



OPPORTUNITIES IN RENEWABLE ENERGY

Jordan's Energy Challenges

Unlike many of its neighbors, Jordan does not have a domestic supply of oil or natural gas. Rather, the Kingdom relies heavily on imports to meet its domestic energy requirements for socioeconomic development.

Jordan's Advantage in Renewable Energy

Despite lacking fossil fuels, Jordan has a distinct advantage in renewable energy (RE) resources – particularly solar and wind.

ENERGY SUPPLY & DEMAND

3,120 System Peak (MW), 2013

16,372 Total Energy Sales (GWh), 2013

5.5% Projected annual increase in energy demand in Jordan, 2008-2020

DEPENDENCY ON IMPORTS

96% Proportion of Jordan's energy needs met through imports

19% Annual GDP spent on energy imports, 2011

163% Increase in real electricity prices following the 2012 disruption of natural gas supply from Egypt

GOVERNMENT SUBSIDIES

29% Government subsidy for fossil fuels, 2010

\$1.3 B Government subsidy for electricity prices



SOLAR ENERGY

With **5 – 7 kWh** of solar radiation per square meter per day and nearly **300 days** of sun each year, Jordan's solar energy potential is amongst the highest in the world.



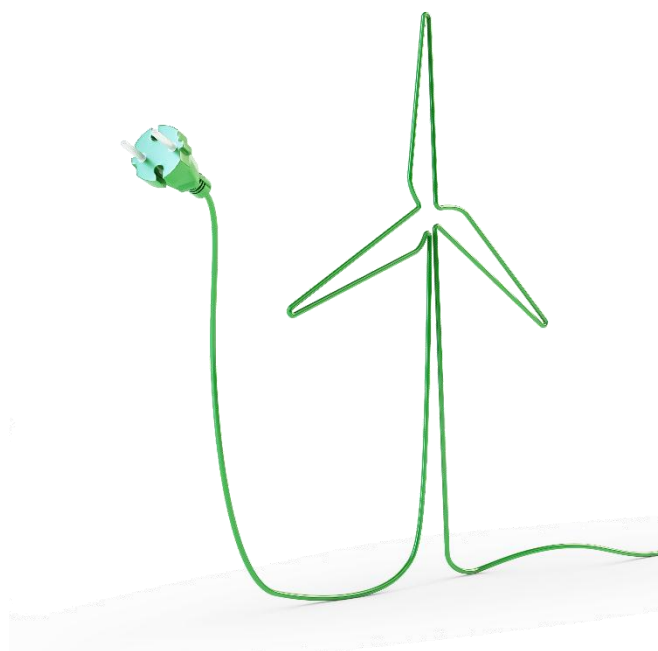
WIND ENERGY

Jordan also has great wind potential, with wind speeds of **7.5 – 11.5 meter/second** in some areas of the country.



BIOGAS ENERGY

Municipal solid waste can be converted to biogas energy.

