Jordan Energy Strategy for 2015-2025

The energy strategy for 2015-2025 was formulated and approved in order to face the energy sector challenges through achieving the following main goals:

❖ **Diversification** of energy forms from local sources by:
  ✓ Increase local energy portion in total **energy mix** such as Oil Shale (>70 billion ton of surface reserve), **Uranium** for nuclear energy (> 65,000 ton of reserve), **Solid Waste** and **Renewable Energy** sources (**Wind** and **Solar**).

❖ Continue the Conventional **Oil** and **Gas** exploration program.

❖ Decrease **dependency** on imported energy

❖ Raise **Energy Consumption Efficiency**
Enhancing the Environment Protection in energy projects and establishing the proper relative regulations.

Enhance Regional Connectivity for energy as Jordan is considered to be a hub and transit country for linking oil, gas and electricity networks among the region.

Formulating the legal and regulatory frameworks for the energy sector.

Achieve the security of supply of oil derivatives and natural gas for 2015-2025.

CO2 emissions: Jordan is a Non Annex 1 country in the Kyoto Agreement and strongly committed to mitigate climate change impacts according to Paris Agreement, it has no implications on the greenhouse gas emissions and can benefit from Carbon credits.
Energy Challenges in Jordan

Major current challenges encountering the energy sector in Jordan:

✓ High dependence on imported fuel (97%)
✓ Limited domestic energy sources
✓ National Budget Stress
✓ High Capital needed for sustainable and energy investment projects by foreign investments.
✓ Volatile oil prices in the international oil market
✓ Geopolitical conflicts and regional instability have contributed in reducing interest and appetite in investing in the Middle East Region.
✓ Continuous increase in energy demand due to the high growth of population and demographics changes and the late refugees crisis:
  • Refugees from Arab Spring Countries account to about 30% of the total population according to 2015 statistics, 1.3 million from Syria only.

Population growth rate is 5.3% from 2004 -2015, 3.1% for Jordanians and 18% for non-Jordanians), 4 millions in the Capital Amman.
Oil Shale in the World

• The largest Oil Shale resources are in the USA, Brazil, Jordan, China, Israel, Sweden, Syria, Thailand, Turkey, Russia and Morocco; 72% of the world's reserves are to be found in the USA.
• In USA there is a considerable interest in the US and several research and Pilot projects are underway in Colorado and Utah.
• Oil Shale is a sedimentary rock that contains an organic material called Kerogen that can be heated, separated from the rock, processed and turned into liquid shale oil that must be treated and refined into Diesel and Jet Fuels and other Petroleum Derivatives.

• The Government is currently adopting a three-track approach to handle Oil Shale resource exploitation:
  • 1- In Situ for the deep Oil Shale to produce oil.
  • 2- Surface Retorting for the mined Oil Shale to produce oil.
  • 3-Direct Burning of Oil Shale for Electricity Generation.
Concession Agreements for Oil Production

1- Jordan Oil Shale Company (Dutch Shell)
The Concession Agreement was ratified in 2009 / In Situ Process

2- Jordan Oil Shale Energy (Estonian/Malaysian/Jordanian)
The Concession Agreement was ratified in 2010 / surface mining.

3- Karak International Oil (British/Australian)
The Concession Agreement was ratified in 2011 / surface mining.

4- Saudi Arabian Corporation for Oil Shale (Saudi)
The Concession Agreement was ratified in 2014 / surface mining

Memoranda of Understanding to produce oil by Surface Mining

1- Shale Energy (JOSECO)/ National Company / surface mining

2- Global Oil Shale Holdings (GOSH)/ Canadian / surface mining

3- Al Qamer for Energy and Infrastructure / Indian / surface mining

4- Questerre Energy Company/ Canadian/ surface mining

5- Al Lajjun for Oil Shale and Mineral Resources / surface mining

Ministry of Energy and Mineral Resources
Overview of the Oil Shale Power Project

Open Cast Oil Shale Mine
- 10m tonnes oil shale per year - JORC Resource/ 10mm feed size

Mine Mouth Oil Shale Fired Power Station
- 2 x 235 MW net COD: 38 months / 42 months

40 year Power Purchase Agreement / 470MWe
- 3.8 Mm³/year of water

Investment Total: $2.2bn

Employment of more than 1000 permanent jobs
Oil and Gas in Jordan

1. The Kingdom was divided into ten (10) exploration blocks and two development blocks (Hamza oil field and Sirhan 4 block).

2. The Government has signed a Concession Agreement with the NPC to develop Risha gas production in 1996, the field produces gas with an average of 10 mmscf/day.

