Sweden

Energy efficiency report

Objectives:

– 41 TWh of end-use energy savings by 2016

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<td>124</td>
<td>-2.0%</td>
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<td>54</td>
<td>-3.3%</td>
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<td>14</td>
<td>8.7%</td>
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<td>0.36</td>
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*2008 and 2000-2008 for steel

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

Latest update: February 2011

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

1.1. Policies: 41 TWh of end-use energy savings by 2016

Sweden has adopted a National Energy Efficiency Action Plan 2008-2016, which sets an energy savings target of 41.1 TWh (3.5 Mtoe) for 2016, to be achieved in buildings, transport and small industries (excluding sectors under ETS). That target corresponds to 9 percent of the reference final energy consumption.

In the framework of the Climate Plan, the Government plans to double the funds earmarked annually for energy efficiency measures to SEK 300m/year (US$39m/year) between 2010 and 2014.

The Government has set an objective to reduce the energy used to heat dwellings and public/commercial premises by 20 percent by 2020, and by 50 percent by 2050 compared with 1995 figures.

1.2. Energy consumption trends: high energy consumption per capita

Swedish primary energy consumption per capita is relatively high, and in 2009 stood 45 percent above the EU average.

Total energy consumption remained roughly stable between 1996 and 2008. In 2009 it fell sharply, decreasing by more than 9 percent. In that same year, the economic downturn caused a noticeable drop in industrial energy consumption.

Primary electricity (e.g., nuclear, hydro, and wind energy, etc.) accounted for 45 percent of the country’s energy consumption in 2009. Its share has decreased slightly since 1990 while the share of biomass has grown steadily, from 12 percent in 1990 to 20 percent in 2009. Fossil fuels make a stable contribution towards the fulfillment of Sweden’s energy needs: oil with 27 percent of overall consumption, coal with 5 percent and natural gas with 2 percent. The remainder corresponds to heat.
2. Power generation

2.1. Policies: 50% of renewables in energy consumption by 2020

In 2009 the Climate Plan set the target of achieving 50 percent of renewables in energy consumption by 2020. To reach that target, the Swedish Parliament fixed the objective of producing 10 TWh/year of electricity from wind (4 TWh onshore and 6 TWh offshore) by 2015 and 30 TWh/year by 2020 (20 TWh onshore and 10 TWh offshore).

Certificates for the production of electricity from renewables were introduced in 2003. As such, electricity distributors and large consumers are obliged to buy a quota of electricity from renewables (17.9 percent in 2011 and 2012). Sweden and Norway have agreed on the basis for the creation of a common green certificate market, expected to be launched in January 2012. Plans have also been made to improve the conditions for the connection of renewable electricity production to the national grid.

2.2. Power generation trends by source: CO₂-free power generation

Electricity generation is primarily made up of hydropower and nuclear energy, which both have market shares of around 40-45 percent, depending on the years. The market share of wind energy and other renewables is increasing and in 2009 reached 10 percent of overall power production. Accordingly, electricity generation is almost completely CO₂-free. Fossil fuels play a marginal role in electricity production.

1.3. Energy efficiency and CO₂ trends: high energy intensity but reductions achieved

Total energy consumption per unit of GDP (primary energy intensity), measured at purchasing power parity, is 25 percent higher than the EU average.

Primary energy intensity has decreased at a faster pace than in the EU as a whole, ie, by 2 percent/year compared with 1.7 percent/year for the EU between 1990 and 2009. It also decreased more rapidly than final energy intensity over the period, thanks to a reduction in conversion losses (primarily in power generation).

CO₂ emissions per unit of GDP (CO₂ intensity) decreased faster than the total energy intensity over the period 1990-2009 because of an increasing share of biomass in the primary energy mix. Around 30 percent of the CO₂ intensity decrease was achieved through the substitution of oil and coal by biomass, while the remainder is explained by a reduction in energy intensity.
2.3. Efficiency of the power sector: high efficiency in power generation thanks to hydropower

The efficiency of the power sector is high, at around 50 percent, thanks to the large contribution of hydropower to power generation.

The rate of T&D losses in the Swedish electricity grid is around 7.5 percent, ie, 15 percent higher than the EU average.

The emission factor for power generation (CO₂ emissions per kWh produced) is very low in Sweden, since almost the entire power generation is CO₂-free. In 2009, the amount of CO₂ emissions released per kWh produced was around 30 gCO₂.

3. Industry

3.1. Policies: tax exemption and subsidies for energy audits

An energy tax on the electricity used in the manufacturing industry, agriculture, forestry and fisheries was introduced on 1 July 2004. Industries participating in a five-year program to improve energy efficiency are exempt from this tax for the electricity they use for industrial processes.
Since December 2009, energy audits in energy-intensive companies (consumption >500 MWh/year) are subsidized. The scheme covers up to 50 percent of the costs with a maximum of SEK 30,000 million (US$3,900 million).

3.2. Energy consumption trends: large share of paper in industrial energy consumption

Industrial energy consumption increased slightly between 2001 and 2007, by 1 percent/year. It decreased by 4 percent in 2008 and by 12 percent in 2009.

Electricity is the sector’s largest energy source, with a market share of 40 percent, while biomass represents 30 percent of industrial energy consumption (34 percent in 2009). The share of oil has decreased since 1990, from 15 percent to 10 percent in 2009. Coal accounts for 12 percent of overall consumption (8 percent in 2009) while natural gas accounts for just 3 percent. The remainder corresponds to district heating (4 percent in 2009).

Energy-intensive industries represent more than 70 percent of industrial energy consumption. The paper industry is the largest consuming sector, with 50 percent of overall consumption, up slightly since 1990. The steel industry accounts for 15 percent of the sector’s consumption (13 percent in 2009), while the non-metallic minerals and chemicals sectors have much smaller market shares (6 percent and 3 percent, respectively).

3.3. Energy intensity trends: large reduction in industry

Between 1990 and 2008, the energy consumption per unit of industrial value added decreased at the rapid pace of 3.2 percent/year. The largest drop was seen in the chemical sector, since energy consumption per unit of value added decreased sharply (by 3.7 percent/year). In the paper industry, ie, the largest energy consuming sector, the energy required per ton of paper decreased by 0.6 percent/year. In turn, over the given period the energy consumption per unit ton of steel increased slightly, by 0.2 percent/year, while the energy used per ton of cement increased by 0.1 percent/year between 1990 and 2008.
The share of combined heat and power generation in Swedish industrial consumption has increased rapidly since 2005, and reached 14 percent in 2009 compared with 5 percent in 1990. However, it is lower than the EU average (17 percent).

The energy intensity of the manufacturing industry (ie, excluding mining and construction) decreased by 3.5 percent/year between 1990 and 2008. That trend was largely supported by changes in the value added structure, beyond energy efficiency improvements. Around 15 percent of the decrease was achieved through improvements in the sector’s energy efficiency, as shown by the trend in the energy intensity calculated at constant value added structure (-0.6 percent/year), while almost 85 percent of the decrease resulted from structural changes in the industry, namely a growing share of machinery and transport equipment, ie, the branches with the lowest energy intensity.