

# United Kingdom energy efficiency report

Latest update: January 2012

Objectives:

- 136.5 TWh of end-user energy savings by 2016
- 293 Mt of CO<sub>2</sub> savings in the residential sector by energy distributors by 2012

<b>OVERVIEW</b>	2010		2000-2010 (%/year)	
Primary intensity (EU=100) <sup>1</sup>	81	++	-2.4%	++
CO <sub>2</sub> intensity (EU=100)	93	+	-2.3%	+
CO <sub>2</sub> emissions per capita (in tCO <sub>2</sub> /cap)	7.8	-	-1.4%	+

<b>POWER GENERATION</b>	2010		2000-2010 (%/year)	
Efficiency of thermal power plants (in %)	44	++	0.2%	-
Rate of electricity T&D losses (in %)	7	-	-1.3%	-
CO <sub>2</sub> emissions per kWh generated (in gCO <sub>2</sub> /kWh)	454	-	-0.4%	-

<b>INDUSTRY</b>	2010		2000-2010 (%/year)	
Energy intensity (EU=100)	81	++	-1.7%	-
Share of industrial CHP in industrial consumption (in %)	27	+	1.4%	-
Unit consumption of steel (in toe/t)	0.3	-	-1.8%	+

- ++ Among the best performing countries
- + Above the EU average<sup>1</sup>
- Below the EU average<sup>1</sup>
- Among the worst performing countries

<sup>1</sup> The European Union, as the best performing region, is used as the benchmark.

# 1. Overview

## 1.1. Policies: lower expectations

Like the Action Plan 2008-2016, the National Energy Efficiency Action Plan 2011-2020 sets an energy savings target of 136.5 TWh by 2016 in buildings, transport and small industries, excluding sectors under the Emissions Trading Scheme (ETS), corresponding to 9 percent of the reference energy consumption of final consumers.

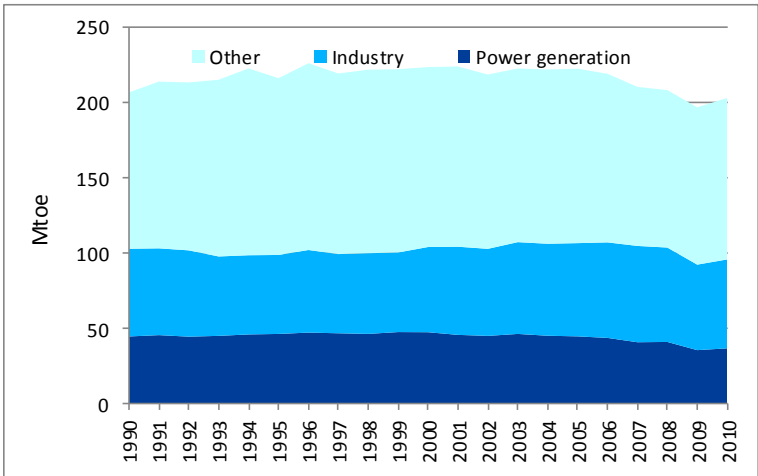
An energy saving obligations system, called Energy Efficiency Commitment (EEC), requires energy suppliers to encourage their domestic customers to reduce their energy consumption (50 percent must be low-income households). The 1 percent energy consumption reduction target set for the first period (2002-2005) was doubled over the second period (2005-2008). The EEC scheme resulted in annual energy savings of around 6 TWh/year for electricity and around 8 TWh/year for fossil fuels over the period 2002-2008 (or about 5 percent and 2 percent, respectively, of residential energy consumption in 2008). From April 2008 to April 2011, the energy savings obligation imposed on energy suppliers was expressed in terms of CO<sub>2</sub> savings and was called Carbon Emissions Reduction Target (CERT). The CERT was set at 185 MtCO<sub>2</sub> (lifetime savings). In April 2011 a new policy targeting large private and public sector organizations was introduced. The Carbon Reduction Commitment (CRC) Energy Efficiency scheme aims to improve energy efficiency and energy savings, and reduce greenhouse gas (GHG) emissions. The scheme places a cap on the emissions of participating organizations which must buy allowances equal to their annual emissions, in CO<sub>2</sub> equivalent. Within the overall limit on emissions the participating organization can determine the best way to reduce the emissions: either by investing in measures that decrease the number of allowances that must be purchased, or by buying extra allowances.

