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Ministry of Energy and Mineral Resources

Energy Policy
Country Report/ Jordan

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Japan

2nd of June 2015

Outline

- Jordan
- Challenges facing the Energy Sector in Jordan
- The effects of the energy crisis in Jordan
- Jordan National Energy Strategy Plan (2007-2020)
- Energy Resources in Jordan
- Jordan Energy Policy
 - Short-Term Solutions
 - Medium and Long Term Solutions
- Primary energy mix according to the National Energy Strategy 2007-2020

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JORDAN

Jordan

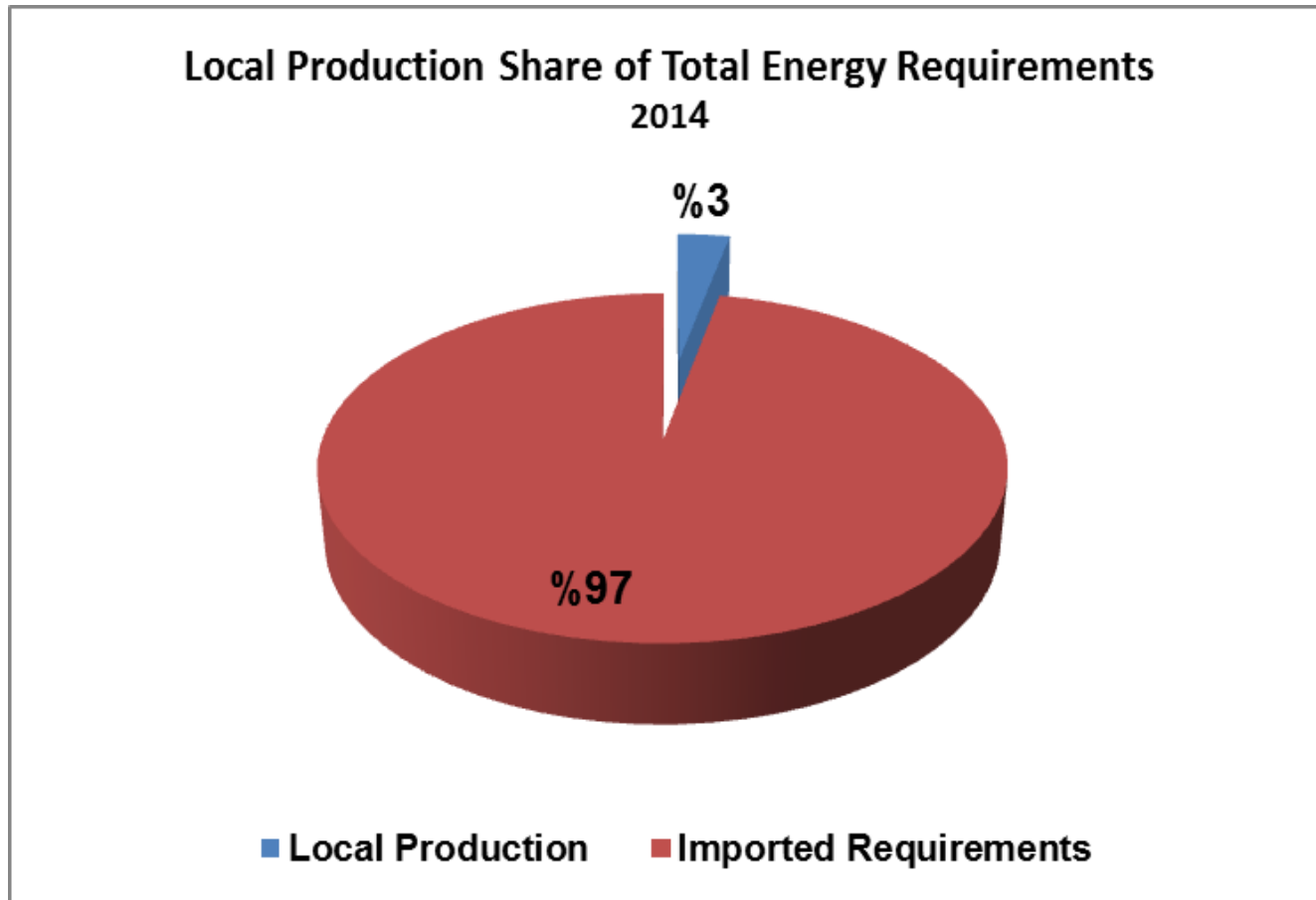
Total Population of Jordan is **6.653.000** (according to 2014 estimates) in addition to that **Jordan hosted** 2.070.973 Palestinian refugees (UNRWA); 2.5 million refugees from Syria; 750.000 refugees from Iraq; 1 million labors from Egypt & 700.000 labors from Sri Lanka & others.

