

China

Energy efficiency report



Objective: 16% reduction in primary energy intensity by 2015

Overview	2011		2000-2011 (%/year)	
Primary intensity (EU=100) ¹	222	--	-2.8%	++
CO ₂ intensity (EU=100)	294	--	-2.5%	+
CO ₂ emissions per capita (in tCO ₂ /cap)	5.4	+	7.0%	--
Power generation	2011		2000-2011 (%/year)	
Efficiency of thermal power plants (in %)	35	-	1.5%	++
Rate of electricity T&D losses (in %)	6.6	-	-1.3%	-
CO ₂ emissions per kWh generated (in gCO ₂ /kWh)	793	--	-1.4%	+
Industry	2011		2000-2011 (%/year)	
Energy intensity (EU=100)	236	--	-1.9%	+
Share of industrial CHP in industrial consumption (in %)	-		-	
Unit consumption of steel (in toe/t)*	0.485	--	-4.0%	++

*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: February 2013

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

1. Overview

1.1. Policies: 16% reduction in energy intensity by 2015

China has made energy efficiency and conservation its highest priority energy strategy. Since issuing the Medium- and Long-term Plan for Energy Conservation in 2004, several important high-level actions have been taken to put China on a path towards a less energy-intensive development.

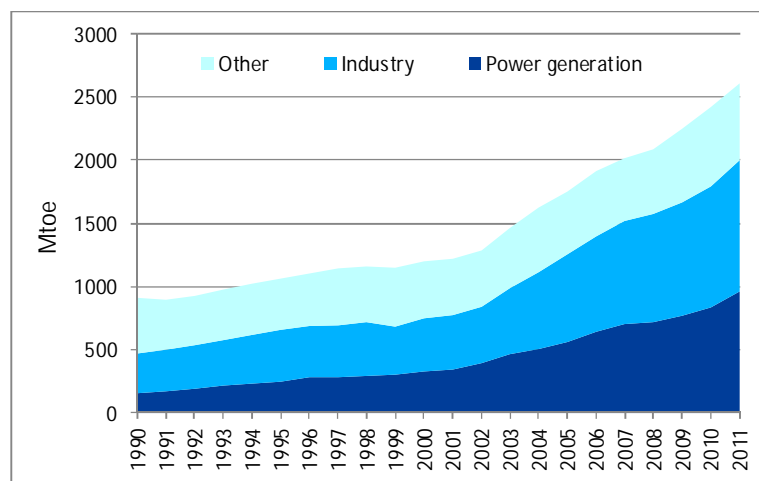
The 12th Five-Year Plan (2011-2015) set a new 16 percent energy intensity reduction target for 2015, compared with the 2010 level. China plans to invest US\$372 billion to save energy and launch anti-pollution projects, as part of a push to cut its coal consumption by 300 Mt; US\$155 billion should go towards energy savings projects. A report from China's State Council said the move would take the country about halfway towards its 2015 energy intensity reduction target. Several types of policy measures have been implemented to promote energy efficiency and conservation: energy efficiency labels, minimum efficiency standards, financial incentives, pricing and government procurement. Financial tools include direct funding of energy efficiency projects in industry and buildings, subsidized loans, and loan and credit guarantees.

1.2. Energy consumption trends: sharp increase since 2001

China's energy consumption per capita is high compared with non-OECD countries: 1.9 toe versus 1.2 toe for non-OECD countries. However, Chinese energy consumption per capita is similar to the world average (1.9 toe).

Total energy consumption increased by 2.7 percent/year between 1990 and 2001. Ever since 2001 it has increased at a very rapid rate (7.9 percent/year, on average). That very rapid growth was driven by the industrial and power generation sectors. While the share of industrial energy consumption remains stable on a worldwide level and is decreasing in developed countries, it is increasing significantly in China: from 34 percent in 1990 to 40 percent in 2010. The share of the power sector rose from 17 percent to 37 percent over the period due to the very rapid growth of electricity use (consumption increased eightfold between 1990 and 2011).

