



THE HASHEMITE KINGDOM OF JORDAN

Ministry of Energy and Mineral Resources

Annual Report
2015



His Majesty King Abdullah II Bin Al Hussein



H.R.H Crown Prince Hussein Bin Abdullah II

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Vision

Achieving a secure sustainable supply of energy and optimal utilization of natural resources.

Mission

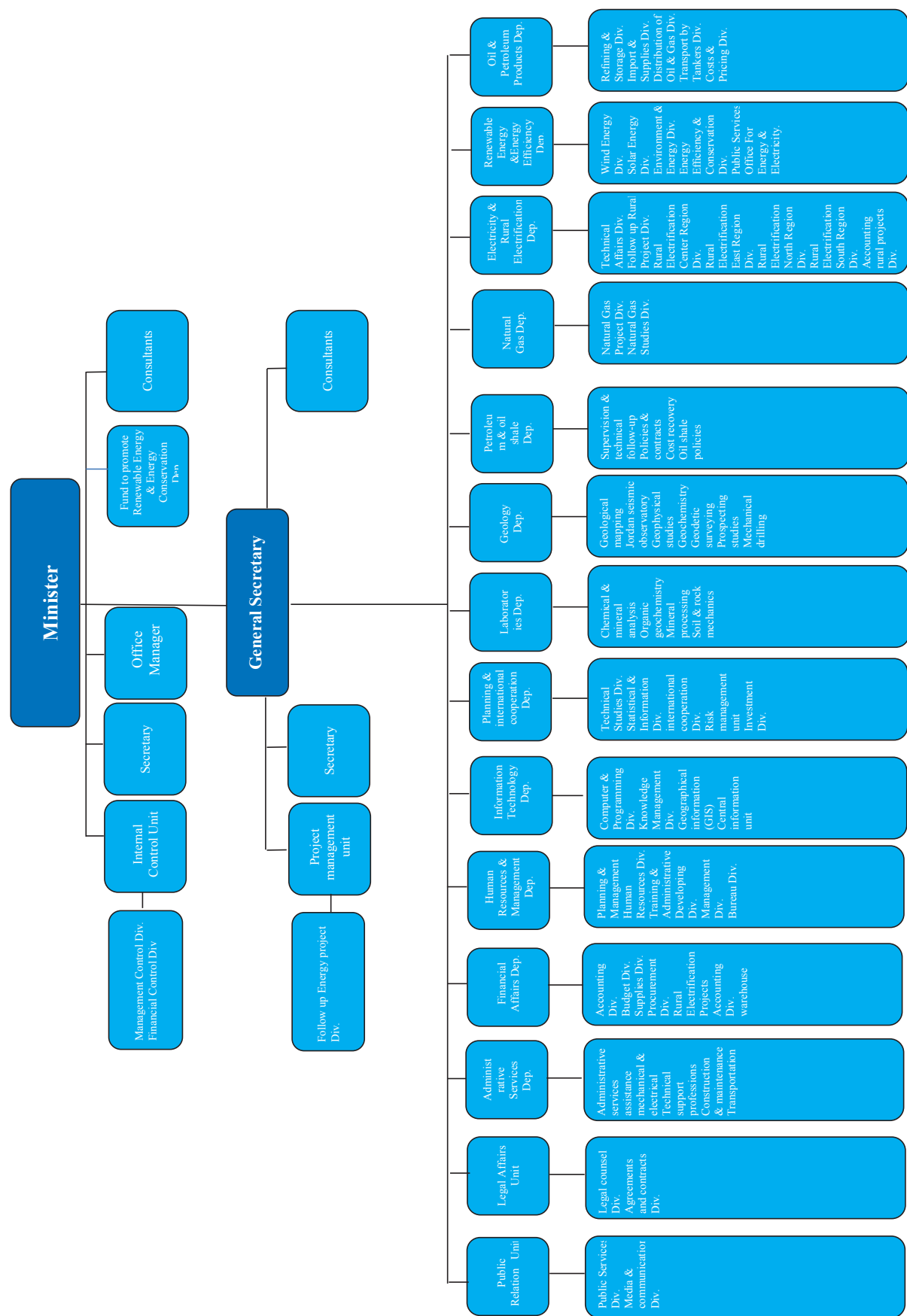
Setting and developing the appropriate policies and legislations to achieve secure sustainable supply of energy and the optimum utilization of natural resources complies with international best practices.

Core Values

- Teamwork Spirit.
- Loyalty and Affiliation.
- Integrity and Transparency.
- Excellence and Entrepreneurship.
- Knowledge Dissemination and Use.

Strategic Objectives

- Achieve a secure energy supply.
- Diversification of sources and types of energy.
- The development and utilization of conventional and renewable domestic energy sources, Oil Shale and Uranium.
- Transfer, localize, develop, sustain and improve the uses of the technology of nuclear energy.
- Increase energy efficiency in all sectors.
- Maximize the value added to utilize mineral ores.



Terms and Abbreviations

Unit	Definition
b/day	Barrel/day
boe	Barrel oil equivalent
boe/day	Barrel oil equivalent /day
CF	Cubic Feet
GDP	Gross Domestic Product
GWh	Gigawatt-hour =10 ⁹ Watt-hour
JD	Jordan Dinar (10 ³ Fils)
kg	Kilograms
kgoe	Kilogram oil equivalent
km	Kilometer
kt	Thousand tons
kV	Kilovolt
kW	Kilowatt (10 ³ Watt)
kWh	Kilowatt-hour
MVA	Mega Volt Ampere
MW	Megawatt
MWh	Megawatt-hour (10 ⁶ Watt-hour)
toe	Ton oil equivalent

Significant Statistics of Economy in Jordan 2015

Item	Unit	Amount
Population	Million	6.514
Gross Domestic Product (GDP) at current prices	Million JD	26637
GDP per capita	JD	4089

Source: Department of Statistics

Significant Statistics of Energy in Jordan 2015

Item	Unit	Amount
Energy Intensity	kgoe/US\$1000 Fixed Price	207
Per capita energy consumption	kgoe	1373
Per capita electricity consumption	kWh	2483
Electricity generation	GWh	18911
Electricity consumption	GWh	16173
Population access to electricity	% of population	99.9
Domestic energy production (crude oil and natural gas)	1000 toe	102
Energy imports	1000 toe	8856
Primary energy consumption	1000 toe	8944
Cost of consumed energy	billion JD	2.532
The Cost of Consumed Energy		
Exports	%	52.8
Imports	%	17.5
Gross Domestic Product	%	9.5

Introduction

The Ministry of Energy and Mineral Resources aims to provide all forms of energy required for sustainable development through the enhancement and implementation of proper policies, legislations and programs; diversify sources and forms of imported energy; and to boost local and renewable sources of energy and efficiency in various sectors.

In this context, the Ministry of Energy and Mineral Resources and other sector's institutions were able to accomplish many achievements during 2015.

Crude Oil and Oil Products

A continuous approach towards securing the Kingdom's need of crude oil and oil products was duly achieved. All the storage capacities projects for crude oil, oil products and liquefied petroleum gas established in Aqaba are under implementation and it is anticipated to complete the projects in 2016. The Logistic Company for Jordan Oil Facilities has been established, licensed and operated in 17/8/2015. The Ministry of Energy and Mineral Resources has followed up and supervised all relevant work to petroleum prospecting. It also monitored the performance of signatory companies of memoranda of understanding and production sharing agreements beside trading petroleum via submitting international tenders for oil prospection all over the Kingdom.

Oil Shale

The Government has given several local and international companies the concession to invest in areas of oil shale by surface, In-situ retorting and direct burning in addition to signing memoranda of understanding with many other companies.

Natural Gas

To diversify external natural gas resources to secure and meet NG power plants and NG industries, the Ministry of Energy and Mineral Resources has inaugurated LNG Terminal in Aqaba under the patronage of his Majesty King Abdullah II on 30/7/2015. The liquefied gas terminal in Aqaba was given the name of Sheikh Sabah Al Ahmad Al Jaber Al Sabah of Kuwait under the Cabinet resolution. The arrival of FSRU "Golar Eskimo" to LNG port of Aqaba loaded with LNG commissioning cargo on 25/5/2015 in addition of signing Sale and Purchase Agreement (SPA) between NEPCO and Shell International to supply Jordan with 150 Mcf/d for 5 years.

Electricity

Launch of a commercial operation of the Third Independent Power Producer Project IPP3 under the royal patronage with a capacity of 570 MW on 29/4/2015. The rehabilitation of Hussein Thermal Power Station project agreements were signed in 21/12/2015 with a capacity of 485 MW and a total cost of million USD 470 expected to be commercially operated in the second half of 2018.

Renewable Energy

The construction of IPP PV project-direct offers with a capacity of 10 MW in Mafrag to be connected and commercially operated in October 2015. Complete two PV Solar Power plants to generate electricity in Azraq, one with a capacity of 2 MW in cooperation with the Spanish Government and the second with a capacity of 3 MW,

implemented on EPC basis and operated in April 2015. Also 12 photovoltaic projects with a capacity of 200 MW in Ma'an have achieved the financial closure in 31/5/2015. All IPP PV project-direct offers to be implemented and operated by 2016. JWPC has completed IPP Project construction with a capacity of 117 MW in Tafilah. The project was connected to grid and commercially operated in September 2015. A tender wind power project has been awarded to the Spanish company Elecnor with a capacity of 66 MW in Ma'an. The company has completed installing wind turbines to generate electricity and feed the grid. The Kuwait Fund for Arab Economic Development has approved to increase the project capacity to 80 MW expected to be operated in the fourth quarter of 2016. A capacity of 38 MW in total was installed into a grid-connected photovoltaic power system in various sectors leading to companies' financial savings.

Geology and Mining

Several areas were extensively drilled to add new areas and increase the reserves of oil shale in the Kingdom. Plenty of projects of mineral explorations were implemented and conducted to prospect, evaluate, determine the specifications, quantities, different industrial use and needs of local and external markets of various ores such as dolomite, phosphate and pure limestone, etc.

Currently, Jordan Seismological Observatory is in full swing to detect, monitor and record earthquakes. Jordan Seismological Observatory JSO stations have recorded 167 earthquakes; 15 local recorded in Jordan Valley and Eastern Mediterranean regions, 85 regional and 67 distant seismic events.

The annual report shall also cover many accomplishments and achievements that have been made to other energy sectors such as nuclear energy, mining, and rural electrification, etc.

The Development of Oil and Natural Gas Sectors

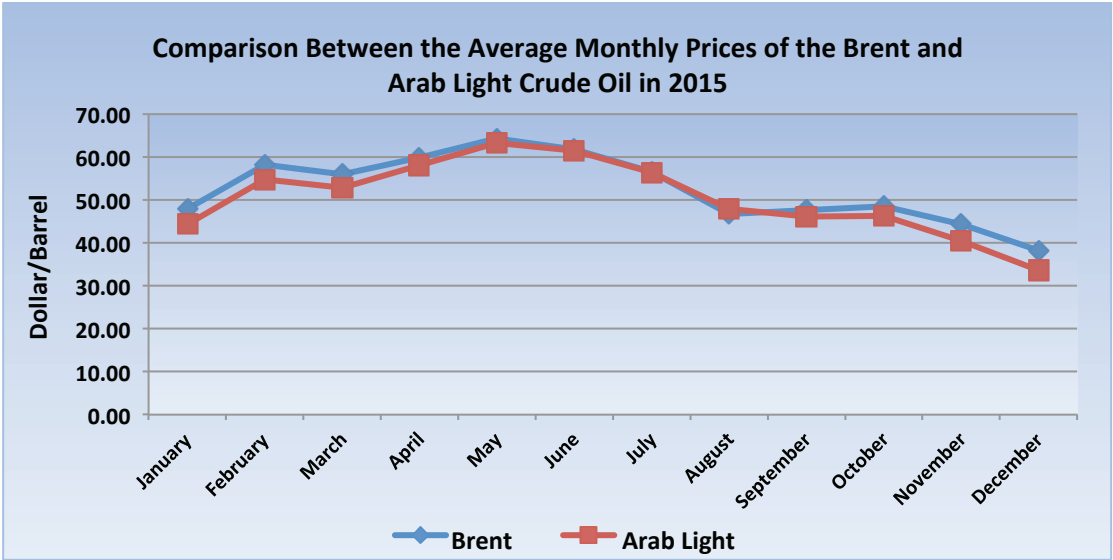
First-The Arab and International Levels

The average daily world production of crude oil in the year 2015 has reached around 78 million barrels showing a growth of 1.7% comparing to 2014. However, the world’s proven reserves in 2015 scored around 1293 billion barrels.

With regard to the Arab counterpart daily production of crude oil for the same year has amounted to around 23 million barrels, a proportion of 29% of the global production.

The Arab’s proven reserves of crude oil for 2015 has amounted to 714 billion barrels that represents 55% of global reserves.

Brent oil prices have fluctuated and reached the highest rates at 64 dollars/ barrel in May. It hit the lowest rate at around 38 dollars/barrel in December. The following chart shows comparison of monthly average prices on Brent crude oil and Arab light imported by Jordan in 2015.



Source: Platte Bulletin

The world production of natural gas in 2015 amounted to approximately 3538 billion cubic meters with a growth estimated to 2.2% comparing with 2014 while the world’s reserves stood at 186.9 trillion cubic meters.

On the Arab level, the Arab states’ produced nearly 583 billion cubic meters of natural gas representing 16% of the world production. Yet, the Arab states’ reserves of natural gas have reached nearly 54 trillion cubic meters representing 29% of the global reserves.

Second-The Local Level

The local production of energy (crude oil, natural gas and renewable energy) was around 304.6 thousand toe in 2015 representing 3% of Jordan’s total energy needs. Due to the lack of energy sources, Jordan heavily depends on imports to fulfill its domestic energy needs. The imported quantities of crude oil and oil products in 2015 were amounted to approximately 6534.8 thousand toe, while total quantities of natural gas imported from Egypt reached 224 million cubic meters, and quantities of liquefied natural gas imported reached 1703 million cubic meters. The total cost of crude oil and oil products, natural gas and coal imported by Jordan has reached to JD

2497 million in 2015 with a 57% of decrease comparing with 2014.

The total demand for primary energy was estimated to 8944 thousand toe in 2015 with a rise of 5.7% while the total demand for final energy i.e., energy available to the consumer, has reached 5927 thousand toe with a rise of 5.9% comparing with 2014 demand levels. On the other hand, the demand for oil products was amounted to 4050 thousand toe.

