

**Market Brief on  
Power Generation Sector  
in Jordan**

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## **Executive Summary**

The electricity sector in Jordan could be divided into three elements generation, transmission and distribution. Each of these elements is involved in many activities and is responsible for delivering the electricity in order to complete the chain up to the end users.

The Ministry of Energy and Mineral Resources is responsible for fixing the electricity power prices and controlling all the companies in the electricity sector. It is also responsible for the energy sector formulation and policies. The generation part is under the responsibility of the Central Generating Company (CEGCO) which is responsible for all generated power in Jordan. This company is owned by the government and it is in the process of being privatized. Electricity dispatch and transmission is handled by The National Electric Power Company (NEPCO), which is a governmental entity and it will remain as a governmental owned company. NEPCO also manages the system loads through its national control center.

The distribution aspects is handled by three private companies responsible for distributing power to Amman ,central of Jordan, northern and southern parts of the Kingdom.

The government is planning to privatize the power generation sector in order to avoid any shortages in the potential generating capacity and to meet the high growth rates in the electricity demand in Jordan.

The demand on energy and electricity is rising at a growth rate of 4.3% per annum. As the statistical data published by the Ministry of Energy and Mineral Resources, the forecasted demand on electrical energy will be in the year 2020 15,905 GWh where it was 9,356 GWh in 2004. In 2003, the Ministry with other energy entities attained various achievements; the most important one was the project of natural gas pipeline from Egypt to Jordan.

On another level, the Ministry with the electricity distribution companies continued their serious efforts to complete electrification of the Jordanian rural areas and populated areas as well. About 100% of the population was given access to electricity which is an achievement Jordan is proud of, when compared with other Arab and foreign countries.

Although the demand for electrical machinery and equipment used in the electrical power sector is growing rapidly in Jordan, but US companies, due to the high quality machinery which lead to higher cost compared with other countries products, don't hold a high market share in the supply of goods and services to the electricity sector in Jordan.

It is worth mentioning that the government of Jordan adapted many laws and regulations which lead to reduce the import barriers and open competitive unlimited market.

## **1. Market Overview and Highlights**

This study covers the power and the electrical sector in the Hashemite Kingdom of Jordan which includes a brief on each stage of the power sector in this country. It also highlights the major investments in this sector, and the new opportunities for investment in Jordan concerning the same subject.

The electrical sector in Jordan is managed by the Ministry of Energy and Mineral Resources (MEMR). Electricity Sector Regulatory Commission (ERC) was founded in 2001 to regulate and supervise the efficiency and the affectivity of service in this sector to encourage private sector to invest in Jordan as the power sector is in the process of being privatized.

The power supply passes through three stages to reach the end-users as follows:

1. **Power Generation:** This sector is under the full responsibility of the Central Generating Company (CEGCO). It involves all the power plants which employ different fuels and technologies to generate electrical energy and sell it in bulk to the National Electric Power Company (NEPCO).
2. **Power Transmission:** it involves the transmission of electricity from the power plants to load centers. The National Electric Power Company (NEPCO) purchases the power from CEGCO and sells it to the distribution companies and bulk industries. It is also responsible for managing the interconnection links with Egypt and Syria.
3. **Power Distribution:** it involves the delivery of electric power to the premises customers, commercial, industrial, residential ... etc. The distribution sector is being handled by three private companies, briefed as follows:
  1. The Jordan Electric Power Company (JEPCO), which distributes power to Amman Area and central Jordan.
  2. Irbid District Electricity Company (IDECO), which distributes power to the north of Jordan
  3. Electricity Distribution Company (EDCO), which distributes power to the areas outside the concession areas of JEPCO and IDECO.

The ministry aims to enable all the sectors of the society with their various categories and locations to enjoy the energy services in order to improve the welfare and living standards. As stated in the ministry's annual report, the percentage of population supplied with energy reached extremely high rate of 99.9%.

The project of natural gas pipeline from Egypt to Jordan was the most important achievement in the year 2003. The project with its two stages is considered part of the Arab Gas Pipeline project, which will connect Egypt,

Jordan, Syria and Lebanon. The pipeline is expected to be completed and commercially operated, and to start transporting and delivering gas to electric power station in 2006.

To meet the increasing demand for electricity, work has started on the project of converting gas generation station of Rehab to operate on combined cycle by adding two steam turbines with a capacity of 100 MW. Adding a fifth gas generation unit in Al Risha area with a capacity of 30 MW has been started as well.

