Objective: 7.3 TWh of end-use energy savings by 2016

<table>
<thead>
<tr>
<th>Overview</th>
<th>2011</th>
<th>2000-2011 (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary intensity (EU=100)¹</td>
<td>186</td>
<td>--</td>
</tr>
<tr>
<td>CO₂ intensity (EU=100)</td>
<td>234</td>
<td>--</td>
</tr>
<tr>
<td>CO₂ emissions per capita (in tCO₂/cap)</td>
<td>6.8</td>
<td>+ 2.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power generation</th>
<th>2011</th>
<th>2000-2011 (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency of thermal power plants (in %)</td>
<td>29</td>
<td>--</td>
</tr>
<tr>
<td>Rate of electricity T&amp;D losses (in %)</td>
<td>13.6</td>
<td>--</td>
</tr>
<tr>
<td>CO₂ emissions per kWh generated (in gCO₂/kWh)</td>
<td>568</td>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Industry</th>
<th>2011</th>
<th>2000-2011 (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy intensity (EU=100)</td>
<td>167</td>
<td>--</td>
</tr>
<tr>
<td>Share of industrial CHP in industrial consumption (in %)</td>
<td>3.4</td>
<td>--</td>
</tr>
<tr>
<td>Unit consumption of steel (in toe/t)*</td>
<td>0.208</td>
<td>+ --6.9%</td>
</tr>
</tbody>
</table>

*2010 and 2000-2010 for steel

++ + Among the best performing countries  Above the EU average¹ - Below the EU average¹ –Among the worst performing countries

Latest update: April 2013

¹ The European Union, as the best performing region, is used as the benchmark.
1. Overview

1.1. Policies: 7.3 TWh of energy savings by 2016

Bulgaria adopted a National Energy Efficiency Action Plan (NEEAP) with an energy savings target of 7.3 TWh (627 ktoe) for 2016, which was maintained in the second NEEAP (2011). This target has been allocated to the different sectors as follows: transport 30 percent, the residential sector 29 percent, industry 23 percent, services 14 percent and agriculture 4 percent. In view of the fact that the country exceeded the intermediate target in 2010 (energy savings of 3.5 TWh compared with the targeted 2.4 TWh), Bulgaria expects the energy efficiency measures to save up to 13.7 TWh by 2016.

The Bulgarian Energy Strategy until 2020, published in June 2011, aims to reduce energy intensity by 50 percent by 2020, which would correspond to total energy savings of more than 5 Mtoe by 2020 in comparison with the reference scenario.

A law on Energy Efficiency was adopted in March 2004 and amended several times to comply with EC requirements. It introduced mandatory energy audits and the certification of all new buildings, as well as minimum efficiency standards for new constructions and electrical appliances. New amendments were adopted in February 2012 and should be followed by a national plan focusing on buildings with nearly zero energy consumption, energy certificates for buildings, and the establishment of a system for the independent control of these certificates.

The country has introduced financial assistance for energy efficiency projects. The Bulgarian Energy Efficiency Fund (BEEF) provides soft loans, partial credit guarantees and portfolio guarantees (ESCO and residential) to promote energy efficiency projects. A Residential Energy Efficiency Credit Line offers households soft loans and 20 percent incentive grants for building renovations or equipment replacements.

1.2. Energy consumption trends: declining consumption

At 2.6 toe/capita, Bulgaria’s total energy consumption per capita is around 22 percent below the EU average (2011). Total energy consumption fell by 34 percent between 1990 and 2000, and grew by just 1.1 percent/year until 2007. In 2008 and 2009 it declined by 1.5 percent and 12 percent, respectively, due to the global economic crisis. Since then it has been on an upward trend again (+2.1 percent in 2010 and +8.1 percent in 2011), almost recovering its 2008 level.

