Oman Green Hydrogen Strategy

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Hydrogen Oman

22ND ERRA ANNUAL CONFERENCE
Progressing Energy Transition via Effective Policies and Regulation

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Oman today

Oman tomorrow

Oil & gas

Green Hydrogen

Road to net zero by 2050

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Oman has 5 strategic objectives to move into Green H_2

Ensure energy security for Oman and global demand

Diversify the local economy, onshore the supply chain, forward connect industries and create local long-term jobs

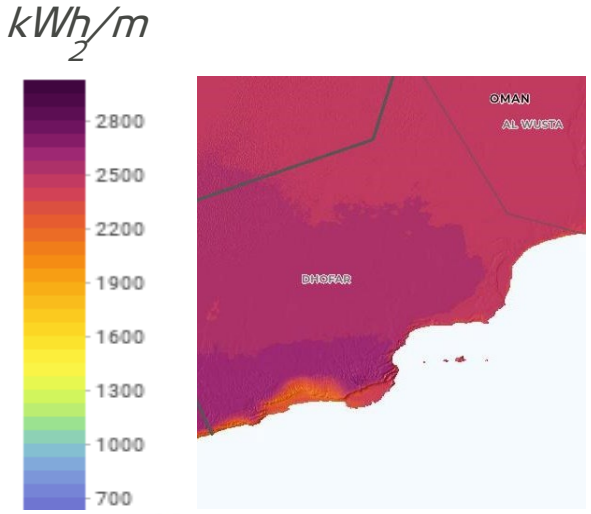
Decarbonize the country to safeguard a sustainable future

Create a Green H_2 sector with a competitive LCOH for export markets and attractive for Foreign Direct Investments

Support innovation and ensure capabilities development for Oman

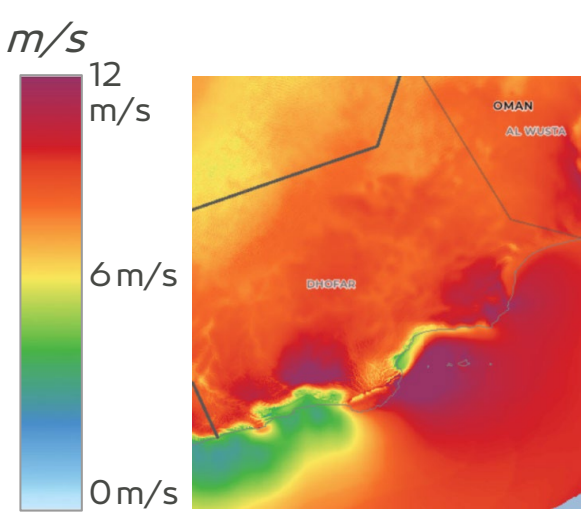
Oman is one of the top countries for renewable resources

Solar PV potential[1]



