



Jordan's Renewable Energy Program

**Best Practices in Renewable Energy:
Policy Incentives and Enabling Environment**

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Ministry of Energy and Mineral Resources - Jordan



Main Challenges of Energy Sector in Jordan

- Almost no indigenous energy resources .
- High dependency on imported energy (95% import in 2010).
- High cost (The energy imports accounted for 13.3% of GDP in 2010).
- High growth of primary energy demand.

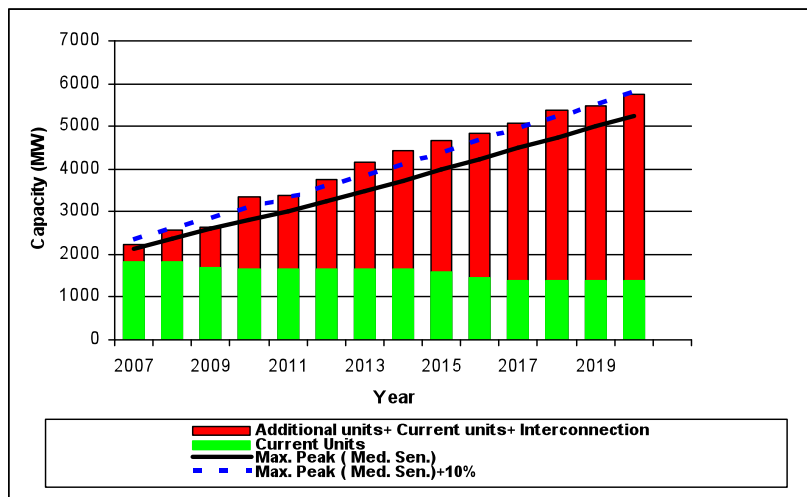


Energy Demand

Jordan witnesses high growth of energy demand

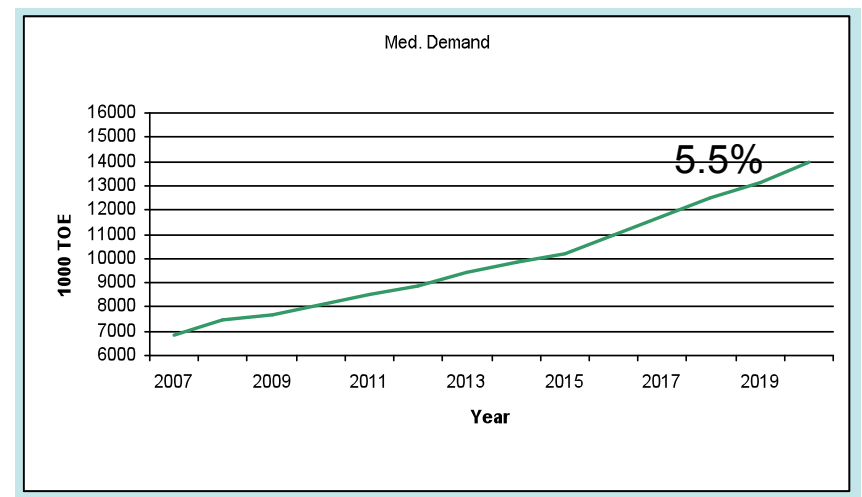
Period	Electricity Demand Growth (%)	Primary Energy Demand Growth (%)
(2008-2020)	7.4	5.5

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.



Energy Strategy (2008-2020)

MAIN GOALS :

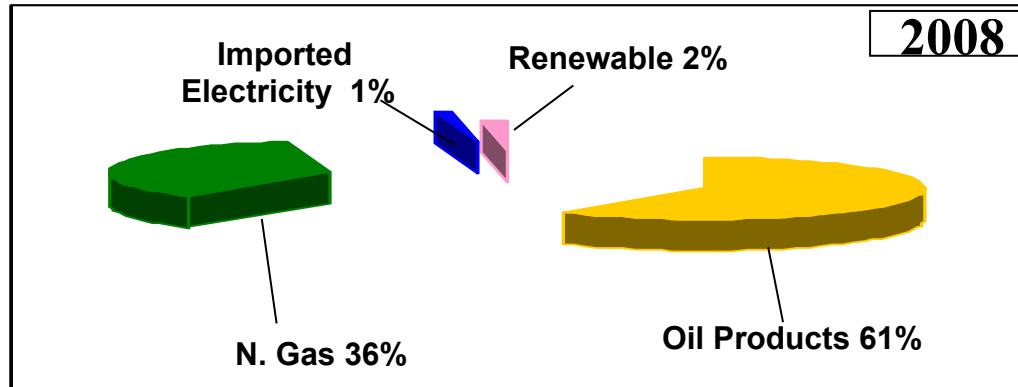
- Diversifying the energy resources.**
- Increasing the share of local resources in the energy mix.**
- Reducing the dependency on imported oil.**
- Enhancing environment protection.**

