



JORDAN RENEWABLE ENERGY PROGRAM

Ministry of Energy and Mineral
Resources

Nov. 2017



Key Challenges Facing the Energy Sector in Jordan

Lack of conventional energy resources

High dependency on imported energy

*A significant increase of primary &
Electricity energy demand*





Figures of Jordan Energy Sector - 2016



Cost of consumed energy (7.0% of GDP)



High dependency on imported energy (95%)



Annual growth of electricity demand (2.5%)



Annual growth of primary energy demand (7.0%)





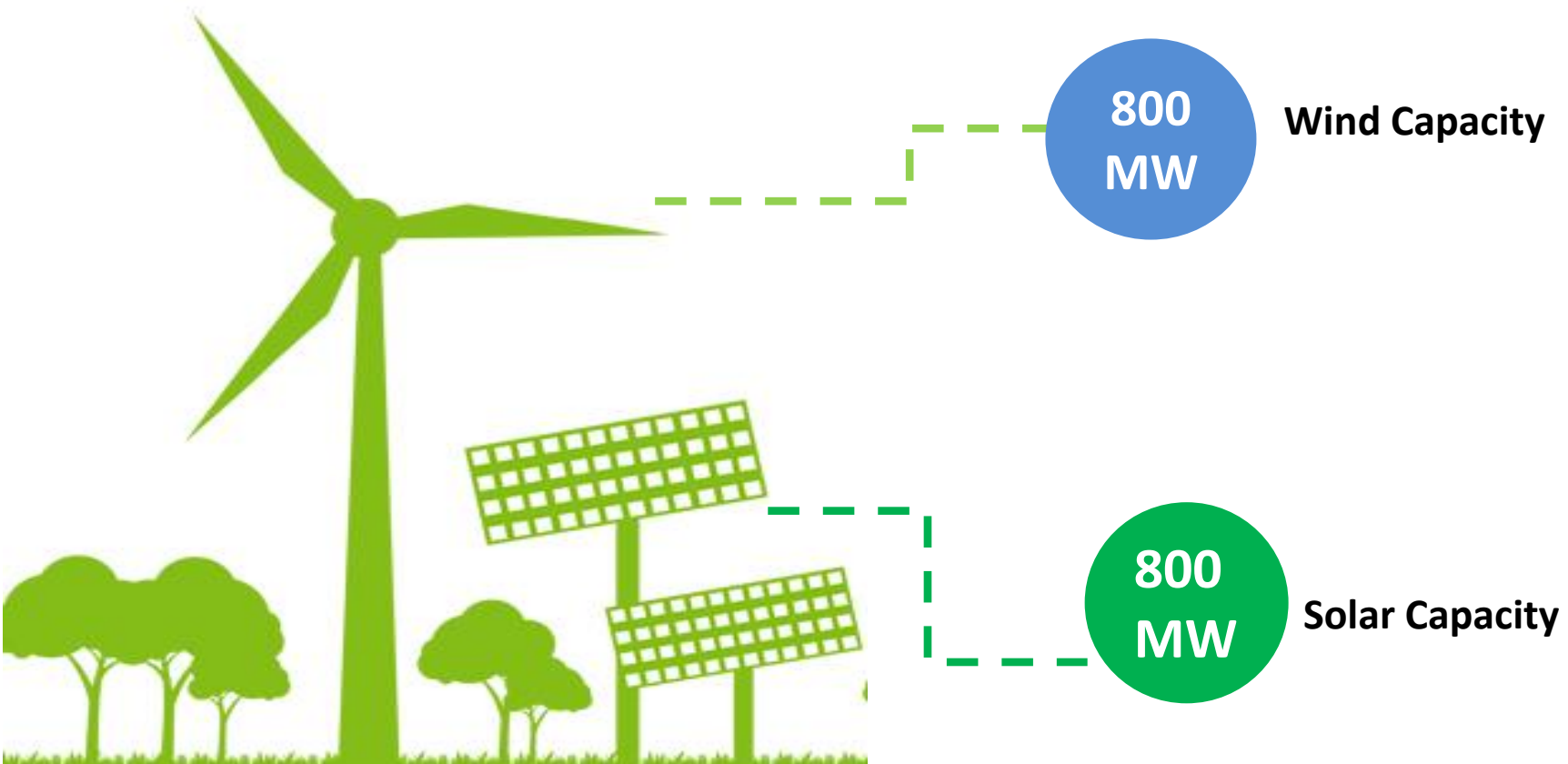