Continuous efforts have been started to reorganize the energy sector aiming at spreading the functions between the private and public sectors in order to reinforce the role of the private sector to take serious part in this vital area.

## 2. Market Trends

### Power Generation:

Central Electricity Generating Company was registered in accordance with the Jordanian Companies Law no 22 for the year 1997 and implementation of the Council of Ministries resolution dated October 4, 1997. The resolution aimed at establishing a separate company from the National Electricity Company, the objectives of which are to own and manage the power generating activities. The newly formed company will be 75% owned by the government and 25% owned by the National Electricity Company, until it will be privatized.

CEGCO is keen to meet the increased electrical demand, which witnessed a growth rate of 6% over the year of 2003, by increasing its capacity of its existing power plants, where a gas turbine unit with a capacity of 100 megawatt was added to Rehab Power Plant, which started operating in January 20, 2003 making the total generating capacity 360 megawatt.

Electricity generated in 2003 was 7988 GWh with a decrease of 1.7% against the year 2002. This is due to an increase in electricity imported from Egypt. The volume of consumed electricity was 7345 GWh, with an increase of 6.4% against 2002.

The peak load of the Kingdom in 2003 was 1428 MW, compared with 1410 MW in 2002 representing a growth rate of 1.24% and 1255 in 2001 with a growth rate of 11.8%. CEGCO contributed 93.5% of the total electricity generated in 2003, while other industrial establishment contributed 6.5%.

Electrical energy consumed in the Kingdom during 2003 was 8964 GWh compared with 8453 GWh, with an annual growth of 6%. The average per capital consumption in the Kingdom grew to 1635 KWh in 2003, compared with 1585 KWh in 2002 with a growth rate of 3.2%. The electrical energy imported from Egypt in 2003 was 972.3 GWh, compared with 322 GWh in the year 2002 with an increase of 202%.

It is worthy to mention that the available installed capacity is 1636 MW where the peak load reached 1428 MW, and the total system installed capacity at the end of 2003 was 1788 MW. According to specialists, this capacity will satisfy the Kingdom's need until the year of 2008.

To keep pace with the increasing demand for electricity in the Kingdom and by implementing development plans, CEGCO is carrying out various power plants projects, so as to cover the potential demand for electricity in the Kingdom until 2010 in the following manner:

### **Table (1) Power Plants in Jordan**

Power Plant	Steam	Gas Turbines		Diesel	Wind	Hydro	Total
		Diesel	N. Gas				
Aqaba Thermal	5*130					6	656
Hussain	3*33 + 4*66	1*14+1*19					396
Rehab		2*30+2*100					260
Al-Risha			4*30				120
Marka		4*20		20			100
Amman South		2*30					60
Karak		1*20		4.5			24.5
Aqaba Central				15			15
Tafila				1.5			1.5
Ma'an Remote Village				1.5			2
Al-Ibrahimiah				2	0.3		0.3
Hofa					5*0.225		1.125

Source: CEGCO Annual Report 2003.

Other organizations supported CEGCO in operating and generating power in the Kingdom with 152 MWh in the year 2003. These organizations are King Talal Dam, South Cement Factory, Refinery Co., Arab Potash Co., Indo Jordan Co., Jordan United Iron Industry Co., and others.

CEGCO continued in 2003 in utilization of local sources of energy available in the Kingdom and investing thereof in electric generation. These investments were in the Risha field for electricity production through gas turbines operating in a capacity of 4\*30 MW contributing to decreasing heavy fuel imported to the Kingdom by 221 thousands tons with total value of US\$ 33.3 million.

A project to transfer Aqaba Thermal Plant boilers to operate in natural gas, this project was completed in April 2004. Advantages of this project are an improvement of environment through lessening gas pollutants emitting from combustion resultants at the steam boilers.

Hofa and Al-Ibrahimiah plants are operating through wind energy. Electric power produced in these two stations amounted to 3 megawatt/hour in 2003. In September 2003, CEGCO signed an agreement with American Delenova Company in cooperation with the Ministry of Planning under which the American company will carry out feasibility technical and economic study to broaden the wind plants of Hofa and Al-Ibrahimiah.

CEGCO through Jordan Bio Gas Company continued its operation at Rusaifeh dump for purposes of production of electricity. Electric energy produced by this factory amounted 6 GWh in 2003, compared with 5.4 GWh in 2002. A contract was signed with a German company to carry out an expansion of electric generation station to increase its total capacity within five MW.

