

Japan

Energy efficiency report



Objective: 30% improvement in energy efficiency by 2030

Overview	2011		2000-2011 (%/year)	
Primary intensity (EU=100) ¹	101	-	-1.7%	+
CO ₂ intensity (EU=100)	115	-	-0.8%	--
CO ₂ emissions per capita (in tCO ₂ /cap)	8.7	-	-0.2%	-
Power generation	2011		2000-2011 (%/year)	
Efficiency of thermal power plants (in %)	46	++	0.4%	+
Rate of electricity T&D losses (in %)	4.6	+	-0.1%	-
CO ₂ emissions per kWh generated (in gCO ₂ /kWh)	490	-	2.1%	--
Industry	2011		2000-2011 (%/year)	
Energy intensity (EU=100)	103	-	0.3%	--
Share of industrial CHP in industrial consumption (in %)				
Unit consumption of steel (in toe/t)	0.371	--	0.0%	-

*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: March 2013

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

1. Overview

1.1. Policies: 30% energy efficiency improvement target for 2030

The energy efficiency policy is governed by the Energy Conservation Law (Rational Use of Energy Act), voted in 1979, which obliges manufacturers and importers to enhance the energy efficiency of their products. The government drafted the New National Energy Strategy to promote energy conservation measures in 2006; the strategy also presented the Energy Conservation Frontrunner Plan. The target set in the plan is to further improve energy efficiency by at least 30 percent by 2030 compared with its 2003 level.

Energy efficiency standards for many electrical appliances and vehicles were created under the Top-Runner Program in 1999 and reinforced in 2006. It currently concerns 23 products. The first set of targets, fixed for the first period, has been achieved.

Following the Fukushima nuclear accident and the consequent drop in electricity capacity, the government implemented emergency plans to overcome peak demand caused by high air conditioning usage during the summer months and by space heating in winter.

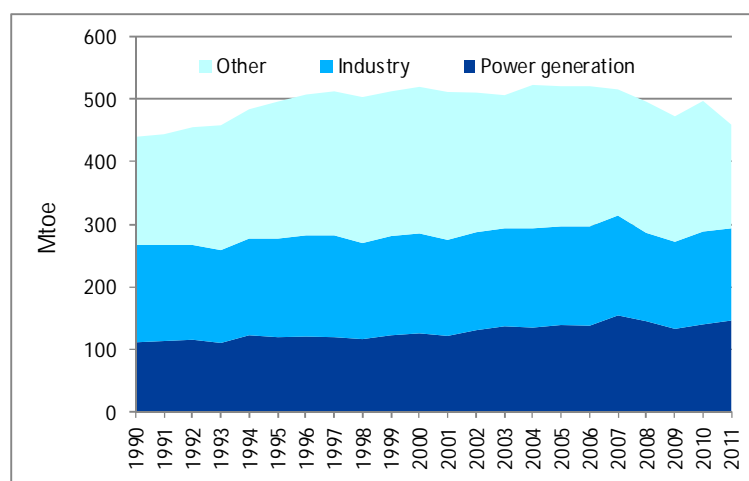
1.2. Energy consumption trends: consumption per capita slightly higher than in the EU

Japan has a slightly higher level of energy consumption per capita than the European Union (nearly 10 percent higher).

Total energy consumption has been decreasing since 2004 (-1.8 percent/year, on average), with a sharp drop in 2009 (-5 percent) due to the economic crisis and again in 2011 (-8 percent) because of the Fukushima nuclear accident and the subsequent restriction of electricity use.

The share of industry (including non-energy uses) in total energy consumption has been stable at about 30 percent since 2000, whereas the share of power generation increased slightly, from 25 percent in the 1990s to about 30 percent.

