

Brazil energy efficiency report

Latest update: February 2012

Objectives:

- 109 TWh of electricity savings by 2030

OVERVIEW	2010		2000-2010 (%/year)	
Primary intensity (EU=100) ¹	109	-	-0.1%	--
CO ₂ intensity (EU=100)	75	++	-1.0%	--
CO ₂ emissions per capita (in tCO ₂ /cap)	1.9	++	1.3%	--
POWER GENERATION	2010		2000-2010 (%/year)	
Efficiency of thermal power plants (in %)	42	+	1.9%	++
Rate of electricity T&D losses (in %)	16	--	-0.1%	-
CO ₂ emissions per kWh generated (in gCO ₂ /kWh)	82.1	++	-0.4%	--
INDUSTRY	2010		2000-2010 (%/year)	
Energy intensity (EU=100)	222	--	0.7%	--
Unit consumption of steel (in toe/t)	0.5	--	-0.4%	-

++ Among the best performing countries

+ Above the EU average¹

- Below the EU average¹

-- Among the worst performing countries

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

1. Overview

1.1. Policies: 109 TWh of electricity savings by 2030

In December 2008 Brazil's President signed the National Climate Change Plan (PNMC), which contains provisions regarding energy efficiency. It seeks to increase energy efficiency across various sectors of the economy, in line with best practices.

A national energy efficiency action plan is foreseen within the framework of the PNMC. It involves a reduction in electricity consumption of around 10 percent by 2030 compared with a reference scenario (equivalent to savings of 106 TWh), which would avoid 30 million tons of CO₂ emissions that same year. The plan also involves the replacement of one million old refrigerators per year for 10 years. Lastly, the plan aims to improve energy efficiency in industry, transport and buildings.

Two other energy efficiency programs were previously launched and are still active: the National Electrical Energy Conservation Program (PROCEL), in 1985; and the National Program for the Rational Use of Oil Products and Natural Gas (CONPET), which focuses on transport, in 1991.

1.2. Energy consumption trends: rapid increase

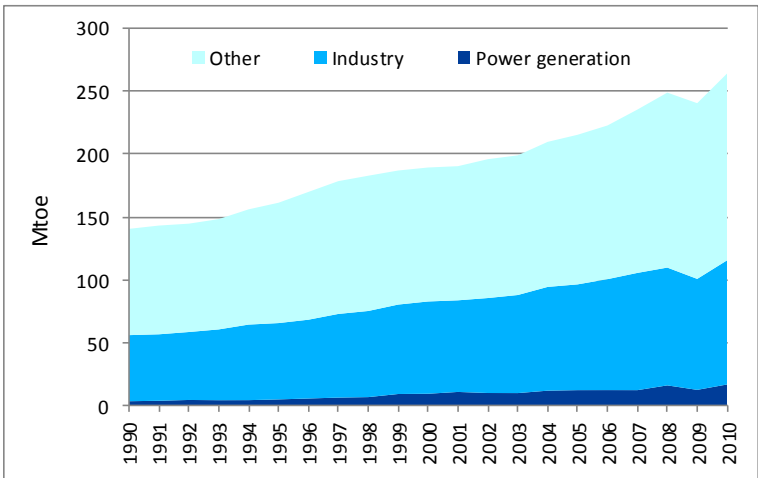
At 1.3 toe, Brazil's per capita consumption is 28 percent lower than the world average of 1.9 toe.

Total energy consumption increased at the rapid pace of 3.2 percent/year between 1990 and 2010. In 2009 it decreased as a consequence of the global economic crisis.

Oil is the main source of energy, accounting for 40 percent of the country's overall consumption. Non-commercial energy sources (wood, bagasse) come second with 32 percent, followed by hydroelectricity (14 percent), gas (7 percent), coal (5 percent) and nuclear power (3 percent).

The share of industry (including non-energy uses) in primary energy consumption has been relatively stable since 1990 (37 percent); the share of the power sector is low due to the large diffusion of hydroelectricity (6 percent).