The Institutions of the Energy Sector in 2015

Given the importance of the overriding role played by energy in the socioeconomic aspects and the direct relationship to the political and economic issues; the Government has paid the sector a great attention to enhance the efficiency and effectiveness. In the light of the new institutional amendments, the current institutional framework of the energy sector comprises of the following structure:

1. The Ministry of Energy and Mineral Resources MEMR

The Ministry has adopted a comprehensive planning process for the sector in terms of regulation, policies and follow-up implementation to achieve the tasks entrusted. The most important of which is to provide the required energy by all forms needed for the purposes of comprehensive development at the lowest possible cost and better quality; beside attracting the required capital needed to invest in energy sector such as generating electricity, producing oil products, and utilizing domestic energy resources particularly the renewable ones. Not to mention supplying villages, populations and Jordanian rural communities with electricity through rural electrification. However, the Ministry spares no effort to support studies to improve energy efficiency in various sectors and ensure loan guarantee for renewable energy and energy efficiency projects through Jordan Renewable Energy and Energy Efficiency Fund JREEEF.

2. Energy and Minerals Regulatory Commission EMRC

Energy and Minerals Regulatory Commission is an autonomous corporate and the legal successor of the Electricity Regulatory Commission, the Nuclear and Radiation Regulatory Commission and the regulatory functions of the National Resources Authority with financial and administrative autonomy pursuing to the restructuring of Institutions and Government Departments law, no. 17/2014.

3. Electricity Institutions

Institutions responsible for generating, transmitting and distributing electricity all over the Kingdom as:

3.1 National Electric Power Company NEPCO

A public shareholding company owned by the government responsible for the construction, operation and maintenance of the transmission system in the Kingdom along with the electric transmission system which connects the system with other neighboring countries' systems. It also secures power supply through expansion of generating units either by the private sector and/or the public sector.

3.2 Electricity Generating Companies

3.2.1 Central Electricity Generating Company CEGCO

A public shareholding company founded in 1999 generates electricity and sells electricity in wholesale to the National Electric Power Company. The generating capacity of the company has amounted to 1392 MW at the end of 2015.

3.2.2. Samra Electric Power Company SEPCO

A private shareholding company founded in 2004 and whose shares are fully owned by the government. The company is responsible to generate electricity and sell it to NEPCO. The generating capacity of the company reached around 1059 MW at the end of 2015.

3.2.3. AES-Jordan. PSC

Also known as Amman East Power Project, a private company owned by the American AES company and the Japanese MITSUI company founded in 2009. It generates and sells electricity to NEPCO. AES-Jordan. PSC owned the first private project to generate electricity in East Amman power plant/Al-Manakher which was inaugurated under the patronage of His Majesty King Abdulla II on 26th, Oct. 2009. The generating capacity of the company reached around 373 MW at the end of 2015.

3.2.4. Qatraneh Electric Power Company

A private company owned by the Korean KEPCO company and the Saudi XENEL company founded in 2010. The company generates and sells electricity to NEPCO. The generating capacity of the company Amounted to around 373 MW by end of 2015.

3.2.5 Amman Asia Electric Power Company

A private company established in 2014 by the Korean KEPCO Company and the Japanese Mitsubishi. The company produces and generates around 570 MW of electricity capacity in 2015 and sells electricity to National Electricity Power Company NEPCO.

3.2.6 AES Levant Holding B.V/Jordan

A private company established in 2014 by the Korean KEPCO Company and the Japanese Mitsubishi. The company produces and generates around 240 MW of electricity capacity in 2015 and sells electricity to National Electricity Power Company NEPCO.

3.2.7 Jordan Wind Project Company PSC, JWPC

A co-development consortium between InfraMed 50%, Masdar 31% and EP Global Energy 19%. JWPC produces approximately 400 GWh of electricity annually and displace 235,000 tons of CO₂ emissions per year. The company has completed a construction of IPP Project-direct proposals and started commercial operation in 2015 with a capacity of 117 MW in Tafilah. JWPC now sells electricity to National Electricity Power Company NEPCO.

3.3 Electricity Distribution Companies

Includes three companies, each has a concession area to distribute electricity as follows:

3.3.1 Jordan Electric Power Company JEPCO

A 20-year licensed public shareholding company which was given license in 29.5.2014. JEPCO is responsible for distributing electricity in Zarqa, Ma'daba and Balqa governorates excluding Central Jordan Valley.

3.3.2 Irbid District Electricity Company LTD IDECO

A public shareholding company responsible for distributing electricity in Irbid, Mafrq, Jerash and Ajloun governorates excluding Northern Jordan Valley and Eastern areas. The company has been granted a 25-year license in 2008.

3.3.3 Electricity Distribution Company EDCO

A public shareholding company responsible for distributing electricity outside the concession areas of JEPCO and IDECO; namely the Southern, Eastern and Jordan Valley areas. The company had been granted a 25-year license in 2008.

4. Petroleum, Gas, and Mineral Ores Institutions

Institutions carry out operations of prospecting oil, gas and mineral ores inside the Kingdom along with refining and selling crude oil and oil products. The institutions include:

4.1 National Petroleum Company NPCO

A public company owned by the government. NPCO prospects oil and gas in the concession area to the northeast of the Kingdom along with the Iraqi borders covering an area of 7000 square kilometers including Risha gas field within an area around 1500 square kilometers. The duration of the concession period lasts for 50 years from the date of entry into force in 1996.

4.2 Jordan Petroleum Refinery Company JPRCO

A public shareholding company responsible for refining producing and distributing crude oil and oil products inside the Kingdom by service agreements signed with MEMR and have been extended several times.

4.3 Jordanian Egyptian Fajr for Natural Gas Transmission & Supply Co. Ltd

A limited liability company, pursuant to the Jordanian Companies Law and License Agreement signed on 25.1.2004 by both Jordan government represented by the Ministry of Energy and Mineral Resources and Jordanian Egyptian Fajr. It builds, operates and owns the gas pipeline from Aqaba to the north of Kingdom. Moreover, it collects the Egyptian natural gas in Aqaba through the pipeline, transfers and sells it to the power plants and major industries.

4.4 Gas Stations

Stations owned by legal or natural persons concerns with selling fuel. The number of the stations operated in the region reached 496 stations at the end of 2015.

4.5 LPG Agencies

Agencies owned by legal or natural persons concerns with distributing gas cylinders. The number of working agencies reached 1112 stations at the end of 2015.

4.6 LPG Warehouses

Warehouses owned by legal or natural persons distribute and transfer LPG cylinders from filling stations to warehouses and provide licensed distribution agencies. The number of warehouses has reached 127 warehouses at the end of 2015.

4.7 Central LPG Distribution Companies

Privately-held companies concerns with distributing LPG by tanks. The number of the companies reached 6 companies in 2015.

4.8 Oil Products Marketing Companies

Three privately-held companies concerns with distributing oil products (gasoline, diesel, kerosene and jet fuel).

5. Jordan Atomic Energy Commission

Jordan Atomic Energy Commission was established at the beginning of the year 2008. The work of the Atomic Energy Commission focuses on introducing the peaceful uses of nuclear energy and radiation to the Kingdom and developing its sustainable use to generate electricity, desalinate water and various applications of agriculture, medicine and industry purposes.

6. Jordan Bio-Gas Company Ltd.

A joint-stock company owned by the CEGCO and Greater Amman Municipality GAM founded in 1998. The Company aims at converting organic waste into methane gas to generate electricity. The generating capacity reaches 3.5 MW.

The Energy Sources in Jordan

Jordan local energy sources of oil and natural gas are very limited despite the exerted efforts spent by the government to develop, search, or prospect for other domestic resources through foreign companies associated with the government. Those companies have offered all required facilities and information provided by seismic studies and surveys.

Jordan has a huge amount of oil shale which exceeds 70 billion tons containing more than 7 billion tons of oil. Oil shale may be burned directly to generate electricity. Furthermore, ICP technology and surface retorting may be used to produce gas and shale oil.

In connection with the contribution of renewable energy resources to the total energy mix, it does not exceed 2%. The Ministry of Energy and Mineral Resources has adopted an ambitious program to increase the contribution of renewables the total energy mix to reach 10% by 2020.

All details related to domestic energy resources will be subsequently discussed while pointing out to the comprehensive strategy of the energy sector.

Table 1 shows the domestic production of crude oil and natural gas and their contribution to the overall energy consumed during 2011-2015 in the Kingdom.

Table (1)
Domestic Production of Crude Oil and Natural Gas during 2011-2015

Year	Crude Oil (kt)	Natural Gas (BCF)	Contribution of Domestic Production of Oil and Natural Gas to the Overall Energy Consumption (%)
2011	1.0	6.4	3.0
2012	1.0	5.8	2.4
2013	1.0	5.3	2.1
2014	0.8	4.6	3.0
2015	0.5	4.3	3.0

The Domestic Demand for Energy and Electricity

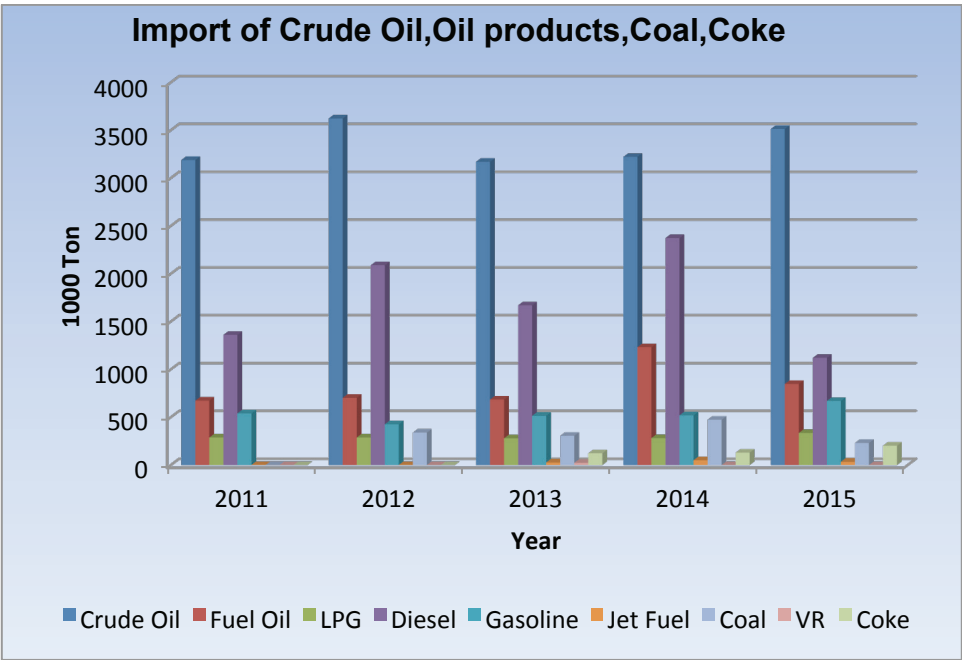
1. Crude Oil and Oil Products

The cost of crude oil and oil products imports in 2015 was estimated to JD 2039 million registering a decrease of 47% comparing with 2014.

Table 2 shows the quantity of crude oil and oil products imports during 2011-2015.

Table (2)
Imports of Crude Oil and Oil Products during 2011-2015(thousand ton)

Year	Crude oil	Fuel oil	Liquefied gas	Diesel	Gasoline	Jet fuel	Coal	Vacuum residuals	Pet coke	Total
2011	3189	674	288	1361	540	1				6137
2012	3623	703	288	2089	426	1				7130
2013	3170	685	280	1670	515	27	306	23	123	6799
2014	3221	1255	282	2373	552	51	474	0	130	8338
2015	3513	848	335	1121	670	34	230	0	204	6955



2. Natural Gas

The overall quantities of natural gas imports from Arab Republic of Egypt in 2015 through the Arab gas pipeline was around 224 million cubic meters with an increase amounted to 1.4% comparing to that registered in 2014. and quantities of liquified natural gas imported reached 1703 million cubic meters.

3. Primary and Final Energy Consumption

The overall demand for primary energy in 2015 was nearly 8944 thousand toe with 5.7% of increase comparing with 2014.

Table 3 demonstrates the domestic demand for primary energy during 2011-2015.

Table (3)
Primary Energy Consumption during 2011-2015
(thousand toe)

Year	Type of primary energy						Total
	Crude Oil and Oil Products	Coal	Pet Coke	Natural Gas	Renewable Energy	Imported Electricity	
2011	6141	–	–	873	130	313	7457
2012	6992	226	–	659	140	188	8205
2013	6689	204	116	907	145	96	8157
2014	7479	332	88	301	152	109	8461
2015	6331	161	165	1944	160	183	8944

As for final energy consumption and distribution to all economic sectors are shown in table 4.

Table (4)
Sectorial Distribution of Final Energy Consumption during
2011-2015 (thousand toe)

Year	Sector				Total
	Transport	Industry	Household	Others*	
2011	2012	961	1136	779	4888
2012	2521	921	1198	743	5383
2013	2734	924	1109	617	5384
2014	2558	1079	1152	718	5507
2015	2811	991	1272	754	5828

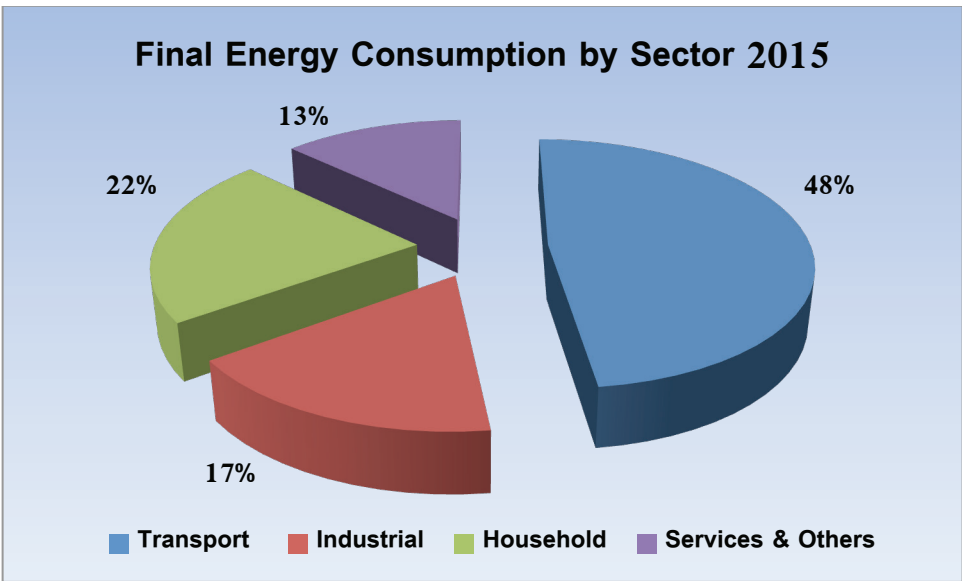
**Includes commercial and agricultural sectors along with street lights.*

Table 5 shows the percentages of the sectorial distribution of final energy.