>2400 kWh/m²

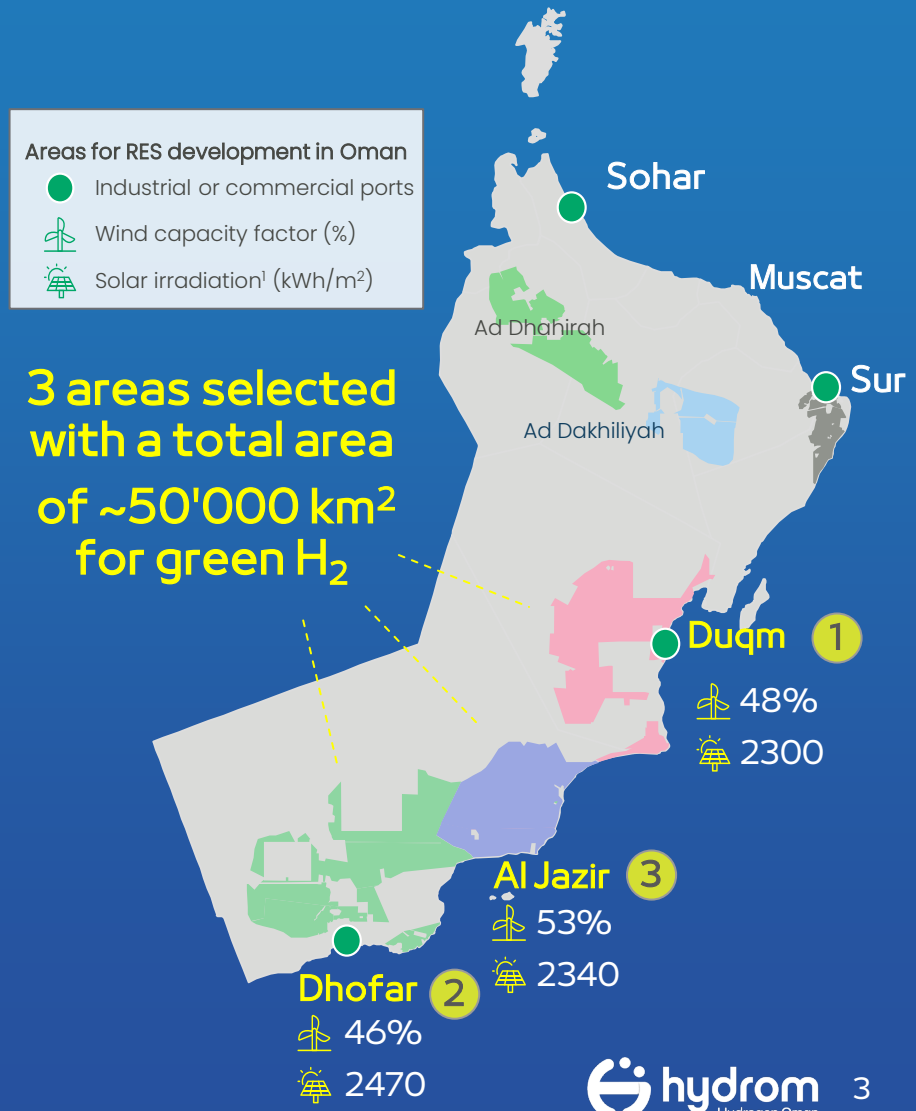
Wind speed



Up to 11 m/s

1. Global Horizontal Irradiation (GHI)
Source: Global solar atlas, Global wind atlas (July '22)

50,000 km² allocated for green H_2 projects

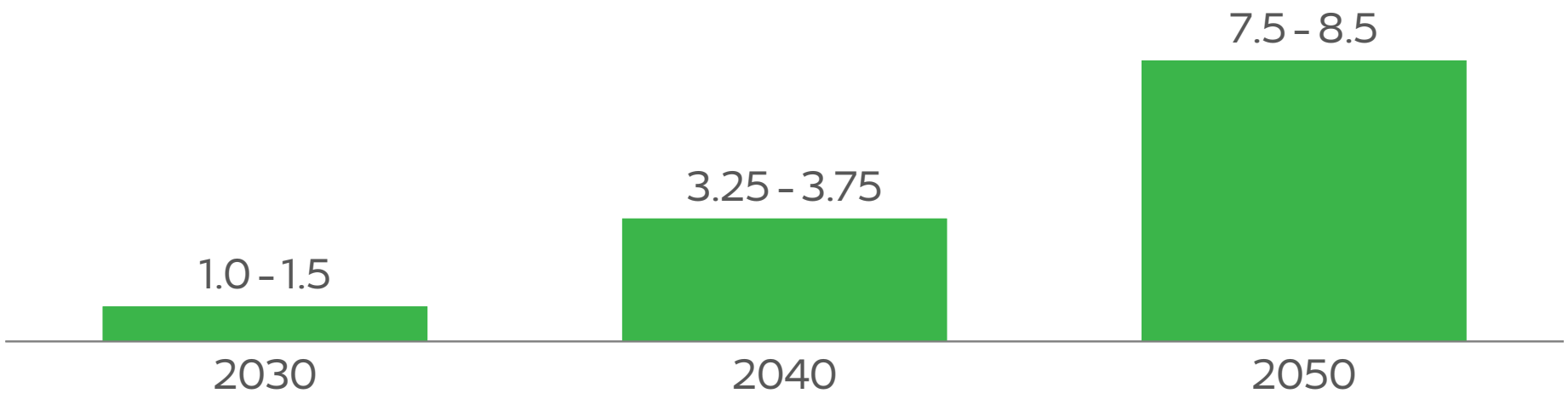


Oman has ambitious production targets until 2050, with already >1 Mtpa by 2030

Green H_2 production ambition for Oman in 2030-2050 (Mtpa)

Includes exports mainly to Europe and Asia, and local Omani demand

Oman expected to become among top 10 H_2 exporters by 2030 according to IEA



	2030	2040	2050
Electrolyzer capacity[1] (GW)	8-15	35-40	95-100
Renewables capacity[1,2] (GW)	16-30	65-75	175-185

1. Approximate values for Duqm, Oman 2. Includes 25% buffer over Renewables needed for electrolyzers to account for Balance of plant load (which includes NH3 synthesis loop, Storage tanks for H2/NH3, another auxiliary facilities load). Assumption: Sustainable Development Scenario (2°C). Source: Team analysis; IEA

