EGYPT

(UPDATED 2010)

1. GENERAL INFORMATION

1.1. Country Overview

1.1.1. Governmental System

Egypt became independent in 1922. Egypt has been a republic since 18 June 1953. The current constitution was adopted in 1971. Egypt has a president, (Mr. Mohammed Hosni Mubarak has been the president since 1981), a prime minister and a cabinet. The People's Assembly is comprised of 444 elected and 10 presidentially appointed members and the Shura (consultative) Council has 176 elected members and 88 presidentially appointed members. The Judicial system is headed by the Supreme Constitutional Court.

Egypt is divided in to Administrative subdivisions of 28 governorates. The Principal political parties are the National Democratic Party (ruling), New Wafd Party, Liberal Party, National Progressive Unionist Grouping (Tagammau) and Nasserite Party. All citizens of 18 years and above are eligible to vote.

1.1.2. Geography and Climate

Egypt lies in the northern corner of Africa. It is bounded by the international frontiers of the Mediterranean Sea in the North, the Red Sea in the East, Libya in the west and Sudan in the south.

FIGURE 1: MAP OF THE ARAB REPUBLIC OF EGYPT

The total area of Egypt is 1.01 million Km^2; geographically it is divided into four main divisions: The Nile Valley and Delta (approx. 33,000 Km^2). The Western Desert (approx. 681,000 Km^2), The Eastern Desert (approx. 325,000 Km2), and Sinai Peninsula (approx. 61,000 Km^2).

Egypt lies for the most part within the Temperate Zone, and the bio-climate varies from arid to extremely arid. The daily maximum temperatures in Egypt ranges from 18°C to 41°C and daily minimum temperature ranges from 5°C to 23°C.

The entire Egyptian Mediterranean coastal region, from Sallum in the west to Rafah in the east, shares essentially similar climate. The greater part of the annual rainfall is confined to a few rainstorms occurring in the mid winter months. On the rainless days, the winter climate is mostly warm, sunny and frost free. During the transitional spring and autumn months, there are few days with light rain, marked seasonal changes in temperature and, to a lesser extent, changes in humidity and cloudiness. There is no rain during the summer.

1.1.3. Population

Egypt is one of the very few developing countries where accurate demographic data has existed since the year 1800 when the first census was carried out during the French Campaign. The population of Egypt at that time was about 2.5 millions. The growth of the Egyptian population according to census is shown in Table 1. The Analysis of population growth data indicates that during the period 2000- 2008, the average growth rate was 2.0%.

TABLE 1: POPULATION INFORMATION

	1970	1980	1990	2000	2005	2008*	Average Annual Growth Rate (%) 2000 - 2008
Population (Millions)	35.3	40.5	51.9	64.8	71.3	76.0	2.0
Population Density (Inhabitants/km^2)	35.5	40.7	52.4	65.0	71.6	76.3	
Urban Population as % of Total	42.2	43.9	43.0	42.5	42.3	42.6	
Area (1000 km)				995.5			

*Latest Available Data
Source: World Bank World Development Indicators; Egyptian Ministry of Finance Web

1.1.4. Economic Data

Prior to 1952, the Egyptian economy was largely based on irrigation agriculture, using water from the Nile. Industry was limited to the processing of agricultural products. In the 1960s, Egypt adopted a policy of centrally planned economy with ambitious industrialization program that came to a halt in the aftermath of the 1967 War. Towards the end of the 1980s, major re-orientation of development strategy took place, aiming at shifting from state active role to full-scale market economy.

The Egyptian economy maintained robust growth momentum during the past three fiscal years, with real GDP growth averaging 7 percent during 2005/06-2007/08. Among the principal stimulants of Egypt's prominent economic performance comes the

implementation of structural reforms, coupled with the increasing integration of the Egyptian market in the global economy and supported by favorable external conditions

As a result the rate of these changes, the gross domestic product (GDP) and the GDP/capita has registered sharp ups and downs. The average rate of growth was 5.46% annually during the period 1980-2000.

TABLE 2: GROSS DOMESTIC PRODUCT

	1970	1980	1990	2000	2005	2008**	Average Annual Growth Rate (%) 2000 - 2008
GDP (Millions of Current US$)	12343.3	23377.0	39812.7	60732.1	103775.9	152905.2	5.9
GDP (Millions of Constant 2000 US$)	20330.1	38503.3	65573.9	99838.5	166041.4	244648.3	
GDP Per Capita (Current US$/Capita)	349.7	577.0	767.1	940.0	1451.4	2012.0	

** Latest Available Data
Source: Egyptian Ministry of Finance Web

1.2. Energy Information

1.2.1. Estimated Available Energy

TABLE 3: ESTIMATED AVAILABLE ENERGY RESOURCES

	Fossil Fuels			*Nuclear*	*Renewables*	
	Solid (1)	**Liquid (2)**	**Gas (3)**	**Uranium (4)**	**Hydro (5)**	**Other Renewable (6)**
Total Amount in Specific Units*	21.00	540.50	2.05	-	2.77	7.50
Total Amount in Exajoules [EJ]	0.46	23.24	76.85	-	0.05	0.07

*Solid, Liquid: Million Tons
Gas: m^3
Uranium: Metric Tons
Hydro, Renewable: TW

(*) Sources: 20th WEC Survey of Energy Resources, 2004 and Uranium 2005: Resources, Production and Demand ("Red Book") , Egyptian Ministry of Petroleum web.

(1) Coal including Lignite: proved recoverable reserves, the tonnage within the proved amount in place that can be recovered in the future under present and expected local economic conditions with existing available technology

(2) Crude oil and natural gas liquids (Oil Shale, Natural Bitumen and Extra-Heavy Oil are not included): proved recoverable reserves, the quantity within the proved amount in place that can be recovered in the future under present and expected local economic conditions with existing available technology

(3) Natural gas: proved recoverable reserves, the volume within the proved amount in place that can be recovered in the future under present and expected local economic conditions with existing available technology

(4) Reasonably Assured Resources (RAR) under < USD 130/kgU

(5) Hydropower: technically exploitable capability, the amount of the gross theoretical capability that can be exploited within the limits of current technology Energy Statistics

(6) Other Renewable includes only the wind power, the amount is estimated related to the energy policy to install this amount in year 2020

