Objectives:

– 5% of savings in energy consumption by 2015

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*2008 and 2000-2008 for steel

++ Among best countries  + Better than the EU average\(^1\)  - Below the EU average\(^1\)  -- Among countries with lowest performances

Latest update: January 2011

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\(^1\) The European Union, as the best-performing region, is used as the benchmark.
1. Overview

1.1. Policies: 5% reduction in energy consumption by 2015
In 2001 Parliament adopted a law on energy efficiency, known as the Energy Conservation Act. This law came into force in March 2002. It required large energy consumers to implement specific actions and introduced energy consumption labels and performance standards for electrical appliances. The Bureau of Energy Efficiency was created to implement those provisions.

Within the National Action Plan on Climate Change (NAPCC) adopted in 2008, a National Mission for Enhanced Energy Efficiency was launched with several targets for 2014-2015: annual fuel savings of at least 23 Mtoe, a cumulative avoided electricity capacity addition of 19,000 MW and a CO₂ emission mitigation of 98 Mt.

1.2. Energy consumption trends: surge driven by electricity demand
Total energy consumption per capita remains very low. In 2009, it reached 0.6 toe, compared with 1.8 toe on average for the world and around 1 toe for non-OECD countries.

Primary energy consumption has been increasing rapidly since 1990 (4 percent/year), with a growth rate of over 5 percent/year since 2005. The global economic downturn in 2009 did not affect this rapid pace. Final energy consumption has grown at a rate of 3.5 percent/year since the year 2000.

Coal is the country’s top energy source with 42 percent of primary energy consumption in 2009, followed by biomass (26 percent). Oil products covered 23 percent of the country’s needs, gas accounted for 7 percent, and nuclear and hydroelectricity reached 2 percent in 2009.

Electricity consumption per capita is very low: 560 kWh in 2009, compared with an average of about 1,400 kWh in non-OECD countries. The share of electricity in final energy consumption is developing over time and reached 12 percent in 2009 (7 percent in 1990). Electricity consumption has increased by more than 6 percent/year since 2000, ie, more rapidly than total energy consumption. Industry accounts for 45 percent of total electricity consumption. Compared with other countries the share of agriculture in electricity consumption is high (20 percent), which is explained by the heavily subsidized rates, while the share of households is 22 percent. The household electrification rate is 61 percent and 84 percent of villages are electrified (2009).
1.3. Energy efficiency and CO2 trends: large reduction in very high energy intensity

Total energy consumption per unit of GDP (primary energy intensity), measured at purchasing power parity, is close to the world average but remains lower than the average in non-OECD countries.

Total energy intensity has decreased by 2.2 percent/year since 1990. Between 1990 and 2009, final energy consumption per unit of GDP (final intensity) decreased more rapidly than primary energy intensity. The soaring electricity demand leads to a rise in conversion losses since most power generation is from coal, which in turn results in a slower reduction in primary energy intensity.

CO2 emissions per unit of GDP (CO2 intensity) decreased by 0.5 percent/year between 1990 and 2009, which is much slower than energy intensity. This is mainly explained by the decreasing share of carbon-free energy sources in the fuel mix (mainly biomass and hydro). The NAPCC (2008) aims to reduce carbon intensity by 20-25 percent by 2020 (compared with 2005 levels).

2. Power generation

2.1. Policies: ambitious targets for renewables

Electricity production falls chronically short of the country’s electricity needs (with a peak capacity deficit of almost 20 percent). The capacity expansion is systematically below the needs, and the objectives fixed in the Plans are rarely met.

The government’s target under the 11th Plan (2007-2012) is to install a renewable power capacity of 14,500 MW, of which 10,500 MW would be from wind. The Government will grant Rs3,600bn (US$79bn) in subsidies for wind power projects (Rs0.49/kWh (US$0.49/kWh) for a minimum of four years and a maximum of 10 years) to be connected to the national grid. The subsidies will be applicable to projects of up to 4 GW and are earmarked for developers until 2012. India has announced its goal of having a solar energy capacity of 20 GW by 2022, as forecasted in the 13th Five-Year Plan (2018-2022).