This will be achieved through :

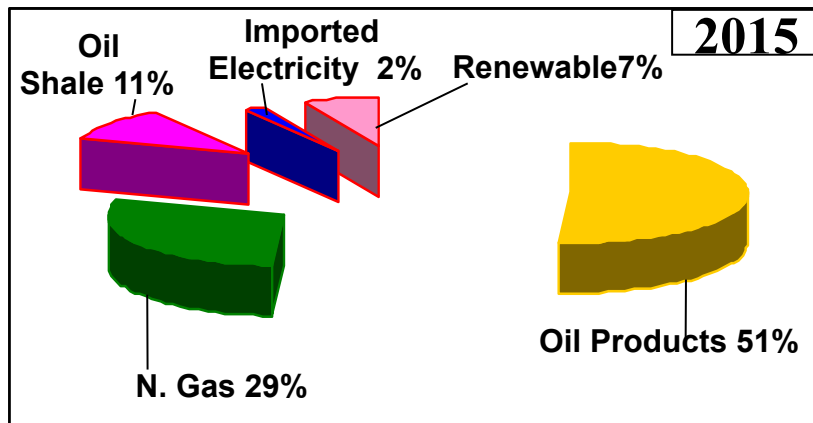
- Expanding the development of renewable energy projects.**
- Maximizing the utilization of domestic resources.**
- Promoting energy conservation and awareness.**
- Generating electricity from nuclear energy.**

Jordan's Energy Strategy for 2020.

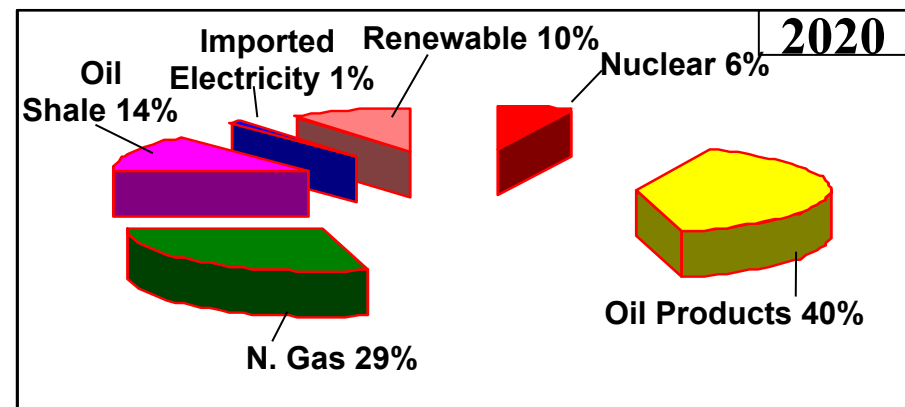
The Energy Mix in Jordan (2008 – 2020)



Domestic Resources 4%, Imported 96%



Domestic Resources 25%, Imported 75%



Domestic Resources 39%, Imported 61%



Renewable Energy Targets:

- Promoting the Renewable Energy Source to share 7% in the primary energy mix in 2015 and 10% in 2020 :-
 - ✓ 600 - 1000 MW Wind Energy.
 - ✓ 300 - 600 MW Solar Energy.
 - ✓ 30 - 50 MW Waste to Energy.



Renewable Energy and Energy Efficiency Law

Main Goals

- **Provide a legal mandate for the Government and a regulatory framework for RE and EE development.**
- **Encourage private-sector investment in RE.**
- **Diversify energy sources in Jordan.**
- **Reduce greenhouse gases.**
- **Develop in-country expertise related to RE and EE**
- **Establish a “Renewable Energy and Energy Efficiency Fund”**



Main Articles

- **Creates a registry of renewable energy sites.
(Develop a Land Use List for RE projects based on resource maps and measurements).**
- **Tendering of RE Projects:**
 - **Authorizes MEMR to issue public tenders on competitive basis for developing RE projects at specific sites in accordance with MEMR's development plan.**
 - **Permits unsolicited or direct proposals complying with certain conditions.**



- **Obligation to purchase renewable energy:**

All Energy Output from RE projects must be purchased pursuant to Power Purchase Agreements (PPA).

- **Interconnection and Licensing Incentives:**

NEPCO to interconnect and assume the costs of interconnection line between the project and the nearest substation.

