

HASHEMITE KINGDOM OF JORDAN
Ministry of Energy & Mineral Recourses

Answers to Section B
Part II of CSD-14 National Reporting Guideline
"ENERGY"

Country Name: The Hashemite Kingdom of Jordan

Population 2004: 5.350 Million

Energy and Electricity Sectors

Jordan has almost no indigenous energy resources and energy imports account for nearly 10% of GDP. Due to economic growth and increasing population energy demand is expected to increase by at least 50% over the next 20 years, and therefore the provision of reliable energy supply at reasonable cost is a crucial element of economic reform.

Over the last decade, the energy sector of Jordan has undergone significant transformation, however, in the near to medium term there are several additional challenges:

- The concession agreement for the refinery will expire in 2008
- Commercial gas imports from Egypt will have substantial impact on the primary energy supply to Jordan.
- The move to gas and changes in historic subsidised supplies of crude from Iraq will have a substantial impact on the refinery
- Current energy pricing regimes do not reflect international market prices, and numerous, complex subsidies exist.

In addition, demand growth requires a number of policy initiatives: increased emphasis on energy efficiency; diversification of energy supplies to reduce risk; development of improved energy supply infrastructure; development of the gas industry and increased use of indigenous energy resources. The investment opportunities arising from the Energy Master Plan are described below.

Electricity Sector

Over the last 5 years Jordan's electricity sector has been undergoing significant reform. This will continue and over the next 20 years 2100 MW of new gas fired generating capacity, costing some \$870 million, will be built to meet demand growth and replace old generating assets. In addition \$386 million will be invested in transmission assets and the development of regional electricity markets and interconnection capacity will be encouraged.

Refined Products Sector

Demand for refined products will to grow strongly, particularly for diesel and gasoline. while demand for fuel oil will decline as this is displaced by gas in the power sector. Currently the Jordan Petroleum Refining Company (JPRC) has a monopoly on most of the value chain including importing products, refining, logistics and customer supply however the concession awarding this monopoly will expire in 2008 and the refined products sector will be extensively reformed.

To meet the requirements for the changing product mix, the refinery will be upgraded to produce lighter products and improve product specification. JPRC are investigating a range of options to make the required \$700 million investment, including partnering with strategic and financial investors. Following the end of the concession agreement, JPRC will operate on a commercial basis and will continue to play a major role in the refined products sector.

Upgrading the refinery is only part of the sector reform. In addition a number of new companies will be formed:

- a logistics company to manage storage and products handling
- new marketing companies – which will buy products from JPRC refinery or import products and supply to wholesale and larger customers.
- retail companies – which will purchase products from marketing companies and operate retail stations to supply customers

Price restructuring will also be undertaken and refined product prices will be based upon international parity prices. In the short term prices will be regulated, but as the market matures prices will, as far as possible, be set by competition.

As part of the process of price reform there will be a transition period and price subsidies will be phased out over 4 – 5 years.