Figure 1: Energy consumption trends by sector

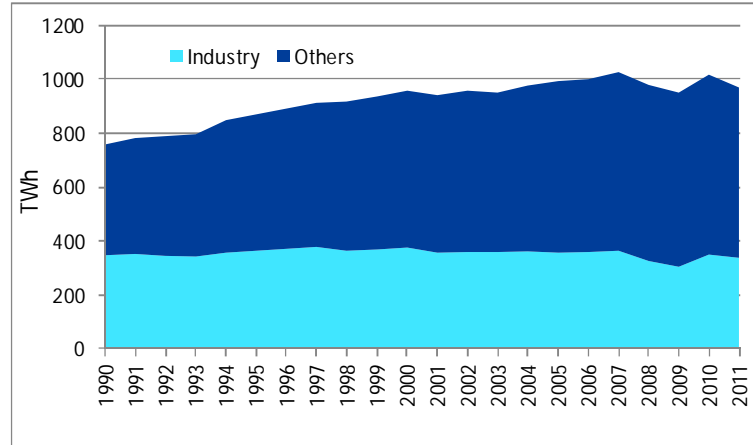


Source: Enerdata

Electricity consumption per capita reached 7,600 kWh in 2011, ie, identical to the OECD average but one-third higher than the EU average. Total electricity consumption decreased by about 4 percent in 2008 and 2009 due to the economic crisis, and by 4.6 percent in 2011 following the Fukushima nuclear accident. Between 2000 and 2007 the growth in electricity consumption was much slower than over the 1990s (1 percent/year compared with

2.3 percent/year between 1990 and 2000). In 2011, industry absorbed 35 percent of electricity consumption, down from 46 percent in 1990.

Figure 2: Electricity consumption trends by sector



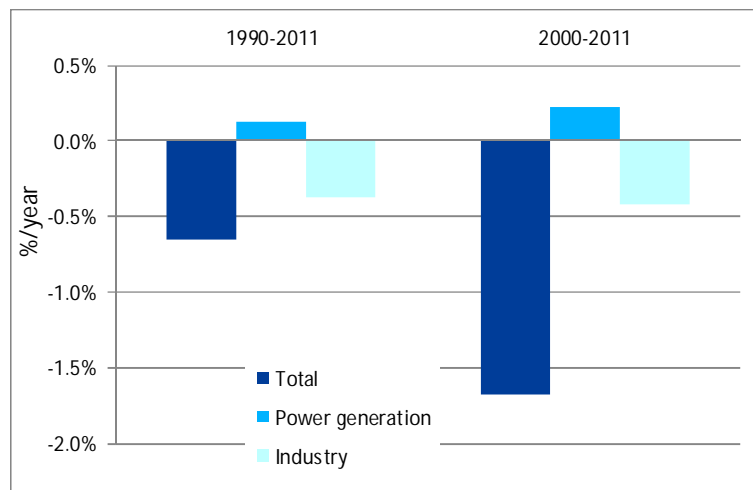
Source: Enerdata

1.3. Energy efficiency trends: consumption per GDP close to the EU average

Total energy intensity (total energy consumption per unit of GDP), measured at purchasing power parity, is close to the EU average.

Since 2000, total energy intensity has decreased at the rapid pace of 1.7 percent/year; the reduction has been nearly three times as fast as over the entire period 1990-2011, mainly thanks to energy efficiency improvements in the transport and residential sectors.

