France
Energy efficiency report

Objectives:

– 139 TWh of end-user energy savings, or about 9 percent, in 2016
– 345 TWh of lifetime energy savings obligations for energy distributors over 2010-2013

Overview	**2009**		**2000-2009 (% / year)**	
Primary intensity (EU=100)[1]	109	-	-1.3%	-
CO_2 intensity (EU=100)	68	++	-2.2%	+
CO_2 emissions per capita (in tCO_2 / cap)	5.4	+	-1.6%	+
Power generation	**2009**		**2000-2009 (% / year)**	
Efficiency of thermal power plants (in %)	33	-	-0.6%	--
Rate of electricity T&D losses (in %)	7	-	-0.3%	-
CO_2 emissions per kWh generated (in gCO_2 / kWh)	83	++	0.9%	--
Industry	**2009***		**2000-2009* (% / year)**	
Energy intensity (EU=100)	95	+	-2.9%	+
Share of industrial CHP in industry consumption (in %)	10	-	3.1%	-
Unit consumption of steel (in toe / t)	0.34	-	0.7%	--

*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: January 2011

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

1. Overview

1.1. Policies: 9 percent energy savings target for 2008-2016

France has adopted a National Energy Efficiency Action Plan 2008-2016 (NEEAP), which sets an energy savings target of at least 9 percent between 2008 and 2016, ie, 139 TWh (12 Mtoe) in buildings, transport and small industries (excluding sectors under ETS).

The 2005 energy law aims to reduce final energy intensity by 2 percent / year by 2015 and implements energy saving obligations for energy utilities, known as the energy savings certificate scheme. This scheme set the volume of energy savings for energy companies over a first period from July 2006 until July 2009 at 54 TWh (lifetime cumulative savings), split according to energy source. At the end of the first period the volume of certificates exceeded the target and amounted to 65 TWh. Most of the certificates were obtained in residential buildings (above 85 percent). A second period of white certificates was approved in December 2010 and extended to the transport sector. The target is to reach 345 TWh (lifetime cumulated) over 2010-2013.

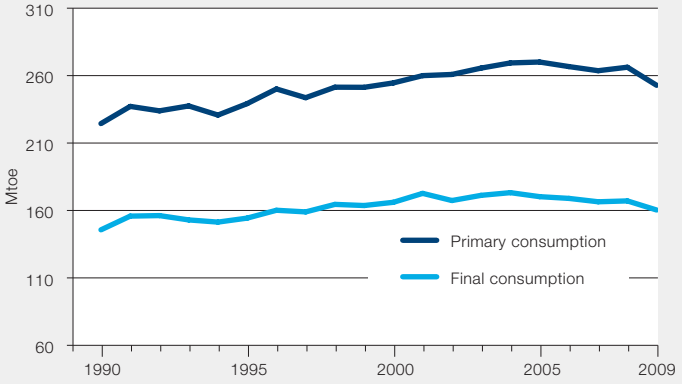
In the framework of the Finance Law 2005, the government reinforced the tax credit system, which can go up to 50 percent, to support the diffusion of energy efficiency materials.

1.2. Energy consumption trends: higher than EU average

France has one of the highest levels of energy consumption in the European Union. In 2009 France's total consumption per capita was 4 toe, which is 20 percent above the European average. Over the period 2000-2008 total energy consumption increased by 0.5 percent / year. However, in 2009 it decreased by 5 percent, to just below its 2000 level.

Nuclear power is the principal energy source, with a stable share of over 40 percent of total consumption. Oil meets 30 percent of the energy needs and its share has been decreasing since 1990. The role of natural gas in the energy supply has increased over time and accounts for 15 percent of the total. The contribution of coal was scaled down from 9 percent in 1990 to 4 percent in 2009, while the use of biomass remains low (6 percent in 2009).