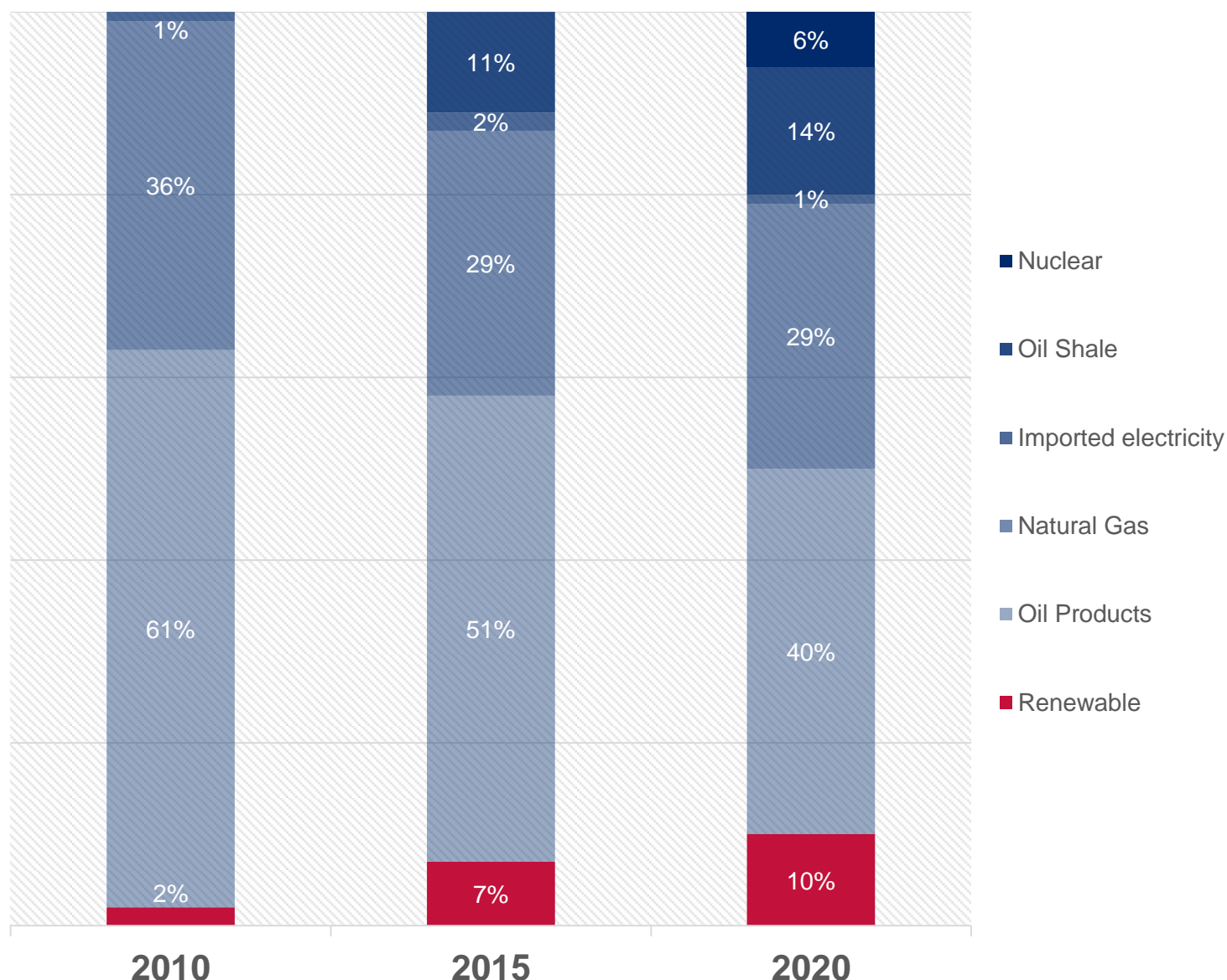


Jordan's Energy Strategy: Toward Diversification

As part of its 2007-2020 Energy Strategy, the Government of Jordan aims to increase the proportion of renewable energy in Jordan's energy mix from **2%** in 2010 to **10%** – **targeting an additional 1,000 MW of wind and 800 MW of solar energy by 2020.**

In addition, the government is targeting a 30% increase in solar water heater uptake and 20% increase in energy consumption efficiency by 2020.

ENERGY TARGETS 2010-2020



Legal and Regulatory Framework for Renewable Energy

Renewable energy development in Jordan is guided by the **Renewable Energy and Energy Efficiency Law no. 13 (RE & EE Law)**, adopted in 2012. The RE & EE Law:

- Creates a **regulatory and financial framework** for renewable energy production
- Allows **direct proposal submission** for grid-connected electricity projects
- Creates **incentives** to encourage energy efficiency
- Establishes the **Jordan Renewable Energy and Energy Efficiency Fund (JREEEF)**
- Mandates NEPCO to **purchase electricity from RE projects**
- Mandates The Government of Jordan to **cover the cost of grid connection**

SUPPORTING INVESTMENT IN RENEWABLE ENERGY

The RE& EE Law provides a clear legal and regulatory framework to support investments in the Renewable Energy sector.



Tax Exemption By-Law

Describes tax incentives available for RE and EE projects:

- Exemption from **customs duties and sales tax** for RE and EE systems and equipment
- Exemption from **income tax** for investments in RE during first decade of operation



Reference Price List

Indicative prices for each type of energy:

- **80 fils/kWh** for wind
- **135 fils/kWh** for solar thermal
- **100 fils/kWh** for solar PV
- **90 fils/kWh** for biomass
- **60 fils/kWh** for biogas



Land Use List

List of land areas that the Government of Jordan has made available specifically for RE projects



Mapping of RE Resources

Geographic mapping of renewable energy resources in Jordan



Routes for Renewable Energy Production include:

DIRECT PROPOSALS

- Parties are invited to identify their own sites for generating renewable energy
- Government determines which proposals to procure

COMPETITIVE IPP PROCESS

- Government identifies a site, technology type, and capacity and invites bids
- Most competitive bid is awarded a contract

DISTRIBUTED GENERATION & NET METERING

- Excess power from on-site generation can be sold to the grid with a feed-in tariff of **120 fils/kWh** for solar and **95 fils/kWh** for hybrid energy

Renewable Energy Production

ROUND 1 – BIDS SUBMITTED FOR LARGE-SCALE SOLAR PV AND WIND PROJECTS

The Ministry of Energy and Mineral Resources opened Round 1 for Direct Proposal submissions in 2012 and received 64 Expressions of Interest. Of these, 30 MOUs were signed. Below is the list of projects currently in progress.