3. Government signed with NPC a Production Sharing Agreement “PSA” to explore the East Safawi Block.

4. The Hamza oil field in the Azraq area produces an average of 10 barrels/day since 1985, the field is under evaluation processes in order to investigate the potentiality of raising the production capacity.

5. Marketing of six open oil blocks, tenders were launched in early 2018 and qualified companies were invited to enter bids for the six blocks.

6. Other oil occurrences in Jordan were identified in the Sirhan Block (well WS-4), Northern Highlands Block (well NH -2) and Dead Sea Block (well AH).
New Blocks Delimitation and Potentiality

Available: wells & “seismic data 2D & 3D”
The Ministry of Energy and Mineral Resources
“The 4th Jordan International Oil Shale Symposium”
“JIOSS 2019”
October 2019 in the Dead Sea area/ Jordan
Natural Gas

1- The Jordan Gas Transmission Pipeline (JGTP)

- In 2004, the Government of Jordan signed a license agreement with Jordanian Egyptian FAJR Co. to implement The Jordan Gas Transmission Pipeline (JGTP), started operation in 2006.
- The Power plants in Jordan were dependent on more than 85% on gas imported from Egypt.
  - Since 2011, the Arab Gas Pipeline has been attacked in Egypt on several times and caused shortage of natural gas supply from Egypt.
The Average daily imported Natural Gas over (2005-2015)

<table>
<thead>
<tr>
<th>Year</th>
<th>MMscf/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>124.0</td>
</tr>
<tr>
<td>2006</td>
<td>187.0</td>
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<td>2007</td>
<td>229.0</td>
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<td>2008</td>
<td>262.0</td>
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<td>305.0</td>
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<td>2010</td>
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<td>2012</td>
<td>56.6</td>
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<tr>
<td>2013</td>
<td>84.0</td>
</tr>
<tr>
<td>2014</td>
<td>21.4</td>
</tr>
<tr>
<td>2015</td>
<td>21.7</td>
</tr>
</tbody>
</table>
2- Jordan LNG Project

- **Jordan LNG Terminal at Aqaba** has started commercial operation in 2015.
- The Project has been connected with the Jordan Gas Transmission Pipeline”JGTP” to supply Jordan with its needs of natural gas.
- The National Electric Power Company (NEPCO) has signed 3 contracts with **Shell International** for supplying **LNG** to Jordan with 150 MMscf/d for each contract.
- In 2017, the LNG was contributed more than 87% in electric power generation.

Ministry of Energy and Mineral Resources
The Jordan LNG project is structured as four separate parts:

- Jordan Gas Transmission Pipeline
- LNG Supply
- Aqaba Terminal Infrastructure
- Floating Storage & Regasification Unit
The average daily imported LNG over (2015–2017)

<table>
<thead>
<tr>
<th></th>
<th>from 2nd half of 2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMscf/d</td>
<td>318</td>
<td>335</td>
<td>347</td>
</tr>
</tbody>
</table>
3- Development of the Risha Gas Field

- The National Petroleum Company (NPC) has been granted the Risha Gas Field Concession in 1996 for 50 years.
- Risha Gas Field average current production is 10 MMscf/d.

The average daily production from the Risha Gas field over (2003-2017)
Crude Oil and Oil Derivatives

The Government aimed to achieve security of supply of oil derivatives and enhance competition in the sector through:

1- Licensing **three oil marketing** companies (OMCs) to import and trade of petroleum products.

2- Establishing the “**Jordan Oil Terminals Company**” JOTC to be responsible of the strategic reserves and providing the logistic storage and import handling services.

3- Oil and Oil products Storage Terminals:

   - **Aqaba Oil** Terminal (100 thousand tons)
   - **Aqaba LPG** Terminal (6 thousand tons)
   - **Amman Strategic Reserve** Terminal (340 thousand tons of light oil products & 16 thousand tons of LPG)
Regulatory Framework

Petroleum Products Structure

Ministry of Energy & Mineral Recourses “MEMR”

Energy and Minerals Regulatory Commission (EMRC)

Jordan Oil Terminals Company “JOTC”

Global Market

JPRC “Refinery”

Jordan Total

Manaseer

JPPMC

Gas Stations

Big Consumers

End Users

Setting regulations & overall process Control

Regulate - audit - Issue Licenses & Pricing

Provide strategic reserve & Handle petroleum products

Ministry of Energy and Mineral Resources
Future Projects

▪ The North Gas Pipeline Project: The Gas Sale and Purchase Agreement (GSPA) was signed in 2016 between The National Electric Power Company (NEPCO) and Noble Energy to supply Jordan with 300 MMscf/d natural gas. The commercial operation of the project will start by early of 2020.

