

Promoting Renewable Energy

Developing the Capacity of ESCWA Member Countries to Address the Water and Energy Nexus for
Achieving the SDGs: Regional Policy Tool Kit

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Economic and Social Commission for Western Asia



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Title of Section

Impact of Renewable Energy Nationally and Regionally in ESCWA Region

According to IRENA (during an international meeting in Abu Dhabi in January 2016), countries can deliver on the commitments made in COP21 to keep global temperature increases < 2 degrees Celsius by rapid scaling up of wind and solar power to **36%** of the global energy mix by 2030.

This would bring an increase in GDP by $\sim 1.1\%$, global welfare by 3.7% and more than 24 million job opportunities in the renewable energy sector.

Prerequisites of adopting alternative energy within the existing energy portfolio

1. Understand how the new portfolio will interface with different energy users and other resources
2. Recognize the impact of the new portfolio on other primary resources of water, land and agriculture
3. Evaluate the role of this new energy portfolio in expanding the distributed energy access to rural areas that the previous centralized energy production system prevented electrification of
4. Set up a renewable energy readiness plan that includes financial, technological, social and policy factors

Framework for achieving national Renewable Energy Targets in the Arab Region



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Framework

Working through the
barriers to achieving
renewable energy
targets

Enabling Policies

Emerging
Technologies

Regional integration
and Infrastructure

Renewable Energy-
Readiness factor and
Competiveness Index

Working through the barriers to achieving renewable energy targets

1. Local Capacity for research and development

- Renewable technologies are linked to specific local conditions
 - This requires national investment in science and technologies (this is lacking in ESCWA region).
- Few, uncoordinated programs can be found in engineering and science. However, they have not been incorporated into other relevant areas (social sciences etc.)

Working through the barriers to achieving renewable energy targets

1. Local Capacity for research and development (continued)

- Training at the supply chain (industry) is needed in order to transition to a more diverse energy mix
- In the vocational capacity, there is a limited expertise to support the research and development efforts of this sector

Working through the barriers to achieving renewable energy targets

1. Local Capacity for research and development (continued)

- To better design a national energy portfolio, expertise and capacity is needed in many areas
- Developing capacities at civil society level plays an important role in development of renewable energy

Working through the barriers to achieving renewable energy targets

1. Local Capacity for research and development (continued)

- Launching awareness campaigns can:
 - Promote RET in local communities
 - Improve society's ability to represent their interests in the national renewable energy action plan process

Working through the barriers to achieving renewable energy targets

2. Culture of innovation

- Promote development and adaption of new technologies

3. Manufacturing and industries

Enabling Policies

Two elements of public policies:

1. Energy pricing and valuation
2. Energy public awareness and education

There is a strong correlation between energy price and energy use and conservation

Enabling Policies (continued)

Incentives framework is needed for local industries to produce and adopt renewable energies

Emerging Technologies

Two types of solar technologies that have been the focus of development and technological advancement

1. Thermal based technologies
2. Photovoltaic cells that directly generates electricity

Emerging Technologies: Thermal Technologies

Few cautions

- New materials that are resistant to temperature and less vulnerable to dust accumulation are needed
- Co-generation of power and water production is clear way to proceed to make technology more economically feasible
 - Ex: Coupling of water desalination and power generation.
- Typical thermal energy storage using molten salt are being used to store thermal energy during night times when solar generation power is down

Emerging Technologies: Photovoltaic Technologies

Challenges exist from the high temperature and dust concentration prevalent in many ESCWA countries.

Efforts are being focused on new materials and composites:

- Maintain high efficiencies at high temperatures
- Self-cleaning surfaces that are robust under high dust