Oman's concrete actions to develop its H_2 economy

50,000 km^2 of land

Land allocated for gH2 production projects

Hydrogen auctions

Clear process, 2 auction rounds completed and launched 3rd AR

8 projects awarded

~1.38 mtpa of H_2 by 2030 with +49 B$ investments

Oman gH2 Strategy

Provided clarity and direction

Shared infrastructure for gH_2

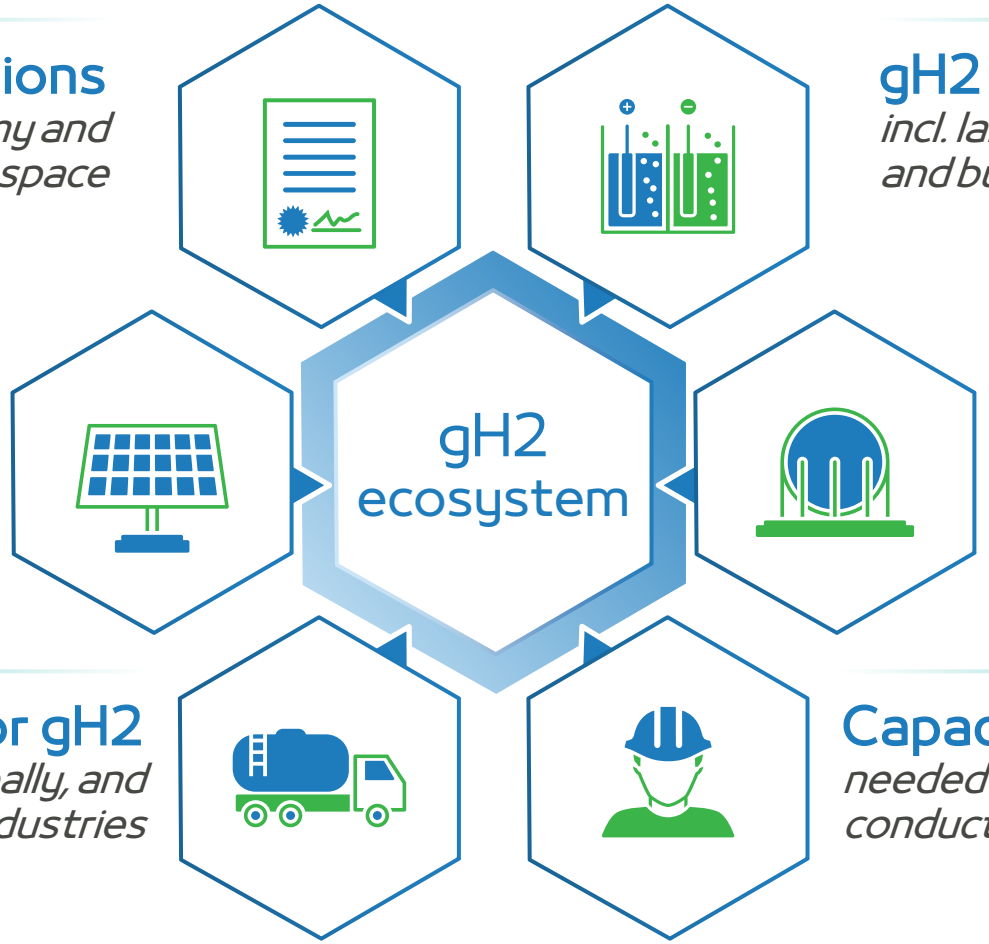
Master planning finalized; pre-feed activities underway

Establishing a gH2 ecosystem in Oman requires the development of multiple elements

Policies and regulations
governing the gH2 economy and operations in the space

gH2 supply
incl. land delineation, auctions of blocks and building and running gH2 facilities

gH2 supply chain
incl. tech, equipment and mtl., sourced internationally & locally



gH2 infrastructure
incl. structuring and development of shared infrastructure

Demand for gH2
locally and globally, and for downstream industries

Capacity and skills
needed to run gH2 operations, and conduct R&D work

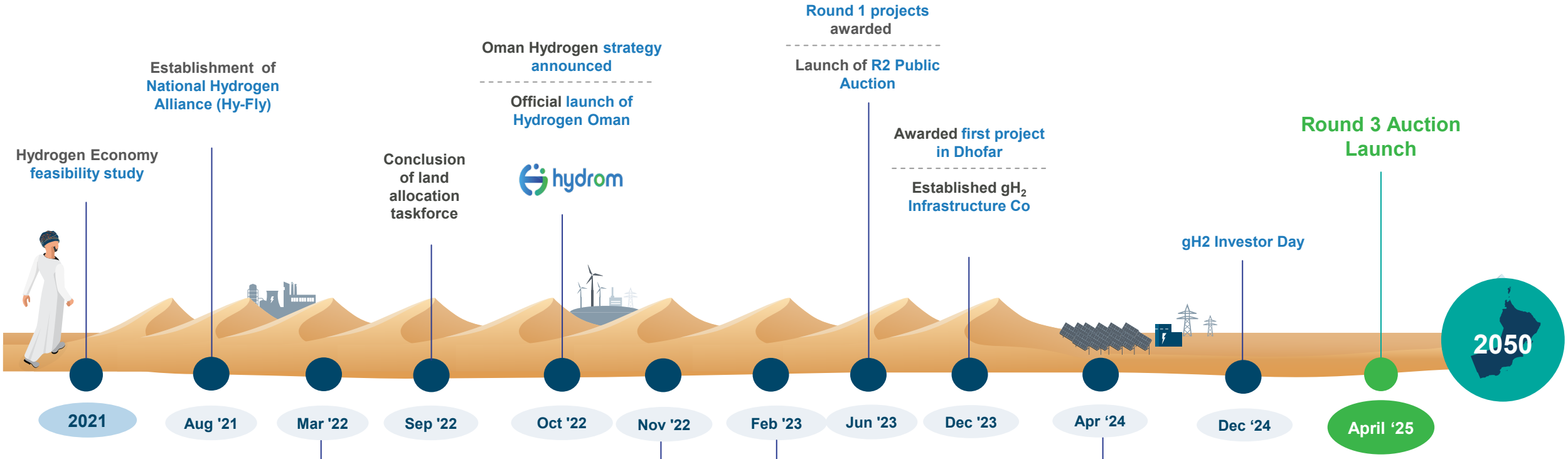
Clear sector structure and multiple roles needed to drive gH_2 ecosystem in Oman, with Hydrom as central orchestrator

