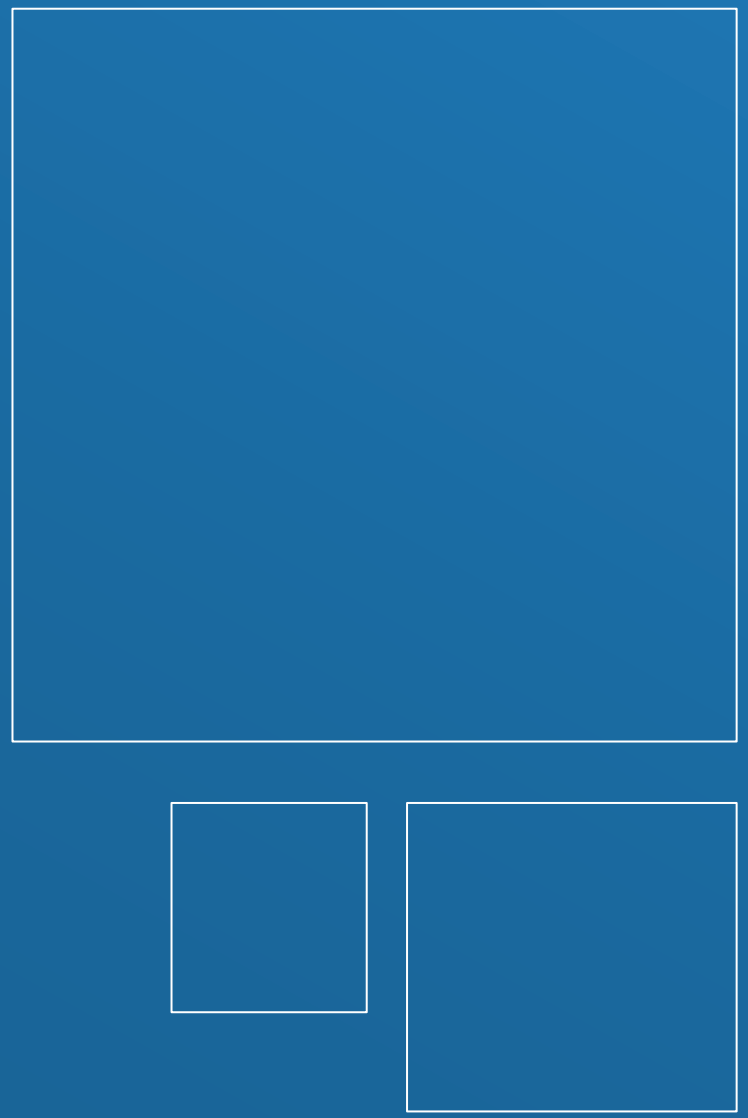
Oman Green Hydrogen Strategy

May 2024



Oman's gH2 strategy
Oman's gH2 journey
Shared infrastructure
Localization
Investing in Oman
Way Forward

Oman today

Oman tomorrow

Oil & gas

Green Hydrogen

Road to net zero by 2050

hydrom
Hydrogen Oman

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, 1st round completed and 2nd open

6 projects awarded

~1010 ktpa of H_2 by 2030 with +38 B$ investments

Oman gH2 Strategy

Provided clarity and direction

Shared infrastructure for gH_2

Concept & timeline approved, infra company incorporated

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

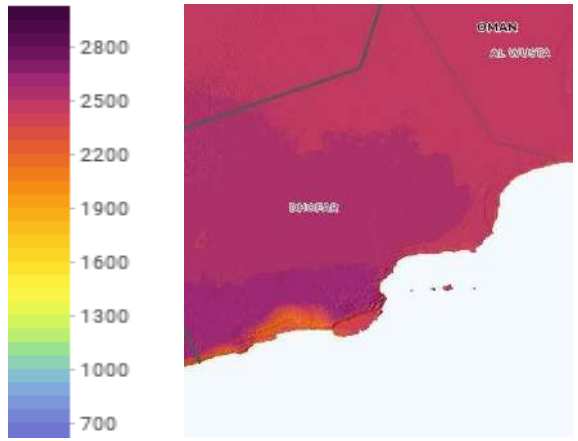
Create a Green H_2 sector with a competitive LCOH for export markets and attractive for Foreign Direct Investments