Table (5)
Percentages of Sectorial Distribution of Final Energy Consumption during 2011-2015

Year	Sector				Total %
	Transport	Industry	Household	Others *	
2011	41	20	23	16	100
2012	47	17	22	14	100
2013	51	17	21	11	100
2014	46	20	21	13	100
2015	48	17	22	13	100

**Includes commercial and agricultural sectors along with street lights.*



4. Oil Products Consumption and Prices

In general, the year 2015 had witnessed decrease of around 15% in the consumption of oil products due to the decrease demands of oil products used in electricity generation and large imported quantities of natural gas. The decrease of consumption amounted to 32% and 16% for fuel oil and diesel respectively. The consumption of oil products has amounted to around 6272 thousand tons comparing with 7420 thousand tons in 2014.

Table 6 shows development in the production of oil products during 2011-2015. Meanwhile, table 7 shows development in the consumption of oil products for the same period.

Table (6)
Development of Jordan Petroleum Refinery’s Production of Oil Products during 2011-2015 (thousand ton)

Oil Products Year	Liquefied Gas	Gasoline	Jet Fuel (Avtur)	Kerosene	Diesel	Fuel Oil	Asphalt	Total
2011	84	681	329	58	1030	868	107	3157
2012	102	716	357	96	1109	999	97	3476
2013	78	663	325	34	980	900	101	3082
2014	91	634	318	63	930	812	160	3008
2015	80	653	257	91	1058	885	188	3212

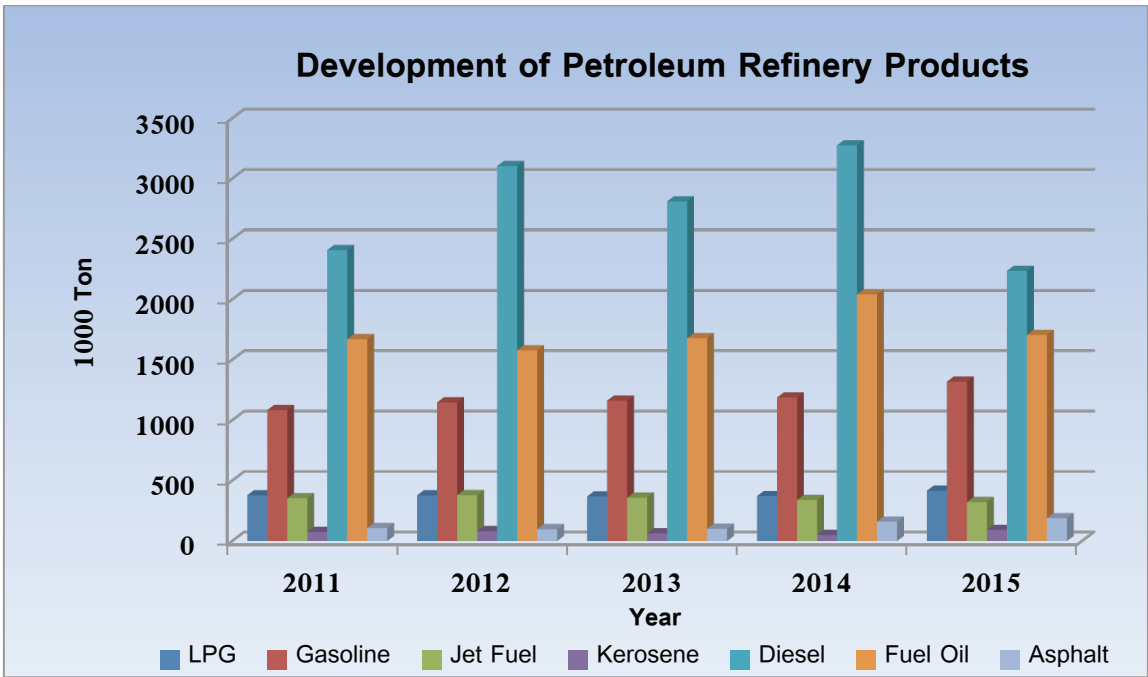
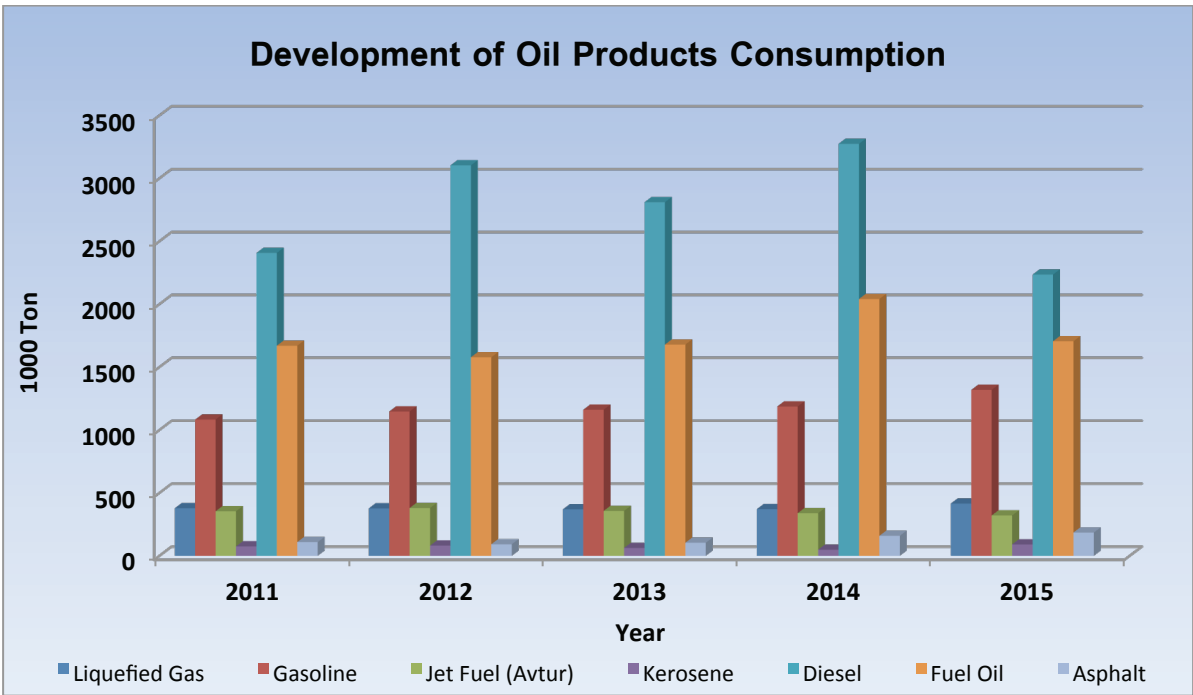


Table (7)
Development of Oil Products Consumption during 2011-2015
(thousand ton)

Oil Products Year	Liquefied Gas	Gasoline	Jet Fuel	Kerosene	Diesel	Fuel Oil	Asphalt	Total
2011	378	1083	354	75	2407	1670	109	6076
2012	377	1147	380	81	3103	1578	92	6758
2013	369	1161	357	63	2810	1679	104	6544
2014	371	1187	339	49	3274	2041	159	7420
2015	416	1319	321	91	2235	1705	185	6272
Growth Rate %	12	11	(5)	86	(32)	(16)	16	(15)

**Where brackets around numbers signifies a negative amount.*



As for oil products prices in 2015, a policy towards liberating oil products prices was reinstated starting from 14.11.2012 according to global pricing policy after a stop in early 2011. A monthly pricing formula was applied on most oil products. The following table demonstrates the prices of oil products announced locally in 2015.

Table (8)– Local Prices of Oil Products 2015

Item	Unit	Jan.	Feb.	Mar.	Apr.	May	June	Jul	Aug.	Sept.	Oct.	Nov.	Dec.
Gasoline (90)	Fils/Litre	590.00	525.00	585.00	610.00	625.00	655.00	655.00	620.00	560.00	555.00	555.00	535.00
Gasoline (95)	Fils/Litre	735.00	660.00	740.00	775.00	795.00	840.00	840.00	800.00	725.00	720.00	720.00	700.00
Kerosene	Fils/Litre	460.00	405.00	455.00	455.00	470.00	495.00	485.00	455.00	405.00	410.00	410.00	400.00
Diesel	Fils/Litre	460.00	405.00	455.00	455.00	470.00	495.00	485.00	455.00	405.00	410.00	410.00	400.00
Diesel/Ship	Fils/Litre	590.00	520.00	530.00	530.00	530.00	535.00	515.00	495.00	480.00	475.00	430.00	400.00
Liquefied Gas 12.5kg	JD/Cylinder	8.75	8.00	8.00	8.00	8.00	8.00	7.75	7.50	7.25	7.00	7.00	7.50
Liquefied Gas 50kg	JD/Cylinder	35.00	31.94	33.94	33.94	33.94	33.94	31.00	30.21	29.34	28.00	28.66	31.00
Liquefied Gas/Central Distribution/ Bulk	JD/ton	660.00	597.74	635.10	635.10	635.10	635.10	580.00	604.21	545.87	560.00	573.21	577.53
Liquefied Gas/Tank Bulk	JD/ton	700.00	638.75	678.67	678.67	678.67	678.67	620.00	563.20	586.87	520.00	532.20	618.53
Fuel Oil/Industry	JD/ton	295.00	265.00	310.31	310.31	312.62	341.51	331.00	310.80	250.00	241.65	243.11	234.31
Fuel Oil/Electricity	JD/ton	295.00	265.00	310.31	310.31	312.62	341.51	331.00	310.80	250.00	241.65	184.53	168.38
Fuel Oil 1% Sulpher	JD/ton	330.00	300.00	345.62	345.62	347.93	376.83	367.00	346.11	285.00	276.97	278.43	269.63
Fuel Oil/Ships	JD/ton	370.64	265.00	310.31	313.56	313.56	352.39	331.00	310.80	250.00	241.65	243.11	234.31
Avtur/Local	Fils/Litre	410.00	362.00	406.00	406.00	408.00	430.00	416.00	390.00	340.00	346.00	342.00	336.00
Avtur/Foreign	Fils/Litre	415.00	367.00	411.00	411.00	413.00	435.00	421.00	395.00	345.00	351.00	347.00	341.00
Avtur/Charter	Fils/Litre	430.00	382.00	426.00	426.00	428.00	450.00	436.00	410.00	360.00	366.00	362.00	356.00
Asphalt	JD/ton	315.00	285.00	331.78	331.78	337.17	367.76	357.00	335.17	265.46	261.50	263.04	253.72

* The price of 12.5 kg LPG cylinder has been adjusted from the date of 7 / December and becomes 7 JD instead of 7.5 JD.

5. The Electricity

The demand for electricity had increased and reached 5% in 2015. The highest rate recorded by street lighting and water pumping and reached 6.3%, 6% respectively. The overall amount of electricity imports through interconnection network with Egypt and Syria reached 604 GWh registering an increase of 39% comparing to year 2014. The Ministry of Energy and Mineral Resources and the National Electricity Power Company made several actions to meet the growing demand. The details of mentioned procedures will be described later on while viewing the overall strategy for the energy sector.

○ Electricity Generation and Consumption

The volume of electricity generated in 2015 reached 18911 GWh registering a growth of 1% of that in 2014 while the electricity consumed for the same period reached 16173 GWh recording a growth of 5% approximately comparing with that in 2014. However, the Peak load of the electricity system has recorded 3300 MW in 2015 pointing a growth of 9 % compared to that in 2014. The following tables 9, 10 and 11 demonstrate the development of production and consumption of electricity as well as the distribution of the consumption and the rate across sectors.

Table (9)
Growth of Electricity Production and Peak Load during 2011-2015

Year	Peak Load MW	Growth Rate %	Electricity Generated GWh	Growth Rate %
2011	2790	4.5	14647	(0.9)
2012	2880	3.2	16595	13.3
2013	3100	7.6	17261	4.0
2014	3020	(2.5)	18704	8.4
2015	3300	9	18911	1