▪ The Iraq Jordan Export Pipeline Project is to facilitate the export of (1) million barrels/day of Iraqi crude oil. The Project Path will be in Iraq Territory from Al Basrah – Najaf through an EPC contract, and from Najaf – Aqaba will be implemented on BOOT basis.

▪ Upgrade Jordan Petroleum Refinery Company for the fourth expansion project.
Facts and Figures
## General Indicators

<table>
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<tr>
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<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<tr>
<td>Population (000)</td>
<td>6530</td>
<td>6650</td>
<td>6514</td>
<td>9798</td>
<td>10053</td>
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<tr>
<td>GDP (Million JD) at current price</td>
<td>23852</td>
<td>25437</td>
<td>26637</td>
<td>27445</td>
<td>28449</td>
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<tr>
<td>GDP Per Capita (JD)</td>
<td>3653</td>
<td>3825</td>
<td>4089</td>
<td>2801</td>
<td>2830</td>
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<tr>
<td>Primary Energy Consumption Per Capita (kgoe)</td>
<td>1249</td>
<td>1272</td>
<td>1373</td>
<td>981</td>
<td>996</td>
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<td>Electricity Consumption Per Capita (kwh)</td>
<td>2235</td>
<td>2318</td>
<td>2483</td>
<td>1701</td>
<td>1748</td>
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<td>Year</td>
<td>Crude Oil and Oil Products</td>
<td>Coal</td>
<td>Pet Coke</td>
<td>Natural Gas</td>
<td>Renewable Energy</td>
</tr>
<tr>
<td>------</td>
<td>---------------------------</td>
<td>------</td>
<td>----------</td>
<td>-------------</td>
<td>------------------</td>
</tr>
<tr>
<td>2013</td>
<td>6689</td>
<td>204</td>
<td>116</td>
<td>907</td>
<td>145</td>
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<tr>
<td>2014</td>
<td>7479</td>
<td>332</td>
<td>88</td>
<td>301</td>
<td>152</td>
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<tr>
<td>2015</td>
<td>6331</td>
<td>161</td>
<td>165</td>
<td>1944</td>
<td>160</td>
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<tr>
<td>2016</td>
<td>5327</td>
<td>220</td>
<td>182</td>
<td>3389</td>
<td>412</td>
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<tr>
<td>2017</td>
<td>5671</td>
<td>165</td>
<td>148</td>
<td>3510</td>
<td>515</td>
</tr>
</tbody>
</table>

**Primary Energy Consumption 2017**

- Crude Oil and Oil Products: 57%
- Natural Gas: 35%
- Renewable Energy: 5%
- Imported Electricity: 0%
- Coke: 1%
- Coal: 2%

Ministry of Energy and Mineral Resources
<table>
<thead>
<tr>
<th>Year</th>
<th>Crude Oil (kt)</th>
<th>Natural Gas (BCF)</th>
<th>Contribution of Domestic Production of Oil and Natural Gas to the Overall Energy Consumption (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>1.0</td>
<td>5.3</td>
<td>2.1</td>
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<tr>
<td>2014</td>
<td>0.8</td>
<td>4.6</td>
<td>3.0</td>
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<tr>
<td>2015</td>
<td>0.5</td>
<td>4.3</td>
<td>3.0</td>
</tr>
<tr>
<td>2016</td>
<td>0.4</td>
<td>4.1</td>
<td>5.0</td>
</tr>
<tr>
<td>2017</td>
<td>0.3</td>
<td>3.6</td>
<td>6.0</td>
</tr>
</tbody>
</table>

**Local Production Share of Total Energy Requirements 2017**

- Local Production: 6%
- Imported Requirements: 94%
### Sector Distribution of Final Energy Consumption to 2013–2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Transport</th>
<th>Industry</th>
<th>Household</th>
<th>Others*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>2734</td>
<td>924</td>
<td>1109</td>
<td>617</td>
<td>5384</td>
</tr>
<tr>
<td>2014</td>
<td>2558</td>
<td>1079</td>
<td>1152</td>
<td>718</td>
<td>5507</td>
</tr>
<tr>
<td>2015</td>
<td>2811</td>
<td>991</td>
<td>1272</td>
<td>754</td>
<td>5828</td>
</tr>
<tr>
<td>2016</td>
<td>3184</td>
<td>1064</td>
<td>1342</td>
<td>826</td>
<td>6416</td>
</tr>
<tr>
<td>2017</td>
<td>3431</td>
<td>938</td>
<td>1549</td>
<td>950</td>
<td>6868</td>
</tr>
</tbody>
</table>

**Final Energy Consumption by Sector 2017**

- **Transport**: 49%
- **Industry**: 23%
- **Household**: 14%
- **Services & Others**: 14%
Contacts: Ghussina.alhilu@memr.gov.jo
          studies.ngp@memr.gov.jo