	Policies & regulations	Strategy & masterplan.	Auction	gH_2 project dev.	Shared infra	Logistics	Demand	Spin-off industries
Role	• Design policies and regulations for gH_2 industry	• Develop national gH_2 strategy • Delineate lands dedicated for gH_2 development	• Manage auction process of gH_2 blocks • Award blocks to gH_2 developers and oversee implementation	• Finance and develop gH_2 projects incl. RE generation, gH_2, & derivative production	• Develop shared infra, incl. electricity transmission, water and H_2 pipelines, desal.)	• Provide logistics, incl. transport and other enabling infra for the gH_2 sector and developers	• Support offtake agreements for gH_2 developers in Oman, incl. negotiating with gH_2 demand aggregators	• Industries that could benefit indirectly from gH_2 (e.g., agriculture with excess power and water)
Involved entities	وزارة الطاقة والمعادن Ministry of Energy and Minerals	hydrom	hydrom	POSCO HOLDINGS, PTTEP, EWP, SAMSUNG, KOSPO, ENGIE, CIP, AL KHADRA, BLUE POWER PARTNERS, OQ, HYPORT, SHELL, DEME, GEO, EDF, actis, J-POWER, Yamna, DT	• Infrastructure providers • National champions OQGN, نماء nama	Public Authority for Special Economic Zones and Free Zones Sultanate of Oman; Ministry of Transport, Communications and Information Technology Sultanate of Oman; Duqm Special Economic Zone Authority; ASYAD	hydrom	وزارة الطاقة والمعادن Ministry of Energy and Minerals; Ministry of Agriculture, Fisheries Wealth & Water Resources; سلطنة عمان وزارة التجارة والصناعة وترويج الاستثمار Ministry of Commerce, Industry & Investment Promotion
Hydrom role	Advise	Lead	Lead	Coordinate	Coordinate	Coordinate	Incubate	Coordinate

In-Country Value creation — hydrom — Hydrom to **Lead**

Talent and skills — • Ministries of Education and Higher Education • Developers • Higher education inst. — Hydrom to **Advise**

Oman already made significant steps in its H_2 journey



Royal Directives for Hydrogen

- Set the required strategy, policies and legal framework
- Allocate lands for gH_2
- Establish a Directorate General for Clean Energy & Hydrogen
- Establish a company to develop the Hydrogen sector

Creation of Directorate General for Renewable Energy & Hydrogen in MEM

Launch of R1 Public Auction

Royal decree RD 10/23 issued (governing the gH_2 sector)

Signed commercial terms sheets with 6 legacy initiatives

All round 2 projects awarded

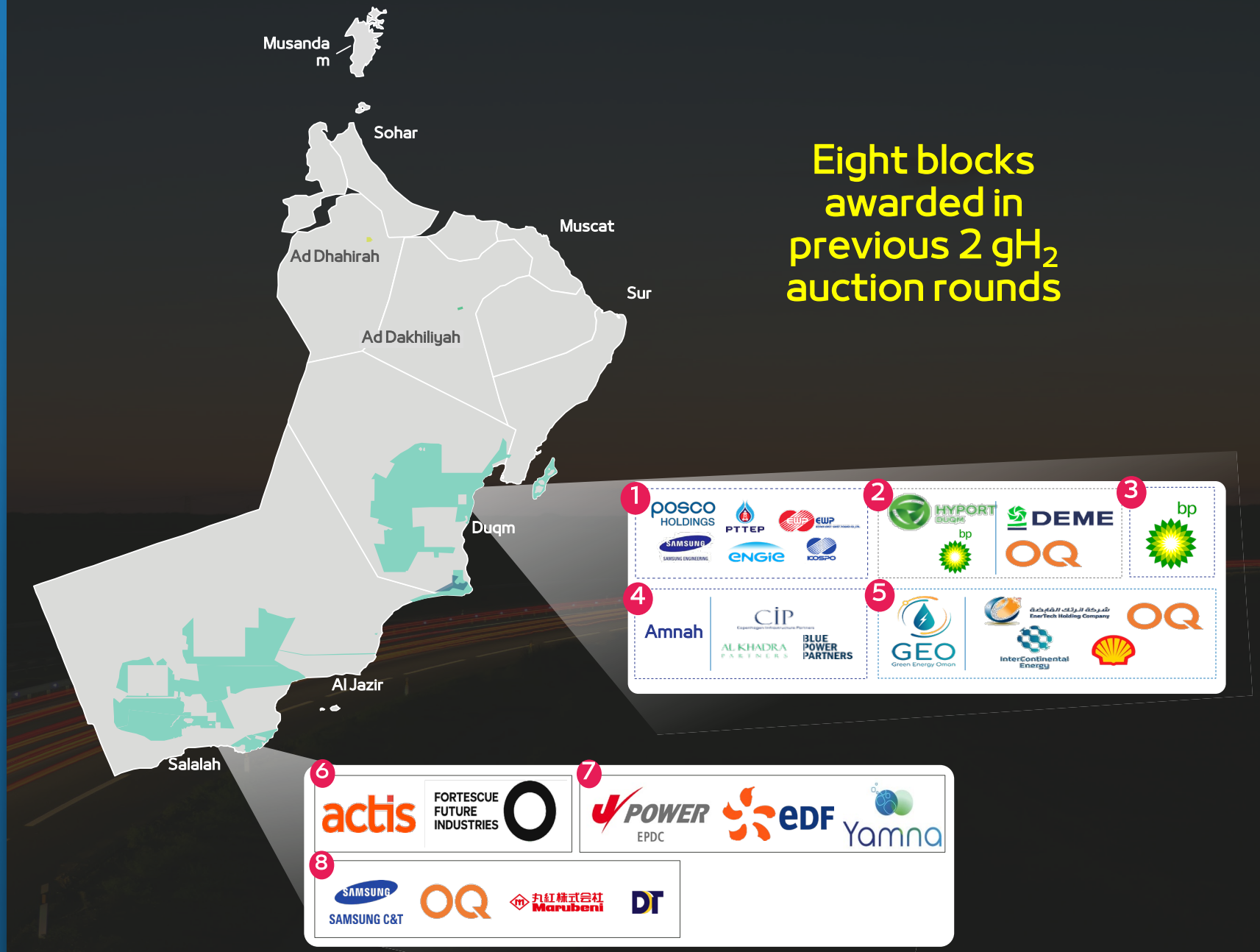
Oman achieved significant milestones across 2 previous gH_2 auction rounds