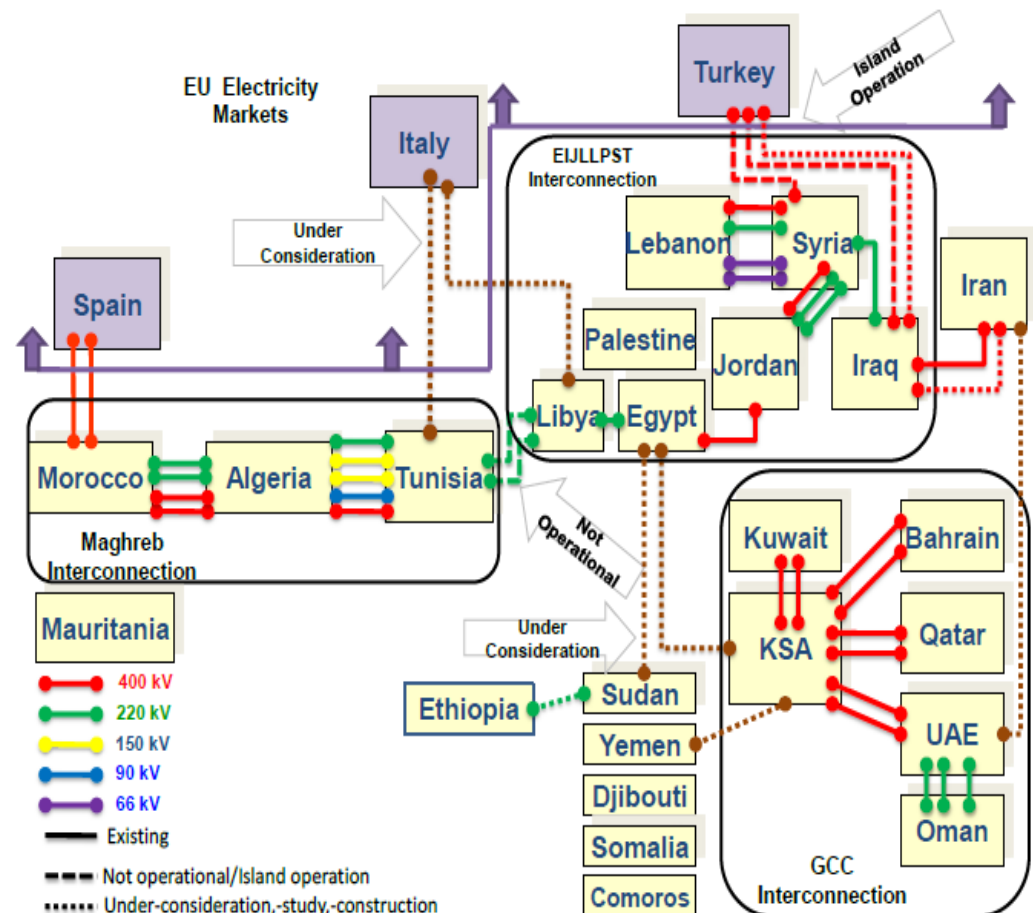
Electric energy storage is of concern.

Battery storage is heavy, bulky and very costly.

Framework:

Regional integration and infrastructure

- 3 major regional interconnection grids in the Arab region
 1. Maghreb regional interconnection
 2. EIJLLPST regional network
 3. GCC power interconnection



Framework: *Renewable Energy-Readiness factor and Competitiveness Index*

1. Infrastructure

- Natural resources, country overall infrastructure, grid capacity, market infrastructure, electricity access rate and projected demand

2. Institutions

- Public and private institutions related on renewable energy, key policies, access to renewable energy finance, macroeconomic environment.

3. Human capital

- Technical and commercial skills, technology adoption and diffusion and awareness among consumers, investors and decision makers.