Energy Strategy Main Goals





RE in National Energy Strategy

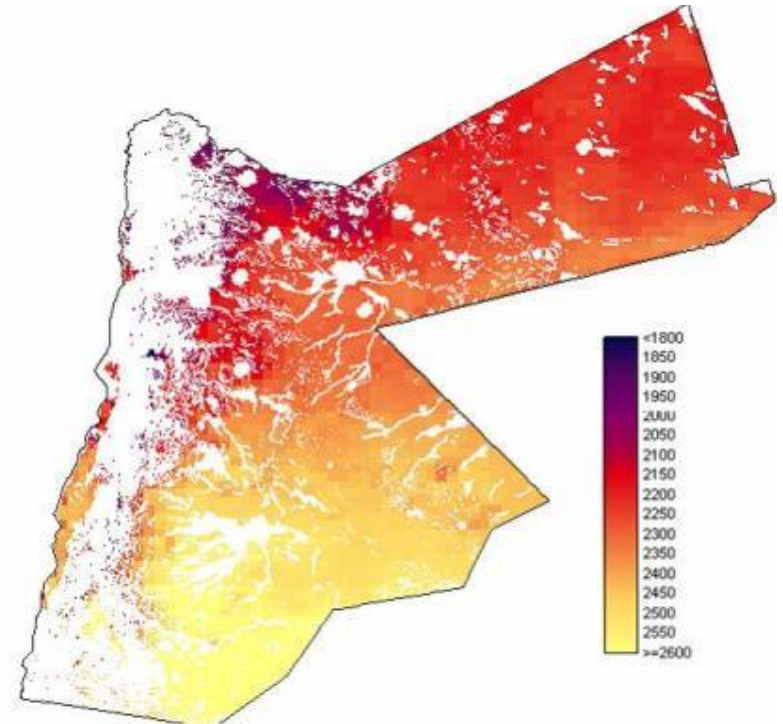
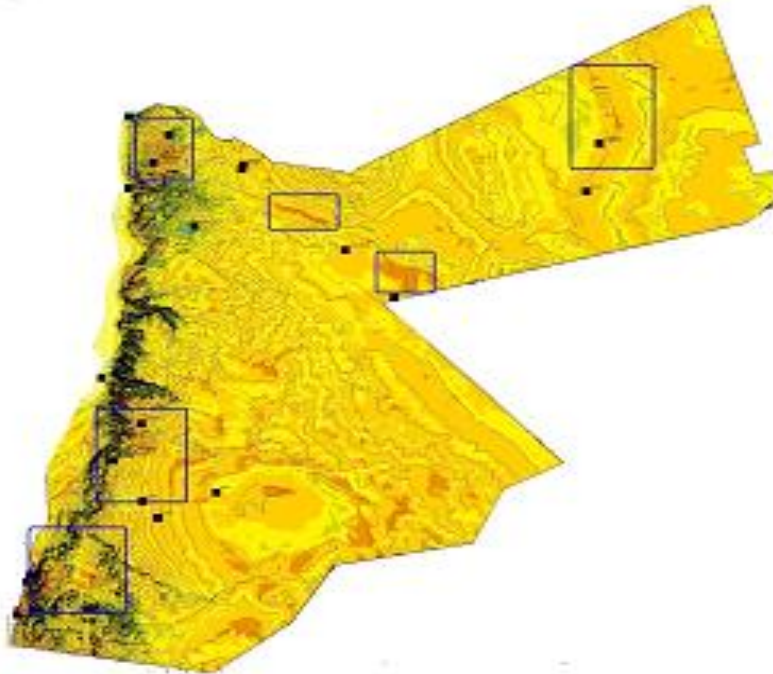
10% RE Contribution to Jordan's Energy mix by 2020





Jordan enjoys world class quality solar and wind energy resources

- Wind speeds could reach 9.0 m/s in some places.
- Wind projects are site specific, feasible and competitive without further concessional support
- High solar radiation figures of 5 – 7 kWh/m² per day with about 300 sunny days per year.
- PV are mature, CSP and CPV still need further development.