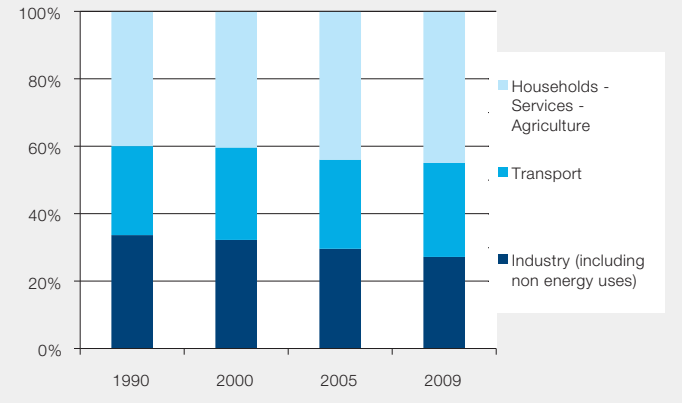
Figure 1: Total and final energy consumption trends



Source: Enerdata

The share of industry in energy consumption fell from 35 percent in 1990 to around 25 percent in 2009 (including non-energy uses). The households, services and agriculture sectors absorb more than 40 percent of consumption and the transport sector around 30 percent.

Figure 2: Distribution of final energy consumption by sector



Source: Enerdata

The country's electricity consumption per capita is significantly higher than the European average due to the high penetration of electric heating (7,250 kWh in 2009, compared with 5,650 kWh in the EU). The share of electricity in final energy consumption is increasing steadily and reached 23 percent in 2009 (compared with 18 percent in 1990). The country's electricity demand has been increasing relatively rapidly: almost 2 percent / year on average since 1990 and over 1 percent / year since 2000. It dropped by 2 percent in 2009, with a significant reduction of power consumption in the industrial sector.

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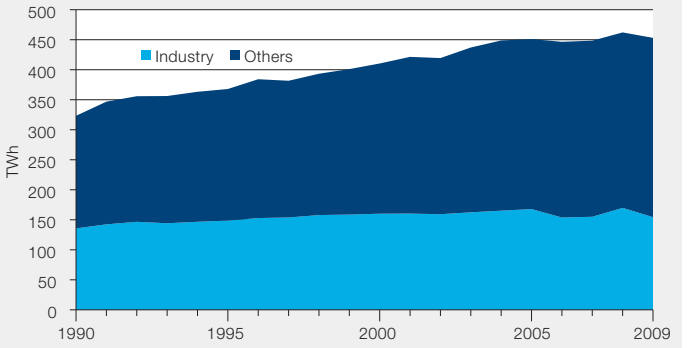
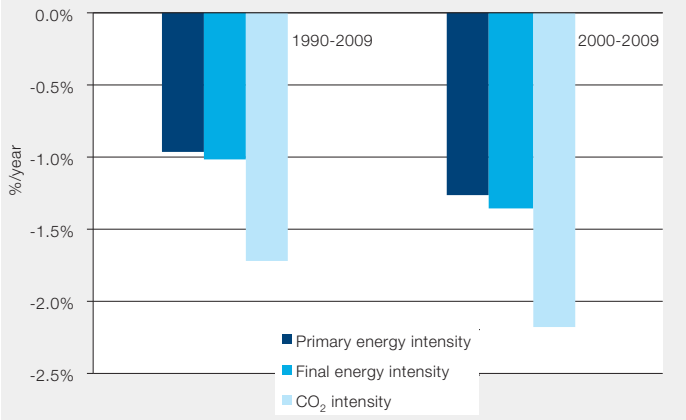
Figure 3: Electricity consumption trends by sector



Source: Enerdata

Figure 4: Energy and CO_2 intensity trends



Source: Enerdata

1.3. Energy efficiency and CO_2 trends: reductions achieved since 1990

Total energy consumption per unit of GDP (primary energy intensity), measured at purchasing power parity, is 9 percent higher than the EU average.

This total energy intensity has decreased at a slower pace than in the EU as a whole, at 1 percent / year compared with 1.7 percent / year for the EU between 1990 and 2009. Despite energy substitution and the diffusion of more efficient technologies achieved over the period, this drop in total energy intensity was not as fast as the reduction in final energy consumption per unit of GDP (final intensity). This trend is related to the increasing share of electricity in the energy supply, which leads to growing conversion losses in power generation, since most of the electricity is produced from nuclear, which has a low efficiency rate.

