



10- Energy

Introduction

Improving energy efficiency in fields of industry, transport, electricity, buildings, and petroleum is still one of the main challenges at the national level. There is a great amount of mutual benefits from implementing energy efficiency policies in production and consumption sectors. This includes reducing demand on energy, reducing its cost, improving air quality, and reducing emissions of green house gases.

Making energy efficiency technologies available for these fields would undoubtedly support all efforts aiming to achieve sustainable production and consumption patterns.

Environmental State of Power Stations

Power stations in Egypt are the main driver of Egyptian industry. It is the main pivot of Egyptian economy growth. Mammoth development has taken place in electrical power stations through past decades, where the rate of generated electricity country-wide had increased 7.3% annually. Mazot fuel and gasoline fuel consumption rates decreased by 6.2% and 23% respectively, while natural gas usage rate increased 12.8%. This shows that natural gas consumption rate to total fuel used for 2005/2006 is around 79.6%; i.e. with about 4.2% increase compared to 2004/2005 as shown in table (10-1).

Table (10-1) Natural Gas to Total Fuel used in 2005/2006

Item		05/06	04/05	Development rate%
Mazot	Thousand ton	3691	3936	(6.2)
Natural gas	Million m ³	17298	15334	12.8
Ordinary gasoline	Ton	6722	28778	(76.6)
Special gasoline	Ton	63350	61324	3.3
Total		18448	17028	8.3

Reviewing the situation of fuel used at electric power stations, it is found that current use of mazot, considered the worst environmentally polluting fuel, is limited to only four power stations in Egypt (Arish, Syouf, Walidiah, and Assiout).

With increased Egyptian stock of natural gases, the Ministry of Electricity in cooperation with MSEA has pursued a policy to replace liquid fuels such as mazot and gasoline with natural gas. Table (10-2) shows development in activating the use of natural gas.

The environmental return resulting from the use of eco-friendly fuel is very high, particularly in power generation stations. The use of liquid fuel such as mazot and solar causes an increase in SO₂ and CO and lead ratios in the ambient air, thus causing significant environmental degradation of air quality.

Table (10-2) Development in Activating the Use of Natural Gas

Company	Natural gas million m ³	Special gasoline ton	Ordinary gasoline ton	Mazot x1000 tons	Total x1000 ton/oe
Cairo	5194	1738	515	831	5211
East Delta	5327	55538	2114	758	5395
West Delta	5485	6074	2375	689	5319
Upper Egypt	1292	-	1718	1413	2523

In this framework, MSEA in coordination with the Ministry of Petroleum supplied power stations with natural gas as an alternative fuel, where air quality to lead and SO₂ improvement ratio reached 6% and about 20% respectively according to a study on pollutants' sources

New and Renewable Energy

Upon a commissioning by the Supreme Council for Energy, a strategy is developed currently to increase electrical energy generation capacity from renewable energy sources to 20% of total generated energies till 2020; i.e. around 13,500 MW. This strategy includes the following:

- Executive plan divided over the years until 2020
- Plan for local manufactured components of wind turbines
- Surveying required lands and their availability for wind energy projects
- Developing the necessary legislation for regulating and encouraging investments in this field

In the field of solar energy, procedures for implementing the first thermal solar power plant are currently underway with a capacity of 150 MW where 20 MW of which would be the capacity of the solar component at Al Korymat area. The project is implemented in cooperation with GEF, MSEA and the World Bank. The project is planned to be completed mid 2009. Annual energy generated from this power plant would reach 985 GWhr/year.

Energy Efficiency in Egypt

Energy Efficiency is measured in all countries through Energy Intensity Coefficient; i.e. total energy consumed to total GDP. In other words, energy intensity is defined as total primary energy consumption (Kg oil equivalent/year) for every \$1000 of GDP.

Energy Intensity indicator in Egypt equals 0.53; which is a high rate compared to North Africa countries such as Tunisia and Morocco, where it equals 0.25 and 0.26 respectively. While it ranges from 0.15 to 0.17 in EU countries.

This means that Energy Intensity Coefficient in Egypt is five times more than that in Spain, Germany, and Austria (0.15), and two times more than Tunisia and Morocco, i.e. increased wasted consumed energy (fuel + Electricity) in Egypt, which is due to several reasons including continuous local fuel subsidy, bringing its price as the lowest among countries and low awareness level with the importance of energy efficiency in all production and consumption sectors.

To face this problem, the Supreme Council for Energy in its first meeting in September 2006 commissioned MSEA to present a study on proposed policies for rationalizing energy use in production and consumption sectors. The following is a brief presentation of proposed policies to improve energy efficiency in Industry, Power, Transport, and Housing sectors.

