Brazil

Energy efficiency report

Objective: 106 TWh of electricity savings by 2030

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<th>2000-2011 (%/year)</th>
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<td>Primary intensity (EU=100)¹</td>
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<td>79</td>
<td>0.8%</td>
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<td>CO₂ emissions per capita (in tCO₂/cap)</td>
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<th>Power generation</th>
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<td>77</td>
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+++ 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: 106 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 was adopted in October 2011 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: in 1985 the National Electrical Energy Conservation Program (PROCEL), which focuses on household electrical appliances and electric motors; and in 1991 the National Program for the Rational Use of Oil Products and Natural Gas (CONPET), which focuses on transport. The latest assessment of PROCEL, which was carried out in 2009, estimated that the program had already saved 38 TWh, corresponding to 10 percent of the national electricity consumption. In 2009, the savings amounted to 5.5 TWh or 1.4 percent of the power consumed that year. Around 15 percent of these savings came from electric motors, 37 percent from lighting, 34 percent from refrigerators and 13 percent from air conditioners.

1.2. Energy consumption trends: rapid increase

At 1.4 toe, Brazil’s per capita consumption is 27 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 2011. 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 29 percent, followed by hydroelectricity (14 percent), gas (9 percent), coal (6 percent) and nuclear power (2 percent).

The share of industry (including non-energy uses) in total energy consumption is relatively stable (38 percent). The small share of the power sector is explained by the large diffusion of hydroelectricity (7 percent).
The country’s electricity consumption per capita is 12 percent lower than the world average, but 49 percent higher than the average of non-OECD countries (2,450 kWh in 2011, compared with the world average of 2,800 kWh). It is still more than three times lower than the OECD country average.

Total electricity consumption is increasing at a steady pace (4.6 percent/year between 2002 and 2011). It decreased by 7 percent in 2001 because of a low level of hydro production linked to severe drought, and again slightly in 2009 because of the global crisis. 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.

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 (0.1 percent/year), and more slowly than the world average (1.2 percent/year). The power sector had a negative impact on energy intensity since its efficiency decreased slightly over the period.
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 at least 5% of their revenue in 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 (around 80 percent). Nevertheless, this efficiency rate is decreasing due to a declining share of hydroelectricity in power generation, and despite the high efficiency of thermal power generation. Indeed, thermal efficiency stood at 41 percent in 2011, which is 5 points higher than the world average, boosted by the deployment of new gas combined cycle power plants (close to 60 percent of the total thermal capacity in 2011).

![Figure 4: Efficiency of power generation and thermal power plants](image1)

![Figure 5: Thermal electricity capacity, by technology](image2)

Source: Enerdata

The rate of transmission and distribution losses (T&D) in the Brazilian grid is above 15 percent of the distributed volumes, i.e. higher than the world average (9 percent). Those losses have remained almost stable since 2000, at around 15-16 percent. The PNMC aims to decrease non-technical losses in electricity distribution at a rate of 1 TWh per year for the next 6 years.

![Figure 6: Electric T&D losses](image3)

Source: Enerdata
3. Industry

3.1. Policies: MEPS for electric motors

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 3.4 percent/year between 2000 and 2011. In 2009 it dropped by 6.9 percent, showing the strong impact of the global crisis on the sector.

Biomass represents a high share of industrial energy consumption, with more than 41 percent. It has increased by 5 points since 2000 (35 percent). In 2011 electricity accounted for 21 percent of industrial energy consumption, coal for 14 percent and oil for 13 percent. The use of natural gas has increased over time, reaching 11 percent in 2011.

The share of energy-intensive industries (steel, chemical, paper and non-metallic minerals) in industrial energy consumption has decreased by 6 percent since 2000, 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 21 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.
3.3. Energy intensity trends: low reduction in intensity

Since 2000, consumption per unit of industrial value added (energy intensity) has decreased at the very slow pace of 0.2 percent/year, which is far below the OECD average of 2 percent/year. Some energy efficiency improvements were seen in the cement (1.9 percent/year) and chemical (1.4 percent/year) industries, but were offset by a negative performance of the paper industry (over the same period the unit consumption per ton increased by an average of over 1.5 percent/year).