CO_2 emissions per unit of GDP (CO_2 intensity) decreased almost twice as fast as the total energy intensity over the period 1990-2009 due to substitutions of oil and coal by electricity, natural gas and biomass; fuel substitutions explain about 40 percent of the CO_2 intensity reduction.

2. Power generation

2.1. Policies: +38 GW of renewable capacities by 2020

According to the European Directive that promotes the use of energy derived from renewable sources, the national target is to increase the share of renewables in final consumption to 23 percent by 2020.

The European target was included in the framework of a program called Grenelle de l'Environnement, which defines installed capacity targets for electricity production from renewable energies in 2020: 25,000 MW of wind, 6,000 MW of which is offshore; 5,400 MW of solar photovoltaic; 2,300 MW of biomass; and 3,000 MW of hydroelectric for peak periods.

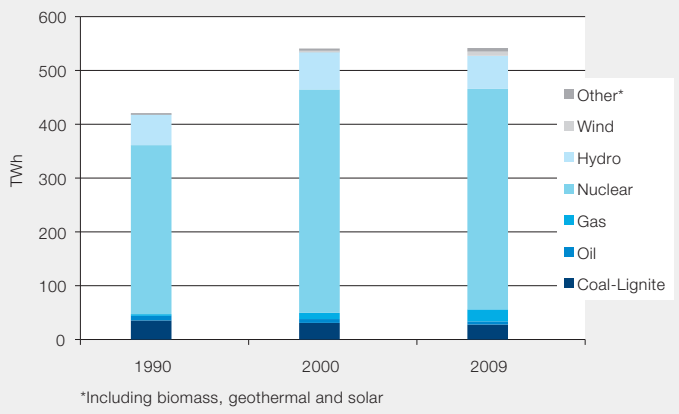
The development of renewables is supported through the purchase of electricity generated from renewables at feed-in tariffs. The implementation of a Solar Plan, as from 2000, through tax credit (raised to 50 percent for the installation of either photovoltaic or thermal solar panels in 2006), has resulted in a rapid growth of the solar photovoltaic market. In January 2010 the Government clarified the conditions that need to be met in order to benefit from the new feed-in tariffs introduced in 2009, and which should stay unchanged until 2012. However, feed-in tariffs for large installations were cut by 12 percent with effect from September 2010, in an effort to soften the rapid development of new solar energy capacities. In the framework of its 2011 budget, France announced a reduction in the tax break for household-solar installations from 50 percent to 25 percent as of September 2010.

2.2. Power generation trends by source: CO_2-free generation mix

France has the world's largest share of nuclear in electricity production. More than 75 percent of electricity is generated from nuclear power, while hydroelectricity represents around 10 percent of power generation. Wind energy accounted for 1 percent of the total in 2009. Consequently, more than 85 percent of electricity generation is CO_2-free.

Within thermal generation, the use of coal and oil has been decreasing since 1990 to the benefit of natural gas, which reached 4 percent of total production in 2009 (2 percent in 2000). Despite the fact that its market share fell sharply, coal was still the largest thermal source for power generation in 2009.