**Where brackets around numbers signifies a negative amount.*

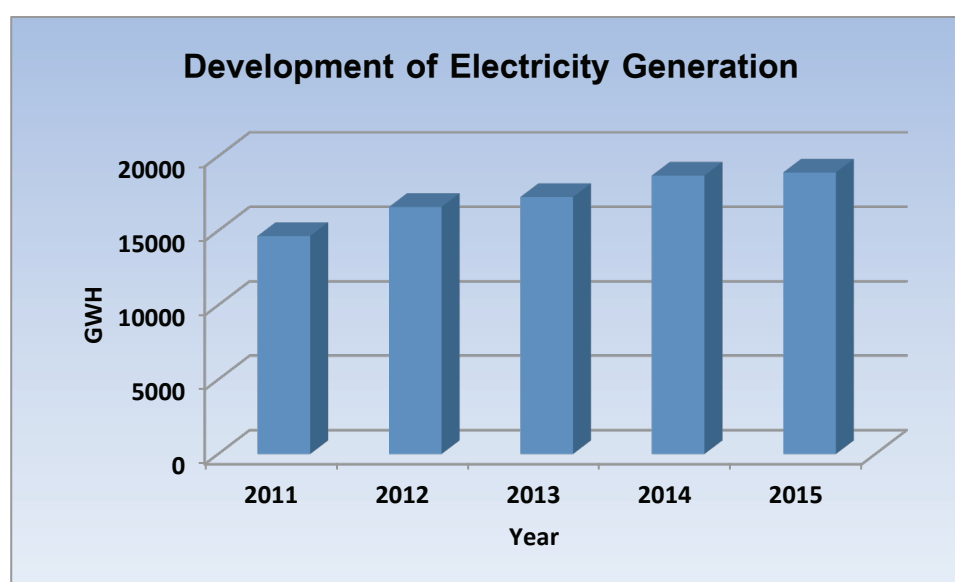
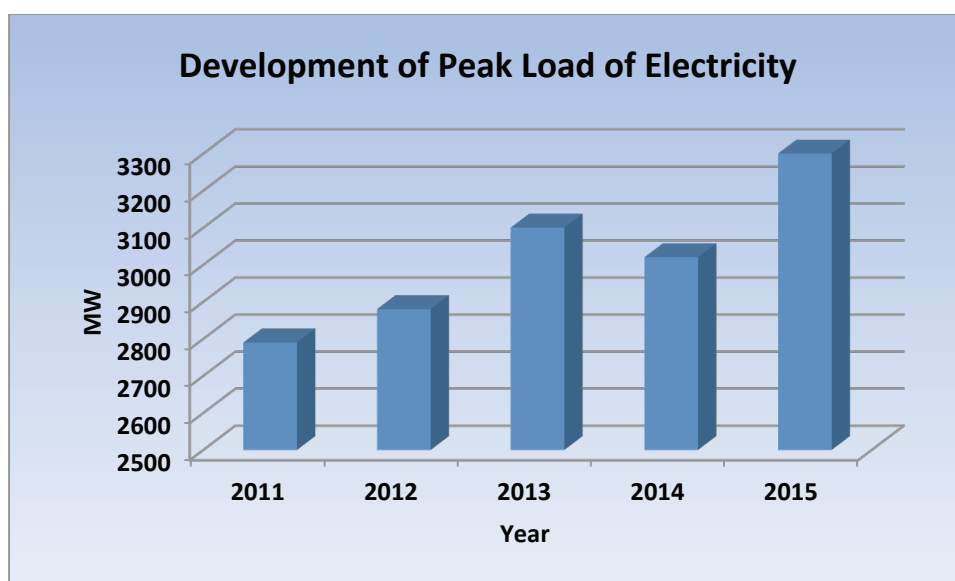
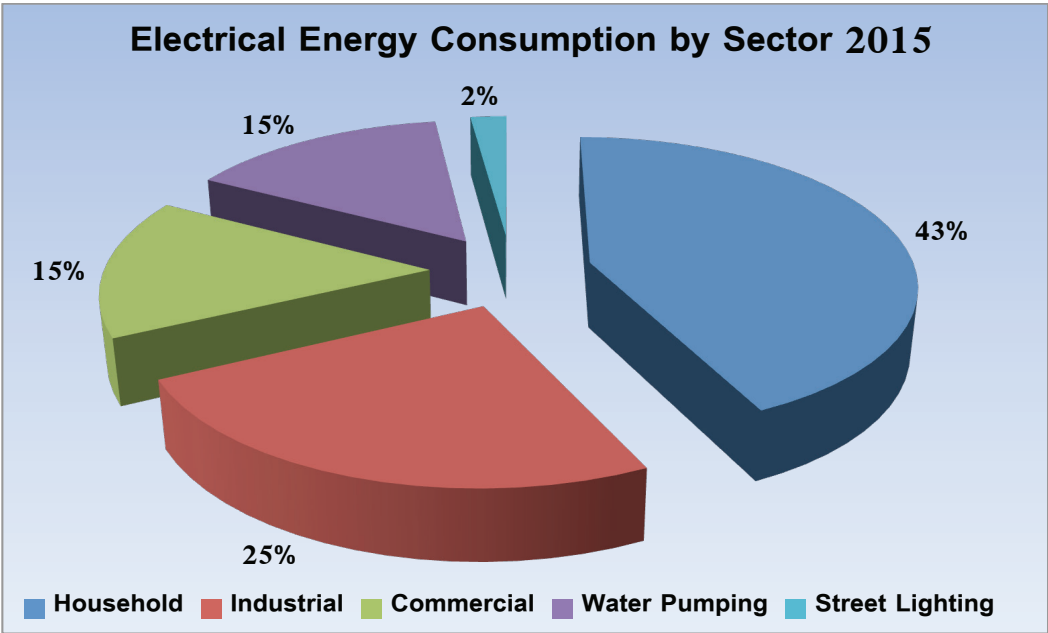


Table (10)
Sectorial Distribution of Electricity Consumption and Growth Rate
during 2011-2015 (GWh)

Sector Year	Household	Industry	Commercial	Water Pumping	Street Lights	Others	Total	Growth Rate %
2011	5441	3478	2260	1938	324	94	13535	5.4
2012	6126	3461	2427	1955	305	0	14274	5.5
2013	6265	3517	2415	2076	291	0	14564	2.0
2014	6580	3877	2358	2287	316	0	15418	5.9
2015	6938	4013	2460	2426	336	0	16173	5

Table (11)
Percentages of Sectorial Consumption of Electricity during
2011-2015

Sector Year	Household	Industry	Commercial	Water Pumping	Street Lights	Total%
2011	41	26	17	14	2	100
2012	43	24	17	14	2	100
2013	43	24	17	14	2	100
2014	43	25	15	15	2	100
2015	43	25	15	15	2	100



- **The Electricity Tariff**
Electricity tariffs sold by NEPCO to the distribution Companies and major subscribers in 31.12.2015 are demonstrated in the following table:

Table (12)
Electricity Tariffs Applicable in the Kingdom Issued on January^{1st}, 2015

Electricity Tariff sold by NEPCO to the Electricity Distribution Companies:	Unit	Tariff Value
A. JEPCO		
<input type="checkbox"/> Peak Load	JD/kW/Month	2.98
<input type="checkbox"/> Day-time Supply	Fils/kWh	75.81
<input type="checkbox"/> Night-time Supply	Fils/kWh	65.76
B. EDCO		
<input type="checkbox"/> Peak Load	JD/kW/Month	2.98
<input type="checkbox"/> Day-time Supply	Fils/kWh	76.62
<input type="checkbox"/> Night-time Supply	Fils/kWh	66.55
C. IDECO		
<input type="checkbox"/> Peak Load	JD/kW/Month	2.98
<input type="checkbox"/> Day-time Supply	Fils/kWh	66.34
<input type="checkbox"/> Night-time Supply	Fils/kWh	56.29

Table 13 below shows the electricity tariffs sold by the distribution companies to consumers in 31.12.2015.

Table (13)
Electricity Tariffs sold by the Distribution Companies to Consumers

Consumer	Unit	Value
A. Household Users		
<input type="checkbox"/> First Block: 1-160 kWh per month	Fils/kWh	33
<input type="checkbox"/> Second Block: 161-300 kWh per month	Fils/kWh	72
<input type="checkbox"/> Third Block: 301-500 kWh per month	Fils/kWh	86
<input type="checkbox"/> Fourth Block: 501-600 kWh per month	Fils/kWh	114
<input type="checkbox"/> Fifth Block: 601 -750 kWh per month	Fils/kWh	158
<input type="checkbox"/> Sixth Block: 751-1000 kWh per month	Fils/kWh	188
<input type="checkbox"/> Seventh Block: More than 1000 kWh per month	Fils/kWh	265
B. Ordinary Users		
<input type="checkbox"/> First Block: 1-160 kWh per month	Fils/kWh	42

<input type="checkbox"/> Second block: 161–300 kWh per month	Fils/kWh	92
<input type="checkbox"/> Third Block: 301–500 kWh per month	Fils/kWh	109
<input type="checkbox"/> Fourth Block: 501–600 kWh per month	Fils/kWh	145
<input type="checkbox"/> Fifth block: 601–750 kWh per month	Fils/kWh	169
<input type="checkbox"/> Sixth Block: 751–1000 kWh per month	Fils/kWh	190
<input type="checkbox"/> Seventh Block: More than 1000 kWh per month	Fils/kWh	266
C. Radio and TV Broadcasting Stations–Flat Rate Tariff	Fils/kWh	173
D. Commercial Users		
<input type="checkbox"/> First Block: 1–2000 kWh per month	Fils/kWh	129
<input type="checkbox"/> Second Block: More than 2000 kWh per month	Fils/kWh	181
E. Banks		
<input type="checkbox"/> First Block: 1–2000 kWh per month	Fils/kWh	285
<input type="checkbox"/> Second Block: More than 2000 kWh per month	Fils/kWh	285
F. Telecommunication		
<input type="checkbox"/> First Block: 1–2000 kWh per month	Fils/kWh	257
<input type="checkbox"/> Second Block: More than 2000 kWh per month	Fils/kWh	300
G. Small Industries – Flat Rate Tariff		
<input type="checkbox"/> First Block: 1–10.000 kWh per month	Fils/kWh	71
<input type="checkbox"/> Second Block: More than 10.000 kWh per month	Fils/kWh	81
H. Medium Industries		
<input type="checkbox"/> Peak Load	JD/kW/Month	3.79
<input type="checkbox"/> Day–time Supply	Fils/kWh	89
<input type="checkbox"/> Night–time Supply	Fils/kWh	75
I. Agriculture– Flat Rate Tariff	Fils/kWh	60
J. Agriculture– Three Part Tariff		
<input type="checkbox"/> Peak Load	JD/kW/Month	3.79
<input type="checkbox"/> Day–time Supply	Fils/kWh	59
<input type="checkbox"/> Night–time Supply	Fils/kWh	49

K. Water Pumping.	Fils/kWh	94
L. Hotels– Flat Rate Tariff	Fils/kWh	181
<input type="checkbox"/> Peak Load	JD/kW/Month	3.79
<input type="checkbox"/> Day–time Supply	Fils/kWh	164
<input type="checkbox"/> Night–time Supply	Fils/kWh	145
M. Street lighting– Flat Rate Tariff	Fils/kWh	114
N. Armed Forces– Flat Rate Tariff	Fils/kWh	146
O. Ports Corporation– Flat Rate Tariff	Fils/kWh	159
P. Large Industry		
First: Mining Extractive Industries		
<input type="checkbox"/> Peak Load	JD/kW/Month	2.98
<input type="checkbox"/> Day–time Supply	Fils/kWh	264
<input type="checkbox"/> Night–time Supply	Fils/kWh	197
Second: Other Industries		
<input type="checkbox"/> Peak Load	JD/kW/Month	2.98
<input type="checkbox"/> Day–time Supply	Fils/kWh	133
<input type="checkbox"/> Night–time Supply	Fils/kWh	109
Q. Mixed (Commercial/Agriculture)		
• Tow Third of Consumption	Fils/kWh	129
• Last Third of Consumption	Fils/kWh	60

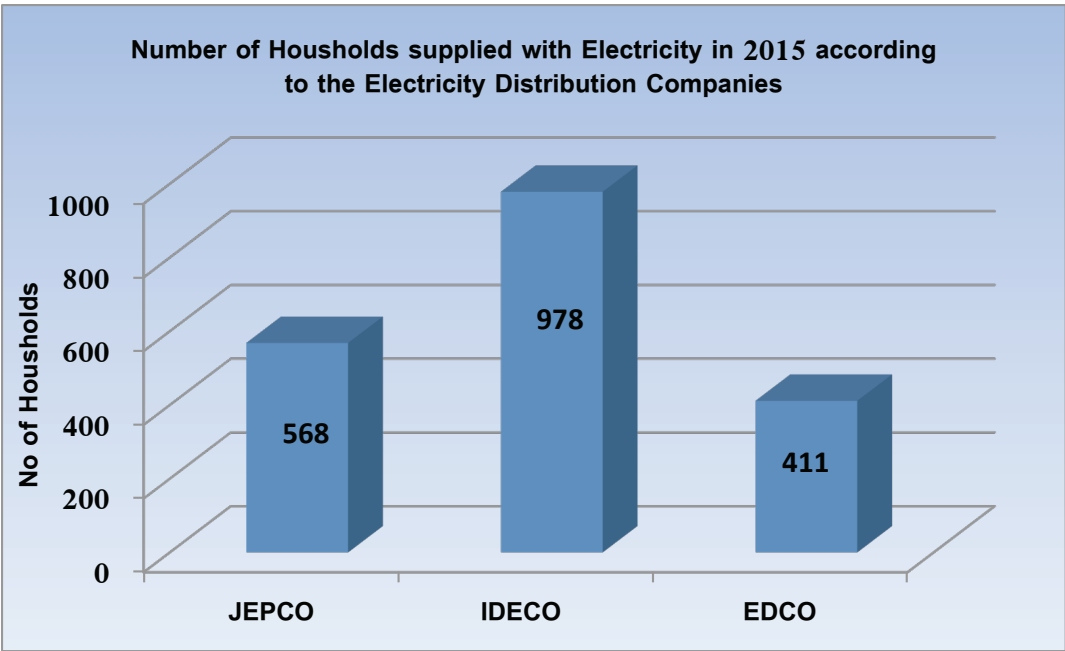
○ The Rural Electrification

The Ministry of Energy and Mineral Resources has continued electrification to remote villages, rural communities and poor families in 2015. The total recorded requests for electrification was 4971 at an estimated cost amounted to JD 22.476 million. Requests were handled as described in table 14, which also shows the cost for each category based on the total cost estimates required by all applications amounting to JD 22.476 million.

The following figures illustrate the number of houses electrified in 2015 recording 1957 houses distributed by areas under concession of the electricity distribution companies.

Table (14)
Classification of processed sites in 2015 and cost of each category of estimated total cost

Implemented Sites		Sites under construction		Remained Sites		Cancelled Sites		Rejected Sites		Approved Sites	
No.	Cost million JD	No.	Cost million JD	No.	Cost million JD	No.	Cost million JD	No.	Cost million JD	No.	Cost million JD
977	3.013	1024	3.955	344	1.562	88	0.580	858	7.887	1666	5.444
Cost%	13	18		7		3		35		24	



The Council of Ministers has approved to provide electricity for some projects at the expense of rural electrification. The decision aims at contributing to CBOs development, create jobs, reduce poverty, unemployment and support both the agricultural and tourism sectors. The total value of the projects was amounted to around JD 174028 in 2015.

The projects included areas like farms located in the north and south of Mujib Dam, Wala-Hidan Valley, Mkawer archaeological site, Al Mawa Wildlife Reserve, Al Taatn village-Aqaba, children's park in Tafila, the training center of the Royal Academy for Nature Conservation in Ajloun, which provide qualified competencies on global and local levels for many services in nature protection, ecotourism, inspection and protection services.

Most Significant Accomplishments of Energy and Mineral Resources Sector in 2015

The Ministry of Energy and Mineral Resources alongside with other energy institutions have sustained the action plan for 2015 emerged from the Executive Development Program along with the overall energy strategy.