2.2. Power generation trends by source: growing market share for coal

Power generation is increasingly based on fossil fuels, which in 2009 accounted for around 85 percent of the country’s electricity generation, compared with 75 percent in 1990. Coal is the main fuel for electricity production, accounting for 70 percent in 2009 compared with 66 percent in 1990. Natural gas is developing rapidly: in 2009, it accounted for 12 percent of the power generation compared with 3 percent in 1990. The share of hydroelectricity fell significantly, from 25 percent in 1990 to 12 percent in 2009. Among CO2-free energy sources, wind energy has started to develop significantly in recent years, but in 2009 it still accounted for less than 2 percent of the total. Nuclear represents around 2 percent of total electricity generation. Altogether, the share of carbon-free power generation decreased from 27 percent in 1990 to 16 percent in 2009.
2.3. Efficiency of the power sector: deterioration in energy efficiency

The efficiency of the power sector is decreasing and in 2009 stood at 30 percent, compared with 36 percent in 1990. The reduction of the share of hydropower, the development of nuclear power and the aging of coal power plants explains the deterioration of this ratio. The rise in gas-fired capacities, which are more efficient than coal, leads to a smaller drop in the efficiency of thermal power plants. In 2009 thermal power plants had an efficiency rate of 27 percent, compared with 30 percent in 1990. The use of more efficient technologies, such as gas combined cycles and cogeneration, also limited the fall in the ratio for thermal power generation. In 2009, combined cycles accounted for around 15 percent of thermal capacities and almost the entire gas-fired power production.

Transmission and distribution losses are very high but have been decreasing since 2000 (from 30 percent to about 25 percent in 2009). Around 5 percent of these losses are non-technical losses (unpaid electricity). The losses exceed 40 percent in eight states, range between 30 percent and 40 percent in seven other states and between 20 percent and 30 percent in a further eight states. India is far above the average for non-OECD countries, which stands at 11 percent.

As a result of the fast-growing share of fossil fuel in power generation, the average CO₂ emission factor has increased by about 20 percent since 1990, reaching 960 gCO₂/kWh in 2009. However, the growth in CO₂ emissions per kWh generated has slowed down since 2000, at 0.5 percent/year compared with 1 percent/year between 1990 and 1999.
3. Industry

3.1. Policies: an ambitious program for energy intensive branches

In the framework of the Energy Conservation Act, large industrial energy consumers in nine sectors have to implement energy audits, appoint certified energy managers and report energy consumption data.

As part of the National Mission for Enhanced Energy Efficiency, energy efficiency improvement targets should be assigned to the country’s most energy-intensive industrial units and an Energy Savings Certificate market (ESCerts) should be created.

3.2. Energy consumption trends: sustained growth

Energy consumption in industry has soared by 5.5 percent/year since 2003, supported by a high GDP growth rate (6-9 percent/year since 2003). In 2009, the sector’s energy consumption was not affected by the global economic slowdown and increased by 7 percent.

The share of electricity in industrial energy consumption is increasing steadily (5.5 percent/year) and reached 20 percent in 2009, compared with 13 percent in 1990. Coal is the dominant fuel but its market share is decreasing (from 40 percent in 1990 to 35 percent in 2009).

The share of energy-intensive industries in the overall energy consumption of industry has been stable since 1990. They accounted for just below 40 percent of the sector’s energy consumption in 2009. The shares of the steel industry and the non-metallic minerals industry (cement, ceramics, etc.) have remained pretty stable since then and in 2009 stood at about 20 percent and 10 percent, respectively. The market share of the chemical industry has decreased slightly since 1990, from 9 percent down to 8 percent in 2009. The paper industry has maintained its market share since 1990 (2 percent of the total).
3.3. Energy intensity trends: large improvements achieved in industry

Between 1990 and 2009, energy intensity in industry fell by more than 3 percent / year. Since 2000, it has decreased at the even faster pace of 3.8 percent / year.

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