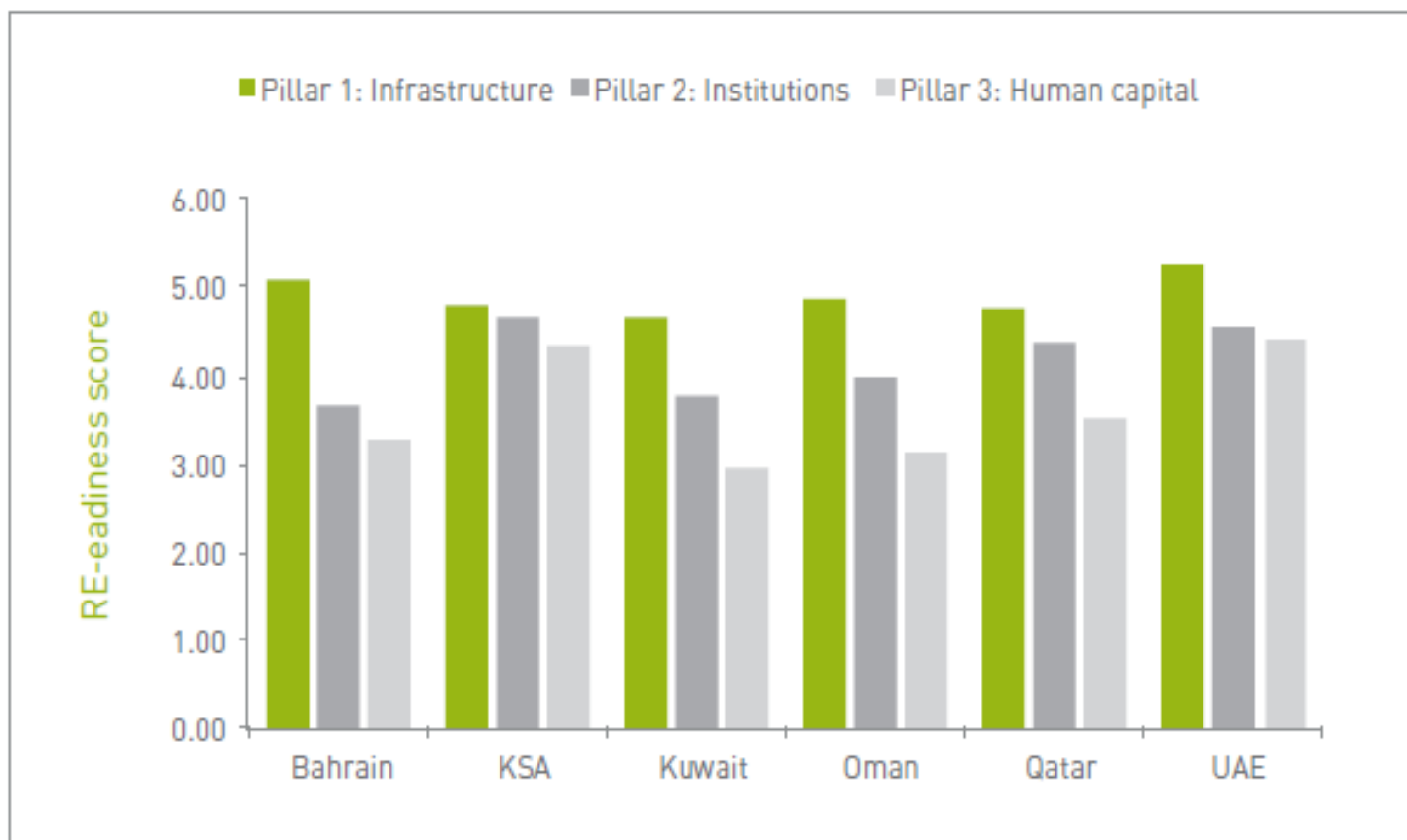
Global competitiveness scores of the GCC countries

Global Competitiveness Index (GCI)-pillars	Bahrain	Kuwait	Oman	Qatar	KSA	UAE
GCI 2012-2011	4.5	4.6	4.6	5.2	5.2	4.9
Basic requirements	5.4	5.2	5.6	5.8	5.7	5.8
Institution	5.3	4.4	5.3	5.4	5.5	5.2
Infrastructure	5.1	4.4	5.2	5.2	5.3	6.0
Macroeconomic environment	5.1	6.6	6.5	6.4	6.1	6.1
Higher education and training	5.0	3.8	4.2	4.6	4.8	4.8
Goods market efficiency	5.2	4.3	4.8	5	5.2	5.2
Financial market development	5.1	4.2	4.7	5	5.1	4.6
Technology readiness	4.5	3.7	4.1	4.7	4.3	4.9
Innovation	3.2	3.0	3.4	4.7	4.2	4.0