Support innovation and ensure capabilities development for Oman

Oman is one of the top countries for renewable resources

Solar PV potential[1]

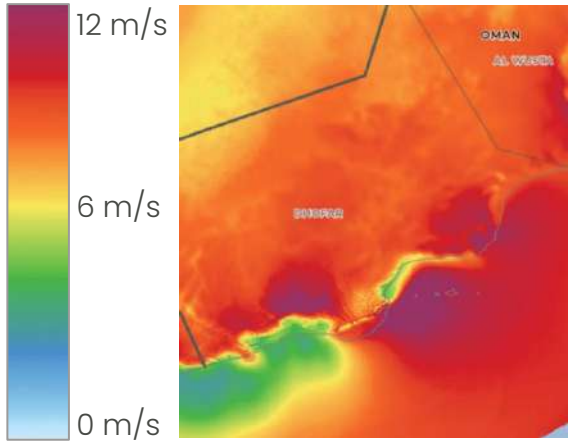
kWh/m²



>2400 kWh/m²

Wind speed

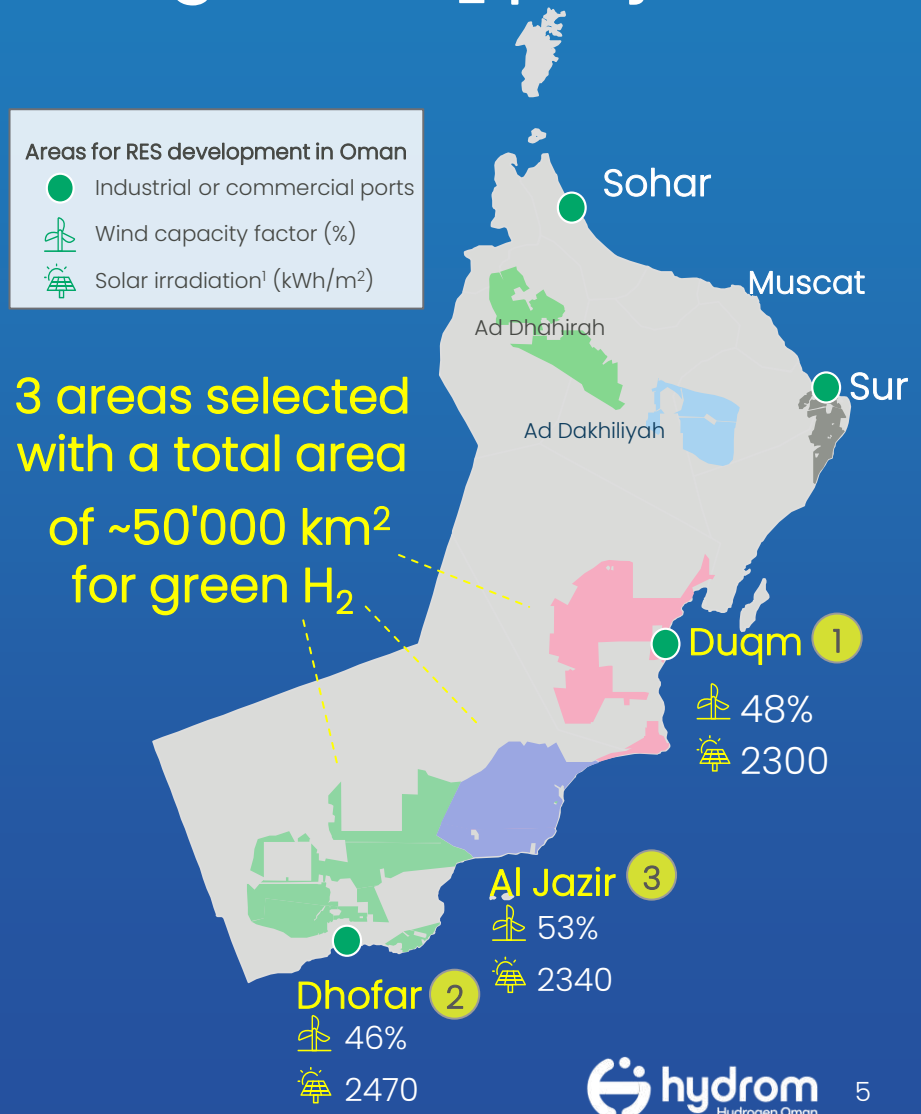
m/s



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

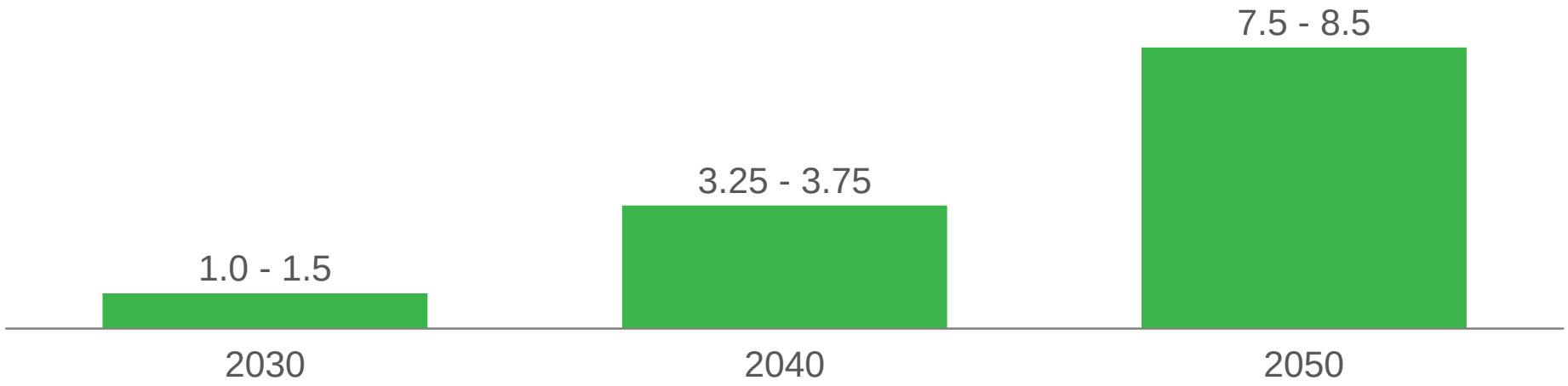


Oman has ambitious production targets until 2050, with already >1 Mtpa by 2030

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

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

Hydrom's Vision and Mission

Vision

Positioning Oman as a leading global green hydrogen hub

Mission

To create a sustainable value to Oman's economy through the development of a competitive and sustainable green H_2 ecosystem

Hydrom assumes different roles across the gH2 value chain

Lead

in components that fall under Hydrom's responsibilities, where the entity is fully and independently leading

Incubate

in components that require Hydrom to set them up and operate them initially before being spun off

Coordinate

in components where implementation is part of other entities' responsibilities but require coordinated approach