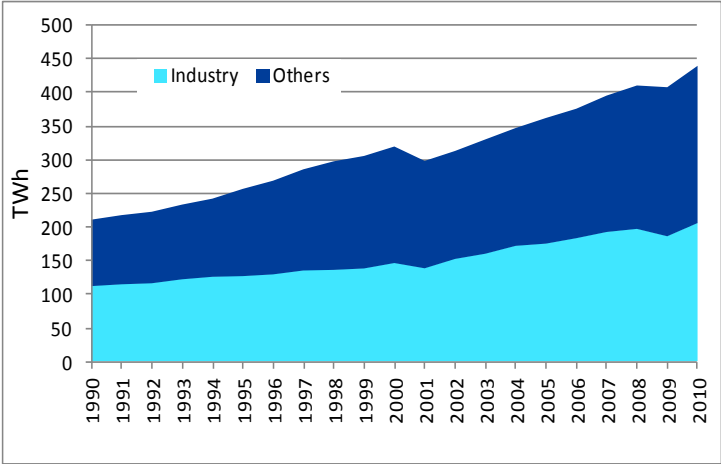
Figure 1: Energy consumption trends by sector



Source: Enerdata

The country's electricity consumption per capita is 17 percent lower than the world average, but 44 percent higher than the average of non-OECD countries (2,250 kWh in 2010, compared with the world average of 2,700 kWh). It is still more than three times lower than the average of OECD countries. Total electricity consumption increased at the steady pace of 3.7 percent/year between 1990 and 2010, except in 2001/2002 when it decreased by 7 percent because of a low level of hydro production linked to severe drought, and in 2009 because of the global crisis (-0.6 percent). Electricity represents 18 percent of final energy consumption, and its market share is increasing slightly (16 percent in 1990). Industry absorbs nearly half of the consumption.

Figure 2: Electricity consumption trends by sector



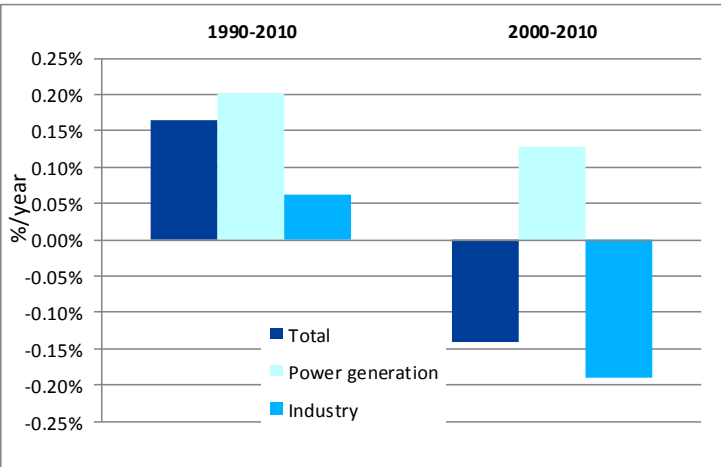
Source: Enerdata

1.3. Energy efficiency trends: overall energy efficiency improvements since 2000

Total energy consumption per unit of GDP (primary energy intensity), measured at purchasing power parity, is about 30 percent lower than the world average.

Total energy intensity has been decreasing at a moderate pace since 2000 (less than 0.2 percent per year), and more slowly than the world average (1.2 percent/year). Industry's intensity decreased at a higher pace but the power sector had a negative impact on energy intensity since its efficiency decreased over the period.

Figure 3: Energy intensity trends



Source: Enerdata

2. Power generation

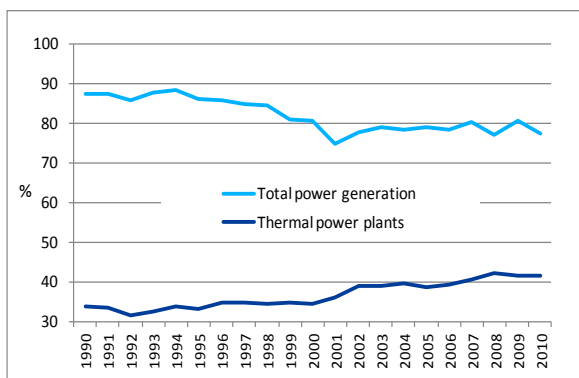
2.1. Policies: obligations on electric power distribution in order to reduce electric waste

Since 1998 the Brazilian energy regulator, ANEEL, has obliged electric power distribution companies to invest in reducing electricity waste, including implementing energy efficiency measures for their consumers.