Total area	89.318 sq. km, of which 88.778 sq. km is land area
GDP at current price	35.877 million US\$
GDP per Capita	5.395 US\$
Energy Consumption /Capita	1272 kgoe
Electricity consumption/Capita	2318 KWh
Population under supply	99.9%
Primary energy consumption	8461 Thousand Toe
Final energy consumption	5507 Thousand Toe
Electricity generation	16595 GWh (2012); 17261 GWh (2013)
Electricity Consumption	15418 GWh
Local crude oil and oil products production	97 Thousand Toe
Cost of Consumed Energy	6.3 billion US\$

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Challenges facing the Energy Sector in Jordan

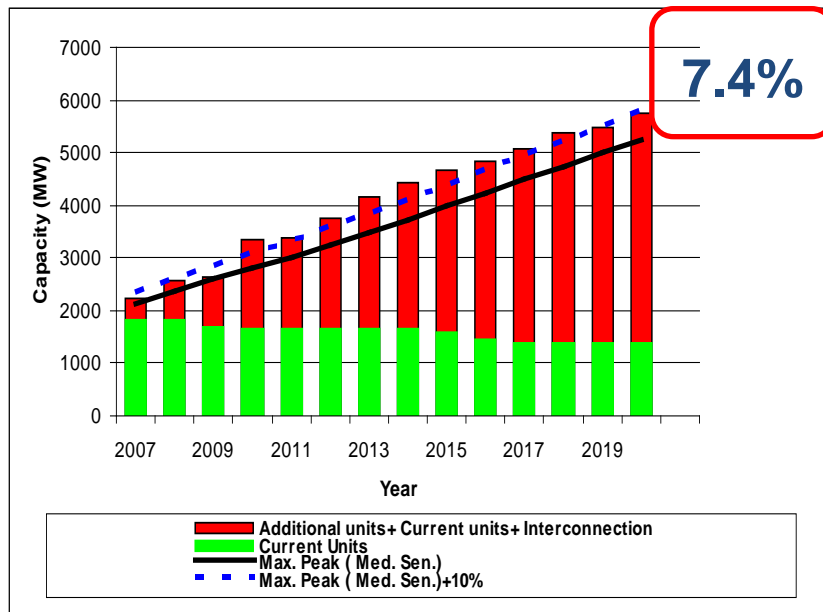
1. Jordan is lacking conventional sources of energy; the country needs to import almost (97%) of its fuel needs.



2. Jordan witnesses high growth of energy demand.

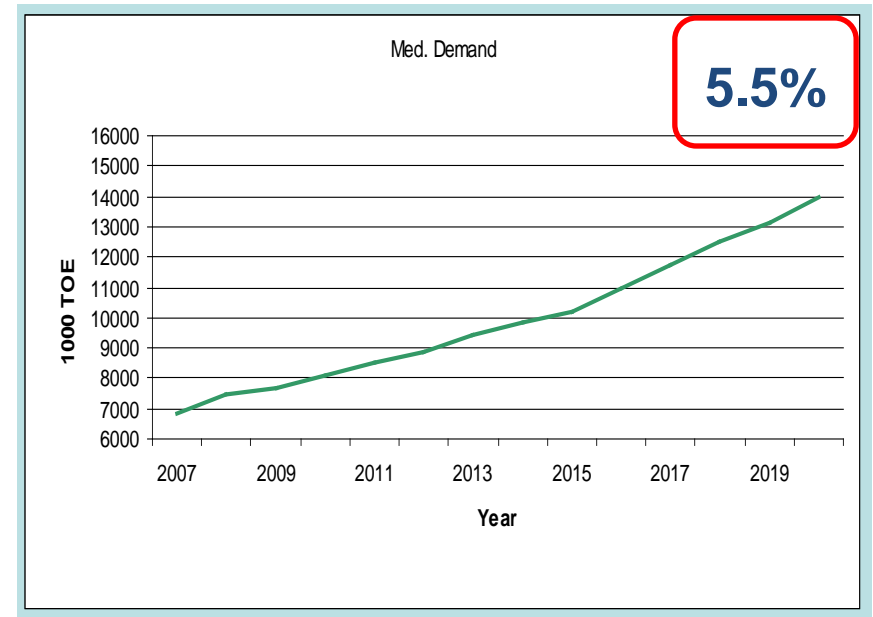
Period	Electricity Demand Growth (%)	Primary Energy Demand Growth (%)
2008-2020	7.4	5.5

Electricity Generated Capacity to meet Future Demand.



The additional generated capacity needed up to 2020 is 4000 MW, an average of 300 MW per year.