Figure 3: Energy intensity trends

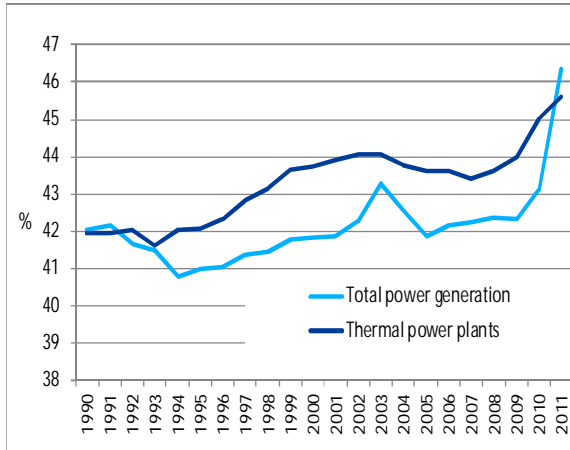


Source: Enerdata

2. Power generation: slight increase thanks to gas

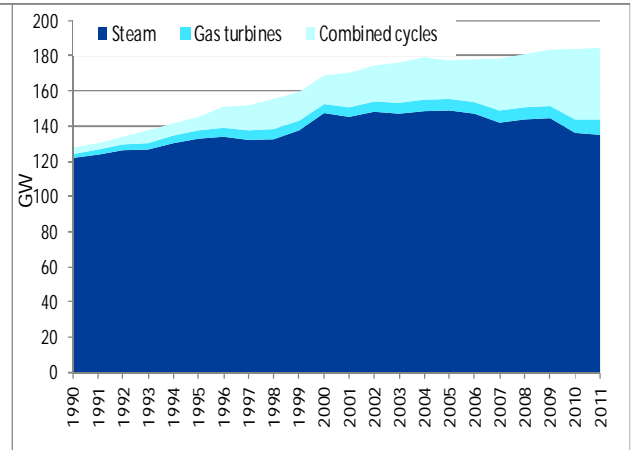
In 2011, the efficiency of the power sector jumped to 46 percent following the closure of nuclear reactors. Prior to that, there had been a slight improvement in the efficiency since 1994, bringing it to 43 percent in 2010. The efficiency of thermal power plants has improved (+4 percentage points) and in 2011 stood at 46 percent, ie, 8 percentage points higher than the EU average. That improvement is due to a switch in the power generation mix to gas combined cycles, which in 2011 accounted for 22 percent of the country's total thermal capacity.

Figure 4: Efficiency of power generation and thermal power plants



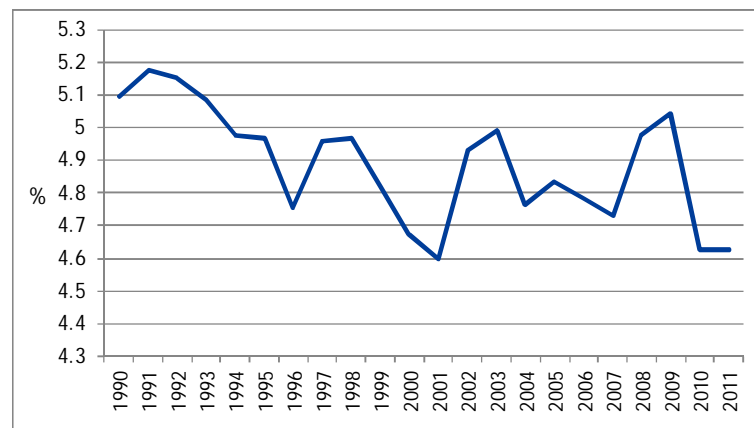
Source: Enerdata

Figure 5: Thermal electricity capacity, by technology



The Japanese grid shows a low rate of transmission and distribution losses (T&D) of around 5 percent of the distributed volumes, which is below the average of OECD countries.

Figure 6: Electric T&D losses



Source: Enerdata

3. Industry

3.1. Policies: market-based instruments combined with voluntary agreements

Various financial and fiscal incentives have been put in place to encourage energy conservation and efficiency in industry. A tax incentive scheme (Tax Scheme for Promoting Investment in the Reform of the Energy Demand-Supply Structure) provides a special depreciation rate of 30 percent of the acquisition cost for businesses investing in specified energy conservation and efficient equipment. For small businesses, the special depreciation rate is coupled with a 7 percent tax deduction off the acquisition cost. Large industrial companies are obliged to name an energy manager who is in charge of implementing an energy plan in the company.

