

# Saudi Arabia

## Energy efficiency report



### Objectives:

- 30% reduction in electricity intensity between 2005 and 2030
- 50% reduction in peak demand growth by 2015 compared with the 2000-2005 increase

<b>Overview</b>	<b>2011</b>		<b>2000-2011 (%/year)</b>	
Primary intensity (EU=100) <sup>1</sup>	260	--	1.8%	--
CO <sub>2</sub> intensity (EU=100)	318	--	2.3%	--
CO <sub>2</sub> emissions per capita (in tCO <sub>2</sub> /cap)	16.9	--	2.8%	--
<b>Power generation</b>	<b>2011</b>		<b>2000-2011 (%/year)</b>	
Efficiency of thermal power plants (in %)	32	--	0.8%	+
Rate of electricity T&D losses (in %)	10.1	--	2.8%	--
CO <sub>2</sub> emissions per kWh generated (in gCO <sub>2</sub> /kWh)	731	--	2.8%	--
<b>Industry</b>	<b>2011</b>		<b>2000-2011 (%/year)</b>	
Energy intensity (EU=100)	94	+	3.7%	--

++ Among the best performing countries + Above the EU average<sup>1</sup> - Below the EU average<sup>1</sup> --Among the worst performing countries

Latest update: March 2013

<sup>1</sup> The European Union, as the best performing region, is used as the benchmark.

## 1. Overview

### 1.1. Policies: creation of the Saudi Energy Efficiency Center

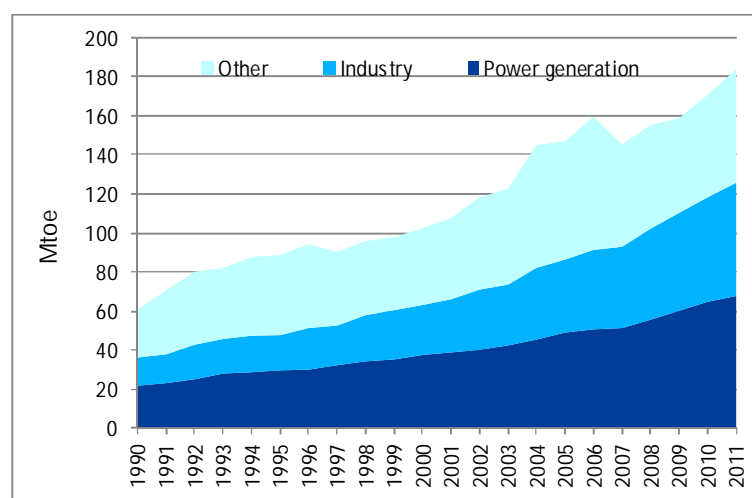
The Saudi Energy Efficiency Center (SEEC) was created in October 2010 and held its first meeting in April 2011. It is responsible for the development of energy efficient technologies and conservation policies. The SEEC targets households, whose energy consumption has soared in recent years, through awareness campaigns, strengthened minimum energy efficiency ratios for air conditioners (AC), and labels for electrical appliances. The proposed programs under the demand-side management program being considered include the replacement of low-efficiency AC units and mandatory thermal insulation for all new buildings (Saudi Building Code). For commercial and industrial customers, measures include remote control of AC units during peak times and curtailable load contracts and load tariffs.

In 2008, the National Energy Efficiency Program (NEEP) defined eight objectives, including energy audit services and industry support, efficient use of oil and gas, energy efficiency labels and standards for appliances, construction codes and technical management and training. The NEEP currently focuses on four outcomes: regulation (design of the first Energy Conservation Law and national and regional regulations), information (new national database on energy supply and demand), capacity development of energy efficiency managers and public awareness. The NEEP plan aims to cut electricity intensity by 30 percent between 2005 and 2030 and the growth in peak demand by 50 percent compared with the average 2000-2005 increase. Subsidized electricity prices may be removed to limit the demand growth.