Growth of Primary Energy Demand

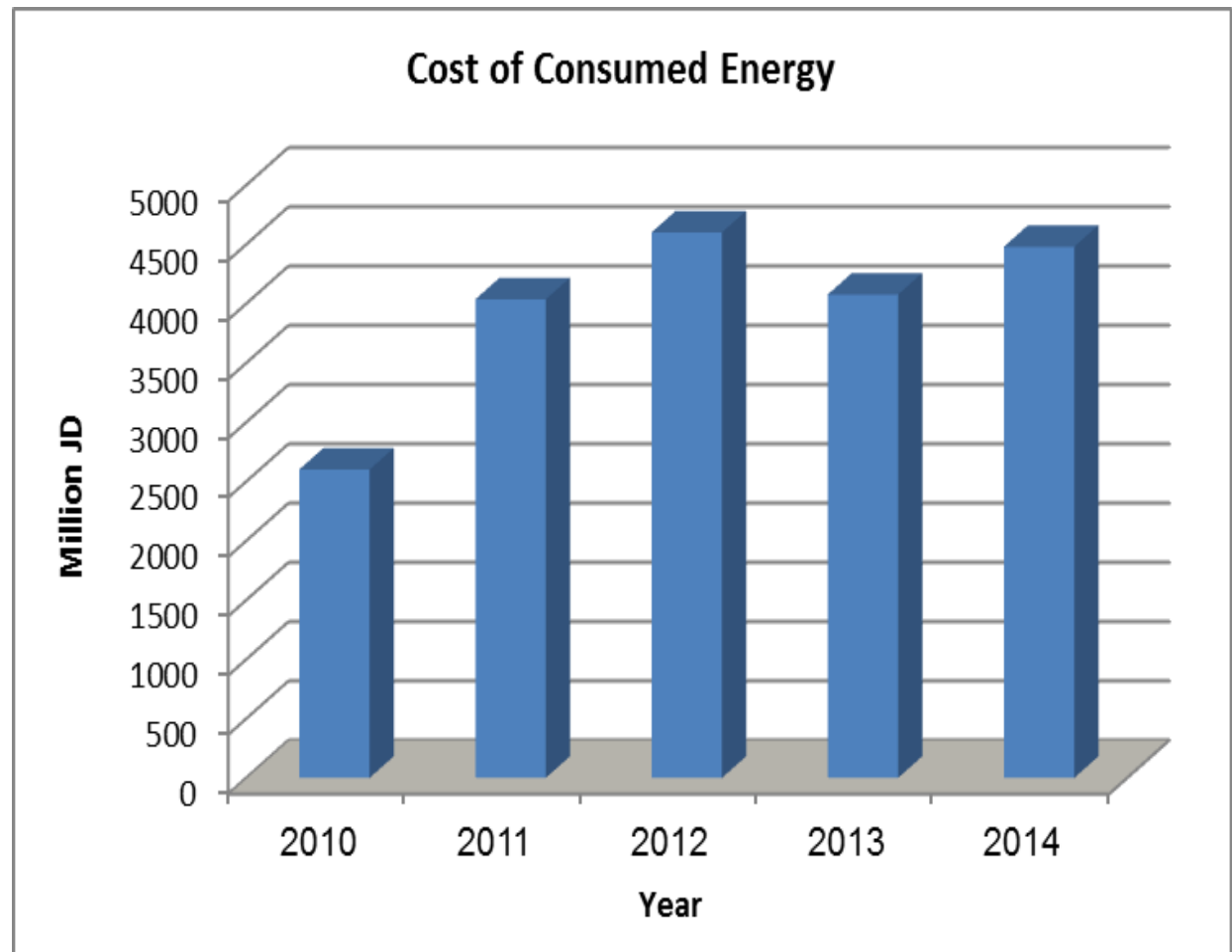


The expected demand for primary energy amounts is 15 million tons of oil equivalent in 2020 compared to 7.5 million tons of oil equivalent in 2008.

3. The cost of consumed energy is steadily increasing.

In 2014: it reached 4480 million JD (6.3 billion US\$), accounting for 18% of GDP.

Year	Million JD
2010	2600
2011	4036
2012	4600
2013	4076
2014	4480



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The effects of the energy crisis in Jordan

1. The heavy burden of energy costs on the Jordanian economy. (\$1 increase in barrel of oil internationally reflects the Jordanian economy about US\$40 million a year).
2. Imported energy consumes 28% of the GDP value (accounted to US\$ 6.3 billion in 2014).
3. Government subsidy for petroleum products and electricity reached nearly US\$ **2.5 billion**.
4. The provision of necessary funding for investment in the development of energy industry and its installations within time frameworks to meet energy needs (Jordan needs US\$18 Billion investment in the energy sector by the end of 2020).
5. Energy crisis has negative impact on social life. (Poverty, unemployment, poor income distribution and lack of sense of social justice).

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Jordan National Energy Strategy Plan (2007-2020)

The National Energy Strategy 2007-2020 was adopted to face energy challenges that has set as following:

- Diversifying the energy resources.
- Increasing the share of the local energy in the energy mix.
- Reducing the dependency on imported oil.
- Enhancing environmental protection.