1.2.2. Energy Statistics

TABLE 4: ENERGY STATISTICS

*ENERGY CONSUMPTION***	1970	1980	1990	2000	2005	2008*	Average Annual Growth Rate (%) 2000 - 2008
TOTAL	0.10	0.28	0.62	1.17	1.90	3.40	11.25
- Solids	0.01	0.03	0.05	0.23	0.23	0.23	0.00
- Liquids	0.06	0.18	0.27	0.73	0.72	1.40	31.50
- Gases	< 0.01	0.03	0.04	0.33	0.43	1.53	35.00
- Nuclear	-	-	-	-	-	-	-
- Hydro	0.02	0.04	0.04	0.05	0.06	0.05	0.00
- Other Renewables	0.03	0.03	0.16	0.19	0.19	0.19	0.00
ENERGY PRODUCTION	**1970**	**1980**	**1990**	**2000**	**2005**	**2008***	**2000 - 2008**
TOTAL	0.29	0.69	1.27	2.28	2.73	3.98	8.00
- Solids***	0.01	0.02	0.04	0.03	0.04	0.04	0.00
- Liquids	0.23	0.54	0.78	1.23	1.27	1.49	2.50
- Gases	< 0.01	0.06	0.26	0.78	1.17	2.21	17.25
- Nuclear	-	-	-	-	-	-	-
- Hydro	0.02	0.04	0.04	0.05	0.06	0.05	0.00
- Other Renewables	0.03	0.03	0.16	0.19	0.19	0.19	0.00
NET IMPORT (IMP - EXP)	**1970**	**1980**	**1990**	**2000**	**2005**	**2008***	**2000 - 2008**
TOTAL	0.19	0.41	0.65	0.57	0.83	0.58	2.50

* Latest Available Data
** Energy Consumption = Primary Energy Consumption + Net Import (Import - Export) of Secondary Energy
*** Solid Fuels Include Coal and Ligite
Source: International Atomic Energy Agency (IAEA) Energy and Economic Database; Energy Information Administration (EIA); Energy Data and Analysis for Egypt.htm; Egyptian Ministry of Petroleum Web

1.2.3. Energy Policy

Egypt is one of the countries suffering from limited energy resources, the available energy resources are limited on the oil and gas, the oil is almost internally used, the natural gas is available just to cover 30 year of the current consumption. The hydro potential is completely explored, other renewable potential (wind and solar) under progress. For sustainable development and securing the several strategies and policies were developed and implemented along the last 50 years. These strategies targeted optimizing the energy resources, develop the alternative options, and improve the energy efficiency and conservation.

Several actions was taken institutionally, legislatively, and organizationally, Egypt was organize the supreme energy consul headed by prime minister to supervise and mange and approve all the activities related the energy strategies and plans since 1975, and it was reassembly a year 2007, currently the supreme energy consul is approved several actions such as:

- 20% renewable energy share on energy mix at year 2020, the incentives legislative and policies related to encaging the private sector participation to invest in this subject
- directed the governmental sector to take the necessary action improve the energy efficiency and energy saving,
- develop the energy strategy for Egypt till year 2030 by a international consultant currently under a final stage of approval,
- develop the policy increasing the activity of increase the oil and gas reserves and production and related policies of using optimization
- investigate the friability of nuclear option

During the last seven years, the Government of Egypt implemented a successful strategy to monetize its natural resources. The achievements of this strategy include a significant increase in the country's proven gas reserves; signing of over eighty concession agreements with international oil and gas companies (IOCs); an expansion of the country's domestic hydrocarbon infrastructure; an impressive development of a gas export infrastructure (cross-border gas pipelines and liquefied natural gas (LNG) complexes) to boost Egypt's foreign earnings; and an on-going restructuring of the hydrocarbon industry. However, recent local, regional and global transformations in the energy scene have resulted in a series of challenges that are affecting the whole energy sector with significant implications for Egypt's economy.

A gradual and transparent reduction of energy price subsidies should be implemented in line with the overall national economic development goals. Principally, subsidy should be targeted to selected end users based on economic and social factors and not to commodities. A recent decision by the Egyptian cabinet to allow companies to export gas has encouraged more deals with foreign energy companies. Export of natural gas has began at July 2003. Egypt sees natural gas as its energy source for the future. Massive discoveries of natural gas have come at time when production from maturing oil fields is declining.

Furthermore, the government is trying to discourage domestic consumption of petroleum to free up oil to generate export revenues. Oil -fired power plants have been converted to run on natural gas.

Several regulatory body of energy sectors was created or currently under process monitoring managing and the relation between the parties of energy activities

The government of Egypt has given special attention for the environmental aspects. The government has promulgated several laws and regulations concerning protection of the environment. Egypt issue the Environmental low since year 1994, accordingly the

Egyptian Environmental Affairs Agency was also created; An environmental impact assessment must be submitted to the Egyptian Environmental Affairs Agency for review before licensing the plants. In addition, air and water pollution limits that are applicable to the power plant projects are established

1.3. The Electricity System

1.3.1. Electricity Policy and Decision Making Process

Egypt now holds approximately 23 GWe of electricity supply in 2008. Electricity distribution by source is roughly 88% from gas and 12% from hydro which are almost fully utilized. Wind Energy installed capacity represents ~1% of the total.

Fig.1. shows that the mix of the electrical energy generated in 2008 by Egyptian Electricity Sector:

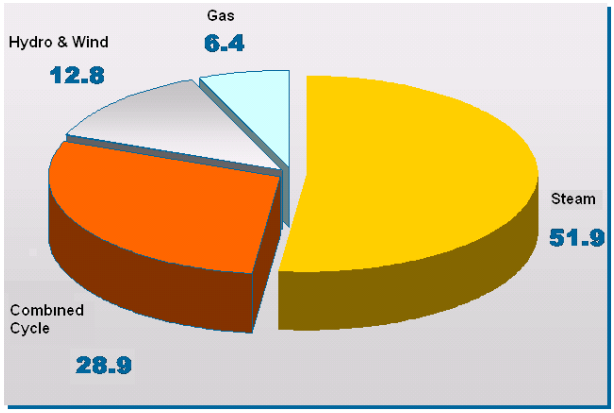

FIGURE 2: Total Electricity Generation in 2008

Due to the effect of the draught conditions existing in Africa and its impact on the hydro power potential of Egypt, a fast track crash program to construct the power generating plants Combined Cycle. These are considered an important part of the fuel conservation strategy of the electricity system.

1.3.2. Structure of Electric Power Sector

The ministry of electricity and Energy is the focal point for seven different authorities including: The Egyptian Electricity Holding Company (EEHC), Rural Electrification Authority (REA), Hydro Power Projects Execution Authority, Atomic Energy Authority, Nuclear Power Plants Authority (NPPA), Nuclear Materials Authority, and new and renewable Energy Authority.

The Egyptian electric system was developed along 40 years as unified grid, it caver more than 99% the customers, right now 99.3% of the Egyptian population have access to the electricity, the number of consumer is over 21 millions. The transmission line level is started from extra high voltage 500 kv, it is almost cover the urban area, the secondary levels are 220, 132, 66, and 33 kv , with total lengths of the overnight lines and underground cables are almost 40k km, with station transformers are exceed 70 GVA at year 2008. The distribution system levels 20, 11, and ,4 kv.