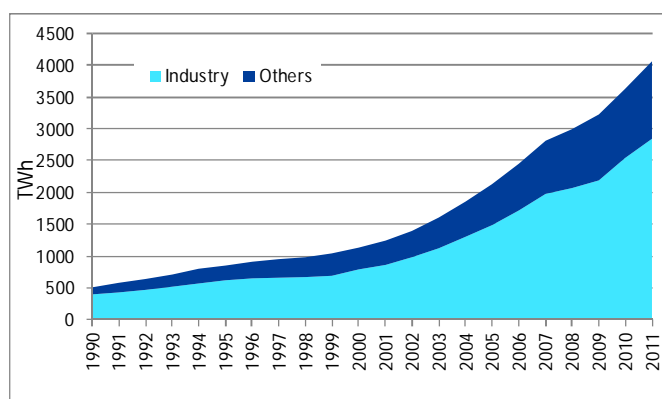
Figure 1: Energy consumption trends by sector



Source: Enerdata

The country's electricity consumption per capita reached 3,000 kWh in 2011. Although that level is double as high as the average in non-OECD countries, it is still less than half of the average in OECD countries. Total electricity consumption is increasing very rapidly: by 8 percent/year during the 1990s and by 12 percent/year between 2000 and 2011. The industrial sector consumes about 70 percent of the electricity used in the country.

Figure 2: Electricity consumption trends by sector



Source: Enerdata

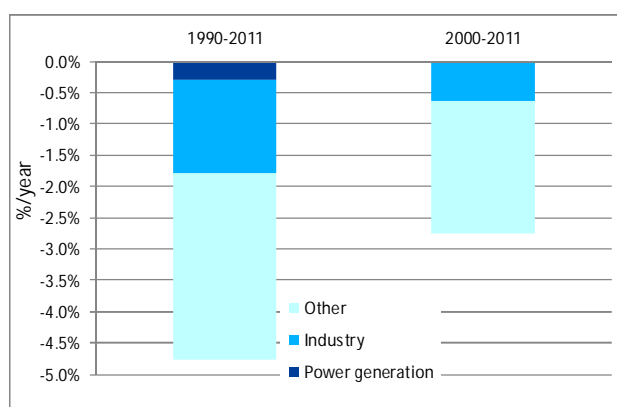
1.3. Energy efficiency trends: very high energy intensities

Total energy consumption per unit of GDP (primary or total energy intensity), measured at purchasing power parity, is slightly higher than the average in non-OECD countries and about 85 percent higher than in OECD countries.

Total energy intensity decreased at the very rapid rate of 4.8 percent/year between 1990 and 2011. That rapid trend, which is among the top 10 performances at world level, has to be related to the high energy intensity that prevailed in the 1990s. Since 2000, Chinese total energy intensity has decreased at a much slower pace (2.8 percent/year).

Industrial energy intensity dropped significantly between 1990 and 2011. As a result, the industrial sector contributed to about 30 percent of the total energy intensity decrease during this period. The power sector had a marginal impact on the energy intensity decrease.

Figure 3: Energy intensity trends



Source: Enerdata

2. Power generation

2.1. Policies: decommissioning of small, inefficient thermal power plants

In 2007, the National Development and Reform Commission (NDRC) issued orders to retire small and inefficient power plants, leading to the decommissioning of more than 70 GW worth of thermal power plants in the five years through 2010.

In addition, significant efforts are being made to increase the efficiency of coal use. Since 2008, China requires all new coal-fired power plants to use the best available technology; newly built coal power plants use supercritical or ultra-supercritical technology. China has set an energy savings target of 8 percent for coal-fired power plants by 2015.

2.2. Efficiency of the power sector: low efficiency rates

The efficiency of power generation is low compared with international standards. The average efficiency of thermal power generation was just 35 percent in 2011, which is 5 percentage points lower than the OECD average. Nevertheless, average efficiency has increased since 1998. That trend is driven by the increasing share of more efficient, new thermal power plants, combined with the closure of small and inefficient plants.

Figure 4: Efficiency of power generation and thermal power plants

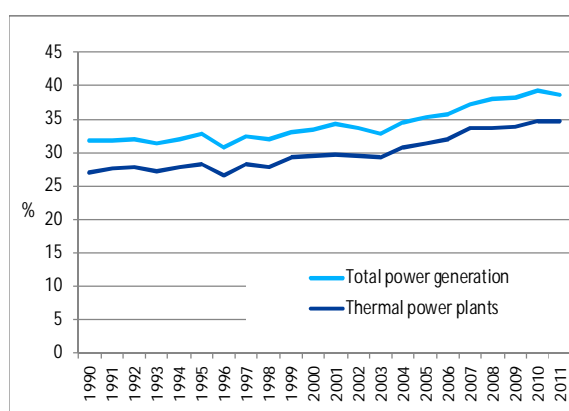
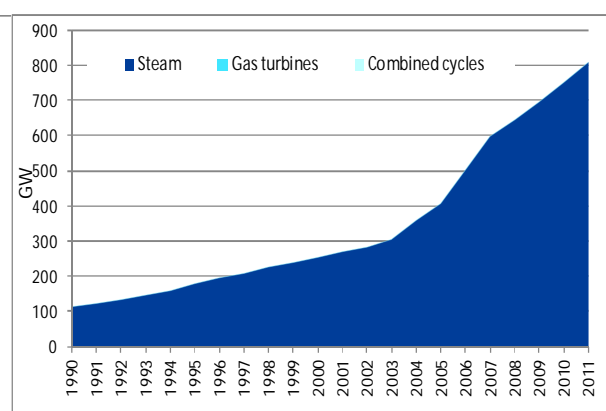