The main goals of the National Energy Strategy will be achieved through:

- Maximizing the utilization of domestic resources (Oil shale, natural gas, etc.)
- Expanding the development of renewable energy projects
- Generating electricity from nuclear energy

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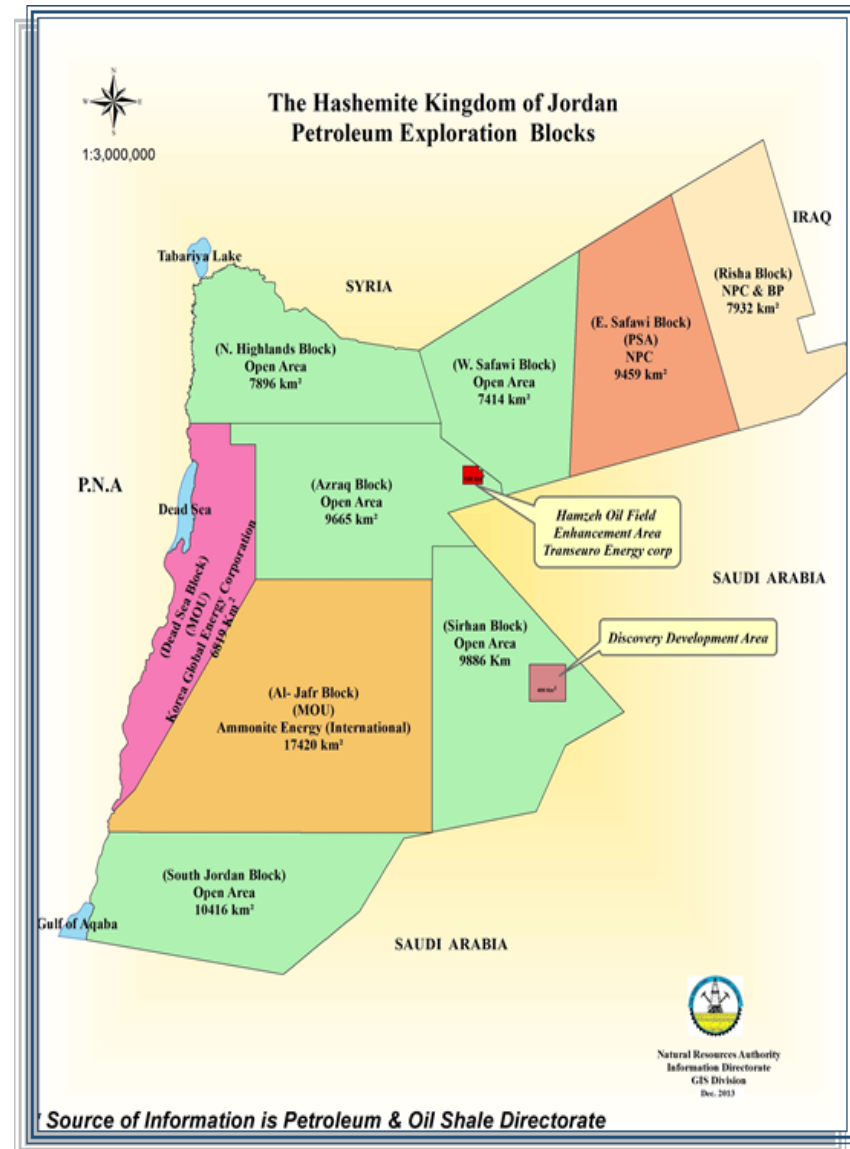
Energy Resources in Jordan

Jordan lacks conventional energy resources and imports the vast majority of its energy.

1. Jordan has potential of **Oil and Gas** exploration but has not been explored yet.
2. Jordan has a huge potential of energy resources such as **Oil Shale and Uranium**
3. Jordan has a huge potential of **Renewable Energy** utilization
 - mainly **wind** and **solar** energy;
 - Pilot projects of **biogas** and
 - Limited and infeasible (in terms of generating electricity) **geothermal energy** resources.

Oil and Gas

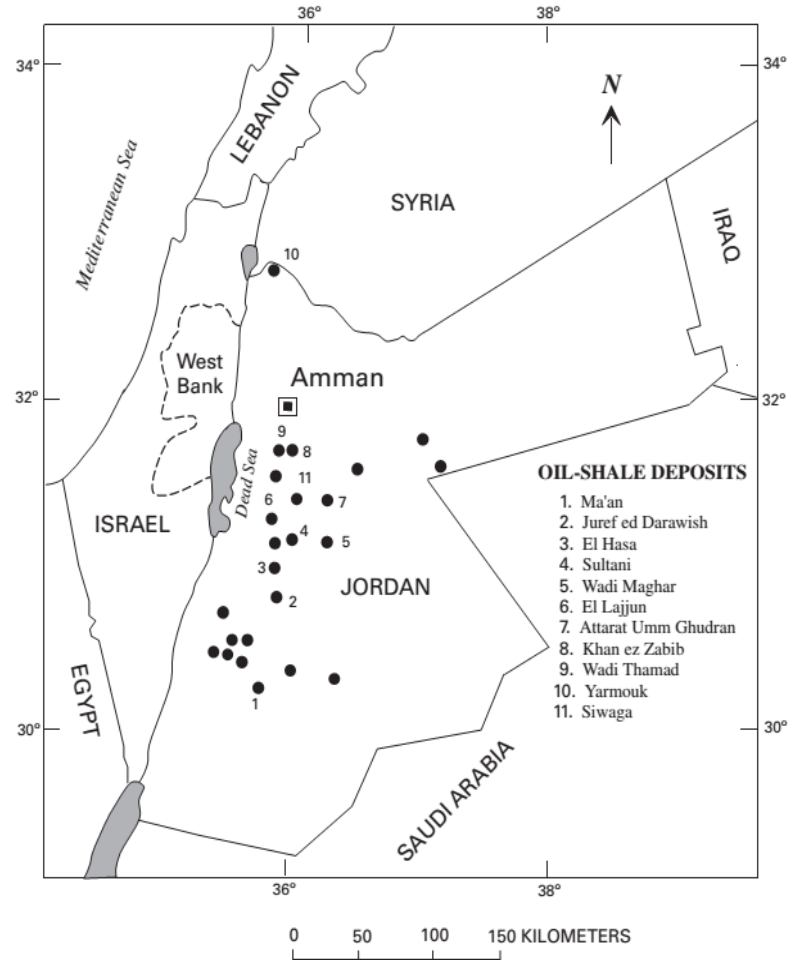
- Small deposits of non-commercial Crude Oil were discovered in Jordan, produces 20 barrels/day only.
- Currently, Jordan produces 15 million cubic feet of gas daily from Al Risha field/ NE of Jordan. This gas used to run the 150-MW Al-Risha gas turbine station.
- The Government is searching for more crude oil and natural gas.
- Jordan is divided into nine exploration blocks as displayed in the Figure.