The power sector is the largest energy consuming sector, representing 43 percent of total energy consumption in 2011. The share of the power sector increased strongly over the years because of the dramatic fall in industrial energy consumption, which was halved over this period, from 38 percent in 1990 to 16 percent in 2011. Bulgarian energy consumption is dominated by coal and lignite with 43 percent in 2011 (32 percent in 1990), followed by nuclear with 22 percent, oil with 19 percent (33 percent in 1990) and gas with 13 percent. The shares of biomass and hydro are limited (5 percent and 1 percent, respectively).
Electricity consumption per capita is around 30 percent lower than the EU average, at around 3,900 kWh. It fell by 3.6 percent/year between 1990 and 2000, but rose by 2 percent/year until 2008. In 2009 it dropped by more than 5 percent, with a sharp decrease in the industrial sector (-16 percent). Industrial electricity consumption dipped again in 2010 (-8.3 percent), but increased by 3.8 percent in 2011, contributing to the 4.3 percent hike in Bulgarian electricity demand. Industry accounted for 32 percent of electricity consumption in 2011, compared with 55 percent in 1990. This sharp reduction is explained by the falling industrial electricity demand (halved between 1990 and 2011), but also by a soaring electricity consumption in the household and services sectors.

Figure 2: Electricity consumption trends by sector

Source: Enerdata

1.3. Energy efficiency trends: rapid improvements between 2000 and 2011

Between 1990 and 2011 total energy intensity (total energy consumption per unit of GDP) decreased at the very rapid pace of 3.2 percent/year, on average. The largest contributor to this reduction was the industrial sector, which was responsible for more than half of the improvement. The power sector started to achieve significant efficiency gains as of 2000, contributing to around 20 percent of the energy intensity decrease seen since then.

Figure 3: Energy intensity trends

Source: Enerdata
2. Power generation

2.1. Policies: promotion of high-efficiency CHP plants

Bulgaria aims to improve efficiency in energy generation and transmission. The country has already implemented feed-in tariffs and mandatory off-take of electricity produced by modern high-efficiency CHP plants. It is now considering providing loans combined with grants for the development of decentralized energy production, including micro-cogeneration.

Bulgaria also aims to introduce energy savings targets for transmission and distribution companies and to develop a special energy efficiency program for the energy sector, covering energy generation, transmission and distribution. The country is considering implementing Energy Efficiency Obligations for energy suppliers, which would oblige power supply companies to deliver energy savings at their customers’ premises.

In 2012, energy audits were extended from industrial companies to large combustion plants consuming more than 3 GWh/year. This measure, which is included in the second NEEAP (2011), is expected to save up to 1.5 TWh/year by 2016 and 2.7 TWh/year by 2020.

2.2. Efficiency of the power sector: improving efficiency rate in power generation

The average efficiency rate of power generation grew by 7 percentage points between 1990 and 2010, to 33 percent. That improvement was achieved through an increase in the efficiency rate of thermal power plants, which rose from 22 percent to 28 percent in 2010. Nevertheless, that level remains 24 percent lower than the EU average because of the structure of thermal generation, which is dominated by coal and lignite (55 percent of total power generation in 2011). In addition, Bulgaria does not have gas combined-cycle power plants. In 2011 the efficiency of power generation decreased, owing to a strong decrease in the share of hydropower generation, which saw its share halved (ie -6 percentage points).

Source: Enerdata
The average rate of T&D losses increased by 9 percentage points between 1990 and 2000, but fell from 20 percent to 14 percent in 2007, when it stabilised. This level remains twice as high as the EU average.

![Figure 6: Electric T&D losses](image)

Source: Enerdata

### 3. Industry

#### 3.1. Policies: energy audits and soft loans

Since 2007 industrial companies with an energy consumption over 3 GWh/year have to conduct mandatory energy audits every three years. The state budget includes funds to cover the audit costs of small and medium companies affected by this obligation. Those energy audits are expected to save nearly 1 TWh/year in 2016 (up to 1.8 TWh/year in 2020). Industrial companies consuming more than 3 GWh/year can also enter into long-term energy savings agreements.