- **Allow for the so-called “Net Metering”:**

small RE projects and residences having RE systems to sell power to the Grid at the same purchase price pursuant to instructions to be issued by ERC.



- **Establishing a Renewable Energy & Energy Efficiency Fund:**
 - provide good financial framework to support energy efficiency programs and renewable energy projects, to help achieve the targets set in the Energy Strategy; 10% renewable and 20% energy savings by 2020 .
 - Funding resources are annual Budget allocations and Foreign donation.
- **Allows for Bylaws to be issued for EE measures in different sectors.**



Undergoing Renewable Energy Activities

Direct Proposals Submission:

- In accordance with the Renewable Energy and Energy Efficiency Law provisions, the Government of Jordan (through MEMR) has sought expression of interest (EOI) from qualified investors interested in investment in renewable energy projects for power generation on build, own and operate (BOO) basis.
- On the submission date (July 28, 2011), MEMR has received 64 EOIs (37 interested in Solar Projects, 22 in Wind Projects, and 5 in other Renewables – Draft list has been published on MEMR website).
- These EOIs are currently under evaluation, where successful applicants will receive a Memorandum of Understanding from the Government which enables them to proceed with preparing their proposals for their proposed projects.
- The Government then selects the best projects subject to any financial affordability or technical constraints which may exist

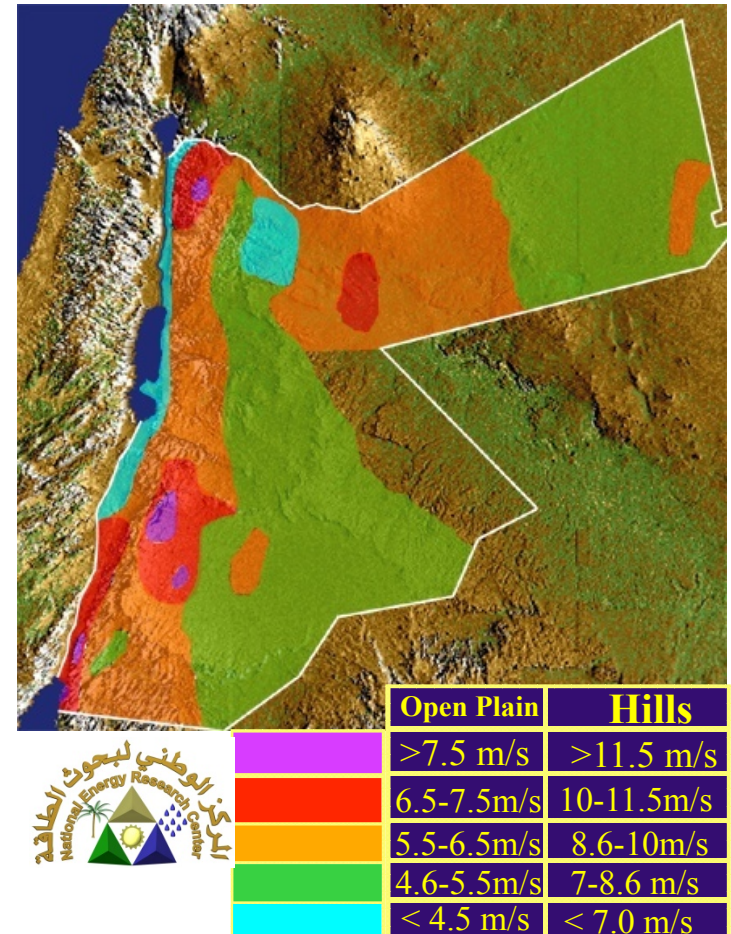


- Resources are available and attractive wind sites have been identified.
- More sites (about 15) are still under further measurements and investigation.
- Two commercial Wind Energy Projects are currently under the pipeline (tendering process):

- Al-Kamshah Wind Energy Project; under negotiation with the 1st ranked bidder.