CEGCO is currently working for carrying out and setting up several projects of electricity power plants to cover the progressive demand for electricity in the Kingdom. These projects are:

- Expansion project of Rehab Power Plant to added 100 MW of capacity.
- Rehab Power Plant transfer projects for working on combined cycle to increase the efficiency from 30% to 45% in a total cost of US\$ 91 million where a Korean Company will complete the project in February 2005.
- Al-Kherba Al-Samra Power Plant Combined Cycle with a total generation capacity of 280-400 MW Build-Own-Operate (BOO) basis of a total cost US\$ 210 million. The project was awarded in July 2004.
- Expansion of Risha Power Plant with a capacity of 30-40 MW which was awarded in April 2004 for being completed in 14 months.

Interconnection constitutes are an additional generation capacity for the interconnected networks. Due to the importance of this fact, Jordan implemented a number of electric interconnection projects at the regional level such as:

- Jordan – Egypt Electric Interconnection Project with a total cost of US\$ 75 million from the Jordanian side. It was agreed that the Jordanian party will import maximum electric capacity of 300 MW per year.
- Jordanian – Syrian Interconnection Project with a cost of US\$ 25 million for the Jordanian party paid in kind basis.
- Jordanian – Iraqi Interconnection Project with a voltage of 132 KV and/or 400 KV, plus allow the Jordanian electric companies to participate in the works of maintenance needed for the various components of the Iraqi system.

All the equipments in this field are imported due to a lack of production in local markets. Such equipments include steam or gas turbines, diesel sets, wind energy units... etc.

CEGCO is a public shareholding company where the government owns 75% of its shares, while the rest are owned by NEPCO. The government's policy to reform the Jordanian economy has involved the restructuring of economic institutions and reforming of laws and regulations in order to attract more investment. The Cabinet reviewed the letter of the Minister of Energy and Mineral Resource relating to the privatization of the sector of electricity generation and distribution and the marketing of the Central Electricity Generating Company as a whole unit up to 60% of its value.

The approval was granted in connection with the percentage of the value of CEGCO offered for sale. The percentage has been determined to be 51% instead of leaving it up to 60%. However, priority to purchase the difference of 9% is to

be given to the Social Corporation. The government appointed a consulting firm to study the possibility of privatizing CEGCO and selling of the government's share.

An American Consultant, K&M, was contracted to do the consultancy works needed to privatize electricity generation sector. Tender draft is expected to be issued by the end of 2004. This project comes to meet the demand on electricity during summer 2008. The commercial operation of the project as a simple cycle will be in the end of 2007, and as a combined cycle at the end of the first half of 2008.

### Power Transmission:

During 2003, NEPCO constructed and expanded main substations 400/132, 132/33kV and the national grid of 400, 132 kV and developed the interconnection networks with the neighboring countries with the aim of meeting the increasing electric loads and the electricity needs of all consumers with high continuity and reliability.

The interconnected system in Jordan consists of the main generating power stations, 132 kV and 400 kV transmission network, this transmission network interconnects the power stations with the load centers and different areas in the kingdom. The system also includes the 230 kV, 400 kV tie lines with Syria and 400 kV tie line with Egypt and the distribution networks which serve about 99.9% of the total population in Jordan. In addition to that, the electrical power system in Jordan includes some private power stations, which are synchronized with the rest of the power stations in the integrated network and there are a few private power stations, which are not connected with the interconnected network and serve only their owners.

The total length of 132 kV network and above is about 3346 km-circuit and the total installed capacity in the substations is 4801 MVA.

The generated energy for the purpose of local consumption amounted to 7994 GWh in 2003, compared to 8132 GWh in 2002 representing an annual decrease of -1.7% compared to 7.7% in 2002 due to the decrease production in the steam units, the diesel engines, and the hydro units.

The share in the generated energy is as clarified in the following table:

**Table (2)**  
**Share in the**  
**Generated Energy**

CEGCO	93.42%
King Talal Dam	0.18%
Jordan Biogas Company	0.08%
Industrial Companies	6.32%

Source: NEPCO Annual Report 2003.