In 2011 the Department of Energy and Climate Change (DECC) published the country's Carbon Plan, which is aimed at cutting carbon emissions by 80 percent by 2050 compared with 1990 levels.

## 1.2. Energy consumption trends: stabilizing energy needs

UK energy consumption is 3.3 toe per capita, which is in line with the EU average. Total energy consumption was relatively stable between 1995 and 2005, when it started to decrease by more than 2 percent/year. In 2009 total consumption dropped by 5 percent, whereas the country's GDP decreased by 4 percent. In 2010 consumption rebounded by 2.5 percent, but it still remains below pre-crisis levels.

Figure 1: Energy Consumption trends by sector



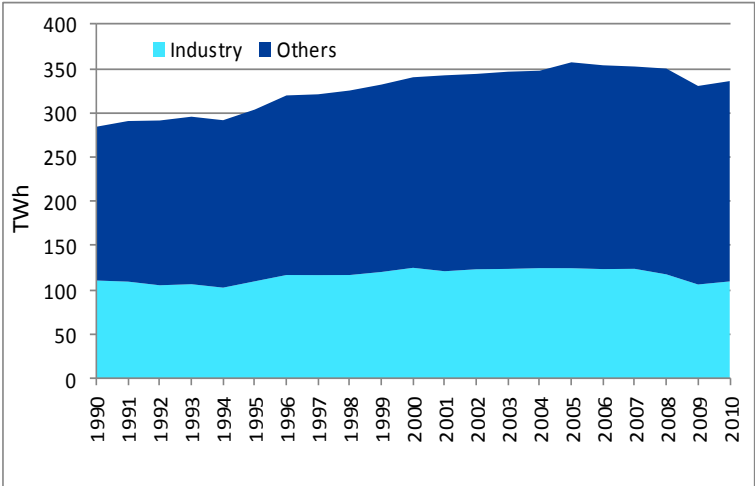
Source: Enerdata

The supply structure is dominated by natural gas, which accounts for 42 percent of the total compared with 23 percent in 1990, and by oil with 31 percent (37 percent in 1990). The share of coal has been scaled down from 30 percent in 1990 to 16 percent in 2010. Hydroelectricity and nuclear power account for 8 percent while biomass represents 3 percent of the total. In 2010, natural gas consumption increased by 5 percent and oil consumption decreased by 6 percent.

Industry (including non-energy uses) accounted for 28 percent of total consumption in 2010 and the power sector for about 20 percent. Their shares are almost stable.

Electricity consumption per capita decreased to 5,350 kWh in 2009 (compared with around 5,800 kWh since 2000) because of the crisis, and has not recovered since then. The share of electricity in final energy consumption has been increasing steadily since 1990 and now stands at 20 percent. Electricity consumption increased on a regular basis between 1990 and 2005, and remained relatively stable between 2005 and 2008. In 2009 electricity demand fell by 7 percent as a result of the global economic downturn, with the decrease in industry reaching as much as 11 percent. In 2010 electricity consumption increased slightly, by 1 percent, but still remains about 6 percent below its pre-crisis level. Industry accounts for 32 percent of electricity consumption.

