Economic and Social Commission for Western Asia

Potential Blue and Green Hydrogen Developments in the Arab Region

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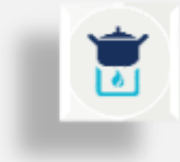
Is the Arab region on track to meeting targets under SDG 7

Electrification - 2019

- **90%** of the Arab region is electrified.
- **45 million** still remain without electricity access. Mainly in six LDCs with **41%** deficit in rural.



Clean cooking - 2019

- Access to CFTs is encouragingly high in the Arab region with **87%**.
- **53 million** people still lack access to CFTs, mainly in rural LDCs and conflict areas.

Renewables - 2018

- RE consumption averaged around **13%** of the region total final energy consumption, mainly in Residential sector (**around 83%).**
- The share of solar, wind and hydro power lies at only **19%** of the region's RE total.

Efficiency - 2018

- 2nd lowest energy intensity of the world's regions, largely an artefact of its fuel mix based on widespread efficient use of gas. EI for the region stood at **5.06 MJ/US$ 2017 PPP**
- **Transport** remains by far the most energy-intensive sector, accounting for 30% of TFEC in the Arab region in **2018**. Building EI is growing, albeit starting from a low point by global comparison.

Why Hydrogen is needed in the Arab Region

- Diversifies energy mix and enhances energy security
- Reduce dependence on hydrocarbons both as a source of revenue and in the energy mix
- Contributes to economic diversification
- Preserve value and enhance longevity of natural resources
- Support delivery on climate change objectives and 2050 NZE targets
- Leverage the region’s natural gas resources and favourable existing and future RE potential

Hydrogen and Sustainable Development Goals

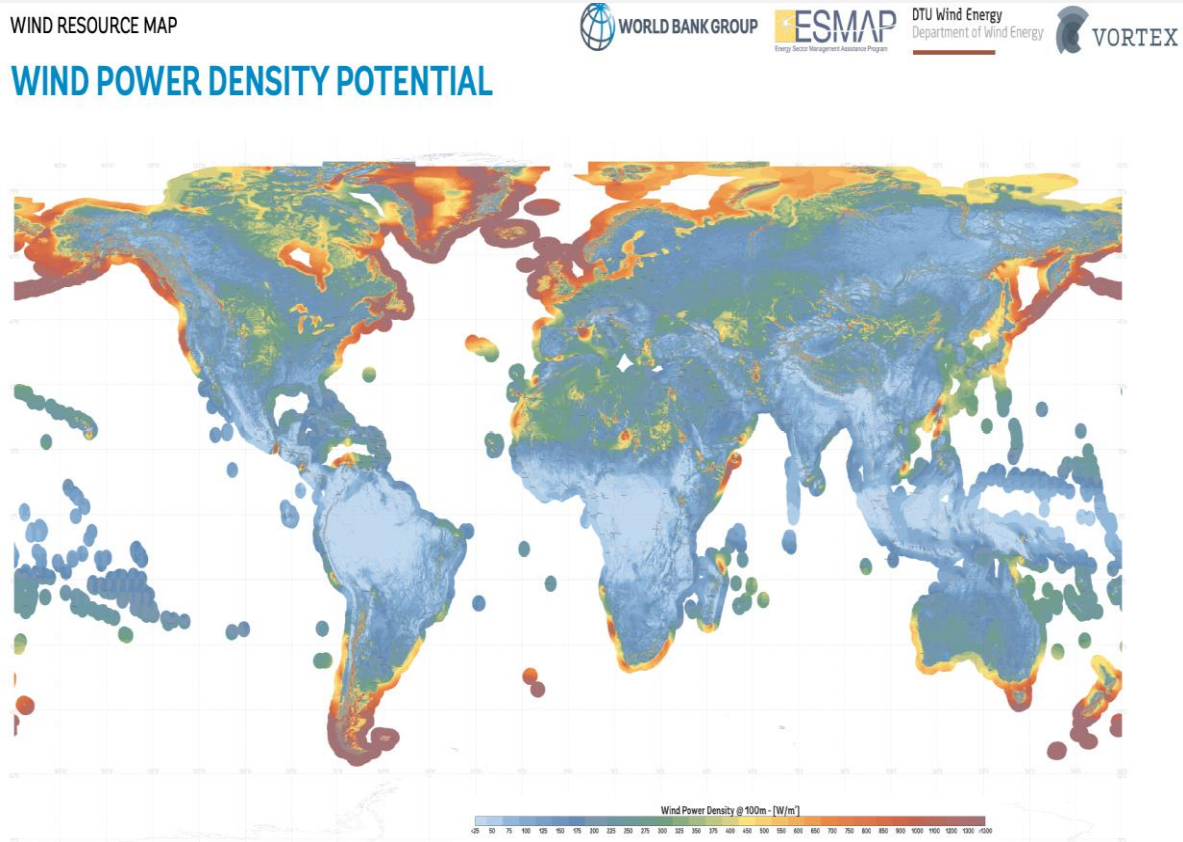
Sustainable Development Goal	Low Carbon Hydrogen Impact
SDG 3: Good Health and Well-being	Clean sources of hydrogen, especially in hard-to-abate sectors, should improve health and wellbeing via reduced pollution
SDG 6: Clean Water and Sanitation	Despite water scarcity in the Arab region, and the challenges posed for green hydrogen, the development of commercially viable and sustainable additional sources of seawater desalination capacities for hydrogen production could also provide clean water supplies for local communities
SDG 7: Affordable and Clean Energy	Production and use of low carbon hydrogen will provide a new source of clean energy, whilst scaling up its production capacity overtime could create viable markets to make it widely affordable.
SDG 8: Decent work and economic growth	Part of a low carbon industry that provide new employment opportunities lead to economic growth
SDG 9: Industry, Innovation and Infrastructure	Low carbon hydrogen is already promoting innovation along the low carbon hydrogen chain
SDG 11: Sustainable Cities and Communities	Large-scale use of low carbon hydrogen in the mobility or transport sector would contribute to the reduction of road traffic pollution and help improve the environment of cities and communities
SDG 13: Climate Action	Low carbon hydrogen is part of a mix of clean solutions to address the issue of climate change mitigation, especially in hard-to-abate sectors.