It's clear that CEGCO covers the largest part of the Kingdom electrical demand. The peak load in the Jordanian power system in 2003 was 1428 MW compared with 1410 MW in 2002 representing an annual growth of 1.3%. The annual peak load for the interconnected system amounted to 1387 MW during August 2003 compared with 1370 MW in 2002. The generating units share in covering the system peak load 1387 MW are shown in table (3):

**Table (3)**  
**Generating Units Share**

Steam Units	69.94%
Gas Units (Burning Diesel)	15.86%
Gas Units (Burning Natural Gas)	6.13%
Imported from Egypt	6.63%
Other Companies	1.44%

*Source: NEPCO Annual Report 2003.*

Electricity consumption in Jordan for 2003 amounted to 7346 GWh compared with 6906 GWh in 2002, representing an annual growth of 6.4%. The average growth rate of electrical energy consumption during the last five years amounted to 5.2%. The distribution of electrical consumption by type of sectors in 2003 was as follows:

**Table (4)**  
**Distribution of Electrical Consumption by Sector**

Domestic	33.6%
Industrial	31.50%
Commercial	14.30%
Water Pumping	15.00%
Street Lighting	2.70%

*Source: NEPCO Annual Report 2003.*

The following table compares NEPCO's energy sales between the year 2002 and 2003 along with the buyers portions:

**Table (5)**  
**NEPCO's Energy Sales (2002-2003)**

<b>Buyers</b>	<b>2002</b>	<b>2003</b>
Distribution Companies	6399.9 GWh	6917.2 GWh
Large Consumers	729.5 GWh	746.9 GWh
Retail Sales	-	-

*Source: NEPCO Annual Report 2003*

The demand for electrical machinery and equipment used in this field is growing rapidly in Jordan. These products can be classified into three major categories as elaborated in Table (6) below:

**Table (6)**  
**Electrical Machinery and Equipment**

<b>Short Products</b>	<b>Term</b>	<b>Medium Products</b>	<b>Term</b>	<b>Long Products</b>	<b>Term</b>
Distribution Transformers		H.V. Equipment		Steam Units	
Over Conductors	Head	Transformers		Combines Units	Cycle
Switchboards		Switchgears			
Underground Cables		Overhead Conductors			
Meters		Protective Devices			
Breakers, Isolators		Gas Turbines			
Wires		Communication Equipment			

*Source: Field Survey.*

The transmission system includes different types of transformers 400/132 KV, 132/33KV, 132/11KV. It also includes 400, 132 KV ACSR overhead conductors, underground cables, steel towers, switchgears 132, 33 KV, protective devices, insulators...etc. East European and Asian countries hold more than 51% of the total import due to the price aspect.

Plans for the privatization of CEGCO and EDCO are advanced while NEPCO will remain as a government-owned company.

*Power Distribution:*

The distribution business is handled by the three private distribution companies as follows:

1. Jordan Electric Power Company (JEPCO) was established in 1947 as a public shareholding company, in charge of electricity distribution in the middle governorates such as the Capital (Amman), Zarqa, Madaba and Balqa' (excluding the middle Jordan Valley areas), under 50 years concession that expires in 2012.
2. Irbid District Electricity Company (IDECO) was established in 1961 as a public shareholding company in charge of electricity distribution in the northern governorates such as Irbid, Mafraq, Jerash and Ajloun (excluding the northern Jordan Valley areas and the eastern areas) under a 50 years concession that expires in 2011.
3. Electricity Distribution Company (EDCO) is a public shareholding company. It started its activities in 1/2/1999 after separating the distribution activity

from NEPCO. The government and NEPCO own 75% and 25% of its shares respectively. It distributes the electric power in the regions located outside the concession areas of JEPCO and IDECO namely in the South and Eastern regions and in the Jordan Valley regions.

The government continued providing electricity to the rural settlements through the rural electrification projects by the electricity distribution companies in accordance with their respective concession areas.

In the year 2003 a number of 3901 houses dwelled by about 21,845 persons had access to electricity at a total cost of around JD 9.3 million. The hereunder table shows the number of houses and beneficiaries and the total cost according to the respective concession areas of the electricity distribution companies in 2003.

**Table (7)**  
**Electricity Distribution Companies**

Company	No. of Sites	No. of Houses	No. of Beneficiaries	Total Cost in million US\$
JEPCO	553	1,822	10,203	4,942,327.60
IDECO	230	964	5,398	3,710,319.20
EDCO	379	1,115	6,244	4,301,274.60
Total	1,162	3,901	21,845	12,953,921.40

Source: NEPCO Annual Report 2003.