Oil Shale

- Jordan possesses a very large energy resource in its vast reserves of oil shale; it ranked as the fourth country in the world.
- The Government through the Ministry of Energy and Mineral Resources is currently engaged with a three-track approach to deal with Oil Shale development:

- (1) Deep Oil Shale Reserves
- (2) Surface Reserves and
- (3) Direct burning of oil shale for Power Generation



Current status of oil shale investment projects

• Concession Agreements

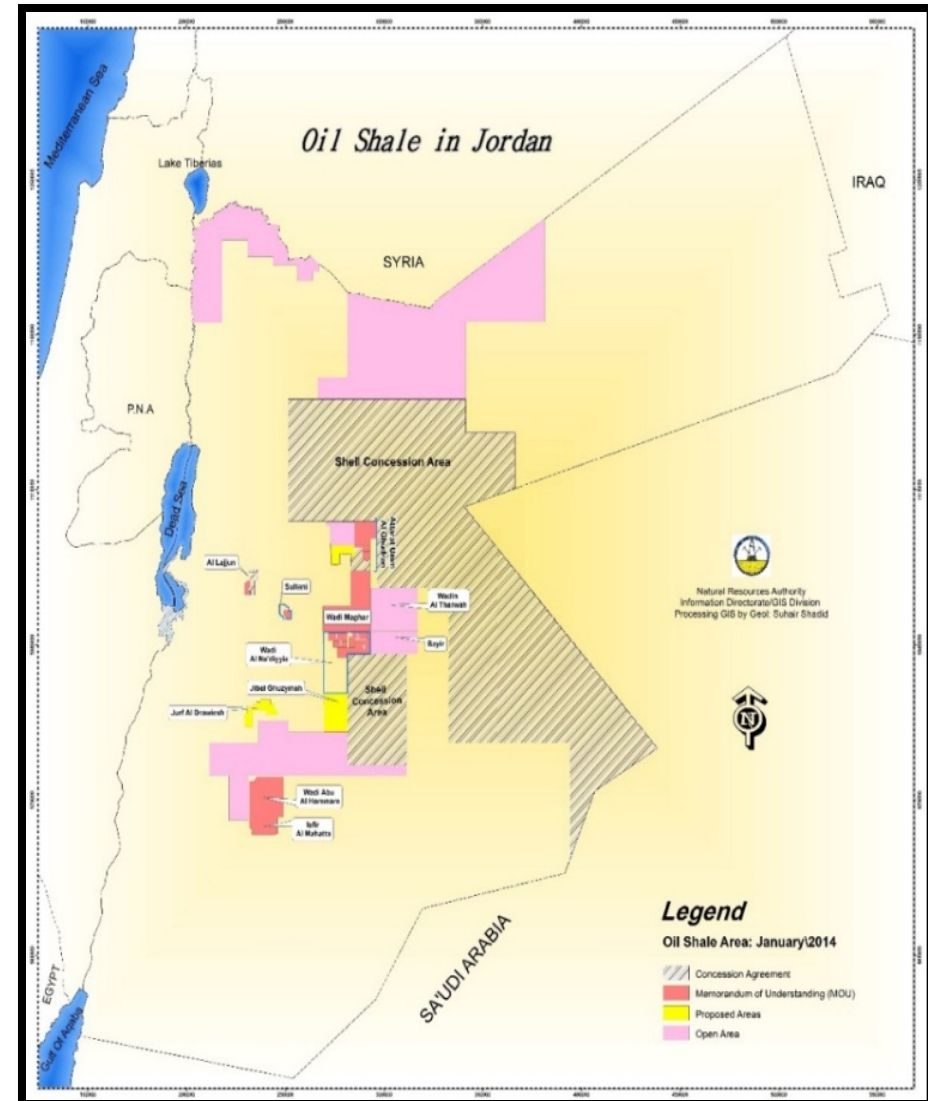
The GOJ represented by MEMR signed three Concession Agreements. These companies are:

- In-Situ Process with JOSCo (Shell Project)
- Oil shale Surface Retorting with Jordan Oil Shale Energy (JOSE)
- Oil shale Surface Retorting with Karak International Oil psc (KIO)
- Saudi Arabian Corporation for Oil Shale (SACOS)

• Memoranda of Understanding

The GoJ represented by MEMR signed seven Memoranda of Understanding with national and international companies who are interested in the oil shale mining and development investment, in different areas of the Kingdom. These companies are:

1. Aqaba Petroleum Company for Oil Shale (APCO)
2. National Company for the production of oil and electric power from Jordanian oil shale (JOSECO)
3. Al-Lajjun Company
4. Global Oil Shale Holdings (GOSH)
5. Whitehorn Resources Inc.
6. Fushun Mining Group
7. Al Qamar for Energy and Infra Structure



Uranium

- Uranium is not yet used in Jordan to produce electricity. The Jordanian Atomic Energy Commission (JAEC) was established in 2008 in order to introduce the peaceful uses of nuclear energy and radiation to the kingdom and developing its sustainable use to generate electricity.
- Project Development Agreement (PDA) was signed by JAEC and Rasatom Overseas (RAOS) and approved by the Cabinet of Ministers of Jordan on September 22nd, 2014, to generate a Net-Output of 2 X 1000 MW.

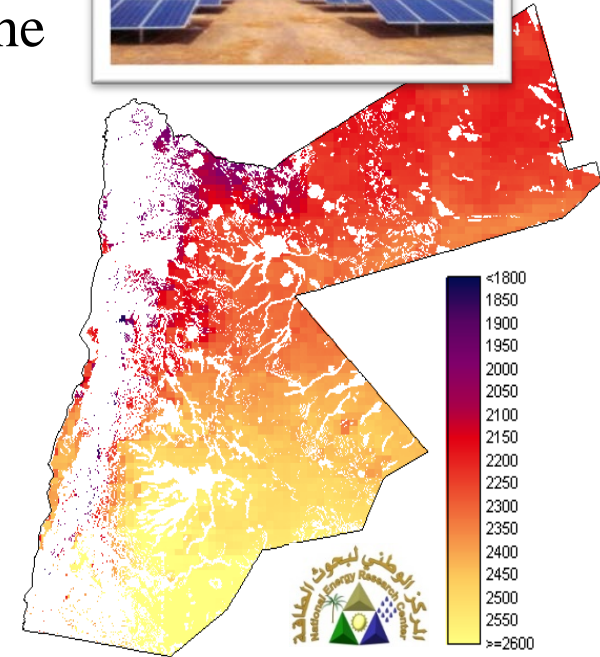


Renewable Energy

- ✓ Jordan has great potential sources of renewable energies with particular reference to the solar energy and wind energy.
- ✓ A target of 10% renewable energy input into the energy mix by 2020 is set in the National Energy Strategy, mainly aiming for about 1200MW of Wind and 600MW Solar.
- ✓ To achieve this target:
 - The Renewable Energy and Energy Efficiency Law passed as a permanent Law in 2012 and amended in 2014.
 - This law, the first in the region, allows investors to identify and develop grid-connected electricity production projects through the so called unsolicited or direct proposal submission.
 - The Jordan Renewable Energy and Energy Efficiency Fund has been established, which aims to channel financial resources to that end.
 - A well-founded reference price list (ceiling prices) for different Renewable technologies was set by the EMRC .
 - Net- Metering for small RE Systems (Roof Tops) with Fixed Purchase Prices for Excess Power.
 - Tax Incentive regime, a By-Law was issued on Tax exemptions for RE and EE systems and Equipment.
 - Grid Expansion and Reinforcement Plans are ongoing.

SOLAR ENERGY

Jordan is located within the Sunbelt where the intensity of direct solar radiation is (5-7) kWh/m².



Under Execution

- Two Solar PV projects with total capacity of (5) MW have finished construction at Azraq in cooperation with the Spanish Government, and currently under commissioning (EPC basis).
- Solar PV project of (10) MW capacity in Mafrag area to be connected to the distribution network, to be operational in July 2015 (BOO basis).
- 12 PV projects agreements of solar cells to generate electricity, with total capacity of (200) MW mostly in Ma'an area was signed between the GOJ and private companies / Direct Proposal Submissions – Stage I, to be operational at the beginning of 2016 (BOO basis).

Under Process

- 4 Solar PV projects with total capacity of (200) MW/ Direct Proposal Submissions – Stage II, proposals under evaluation (BOO basis).
- Solar PV Project at Quweira/Aqaba (65-75 MW), funded through the Gulf Grant (Abu Dhabi Fund, USD 150 million), under re-bidding process.