$50 Bn
Investment

18 GW
Electrolyzer capacity by 2030

35 GW
Renewables' capacity by 2030

1.4 Mtpa
gH_2 production by 2030



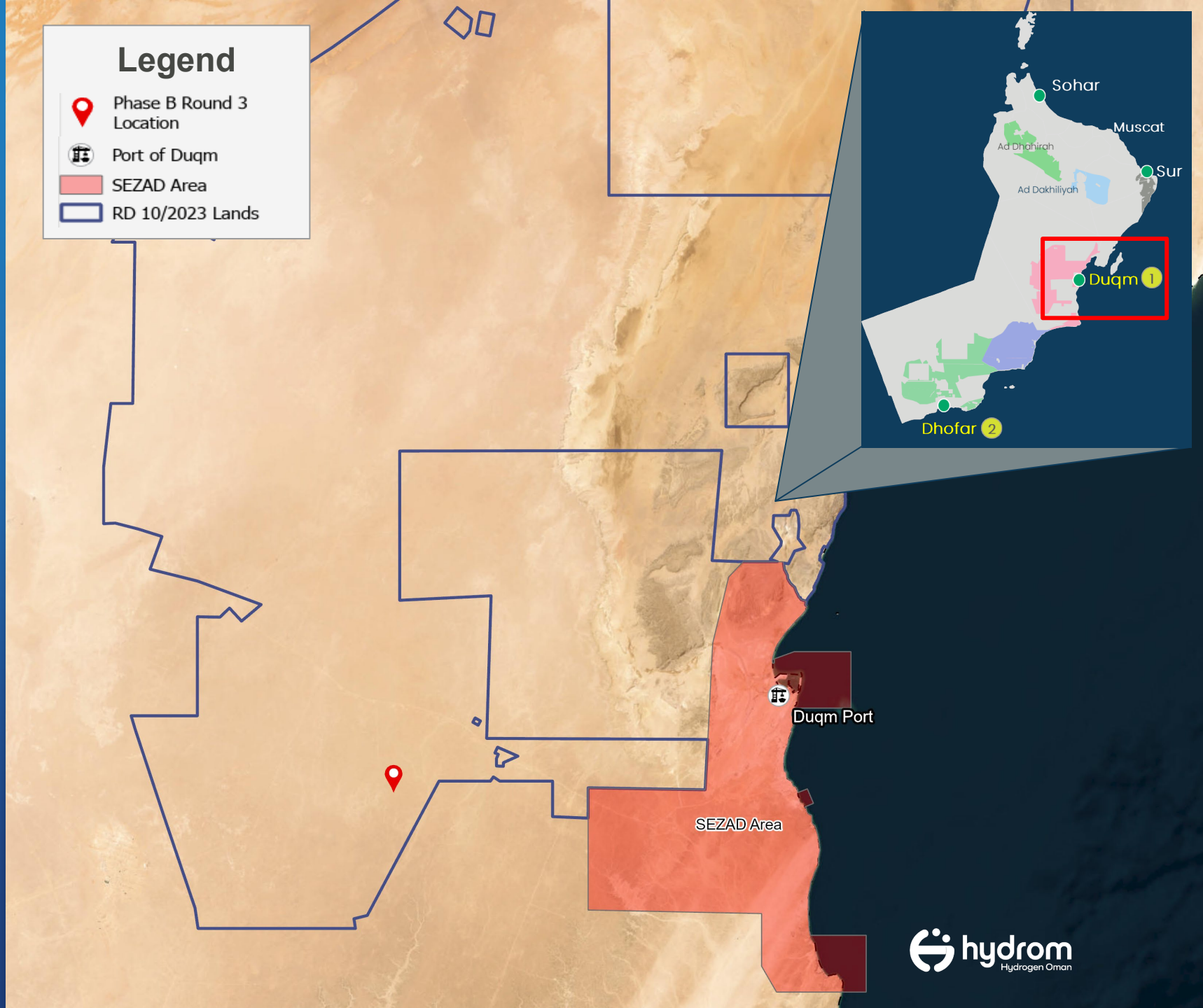
Eight blocks awarded in previous 2 gH_2 auction rounds