Outlined below are the accomplishments of the Ministry:

Crude Oil and Oil Products

1. Projects of Oil Sector

To follow-up implementing the following projects:

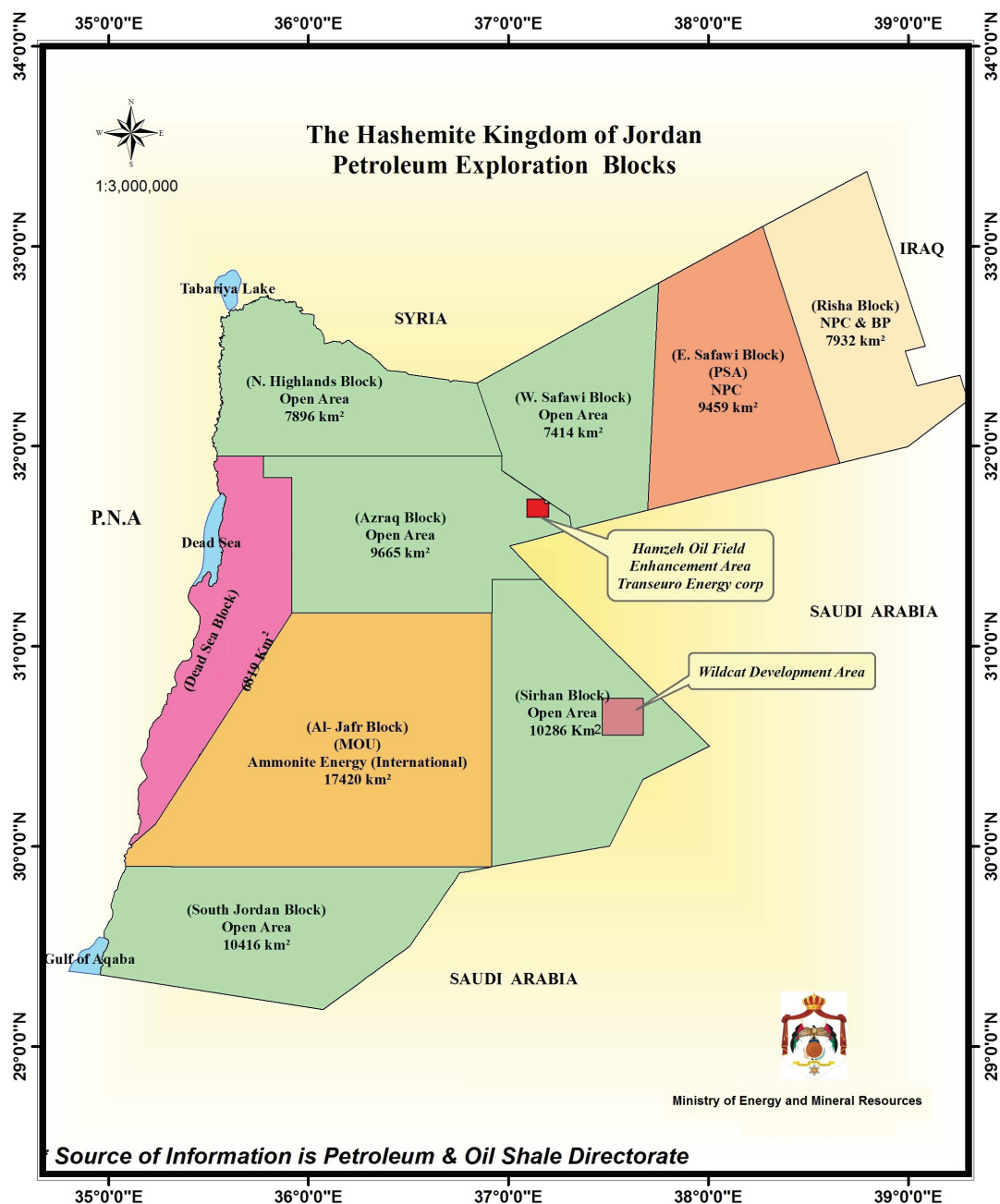
- Building storage capacities of crude oil and oil products estimated to around 100 thousand tons in Aqaba, expected in 2016.
- Building storage capacities of liquefied petroleum gas estimated to around 6 thousand tons in Aqaba, expected in 2016.
- Building 250-300 thousand tons strategic capacities of oil products and 8000 tons of LPG in the middle of the kingdom, expected by the end of 2016.
- LPG port implemented by Aqaba Development Corporation ADC in 2015.
- Developing oil port to increase the handling capacity of crude oil and oil products to around 14 thousand tons/day instead of 8 thousand tons/day. The operation has already started during 2015.
- Building Iraq-Jordan pipeline to import crude oil from Iraq to the port of Aqaba. A framework agreement was signed and deemed effective in 22.4.2013.

2. Extra Achievements of Crude Oil and Oil Products

- Establishes, licenses and operates the Logistic Company for Jordan Oil Facilities in 17/8/2015.
- Ongoing discusses to import Iraqi crude oil via the Turkish port of Ceyhan.
- Progresses of Jordan Petroleum Refinery Company fourth expansion project.
- Studies investor's requests to construct new refineries.
- Monitors and observes crude oil and oil products prices data using Platts' daily assessment to determine oil prices in local market beside preparing monthly pricing schedules for oil products based on prices and costs in Platt Bulletin plus the shipping costs and follow-up Jordan Petroleum Refinery Company financial statements and marketing companies' activities.
- Grants six licences to cement factory companies to import 250 thousand tons of pet coke, 24 twenty-four operating licences to new gas stations, 136 permits to start LPG agencies, 7 licences to operate LPG small cylinders storage areas and 187 permits to operate central LPG facility.

Energy Domestic Resources – Natural Gas & Oil

The Ministry of Energy and Mineral Resources MEMR has attracted many global companies to prospect oil and gas in Jordan and it supervises all relevant work of petroleum prospecting and exploiting oil shale in three ways (direct burning, surface retorting and In-situ for the deep oil shale). It also monitors the performance of signatory companies of memoranda of understanding and production sharing agreements. The Kingdom has been divided eleven exploratory area in terms to the geological nature, petroleum possibilities. As shown below:



The Ministry has worked on multi-faceted approaches in 2015

First: Petroleum Agreement

- **Risha Well:** the Ministry follows up the Concession Agreement with the National Petroleum Corporation for a period of 50 years from 1996 to 2046. The daily production has amounted to around 12.6 million cubic feet during 2015 with total cumulative amounted to 209,600,165,101 million until the end of 2015. All quantities produced supplies the power plant in the Risha field and contributes with around 2.5% of the Kingdom’s needs of electricity. However, the natural gas quantity produced has amount to 122 923 765 cubic meters with the total value of JD 6146227.
- **East Safawi:** An area of 9459 km². The Ministry follows-up a production-sharing agreement alongside with the National Petroleum Company which was already

issued by a special law No. 14/2014 in 01/04/2014. The Oil Petroleum Company has covered its contractual obligations related with training and implementing for the years 2014-2015. A 100 km of two-dimensional seismic line and some other lines close to well RH11 in the geophysical services center were processed. Three more testings were conducted while having a re-entry to RH11.

- **Hamza Oil Field:** An area of 100 km². The Ministry follows-up and starts activating a development and production agreement issued by a special law No. 29/2015 in 16/06/2015 alongside with Transeuro Energy Corporation. The Ministry currently monitors Hamza oil field production and shipment to the Jordan Petroleum Refinery. The quantities shipped to the refinery has in 2015 has amounted to 3263.48 barrels with a total value of JD 116,969.398.
- **Al-Jafr & Central Jordan Blocks:** An area of 17,420 km². The Ministry follows up and starts activating a production sharing agreement with the Canadian Ammonite Energy International Inc. issued by a special law No. 25/2015 in 2/6/2015.
- **Dead Sea-Wadi Araba:** An area of 6819 km². The Ministry Pursues a production sharing agreement with both the Korea Global Energy Corporation and the Canadian Enegi Oil Plc. and the agreement is not approved yet by the Parliament. On contrary, The Parliament has disapproved the entire agreement due to company's disqualification in 10/5/2014.

Second: Marketing Petroleum Regions

The Ministry has submitted three international tenders during 2014-2015:

1. **A tender for conventional oil exploration in Azraq:** An area of 9565 km² excluding Hamzah Oil Field. An international tender was submitted on 20/08/2014 and was extended to three months. The Canadian Abenteuer Resources Corp. has submitted for the tender for thirty thousand US dollars. A second extension up to 02/02/2015 was made for other companies to apply and compete. Yet no company applied and the tender was closed at second extension. After studying the tender, the technical committee has disapproved Abenteuer offer due to company's disqualification.
2. **Conventional and unconventional oil exploration in As-Sirhan excluding WS-4:** An area of 9886 km². The Ministry has launched an international Bid for oil exploration and drilling on 20/8/2014 for three months. Yet no company applied for the tender, so it was closed to be re-tender in 2016.
3. **Area around WS-4:** An area of 400 km². An international Bid Round for discovery and development for oil was submitted on 20.8.2014 for a period of three months. The Canadian Abenteuer Resources Corp. has submitted for the tender for fifty thousand US dollars. The Ministry decided to extend the period once again up to 02/02/2015 in an opportunity to give other companies a chance to apply and compete. Yet no company applied and the tender was closed at second extension. After studying the tender, the technical committee has disapproved Abenteuer offer due to company's disqualification.

Third: Global Investing for Open Exploratory Areas/West Safawi, North Highlands and Southern parts of Jordan-Areas opened to global petroleum companies for direct investment.

Fourth: Other Projects

- **Zoning of Petroleum Areas:** with a total cost of USD 1,471,778 for scientific purposes, assess oil possibilities and set commensurate agreements concerning petroleum activities. The agreement is currently under process and 30% of work is already achieved in 2015.
- **Update CIU:** Getting new programs and softwares compatible with petroleum input and output database.
- **The Expertise House:** to study the economic feasibility and evaluate companies and petroleum agreements by Middle East Economic Strategy Group MEESG 2015.
- **Shale Gas and Shale Oil Project:** corporate with USGS Geological Survey and US State Department via US embassy in Amman to hold training and studies on shale gas and shale oil to determine terms of reference for future investment on shale gas. A workshop attended by the Ministry of Energy and Mineral Resources and the National Petroleum Corporation was held in June 2015.
- **In-House-Data-Show:** Hosts Jordan-International Energy Summit between 19-20 May 2015 to exhibit petroleum, mineral and oil shale products and services. Yet no company has shown any desire to invest in open areas.
- **Space Information management System SIMS and data stewardship** to collect, categorize and document 3108 boxes to be inserted to the SIMS. The information will be passed over to CIU and saved to online data room.
- Provide consultancy to CIU to select information required for CGG Company for rezoning oil exploratory areas and to answer technical committee's relevant to seismic surveys inquiries and train some of the Ministry's employees on how to get seismic field data acquisition and complete global SIMS data coding.

Fifth: Cancellation of Petroleum Agreements

- **Law No. 33/2015:** Cancellation of production sharing agreement-Global Petroleum Ltd. - Jordan in West Safawi 2015.
- **Law No.34/2015:** Cancellation of production sharing agreement- Universal Energy Ltd. in As-Sarhan 2015.
- **Law No. 28/2015:** Cancellation of production sharing agreement- Sonoran Energy in Azraq 2015.

Oil Shale

Follow-up the signed Oil Shale MOUs:

- Monthly follow-up to companies' excavation programs and studies.
- Follow-up relinquishment and conceptual engineering programs of pre-economic feasibility.
- MOUs amendments in terms of extension by adding new articles by company's request.
- Take firm action against companies that do not adhere to signed MOUs requirements. Companies that have signed an MOU:
 - Global Oil Shale Holdings GOSH-2012
 - Whitehorn Resources, Inc 2012
 - Fushun Mining Group-2014
 - Al Qamar for Energy & Infrastructure Ltd.-2014
 - Questerre Energy Jordan Corporation-2015

- Aqaba Petroleum for Oil Shale Co. APCO-2010
- National Oil & Electricity from Oil Shale Company JOSECO-2010

Follow-up the signed concession agreements

- Jordan Oil Shale Company JOSCO: utilize deep oil shale ores and follow-up the experimental station initiated in 29/9/2015.
- Karak International Oil Company KIO: surface retorting technology in prospecting for oil shale. To follow up with KIO to carry out the contractual obligations. KIO is prospecting in An-Na'diyah.
- Saudi Arabian Corp for Oil Shale SACOS: surface retorting technology in prospecting for oil shale. To follow up with SACOS to carry out the contractual obligations.
- Jordan Oil Shale Energy Company: surface retorting technology in prospecting for oil shale. To follow up with the company to carry out the contractual obligations and relinquish part of the concession area in favor of direct burning project.
- Supervise oil shale drilling projects to prospect in El- Boe'jeh and North Jafr to describe extracted samples for study and research purposes to oil shale coats.
- Receive 533 samples of oil shale belongs to 30 oil shales well from Jordan Oil Shale Company JOSCO concession area during appraisal. All samples were stored in Azraq warehouse.
- Transfer 2697 samples of oil shale from temporary storage places to Azraq warehouse to sort out MCM from O.B. sediment samples.
- Determine areas for oil shale prospecting:
 - Oil shale prospecting in Wadi El-Abyadh/El- Boe'jeh of 214 km² and 20 well.
 - Oil shale prospecting in Bahia of 800 km² and 43 well.
 - A proposed prospection of 1100 km² of oil shale in Bayer.
- Determine the proposed drilling wells in Wadi El-Abyadh to drill 2000 m using software Rockware Software and geographic information systems GIS.
- Prepare an explanatory maps for all oil shale areas that have been studied and proposed for exploration.
- Create 3D geological cross-sections for open areas for marketing purposes.
- Draw maps showing thickness of selected oil shale zones to measure cover and coat thicknesses and percentage of oil.

Oil Shale Direct Burning Projects to Generate Electricity The Estonian /Malay/ Jordanian Attarat Power Company

- Enefit together with its partners (the Estonian /YTL Power International Berhad of Malaysia and Near East Investments of Jordan) has established and indirectly own Attarat Power Company (APCO) which started an EPC tendering for Jordan's first direct burning oil shale fired power plant with a capacity of approximately 470 MW located at the Attarat um Ghudran oil shale deposit approximately 100km south east of Amman. The Enefit consortium has provided a tender which was negotiated to be signed after taking all the necessary approvals from the Cabinet.
- Agreements signed with the Estonian company has included the executive agreement, direct executive agreement, Key stakeholder agreement, land lease agreement, mining agreement, power purchase agreement, and national grid agreement.
- Currently, the companies are negotiating Chinese banks and companies to get the financial closure and funding around USD billion 2.2.
- The power plant is scheduled to start generating electricity by end of 2019.

Other Companies

The Cabinet has opened a negotiation with number of international companies show an interest in tendering direct burning oil shale for generating electricity. The Enefit consortium of Thanya for energy and mining and Chinese CEMC, Dongfang Boiler Group Co., Ltd., China Railway Construction 19th Bureau Group Co., Ltd. has provided a tender to generate 900 MW of electricity out of direct burning in EI-Lajjun at beginning of 2021 to be studies by NEPCO.

The Renewable Energy

Undoubtedly, Jordan has great potential sources of renewable energy, particularly solar and wind energy. Jordan is located within the Sunbelt where the intensity of direct solar radiation is 5-7 kWh/m² and wind speed in specific areas ranges between 7-9 m/s; the data is promising to generate electricity in Jordan. Based on the previously mentioned figures, the overall comprehensive strategy for energy sector aims at diversification of energy sources and reduction of reliance on energy imports and contributes with 10% of an overall energy mix by 2020.