Advise

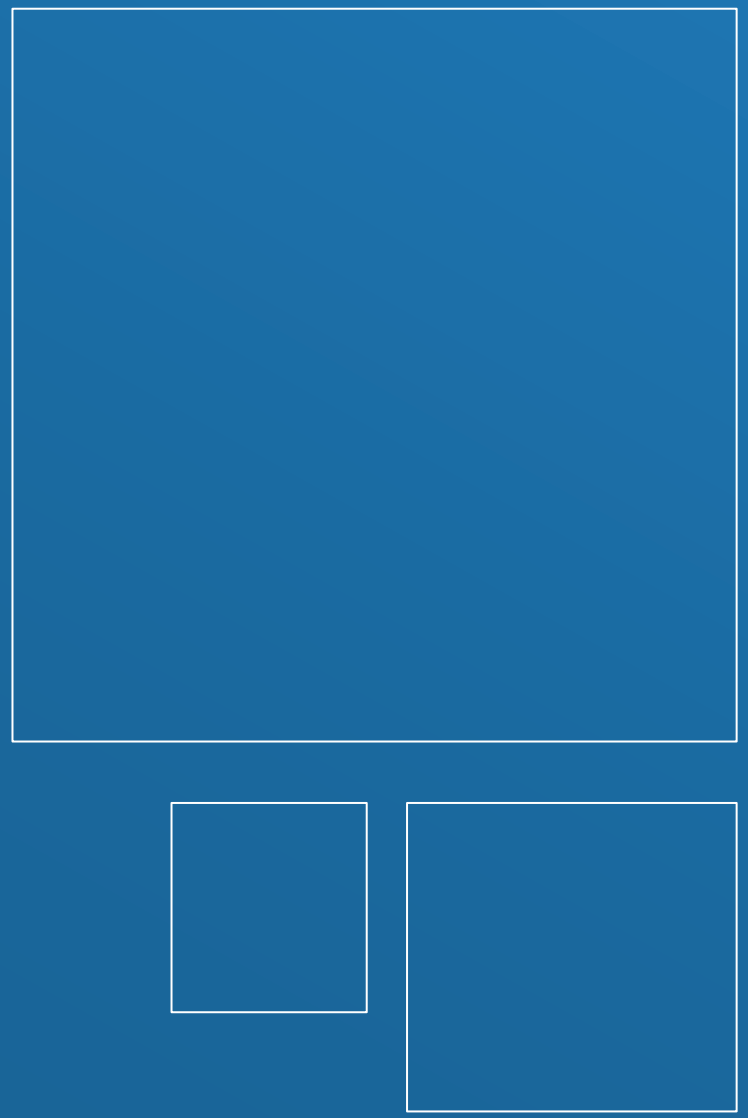
in components where other entities have core responsibilities and skills but require Hydrom's perspective

Level of responsibility

Clear sector structure and multiple roles needed to drive gH2 ecosystem in Oman, with Hydrom as central orchestrator

	Policies & regulations	Strategy, masterplan & ICV	Auction	gH2 project development	Shared infrastructure	Logistics	Demand
Role	• Design policies and regulations for gH2 industry	• Develop national gH2 strategy • Delineate lands dedicated for gH2 development	• Manage auction process of gH2 blocks • Award blocks to gH2 developers and oversee implementation	• Finance and develop gH2 projects incl. RE generation, gH2, & derivative production	• Develop shared infra, incl. electricity transmission, water and H2 pipelines, desal.)	• Provide logistics, incl. transport and other enabling infra for the gH2 sector and developers	• Support offtake agreements for gH2 developers in Oman, incl. negotiating with gH2 demand aggregators
Involved entities	وزارة الطاقة والمعادن Ministry of Energy and Minerals	hydrom	hydrom	OQ + int'l developers	• Infrastructure providers • National champions	Public Authority for Special Economic Zones and Free Zones Sultanate of Oman; اسياد ASYAD; الدقم Duqm Special Economic Zone Authority	hydrom
Hydrom role	Advise	Lead	Lead	Coordinate	Incubate and then coordinate	Coordinate	Incubate

Hydrom as orchestrator of the gH2 sector, with the goal to maximize value creation for Oman through Oman take and In-Country Value