Source: WEF, 2011 and Khalifa, 2012

Framework for achieving national Renewable Energy Targets in the Arab Region

The GCC countries' attractiveness index on renewable energy development pillars



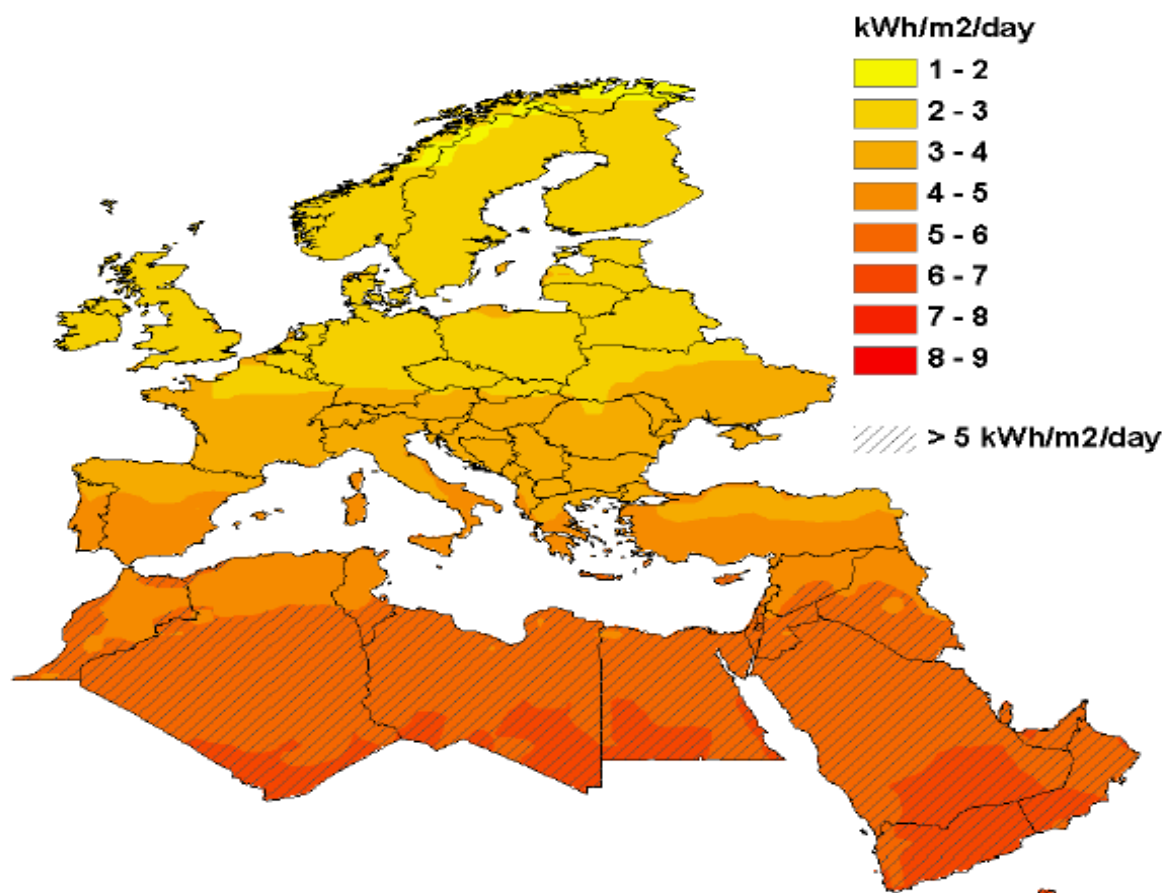
Source: WEF, 2011 and Khalifa, 2012

Main barriers that limit competitiveness

1. Bureaucracy and inefficient institutional structures
2. Lack of policy support
3. Fossil fuel/electricity subsidies

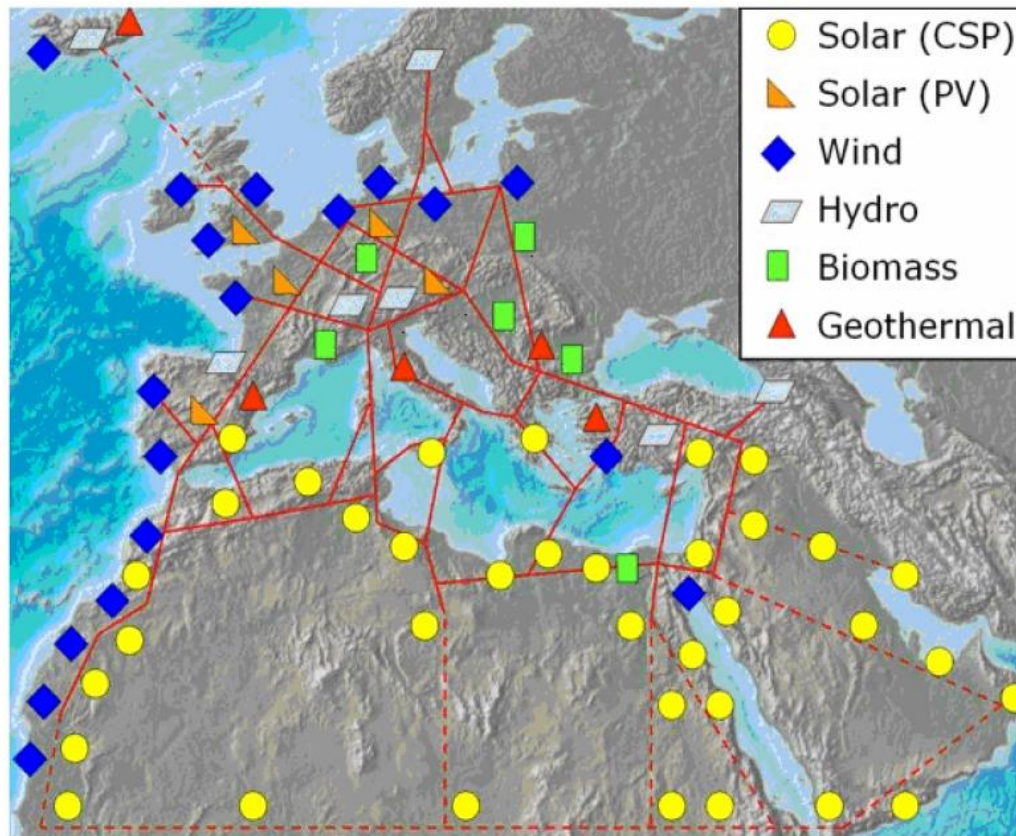
Mapping renewable energy potential in the Arab World