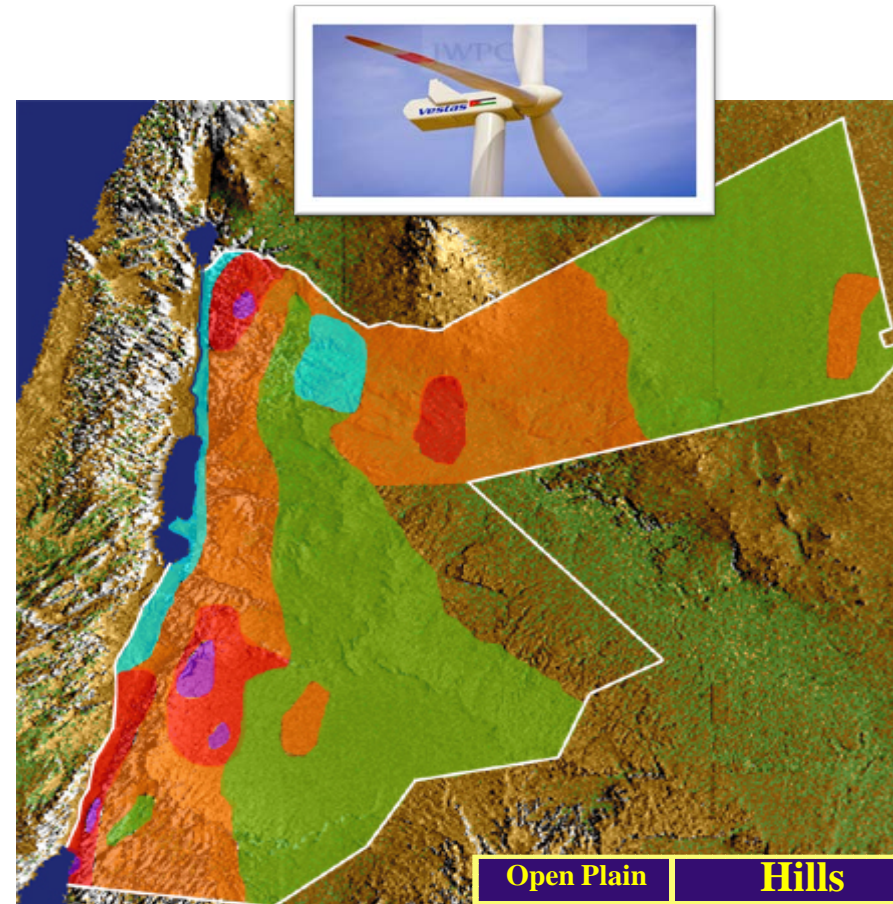
WIND ENERGY



Wind speed in specific areas ranges between (7-9) m/s; the data is promising to utilize renewable energy to generate electricity in Jordan.

Two commercial wind projects in progress as follows:

Under Execution

- I. Tafila wind project of **(117) MW capacity**, to be operational in September 2015 (BOO basis); and 205 JD millions of investment with Jordan Wind Project Company (JWPC).
- II. as well as **(66) MW capacity** Wind project at Ma'an, funded through the Gulf Grant (the Kuwaiti Fund, USD 150 million), to be commissioned by the end of 2015 and operational by March 2016 (EPC basis).



	Open Plain	Hills
	>7.5 m/s	>11.5 m/s
	6.5-7.5m/s	10-11.5m/s
	5.5-6.5m/s	8.6-10m/s
	4.6-5.5m/s	7-8.6 m/s
	< 4.5 m/s	< 7.0 m/s



Under Process

- I. 4 Wind projects with total capacity of **(230) MW capacity/** Direct Proposal Submissions – Stage I, under negotiation (BOO basis).
- II. Wind project at Fujeij of **(90) MW capacity/** Direct Proposal Submission, under negotiation (BOO basis).

Biomass/Biogas/Biofuels

Most viable resource for biogas in Jordan is municipal solid waste.

□ Resources:

- Resources are available.
- The amount of municipal solid waste is fast growing.

□ Past & on-going activities:

- A pilot plant using municipal solid waste of 3.5 MW in operation since 2000.
- Pilot projects for the cultivation of *Jatropha curcas* underway throughout the Kingdom to help identify the most suitable areas and the feasibility of large scale cultivation (Biofuels production).

Geothermal Energy

Geothermal

- Hot and geothermal springs do exist, found to have low enthalpy and could not support commercial power development ([West Japan Engineering Consultants, Inc.](#) 2007).
- Deep drilling is required for further investigations and feasibility of commercial projects.

Hydropower

Hydropower

- Resources are very limited.
- **Around 10 MW installed power.**
- **Red - Dead Seas Project (400-800 MW)**

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Jordan Energy Policy

One of the most important policies of energy sector in Jordan **is to increase the local energy resources contribution to the total energy mixture**, through improving the local sources available and searching for new sources in order to realize the energy supplies-related security and bring such contribution up to 39% in 2020.