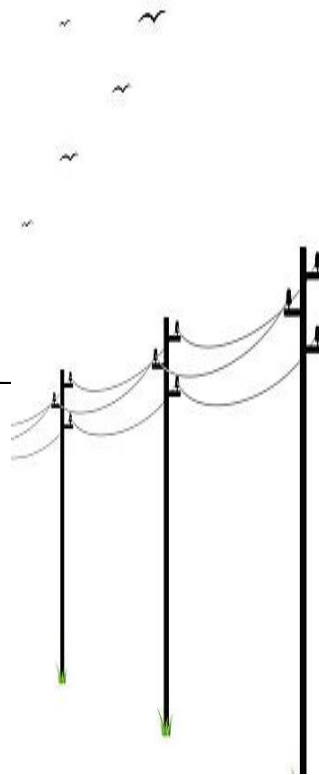
Key Figures of Jordan Electricity Sector 2016

**Total Electricity Generation:
19730 GWh**

**Renewables Contribution
to Installed Capacity: 13%**

**Total Electricity
Consumption: 16843 GWh**

**Renewables Contribution
to Gen. Electricity: 5.44%**



**Installed Capacity
(Conventional): 4100 MW**

**Installed Capacity
(Renewable): 544 MW**

Peak Load: 3250 MW

**Per Capita Electricity
Consumption: 1719 KWh**



Why Investment Security is High in Jordan?



Clear Development Path of the Government of Jordan



Stable Political and Regulatory Frameworks



Clear Financial and other Support Schemes (tax regime)



Adequate and Transparent Public Policies

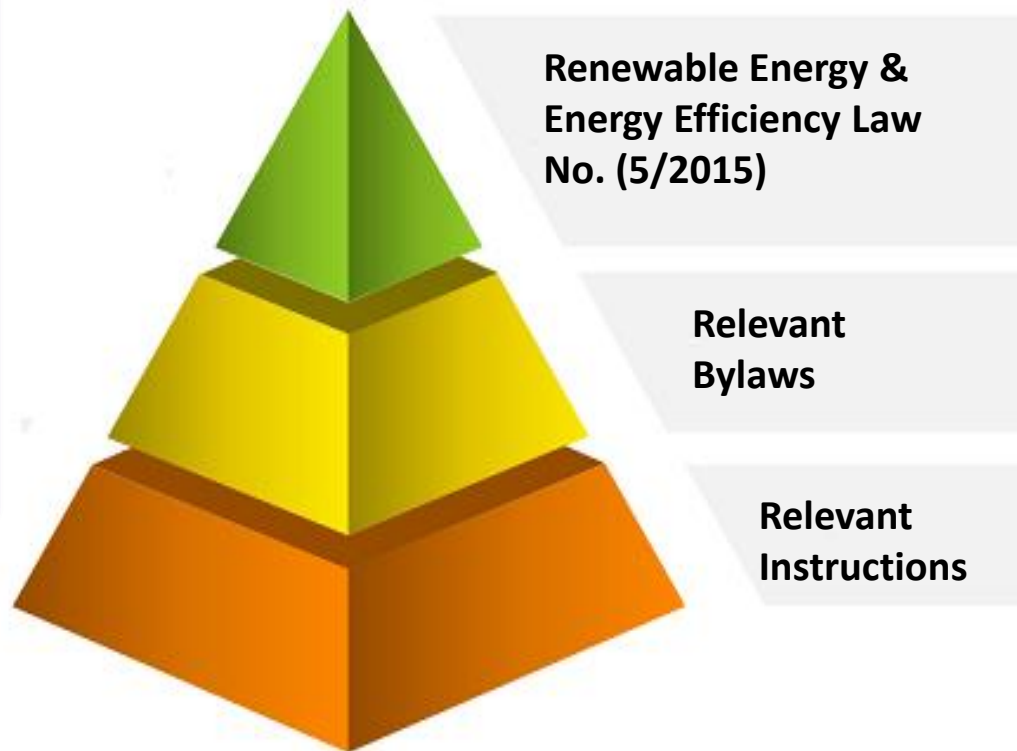


Well defined Infrastructure Provisions (land, grid connections, etc.)



Regulatory Framework

The Renewable Energy and Energy Efficiency Law (REEEL) – Law No. (13/2012) was passed as a permanent Law in 2012 and amended in 2014.



Regulatory Framework

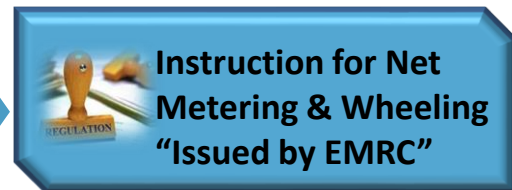
1

This law allows investors to identify and develop grid-connected electricity production projects through the so called direct proposal submission.