SOLAR MAP OF THE ESCWA REGION



Mapping renewable energy potential in the Arab World

Renewable Energy Map for the Arab World



HYDROPOWER : LEBANON CASE STUDY

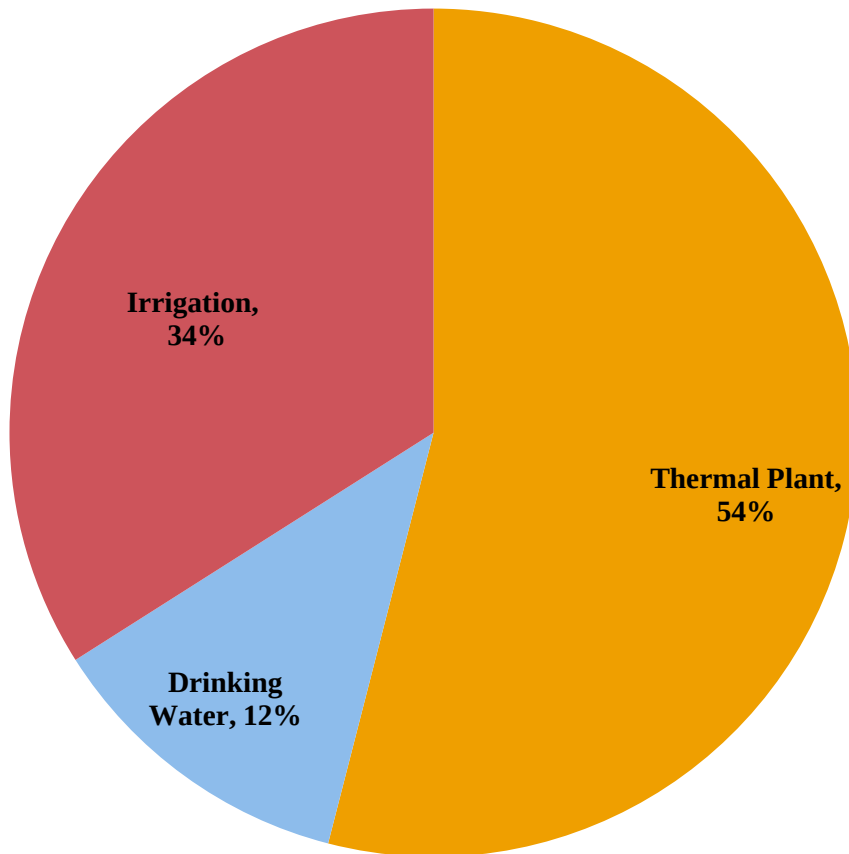


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Hydropower Potential of Lebanon



Energy Potential of 20 non river sites visited in Lebanon.