Figure 2: Electricity consumption trends by sector

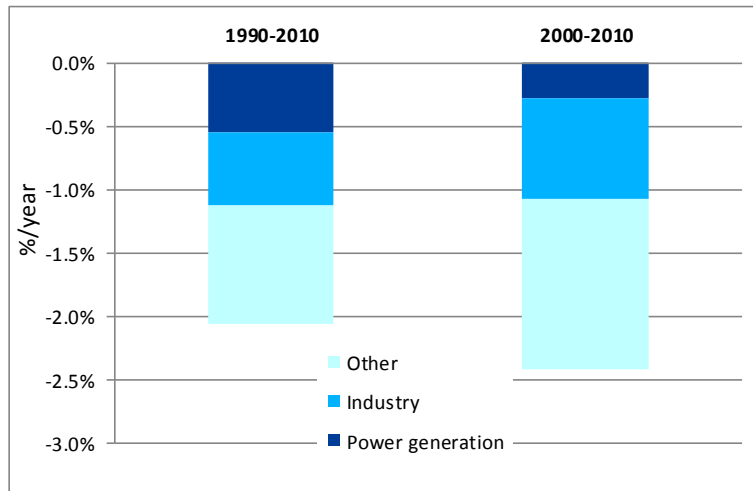


Source: Enerdata

### 1.3. Energy efficiency trends: considerable energy intensity reduction

The UK’s total energy consumption per unit of GDP (primary energy intensity), measured at purchasing power parity, is about 20 percent lower than the EU average. It has also decreased more rapidly than in the EU, at a pace of around 2 percent/year between 1990 and 2010 (compared with the EU average of 1.6 percent/year). Industry contributed to 28 percent of that decrease and the power sector to 26 percent over the period 1990-2010. Energy intensity continued to decrease but at a much faster rate over the period 2000-2010.

Figure 3: Energy intensity trends

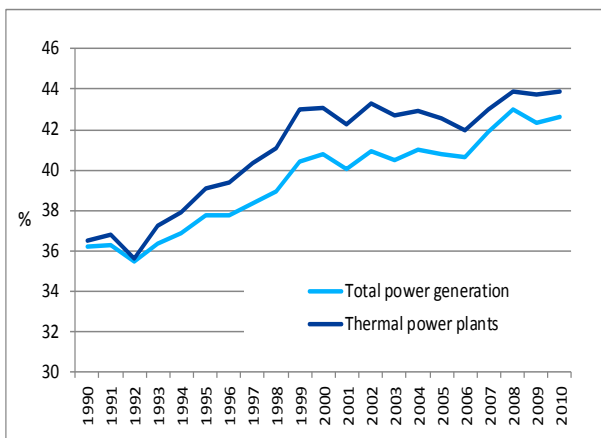


Source: Enerdata

## 2. Power generation: high increases in average efficiency thanks to more efficient technologies

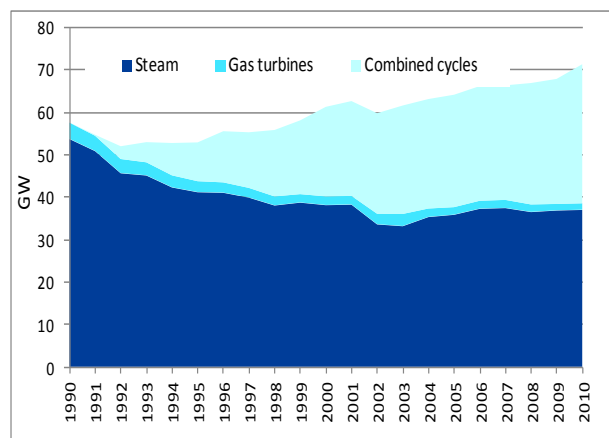
The efficiency of the power sector has increased substantially, from 36 percent in 1990 to 43 percent in 2010. Despite the major role of thermal energies, that energy efficiency level is above the EU average and equal to or greater than the levels in countries with a larger share of hydropower in their power mix. In fact, the energy efficiency of thermal power plants is relatively high in the UK and has increased rapidly, reaching 44 percent in 2010. That improvement is due to a switch in the power generation mix to natural gas, and to the spread of efficient technologies like gas combined cycles and cogeneration. In 2010, combined cycles accounted for 46 percent of the thermal electricity capacity, which equals an average increase of 4.5 percent/year over the period 2000-2010.