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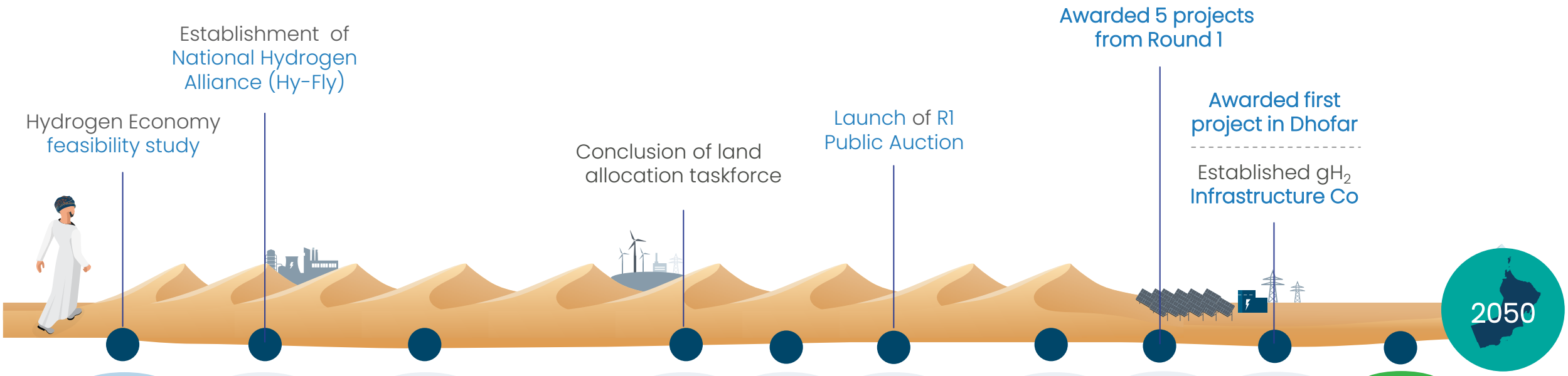
Way Forward

Our path forward with a major achievement by Q2 2024



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

Oman Hydrogen strategy announced

Official **launch of Hydrogen Oman**

hydrom

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

Signed commercial terms sheets with 6 legacy initiatives

2nd bid round projects expected to be awarded

Two processes being run in parallel for Public Auction and Legacy Initiatives

Public Auction (PA)

Any new investor or developer trying to start a green hydrogen project in Oman can apply for the public Auction on a competitive basis

New blocks will be auctioned on a yearly basis

Need to compete for best bid

Legacy Initiatives (LI)

Initiatives that commenced before the launch of the public auction and had some sort of land agreements in place that needed to be honored

6 term sheets were signed on 14th March 2023

Given 1st dibs on land but need to match Public bids

5 projects in Duqm and 3 projects in Dhofar awarded already position Oman as one of the world's leading gH_2 hubs

1st Public Auction round: 2 projects awarded
(out of 2 auctioned)

1. Amnah — CIP, Al Khadra Partners, Blue Power Partners — 1st Jun
2. POSCO Holdings, PTTEP, EWP, Samsung Engineering, ENGIE, KOSPO — 21st Jun

Duqm

Legacy Initiative process: 3 projects awarded

1. GEO Green Energy Oman; InterContinental Energy; EnerTech Holding Company; OQ; Shell — 1st Jun
2. bp — 1st Jun
3. HYPORT DUQM; DEME; OQ — 21st Jun

RES = Renewable Energy Sources; LIs = Legacy Initiatives

5 projects in Duqm and 3 projects in Dhofar awarded already position Oman as one of the world's leading gH_2 hubs

2nd Public Auction round: 2 projects awarded
(out of 3 auctioned)