Source: CEDRO-UNDP, 2013

Challenges and Opportunities of Hydropower potential

1. In stream hydropower energy resources and non-stream hydropower energy resources
2. Quantification of impact of climate change on hydropower production to fully understand the economic and technical impact is needed

Challenges and Opportunities of Hydropower potential (continued)

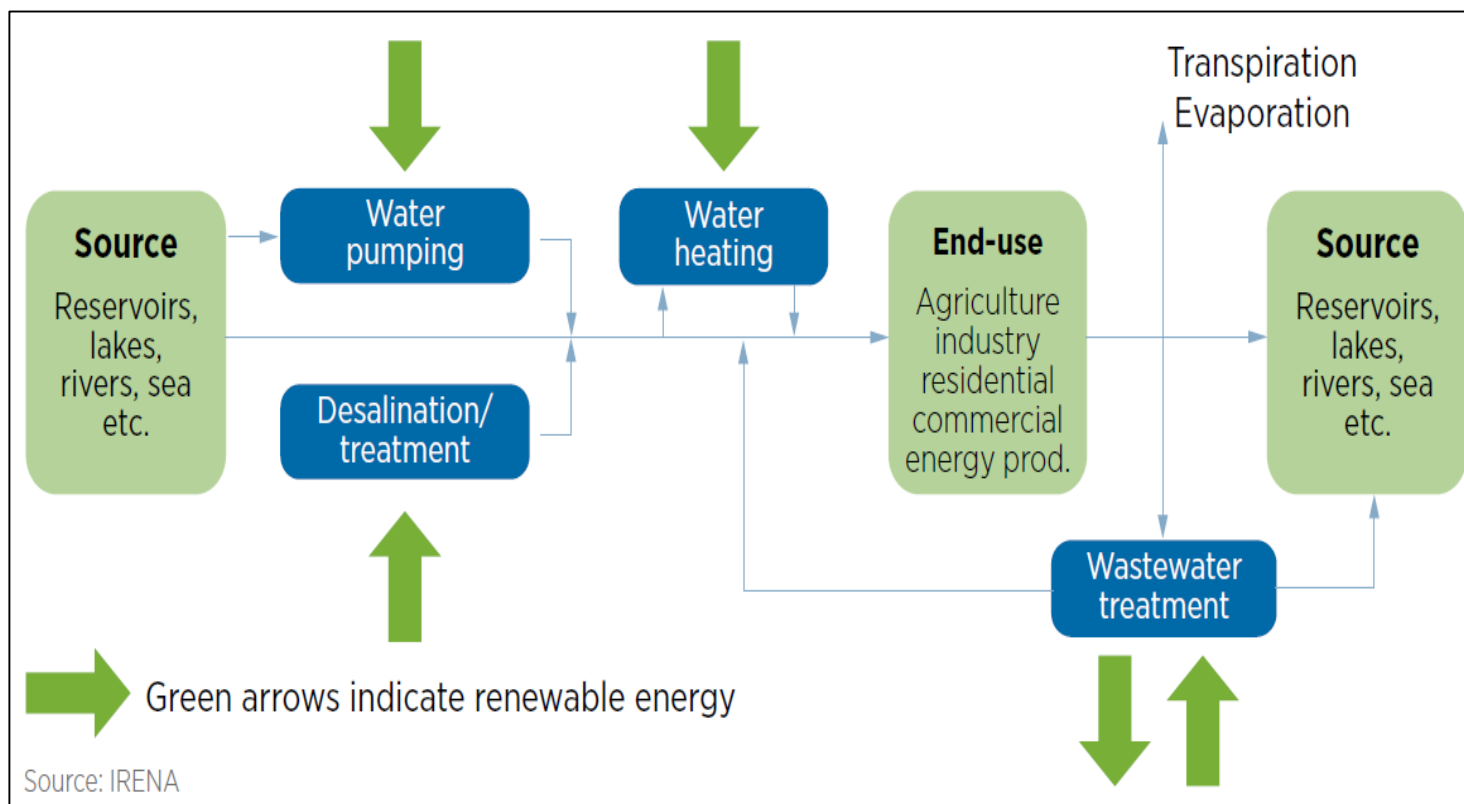
3. Hydropower risks need to be taken into account as nexus tradeoffs
Nexus tools are ideal to assess these tradeoffs and are described in the “Examining the Water-Energy Nexus” Module

Lebanon's attempt to diversify renewable energy sources

The Lebanese Ministry of Energy and Water has expressed interest in developing solar energy, in addition to investing in hydropower.