Figure 4: Efficiency of power generation and thermal power plants



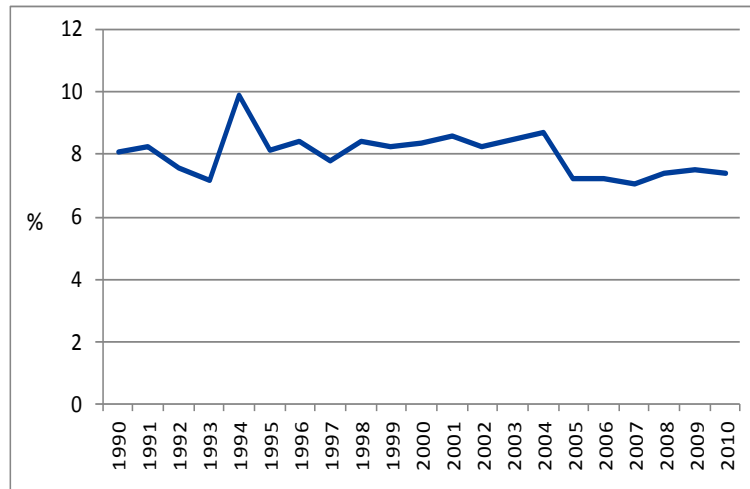
Source: Enerdata

Figure 5: Thermal electricity capacity, by technology



The rate of transmission and distribution losses (T&D) in the grid is less than 8 percent, ie 13 percent above the EU average.

Figure 6: Electric T&D Losses



Source: Enerdata

### 3. Industry

#### 3.1. Policies: new energy efficiency scheme targets large energy consumers

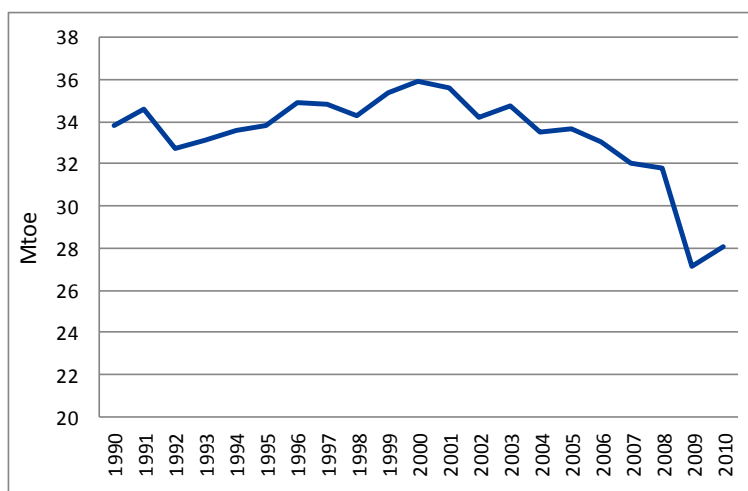
The CHP capacity increased rapidly in order to meet the official target of 10 GW in 2010, set within the framework of the Strategy for Combined Heat and Power of the climate change program. However, the target was not achieved (5.6 GW of installed capacities in 2010).

Energy efficiency in energy-intensive industries is driven by the EU ETS introduced in 2010. The CRC Energy Efficiency Scheme aims to improve energy efficiency and thus cut CO<sub>2</sub> emissions in large energy-consuming private and public organizations. The scheme involves a cap on emissions for each qualified entity and the purchase of allowances to emit carbon dioxide. The first sale of allowances will start in 2012.

#### 3.2. Energy consumption trends: decreasing energy needs in industry

Industrial energy consumption has been decreasing at a pace of 2.4 percent/year since 2000, ie more rapidly than the overall energy consumption. In 2009 energy consumption fell by 15 percent due to the economic crisis, and in 2010 increased by a mere 3.6 percent.

