



MINISTRY OF ENERGY AND MINERAL RESOURCES



Role of Energy Storage in Energy Transition in Jordan

Energy Storage Partnership (ESP)
Meetings June 26-30, 2023

Promoting Renewable energy in Jordan



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Renewable Energy & Energy Efficiency Law

This law allows for the development of grid-connected electricity production projects through the so called direct proposal submission.



-Direct Proposal Bylaw No. 50/2015
-Ceiling Price list set by EMRC

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



Instruction for Net Metering & Wheeling
"Issued by EMRC"

Renewable Energy & Energy Efficiency Law No. (5/2015)

Tax Incentives Regime



Bylaw No. 10 of 2013

Relevant Bylaws

Establishing the Jordan Renewable Energy and Energy Efficiency Fund (JREEEF).



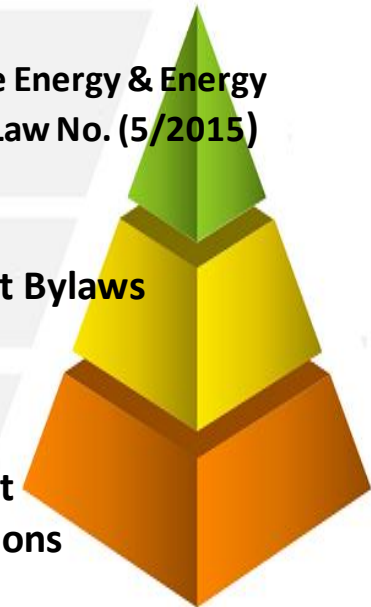
Bylaw No. (49) of 2015

Relevant Instructions

regulating procedures & means of conserving energy & improving its efficiency.



Bylaw No. (73) of 2012





Barriers Against Integrating more Renewable into Grid

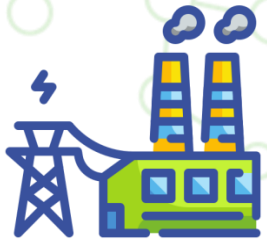
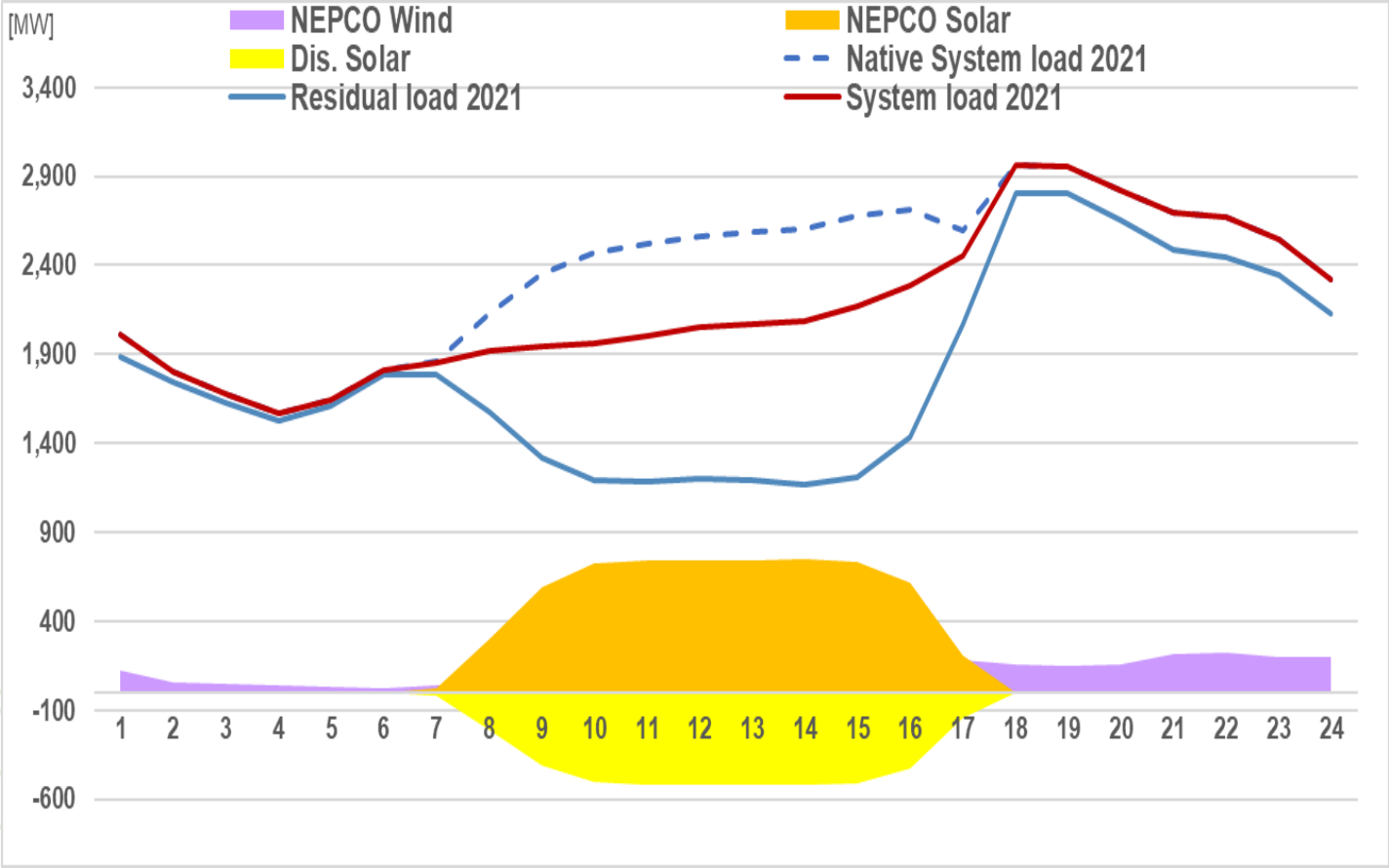
Key Facts (2022)