Below are the most prominent achievements in 2015 :

1. Solar Energy

- Badia Company has completed the construction of the Philadelphia Solar Power Company IPP PV project-direct offers with a capacity of 10 MW in Mafrq. The project is developed by Build, Own, and Operate contract BOO and the commercial project is one of a kind to be connected to Irbid District Electricity Company IDECO grid/Irbid governorate.
- Complete PV Solar Power plant to generate electricity with a capacity of 2 MW. The project is financed by a Spanish-Jordan Debt Swap agreement with the Spanish Government. Another PV project is completed and financed by a Spanish Soft loan with a capacity of 3 MW. Both projects are located in Azraq, implemented on EPC contract basis and operated in April 2015.
- All 12 photovoltaic projects to generate electricity with a capacity of 200 MW mostly in Ma'an have achieved financial closure in 31/5/2015. The investing companies have started implementation expected to be operated by 2016.
- On 10/2/2015, 24 companies have submitted bids as part of the second round to develop 4 PV projects with a total capacity of 200 MW(50 MW each) in north, middle and east of the Kingdom. The Ministry has qualified technical offers by 24 companies and final selection of the winning bidder is made on 22/6/2015. The Ministry has signed 3 MOUs by end of 2015 while the fourth project will be signed in January 2016. All concerned companies started their financial closure process.
- Complete tender procedures for a photovoltaic project with a capacity of 65-75 MW in Qweirah/Aqaba funded by UAE/ Abu Dhabi Fund for Development under an Engineering, Procurement and Construction contract EPC after increasing the utmost capacity to 100 MW instead. The consortium formed by the Spain's TSK Group and UAE's Enviromena Power Systems was awarded to sign a contract and carry out the project with a capacity of 103.192 MW in 20.12.2015. The project is planned for 2017.

2. Wind Energy

- JWPC has completed a construction of IPP Project through direct proposals with a capacity of 117 MW in Tafilah on the basis of EPC contract. The project was connected to grid and commercially operated in September 2015.
- A tender project has been awarded to the Spanish company Elecnor with a

capacity of 66 MW on EPC contract basis in Ma'an on 24.7.2014. The company has completed installing wind turbines to generate electricity and feed the grid. The Kuwait Fund for Arab Economic Development has approved to increase the project capacity to 80 MW on 15.6.2015. The project is expected to be operated in the fourth quarter of 2016.

- Receive four wind project offers within the first stage of direct offers in 30.9.2014 with a total capacity of 230 MW. The technical and financial evaluation process for negotiations on the project agreements is completed. The first purchase power agreement was signed on 12.10.2015 with Green Watts LLC in Ar Rajif with 82 MW of capacity. Three more agreements for three projects will be signed before end of March 2016. All projects are expected to be operated by end of 2018.
- Receive the Korean KEPCO direct offer in al-Fjej/Shoubak with a capacity of 89 MW in October 2014. The technical and financial evaluation process for negotiations on the project agreements is completed and the purchase power agreement was signed in December 2015 awaiting the financial closure and expected to be operated by end of 2018.

3. Small-Scale Renewable Energy System

Currently, all doors were opened for consumers in domestic, industrial, commercial sectors, government institutions, houses of worship and many others to secure the electricity needs using renewable energy and sell the excess (if any) to the electrical grid by installing a grid-connected small-scale renewable energy system to the network in accordance with the instructions issued by the Energy and Minerals Regulatory Commission. A capacity of 38 MW in total was installed into a grid-connected photovoltaic power system in many different sectors (households, universities, commercial and industrial enterprises, government institutions, schools, mosques, churches, telecommunication companies, banks, CBOs, hospitals, farms, etc.) to reach electricity-saving measurements.

On the other hand, the Ministry of Energy and Mineral Resources has succeeded to manage nine EU-funded projects for 6 million euros. However, project contracts were signed during the first quarter of 2015 expected to be completed in mid-2017. The projects has targeted wide range of CBOs aimed at spreading green energy use, CO₂ emissions mitigation beside creating direct and indirect job opportunities to promote energy security and reduce energy imports.

SMEs Projects:

- **Places of worship**- installation of solar and efficient systems for mosques and churches and provide training for 436 thousand euro mostly achieved 50%.
- **Schools**- study the feasibility of RE systems and empower schools through RE system ownership, connection to grid and adopt efficient systems such as:
 - 18 schools in remote areas in collaboration with Princess Alia Foundation for 493 thousand euro mostly achieved 75%.
 - 20 schools in hosting communities for 938 thousand euro mostly achieved 35%.
- **Universities and Research Centers**- to adopt RE & EE policy and study the feasibility of:
 - The Higher Council for Science and Technology buildings - for 785 thousand euro mostly achieved 30%.
 - National Center for Agricultural Research- in cooperation with University Cooperation/Italy for 937 thousand euro mostly achieved 35%.
 - The establishment of a factory and a laboratory in German Jordanian University- to produce biogas out of agricultural and food wastes for 761 thousands euro mostly achieved 40%.

- **Al-Basheer Hospital and three public hospitals**- a feasible study to adopt solar energy systems for 921 thousand euro mostly achieved 15%.
- **Sahara Forest Project**- to develop and sustain green communities by establishing clean energy station in Southern Jordan and provide energy and water solutions for outdoor cultivation and revegetation for 1.3 million euro mostly achieved 15%.
- **The Islamic Charity Center Society/Islamic Hospital**- to generate electricity from solar PV system and energy wheeling regulations for 2.9 million euro mostly achieved 30%.

The Energy and Environment

- The Ministry has started procedures towards licensing advanced factories to produce biodiesel out of consumed vegetable and animal oil and to produce industrial fuel out of waste for electricity generating purposes under supervision of licensing committees.
- In its membership in the commission of the environmental impact assessment of projects in general, MEMR has participated in various projects submitted to the Ministry of Environment.
- The Ministry has also prepared reports on several studies submitted by local and foreign companies to produce industrial, biofuel and electricity out of waste.
- The Ministry co-partnered the Greater Amman Municipality listing the technical specifications of generating electricity tender out of waste using global latest technologies processing municipal solid wastes disposed at Al-Sha'aer waste transfer station or Al-Ghabawi Landfill into industrial gas, or fuel, or electricity .
- The Ministry has a membership in the bidding committee and a membership in the technical committee responsible for rehabilitation of El-Akaider Landfill to generate electricity out of wastes.
- The Ministry has a membership in the technical committee responsible for the assessment of the environment impact of power generation projects to prepare a comprehensive plan for the electricity sector in collaboration between NEPCO and Japaneses Agency for International Cooperation.
- The Ministry has a membership in the permanent technical committee on Safety and Environmental Protection in Jordan Standards and Metrology Organization to issue the specifications relevant to the sector. The Ministry has also contributed in preparation of the technical specification for the industrial fuel and biodiesel for licensing purposes.
- In its membership to the technical committee to prepare a report on the second environment condition, the Ministry has the overall supervision on the energy chapter.

Jordan Renewable Energy and Energy Efficiency Fund JREEEF

The Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) was established by the Renewable Energy & Energy Efficiency Law, Law N. (13) of 2012. JREEEF has been established as an entity under the Ministry of Energy and mineral Resources (MEMR). The basic purpose of JREEEF is providing the funding necessary for the exploitation of renewable energy sources and the rationalization of energy consumption including small renewable energy facilities.

The JREEEF Bylaw was developed in 2014 through extensive consultation with stakeholders and is designed to build the credibility of JREEEF. The Bylaw ensures

effective and transparent management of the Fund. It was approved by the Cabinet and the Executive Committee in May 2015 and has been published in the Official Gazette as "Bylaw no. 49 for 2015 - Bylaw of the Renewable Energy and Energy Efficiency Fund."

The Strategic and Operational Plan 2015-2018

- JREEEF Vision
- JREEEF Mission
- Strategic Objectives
- Operating Principles
- Stakeholders
- JREEEF Target Market Sectors
- JREEEF Projects 2015-2018

Install 45 thousand solar heaters, 500 thousand LED lamps and 50 thousand PV cells to households via electricity distribution companies for more than JD 40 million all over the Kingdom up to 2018.

- JREEEF Agreements and MOUs
- Sign an agreement with Jordan Chamber of Industry to implement RE & EE technology in SMEs.
- Sign agreements with CBOs to install 600 kW PV cells to around 300 households in the north region.
- Sign agreements with three electricity distribution companies to replace incandescent and fluorescent bulbs with LED saving lamps technology.
- JREEEF Projects

Implement of many projects targeting residential electricity subsidies all over the Kingdom. In short period, JREEEF could attract donors to corporate strategic projects:

1. Distribute 51 thousand LED lamps in Za'tri refugee Camp and areas affected by the Syrian Crisis sponsored by IKEA.
2. Install PV solar systems on residential roofs with a capacity of 600-700 kW for around 300 households distributed all over Jordan Valley, Balqa', Irbid, Ajloun, Jerash, and Mafrq provinces for JD 0.5 million in cooperation with Mercy Corps and 10 CBOs via revolving fund loans.

Electricity

Key achievements determined in 2015:

- Launch of a commercial operation of the Third Independent Power Producer Project IPP3 under the royal patronage with a capacity of 570 MW on 29/4/2015. The project consists of 38 diesel engines with a capacity of 15 MW each using diesel engine technology burning heavy fuel oil as base fuel and natural gas as an alternative fuel. The Korea Electric Power Corporation KEPCO and Japanese Mitsubishi joint venture has commenced the commercial operation of the electricity system.
- Launch of a commercial operation of the Fourth Independent Power Producer Project IPP4 under the royal patronage with a capacity of 241 MW on 29/10/2014. The project consists of 16 diesel engines with a capacity of 15 MW each using diesel engine technology burning heavy fuel oil as base fuel and natural gas as an alternative fuel. The American AES and the Japanese Mitsui joint venture have started up the commercial operation on 11/7/2014.
- Metal Constructions of Greece METKA was awarded a tender to startup phase

III expansion of Samra station adding the 5th and 6th gas turbines by Alstom technology on 23/9/2012 with a 143 MW of capacity by addition of combined cycle plant with a total cost of USD155 million - JD 110 million. The project was commercially operated on 1/6/2015.

- At its meeting held on 29/6/2014, the Cabinet has adopted a decision No. 4784 to assign Samra Electric Power Company SEPCO to convert the seventh gas turbine to a combined cycle by adding a gas turbine with a capacity of 70 MW which aims to improve the seventh unit efficiency and reduce consumed fuel. According to NEPCO, the project is to operate within (37) months by end of 2017. Consequently, Samra Electric Power Company SEPCO has signed a contract with K&M on 15/1/2015 and all technical and financial offers by qualified companies are assessed, received and to be expected in January 2016. The project is financed by soft loans from Kuwait Fund for Arab Economic Development and Saudi Fund under Jordanian government sponsorship at a total cost of around JD 75 million to be operated by end of 2017.
- The rehabilitation of Hussein Thermal Power Station project agreements were signed in 21/12/2015 with a capacity of 485 MW and a total cost of million USD 470 expected to be commercially operated in the second half of 2018.
- Prepare the necessary strategies and planning studies to manage NEPCO losses up to 2017 and were uploaded on the Ministry of Energy official website on 23/10/2013.
- The electricity tariff was amended on 16/2/2015.
- Pan-Arab Interconnection Grid among Arab countries including Jordan-Saudi electrical interconnection Saudi Arabia Qurayyat-Jordan Qataneh AC double circuit transmission line 135 km length and 400 kV in addition to expand Qataneh station in Jordan and Qurayyat substation in Saudi Arabia for estimated cost of USD 134.4 million. The implementation of the project needs 4 years of study up to commercial operation. The Ministry of Energy and Mineral Resources, Ministry of Water and Electricity, National Electricity Power Company NEPCO and the Saudi Company have addressed the Gulf Cooperation Council Interconnection Authority GCCIA for Gulf Arab States to speed up the interconnection with Saudi Arabia.

Consequently, the Gulf Cooperation Council Interconnection Authority GCCIA for Gulf Arab States has included the initial expansion study to link Jordan to GCC Interconnection Authority for Gulf Arab states which is currently carried out by GCCIA to be completed mid-next year.

With regard to interconnectivity with Iraq, the Ministry of Energy and Mineral Resources has invited Iraqi stakeholders to meet in Jordan to discuss and study suitable alternatives to supply Iraq with electricity.

Natural Gas

To diversify external natural gas resources to secure and meet LNG power plants and LNG industries and develop Risha gas field by 2015, the Ministry of Energy and Mineral Resources has proceeded the following:

- The inauguration of LNG Terminal in Aqaba under the patronage of his Majesty King Abdullah II on 30/7/2015. The achievement of LNG project implementation is with no doubt a result of direct and deliberate efforts among all concerned parties.

No.	Project	Concerned Party
1	Infrastructure for LNG port	ADC
2	Floating Storage and Regasification Unit FSRU	MEMR
3	LNG Supply	MEMR & NEPCO
4	JGTP Tie-in point & Gas Transportation	MEMR, NEPCO & Fajr Co.

- His Majesty, the King Abdullah II has ordered the government to name a liquefied gas terminal in Aqaba after Sheikh Sabah Al Ahmad Al Jaber Al Sabah of Kuwait under the Cabinet resolution No. 8519 in 11/3/2015. The LNG port project in Aqaba has been financed by The Kuwait Fund for Arab Economic Development (KFAED) with JD 46.5 million according to LNG fund agreement signed on 5/5/2013 in addition to another JD 11.6 million by Jordan treasury.
 - The completion of LNG jetty by Aqaba Development Corporation ADC and BAM-MAG consortium to be put in operation on 12/7/2015.
 - The arrival of FSRU "Golar Eskimo" to LNG port of Aqaba loaded with LNG commissioning cargo on 25/5/2015.
 - Sale and Purchase Agreement (SPA) has been signed by NEPCO and Shell International on 21/1/2015 to supply Jordan with 150 Mcf/d for 5 years and 1st LNG cargo arrived to LNG Terminal on 10/7/2015.
 - Completion of LNG Tie-In with Arab LNG Pipeline by Jordanian Egyptian Fajr for Natural Gas Transmission and Supply Company on 15/5/2015.
 - Aqaba Port Marine Services Co. starts providing marine services for Aqaba LNG Terminal on 25/5/2015 under the Tripartite Agreement signed in 24 July 2014.
 - NEPCO has awarded two bidders; and appointed both the SPT Marine Transfer Services LTD to provide operations, maintenance mobilization & commissioning services, and Intertek Testing Services to provide engineering consultancy services on 1/3/2015.
 - The FSRU Lease Agreement has been transferred to NEPCO under the Novation Agreement signed on 25/8/2015.
 - During the 2nd half of 2015, Aqaba LNG Terminal has received 15 cargoes imported by Shell International contract and 5 cargoes were sold to NEPCO via Spot Market. The average quantity of imported LNG was amounted to 320 Mcf/d.
 - NEPCO has selected shell International in October 2015 as a preferred bidder through a competitive tender to supply Jordan with 150 Mcf/d in Mid-term contract for the period of 2016-2017.
 - Sign an agreement with Egypt to trade FSRU/LNG surplus on 6/8/2015 and provide Egypt with 8 cargoes in Sheikh Sabah Al Ahmad Terminal in Aqaba.
2. International Cooperation
- Open new communication channels with Qatar and Algeria on LNG import cooperation possibility.
 - Sign a Letter of Intent LOI between NEPCO and British Gas Group on 22/5/2015 to supply Jordan with natural gas from Gaza Marine reservoir off the Gazan coast on 22/5/2015.
3. Develop Risha Gas field
- The National Petroleum Company (NPC) plans to develop the Risha Field to raise LNG production to 50 Mcf/d as a 1st stage. However, the company coordinates with the interested investors of private sector to attract strategic partner and create a

- favorable investment opportunity to develop Risha Gas field.
- Risha Gas field local production of natural gas has amounted to around 12 Mcf/d by 2015.
- 4. Supply LNG Industries
 - The Council of Ministers tasked a steering committee under the Cabinet resolution No. (12023) on 14/10/2015 to study the contractual, technical and legal aspects of supply LNG Industries and necessary recommendations were raised on 21/12/2015.

