative	2008		High
<u>BG9</u>	Mandatory energy efficiency certificates and labels for buildings - Services	Ongoing	Legislative/Informative	2008		High

General/Cross-cutting

Code	Title	Status	Type	Starting Year	Ending Year	Semiquantitative Impact
<u>BG16</u>	BG16: Mandatory energy efficiency	Ongoing		2008		High

Energy Efficiency Policies and Measures in Bulgaria in 2007

	control for boilers and air-conditioning systems					
<u>BG17</u>	Individual energy saving targets	Ongoing	Non-classified Measure Types	2009		High
<u>BG1</u>	National Long Term Energy Efficiency Program, 2005-2015	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2005	2015	Medium
<u>BG2</u>	National Short Term Energy Efficiency Program, 2005-2007	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2006	2007	Medium
<u>BG3</u>	National Strategy for Building Insulation Financing, 2006-2020	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2006	2020	High
<u>BG7</u>	National Long term program for RES	Proposed (medium/long-term)	General Energy Efficiency / Climate Change / Renewable Programmes	2006	2015	Medium
<u>BG8</u>	Preferential feed-in tariffs for renewables	Ongoing	Fiscal Measures/Tariffs	2007		High
<u>BG10</u>	Priority access of CHP to the electricity grids	Ongoing	Legislative/Normative Measures	2006		High
<u>BG11</u>	Priority access of RES to the electricity grids	Ongoing	Legislative/Normative Measures	2006		High
<u>BG12</u>	Preferential prices	Ongoing	Fiscal Measu-	2006		High

7Energy Efficiency Policies and Measures in Bulgaria in 2007

	for CHP generated energy		res/Tariffs			
<u>BG13</u>	JOINT IMPLEMENTATION MECHANISM	Ongoing		2001		Medium
<u>BG14</u>	Second National Action Plan on Climate Change 2005-2008	Ongoing	General Energy Efficiency / Climate Change / Renewable Programmes	2005		High
<u>BG15</u>	Bulgarian energy efficiency fund	Ongoing	Financial Measures	2004		Medium