In the Revised Energy Conservation Act (2008), sectoral benchmarks have for the first time been introduced for certain sub-sectors, initially in energy-intensive industries. Indicators are established for companies to benchmark their energy efficiency level against others within the same sub-sector, and medium- and long-term targets are set (to be achieved around 2015-2020).

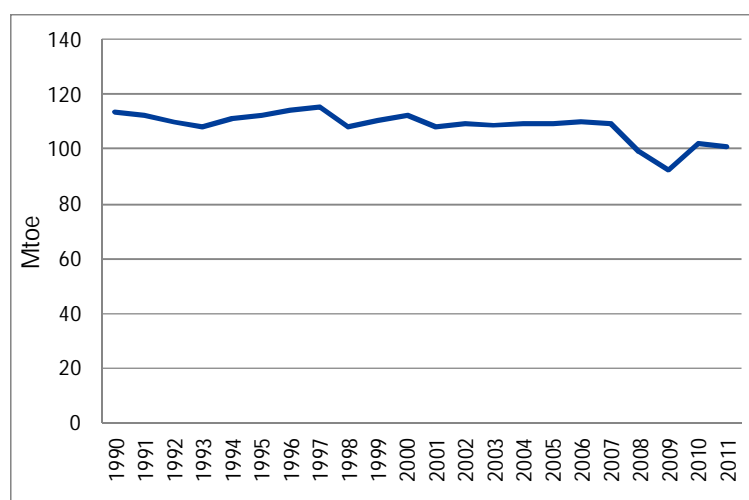
Low interest loans are available for the installation of cogeneration systems. This applies to equipment that generates over 50 kW of output and with over 60 percent efficiency in primary energy use.

Voluntary agreements concerned more than 1,100 industrial companies, with different targets among sub-sectors.

3.2. Energy consumption trends: still below pre-crisis levels

Industrial energy consumption decreased slightly between 1990 and 2007 (-4 percent), while the country's total energy consumption increased by 17 percent. In 2008 and 2009 the global economic downturn caused a dramatic fall in the sector's energy consumption (-15 percent compared with 2007), which to date has still not recovered its pre-crisis level.

Figure 7: Trends in industrial energy consumption



Source: Enerdata

Since 1990 the share of oil in industrial energy consumption has been decreasing, to the benefit of electricity (+3 percentage points), coal (+3 percentage points) and gas (+4 percentage points). In 2011, coal remained the main energy source in industry (46 percent of total energy consumption) whereas natural gas consumption is still low (only 8 percent of the total).

The share of energy-intensive industries in overall industrial energy consumption has increased since 1990. The steel industry's share of energy consumption in particular has increased steadily and now stands at 40 percent.

The share of the chemical industry is steady (around 11 percent), as are the shares of the non-metallic minerals (cement, ceramics, etc.) and paper industries, which each account for 8 percent of total energy consumption.

Figure 8: Energy consumption of industry, by source

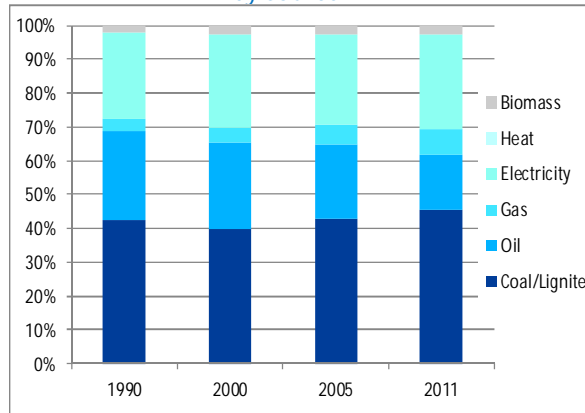
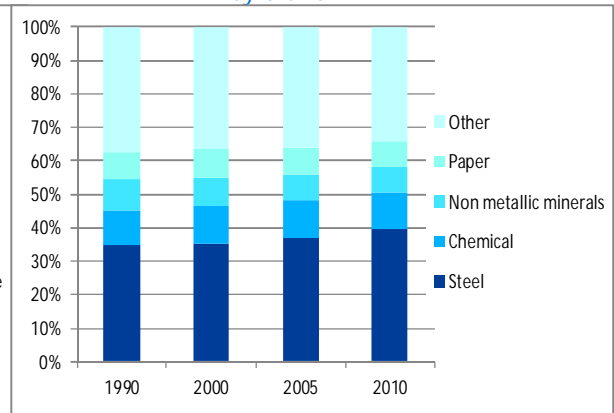