Bio Energy

Jordan Biogas Company Ltd. continues to work on processing the organic waste in Rusaifa Landfill. The generated electricity quantity in 2014 has amounted to 5.2 GWh. The mitigated volume of biogas has amounted to 4.5 million cubic meters.

Peaceful Uses of Nuclear Energy

Jordan's interest of nuclear energy stemmed from the dire need to face all challenges represented by the scarcity of domestic energy and water sources. In other words, to provide domestic long- lasting sources of energy, the National Strategy of Energy for 2007 has strengthened the development role of energy domestics and diversification by introducing nuclear energy as an alternative to electricity generation. Accordingly, Jordan Atomic Energy Commission was created in 2008 to achieve two major goals:

- Transfer, develop and sustain the peaceful uses of nuclear energy and radiation technology to the Kingdom.
- Hold investment projects to boost national economy in radiation technology and nuclear energy and utilize it in electricity generation, water desalination as well as other nuclear practices.

Accordingly, the commission has developed a strategy for nuclear energy represented by the Jordanian nuclear program includes exploitation and investment of nuclear natural resources especially Uranium, establishing and operating Jordan nuclear power plant, empowering qualified domestic human resources, and supporting nuclear sciences and applications infrastructure to better serve science, educational research and community. As a result, Jordan Atomic Energy Commission has continued during the year 2015 all activities designed to achieve the objectives designated.

Major achievements of the Jordan Atomic Energy Commission:

First- Jordan Nuclear Power Plant

The Nuclear Power Plant Commission has finally selected the Jordan Nuclear Power Plant site in Amra. JAEC announced that Rosatom's reactor export subsidiary AtomStroyExport (ASE) would be the supplier of two nuclear units on a build, own and operate (BOO) basis with a capacity of 1000 MW each. The first reactor to be operated by 2024 succeeded by the second two years after. JAEC's functions include third generation technology of Russian reactors which upholds the highest standards of nuclear safety and security. Generally, Russian reactors were originally licensed, built and operated using this type of technology. An intergovernmental agreement was signed at beginning of 2015 between Jordan and Russia on participation in the establishment of Jordan nuclear power plant.

The government has approved establishing Jordan Nuclear Power Plant Company to complete site work, possibility of reliability to grid with NEPCO, need for water, and all technical needs and financial studies required. It is worth mentioning that the International Advisory Group of Jordan's nuclear program which will be tasked with implementing the nuclear program included global scientists, and specialized technical and political figures to support Jordanian staff on local and global levels to observe

implementation and progress to be politically a powerful tool used to support the nuclear program and promote marketing at local, regional and global levels.

To guarantee the fulfillment of the workflow, the commission works on preparing a bank feasible study with the investor and the operator to ensure financing, complete signing agreements and program implementation.

In this context, the commission exerts deliberate efforts to work with the International Atomic Energy Agency IAEA and the Arab Atomic Energy Agency AAEA on the implementation of technical and national projects in support of several national and regional projects in the nuclear and radiological applications and prepare to sign agreements and MOUs in nuclear cooperation between Jordan government and friendly developed countries.

Second- Empower Jordan HR Core Competencies

The commission has continued in 2015 carrying on all appropriate plans to complete Jordan Reactor for Training and Research JRTR, the cornerstone to Jordan Center for Nuclear Research, in University of Science and Technology to train and empower Jordanians, conduct scientific research, and produce radioactive isotopes. The prominent achievement also included environmental studies, a radiological emergency plan to complete licensing requirements, establish an emergency center, prepare a radiation and safety protection plan, equip laboratories of scientific research and neutron activation, and prepare a business plan to market radioactive isotopes produced by such reactor. The overall project achievements were amounted to 95% by end of 2015 to be operated in 2016.

The Commission has continued enhancing the scientific and specialized infrastructure for human resources required to attain the Jordanian nuclear program by providing Jordanian students with international scholarships to study Masters and PHd degrees in the disciplines of nuclear sciences and engineering beside grants in nuclear training to train technical staff from developed countries like Russia, China, France, South Korea, and Japan. The international scholarships of Masters and PHd programs have covered 88 students and 24 specialized training programs were given to Jordanian technicians in South Korea. All Jordanian students and trainees have completed all work requirements to enroll in JRTR. Moreover, 60 students will be given training in South Korea on the operation systems of the nuclear reactor.

Many educational and training opportunities were provided to Jordanian students in nuclear energy and applications in 2015 and 28 students were selected to continue their postgraduate studies in nuclear science and engineering in most prestigious universities in Russia. The Commission has also sent some of the employees for postgraduate studies in nuclear security in Bulgaria on IAEA expense to promote Jordan nuclear program and it has allocated 15 scholarships for the central Badia undergraduates to study nuclear engineering at Jordan University of Science and Technology starting with 2014/2015, to be prepared for future work in the Jordanian Nuclear power in Amra.

Third - Uranium Utilization

The achievements of the Nuclear Fuel Cycle Royal Commission has implicated the continuance of the Jordanian Uranium Mining Company JUMCO the organized and systematic exploratory work in the midst of Jordan undertaken by Jordanian specialized team under the supervision of seven international experts and specialists to perform the following operations in 2015:

Consequent to the first stage in 2014, Uranium resources estimates of U_3O_8 in the explored region have reached 36 thousand tons with a concentration of 135 ppm all

over 40% of the total surface area based on exploratory results according to a global JORC Code-2012 Edition. Currently, the commission is issuing a technical report signed by international experts and specialists for the second stage. The figure is expected to increase to around 5000 ton of U_3O_8 with a concentration of 160 ppm comparing with what was declared in the first stage of the exploration works of the surface area.

A systematic exploratory work in the midst of Jordan to extract uranium ore has been improved in leaps and bounds to build a pilot testing unit and produce yellowcake industrially and laboratorially by a specialized Jordan team.

Future works include completion of establishing and operating the pilot testing unit to produce the yellowcake in significant quantity.

The Radioactive Waste Management directory has approved the national policy in nuclear waste management dominating spent fuel radioactivity, follows-up transportation of radioactive wastes in various available modes of transportations based on international transportation instructions as well as management and treatment of radioactive wastes outputs of peaceful uses of radioisotopes for various medical, agricultural and industrial usages.

Moreover, the directorate is currently handling national and regional projects and training programs to qualify and empower its employees. Meanwhile, the directorate of Chemical and Physical Analysis, the technical arm to the Commission of Nuclear Fuel Cycle, provides laboratory and experimental work services uranium ore extraction operations meticulously and professionally in collaboration with other research centers all over the Kingdom.

Fourth- Nuclear Sciences and Applications

The Nuclear Science Applications Commission has carried on the development of scientific laboratories and various nuclear applications in 2015 which aimed at the development and transfer of peaceful uses of nuclear energy and radiation technology in Jordan through developing skills and empowering human resources to enhance the infrastructure for nuclear science and technology by holding seminars, specialized training, scientific research visits inside and outside Jordan, train engineering students and researches in Jordan universities and scientific centers, laboratory testing and analytical services for production and services sectors particularly those provided by the secondary calibration laboratory, laboratory to measure the exposure of personnel to radiation, and the Mega Gamma-1 Irradiator center to radiate various samples and sterilization of medical devices and research purposes. Meanwhile, the Synchrotron and Accelerators directorate carried on implementation of the national scientific activities to identify work development and mechanisms of support provided to Synchrotron centers, agencies, global scientific research centers, and Jordan universities to empower qualified staff and support scientific research. The Nuclear Applications directorate also follows up all projects and scientific research activities in universities, research centers and production and services sectors in Jordan financed by the International Atomic Energy Agency IAEA and the Arab Atomic Energy Agency AAEA and the Radiation Protection directorate has established many plans and radiation protection programs by observing personal and spatial radiological exposure. Jordan Atomic Energy Commission has paid all attention to maintain life and environment. In implementing all Jordan nuclear projects, JAEC has endorsed full transparency, full commitment to public safety and nuclear security requirements based on standards approved by the IAEA and complying with the laws and regulations governing the environment, radiation protection, and nuclear safety and security in Jordan.

Geology and Mining

The mining sector is one of the vital sectors that play an active role in driving growth and development in the national economy. Despite the instability in contribution all over different periods, geology still possess a great value and represents one of the most important pillars of the national economy.

The mining sector is mainly based on the exploitation of local raw materials and comprises of the two main mining industries:

- Mining Extractive Industries

Phosphates, potash, carbonate and quarrying products, etc.

- Mining Transformative Industries

- A. Chemical Industries

Fertilizer, chemical acids, quick and hydrated lime.

- B. Construction Industries

Cement, white cement, ceramics and building materials.

The Ministry traded mineral resources via conferences and specified local and international workshops as follows:

- Present a scientific paper on minerals investing opportunities in an Energy Conference held in Amman.
- Cooperation with the investment commission in the conference entitled "Belt, road and international cooperation in the construction of industrial regions", and a workshop held with the Jordanian Embassy in China which pursued the following:
 - China Investment Association Company expressed willingness to invest in the field of potash, gold and copper beside oil and gas and to contact the concerned authorities to do so.
 - United Energy Group Company/China expressed a desire in the subject of renewable energy, especially wind energy and plan to visit Jordan to learn about investment opportunities.
 - Zenith Energy Trade and Resources Ltd Corporation/China is interested in the development of the old oil wells and plan to visit Jordan to learn about investment opportunities.
 - Chinese SANY Group Company expressed desire to invest in the field of wind power.
- Present the mining investment opportunities in cooperation with Energy and Minerals Regulatory Commission, Gulf Cooperation Council General Secretariat and Jordanian Engineers Association.
- Update mineral resources file and the MEMR website in English and Arabic languages for the purpose of marketing and investment.

Major projects carried out by the Ministry of Energy and Mineral Resources MEMR in 2015:

1. National Geological Mapping Project

The main task of the Geological Mapping Division is based on the National Mapping Project that produces Geological maps at different scales (1:50,000) and (1:100,000) for the entire Jordan. The following table shows the current status of geological maps and reports.

No.	Maps/ Bulletins	Scale	Current Situation
1.	Al Inab Map	1:100,000	Published
2.	Ras An Naqab Map	1:50,000	Editorial Stage
3.	Mishah Hudruj Map	1:100,000	Field work in progress
4.	Wadi Hudruj & Wadi Ed Dhbei'ani	1:100,000	Field work in progress
5.	Wadi El-Fkok Map	1:100,000	Field work in progress
6.	Ain Jedi & As-Safi Map	1:100,000	Start Survey
7.	Correlation Project between Jordan and Saudi Arabia Report	–	Published
8.	Al Awja Bulletin	–	Published
9.	Wadi Maghar Bulletin	–	In preparation

2. Petrographic Studies

Provide petrographic service to identify the age and mineral contents required for the Ministry projects, public and private sectors (for price). In 2015, 49 rock samples and 79 microscopic slides were studied and 30 technical reports were prepared.

3. Geological Museum

The Geological Museum demonstrates significant achievements of the Ministry of Energy and Mineral Resources and the nature of the work carried out in the field of mineral resources through exhibition to those interested by all sectors. In 2015, the museum was visited by 1249 students from public and private schools. The technical staff of the museum participated in the exhibitions of Amman Summer in Al Hussein Gardens, Jordan International Energy Summit held in the Amman and the workshop entitled "Mineral Ores; a placer in your hands", where most important activities and achievements of MEMR were demonstrated.

4. Exploration Studies Projects

The exploration studies projects aim to add new prospect areas to increase the reserves, besides determining the lateral and vertical extension of the ores, calculate quantities and conduct the necessary tests to determine the quality of the oil shale, in order to provide accurate information for investors and prepare these areas to be ready for investment.

The achievements during 2015 are as follows:

1. Oil Shale

- Supervise the drilling works in the prospecting project for oil shale in Buway'ija and Jabal Al Mutaramil areas (Bid), 2000m were drilled in these areas through 37 boreholes.
- Supervise the drilling works in the prospecting project for oil shale in North Jafr area (Bid), where the progress percentage achieved was 50%.
- Describe and digitize the cutting and core samples from both projects.
- Collect samples from oil shale projects in Jibal Adhriyyat, Buway'ija and Jabal Al Mutaramil areas.
- Archive the samples collected from Dhirwa, Jafr, Isfir Al Mahatta, Adhriyyat, Wadi Buway'ija and Jabal Al Mutaramil areas in the Azraq warehouse.
- Conduct field trips to Wadi Buway'ija, Jabal Al Mutaramil, south Bayer and north Jafr to study the geology and selecting suitable areas for future oil shale prospecting projects.
- Prepare oil shale samples collected from Jibal Adhriyyat area for chemical analysis (XRF, XRD, Fisher Assay, Bulk Density and Heat Value).
- Write the final reports on oil shale in Wadi Dhirwa, Jafr, Isfir Al Mahatta, Jibal Adhriyyat, progress percentage is 85%.
- Prepare the prospecting plans for oil shale in Wadi Buway'ija, Jabal Al Mutaramil and north Jafr areas, and prepare the required maps using GIS technology to locate the proposed boreholes and collect previous studies.
- Prepare the technical specification and the terms of references (TOR) of the drilling bid for Wadi Buway'ija, Jabal Al Mutaramil and Jafr areas.
- Prepare the final report on oil shale in Jafr area.
- 2. Dolomite Exploration/Ras An Naqab "Al Farsh"
 - Archive samples collected from the project in Lajjun warehouse.
 - Prepare samples for chemical analysis.
 - Prepare the final report of the project.
- 3. Coquinal Limestone Exploration/Al Hisa
 - Supervise drilling works in Al Hisa area and drill 5 boreholes with depths ranges between 13 and 23 m.
 - Describe collected samples lithologically.
 - Archive samples collected in Lajjun warehouse (Kuwaiti grant bid).
 - Prepare samples for chemical analysis.
 - Prepare the final report of the project.
- 4. Phosphate Exploration/Ash Shidiyya
 - Archive samples collected in Lajjun warehouse.
 - Prepare samples for chemical analysis.
 - Prepare the final report of the project.
- 5. Chalk Exploration/Waqf As Sawwan
 - Conduct field trips to the project area to study the geology and suitable area for conducting projects.
 - Locate the prospecting boreholes to be ready for the handover to the drilling company.
 - Prepare plan and maps needed for project.
 - Prepare the technical specification and the terms of the drilling bid.