Annex 2

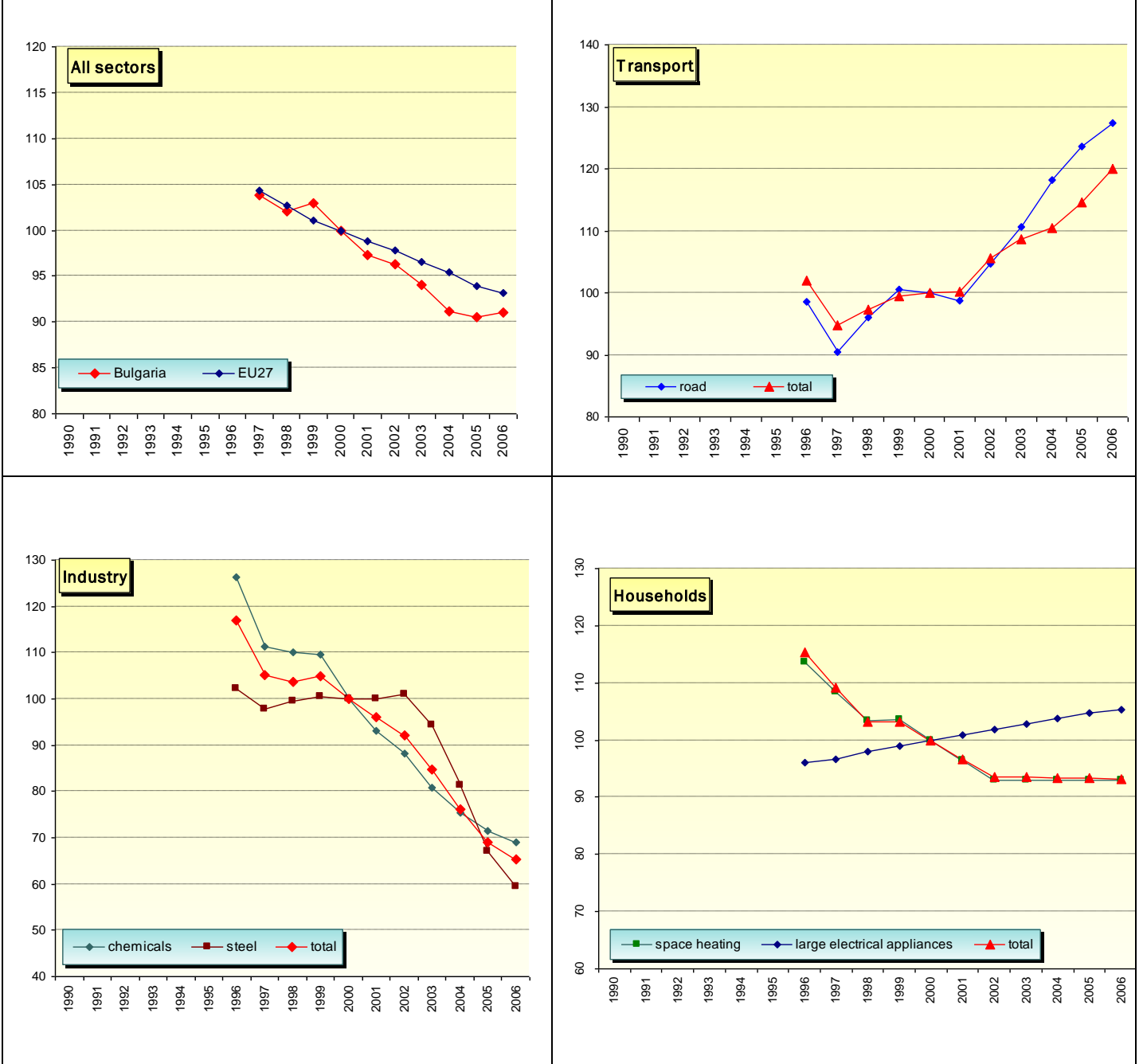
Country Profile

Energy Efficiency Profile: Bulgaria

Energy Efficiency Trends

<p>Overview</p> <p>Over the period 1997 to 2006 the energy efficiency index (ODEX) for all sectors decreases by 13 % in Bulgaria compared to 11 % for the EU-27. This improvement is due, largely, to the industrial sector. In the same way, the decrease in the energy intensity of the Bulgarian economy as a whole is due to a great extent to the decrease of energy intensity in industry.</p>	<p>Transport</p> <p>During the period 1997 to 2006, the energy efficiency index in the transport sector increases by 25 %, which indicates a deteriorated. energy efficiency. The energy efficiency index of road transport, increases by 37 %. in the same period. The most significant driver of the deterioration of energy efficiency in the sector has been the shift from rail to road transport, the city congestions and the high average age of the Bulgarian vehicles stock (cars, light duty vehicles, buses, trucks).</p>
<p>Industry</p> <p>In the industrial sector, there has been reduction in the ODEX index of 40 % over the period 1997 to 2006, which indicates that significant energy savings have been made in the sector. The reduction of ODEX in the production of chemicals is 42 %, in the production of steel 39 % and in the production of paper 21 % in the same period.</p> <p>The growing prices of fuels and energy carriers are the main reason and incentive for energy savings in this sector. The relatively fast growth of production in the period allowed for increasing the load factor of existing production capacity, which becomes a favorable factor for improvement of energy efficiency.</p>	<p>Households</p> <p>Between 1997 and 2006, energy efficiency of the household sector improved by 16 % and this happened in a situation of considerable growth of private households consumption. In the space heating the improvement is 15 %. Bulgarian households increased the energy efficiency of consumption and the effect of this improvement is used almost entirely for improvement of heating comfort, wider use of electric appliances, air conditioning etc.</p> <p>The improvement of the ODEX in this sector is a result of different opposed processes:</p> <ul style="list-style-type: none"> ➤ improved energy efficiency in buildings; ➤ increased thermal comfort; ➤ increased use of household electric appliances; ➤ increased share of solid fuels (wood and coal) for heating .

Energy efficiency index



Energy Efficiency Policy Measures

Institutions and programmes

The Energy Efficiency Agency (EEA) is an executive Agency (governmental institution) to the Ministry of Economy and Energy, according to the Energy Efficiency Law (EEL) from March 2004. The basic EEA activities cover the implementation of broad spectrum of energy efficiency and renewable energy sources programs.