2.2. Efficiency of the power sector: high efficiency thanks to hydro

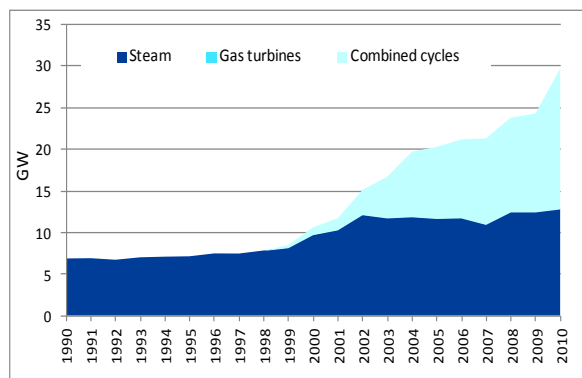
Thanks to the large share of hydroelectricity, the efficiency of power generation is high compared with international standards. In 2010 the average efficiency of thermal power generation was equal to 42 percent, which is 7 points higher than the world average, thanks to the deployment of new gas combined cycle power plants since 2000. In 2010, gas combined cycles represented close to 60 percent of the total thermal electricity capacity.

Figure 4: Efficiency of power generation and thermal power plants



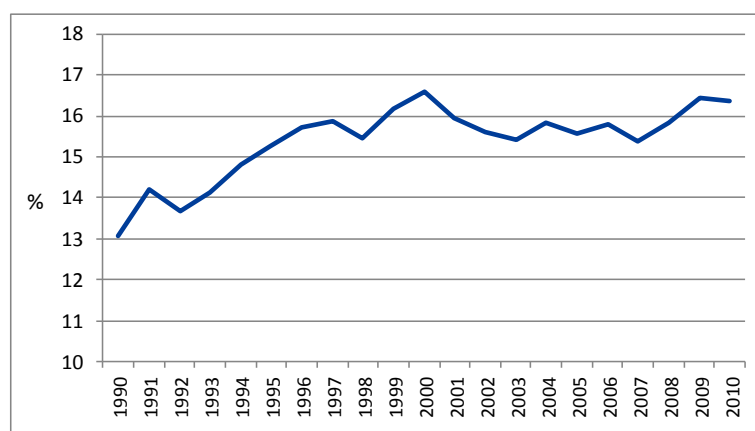
Source: Enerdata

Figure 5: Thermal electricity capacity, by technology



The rate of transmission and distribution losses (T&D) in the Brazilian grid is above 16 percent of the distributed volumes, ie, higher than the world average (8.5 percent). Those losses have increased slightly over time (13 percent in 1990). The PNMC aims to decrease non-technical losses in electricity distribution at a rate of 1,000 GWh per year for the next 6 years.

Figure 6: Electric T&D losses



Source: Enerdata

3. Industry

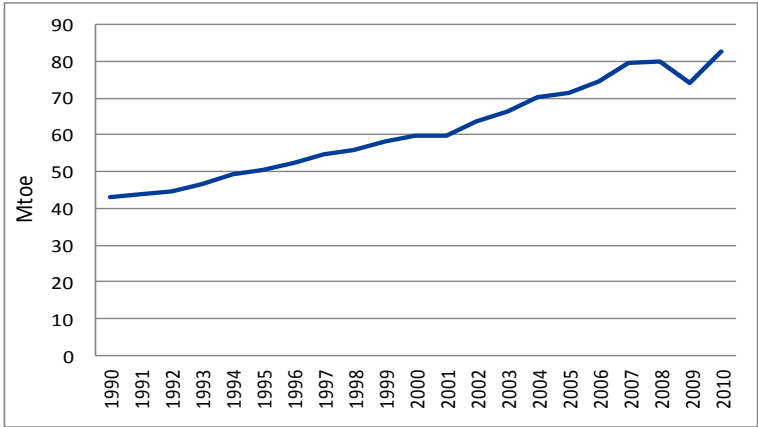
3.1. Policies

The first regulation of the “Energy Efficient Act” for electric motors, launched in 2002, established two sets of minimum efficiency performance standards (MEPS) for ‘standard’ (mandatory) and ‘high efficiency’ (voluntary) motors. An updated regulation dating from late 2005 (Edict 553/2005) established the previous high-efficiency MEPS as mandatory for all motors on the Brazilian market.