Figure 9: Energy consumption of industry, by branch

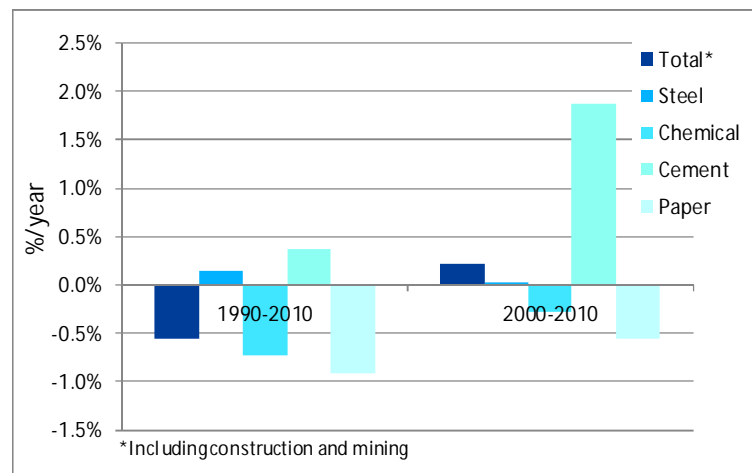


Source: Enerdata

3.3. Energy intensity trends: the crisis ends the energy intensity decrease

The long-term decrease in industrial energy intensity (consumption per unit of industrial value added) ended in 2008. The global economic crisis led to a deterioration in the energy performance, especially in the non-metallic minerals industry (cement), in such a way that in 2010 industrial energy intensity was higher than in 2000.

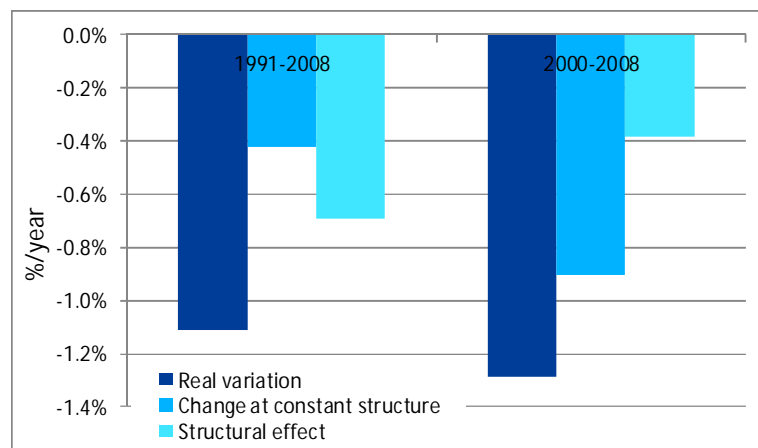
Figure 10: Trends in the energy intensity of industrial branches



Source: Enerdata

Over the period 2000-2008 the energy intensity of manufacturing industries (excluding mining and construction) decreased by around 1.3 percent/year, but when calculated at constant structure, the decrease is much slower, at around 0.9 percent/year; the difference (about 0.4 percent/year) is due to changes in the industrial structure towards less energy-intensive branches. This structural effect explains about one third of the total variation. Over the period 1990-2008 the structural effect was even greater.

Figure 11: Evolution of the energy intensity of manufacturing and structural effect



Source: Enerdata