First National Energy Efficiency Action Plan

This action plan was prepared according to Energy Services Directive and in order to achieve the EU energy saving target. The action plan was adopted by the Government in October 2007. The national energy saving target is 627 ktoe to 2016 – 9 % of average FEC in the scope of the ESD in the period 2001-2005.

Industry

- All energy consumers with annual consumption above 3,000 MWh are subjects to obligatory energy efficiency studies - according to the old and new Energy Efficiency Act and receive individual energy saving targets proportional to the energy consumption according to the new EE Act.
- Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) has been developed by the European Bank for Reconstruction and Development (EBRD) in 2004 in close co-operation with the Bulgarian Government and the European Union. The facility extends loans to private sector companies for energy efficiency and renewable energy projects in industry.

Households and services

Among the main measures on energy efficiency, there are:

- Obligatory energy audits and certification of all new buildings and all existing buildings with gross floor area above 1,000 sq. m according to the new Energy Efficiency Act.
- Mandatory regular energy efficiency control for boilers and air-conditioning systems.
- Mandatory energy labeling of electrical appliances.
- Minimum efficiency standards for hot water boilers with a capacity 4 – 400 kW (heat) firing liquid or gas fuel.
- Buildings Energy Performance Standard.
- Minimum efficiency standards for electrical appliances.
- Efficiency standards for lighting.

- Residential Energy Efficiency Credit Line.
- National Strategy for Building Insulation, 2005-2020 : about 4000 state and municipal building have to be insulated.
- National Expedient Annual Program in Buildings, 2007: energy audits and insulation of large state and municipal buildings. It includes 707 buildings with total floor area 2,17 million m².
- Individual billing and payment of heating energy costs in multi-family residential buildings connected to district heating.

Transport

- Taxes on motor vehicle fuels.. The taxes (incl. VAT) are about 50 % of the consumer prices of gasoline and diesel oil.
- Excise tax relief for biofuels and other clean fuels.
- Mandatory inspections of vehicles. (from 01.09.1999 with several changes to 2007).
- Energy Saving Program in Transport Sector, 2006-2008.

Cross-cutting measures:

- Mandatory energy efficiency control for boilers and air-conditioning systems according the new Energy Efficiency Act.
- Individual energy saving targets.
- National long term program for RES.
- National Short-Term Program on EE, 2005-2007. It is 3 years Action plan, approved with Governmental decision in December 2005. It includes 550 projects.
- Preferential prices for CHP generated energy. According to Energy Law, adopted on 26.11.2003 the public provider or public suppliers are obliged to buy the entire volume of electricity produced by CHP plants at preferential prices.
- Second National Action Plan on Climate Change.

Selected Energy Efficiency Measures

Sector	Title of measures	Since	Energy savings	CO₂
Industry	Obligatory energy efficiency studies of consumers with annual consumption above 3000 MWh	2004	112 ktoe (4,69 PJ) annually*	420 kt
Industry	Bulgarian Energy Efficiency and Renewable Energy Credit Line – soft loans for EE measures	2004	28,1 ktoe (1,18 PJ) annually (only implemented EE projects to June 2008)	101 kt
Residential	National Program for Renovation of the multi-family buildings	2005	52,8 ktoe (2,21 PJ) annually (planned to 2016)	190 kt
Residential	Residential Energy Efficiency Credit Line - soft loans for EE measures	2005	11,8 ktoe (0,49 PJ) annually (only implemented projects to June 2008)	49 kt
Residential	Individual billing and payment of energy costs in multi-family residential buildings connected to district heating.	2004	63 ktoe (2,64 PJ) annually	227 kt
Services	Obligatory energy audits and certification of buildings with gross floor area above 1,000 m ² , state or municipal property.	2005	34 ktoe (1,43 PJ) annually (to June 2008)*	122,4 kt
Transport	Energy Saving Program in Transport Sector, 2006-2008: energy studies in 14 large state and municipal owned transport companies and 9 EE projects.		6,2 ktoe (0,26 PJ) annually*	38,8 kt
Cross-cutting measures	National Short-Term Program on EE	2005	140 ktoe (5,86 PJ) annually**	600 kt
Cross-cutting measures	Second National Action Plan on Climate Change (only EE measures)	2005	146 ktoe (6,11 PJ) annually**	613 kt

* after implementing the measures proposed in the audits

** after implementing the measures and projects included in the Program