### 1.2. Energy consumption trends: buoyant growth for 20 years

Saudi Arabia's total energy consumption per capita is more than 3 times higher than the world average, at 6.5 toe/capita in 2011 compared with the world average of 1.9 toe.

Figure 1: Energy consumption trends by sector



Source: Enerdata

Total energy consumption tripled between 1990 and 2011 (average rate of 5.4 percent/year).

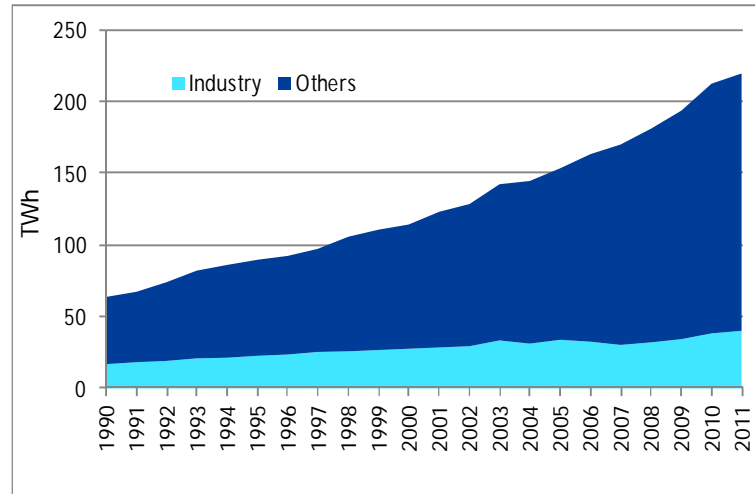
The power sector is the largest consuming sector, with 37 percent of total energy consumption in 2011. Industry also represents a large share in total energy consumption (32 percent in 2011), which is mainly explained by the high energy consumption of non-energy uses in the petrochemical sector, which alone accounts for about 19 percent of energy consumption (2011).

Electricity consumption per capita has been growing very rapidly. It stands at about 7,800 kWh/cap (2011), compared with the world average of 2,700 kWh/cap.

The country's electricity consumption has been growing rapidly since 1990 (at the steady pace of +6.1 percent/year). The share of electricity in final energy consumption increased from 13 percent in 1990 to

about 16 percent in 2011. That surge was propelled by the sharp increase in demand from the residential and tertiary sector (6.6 percent/year), which reached 82 percent of total electricity consumption in 2011, up from 73 percent in 1990. This led to a relative erosion of the share of industry in electricity consumption (18 percent in 2011 compared with 27 percent in 1990).

Figure 2: Electricity consumption trends by sector

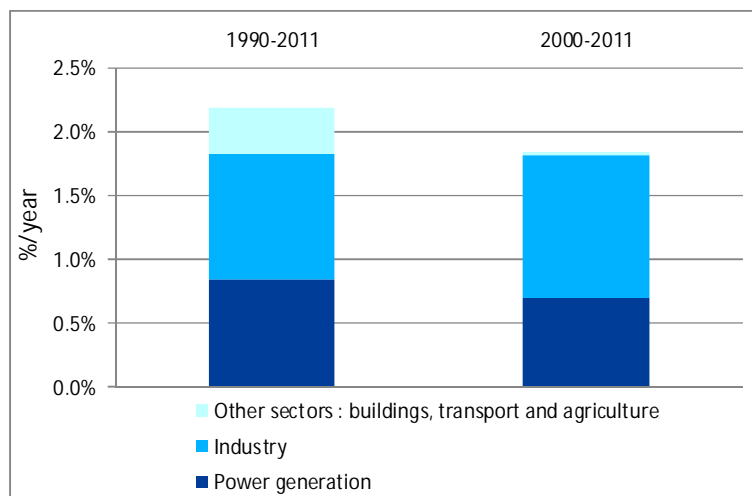


Source: Enerdata

### 1.3. Energy efficiency trends: degradation of energy intensities

Energy consumption is growing faster than GDP, leading to an increase in the total energy intensity (1.8 percent/year, on average, between 2000 and 2011), which is contrary to the general trend observed in most countries. This upward trend is due to the fact that the country's development is based on energy-intensive industries, as well as on electricity-intensive lifestyles in buildings and transport (mainly for AC), encouraged by low electricity prices. From 2000 to 2011, around 61 percent of the increase was due to the industry sector and 38 percent to the power sector.