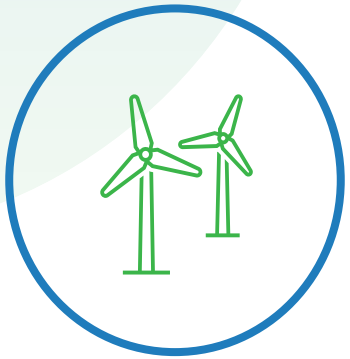
1. Yamna, JPOWER, EDF — 29th Apr
2. actis, Fortescue — 29th Apr

Legacy Initiative process: 1 project awarded

1. SalalaH2 — OQ, Marubeni, SAMSUNG C&T, DT — 12th Dec

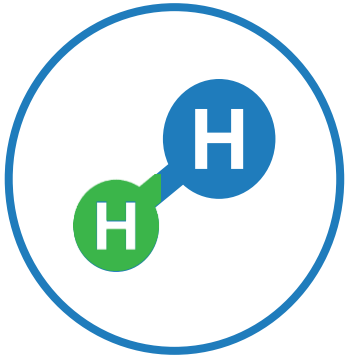
RES = Renewable Energy Sources; LIs = Legacy Initiatives

Currently Oman is on target to meet its 2030 ambitions of up to 1.5 mtpa of gH2 production



34.8 GW
Renewables' capacity

$49 Bn
Investment



1.38 mtpa
H_2 production

8
Project Agreements

Round 1 & 2 of auctions has already been a strong success and signal of Omani gH_2 attractiveness for international players

5 continents represented

Applicants coming from all over the world with stronger representation from W. EU, GCC, S/SE Asia, South Korea, and Japan

>200 international companies

Registration registrations on the auction platform

>20 international companies

Requesting to get the access to the Request for Proposal to Round 1

Phase A Round 2 | Overview of key project parameters, details will be shared in RFQ / RFP

Parameter	Detail
Duration	• 47 years from project development & land sub-usufruct award
Oman take	• Land fees to be paid for the used part of land once production starts • Base royalties and Upside fee • Corporate tax applies • Back-in right for Beneficiary to acquire share in Project Company
Scope	• Integrated projects to produce Green H_2 & potentially derivatives (RES generation, H_2 production, derivatives conversion, offtake) • A minimum target H_2 production will be required • Infrastructure to be shared between projects
Incentives	• Reduced land fees in development & construction phase • ICV incentive fee to decrease with increasing level of Omanization
Conditions	• Offtake of electricity not allowed in general

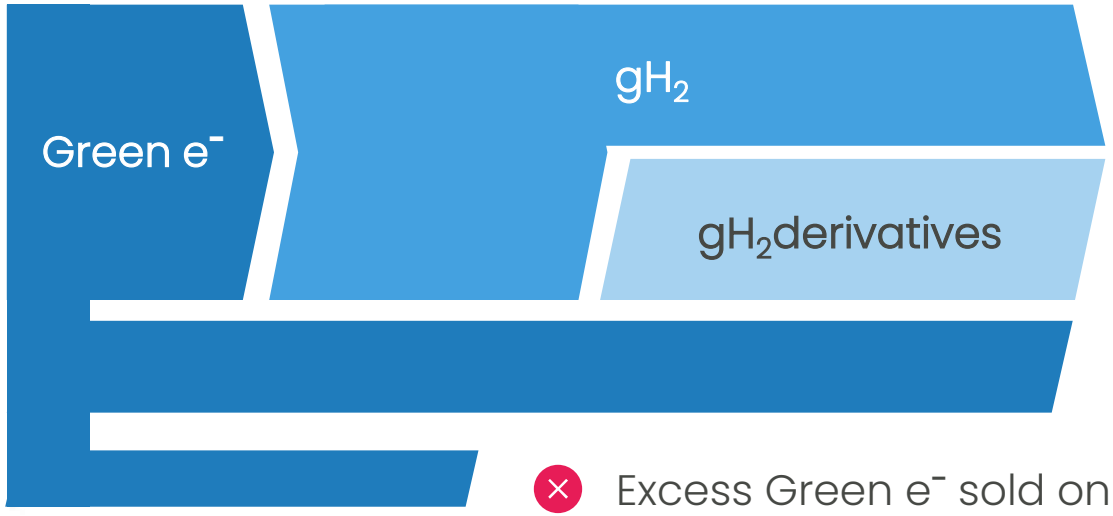
Note: RES = Renewable Energy Sources

gH_2 production for supply to local industry or conversion to derivatives as End Product