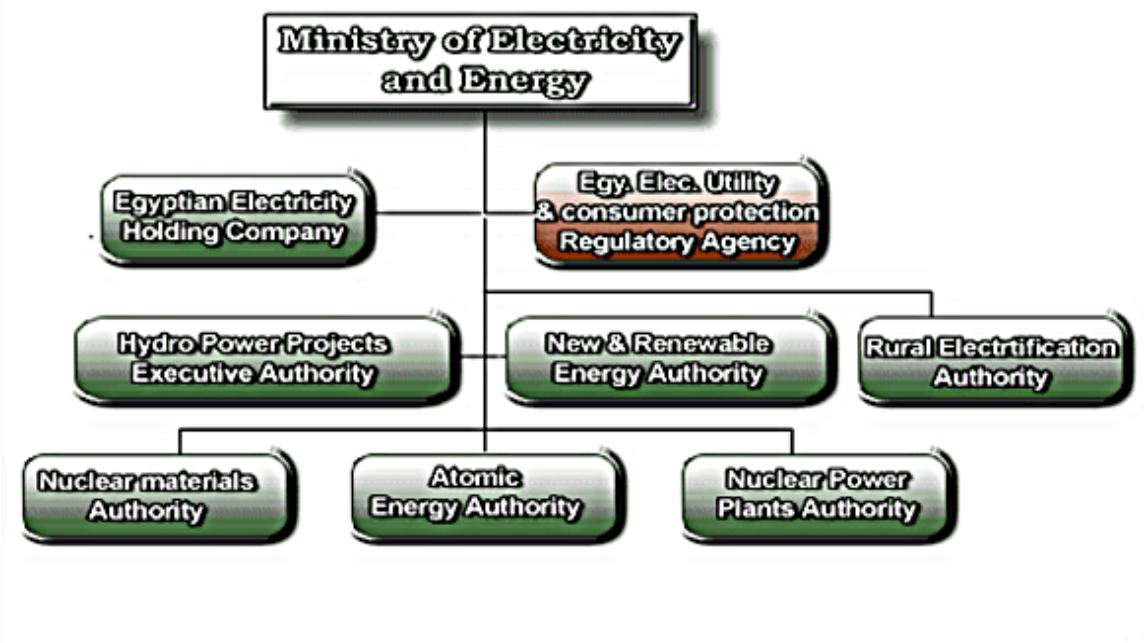

FIGURE 3: Structure of Egyptian Electric Power Sector

EEHC is mainly responsible for system studies and planning, Power Plants, and grid expansion Projects. EEHC own 16 companies: 6 for production, 1 for transmission, and 9 for distribution functions. The new electricity low under review on Perlman, it is expected to approved and issue end of year 2009, according the new low the drive mechanism of the system it will be the Transmission System Operator (TSO), the transmission company will be independent company, and the restructuring of the EEHC is also applied. The role of the electricity regulator will be strengthen, and the market mechanism will move forward.

1.3.3. Main indicators

TABLE 5: ELECTRICITY PRODUCTION, CONSUMPTION & CAPACITY

Capacity of Electrical Plants [GWe]	1970	1980	1990	2000	2005	2008*	Average Annual Growth Rate (%) 2000 - 2008
TOTAL	4.35	4.86	11.72	17.03	20.40	22.52	3.55
- Thermal	1.910	2.420	8.980	14.360	17.436	19.436	3.800
- Hydro	2.440	2.440	2.740	2.650	2.783	2.783	0.000
- Nuclear	-	-	-	-	-	-	-
- Wind	0.000	0.000	0.000	0.020	0.183	0.305	40.600
- Geothermal	-	-	-	-	-	-	-
- Other Renewables	-	-	-	-	-	-	-

Electricity Production (TWh)	1970	1980	1990	2000	2005	2008*	2000 - 2008
TOTAL**	7.59	18.74	49.4	79.69	121.886	141.12	43.55
- Thermal	2.89	9.14	39.42	65.34	108.69	124.78	8.55
- Hydro	4.70	9.60	9.98	14.27	12.64	15.51	1.00
- Nuclear	-	-	-	-	-	-	-
- Wind	0.00	0.00	0.00	0.08	0.55	0.83	34.00
- Geothermal	-	-	-	-	-	-	-
- Other Renewables	-	-	-	-	-	-	-

Total Electricity Consumption (TWh)	1970	1980	1990	2000	2005	2008*	2000 - 2008
TOTAL	2.89	18.74	29.45	70.34	94.75	112.12	6.00

*Latest Available Data
**Electricity transmission losses are not deducted

Energy and Economic Database
Egyptian Ministry of Electricity and Energy web.

TABLE 6: Energy Related Ratios

	1970	1980	1990	2000	2005	2008*
Energy Consumption Per Capita (GJ/Capita)	2.83	6.38	11.13	25.41	25.54	25.4
Electricity Consumption Per Capita (kWh/Capita)	215	431.4	707.7	970.9	1460.9	1587.5
Electricity Production/Energy Production (%)	27.3	24.4	22.8	13.8	20.6	22.5

*Latest Available Data

**Net Import/Total Energy Consumption

Source: International Atomic Energy Agency (IAEA)

Energy and Economic Database

Egyptian Ministry of Electricity and Energy web.

2. NUCLEAR POWER SITUATION

2.1. Historical Development and Current Nuclear Power Organizational Structure

2.1.1. Overview

The reasons which led the country to promote launching a nuclear power program included:

1. Steadily increasing demand for energy and electricity, caused by population growth, urbanization, industrialization, and the desire and intention to improve the conditions and the standard of living of the people;
2. Inadequate and insufficient known national primary energy resources to supply on a medium and long term the increasing demand for energy and electricity; as well as limited potable water resources, which will require the utilization of energy intensive desalination technology particularly in remote areas.
3. Perception of nuclear power as a convenient, economically competitive and viable source of energy which, if introduced in the country, would not only complement the traditional energy sources, but would also promote technological development and serve as an incentive for social and economic progress.

These reasons have not only retained their validity, but have been reinforced by the developments which have been taking place. Currently, energy and electricity demand continues to grow faster than population, and it is recognized that no economic development can be achieved without satisfying this demand.

In compliance with its mission and functions assigned by the Government of Egypt, the Nuclear Power Plants Authority (NPPA) has performed a Feasibility Study for the first Nuclear Power Plant (NPP) to be implemented in Egypt for the cogeneration of electricity and desalted water. The feasibility study was carried out with technical assistance from the International Atomic Energy Agency (IAEA) during the period 1999-2001 and updated in 2003.

The Egyptian nuclear program started in 1955 and developed through the following milestones:

1955 Establishment of Atomic Energy Commission.

1957 Establishment of The Atomic Energy Establishment (AEE).

1961 Operation of the first research reactor.

1963 Establishment of nuclear engineering department, Faculty of Engineering, Alexandria University.

1964 International bidding for constructing a cogeneration nuclear power plant at Borg El-Arab site (150 MWe + 20000 M^3 /d).

1974 limited international bidding for constructing NPP at Sidi-Krir site (600 MWe).

1976 Establishment of the Nuclear Power Plants Authority (NPPA).

1976 Establishment of Nuclear Materials Authority (NMA).

1979 the project of NPP was stopped due to TMI accident.

1980 selection of El-Dabaa site for construction of NPP.

1983 International bidding for El Dabaa NPP.

1986 El Dabaa NPP was postponed due to Chernobyl accident.

1998 Operation the second research reactor .

2006 Consideration of nuclear energy as an option for electricity generation was revived.

2006 State' System of Accounting for & Control of Nuclear Materials (SSAC) has been established.

2007 The strategic decision to start a programme to construct a number of Nuclear Power Plants for electricity generation.