27%
Share of Renewable Generation on Generated Energy

39%
Share of Installed Renewable Generation Capacity

>99%
From Intermittent Resources: PV and Wind

No Significant Large-Scale Storage Facilities



**Installed Capacity (Conventional)
4013 MW**

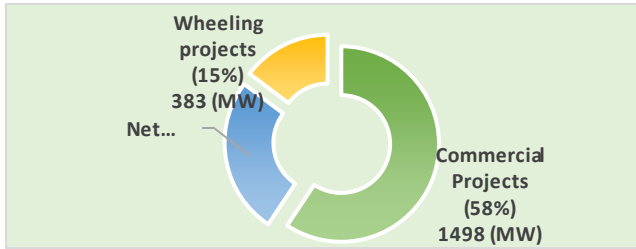


1963 MW



614 MW

**Installed Capacity (Renewable):
2577 MW**



Some Actions toward the Energy Transition in Jordan



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**Current target:
31%
Share of RES in
electricity
generation in
2030**

Developing the electrical grid to increase the contribution of renewable energy and improve the stability of the Grid.

Developing a road map for the introduction of electrical energy storage systems into the electrical system, taking into account the preparation of the necessary legislation.

The shift towards the use of smart grid and the expansion of the use of smart meters to enable us to apply the time-of-use tariff to all consumers, ToU tariffs will encourage investment into storage by end users.

Encouraging the use of electric transportation, which means increasing the use of electricity in an efficient way.

Encouraging investment in green hydrogen production projects by developing a clear strategy in this regard and setting the necessary legislation for the establishment of such projects.

Strengthening the Electricity interconnection with neighboring countries.

**Our Goal:
40-50%
Share of RES
in electricity
generation
in2030**

Energy Storage



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The need of energy storage

Reduction of conventional power plant operation necessary for spinning reserve

Energy shift of otherwise curtailed renewable energy to times of peak demands.

Ramp-rate control of PV and Wind power plants to smooth the power output.

Postponing investment in conventional power plants, and relying more in renewable energy to cover the peak demand.



Previous Effort in Energy Storage

MEMR along side with NEPCO announced in 2017 a tender for a battery storage project in Jordan, however, the tender was canceled later on due to high prices

Recently the Steering Committee for Water-Energy Nexus was adopted the feasibility study for a HPS project uses the waters of dams within a closed system near Wadi Mujib Dam with a capacity of 450 MW for a period of 7 hours (6 hours for load shifting, and an hour for electric network auxiliary services) and as 3150 MWh per cycle, with a total cost of 420 Million JD.



Continued Effort in Energy Storage



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In cooperation with the WB,

A project titled Study on Electrical Energy Storage Options in Jordan was commissioned, which is in the final stages to be issued.

Objectives of the study

advise MEMR on developing their own strategy, roadmap, potential pathways, and action plan to facilitate integrating grid-charged energy storage (independent of the technology)

Recommend options, for regulatory, legal and policy frameworks to accommodate storage technologies in the system

advise on the pros and cons of transmission versus distribution storage within the Jordanian context.