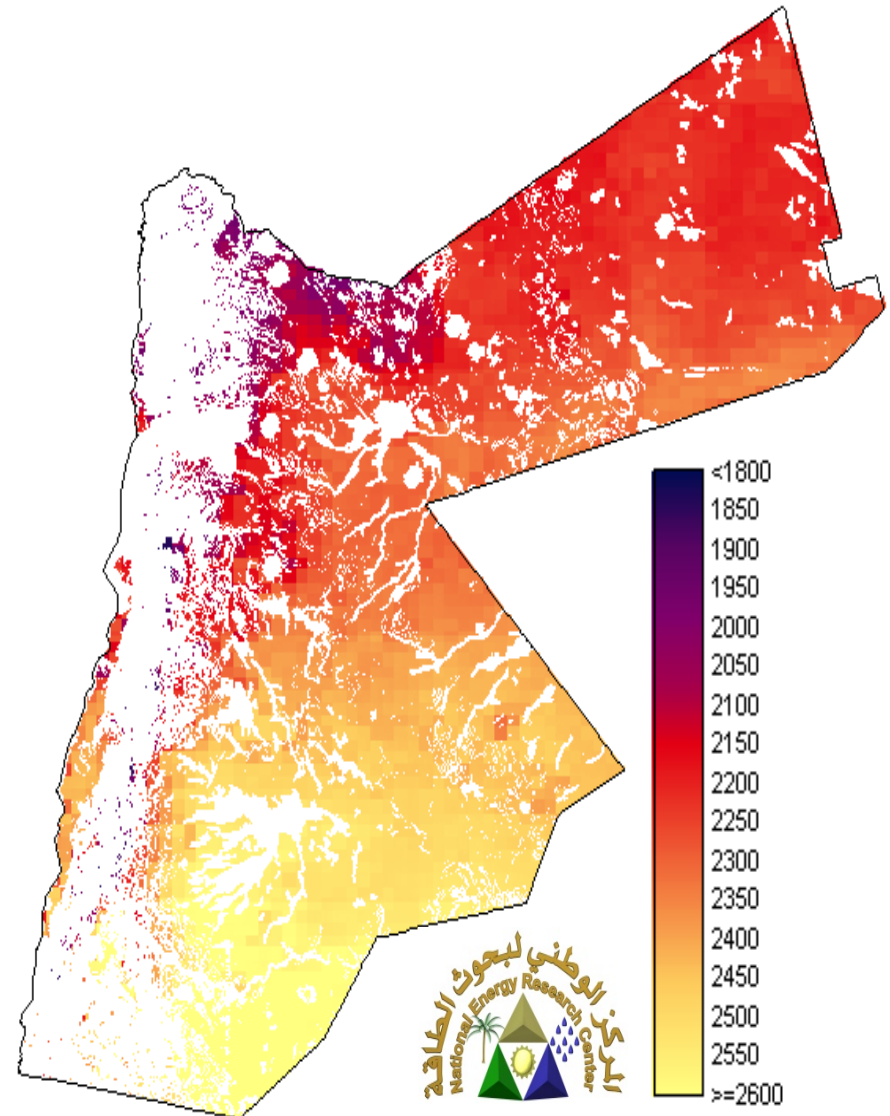
- Fujeij Wind Energy Project; 4 proposals have been received from 4 qualified firms and they are currently under evaluation.

Future projects are under consideration depending on the results of the measurement campaign.





- High solar radiation figures of 5 – 7 kWh/m² per day with about 300 sunny days per year.





Solar Power/ Cont'd...

- **Solar Water Heaters:** A financing scheme program is currently under development to increase the share of households equipped with SWH from 15% today to 20% by 2015 and 30% by 2020.





Solar Power/ Cont'd...

- **Photovoltaic Systems (PV):** Jordan has good utilization and experience in decentralized photovoltaic units in rural and remote villages for electricity generation and water pumping (about 1000kW of peak capacity).





Solar Power/ Cont'd...

- **Two PV Solar Power Projects** are currently under the pipeline in the framework of the bilateral co-operation between the two Governments of Jordan and Spain (the site to be at Azraq):
 - 1) 1MW (PV) Solar Power Project/ (5 m\$ Debt Swap); RFP documents are currently under development. The expected date for tendering the project is the end of 2011 (for Spanish firms only).
 - 2) 2MW (PV) Solar Power Project through a soft loan provided by the Spanish Government. The approvals for securing the soft loan are at the final stages.



Solar Power/ Cont'd...

- **280 kW PV Solar Project:** through a Japanese Grant Aid, where the construction works has been started recently by a Japanese Contractor within the campus of El-Hassan Science City (EHSC), it is expected to be ready for commissioning in November 2011. The National Center for Research and Development / Energy Research Program will conduct the technical maintenance and management of this PV plant.



Solar Power/Cont'd..

- **First Concentrated Solar Power (CSP) project:** Recently launched in cooperation with the EU with expected 10 million Euro grant, 5 MW CSP plant will be built in the South of Jordan and used as a training center for the National Center for Research and Development/ Energy Research Program and for the local workforce.
- **100 MW CSP Power Station:** expected at the south-eastern part of Jordan (Ma'an Governorate). The applicable technology is open at this point of time, and it is expected to be determined by the competitive tendering process on BOO basis. Soft financing is expected through the so-called Clean Technology Fund (CTF) managed by the World Bank. A roadmap for project financing and implementation is currently undergoing by a Consulting firm in order to help the Government to take the right decision on tendering the project before the end of this year 2011.