Crude and Product Supply Infrastructure

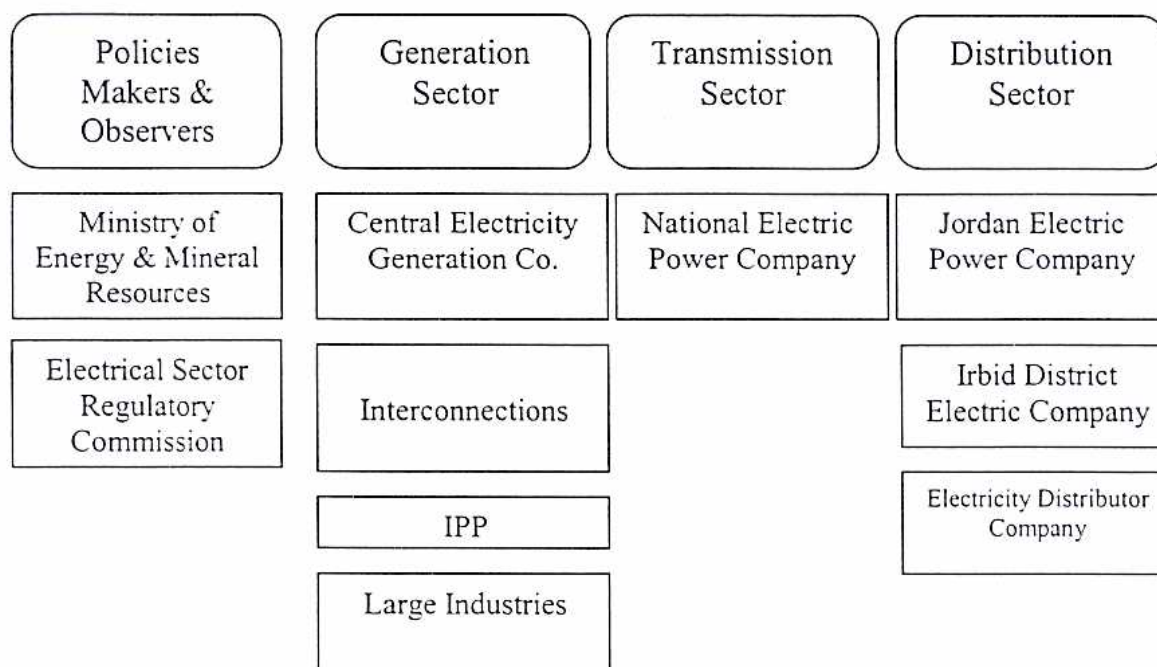
The existing method of crude supply to Jordan via Aqaba port and transportation by road is expensive and inefficient. The best alternative is to invest in a crude supply pipeline from Iraq, but other alternatives such as refurbishment of the tap-line from Saudi Arabia, construction of a crude oil pipeline from Aqaba and refurbishment of the rail system in Jordan are under consideration. In addition, refurbishment of crude and product handling and storage facilities at Aqaba port and at key locations in Jordan will be undertaken. Investments of up to \$400 million will be required.

Gas Sector

The Arab Gas Pipeline has been successfully delivering gas to Aqaba Thermal Power Station since July 2003. Expansion of pipeline to the north of Jordan will be complete by the end of 2005 to supply power and industrial customers.

The GOJ will encourage further development of the gas sector and gas distribution networks will be established to supply smaller customers. Detailed studies will be undertaken in major cities during 2005, and gas distribution concessions will be awarded by tender in 2006. Investment requirements are estimated to be \$300 million.

Structure of Electricity Sector



Electricity

Jordan's electricity sector is facing the biggest challenge in its 66-year history. Having expanded the availability of electricity to the stage where 99% of the population has access to electric power, Jordan now faces the challenge of adapting to utilizing new fuels and technologies to meet both the demands of Jordanian consumers and evermore-stringent regulations for environmental protection.

At the same time, the sector faces the prospect of liberalization, which is expected eventually to see the sell of an existing state-owned power plant as well as the challenge of attracting substantial private investor capital to fund the establishment of a new generating plant to be owned and operated by the private sector.

The liberalization of the distribution sector is also on the cards, with the government's controlling stakes in two of the three distribution companies expected to come up for sale in the near future. Full liberalization is expected to follow the ending of the monopoly concessions granted to distributors in 2012.

On another level, with the aim to upgrade welfare services standards of the rural Jordanian areas, to restructure the population distribution and sustain the livelihood of rural area residents, MEMR and the electricity distribution companies continued their serious work to complete electrification of the Jordanian rural areas, and populated areas.

During 2003, they were able to electrify 1162 villages, and populated areas, which contained 3900 houses, at a cost of JD 9.3 million. About 100% of the population have become electrified which is an achievement Jordan is proud of, when compared with other Arab and foreign countries).

Demand for Electricity

Demand for electricity continued rising in 2004, where the total peak load in the Kingdom was (1555) MW in 2004, against (1428) MW in 2003, with a growth rate of (8.9%). The peak load of the interconnected system was (1515) MW in July 2004 against (1387) MW in August 2003, with a growth rate of (9.2%).

The generated and imported electric energy in the Kingdom was (9793) million kWh in 2004, against (8966) million kWh in 2003, with a growth rate of (9.2%). The electricity production of the interconnected system was (9483) million kWh with a growth rate of (9.6%) against 2003 (table no 9). CEGCO contributed (94.2%) of the total generated electricity in 2004, while the other parties contributed about (5.8%) of the total production.