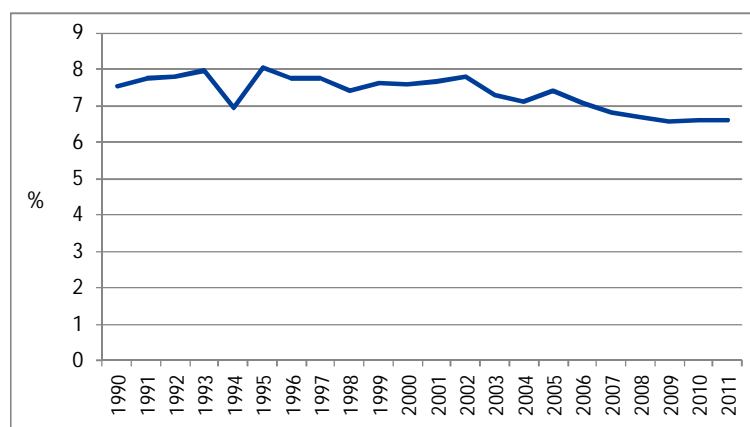
Figure 5: Thermal electricity capacity, by technology



Source: Enerdata

The rate of transmission and distribution losses (T&D) in the Chinese grid is about 7 percent of the distributed volumes, which is better than the world average (9 percent). Those losses have decreased slightly over time (7.5 percent in 1990).

Figure 6: Electric T&D losses



Source: Enerdata

3. Industry

3.1. Policies: measures for the largest enterprises

The most significant energy efficiency program in industry is called Top-10,000 Energy-Consuming Enterprises, implemented in the framework of the 12th Five-Year Plan. Within the framework of that program, the designated enterprises are required to appoint energy managers; measure and report on energy consumption; prepare energy conservation plans; and reach energy consumption reduction targets. Those 10,000 enterprises represent about two thirds of the country's total consumption and about half of the industrial demand. A Top-1,000 Energy-consuming Enterprises program was implemented under the 11th Five-Year Plan and covered one third of the country's total consumption.

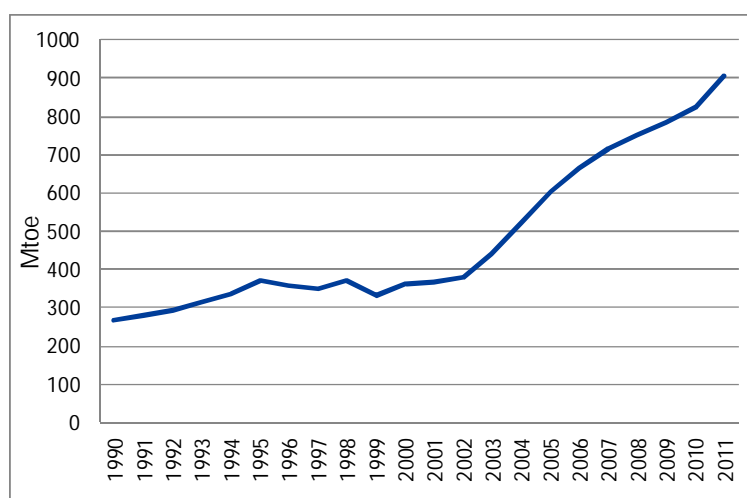
China has set energy savings targets for energy-intensive industries, to be achieved by 2015. The target for steel producers is 25 percent, for the non-ferrous metal industry 18 percent, and for cement production 3 percent. To achieve these targets, the government will phase out obsolete capacity in aluminum smelting and copper, lead and zinc refining. If met, these targets will save China the equivalent of 7.5 Mt of standard coal.