Main findings of the study

- Energy storage may provide several benefits (including energy shifting and ancillary services), but a combination of these services is necessary for economic and commercial viability
- Technical analysis has revealed the following findings:
 - An immediate need of storage for resolving energy service issues
 - Benefit to system frequency support rotor angle and voltage stability for Power services
 - Applications at the distribution level have similar benefits and can also solve local issues providing additional economic benefits to the investments.
- Strong preference for centralized scheduling and dispatch by TSO whilst scheduling by their owners may lead to suboptimal or even detrimental outcomes.

Roadmap implementation timeline



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Short-term

Medium-term

Long-term

Multi-service PPA



Ancillary services

Energy

Hybrid PPA



Merchant co-located customer



Under exceptional cases*

Grid asset

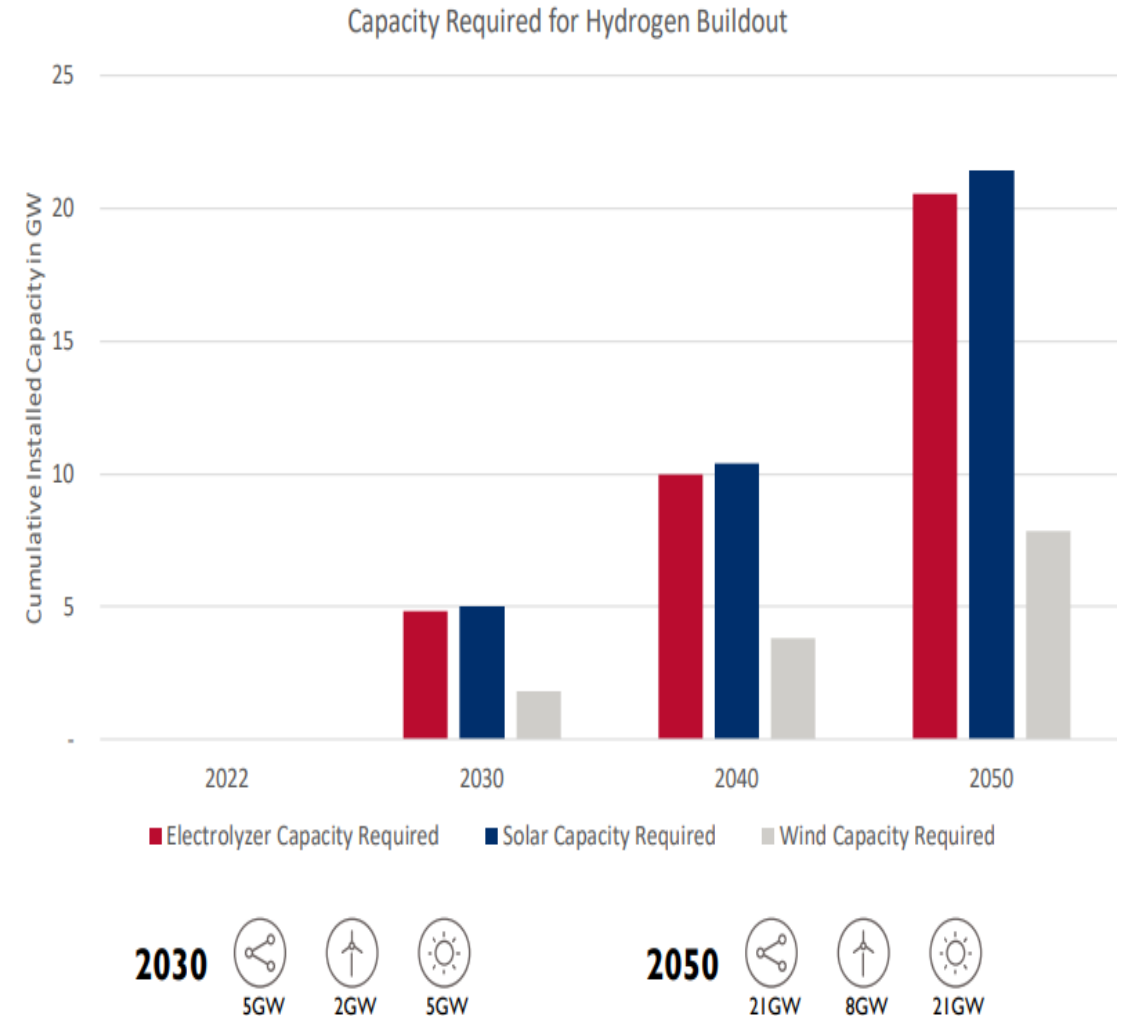
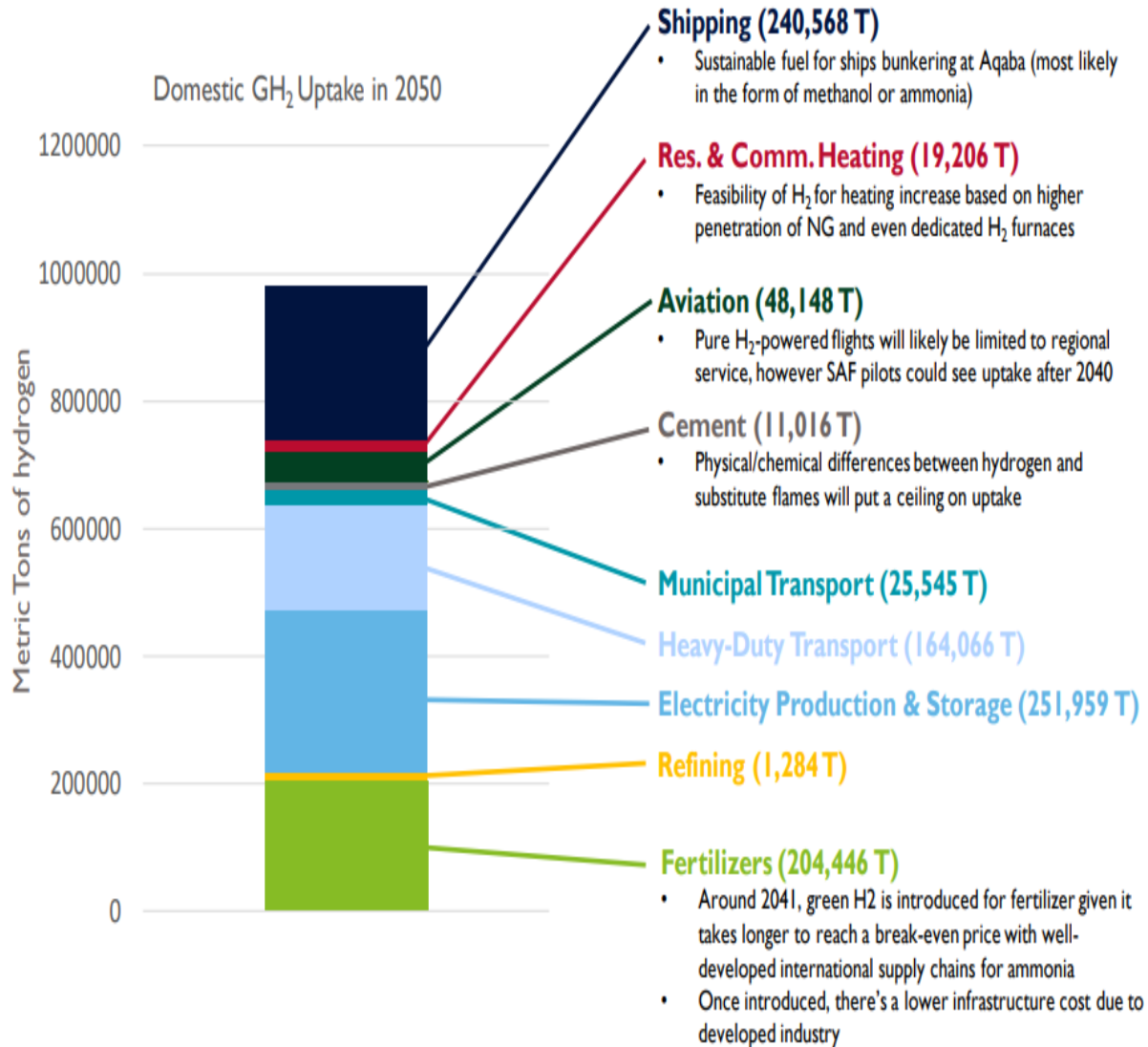


Note: *Serious challenges with regards to possible discrimination of generators in case of future market opening. However, it could allow to deal with specific grid stability issues and constraints that cannot be efficiently addressed by the other models.

Green Hydrogen strategy (2030-2050)



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Thank You