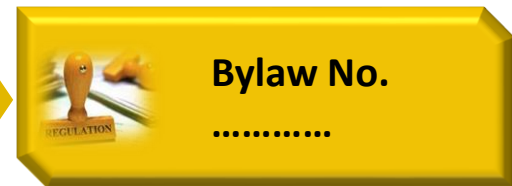
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The law allows consumers to cover their demand of electricity through RE sources with fixed purchase prices for excess power



3

Tax Incentives Regime



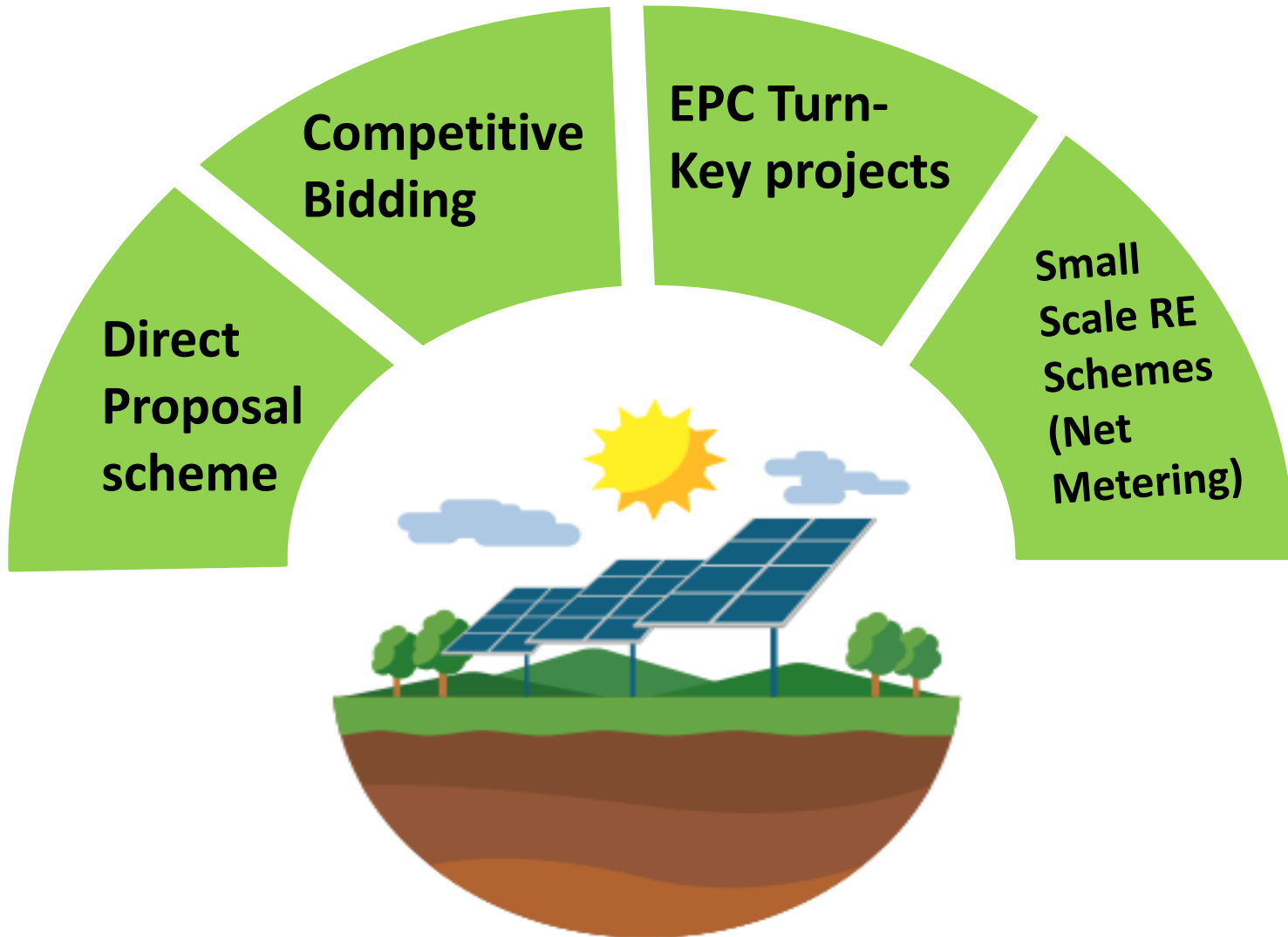


Template Contractual Documents

(Transparent Process – Minimum Risk- Less cost)



A Policy of 4-Track-Approach to Develop Renewable Energy



Small Scale RE Projects

This covers consumers from different sectors like residential, industrial, commercial, agricultural...etc.

Small scale consumers has been given the opportunity to generate their own electricity and sell the extra (if any) to the distribution utilities at a fixed tariff.