Electricity consumption in the Kingdom amounted to (8089) million kWh in 2004 against (7330) million kWh in 2003 (tables 13 and 14), which means an annual increase of (10.3%) against (6.1%) in 2003.

Average per capita consumption of electricity was (1768) kWh in 2004, against (1657) kWh in 2003.

The sectorial distribution of electricity consumption in 2004 was as follows:

Sector	Consumption GWh	Sector Weight (%)
Industrial	2479.5	30.65
Domestic	2744.9	33.93
Commercial	1190.3	14.72
Water pumping	1260.6	15.58
Others	413.5	5.12
Total	8088.8	100.0

Privatization of Central Electricity Generating Company, Electric Distribution Company and Irbid District Electric Company

Project Description

The main aim of this project is to privatize the generation and distribution activities in power sector by selling the government's share in these two activities as follows:-

Name	Government's Share to be sold %
Central Electricity Generating Company	51
Electric Distribution Company	100
Irbid District Electric Company (whole government's share)	55.4

Project Aims

The main aims of the project are as follows:-

- Strengthening the partnership between the public and private sectors.
- Increase the chance for private sector investment participation in electric sector.
- Achieve revenues for the Government.

Project of first private electricity generation

This project comes to meet the demand on electricity during the summer of 2008. It includes constructing an electric power station using the technology of combined cycle that combust natural gas as the main fuel, and diesel as a secondary fuel with a capacity estimated at about 300 MW.

The American Consultant, K&M, was contracted on 31 March, 2002 to do the consultancy works needed for the project.

The consultant conducted several studies concerning the project with the aim of preparing the draft of the tender documents of the project. These documents are expected to be issued by the end of 2004. The commercial operation of the project as a simple cycle will be in the end of the second half of 2007, and as a combined cycle at the end of the first half of 2008.

The institutional situation of the energy sector in 2004

The energy entities in Jordan were historically isolated from each other without any framework that gathers them. Energy matters were distributed among several entities and many committees, which hindered a clear policy for the energy sector. This led to the inability of achieving the optimal efficiency in managing this sector. Due to the importance of the role played by this sector in the economic and social fields, and the direct connection between this sector and the political and economic aspects, the government paid attention to reconstruct this sector to upgrade and activate it. In light of the new institutional amendments, the current institutional framework of the energy sector is comprised as follows:

1. Ministry of Energy and Mineral Resources (MEMR)

The Ministry adopts the comprehensive planning for this sector in regard to organization, setting and following up the implementation of general policies to achieve the assigned missions, mainly providing the necessary forms of energy for the purpose of comprehensive development with minimum cost and best standards, in addition to attract world capital for investment in the Kingdom in various fields of energy such as power generation, oil products and exploiting the domestic energy resources.

2. Electricity Sector Entities

These are the entities that deal with organization, generation, transmission and distribution of electricity inside the Kingdom. These are as follows:

3

2-1 Electricity Sector Regulatory Commission

It is an autonomous entity, set up in 2001. Its most important task is to set electricity tariff, consumer's subscription fee, issue licenses to electricity generation, transmission and distribution companies, control their compliance with the license terms, solve disputes amicably between the electricity companies and consumers, and between the companies themselves in a way that safeguards the public interest, in addition to providing advice on any affair regarding the electricity sector.

2-2 National Electric Power Company (NEPCO)

It is a public shareholding company owned by the government. It is assigned to install and operate the electricity transmission networks from the generation centers to the distribution networks and load centers. The Company also manages and operates the Control Center purchases electric energy from the generation companies and sells electricity to the distribution companies.

2-3 The Central Electricity Generation Company (CEGCO)

It is a public shareholding company assigned to electric power generation and wholesale to NEPCO. CEGCO was established in 1999 where the government owns 75% of its shares, while the rest is owned by NEPCO.

2-4 Electricity Distribution Companies

There are three companies as follows:

2-4-1 Jordan Electric Power Company (JEPCO)

It is a public shareholding company, in charge of electricity distribution in the governorates of the Capital, Zarqa, Madaba and Balqa' (excluding the middle Jordan Valley areas), under a 50 years concession that expires in 2012.