Figure 5: Power generation by source

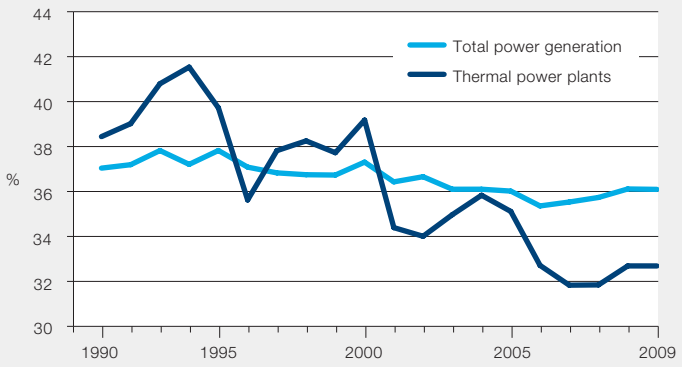


Source: Enerdata

2.3. Efficiency of the power sector: low efficiency rates in power generation

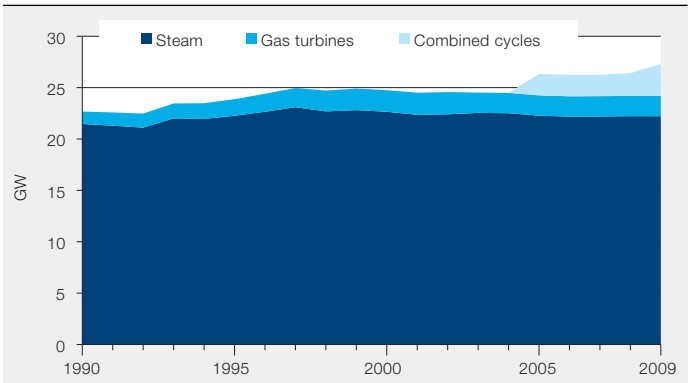
The efficiency of the power sector has decreased since 1990 and stood at 36 percent in 2009. The ratio is driven by the major role played by nuclear energy, which has the lowest power generation efficiency rate.

Figure 6: Efficiency of power generation and thermal power plants



Source: Enerdata

Figure 7: Thermal electricity capacity, by technology



Source: Enerdata

The rate of T&D losses in the French grid is just below 7 percent of the distributed volumes, slightly above the EU average. These losses have been decreasing slightly over time (8 percent in 1990).

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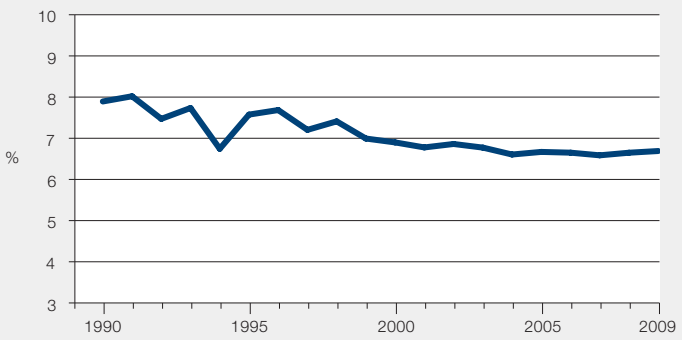
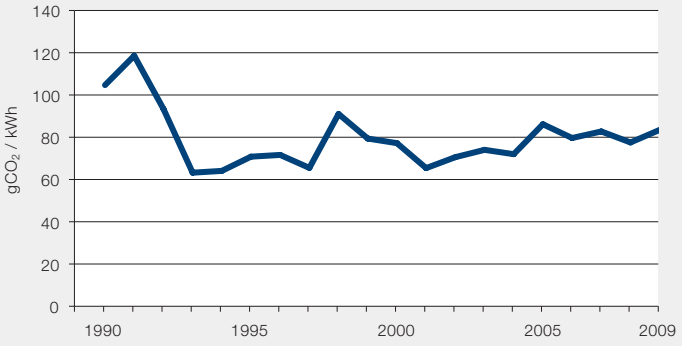
Figure 8: Electric T&D losses



Source: Enerdata

The average CO_2 emission factor for power generation is very low since more than 85 percent of the electricity is produced from CO_2-free technologies. The amount of CO_2 emitted per kWh produced is around 80 gCO_2.

Figure 9: CO_2 emission factor for power generation



Source: Enerdata

3. Industry

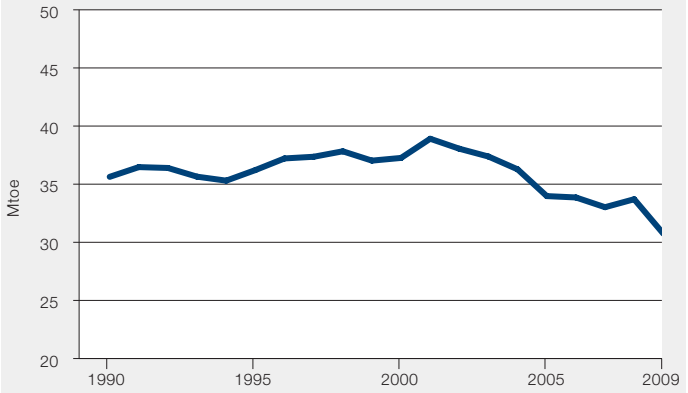
3.1. Policies: EU Emission Trading Scheme main driver of improvements