Hydrogen prospects

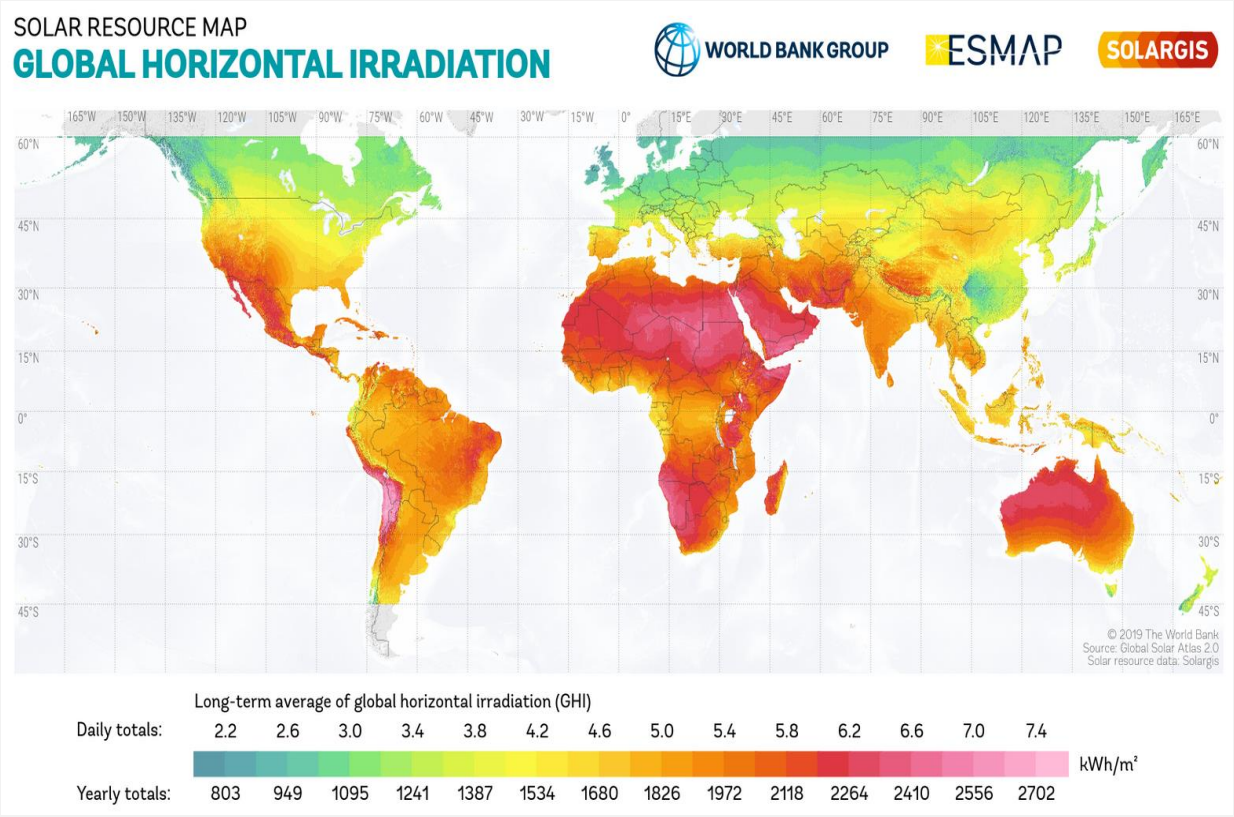
Hydrocarbon Producing Countries	Fuel Importing Countries
Low RE generation costs to produce green hydrogen	Leverage low cost RE available, under development and planned to produce green hydrogen
Ample low-cost natural gas supplies for blue hydrogen production with CCS or CCUS – where CO2 can be used for EOR or stored in depleted hydrocarbon reservoirs	Engage in regional trade and transport of Hydrogen especially where existing gas pipelines can be leveraged
Use of existing hydrogen plants and related infrastructure in oil refineries and ammonia sites to produce low carbon hydrogen.	
Leveraging the use of existing industrial parks (e.g., Jubail in KSA) to create new hydrogen hubs or clusters	
Shipping experience of Arab LNG/LPG exporters could be leveraged for the long-distance trade of low carbon hydrogen and ammonia	