3.2. Energy consumption trends: strong decrease in 2009 due to the global crisis

Industrial energy consumption increased at the steady pace of 3.3 percent/year between 1990 and 2010. The global crisis had a significant impact, since industrial consumption dropped by 7.2 percent in 2009.

Figure 7: Trends in industrial energy consumption

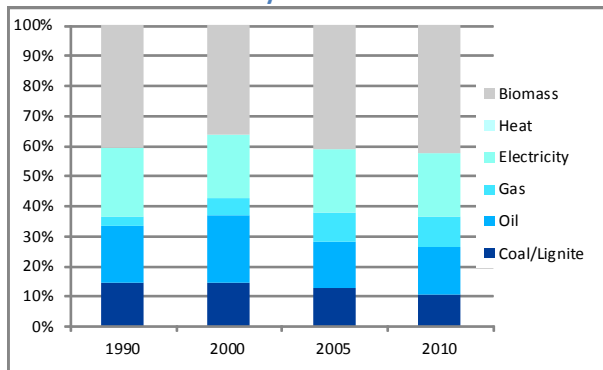


Source: Enerdata

Biomass represents a high share of industrial energy consumption, with more than 42 percent. It has increased slightly since 1990 (41 percent). In 2010 electricity accounted for 21 percent of that consumption, oil for 16 percent and coal for 11 percent. The use of natural gas has increased over time, but accounted for just 10 percent in 2010.

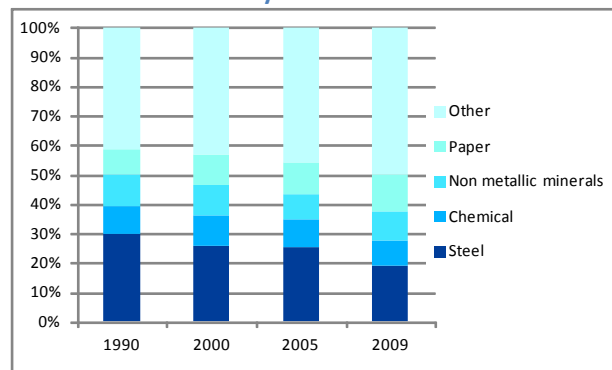
The share of energy-intensive industries in industrial energy consumption has decreased by 8 percent since 1990, now accounting for half of that consumption. The steel industry’s share of energy consumption in particular has decreased steadily and is now just below 20 percent. The share of the paper industry has increased slightly, while the non-metallic minerals (cement, ceramics, etc.) and chemical industries have maintained their shares over the period.

Figure 8: Energy consumption of industry, by source



Source: Enerdata

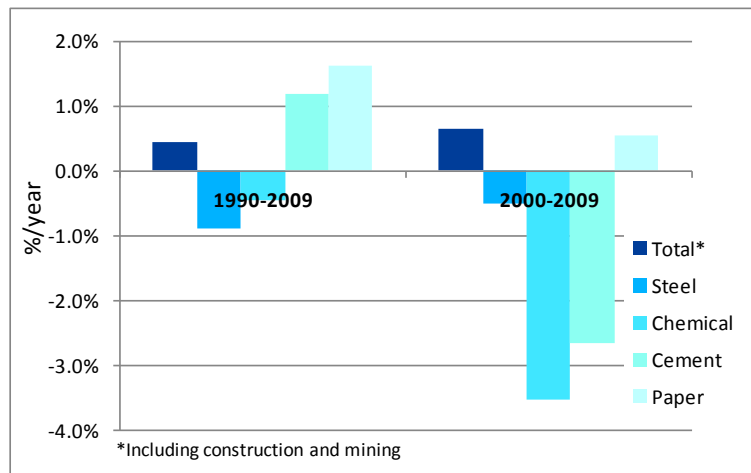
Figure 9: Energy consumption of industry, by branch



3.3. Energy intensity trends: no reduction in intensity

Over the period 1990-2009, consumption per unit of industrial value added (energy intensity) increased by 0.4 percent/year. However, in certain branches energy efficiency improvements gained momentum; in the chemical and steel industries, for instance, energy consumption per ton produced decreased by 0.5 percent/year and 0.9 percent/year, respectively.

Figure 10: Trends in industrial energy intensity



Source: Enerdata