**Figure 7: Trends in industrial energy consumption**

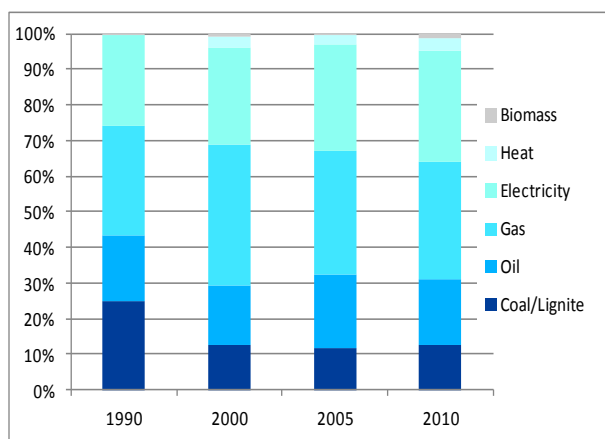


Source: Enerdata

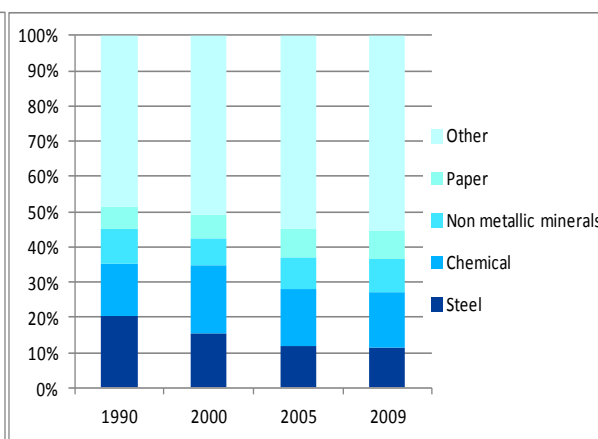
Natural gas accounts for around 35 percent of industrial energy consumption, compared with 30 percent in 1990. Electricity use developed rapidly and has now reached 30 percent. The market share of coal was reduced from 25 percent to 12 percent over the period. Oil has maintained a share of 20 percent since 1990. Biomass is marginal, with 1 percent of the total.

The share of energy-intensive industries has decreased since 1990, from 50 percent to less than 42 percent in 2009. The chemical industry accounts for 14 percent of the total. The share of steel has decreased significantly, from 20 percent in 1990 to 11 percent in 2009. The non-metallic minerals and paper industries have market shares of 10 percent and 7 percent, respectively.

**Figure 81: Energy consumption of industry, by source**



**Figure 92: Energy consumption of industry, by branch**



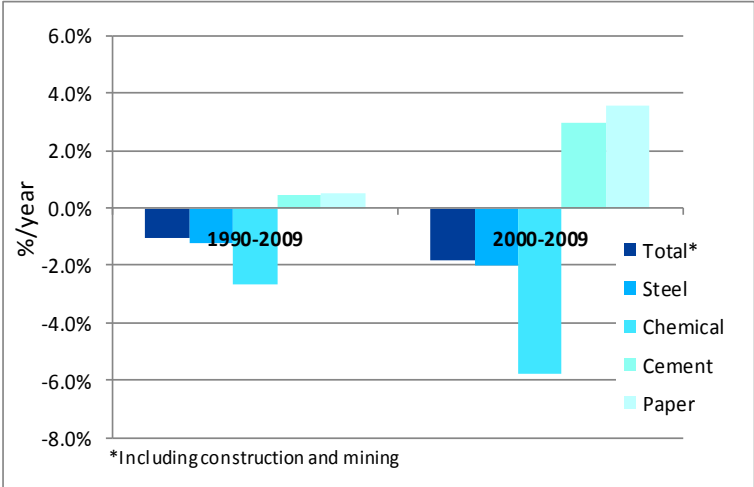
Source: Enerdata

### 3.3. Energy intensity trends: moderate reductions in industrial branches

Between 1990 and 2009, the consumption per unit of industrial value added (energy intensity) decreased at the moderate pace of 1.1 percent/year. The largest decrease was seen in the chemical industry (2.7 percent/year). The steel industry showed an above-average reduction in its energy consumption per ton

produced (1.2 percent/year) while energy consumption per ton of cement rose slightly (0.4 percent/year). The energy consumption per ton of paper also increased over the period, at 0.5 percent/year.

