Bulgaria
Energy efficiency report

Objectives:
- 7.3 TWh of end-use energy savings by 2016
- 17% reduction in primary energy intensity by 2015

### Overview

<table>
<thead>
<tr>
<th>Metric</th>
<th>2010</th>
<th>2000-2010 (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary intensity (EU=100)</td>
<td>177</td>
<td>-- -4.8% ++</td>
</tr>
<tr>
<td>CO₂ intensity (EU=100)</td>
<td>216</td>
<td>-- -4.1% ++</td>
</tr>
<tr>
<td>CO₂ emissions per capita (in tCO₂/cap)</td>
<td>6</td>
<td>+ 0.4% -</td>
</tr>
</tbody>
</table>

### Power generation

<table>
<thead>
<tr>
<th>Metric</th>
<th>2010</th>
<th>2000-2010 (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency of thermal power plants (in %)</td>
<td>28</td>
<td>-- 0.2% -</td>
</tr>
<tr>
<td>Rate of electricity T&amp;D losses (in %)</td>
<td>13</td>
<td>-- -3.8% ++</td>
</tr>
<tr>
<td>CO₂ emissions per kWh generated (in gCO₂/kWh)</td>
<td>492</td>
<td>- 0.6% --</td>
</tr>
</tbody>
</table>

### Industry

<table>
<thead>
<tr>
<th>Metric</th>
<th>2010</th>
<th>2000-2010 (%/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy intensity (EU=100)</td>
<td>167</td>
<td>-- -6.2% ++</td>
</tr>
<tr>
<td>Share of industrial CHP in industrial consumption (in %)</td>
<td>3</td>
<td>-- -19.3% --</td>
</tr>
<tr>
<td>Unit consumption of steel (in toe/t)</td>
<td>0.30</td>
<td>- -3.2% +</td>
</tr>
</tbody>
</table>

++ Among best countries  + Better than the EU average 1  - Below the EU average 1  -- Among countries with the lowest performances

Latest update: May 2012

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 should be achieved in transport (30 percent), in the residential sector (29 percent), in industry (23 percent), in services (14 percent) and in agriculture (4 percent). Since 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 National Long-Term Program for Energy Efficiency 2005-2015 aims to reduce primary energy intensity by 17 percent by 2015. The Bulgarian Energy Strategy until 2020 (June 2011) aims to reduce energy intensity by 50 percent by 2020, which would correspond to a 25 percent increase in the energy efficiency and 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, and the New Energy Efficiency Act was adopted in 2008. It introduced mandatory energy audits and the certification of all new buildings, as well as minimum efficiency standards for new constructions and electrical appliances.

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 2.2 toe/cap, Bulgaria's total energy consumption (primary consumption) per capita is around 35 percent below the EU average. Primary 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. It continued to fall in 2010 (-4 percent), reaching its lowest level over the 1990-2010 period, at under 17 Mtoe.

![Figure 1: Energy consumption trends by sector](image)
The power sector is the largest energy consuming sector, with an average consumption of 7 Mtoe between 1990 and 2010, ie 41 percent of primary energy consumption in 2010. This share increased strongly over the years because of the drop in overall energy consumption and the dramatic fall in industrial energy consumption. The share of industry in energy consumption halved over this period, from 38 percent to 16 percent.

Bulgarian primary consumption comprises coal with 41 percent (32 percent in 1990), oil with 18 percent (33 percent in 1990) and gas with 14 percent. The share of biomass is limited (5 percent). Together, nuclear power and hydroelectricity account for 27 percent of primary consumption.

Electricity consumption per capita is 36 percent lower than the EU average, at around 3,700 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 seen in the industrial sector (-16 percent). Industry accounted for 34 percent of electricity consumption in 2010, compared with 55 percent in 1990. This sharp reduction is explained by the falling industrial electricity demand (halved between 1990 and 2010) but also by a soaring electricity consumption in the services sector (+2.6 percent/year between 1990 and 2000 and +3.9 percent/year between 2000 and 2010).