Currently about 132 MW installed capacity by Net-Metering (rooftop systems) and Wheeling.



More than 2000 Applications received so far by DisCos.





RE Projects in Jordan - 2016



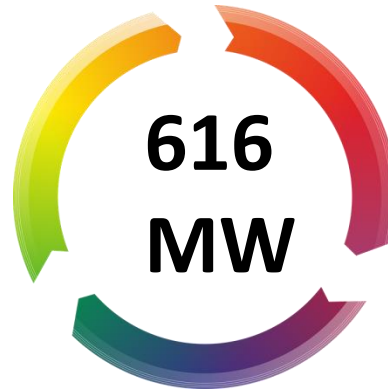
**Total
Operational**



347 MW



197 MW



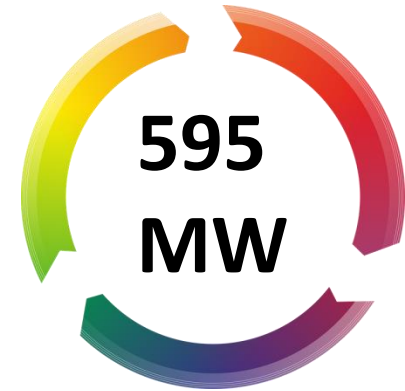
**Total Under
Construction**



445 MW



171 MW



**Total Under financial
close**



350 MW



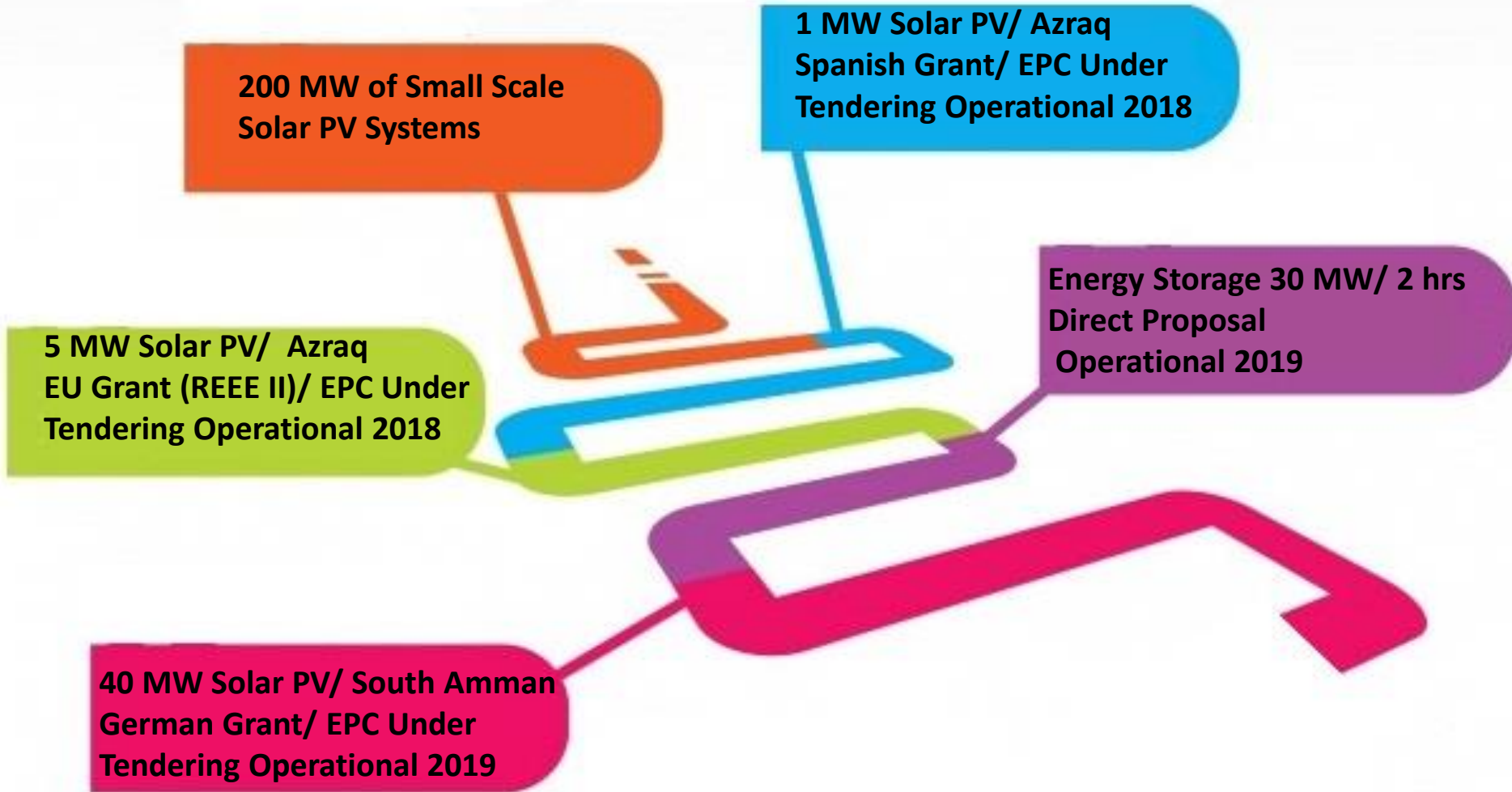
245 MW

Total Capacity: 1755