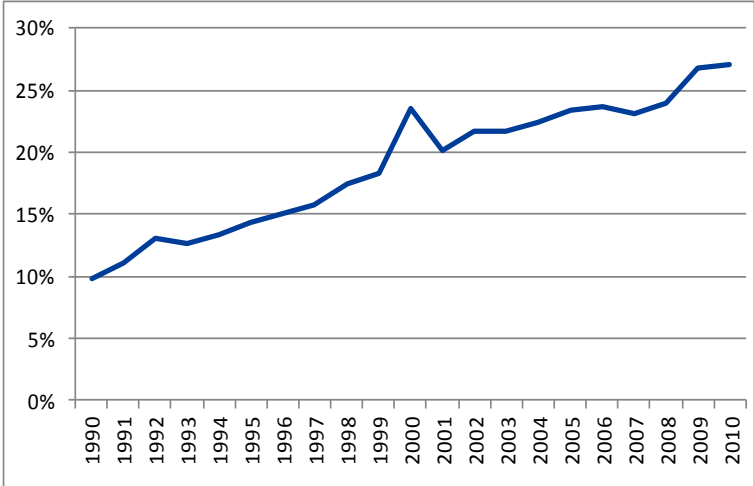
**Figure 10: Trends in the energy intensity of industrial branches**



Source: Enerdata, Odyssee

Combined heat and power generation has developed since 1990 and in 2010 made up 27 percent of industry’s electricity consumption. That level is far above the EU average.

**Figure 11: Share of industrial CHP in industrial consumption**

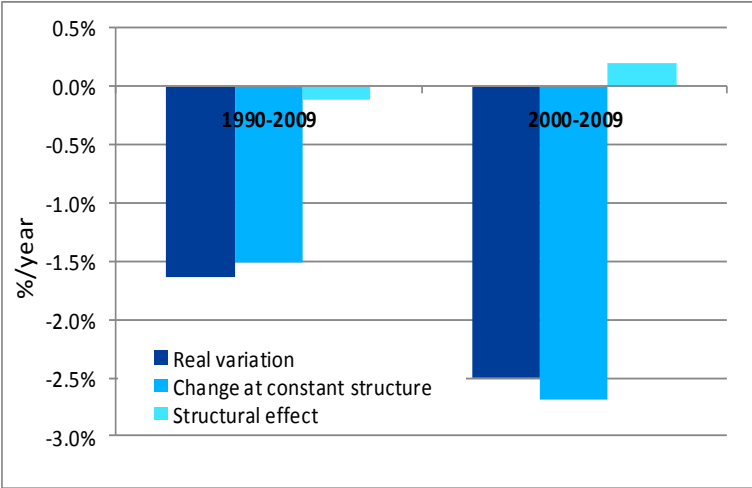


Source: Enerdata

The energy intensity of manufacturing industries (ie excluding construction and mining) decreased by 2.5 percent/year over the period 2000-2009. That trend is influenced by the changes in the energy efficiency of the various industrial branches, but also by changes in the structure of the value added of manufacturing. When calculated at constant structure to remove the effect of changes in the structure of the value added of manufacturing and to better capture the true energy efficiency improvements, the decrease was slightly faster

(2.7 percent/year); the difference (about 0.2 percent/year) reflects structural changes, although they were negligible over the period.

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



Source: Enerdata