2008 Submission a proposal for providing the required consulting services for execution of the first Nuclear Power Plant in the Egyptian Nuclear Program.

2.1.2. Current Organizational Chart

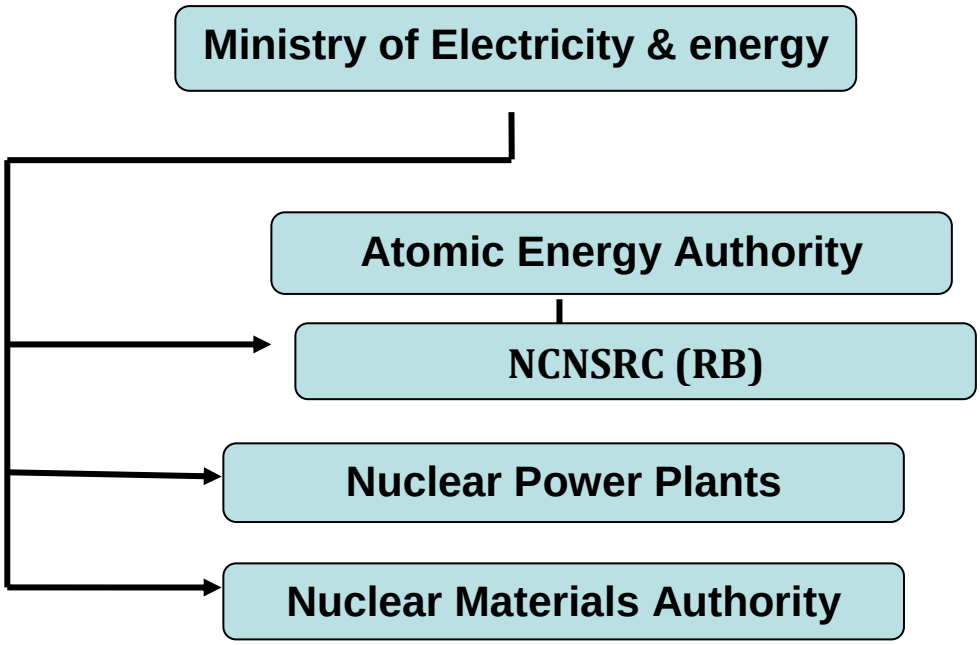

FIGURE 4: Nuclear organizations in Egypt

Drafting of the Nuclear Law has been completed and reviewed by all concerned Ministers and organizations, as well as, by the IAEA. The draft will be submitted to People's Assembly within its turn in 2009 to be enacted before the end of 2009. An independent regulatory body (RB) shall be created by the Nuclear Law for all nuclear and radiation applications.

The State' System of Accounting for and Control of Nuclear Materials (SSAC) has been established by a Presidential Decree No. 152 of 2006 and its executive Ministerial Decrees (No. 419, 420 and 421, 2006) concerning the Egyptian System of Accounting for and Control of Nuclear Materials.

2.2. Nuclear power plants: Overview

2.2.1. Status and performance of nuclear power plants

Not Applicable

2.2.2. Plant upgrading, plant life management and license renewals

Not Applicable

2.3. Future Development of Nuclear Power

2.3.1. Nuclear Power Development Strategy

In September 2006, President Mubarak declared an initiative aiming at:

- Development of a national energy strategy that:
  - Guarantees the rights of future generations in our petroleum and natural gas resources
  - Facilitates utilization of our renewable resources
  - Facilitates the peaceful uses of nuclear energy.
- Study all aspects of nuclear option which represents a strategic issue concerned with the future of Egypt and its people.

The reasons of this initiative were 1) recent surge of gas and oil prices, 2) long-time achievement of safety operation experience of NPPs in the world and 3) long-term perspective of depletion of indigenous natural gas reserve.

Several activities, mainly in cooperation with IAEA, followed the Presidential Initiative. These included: 1) Selection and Evaluation of sites suitable for nuclear power projects, in particular, updating of El-Dabaa site studies and evaluation based on the current international codes and standards, re-evaluation of sites previously screened out during the selection of El-Dabaa at the beginning of the 1980s, and selection of additional sites; 2) Carrying out the Basic Studies needed for the introduction of nuclear power; 3)Review the on going studies related to Energy strategies and planning; 4) Enhance the capabilities of the Egyptian regulatory body; and 5) Assistance in drafting nuclear law.

On October 29th, 2007, the President announced the strategic decision to start a programme to construct a number of Nuclear Power Plants for electricity generation. The elements of this strategic decision include:

- The implementation of the necessary steps to construct the first Nuclear Power Plant for electricity generation.
- Start legislative and structural procedures related to the energy sector in general, and the mechanisms and bodies specific to nuclear energy in particular, including:
  - Re-structuring the Supreme Council for Peaceful Uses of Nuclear Energy to revitalize its role in developing the policies, and in approving the projects
  - Draft the “nuclear law” to regulate the relationship between the various authorities involved in or related to peaceful uses of nuclear energy,
  - Re-structure the existing concerned agencies and authorities,
  - Enhance the nuclear regulatory body and ensure its independence.

By the end of the second quarter of 2009, important steps in the implementation of the Egyptian nuclear power programme have been completed. These include:

- Contract with an International Consultant to provide consultation services for the first Egyptian NPP was concluded on 18 June 2009.
- Drafting the Nuclear Law completed and reviewed by the IAEA and concerned Authorities. The Law was submitted to People’s Assembly at the end of June 2009, and is expected to be passed through 2010. The Nuclear Law will:
  - Setup the relationship between different authorities involved in or related to peaceful uses of nuclear energy,
  - Spell out clearly the mandates, obligations and responsibilities of these authorities.
  - Create a nuclear regulatory body and ensure its independence from other nuclear authorities.

- Cooperation with the IAEA through relevant training courses, workshops and expert missions agreed upon between Egyptian and IAEA experts

TABLE 8: PLANNED NUCLEAR POWER PLANTS

Station/Project Name	*Type*	*Capacity*	*Expected Construction Start Year*	*Expected Commercial Year*
First NPP (Al Dabaa)	WCR	600 - 100 [MW]	2013/2014	2018/2019

2.3.2. Project Management

Egypt have long experience introducing and constructing NPP since 1964, three past Tyrell was conducted, this experiences assess Egypt to establish the necessary infrastructure to manage the project implementation. The Nuclear Power Plants Authority (NPPA) was created year 1976 by law as a sol utility in Egypt responsible to introduce and construct the NPP for electricity generation and water desalination include the all related necessary actions and activities. The next year 1977 Egypt was establish the Nuclear Material Authority (NMA) to discover the Egyptian nuclear ore material potential, also it takes all the activities and arrangements for industrialize this potential.

Year 1982 Egypt was established the national center for nuclear safety and radiation protection responsible to regulate the nuclear and radiation application.