The main driver of energy efficiency improvements is the EU ETS that sets CO_2 quotas in energy-intensive branches. Energy audits in industry are subsidized at rates between 50 percent and 70 percent depending on the type of audit. Combined heat and power generation is supported through a feed-in tariff of between €6.1c / kWh and €9.15c / kWh (US$0.085-0.127 / kWh),, depending on factors including capacity, the natural gas price or even the number of operating hours.

3.2. Energy consumption trends: increase in electricity and natural gas demand

Energy consumption in industry increased at a moderate pace between 1990 and 2000 (0.8 percent / year), but has decreased by 3 percent / year since then. In 2009, industrial energy consumption was impacted by the global economic downturn and dropped by 9 percent.

Figure 10: Industrial energy consumption



Source: Enerdata

The share of fossil fuels in the sector's energy consumption has fallen over time, from around 70 percent in 1990 to 60 percent in 2009. The use of electricity to meet energy needs in industry has increased since 1990, from 28 percent in 1990 to 35 percent in 2009. Biomass is also developing and reached 5 percent of the total in 2009. The use of coal has been scaled down from 25 percent to around 15 percent of the total in 2009. In turn, the share of natural gas has developed and accounted for half of the fossil fuels used in industry in 2009 (30 percent of the total).

The share of energy-intensive industries has fallen slightly since 1990, from 60 percent of the sector's consumption to below 55 percent in 2008. Consumption by the steel industry in particular fell from 23 percent in 1990 to 16 percent in 2008. The shares of the chemical and paper industries fell slightly over the period. In turn, energy consumption in the non-metallic metals industry represented 13 percent of the sector's consumption in 2008, up from 11 percent in 1990.

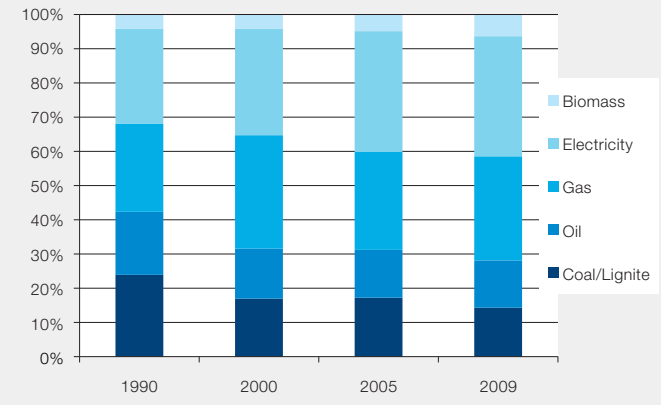
3.3. Energy intensity trends: noticeable energy intensity reductions

Between 1990 and 2008, the energy consumption per unit of industrial value added decreased by 1.5 percent / year. A significant reduction of energy consumption per unit of value added was seen in the chemical industry (above 3.5 percent / year). In the steel industry the energy used per tonne of

steel decreased by 1.2 percent / year over the period 1990-2008, while the energy required per tonne of paper decreased by 0.9 percent / year. Energy efficiency in the cement industry did not improve since the energy consumption per tonne of cement increased slightly.