Renewable Energy Projects in the Pipeline 1/2



Renewable Energy Projects in the Pipeline 2/2

50 MW/ Philadelphia Solar PV
/Direct Proposal
To be Operational in 2019

Electricity Generation Company
Direct Proposals for RE Projects
50 MW Operational 2020

Governmental Universities
Direct Proposals for RE Projects
50 MW Operational 2020

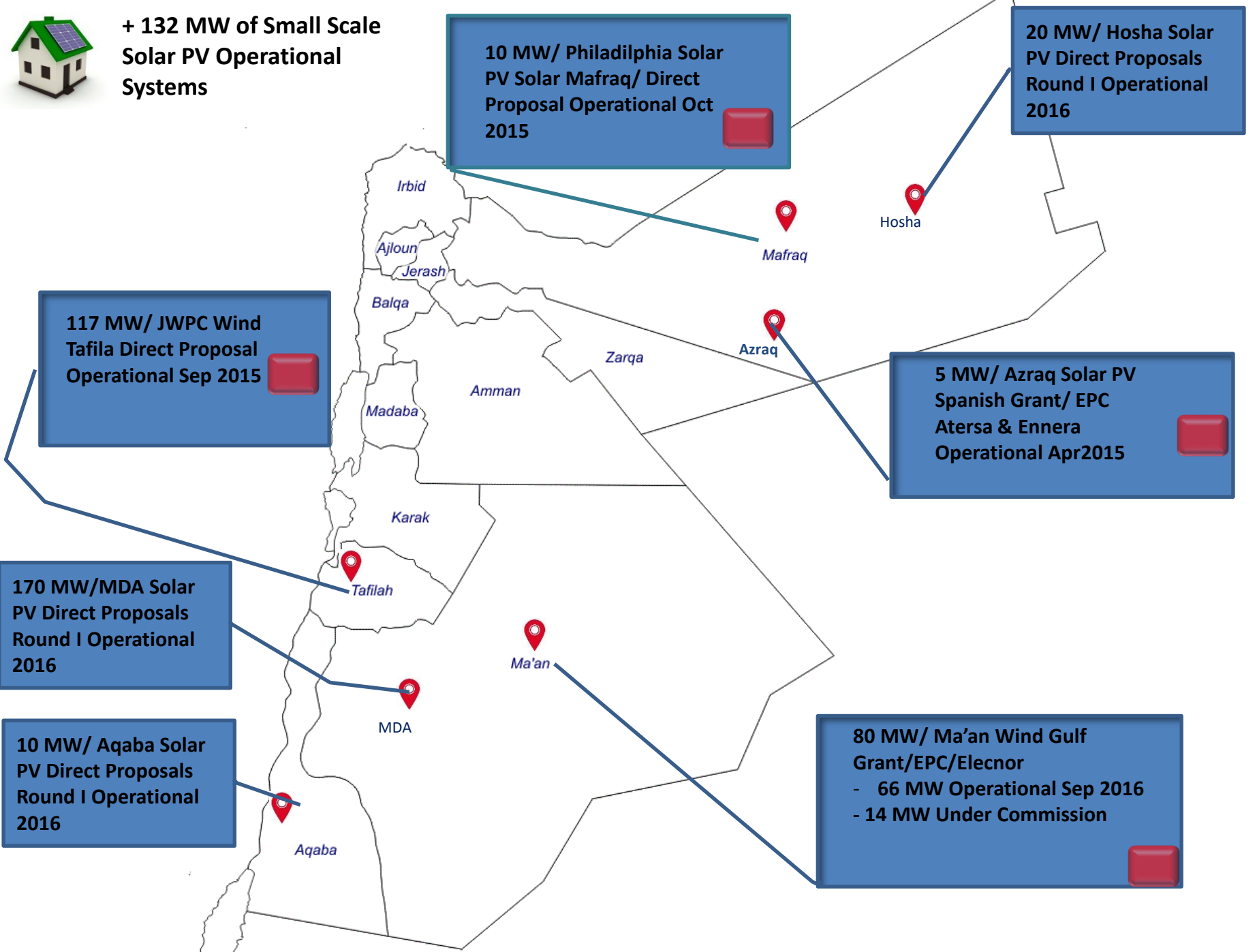
200 MW/Solar PV+100MW Wind
Direct Proposals Round III Under
Tendering Operational 2020