President Moubark announced the strategic decision The strategic decision to start a programme to construct a number of Nuclear Power Plants for electricity generation and implementation of the first NPP, the president is also reformed the supreme council for the peaceful uses of nuclear energy heeded by the president hem self and the concerned ministers as a members.

One of the main responsibilities of this council is managing, coordinating, and strong sporting the project activities

In the second level of coordination and project management the coordination committee headed by minister of electricity and energy, the members of the committee are the chairmen of the concerned authorities

NPPA is directly responsible to manage the project implementation with technical assistances of the selected experienced consultant

2.3.3. Project Funding

Implementing a sound and successful financing plan is in progress. A strong public and government policy in support of nuclear power has been created through activating the role of The Supreme Council for the Peaceful Purposes of Nuclear Energy.

Developing all necessary financial plans in place (including Waste and Decommissioning) are part of the scope of services of the project consultant. One of the bases of the development of the plan the past experiences learned during past trials in 80th, also financing the electricity projects. The electricity sector finance must of their projects through the international financial institutions, the regional fund and banks, and local resources. The governmental guaranty thorough the Egyptian central bank will be support the position of NPPA to minimize the financial risks

2.3.4. Electric Grid Development

During the last attempted to introduce the NPP, NPPA in cooperate with the EEHC was contact a technical study by Swedpower (1984-1986) investigating the interconnection the first NPP to the Egyptian grid. The grid capacity was less than 15 GW, but the outcome of the study is indicated the grid is accommodated the 4 nuclear units 1 GW each in the El Dabaa site without a serious implications, currently a plan for grid expansion to year 2030 is under development include the nuclear power.

When NPPA will select and contract a NPP, a specific study for interconnecting this plant to the grid will care out investigating the mutual impacts including the safety requirements.

2.3.5. Site Selection

Nuclear Power Plants Authority (NPPA) has already got a qualified nuclear site at El-Dabaa. The general conclusion of El Dabaa site studies was the suitability of the site to receive up to 4000 MWe units as well as a desalination plant. The site studies and investigations were performed according to the French Regulations and Practices. The El Dabaa site is coastal site on the Mediterranean see it is also characterized such as; low seismic activity, geologically, topography thermal chemical and mechanical impact on the sea, low population density, and suitable foundation basement for the constructions

However, in order to accommodate for the expected large nuclear power plants programme, NPPA has requested consultation services, to provide consulting services that include:

- Potential sites selection and evaluation;
- Updating El-Dabaa site investigations;
- Pre-contract activities and project implementation.

NPPA has carried out studies for local pathways and likely concentration of effluents. The Regulatory Body will issue the relevant regulations. Local sensitivities (land, people, plants, animals) have been identified, and some measures have been practiced in El-Dabaa site.

2.4. Organizations involved in construction of NPPs

NPPA is working as a sol governmental utility has the right to introduce the NPP including the construction and operation by law, the Egypt strategy during the construction is intended to maximize the spin off effects of the nuclear power plants programme in modernizing Egyptian Industries and Scientific Research, through planned increase in local participation in every new plant.

NPPA shall with assistance of the project Consultant:

- Determine which suppliers can reliably supply which components and services;
- Make firm, realistic decisions on national or foreign supply of items for timely construction of first plant;
- Highlight any proposed scope of national/local supply in bid specification.

2.5. Organizations involved in operation of NPPs

NPPA is working as a sol governmental utility has the right to introduce the NPP including the construction and operation by law, it will cooperate with the consultant and vender to establish the all operation requirements include the O&M staff

2.6. Organizations involved in decommissioning of NPPs

NPPA is working as a sol governmental utility has the right to introduce the NPP including the construction and operation by law, part of this responsibility to develop the decommissioning strategy and it is also needed for NPP' license

2.7. Fuel Cycle Including Waste Management

For the start of the nuclear power program, Egypt has taken the decision to adopt an open fuel cycle for the first nuclear power plant, i.e. no reprocessing of spent fuel. A number of agreements to provide enrichment services exist since the 1980s and are still valid.

NPPA will develop with assistance from the IAEA and the International Consultant a fuel cycle strategy for:

- Purchasing the first reactor core;
- Number of reload cores and capacity of on-site spent fuel storage to be included in first plant contract;

For high-level waste (mostly irradiated fuel), on-site storage will be the method adopted, covering the operating life of the plant. Final disposition (presumably in deep geological formations) will follow international trends and experience.

Waste management is a national responsibility. There is experience in Egypt for handling low and intermediate level waste, will be investigated and applied on the project. For high-level waste (mostly irradiated fuel), on-site storage will be the method adopted, covering the operating life of the plant. Final disposition (presumably in deep geological formations) will follow international trends and experience.

The Nuclear Law revised and updated laws and regulations for handling low and medium level wastes. The consultant will help in assigning responsibility to follow international developments for high level waste disposal. The Consultant will also help in planning for enhancing waste disposal programmes and facilities, and will include waste volume and toxicity minimization provisions.

2.8. Research and Development

2.8.1. R&D organizations

The main nuclear research organization in Egypt is the Egyptian Atomic Energy Authority (EAEA) that comprises four research centers as indicated in Appendix 2. EAEA has two research reactors located in Inshas, the first is a 2-MW thermal power built in 1961 and the second is a 22 MW thermal power built in 1998.

The Egyptian universities are important partner in R&D activities. In Egypt there are 18 Governmental Universities of which only two offer nuclear-related degrees (Alexandria and Cairo Universities). There are also 24 Private Universities of which only one offers nuclear-related degrees (Egyptian - Russian University).

In addition to these institutions, there is a wide scientific research system that consists of the following organs:

- The Academy of Scientific Research and Technology (ASRT) has the mission is to provide a source of credible, independent, expert assessments on the sciences

underlying pressing issues and matters of public interest; and to provide a voice for Egypt on behalf of the sciences, both nationally and internationally.

- The National Research Center which was established in 1956 to carry out scientific research needed in the fields of industry, agriculture, health, and other fields related to the development of national economy.

- Mubarak City for Scientific Research and Technology Applications (Muscat) is the newest addition of research institutes in Egypt that was directed to the development and renovation of industry. The first stage of Muscat was inaugurated on the 13th of August, 2000 and included Genetic Engineering and Biotechnology Research Institute (GEBRI), Informatics Research Institute (IRI) and Institute of Advanced Technologies and New Materials (IATNM). In addition, a Technology Capabilities Development Center is fully functioning in the Dekhlia Branch. The objectives of Muscat institutes were clearly categorized to serve the development and renovation of industry in Egypt.

2.8.2. Development of advanced nuclear technologies

Not Applicable

2.8.3. International co-operation and initiatives

Egypt is only participating in the GNEP initiative as an observer, and also participating in the discussion and regional and international meetings about the nuclear fuel initiatives.

Co-operation with IAEA

- **Enhance the capabilities of the national RB**

Comparative assessment of strategies and options for electricity generation in Egypt up to 2000 (EGY/0/016): to determine the optimal electricity generation mix up to the year 2020, including nuclear and renewable energies.