**Figure 2: Electricity consumption trends by sector**

1.3. Energy efficiency trends: rapid improvements between 2000 and 2009

Between 1990 and 2010 total energy intensity (primary energy per unit of GDP) decreased by 3.6 percent/year. The largest contributor to this improvement was the industrial sector with a yearly decrease in its energy intensity of 2.1 percent. Over the recent period 2000-2010, the decrease in industrial energy intensity was slower (1.9 percent/year), but efficiency gains were higher in the power sector (1.4 percent/year).
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 the creation of a power exchange and 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.

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 in 2016 and 2.7 TWh/year in 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, from 22 percent to 28 percent; nevertheless, that level remains 27 percent lower than the EU average because of the structure of the thermal generation park (Bulgaria does not have combined-cycle power plants).
The average rate of T&D losses increased by 9 percentage points between 1990 and 2000, but fell from 20 percent to 13 percent in 2010. This is twice as high as the EU average.

3. Industry

3.1. Policies: energy audits and soft loans

Since 2007 industrial companies with an energy consumption of 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 by 2016 (up to 1.8 TWh/year by 2020). Industrial companies consuming more than 3 GWh/year can also enter into voluntary agreements (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 dollars) and incentive grants of up to 15 percent of the investments made in energy efficiency (CHP generation, optimization of processes, reconstruction of energy infrastructures) or renewable energy projects. Energy savings are estimated at about 1 TWh/year.
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 62 percent between 1990 and 2000 and by 33 percent between 2000 and 2010 (-74 percent over the 1990-2010 period). It dropped by 11 percent in 2008, 29 percent in 2009 and 1.7 percent even in 2010 due to the global economic crisis.

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

Electricity and gas are the most consumed energy sources in Bulgarian industry (29 percent each in 2010, up from 21 percent and 26 percent, respectively, in 2000). The shares of oil and coal in industrial consumption declined significantly, from 24 percent and 20 percent in 2000, respectively, to 11 percent and 9 percent. Heat and biomass are increasingly used in industry: the share of heat grew from 8 percent in 2000 to 19 percent in 2010, while biomass reached 3 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, at 63 percent in 2010 (compared with 70 percent in 2000). The chemical industry is the largest consumer with 30 percent of industrial energy consumption. The share of the non-metallic minerals industry (mainly cement) is growing steadily, from
12 percent in 1990 to 20 percent in 2010. The energy consumption of the steel industry is falling and the sector currently accounts for just 9 percent of industrial energy consumption (down from 16 percent in 1990 and 24 percent in 2005). The consumption of the paper industry is marginal.

### 3.3. Energy intensity trends: limited efficiency gains in the steel and chemical industries

Between 1990 and 2009, energy intensity in Bulgarian industry decreased at the rapid rate of 5.7 percent/year. Efficiency gains were significant in the cement industry, which saw its specific energy consumption per ton produced drop by 6.9 percent/year. However, improvements were more limited in the two largest industries: the energy intensity of the chemical industry decreased by 3.6 percent/year, while the specific consumption of the steel industry fell by 4.1 percent/year.

![Figure 10: Trends in the energy intensity of industrial branches](source)

The share of industrial CHP in industrial electricity consumption fell dramatically between 1992 and 2010, to below 3 percent (compared with the EU average of 19 percent).

![Figure 11: Share of industrial CHP in industrial consumption](source)
The energy intensity of the manufacturing industry, ie excluding construction and mining, decreased by 6.8 percent/year between 2000 and 2009. This rapid improvement is mainly explained by efficiency gains in the industrial branches (changes at constant structure reached -7.3 percent/year). However, structural changes in energy-intensive industries had a negative impact on energy intensity and offset a small part of those energy efficiency gains.

**Figure 12: Trends in the energy intensity of manufacturing and structural effect**

![Graph showing trends in energy intensity with bars for real variation, change at constant structure, and structural effect. The y-axis represents percentage change per year from -8% to 1%, and the x-axis represents the years 2000-2009.]