2-4-2 Irbid District Electricity Company (IDECO)

It is a public shareholding company in charge of electricity distribution in the governorates of Irbid, Mafraq, Jerash and Ajloun (excluding the northern Jordan Valley areas and the eastern areas) under a 50 years concession that expires in 2011.

2-4-3 Electricity Distribution Company (IDECO)

It is a public shareholding company in charge of electricity distribution in the areas located outside the concessions of JEPCO and EDCO, mainly the southern and eastern areas and the Jordan Valley.

2.5 Rural Electrification Project

Work started in this project in 1992 when the cabinet sanctioned adding one fils on every kilowatt of electricity consumed. This was raised to be two fils in 1997. The sums raised from these two fils are allocated for the Rural Electrification Project that is under direct management by the Ministry.

3- Petroleum, Gas and Mineral ores Entities

These are the entities in charge of petroleum and mineral ores exploration within the Kingdom, in addition to crude oil refinement. They are as follows:

3.1 Natural Resources Authority (NRA)

It carries out exploration of natural resources and geological, geophysical and geochemical surveys, in addition to issuing quarries and exploration licenses, beside supervising their operations.

3.2 National Petroleum Company (NPCO)

It is a public shareholding company owned by the government. It carries out the works of oil and gas search, exploration and production within its concession areas of 7000 square Kilometers in the north eastern part of the country, close to the Iraqi borders. Al-Risha gas field, of about 1500 square kilometers, lies in this area. The renewable concession agreement commenced in 1996 for fifty years.

3.3 Jordan Petroleum Refinery Company (JPRCO)

It is a public shareholding company. The Government holds 6% of its shares. This company is in charge of refining crude oil, production of oil products and distributing them throughout the country according to a concession due to expire in 2008.

4- National Energy Research Centre (NERC)

It is a scientific center affiliated to the Higher Council for Science and Technology. It was established in 1998 to undertake scientific research and development activities, transfer of new and renewable energy technologies, energy conservation and shale oil.

These activities were dispersed among several entities including MEMR, the Royal Scientific Society and the Natural Resources Authority. Minister of Energy and Mineral Resources is the Chairman of the Center's board of directors.

5- Jordan Atomic Energy Commission

It is an independent government entity, established in 2001 to deal with transfer and development of the nuclear energy technology for peaceful purposes and protection from radiation.

6- The Bio Gas Company

It is a joint sharing company owned by CEGCO and Greater Amman Municipality. It was established to utilize methane gas extracted from the organic wastes in generation of electric energy.

Development of Jordan's Indigenous Energy Resources

Jordan is committed to development of its indigenous energy resources. Further development of the Risha gas field in N.E Jordan is planned and the National Petroleum Company is considering options to finance this investment including joint venturing.

Jordan is also committed to continued exploration for oil and gas. 3 new exploration blocks (Azraq, Sirhan and Northern Highlands) will be offered in 2005, and GOJ is reviewing fiscal terms to encourage exploration and development.

In addition to conventional oil and gas, Jordan has oil shale resources with estimated reserves reaching as high as 40 billion tonnes. The GOJ is committed to continued investigation of commercial exploitation methods and is seeking international partners to assist in this effort.

Under the Energy Master Plan the proportion of energy from renewable resources will increase and a number of studies are underway to remove barriers to exploitation of renewable energy, particularly wind, solar and biomass. In order to reach 2% of Jordan's Primary Energy from renewable resources by 2015 an investment of \$450million will be required

National Energy Efficiency Strategy

The main goal of the National Energy Efficiency Strategy in Jordan is to clearly define the course of action which will achieve sustainable economical development and reduce harm to the environment.

Taking into consideration the strong connection between energy and environmental and economical development, the strategy will basically focus on achieving many goals the most important of which are:

1. Reduce energy consumption without negatively effecting production or the standard of living and in order to lower the imported oil bill on the national level and reducing the emission of harmful gasses to the environment.
2. Improve the standard of living.
3. Achieve balance between imports and exports.
4. Reduce production cost and improve competitiveness of the local industries and other sectors.
5. Reduce investment in the equipment used for the production, conversion, transport and distribution of energy.