- **Regional projects**

Cooperation within project RAF/0/028, to enhance the capabilities of AFRA Member States to elaborate national energy strategies for sustainable development, Egypt of the member states is participating actively in this program

Cooperation within project RAF/0/033 , to sensitize the African Member States wishing to embark on nuclear power feasibility studies about the requirements, challenges and obligations related to such programmes.

Several TCP with IAEA was implemented for Human resources development, must of this project was designed to develop for the nuclear power plant project activities such as; preparation and project management (EGY/4/040, EGY/4/045, and EGY/4/047):

Nuclear power and desalination feasibility study to provide the decision makers with all the necessary information regarding the technical and economical feasibility, and viability of the nuclear option for electricity generation and seawater desalination. Also to transfer knowledge, information and experience related to the development of human resources for planning and implementation a nuclear project for electricity generation and water desalination.

Projects (EGY/4/042) was established to develop a Quality Assurance program for NPPA and finalize NPPA QA manual up to the international standards, and to enable NPPA staff to plan for full implementation of QA program.

Recently IAEA and NPPA lunching a new TCP (EGY /0/049) on Safety and Environmental Impact Assessment for El Dabaa Nuclear Power Plant (2005 - 2007)

Introduction of Nuclear Power for Electricity Generation (EGY/4/053) to support national efforts to establish the country's first nuclear power plant (NPP) for electricity generation, specifically to assist Egypt in the areas of nuclear safety, comparative assessment and siting

Managing Nuclear Power Plant Project (EGY/4/054) to enhance the capabilities of NPPA staff in the fields of project management and safety and create safety and quality management culture (2009 - 2012).

Other areas for capacity building in cooperation with IAEA projects include:

Experimental investigation of feed water preheating on the performance of RO membranes (RO/10244): short-term to study performance characteristics of three commercial SWRO membranes over the range of allowed temperatures and pressures. Long-term to study the effect of continuous operation at maximum feed water temperature and pressure on RO membrane life.

Development of an integrated economic and financial assessment tool for power/desalination systems (EGY-11973/RO): to increase the computational capability and flexibility of DEEP, and development water cost module and additional desalination and power models.

2.9. Human Resources Development

The Egyptian strategy for human resource development is to develop the knowledge and skills needed for the human resources to support all phases of the Egyptian nuclear power programme in a timely manner. The short-, medium-, and long-term objectives are:

- *Short-term objectives (1-2 years)*
    - To develop qualified nuclear human resources for nuclear energy program
    - To establish a fully independent Regulatory Body

- *Medium-term objectives (3-5 years)*
    - To develop capabilities and resource and train all NPP personnel in Egypt and abroad

- *Long-term objectives (+ 6 years)*
    - Commission first NPP by 2018
    - To ensure sustainable nuclear human resources development for the nuclear program

There are national experts in many areas related to NPP project, except in construction of NSSS and O&M and Regulatory activities of Nuclear Power Plants. As indicated above there are a number of educational facilities in the field of nuclear engineering. The number of students and professors engaged in nuclear-related programs in Alexandria University are 141 and 11 respectively. There are also a number of high caliber training centers within the Ministry of Electricity and Energy and the Egyptian atomic Energy Authority. There is also an important vocational programme for Technical education, training and employment, known as Mubarek-Kohl Initiative (MKI). The Program's objective is to improve employability of young people through developed training and labor market institutions.

Key partnerships in training outside the country are the IAEA and Countries had bilateral agreements with Egypt (e.g. Argentina, China, France, ROK, Russia, USA). There are also on going activities for cooperation with EU.

2.10. Stakeholder Communication

2.10.1. Objectives of Stakeholder Communication

The main objective of stakeholder communication is to provide open, honest and transparent information to affected stakeholders regarding all aspects of the project in order to maintain their trust. Another objective is to have sufficient number of well qualified and motivated staff (internal stakeholders) to ensure project success.

It is necessary to gather, improve and explain information regarding nuclear power issues (benefits and risks) to stakeholders concerning:

- Climate change
- Economics
- Safety
- Radiation protection
- Environmental protection
- Waste management
- Health effects (on employees and the public)
- Proliferation

2.10.2. Strategy for Stakeholder Involvement

A key factor is to include the principal organizations involved in the project in the development of the strategy (provided later in this document is a listing of those organizations).

In this regard, NPPA shall take a leading role in initiating these efforts, as it has the lead role in the implementation of the NPP project. The Nuclear Regulatory Body will also have its own strategy and communication plans; however, it should coordinate its efforts with those of others. This strategy needs to address all stakeholder groups (target audiences).

Very visible support for the strategy needs to be provided at the top level of these organizations in order for it to succeed. Both financial and human resources need to be identified to implement the strategy, also the Roles and responsibilities.

Communications/public relations specialists need to be a part of the project team. This may include the need to contract with external organizations for activities such as public opinion surveys and public information programs.

An action plan should be developed to implement this activity. This plan should be an integrated part of the overall project schedule/plan.

2.10.3. Stakeholders to be addressed

The stakeholders to be addressed through this action plan are of two categories:

1. Organizations that should participate in development of the strategy and communication plans, and organizations involved in the implementation of these plans.

2. Affecting and Affected stakeholders that should be the target audiences for the communications.

2.10.4. Near Term Actions Needed

The following are the identified main near term actions regarding stakeholder involvement. They are shown in the order in which they should be implemented. However, when the work plans for stakeholder involvement are developed, several of them can proceed in parallel:

1. Clearly define strategic goals and have them approved and supported by top level management.

2. Develop coordinated action plans for different organizations.

3. Create organizational units and identify clearly their roles, responsibilities and interfaces.

4. Identify team members (Individuals in different organizations) and how they will work together (regular meetings to ensure coordination).

5. Identify target audience and prepare suitable messages (suitable data) and coordinate approach to survey target audience.

6. Develop suitable channels for communicating with each of these target audiences (such as websites for each organization).

2.10.5. Public consultation

In order to provide open, honest and transparent information to the stakeholders regarding all aspects of the project in order to maintain their trust, Egypt's requirements for public consultation should be reviewed and the criteria and a methodology for conducting public consultation determined. An important, early example is the Environmental Assessment of the site(s) proposed for NPPs. Participation in the public consultation should be made available to a wide range of stakeholders and sufficient time should be allocated in order to receive submissions, hold public hearings and respond to the views of the participants. Special attention should be paid to the views of the leaders of thought in the communities in the region around the selected site.

Public consultation will be addressed at local, national, regional and levels. The main driver in obtaining this acceptance is the social and economic benefits of the project to the local area. Other drivers are improvement of health, education, safety and security for the people around the site locality. The proponent of the project will outline and promote such benefits to the local residents. Local leaders and persons of influence will also be engaged in the planning and be informed of the measures taken to maximize the local benefits and mitigate the adverse impacts of the project. Examples of such individuals are the elected municipal officials, academic teachers and administrators, health and safety officials, key business and industry leaders, religious leaders.

2.10.6. Training Regarding Stakeholder Involvement

Those responsible for communicating with stakeholder groups will be provided with training suitable for their activities, including such areas as:

- Press conference or presentations to the media
- Presentations to stakeholder groups
- Development of materials that is suitable for the target audience.