In 2007, the National Development and Reform Commission (NDRC) issued orders to retire small and inefficient plants in various industrial sub-sectors. It also announced measures to decrease the nation's kiln and boiler consumption of coal by 70 million tons: the selection of high-quality coal; the renovation of medium-sized and small boilers and kilns with advanced techniques such as circulating fluidized bed (CFB) and pulverized coal firing; and the establishment of a scientific management and operation system.

3.2. Energy consumption trends: sharp increase in consumption

Industrial energy consumption increased at the very rapid pace of 9 percent/year between 2000 and 2011, ie almost twice as fast as the average for non-OECD countries. Contrary to most countries, the global economic crisis did not lead to a fall in the sector's energy consumption.

Figure 7: Trends in industrial energy consumption



Source: Enerdata

The share of electricity in industrial energy consumption has increased since 1990 and in 2011 reached 25 percent of the total (compared with 11 percent in 1990). The use of coal and lignite in industry has more than doubled since 1990, although its share in total energy consumption is decreasing (from 76 percent in 1990 to 62 percent in 2011).

The share of energy-intensive industries (steel, chemical, non-metallic minerals and paper) is increasing due to the massive development of infrastructures. The steel industry's share of energy consumption in particular has increased steadily and now stands at around 38 percent. The shares of the chemical and non-metallic minerals

(cement, ceramics, etc.) industries have declined slightly, whereas the paper industry has maintained its share over the period.

Figure 8: Energy consumption of industry, by source

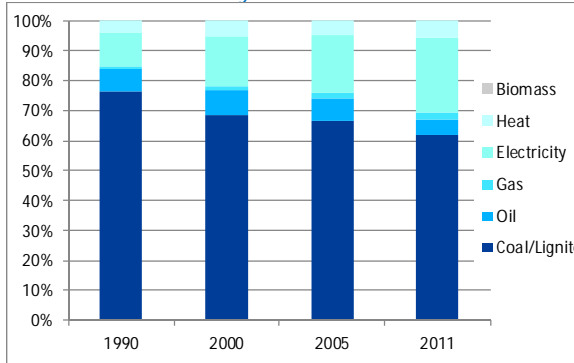
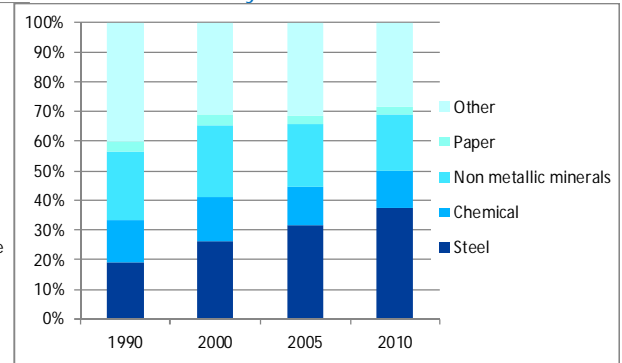


Figure 9: Energy consumption of industry, by branch

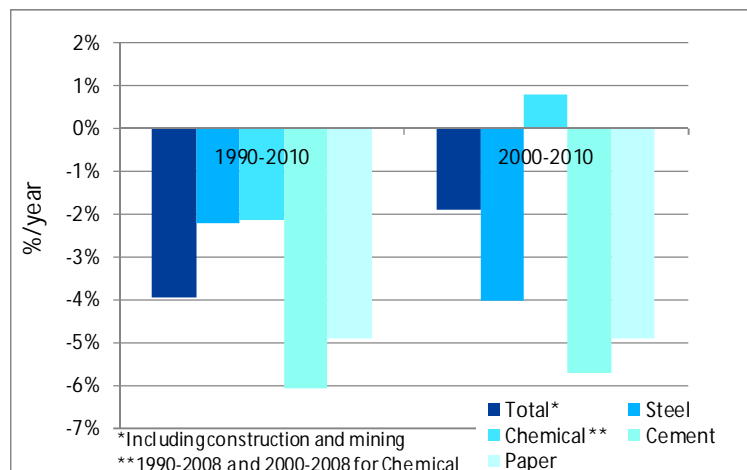


Source: Enerdata

3.3. Energy intensity trends: a very rapid reduction

Over the period 2000-2010 the reduction in the consumption per unit of industrial value added (energy intensity) was very high, averaging 2 percent/year, which is on a par with the average for OECD countries. The largest energy efficiency improvements took place in the cement industry, with a reduction of 5.7 percent/year, followed by the paper industry (-4.9 percent/year). The energy consumption per ton of steel also decreased significantly over the period, dropping by 4 percent/year.

Figure 10: Trends in the energy intensity of industrial branches



Source: Enerdata