24 MW Waste-to-Energy/
Al-Ekaider Direct Proposal
Under Tendering Operational
2022





+ 132 MW of Small Scale Solar PV Operational Systems



Sample Projects: Arabia One (Ennera) at Ma'an



Sample Projects: Ma'an Wind Project





Sample Projects: Azraq Solar PV Project





Sample Projects: Philadelphia Solar PV Project - Mafraq



Sample Projects: Tafila Wind Project (JWPC)

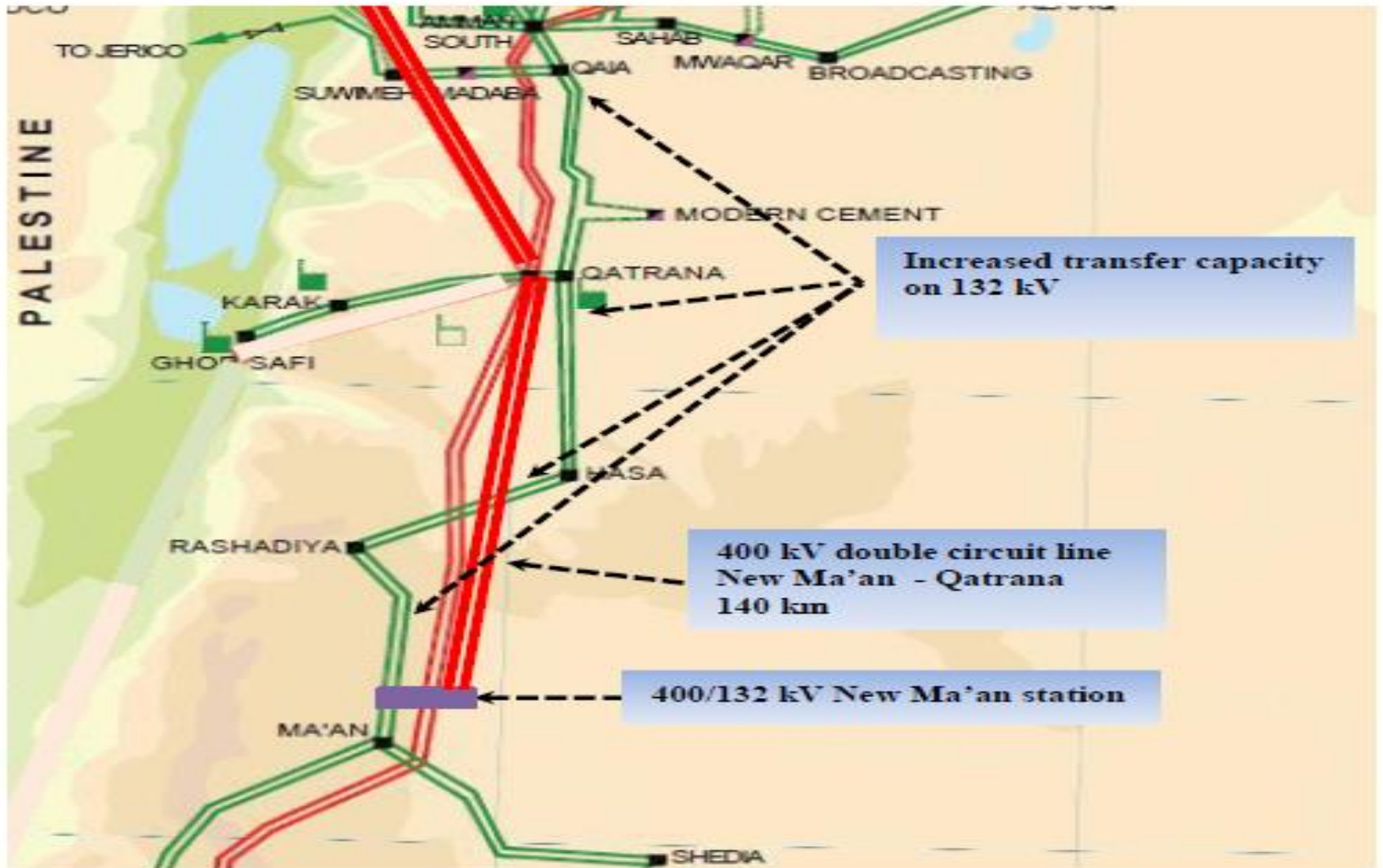


Sample Projects: Tafila Wind Project (JWPC)