### 3. Power Sector Equipments Market Size

Based on the published data by the Department of Statistics (DoS) of Jordan, the local market size for electrical and power equipment was measured. For the purpose of calculating the market size for this sector's equipments in Jordan, the following equation was used:

$$\text{Market size} = (\text{local production} + \text{imports}) - (\text{exports} + \text{re-exports})$$

According to the previous equation, the market size for the years 2002 and 2003 was measured as shown below:

**Table (8)**  
**Market Size**

Items (US\$)	2002	2003	2004 Expected
Total Imports	98,501,839	81,430,551	80,500,000
Local Production	-	-	-
Total	26,449,	16,148,	15,000,

Exports	386	155	000
Total Re-Exports	10,705,722	8,610,589	8,000,000
<b>Market size</b>	<b>61,346,731</b>	<b>56,671,807</b>	<b>57,500,000</b>

It could be seen from the table above that the total imports have been decreased to reach US\$ 81,430,551 in 2003 due to a decrease in the imports of steam and diesel units in comparison to the total imports in 2002. Meanwhile, it is necessary to reveal that the experts in the industry are credibly confident of the optimistic future for power sector equipments in Jordanian market and they assured that this market will flourish and continue its growth in the next years due to the increase demand on electricity and the emerging reliance on the new sources of energy.

#### 4. Third Country Imports

The demand for power sector's equipments in Jordanian market is totally satisfied by imports since there is currently no local production of these products in the market. Power sector's equipments imported into Jordan come from several destinations such as Italy, South Korea, China, USA, Germany, Turkey, United Kingdom, and South Korea...etc. Through the analysis of Jordan's imports data produced by DoS during the period (2001 – 2003), it is revealed that Italy has the lion share of the imports of power sector's equipments in 2003 with a share of 17.75% of the total imports. South Korea and Germany ranked second and third with 10.70% and 9.38%, respectively market shares of overall imported power equipment, followed by the United Kingdom 8.14% and Turkey 7.76%.

#### 5. US position

It is worth noting that the shares of the different countries in meeting the power sector demand for machinery and equipment varies from year to year. This is dependent on tenders and the lumpiness of investments.

Traditionally, U.S. companies share in the supply of goods and services to the electricity sector in Jordan was very limited; it does not exceed more than 4.41% in 2003 from an amount around US\$ 50 million per year represent the total market size annually. This may be justified by the higher prices of U.S. companies, which in turn could be attributed to higher quality and higher transport costs. Generally speaking, the electricity sector will witness an annual growth of about 5% -8% for the coming ten years, which is considered a great investment opportunity to be targeted by U.S. companies.

#### 6. Market Access

The approach adapted in purchasing or importing the power sector machinery and equipment is by international tendering, which favors-in many cases-the lowest

bidder, which opens the door for all manufacturers to compete. However, the award of such tenders is based on a unified method of evaluation which takes the price aspect, the financing terms, the grace period, and the quality of the products or services into consideration. Attempts for bargaining with one or more of the lowest bidders to negotiate better terms are more likely to happen.

The U.S. companies could achieve a better market share only if these companies take an active role in investing in projects such as Build, Own, Operate (BOO) or Build, Own, Operate and Transfer (BOOT) concepts. These companies can introduce their products by creating consortia with other Jordanian companies to establish a stronger presence in the local market. Also, local ventures could be established and then the US companies can benefit from cheap labor, and low transportation cost.

It can be seen that the opportunity for foreign and local investors to invest in the power sector in Jordan is highly encouraging which will lead to justified competition. Jordan expects to have lower prices of electricity which will minimize the burden on consumers. This will be achieved if the monopoly in or electric service companies are welcomed and highly encouraged.

## 7. Financing

Traditionally, the electricity sector used to finance capital investment from International, regional and developed countries' organizations, such as the World Bank, Arab Funds, Islamic Bank, European Investment Bank, USAID ... etc.. Local banks used to participate in financing small projects and operational expenses. However, some of the local banks have the capability to finance larger projects.

## 8. Trade Shows

Until now, tradeshows for power sector equipment had not been carried out in Jordan or even in the Arab countries. Most of tradeshows are for household appliances which are carried out from time to time in Jordan. However, many seminars were held in Jordan which handled different subjects in Energy and Electricity Consumption.

## 9. Key Contacts

- |   |   |
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