Currently open H_2 public auction:

Round 3

Hydrom makes available up to 300 km² in Duqm region

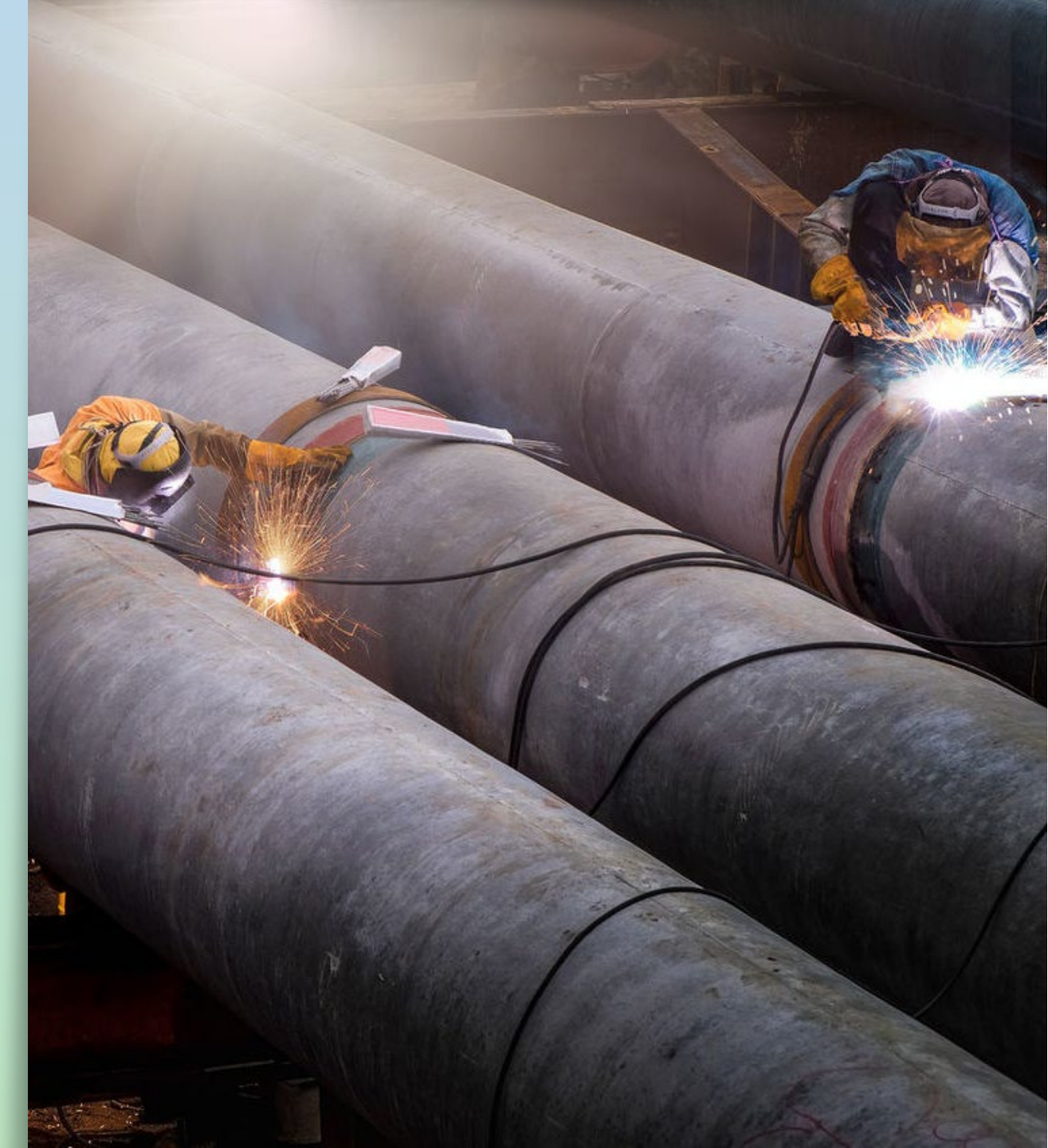
- 100 km away from Special Economic Zone at Duqm
- World-class wind and solar irradiation profiles
- Access to key demand markets in EU and Asia



Oman expects to support gH_2 projects making a shared infrastructure available for common use