Professional public relations firms generally provide such services. Also, the IAEA and other organizations offer training courses and other materials for such purposes.

IAEA assistance should be provided in this area, including:

- Provide experts to share their experiences and review plans/materials.
- Provide opportunities to participate in meetings/conferences on this topic.
- Scientific visits to countries that have effective stakeholder involvement programs.

Provide educational and training materials such as films and other audio visual materials

3. NATIONAL LAWS AND REGULATIONS

3.1. Regulatory Framework

3.1.1. Regulatory Authority

The Chairman of the AEA issued decree No. 15 of 1st of August 1982, establishing Nuclear safety Committee within the AEA (later The National Center for Nuclear Safety and Radiation Control, (NCNSRC) which was established by a presidential decree No. 47 in 1991 to practice the regulatory role in the nuclear field on behalf of the Atomic Energy Authority.

The NCNSRC having the legal authority for conducting the licensing process, for issuing licenses and thereby for regulating nuclear power plant sitting, design, construction, commissioning, operation and decommissioning in Egypt.

Egypt was drafting a new nuclear law, there is right new under discussion in the Perlman, it is expected to be approved through year 2009, one of the function of the law create a new independent and strong regulatory authority for all the nuclear and radiation applications.

3.1.2. Licensing Process

The Ministry of Electricity and Energy coordinate the uses of the nuclear energy in Egypt. Therefore, the organizations concerned with the NPP licensing, i.e. AEA (the Licensing Competent Authority, and NPPA (Utility) are under the jurisprudence of the Minister of Electricity. In addition, the NCNSRC comprises one department of AEA. Throughout the licensing process, the utility submits the required application and the relevant documents for each phase of licensing. The NCNSRC evaluates and reviews the safety documents and makes recommendation to the AEA' board of directors. Based on these recommendations, the AEA' board of directors issues the licenses for NPP.

Furthermore, the Environmental Affairs Agency, which belongs to the Minister of Environment, regulates the environmental aspects relevant to NPP impacts during the licensing process.

The Egyptian organizations involved in the utilizing nuclear energy, especially for the electricity generation and seawater desalination, are presented in Figure 4. The figure shows the interrelation between these organizations with respect to licensing procedures for nuclear power plants in Egypt.

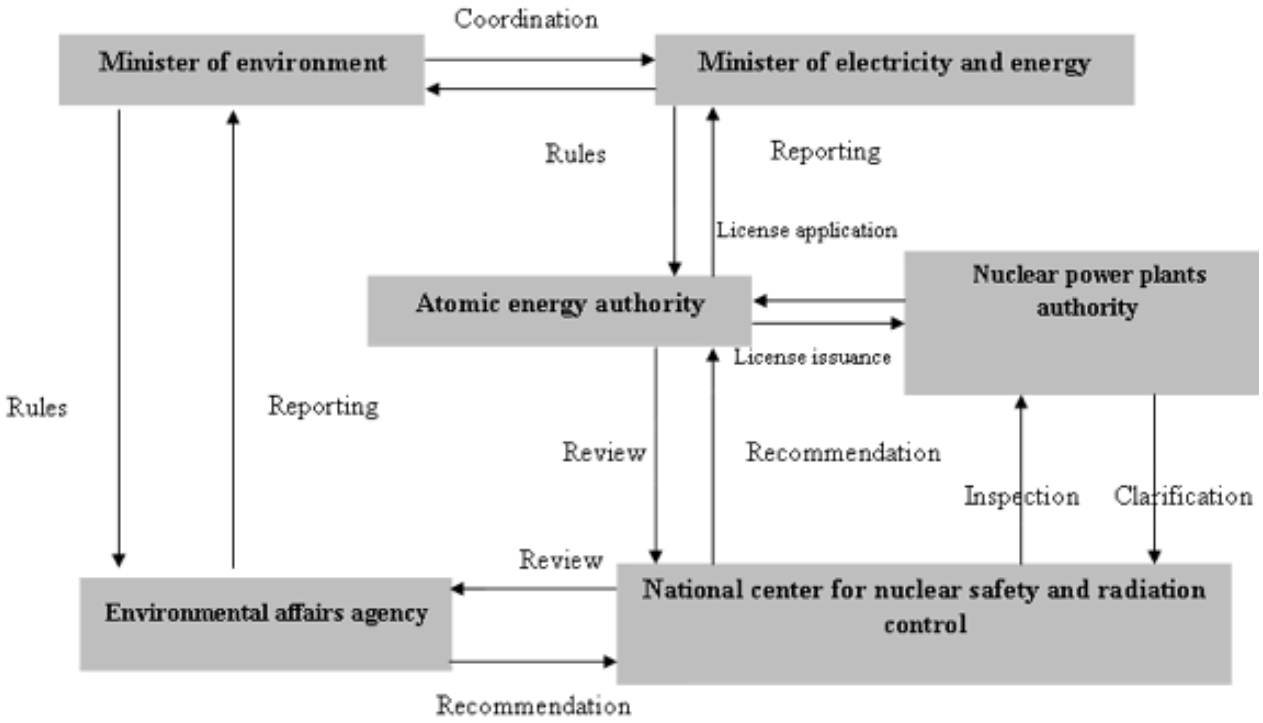

FIGURE 5: licensing procedures for nuclear power plants in Egypt

The AEA has also issued the following basic safety rules, which establishes nuclear regulations, safety criteria, codes, rules and standards to be used for nuclear power plants to be established in Egypt:

- The IAEA Nuclear Safety Standards (NUSS) shall be a main source of the Egyptian nuclear regulations, safety criteria, codes, rules and standards. NUSS shall also be used as a frame of reference for the review and assessment of safety analysis reports as well as other safety-related documents for nuclear power plants to be established in Egypt.
- The competent authority may also accept the safety criteria, codes, rules and standards used in the vendor country at the time of contract signing as well as the latest versions applicable during the time of design and construction, to the extent that they are not incompatible with NUSS. The latest level of practical experience in the vendor country should also be adequately considered.
- The nuclear power plant(s) to be established in Egypt, or any subsequent modifications concerning their design or construction, shall comply with the above accepted safety criteria, codes, rules and standards. Evidence of compliance shall be presented. Reference plant(s) recently licensed in the vendor country or in one of the IAEA member states is considered as good means to demonstrate licensee ability.
- The proposed plant should be licensable in the vendor's country.

The licensing procedures, as stipulated by AEA, are divided into 5 stages:

1. Site approval
2. Construction permit
3. Fuel loading and commissioning permit
4. Operating license
5. Decommissioning license

3.2. Main National Laws and Regulations in Nuclear Power

Egypt started its nuclear program in the mid fifties. The first step was, the presidential decree setting up "The Atomic Energy Commission (AEC)", and determining its competencies to prepare, implement, and coordinate all programs and projects related with atomic energy.