Figure 3: Energy efficiency trends



Source: Enerdata

## 2. Power generation

### 2.1. Efficiency of the power sector: efficiency improvements through new technologies

The efficiency of the power sector (thermal power plants) regularly increases, rising from 27 percent in 1990 to 32 percent 2010. This improvement is explained by the rising share of gas-fired capacity, especially since 2000 (+2.3 GW in CCGT capacity). The rate of T&D losses is about 10 percent, in line with the world average, and shows a slight upward trend.

Figure 4: Efficiency of power generation and thermal power plants

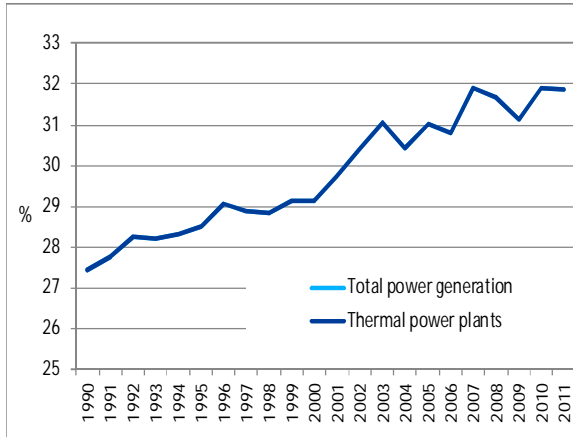
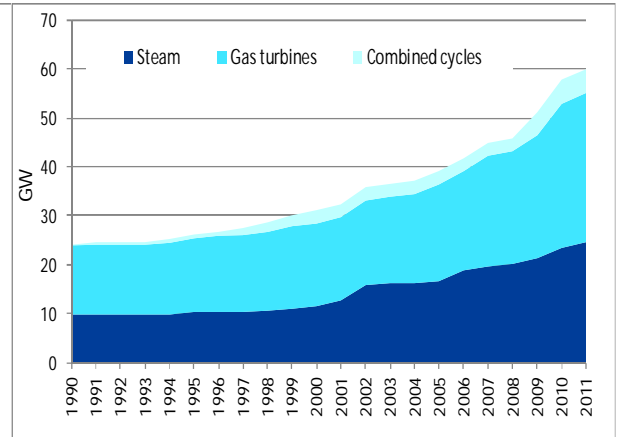
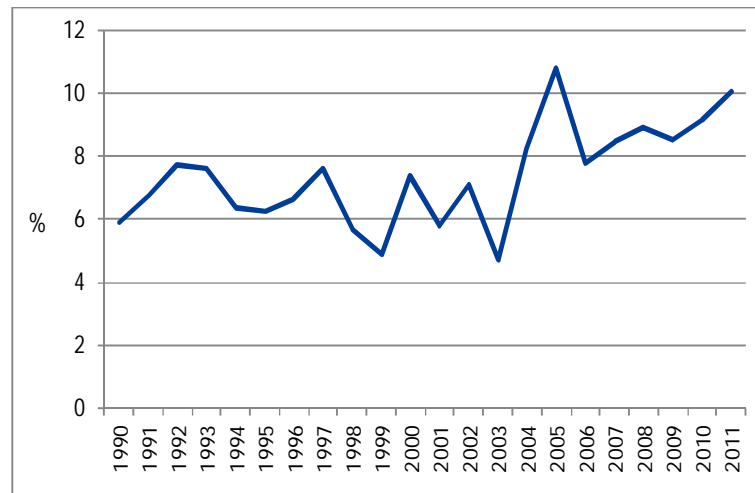