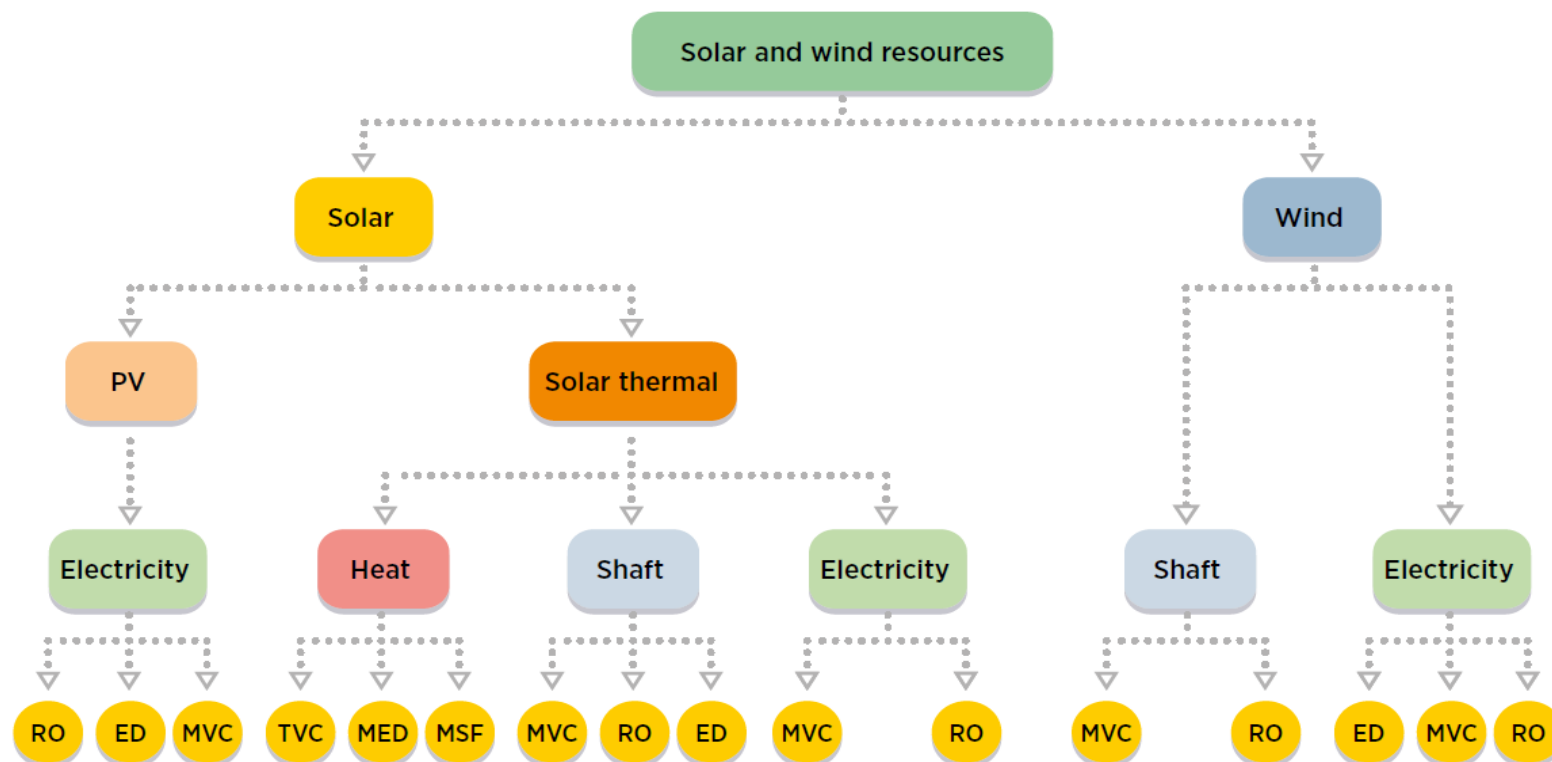
The Lebanese government, and most ESCWA countries, will have to rely on international and technical assistance

Renewable Energy in the Water Supply Sector



Source: IRENA, 2014.

Renewable Energy in Water Desalination Processes



Source: IRENA, 2014.