Biomass/Biogas/Biofuels

Resources:

- **Most viable resource for biogas in Jordan is municipal solid waste.**
- **The amount of municipal solid waste is fast growing.**
- **Resources are available.**



Past & on-going activities:

- **A pilot plant using municipal solid waste of 3.5 MW is 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

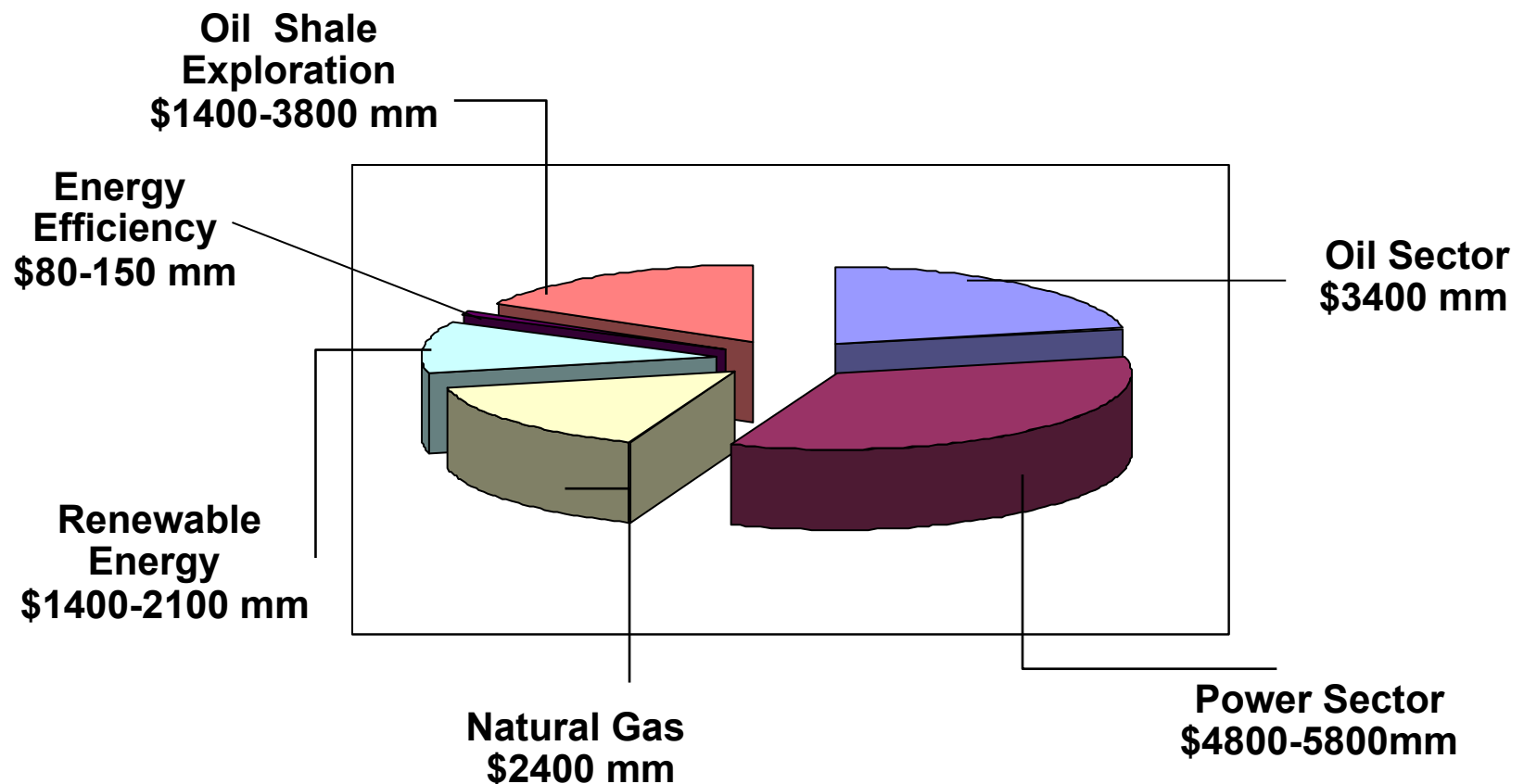
Hot and geothermal springs do exist, found to have low enthalpy and could not support commercial power development. Deep drilling is required for further investigations and feasibility of commercial projects.

Hydropower

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



According to the Master Plan the required investment in the energy sector is around \$14-18 billion over the period (2008-2020)





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Thank You