Figure 5: Thermal electricity capacity, by technology



Source: Enerdata

Figure 6: Electric T&D losses



Source: Enerdata

### 3. Industry

#### 3.1. Policies: energy audits and high-efficiency motors

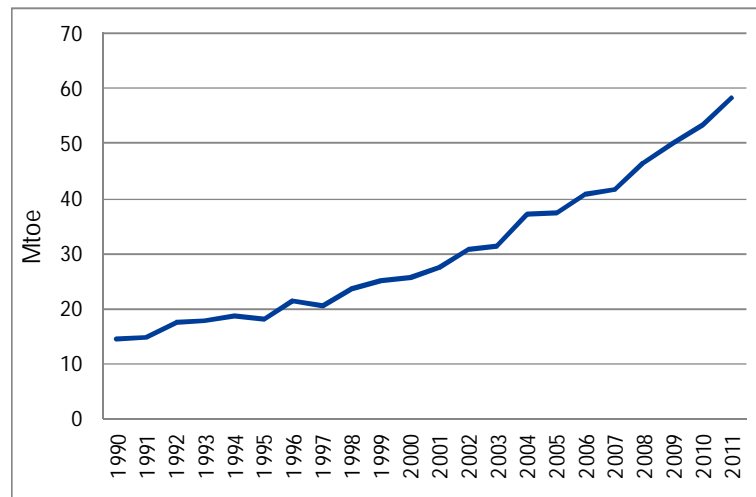
The National Energy Efficiency Program includes energy audits in the industrial sector and the promotion of high-efficiency motors: according to studies, matching motor size to actual load could lead to energy savings of between 5 percent and 25 percent. Audits are led by Energy Service Companies (ESCOs).

The Saudi Basic Industries Corporation (SABIC) aims to reduce its energy intensity by 10 percent between 2010 and 2015. The SEEC is also studying how to convert waste heat in the cement sector to air conditioning.

#### 3.2. Energy consumption trends: surging consumption since 1990

The energy consumption of the industrial sector (including non-energy uses) soared by 6.8 percent/year between 1990 and 2011. Its electricity consumption rose by 5 percent/year over the period 1990-2011.

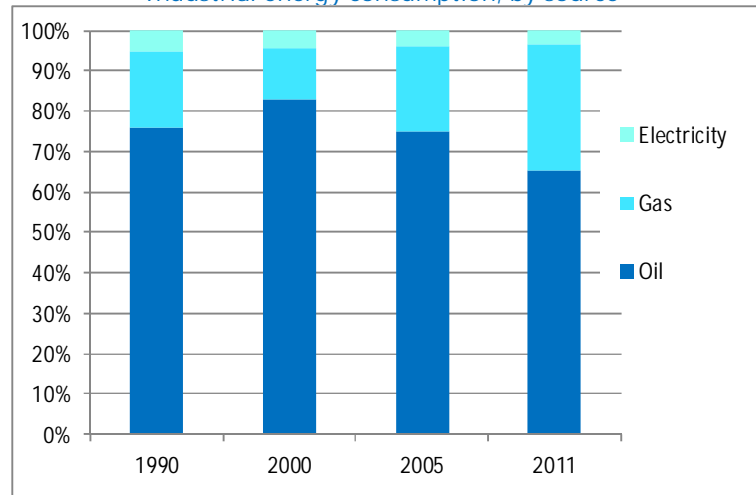
Figure 7: Trends in industrial energy consumption\*



\* including non-energy uses  
Source: Enerdata

Industrial energy consumption (including non-energy uses) is mainly covered by oil products, although their share is declining (65 percent in 2011 compared with 84 percent in 2000). Gas is used for non-energy uses (petrochemical sector) and covered about 30 percent of industrial consumption in 2011 (around 20 percent in 2000). Electricity consumption remains marginal, at around 5 percent of industrial energy consumption. This energy structure is largely influenced by the overwhelming weight of the petrochemical industry in Saudi Arabia.

Figure 8:  
Industrial energy consumption, by source\*



\* including non-energy uses  
Source: Enerdata