1- Electrical Industry Sector

- a. It is proposed to improve energy efficiency in industrial facilities through investing in the following components:

- Lighting (interior and exterior)
- Air-conditioning and ventilation
- Insulation and lining of steam and hot water piping, boilers
- Using capacitors to improve power factor in factories
- Improving burning efficiency in boilers and steam systems, through waste heat recovery.

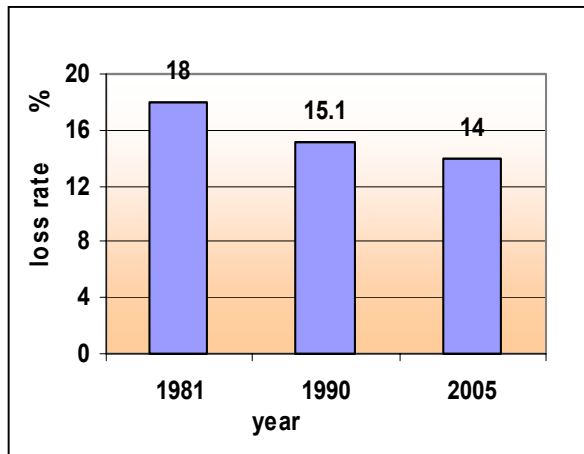


Fig (10-1) losses rate in transferring and distributing electric energy produced from 1981 to 2005

Source: Electric Utility Agency (EUA), 2005

- Applying energy audits system in the industrial sector would reduce energy consumption by 19.5% of total industrial facilities consumption of primary energy.

2-Electrical Power Sector

Electrical Power sector was interested in rationalizing energy for years. This resulted in the reduction of fuel consumption

rate in thermal stations from (250g/KWhr to 226g/KWH). The proposed fuel consumption reduction system in the electrical power sector includes:

- Reducing the losses in electric energy transferred through the National Grid to consumers via load centers through installing capacitors to improve power factors on both high and intermediate tensions. Fig (10-1) shows losses rate in transferring and distributing electric energy produced since 1981 till 2005:
- Using cogeneration combined heat and power systems, waste heat recovery systems and steam turbines.

3- Transport Sector

Transport sector is described as one of the most important of all sectors consuming fuel; it comes in second place after industry sector. It consumes 28% of final total energy consumption, and comes first in consumption of petroleum products; around 10.8 million toe, and represents 40.4% of total petroleum substances consumption; (27.6 million toe).

The proposed system for rationalizing energy use in the transport sector includes:

- Improving economics of land transport, railways, vessels, and planes.
- Identifying a maximum rate for vehicles and trailers fuel consumption, so as not to permit licensing of those vehicles exceeding this rate.
- Reducing maintenance and operation costs.
- Ensuring highest levels of sound and thermal insulation.

4- Buildings Sector

Residential, commercial, and governmental buildings sector comes first in electric energy consumption; around 38 billion KWhr equivalent to 45% of total electric energy consumed 85.8 (billion KWhr). It comes third in final total energy consumption; around 20% of final total energy consumption in Egypt.

Buildings sector in Egypt consumes 45% of total electric energy used; the highest compared to neighboring countries.

Fig (10-2) shows rates of buildings sector consumption of electric energy in Egypt and some neighboring countries:

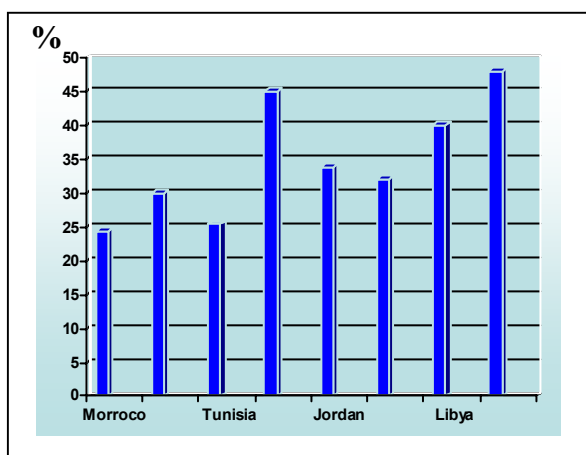


Fig (10-2) rates of buildings sector consumptions of energy in Egypt and

Source: MED_ENEC, 2006

Proposed Energy Efficiency Measures in Buildings

- a. Installing high energy efficient lighting
- b. Using thermal insulation materials in new buildings facades (walls roofs, ceilings, and windows)

- c. Preventing air leakage to the outside and entry of hot air to the inside.
- d. Reducing number and areas of exterior openings
- e. Managing energy use in facilities all day round (optimal control in connection and breakage through smart and occupancy sensors and controlling cooling and heating units based on maximum demand).
- f. Developing incentives for constructing new buildings that comply with buildings codes for reducing energy consumption.