Project	Type	MW	Status
Qawar (Ma'an Development Area))	Solar PV	52	Submitted financial close
Catalyst (Ma'an Development Area)	Solar PV	20	
EMARA (Ma'an Development Area)	Solar PV	10	
Sun Edison (Ma'an Development Area)	Solar PV	24	
EJRE (Ma'an Development Area)	Solar PV	10	
CEC (Ma'an Development Area)	Solar PV	10	
Bright Power (Ma'an Development Area)	Solar PV	10	
Green Land (Ma'an Development Area)	Solar PV	10	
Marti Fire (Ma'an Development Area)	Solar PV	20	
Shamsuna (Aqaba)	Solar PV	10	
Solar One	Solar PV	20	
Scatec Energy	Solar PV	10	
Total Solar		206 MW	
Green Watt (Rajif)	Wind	83	Submitted offers; under evaluation
KOSPOR (Tafila)	Wind	50	
Xenel (Tafila)	Wind	50	
Delenova (Irbid)	Wind	45	
Total Wind		228 MW	
Grand Total PV and Wind		434 MW	

ROUND 2 – IN PROGRESS

The Round 2 application phase closed in July 2014 with 83 bids. Of these, 47 MOUs have been signed, and four or five 50 MW projects will be procured.

ROUND 3 - CANCELLED

GULF COOPERATION COUNCIL (GCC) GRANT FUNDING

In addition to the government-funded projects listed above, Jordan has announced a \$300 million investment in wind and solar PV projects funded by GCC countries Saudi Arabic, UAE, Kuwait, and Qatar. Under this GCC grant, Jordan will fund wind projects between 50-75 MW and solar PV projects between 75-100 MW. The first wind energy project (66 MW) through the GCC grant has been awarded and is under construction in Ma'an.

OTHER DONORS SUPPORTING RENEWABLE ENERGY DEVELOPMENT



U.S. Agency for International Development

- Supported development of the Demand Side Management (DSM) Incentive Mechanism
- Providing capacity building in support of DSM
- Supporting the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF) to make it operational
- Assisting NEPCO to develop a transmission and distribution code for integrating RE
- Designing an accreditation system for energy service providers
- Helping draft a bylaw of the RE and EE Law to accommodate direct proposals by project developers



German Development Bank

- Grant financing for a 5 MW PV project in the North Governate to supply a refugee camp
- Lending to finance to 5 MW hydro project on the King Talal Dam



International Finance Corporation

- Lending \$207.5 million to fund the construction of seven solar photovoltaic plants in Jordan



French Development Agency (Afd)

- Support for government reforms within the energy sector through technical assistance to MEMR
- Launching a study of how to improve the wheeling tariff
- Financing the Green Corridor; in particular Stage 2 facilities including Ma'an substation and portions of the 400 KV parallel corridor
- Financing small EE and RE projects (less than \$5 Million) through the Green Credit Line with Cairo Amman Bank



European Bank for Reconstruction and Development (EBRD)

- Lending \$25 million for the construction and development of a 20M MW solar PV plant
- Lending \$50 million to fund the construction of three solar PV generation plants in Ma'an
- Participating in the IPP 4 peaking power plant
- Developing a sustainable Energy financing facility to support smaller projects (1-5 MW)



EuropeAid

- Technical assistance to the Renewable Energy and Energy Efficiency Program
- WESCP EuropeAid activity
- Spain-NEPCO twinning activity focused on renewable power integration
- Grant facility located at MEMR
- Grant financing for Jordan's first large-scale wind power facility (1.6 MW)
- 1 MW solar thermal power pilot

Barriers to Scaling Renewable Energy in Jordan



ACCESS TO FINANCE

- Dominance of the traditional banking culture
- Lack of awareness and insufficient understanding of RE as a business
- Lack of technical know-how to evaluate and promote RE projects



REGULATORY ENVIRONMENT

- Need to address the regulatory and technical issues of low voltage interconnection
- Lack of incentives in net-metering directives to connect low-electricity usage consumers
- Electricity tariffs do not reflect real costs of generation and transmission
- Lack of certification for equipment for RE systems



CAPACITY BUILDING

Distribution Companies need...

- ✓ Training on interconnection issues
- ✓ Training on when and how to conduct grid impact studies
- ✓ Training on testing and commissioning RE projects

NEPCO needs...

- ✓ Training on when and how to conduct grid impact studies
- ✓ Better understanding of how much RE can be added to the grid, and when, before reaching instability or frequency limits
- ✓ Studies on the cost of integration of large-scale renewables into the grid, and how these reinforcement costs will affect the tariff



INFRASTRUCTURE

Development of Jordan's power system through 2030 will require increasing installed capacity in the central-south region between Qatraneh and Ma'an. **The most critical issue will be the transfer of electricity to the load centers in Amman.**

Phases 1 & 2

Phases 1 and 2 will require building a new sub-station in Ma'an and a high-voltage transmission line from Ma'an to Qatraneh.

Phase 3

If RE projects exceed 1200 MW, additional reinforcements will be required in **Phase 3**, including building a new high-voltage transmission line from Aqaba to Qatraneh.

GREEN CORRIDOR