Short-Term Solutions

- Increase the country's strategic oil and oil products storage capacity and development of infrastructure projects
- Construction of LNG Jetty at Aqaba port.

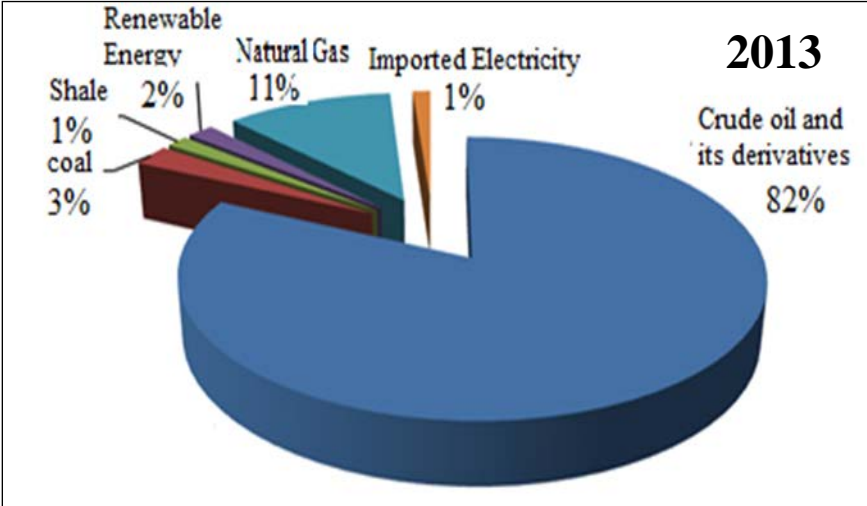
Medium & Long Term Solutions

- Continue the implementation of the country's energy strategy

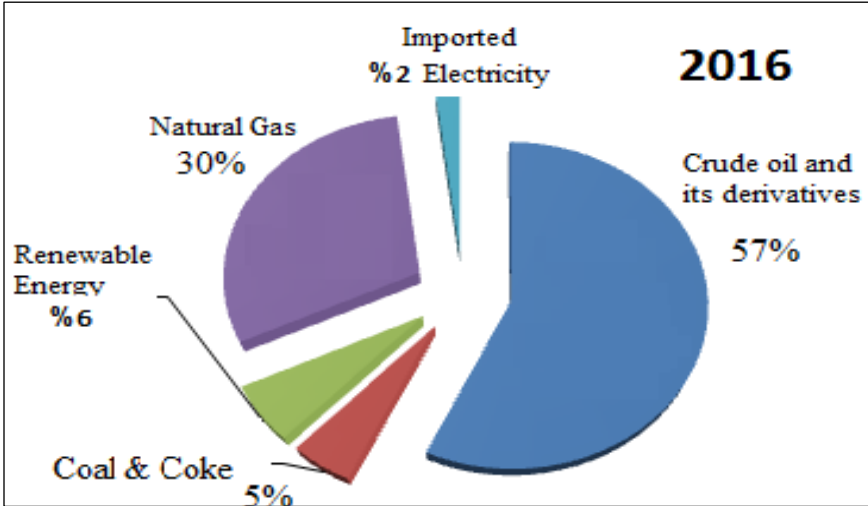
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The primary energy mix according to the National Energy Strategy 2007-2020

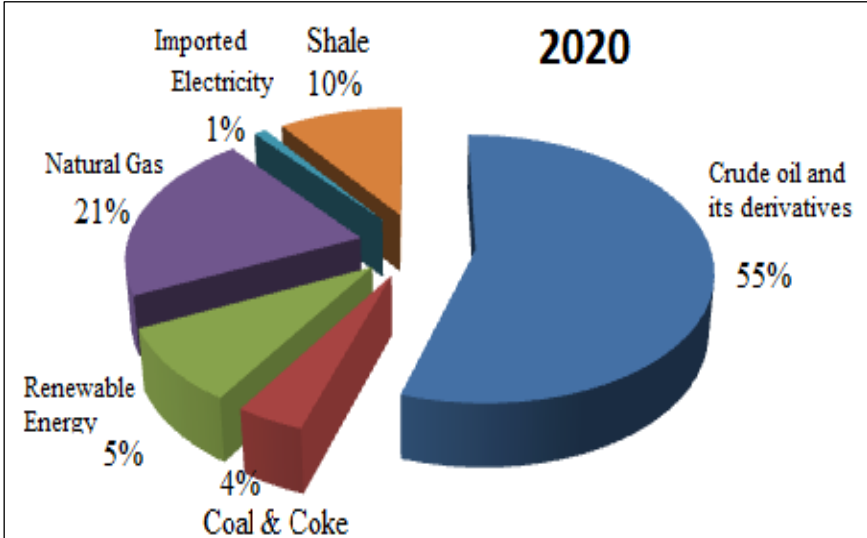
In 2013: Local Energy 3.0% & Imported Energy 97.0%



In 2016: Local Energy 9.0% & Imported Energy 91.0%



In 2020: Local Energy 22.0% & Imported Energy 78.0%



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Thank you

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