Great potential to develop RE in Arab region, but the share of RE in energy mix is very low

Favourable wind potential



High solar irradiation



Major hydrogen developments

- There are several Arab countries that are actively pursuing and/or planning new low carbon hydrogen developments.
- Saudi Arabia is establishing one of the largest hydrogen hubs in the city of NEOM to produce more than 4 million tonnes of green & blue hydrogen per annum
- Other Arab countries with existing or planned large RE capacity and/or with natural gas resources have expressed interest in hydrogen developments
- Sonatrach and Eni development of a pilot project to produce green hydrogen in Algeria –
  - Italy's Snam agreed to buy a stake in a giant pipeline transmitting natural gas from Algeria to Italy
- Hydrogen plans/targets are not explicitly outlined in the NDC's of Arab countries, but targets on RE and CCS/CCUS can indicate the potential for developing Hydrogen

Overarching challenges

- Significant uptake of RE is needed to cater for green hydrogen – region is lagging
- Water consumption is needed for green hydrogen,
  - especially in areas with no access to potential sources of seawater for desalination capacities
- Desalination is an energy intensive and costly process – opportunity to supply freshwater to local communities.
- Availability of skills and relevant manufacturing capacity for technology components
- Heterogenous endowments of financial resources
- In the GCC area alone, estimates on annual investments of US$16 to US$25 billion would be required over 25 years to install 150 to 210 GW of electrolysis capacity to achieve a green hydrogen production of 50 to 70 million tons by 2050
- Need for adequate legal and regulatory framework to support the scaling up of low carbon hydrogen production capacities

Key policy recommendations

- Formulation of low carbon hydrogen strategies
  - Reflect each country's carbon neutrality objectives RE and non-RE endowments, and financial position
  - Encourage involvement of all relevant public and private sector stakeholders in the initial design to obtain buy-in
  - Devise strategies based on thorough multi-disciplinary assessments, including social and environmental impact studies and cost/price sensitive market evaluations
- Leverage existing international partnerships.
- Addressing funding and financing of projects along the entire low carbon hydrogen chain as a matter of priority
- Develop adequate legal and regulatory framework to incentivise low carbon hydrogen investments
- Policymakers need to understand thoroughly, and address all the barriers that could arise in this potential new trade with other regions of the world
- Strongly encourage and fund relevant research and development activities and the effective participation of local universities and research centers, including international research and development partnerships.

Thank you

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