In this legal form the AEC proceeded with its work until it was replaced by Presidential Decree No. 288 for the year 1957 through "The Atomic Energy Establishment - AEE" (which later became the Atomic Energy Authority - AEA). The sub-item (h) of the Second Article of this Presidential Decree empowered the AEE to take the proper security measures needed for protection against the danger of nuclear radiation, cure those affected by it, issue provisions and instructions and propose the necessary legislation.

In 1960, the law No. 59 organizing the use of ionizing radiation and protection against it was issued, it states that "The AEE and the Minister of Health are in charge of executing, each in its field of competency". The second paragraph of the Article 3 of this law states that "The AEE shall regulate work in open isotopes and reactors, and granting the necessary licenses to regulate them."

The Minister of Electricity and Energy issued decree 359 of 22 August 1981 establishing a committee whose function was to draw up draft laws regulating the use of nuclear power for peaceful purposes, and in this committee, all the competent bodies concerned with nuclear power matters in Egypt were represented. The committee completed its reports in January 1982 and appended to it a draft law on a national organ for nuclear protection and security, and civil liability for nuclear damage.

The Draft Law on Nuclear Control and Safety, and Civil Responsibility on Nuclear Damage states that: A general authority is to be established named "The National Authority for Nuclear Control and Safety". This authority will be responsible for protecting and safeguarding individuals, establishments and environment when selecting a location, constructing, operating, suspending and terminating the operation of nuclear establishments

REFERENCES

Egypt Information Portal	**http://www.egypt.gov.eg**
The Egyptian Cabinet Info and Decision Support Center	**http://www.idsc.gov.eg**
The Egyptian Ministry of Electricity and Energy	**http://www.moee.gov.eg**
The Egyptian Ministry of Petroleum	**http:// www.emp.gov.eg**
The Egyptian Ministry of Economic Development	**http://www.mop.gov.eg**
The Egyptian Ministry of Finance	**http:// www.mof.gov.eg**
Energy Information Administration (EIA)	**http://www.eia.doe.gov**
Encyclopedia of Earth	**http://www.en.wikipedia.org**
International Atomic Energy Agency (IAEA)	**http://www.iaea.org**

Appendix 1: International, Multilateral and Bilateral Agreements

Aiming at the implementation of nuclear power reactors for the purpose of electricity generation and desalination, Egypt concluded several international, multilateral and bilateral Treaties, Agreements and Commitments. These would provide Egypt with the necessary international support for co-operation in the peaceful uses of nuclear energy.

First of all, Egypt signed and ratified the Treaty on Non Proliferation of Nuclear Weapons (NPT) and concluded with the International Atomic Energy Agency (IAEA) an Agreement for the application of safeguards in connection with the NPT.

Egypt also signed and ratified several multilateral Conventions, which regulate the applications of nuclear energy in the international frame. In that regard, Egypt ratified the Vienna Convention on Civil Liability and the Joint Protocol Relating to the Application of the Vienna Convention and Paris Convention. In addition, Egypt signed and ratified the Convention on Early Notification of a Nuclear Accident, and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency. It signed the Convention on Nuclear Safety.

Another important step for preparation to implement nuclear power reactors in Egypt was the conclusion of several bilateral agreements with some nuclear exporting countries on co-operation in the peaceful uses of nuclear energy. These countries are France, United States of America, Germany, Canada, Australia and the Republic of Korea and Russian Federation.

Following the co-operation agreement with the Republic of Korea, a Joint- Inter Ministerial Declaration of Intent on Co-operation in the Field of Peaceful Uses of Nuclear Energy was concluded in 1999.

Furthermore, Egypt had singed, in 1981, Memorandums of Understanding for co-operation in the field of nuclear energy with both the United Kingdom and Sweden.

The initiative of president Mohamed Hosni Mubarak

On 8 April 1990 president Mubarak declared an initiative to set up a Weapons of Mass Destruction Free Zone (WMDFZ) in the Middle East, the basic features of the declaration were:

1. to ban WMD in the middle east, whether nuclear, biological, or chemical.
2. All the countries of the region should make equal and mutual pledges in that regard.
3. An appropriate measures and procedures to ensure the full compliance of all countries of the region should be taken.

The Treaty of Plindaba

In 1995 experts from the Organization of African Unity (OAU) elaborated a draft treaty on the African Nuclear Weapon Free Zone, called (The Treaty of Plindaba) on 11 April 1996, it was opened for signature.

SUMMARY OF THE EGYPT'S INTERNATIONAL, MULTILATERAL AND BILATERAL TREATIES, AGREEMENTS AND COMMITMENTS

Commitments	Signature	Ratification	Remaining into force	Renewal*
1- Multilateral				
1-1 NPT		26/02/1981	indefinite	
1-2 Safeguards	25/6/1981	07/10/1981		
1-3-1 Vienna Civil Liability		05/11/1965		
1-3-2 Joint Protocol		10/08/1989		
1-4 Early Notification	26/09/1986	06/08/1988		
1-5 Assistance in the case of nuclear Accident	26/09/1986	17/10/1988		
1-6 Nuclear safety	20/09/1994			
2- Bilateral				
2-1 France	27/03/1981	14/07/1981	30 years	3 years, each
2-2 USA	29/06/1981	29/12/1981	40 years	40 years
2-3 Germany	26/10/1981	26/02/1982	30 years	5 years
2-4 Canada	17/05/1982	8/11/1982	30 years	5 years
2-5 Australia	26/07/1981			
2-6 South Korea	10/04/1985			
2-7 Russian Federation	25/03/2008			
3- Memorandum of Understanding				
3-1 Sweden	23/06/1981			
3-2 United Kingdom	02/11/1981			

* Unless termination by either party, by notification six months before the end of each period.

APPENDIX 2: MAIN ORGANIZATIONS, INSTITUTIONS AND COMPANIES INVOLVED IN NUCLEAR POWER RELATED ACTIVITIES

1- Atomic Energy Authority (AEA)

- Nuclear Research Center (NRC) : Applied Researches related to Nuclear Energy
- The National Center for Radiation Research and Technology (NCRRT)
- The National Center for Nuclear Safety and Radiation Control (NCNSRC) , current authorized Regulatory Body.

Address: 110 NILE STREET
DOKKI
CAIRO 12611
Egypt

All Centers are at address:
3 AHMED EL-ZOMOR STREET, SECT. 8
CAIRO
Egypt

Tel. 202 22876033- 202 22875924 Fax. 202 22876031 http://www.eaea.org.eg

2- Nuclear Materials Authority (NMA):

Main activities :

- Research & Development
- Exploration & Mining of Nuclear Materials

Address: EL MAADI-KATTAMIYA ROAD
P.O. BOX 530, MAADI
CAIRO
Egypt

Tel. 202 27585831
Fax. 202 27585832
http://www.moee.gov.eg/Arabic/fr-main.htm

3- Nuclear Power Plants Authority (NPPA)

Main activities :

- Feasibility Studies for NPPs
- Bid Specification & Evaluation
- NPPs Project implementation
- O& M over NPPs Life Cycle

Address: 4, EL NASR AVENUE
P.O. BOX 8191, NASR CITY

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