An example of Solar Desalination in Qatar



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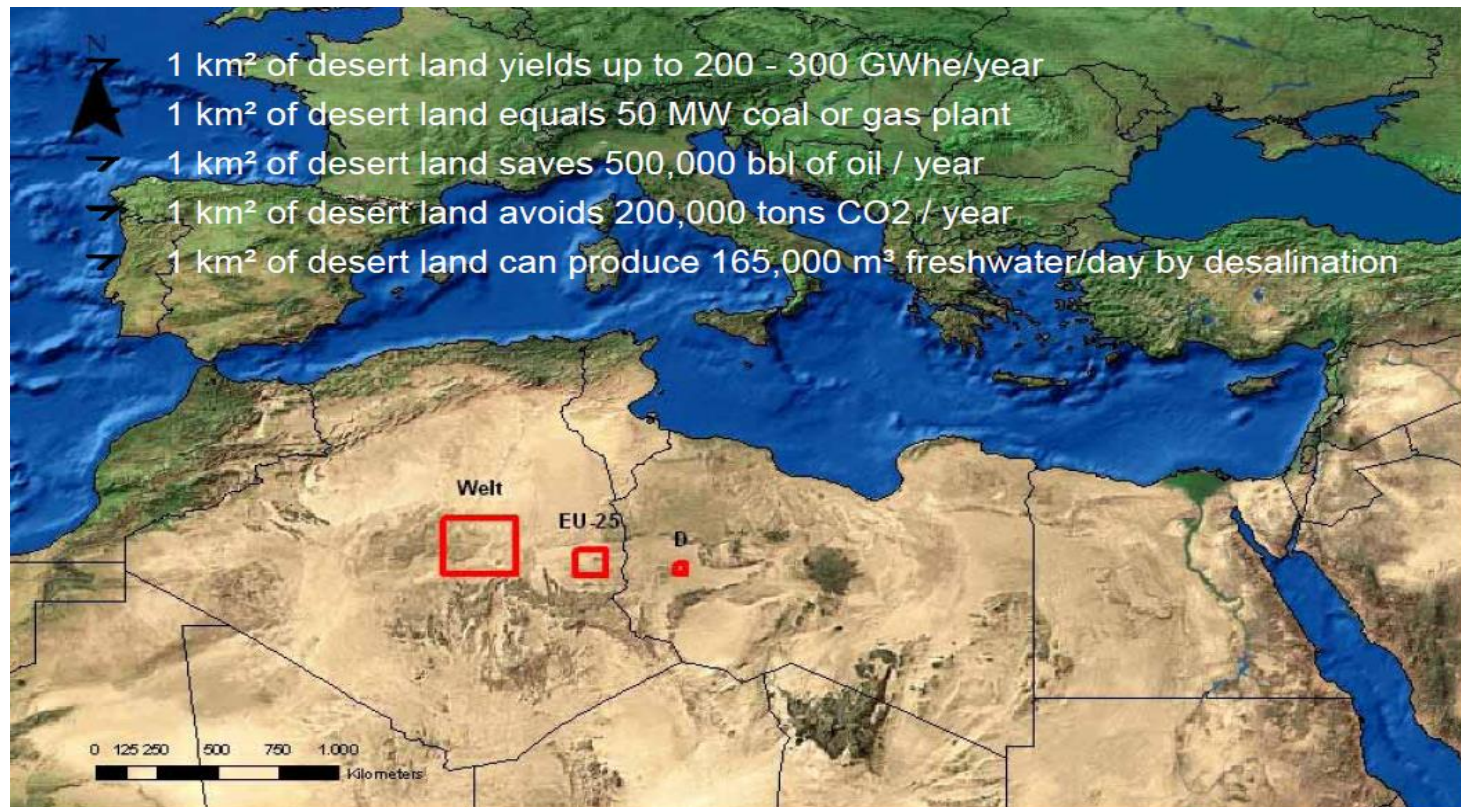
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Solar technologies to consider for Qatari conditions

1. Fresnel Solar collector
2. Parabolic trough + Molten salt storage unit for electricity production (day and night)
3. Dish collector (Sterling motor) for local electricity production
4. Concentrated Photovoltaic collector for electricity production

Solar Desalination in Qatar

Land requirements for solar energy production



Source: Mohtar, 2012.

The small to big red squares represent the piece of land you need to cover, in Algeria, with CSP mirrors to generate enough electricity for Germany, for EU-25 (EU union), and the world. Source: Desertec Project.

KEY MESSAGES



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Key Messages

1. Growth in renewable energy deployment has to be supported with consideration of the positive and negative impacts on other sectors
2. Renewable technology must be localized and requires more planning and investments in many areas
3. Renewable energy plans should be viewed as integrated solutions between water and energy

Key Messages (continued)

4. Renewable energy stimulates the food sector, directly impacts water security and can ease the stresses and potential tradeoffs between water, energy and food sectors.
5. Overall, these dynamics of renewable energy presents both opportunities and challenges for the regional energy, water, land and food resources in the ESCWA region
6. A framework was presented for renewable energy transformation and, specifically a roadmap for MENA countries

Thank you



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