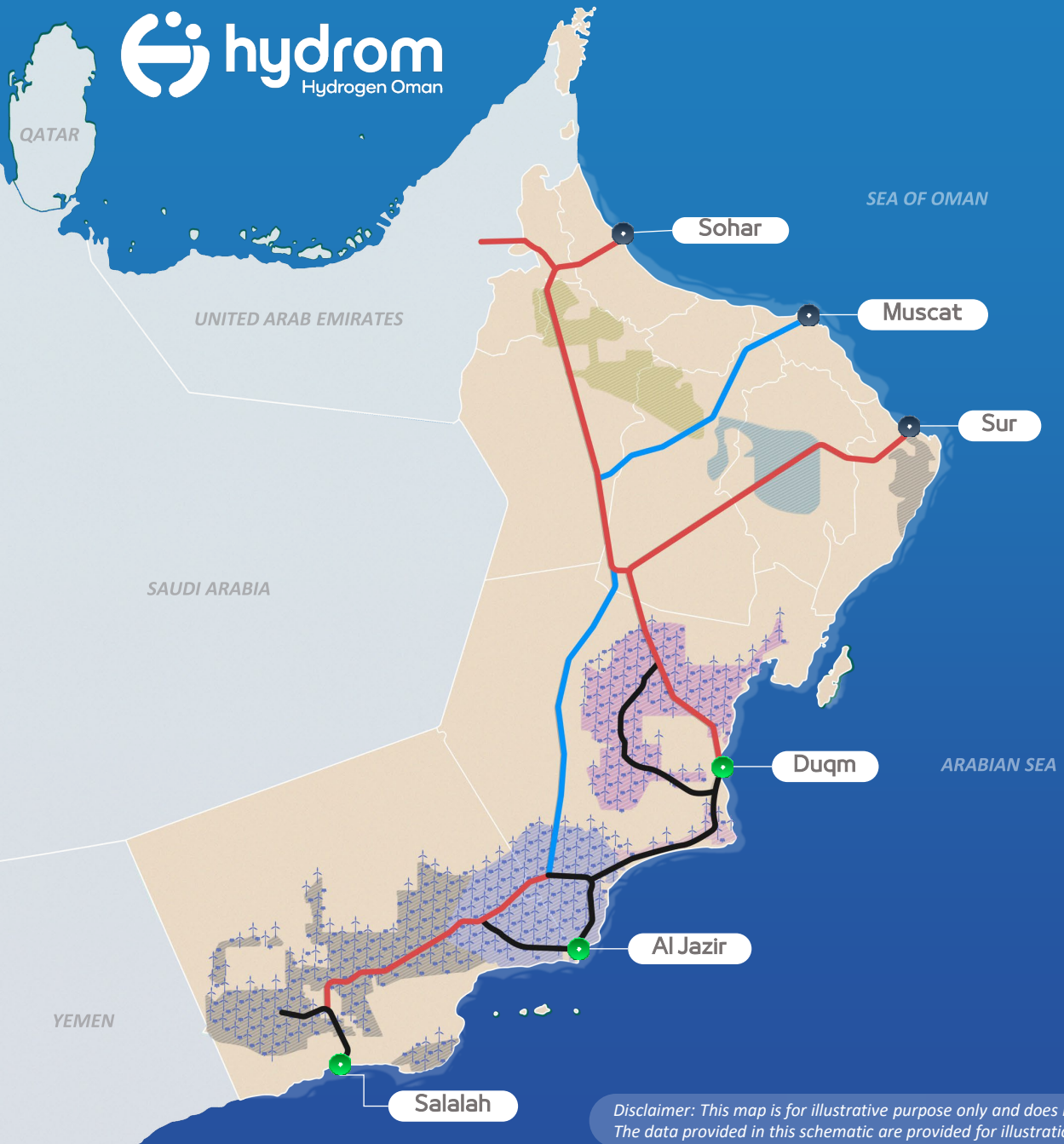
- **Optimal configuration** and conditions being further assessed and defined through **technical studies**

- **Business model and regulatory framework** updates will allow gH_2 Developers to partake in the Shared Infrastructure deployment



Oman will develop a fully integrated hydrogen ecosystem

Oman's integrated hydrogen ecosystem



- Key **economic and industrial zones** of Oman to be **connected** via an infrastructure network
- Approximately **2000 km** of low carbon **Hydrogen pipelines** spread across Oman
- **Spurring localization of key industries** and forward connected industries in existing and new industrial zones

2030 | 2040 | 2050

Green Hydrogen Hub | Wind and Solar plants

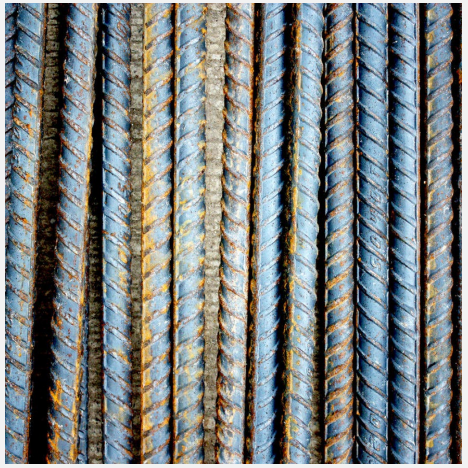
Disclaimer: This map is for illustrative purpose only and does not necessarily accurately reflect international borders.
The data provided in this schematic are provided for illustration purposes only. Hydrom is not responsible for the misuse or misinterpretation of the data.

ICV & Domestic Industry Development are key goals of Oman in its path to developing a green hydrogen ecosystem

In Country Value (ICV)

Domestic Industry Dev.