General policies:

The National Energy Efficiency Strategy will focus on the following policies to achieve its goals:

1. Tariff policy

The proper energy pricing is considered as one of the best tools to improve energy use efficiency in the different sectors in a way which will force end user to search and adopt the best procedures to conserve energy and to choose the right fuel for his application based on its cost and also purchase the most energy efficient technologies. This will gradually lead to removing subsidies on petroleum products and electricity and applying a pricing structure based on actual cost.

2. Legislations

Obligatory and directed legislation are considered as the most important tools in improving energy use efficiency and increase the demand for high efficiency equipment and services. The following are samples of such legislations:

- * **Taxation policies** which will encourage the implementation of energy efficiency projects and the manufacturing of high efficiency equipment locally.
- * **Technical standards** which will set the minimum standards for energy efficiency for imported and locally manufactured equipments.
- * **Thermal insulation** in residential and commercial building in certain zoning areas should be enforced.
- * **Building codes** should be enforced in certain zoning areas.
- * **Customs Duties** should be used as a tool to encourage importing energy efficient equipment and to discourage importing low efficiency ones.
- * **Traffic Congestion** should be reduced and traffic flow improved to minimize the waiting time at traffic heights in order to reduce idling fuel consumption.

3. Awareness and Training

Awareness programs for the benefits of the improvement of the efficiency of the energy consumption should be implemented aiming at strengthening the main policies of the strategy through the following:-

- Increase the awareness of the economic importance of the efficiency of energy consumption to the concerned sectors, such as investors and energy services suppliers. This will encourage the supply of the high efficient series and products which will lead to the increase of the investment income.
- Increase the public awareness of the energy consumption efficiency for all energy consumers, which will improve the public behavior in energy consumption. Accordingly the demand on the high energy efficient products and services will be increased.

The awareness of energy consumption efficiency is a continuous process which could be achieved through the effective awareness, such as:- media, education programs, advertisements, seminars and conferences, schools and universities syllabus. Moreover the private sector and the non-governmental organizations (NGOs) have a positive role in directing and implementing awareness campaigns.

Establishing an integrated energy database is very essential for this strategy, which helps energy consumers and energy services suppliers to take the right decisions of the optimal consumption and investment in the energy sector.

In the field of training and national capacity building, it will be necessary to enhance the capabilities of the targeted groups for the high efficient technologies of energy conservation, and provide policy makers and legislators with the needed experiences and information to set the concerned laws and regulations and make available the skilled and trained personnel to the factories and energy consumers to execute the energy efficiency programs.

4. Financial Policies

Setting proper tools to finance projects and activities of improving energy consumption efficiency is essential to help energy consumers to overcome the investment obstacles through:-

- Increasing the awareness among local financing society of the importance of energy conservation projects and its economic revenues.
- Establishing a special fund for financing the energy conservation projects with a shared capital between the government and donors institutions to provide soft loans for these projects.

Implementation procedures

The implementation of the national strategy for improving the energy consumption efficiency requires executing a number of necessary procedures through a continuous process of planning, execution follow-up and evaluation. In addition to that, specifying definite roles and responsibilities for the concerned institutions as explained in the following table. The Ministry of Energy and Mineral Resources (MEMR) should follow-up the progress of the implementation of the procedures and issue a report annually.

Electric Interconnection Projects

The most important achievements of NEPCO in the field of interconnection with the Arab neighboring countries can be summarized as follows:

*The Seven Countries Electric Interconnection Project (EIJLLST)

This project aims to connect the electric networks of Egypt, Iraq, Jordan, Lebanon, Libya, Syria and Turkey. A brief on the work progress of the project is as follows:

The Jordanian-Egyptian Electric Interconnection

On 16/3/1999, the Jordanian-Egyptian electric interconnection was inaugurated and operated by merging the Jordanian and Egyptian networks.

Electric energy exchange continued between the two countries in 2004, where (786.9) GWh were imported from the Egyptian network to meet the Jordanian needs of electric energy during 2004. This led to several operational and economical benefits for the Jordanian and Egyptian networks.

The agreement on electric energy exchange between the Jordanian and Egyptian sides for the year 2005 was renewed in December 2004.

The Jordanian – Syrian Electric Interconnection

The agreement on Jordanian-Syrian interconnection was signed in Amman on 30/9/1999. The electric interconnection between the two networks was inaugurated officially on 14/3/2001. Electric energy exchange between the two sides continued until the end of July 2004, on the basis of return in kind.