5. Geochemical Projects

The Geochemistry Division is carrying out the surveys and investigations for mineral exploration using different geochemical methods; geochemistry of heavy minerals, stream sediments and rocks in south Jordan, and follow up the results of laboratory analysis of the various geochemical samples and evaluation.

The following is a summary of achievements in 2015.

1. General Geochemical Survey

Geochemistry Division has started the implementation of the joint cooperation of geochemical survey between Jordan and Saudi Arabia on either side borders. Meanwhile, the geochemical survey continued in two areas; Jabal Al Harad and Ain Al Hashim.

- Jabal Al Harad

The study area is located in south Jordan and covers an area of 672 km². Thirty (30) stream and rock samples were collected for chemical analysis to determine the concentrations of elements. Meanwhile, the samples location was allocated on the maps.

- Ain Al Hashim

Thirty-four (34) samples were collected for heavy minerals and 6 rock samples were collected for chemical and gold analysis. The samples are located on the map.

2. Phosphogypsum Project

The project aims to find a way to separate the heavy metals associated with the substance phosphogypsum, uranium element of radioactive material from phosphate ore and separate and get rid of components to make phosphogypsum material valid and of economic value. The quantity of phosphogypsum has amounted to 100 million tons. This metal is used in paving the roads and improve the soil and gypsum board industry etc. Getting rid of the heavy elements using scientific means provides protection for the environment (groundwater, seawater and soil).

The project started early in 2015 to collect the required samples for analysis and experiments. A total of 62 samples were collected and sent to MEMR laboratories.

3. Kaolin Project

Kaolin deposits project is located in Yamaniyya/Aqaba. Twelve (12) samples were collected and sent for analysis, the work is still in progress.

4. Volcanic Dykes Project

Volcanic Dykes Project is located in Wadi Araba. Eighty-five (85) samples were collected and sent for analysis; the work is still in progress.

6. Geophysical Studies Projects

The geophysical studies are conducted in several parts of Jordan to support other geological surveys to locate the anomalous areas which help in mineral exploration projects, earth crust and geotechnical studies including geological structures and groundwater reservoirs.

The achievements during 2015:

1. General Gravity Survey Project

It has covered around 88% of Jordan. The project is considered to be very important for carrying out the integrated geophysical and geological studies, and finding prospecting mineral resources, as well as, locating the groundwater reservoirs and geological structures.

Gravity survey continued during the first half of the year, according to the project plan in the eastern and northeastern parts of Jordan (Azraq and Safawi), then moved to the southern regions of the Jordan to cover Al Thulaythuwa. A total of 119 measuring gravity stations were measured and observed.

All data was digitized and necessary corrections have been made beside the calculation of free air, Bouguer anomaly and gravity values at every station.

2. Magnetic Investigation Project

The project investigates the significant subsurface minerals concentrations related to the hydrothermal activities in Khan Ez Zabib. The marble formed due to hydrothermal

recrystallization of limestone is evidence to this activity. An aeromagnetic survey map is shown a distinct deviation epicenter at Zarqa-Ma'in fault, crosses the region toward the east-west. The magnetic field was measured at 90 points and the necessary corrections have been made to these points on computer and included to previous data to publish the scientific report.

3. Copper Exploration Project

The project aims to investigate the copper bearing rocks near earth surface in Wadi Araba, southwest Jordan. The survey was carried out using Induced Polarization Method to define chargeability and metal factor. A Scientific report was published together with the results.

4. Digitize and Archive Project of airborne electromagnetic survey maps

The previous geophysical surveys are all available in hard copies and needed to be digitized for archive purposes. Some of EM maps were digitized and archived. The project will continue to digitize scientific geophysical reports. The geophysical devices and courses were all updated. The division was provided by a multi-function receiver for electrical and electromagnetic measurements for deep investigations, in addition to the newest processing and modeling software's.

7. Jordan Seismological Observatory (JSO)

The seismic observatory monitors and analyzes local, regional and abroad earthquakes via a network of seismic monitoring stations that cover all the major sources of seismic activity in Jordan to ensure precisely the seismic events, and to develop a data bank for seismic to update Jordanian construction codes and to prepare the catalog of earthquakes.

The achievements during 2015:

- Regular maintenance and calibration of ordinary seismic monitoring stations and strong motion stations on monthly basis maintenance programs and replacing broken parts to maintain the continuity of the monitoring process ideally.
- Fifteen local earthquakes were mostly recorded in Jordan Valley and Eastern Mediterranean regions. Eighty-five (85) regional and 67 distant seismic events were also recorded by JSO.
- Four (4) new sites seismic stations were proposed and studied in Tetten station/ Aqaba, Rahmah station/Wadi Araba, Salt station and Al-Bait station. JSO obtained the official permission to install the stations. Construction procedure was started in Tetten and Salt stations.
- Follow up the Dead Sea Project (DESERVE) where some geophysical studies were conducted on the sinkholes in Ghor Haditha using Geo-Radar and aerial mapping by remotely helicopter.

8. Cadastral Services

Provides cadastral for all MEMR projects.

The achievements during 2015:

- Observe (41) survey point for the gravity survey project in Safawi, and (38) survey points in Ath Thulaythuwat.
- Provide cadastral for the gas pipeline project.
- Detect oil equipment's storage site in Safawi /Tapline.
- Follow up the acquisition activities concerning Gas Line project supplying the electricity station in Al Ghabawi, and the main gas line and lands acquisitions in Al Quweira.
- Detect gas supplying As Samrah Station in Zarqa and determine a gas line track for a transit company in cooperation with the executive company.

9. National Cooperation

The Ministry of Energy and Mineral Resources cooperates with national institutions by carrying out specialized technical studies all over the Kingdom as follows:

- Atomic Energy Commission: Study and appraise the location of the proposed nuclear plant.
- Dhiban Region Authority: Investigate a landslide on the main road in Wadi Mujib to study and assess the slope stability of this part of the road and prepared a technical report.
- The Jordanian Armed Forces: A geophysical survey is carried out along the northern border of Jordan using the Ground Penetrating Radar (GPR).
- Municipalities Ministry in the land use committee.
- Training Cooperation: MEMR has trained 26 student, geologist and engineers on professional geological survey.

10. International Cooperation

The Ministry of Energy and Mineral Resources has collaborated with international institutions as follows:

- British Geological Survey: conduct detailed studies of the Permian and Triassic rocks in the Dead Sea.
- The Geological Correlation Project with Saudi Geological Survey SGS along the borders between Jordan and Saudi Arabia. The report was published /special issue.
- Freiburg University/Germany: Scientific cooperation in the field of thermal energy and petroleum, as well as specific geological mapping studies.
- Geochemical Survey Project with Saudi Geological Survey on either side of Jordan-Saudi borders extending from the Red Sea in the west to Al-Mudawara in the east (96 km in length) including Jabal Al Mubarak, Ain Al Hashim, Um Sahm and Dubaydib sheet in Jordan. Two-hundred and fifty-eight (285) samples of stream sediment, heavy metal and rock samples were collected from the area and sent to SGS laboratories in Jeddah for analysis.
- Cooperation with the Ministry of Water and Irrigation and the German Federal Institute for Geosciences and Natural Resources (BGR) carry out specialized geophysical surveys to study the basin basalt to the northeastern parts. The study includes electromagnetic, geophysical and seismic surveys and an experimental geophysical survey was carried out geophysically. The project operation to be expected in 2016.
- Cooperation with the German Geophysical Research Centre (GFZ) via the Dead Sea Research Project. The current stage of the project aims to study and monitor the sinkholes phenomenon in Ghor Haditha. The field studies include seismic survey methods, ground penetrating radar and aerial photography using a small plane. The results of the studies were published in journals and scientific conferences.
- Active faults and paleoseismicity studies are of high significance in seismic hazard assessment and mitigation. The studies were provided either by routine works by JSO or by cooperation with Japanese partners in the Dead Sea and Jordan Valley, and with French partners in Wadi Araba and Aqaba. During their visit to Jordan, in September 2015, the Japanese partner determined the location of some active faults in Qatrana/Karak and proposed trenching the area in early 2016. The results of paleoseismicity studies were published in the International Geophysical Journal.
- Cooperation with The Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) in the field of training the JSO staff.

- Cooperation with Al Najah University in Palestine via training the university staff on the seismic monitoring and interpretation in the JSO in Jordan.

Laboratories

The Ministry's Labs analyzed all kinds of natural raw materials in different methods to determine types of minerals and main components of major and trace elements. The achievements in 2015:

First: Chemical and Mineral Analyses

Analyze all kinds of natural raw materials to determine mineral type and content of the main, secondary elements, and rare earth elements using X-ray spectroscopy, X-ray Diffraction, plasma, atomic absorption and degree of whiteness instruments.

The total of samples estimated in 2015 were around 10247 samples analyzed for various MEMR projects, Jordanian universities and private sector. The laboratory tests were adopted to obtain ISO 17025 certification post approval for testing X-ray machine certificate (XRD) in 2015. Currently, the work is in progress to adopt the rest of the tests.

Second: Organic Geochemistry

The organic geochemistry analysis of oil shale was developed through providing the laboratories with all the necessary advanced instruments for the lab tests. A total of 1979 oil shale samples were received and analyzed for oil shale projects carried out by MEMR, universities, public and private sectors; Seven-hundred and eighty-five (785) samples were analyzed for oil yield using Fischer Assay retort, 800 samples to determine the calorific value, 187 samples for elements identification, 22 samples for Thermo gravimetric analysis, and 185 samples to determine the organic carbon value. A total of 611 oil shale samples were received from the private sector companies (i.e. Questerre Jordan Company, Karak International, Jordanian Universities, and Modern Company for Cement and Mining (Manaseer) for identification of shale oil content, calorific value and other tests. Another 29 samples were analyzed for the private and public sectors to determine the TDS, pH and sulfates.

Third: Soil mechanics, rock and quality

A total of 573 tests of soil, materials, and rubble and building stones for the Ministry of Energy and Mineral Resources projects have been analyzed. Meanwhile, 672 tests were analyzed for the Energy and Minerals Regulatory Commission and Ministry of Agriculture, and 80 tests for the private sector.

Fourth: Mineral Processing and Ore Dressing

Address and concentrate raw materials through laboratory tests in accordance with industrial standards required for use in various local industries instead of imported raw materials. A total of 59 samples of feldspar from the Rashidiya have been tested by flotation, magnetic separation and gravity separation. Meanwhile, 45 samples of clay from Wadi Mizrab, Wadi Hafira were tested by water separation and magnetic separation.

Fifth: Samples Preparation

Receive and prepare raw materials samples for analysis by crushing, grinding and sieving according to each individual examination in accordance with ISO 17025 System. A total of 2777 samples from the public and private sectors were received and prepared for analysis including the 1503 samples from the Ministry of Energy and Mineral Resources. Currently all the necessary requirements are in progress to obtain the international accreditation certification for testing specific weight and absorption of coarse rubble, specific weight and absorption of fine aggregates, and determine the relative moisture content, sandy equivalent, specific weight and absorption of soil, plasma, and organic carbon. The total revenue from the public and private sectors has reached JD 334918.

Institutional Development

To proceed with the national objective to increase efficiency, effectiveness and productivity of public sector performance, the Ministry of Energy and Mineral Resources continued its commitment towards improving Public Services System No. 64 for the year 2012. The Institutional Development Unit was developed in April/2015 to raise the ministerial performance.

Significant Achievements:

- To develop a performance plan based on various inputs i.e, results of measuring clients and partners satisfaction, results of suggestions and complaints beside the appraisal report of His Majesty King Abdullah II Award for Excellence in Government Performance and Transparency.
- To review and develop relationship methodology with clients 2015 according to a comprehensive plan of whatsoever measurements to improve and develop clients' services. These measurements have raised client's satisfaction to 86% in 2015 comparing to 81.3% in the first half of the same year.
- To renovate Ministry service guide 2015 in cooperation with the Ministry of Public Sector Development. The guide includes 46 services in terms of criteria stated. The guide has been uploaded to the Ministry and e-Government sites.
- The actual service performance has assessed 100% comparing to what has been stated in 2015.
- To study and determine most Ministry services and priorities of 46 services in terms of specific criteria such as demand density and the impact on civilians. Consequently, 3 services were selected to be automated and articulated by applying Jordan e-Government Program in collaboration with the Ministry of Communication and Information Technology. The required funding was allocated to implement the program over the next three years.
- To deal with all suggestions and complaints received during 2015 using communication channels i.e, complaint boxes, e-mails, and government complaint system based on specific timing and methodology.
- To develop operations management methodology for 2015, work on documenting operations of organizational units, design new operations for restructured and renovated units in the Ministry so that all operations are properly connected to the strategic objectives in terms of specific and measurable performance indicators.
- To develop the methodology for knowledge management for 2015 which aims at embracing efficient knowledge and awareness practices.
- To stimulate and encourage creativity and innovativeness of employees at all levels by approving special award to innovative ideas in the Ministry for 2015.

The Financial Statements 2015

Item	Allocations JD	Expenses JD	Disbursed Rate %
Current Expenses	8346000	7972544	96
Capital Expenses	154875000	147499786	95
Total	163221000	155472330	95

The Financial Statements of Major Capital Projects in the Ministry in 2015

Project	Allocations JD	Expenses JD	Disbursed Rate %
Design and construction of an LNG Jetty/Aqaba	19240000	18770508	98
Utilize wind energy to generate electricity -Maan	32000000	32000000	100
Oil products storage facilities	51590000	51290530	99
Supporting projects of Jordan Atomic Energy Commission	8465000	8465000	100
Establish of Public Service Office	545000	520610	96
Oil Shale Drilling	700000	472835	68
The administrative project	5738000	5364544	94
Total	118278000	116884027	99

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