The Bulgarian Energy Efficiency and Renewable Energy Credit Line (BEERECL) was jointly established by the EBRD, the Bulgarian Government and the EU. It offers industrial companies loans of up to 5 billion leva (3.7 billion US dollars) and grants of up to 15 percent of energy efficiency investments (CHP generation, optimization of processes, reconstruction of energy infrastructures) or renewable energy projects. A similar scheme, the Bulgarian Energy Efficiency for Competitive Industry Finance Facility (BEECIFF), set up by the Ministry and the EBRD, offers grants to SMEs for energy efficiency projects (up to 2 million leva, ie 1.3 million US dollars); grants can cover up to 30 percent of the eligible cost of technology-driven projects and 40 percent in the case of energy audits. Moreover, an additional 10 percent bonus grant can be awarded for projects involving CHP or fuel switching, up to a maximum of 50 percent of the project cost.

Industrial companies can also benefit from loans from the Bulgarian Energy Efficiency Fund (BEEF) to finance investments in high-efficiency industrial processes, building rehabilitation, and heat source and distribution system improvements.
3.2. Energy consumption trends: stable consumption since 2000

Industrial energy consumption fell by 61 percent between 1990 and 2000 and remained relatively stable until 2007. It collapsed in 2008 and 2009 (-11 percent and -29 percent, respectively) due to the global economic crisis but recovered in 2010 and 2011 (+4.5 percent and +6 percent, respectively).

![Figure 7: Trends in industrial energy consumption](image)

Electricity and gas are the main energy sources in Bulgarian industry (26 percent each in 2011). The electricity share has been increasing rapidly (21 percent in 2000). The shares of oil and coal declined significantly, from 24 percent and 21 percent, respectively, of industrial consumption in 2000, to 13 percent and 11 percent in 2011. Heat and biomass are increasingly used in industry: the share of heat grew from 8 percent in 2000 to 19 percent in 2011, while biomass reached 6 percent (up from 1 percent).

![Figure 8: Energy consumption of industry, by source](image)

![Figure 9: Energy consumption of industry, by branch](image)

The share of energy-intensive branches in industrial energy consumption is high (68 percent in 2011) but decreasing (72 percent in 2000). The chemical industry is the largest consumer with 28 percent of industrial energy consumption. The share of the non-metallic minerals industry (mainly cement) is growing steadily, from 12 percent in 1990 to 25 percent in 2011. The energy consumption of the steel industry is falling and the sector currently accounts for less than 7 percent of industrial energy consumption (down from 16 percent in 1990 and 24 percent in 2005). The consumption of the paper industry is low but growing (6 percent, up from 1 percent in 2000).
3.3. Energy intensity trends: limited efficiency gains in the steel and chemical industries

Energy intensity in Bulgarian industry is decreasing rapidly (4.6 percent/year between 2000 and 2011). Efficiency gains were significant in the cement and steel industries, which saw their specific energy consumption per ton produced drop by 6.7 percent/year and 6 percent/year, respectively. Improvements were more limited in the chemical sector, which is the largest industry: its energy intensity decreased by just 1.7 percent/year, while the unit consumption of paper dropped by 0.6 percent/year.

![Figure 2: Trends in the energy intensity of industrial branches](image)

Source: Enerdata, Odyssee

The share of industrial CHP in industrial electricity consumption fell dramatically between 1992 and 2011, to 3 percent (compared with the EU average of 19 percent).

![Figure 3: Share of industrial CHP in industrial consumption](image)

Source: Enerdata
The energy intensity of the manufacturing industry, ie excluding construction and mining, decreased at the rapid pace of 5.3 percent/year between 2000 and 2010. This rapid reduction is mainly explained by efficiency gains in the different industrial branches. The increasing share of energy-intensive industries had a negative impact on energy intensity: these structural changes increased the intensity of manufacturing by 1 percent/year, thereby offsetting part of the energy efficiency gains.

**Figure 42: Trends in the energy intensity of manufacturing and structural effect**

![Graph showing trends in energy intensity and structural effect from 2000 to 2010.](source: Enerdata, Odyssee)