An agreement on electric energy exchange between the Jordanian and Syrian sides for (2004-2005) was signed on 27/5/2004. The tariff of electric energy exchange between the two sides was agreed on, and became effective on 18/8/2004. The imported electric energy from the Syrian side in 2004 amounted to (38.3) GWh.

The Syrian-Turkish Electric Interconnection

Operation of the Syrian – Turkish interconnection is expected to be delayed until the "Union for the Co-ordination of Transmission of Electricity" (UCTE) approves joining the interconnected seven countries to it, this is expected to be in 2006.

The Syrian – Lebanese Electric Interconnection

This interconnection line is expected to be operational in the first half of 2005.

The Electric Interconnection Project of the Mediterranean Countries (MEDRING)

Through a consortium which includes the electric entities of some member countries of the European Union (Spain, France, Italy and Greece) and some south Mediterranean countries, (Jordan, Egypt, Syria, Algeria, Tunis and Turkey), NEPCO participated in conducting technical and economical feasibility studies for the electric interconnection of the MEDRING countries. The final studies of the project have been completed and, the final report was issued in mid 2003. The studies showed that the implementation of this project is feasible, technically and economically.

Project of Pan Arab Electric Interconnection

MEMR and NEPCO participated in preparing a draft scope of work to assign a consultant to conduct a comprehensive study on the Pan Arab electric interconnection in light of the existing and planned interconnection projects between the Arab countries and the other neighbouring ones and, the preparation of a document requesting Arab Funds to finance the study. This was based on the decisions taken by the Ministers of Electricity and Energy, members of the executive office of the Council of the Arab Ministers concerned with the electricity affairs. The theme of this study was discussed at the meeting of the executive office which was held in Kuwait on 21/1/2003. An agreement was signed with the Arab Fund for Economical and Social Development to prepare a comprehensive report on the Pan Arab Electric interconnection based on the previous studies for the interconnection groups, and submit it to the General Secretariat of the Arab League.

Gas Pipeline and its status

The Jordanian gas Transmission pipeline Project (JGTP) comprises 36" buried pipeline system with its facilities that extends for 393 Km from Jordan's southern shore at Aqaba towards the north at Rehab, to feed the Samra and Rehab Power stations and any other future power plants within Jordan with natural gas.

The JGTP Project over all progress up to the April 30th , 2005 is 74%.

Aqaba Thermal Power Station (650 MW) is running on Natural Gas since Aug. 2003.

The target date of pipeline commercial operation and gas delivery to Rehab and Samra power stations by end of 2005 / beginning of 2006 after which gas will be available for any future power plant.

Case Study of a National Energy Programme/Strategy

1- The problem or issue addressed:

The Hashemite Kingdom of Jordan committed itself to contribute and share the world in binding reduction targets for greenhouse gasses (GHG), in order to enable these industrialized countries to fulfill their commitments. Jordan is aiming to cooperate through Clean Development Mechanism (CDM), which required enhancing capacity building and develop common understanding of the implementation of Kyoto Protocol to the staff of energy sector.

2- Name of programme:

Capacity Building for CDM Project Development in the Energy Sector.

3- Timeframe: **1 year** year started: **2004**

4- Status: **Ongoing**
completed in year: **2005**

5- Main Objectives:

- **Develop the capacity among energy sector staff**
- **Identify and apply baseline parameters in accordance with international agreements.**
- **To be able to prepare successful investment energy proposals, which could be accepted in the framework of Kyoto flexible mechanisms.**

6- Lead Institution:

Ministry of Energy and Mineral Resources

7- Other implementation arrangements and stakeholders involved (public, private, NGOs, CBOs, international support, etc.)

Ministry of Environment

8- The results achieved (if possible, please address the social, economic and environmental impacts of the programme)

CDM is a new subject in the world and the Ministry of Energy is aiming to gain experience in this field, but so far no major activities regarding this subject were carried out by the ministry.

- 9- The relationship of the programme to internationally agreed goals and targets:

Jordan has adopted a national environment strategy that prioritizes environmental issues, specifically reducing green house gas emissions and supports the sustainable development by using clean and environmentally friendly energy sources. Moreover, the government of Jordan evaluated, approved and signed the Kyoto Protocol.