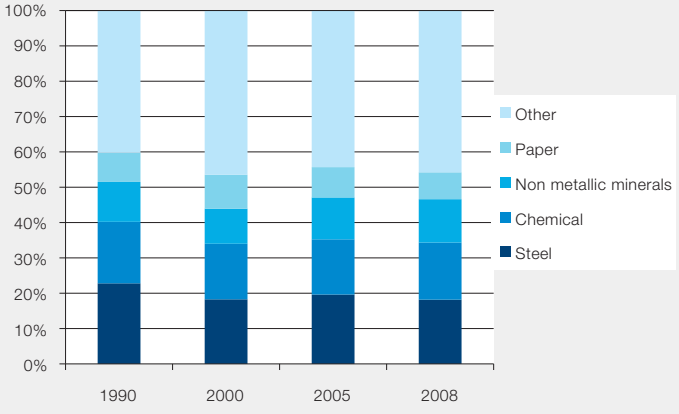
The sector's energy intensity was not only influenced by energy efficiency improvements but also by changes in the structure of the industrial value added. When calculated at constant structure, the energy intensity of manufacturing has decreased to a lesser extent, by 0.3 percent / year, compared with 1.1 percent / year for the actual value. The difference is due to structural changes in the industry, which tend toward a growing share of machinery and transport equipment, a branch with the lowest energy intensity when measuring value added in the manufacturing industry. The structural effect explains 70 percent of the total variation over the period 2000-2008 and 60 percent between 1990 and 2008.

Figure 11: Energy consumption of industry, by source



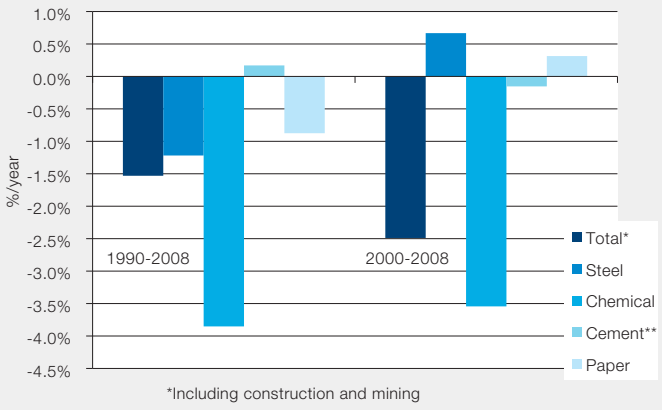
Source: Enerdata

Figure 12: Energy consumption of industry, by branch



Source: Enerdata

Figure 13: Trends in the energy intensity of industrial branches

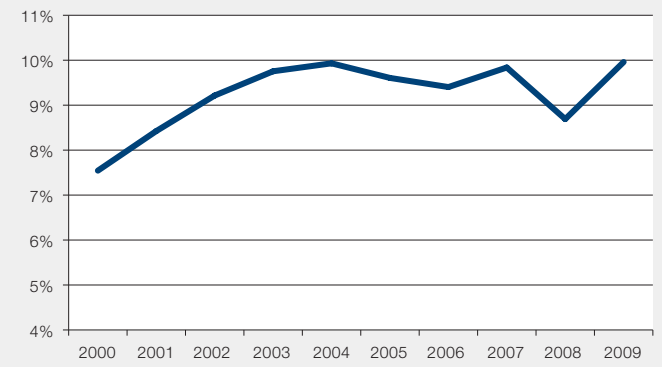


*Including construction and mining

**Non metallic minerals

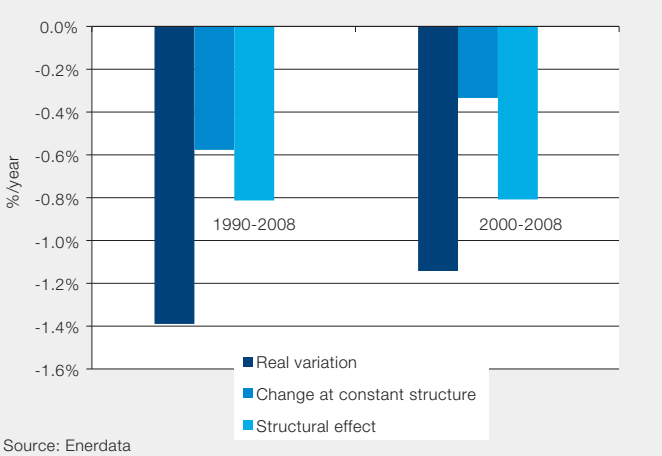
Source: Enerdata

Figure 14: Share of industrial CHP in industrial consumption



Source: Enerdata

Figure 15: Trend in the energy intensity of manufacturing and structural effect



Source: Enerdata

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