Green Corridor





Energy Storage

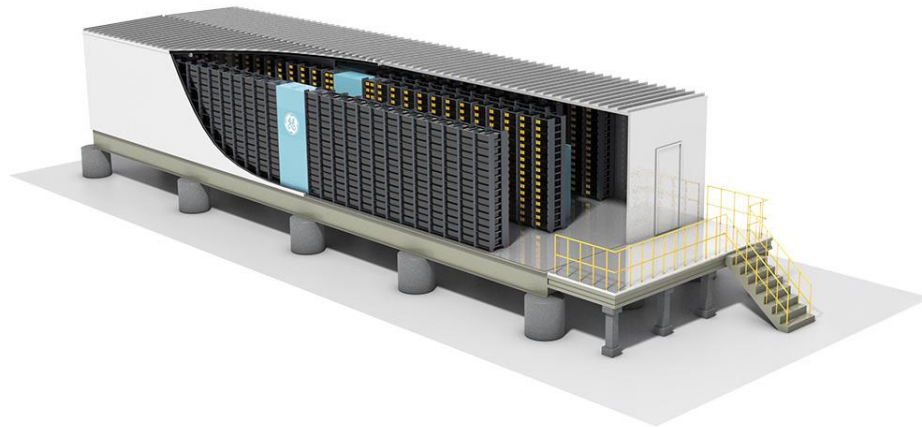
- The **rapid growth of energy projects** in Jordan has led to an interest in developing renewable energy storage which can help **stabilize electricity networks** by balancing intermittent production and **storing excess production for use**.
- As a **pilot project**, MEMR has announced a **(30) MW/(60 MWh) storage project** to be located in **the Maan Development Area** near Solar Projects under Direct Proposals Submission/Round I.





Energy Storage

- The Project will be used for **ramp-rate control** of PV and Wind power plants, and **energy shift** of otherwise curtailed renewable energy.
- **(42) EOIs were received**, and they are under evaluation now, the project **is expected to be operational by Mid/2019**.



Feasibility study for CSP

In-Depth Technical Assistance ('ITA')

The objective of the ITA is to provide Jordan's policy makers and power system planners with information on the potential for CSP in the Jordanian energy mix, and how to develop such potential.





Feasibility study for CSP

The Study has to answer the following questions:

Will Concentrated Solar Power (CSP) be an optimal generation option between now and 2030? What are the optimal specifications for CSP in Jordan?

Will CSP be an optimal way to balance variable renewables? Will CSP contribute to energy security?

Will CSP be part of a lowest cost energy mix?

Will CSP help Jordan implement its Nationally Determined Contribution ('NDC')?

Would concessional donor climate financing enable the financial viability of CSP?





While there are some of the reasons why we currently view CSP as a relatively expensive technology, we have not to ignore

CSP is the dispatchable form of solar, that can be turned on or off on demand, supplying energy when needed.

CSP can use its own thermally stored solar energy to dispatch power any time on demand.

CSP is well-suited for covering the recurring gaps in PV generation. The gap that's growing fastest is the evening peak period after the sun sets.





Conclusion

Jordan has laid down the necessary policy and regulatory framework for renewable energy, and has already attracted several commercial investments.

Template contractual documents (PPAs) and Instructions for developing RE projects do exist.

Grid reinforcement (Green Corridor) is undergoing in order to install more RE Capacities.

Jordan is now a leading country of Renewable Energy in the MENA Region.

CSP will be one of our future options for increasing RE share



شكراً

Dankie Gracias 谢谢

Спасибо Merci Takk

Köszönjük Terima kasih

Grazie Dziękujemy Děkojame

Ďakujeme Vielen Dank Paldies

Kiitos Täname teid תודה

Thank You Tak

感謝您 Obrigado Teşekkür Ederiz

Σας Ευχαριστούμ 감사합니다

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Bedankt Děkujeme vám

ありがとうございます

Tack