Local Employment	Education & research	Domestic sourcing[1]	Upstream industries development	Downstream industries development



Opportunities exist across green H2 value chain in Oman

Value chain

Energy generation & H2 Production		CUI	H2 Industrial use	H2 Derivatives and Fuels
Solar panels	Wind turbines	Electrolysis	H2 transport; H_2O transport; Electr. transmission	Refining; Steel; Shipping; Chemicals (Non-exhaustive)	NH_3 Ammonia and other derivatives as energy carrier

H2 adjacent industry development (Material, components & equipment manufacturing)

Green industries Development (H2 consumers)

H2 export hub development

Opportunities across H2 value chain

- Component & equipment manufacturing can be on-shored (e.g., electrolyzers)
- Respective raw materials production can be developed locally (e.g., glass, steel)
- Decarbonized products to be sold for export
- Decarbonized products to be utilized locally
- Oman can become a H2 commercial & logistics hub

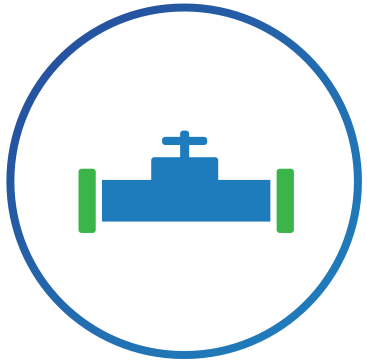
Five potential roles for international players to play in Oman and contribute to the growth of green H_2 economy

H2 project developers

H2 financial partners

H2 equipment providers (OEMs)

H2 industrial off-takers



Infrastructure developers

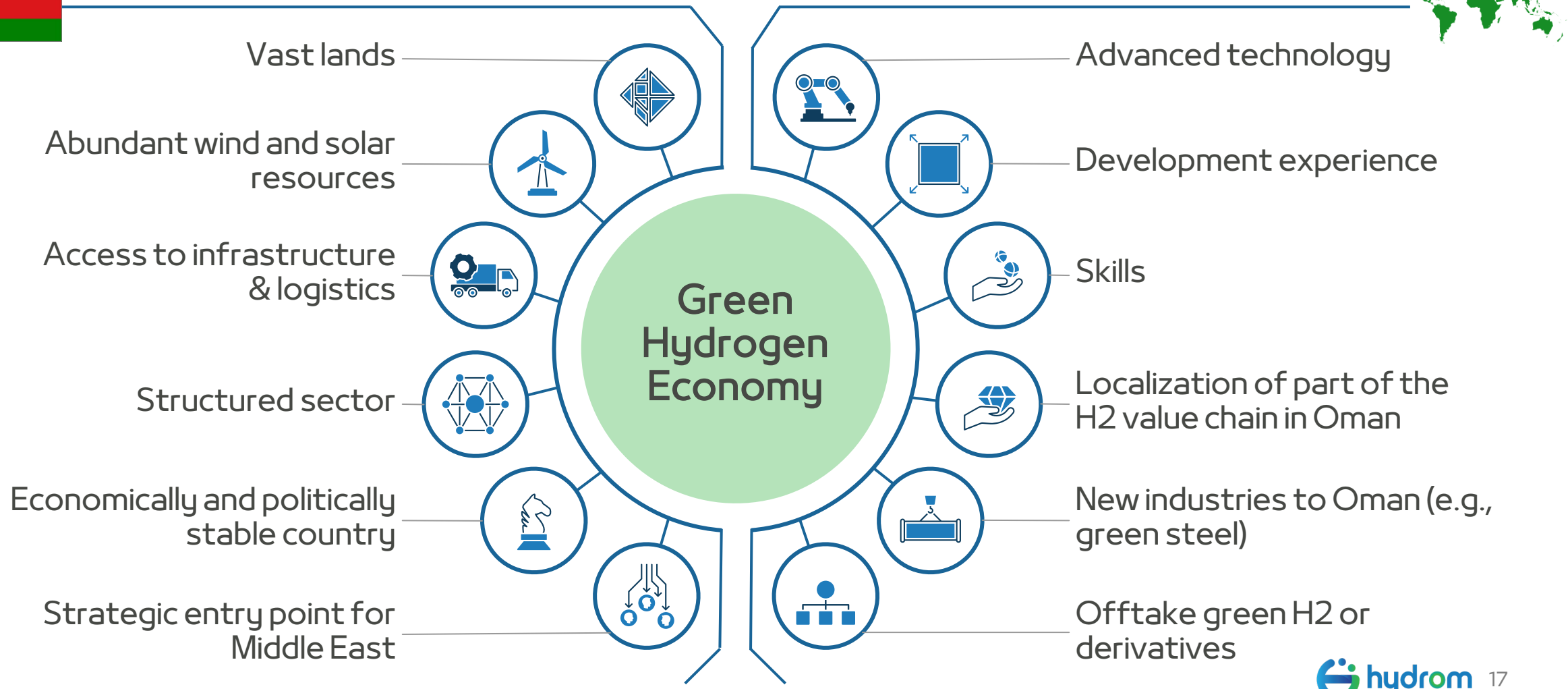
Production equipment

Technical skillset

R&D capabilities

Knowledge-based workforce

Oman and Global Partners can have fruitful collaborations to help build a green hydrogen economy



Oman can become a global sustainability leader

This map provides a conceptual representation and is intended for illustrative purposes only. It does not depict actual masterplans, layouts, or deliverables

Hydrom will be honored to meet international players and provide further information on gH_2 opportunities in Oman

- H_2 project developers
- H_2 financial partners
- H_2 equipment providers (OEMs)
- H_2 industrial off-takers
- Infrastructure developers

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THANK YOU

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