Integrated gH_2 / derivatives projects

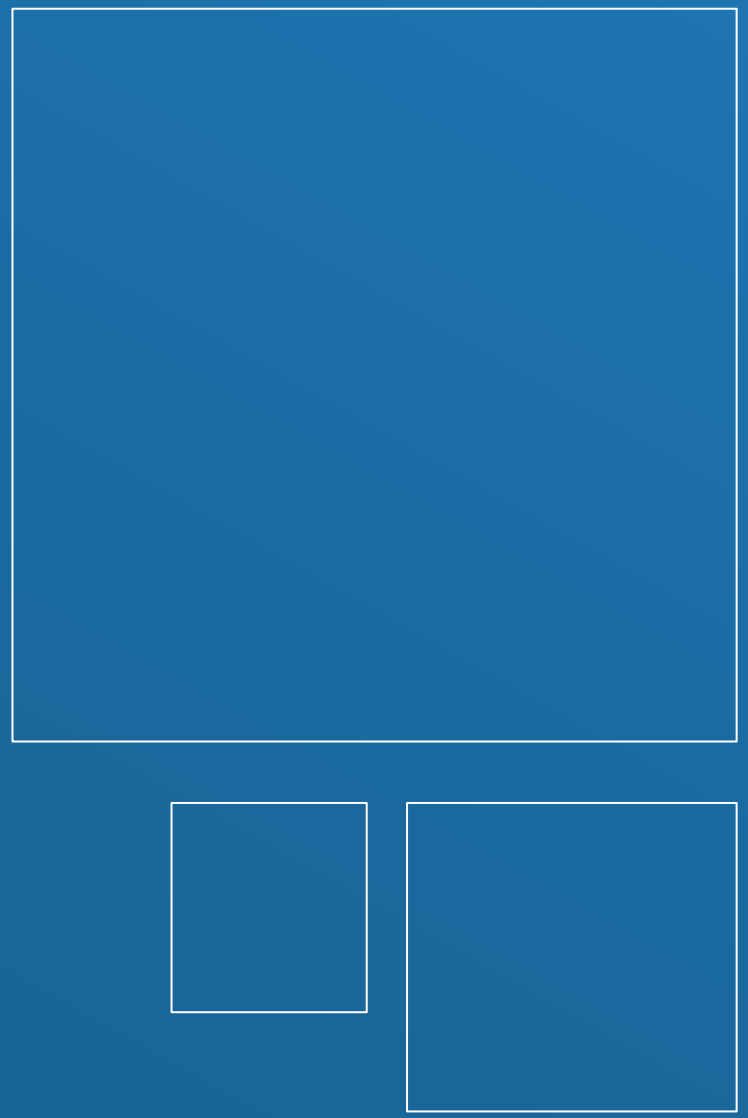
Final products & markets to address

Integrated renewable energy to gH_2 (and derivatives) production to supply:



- ✓ gH_2 to (new) **local industry**
- ✓ **Domestic market and export** of gH_2 derivatives
- ✓ **Green e⁻** connected downstream **local industry** [1] (up to a certain cap)
- ✗ Excess Green e⁻ sold on spot market currently not allowed [2]

1. Green e⁻ can only be supplied to the Project's downstream Facilities owned by the Project Company.
2. Green e⁻ cannot be sold in the foreseeable future. Hydrom will co-operate with gH_2 developers to identify opportunities to allow the sale of excess Green e⁻, provided that doing so is advantageous in view of Oman strategic plans and in compliance with Omani law.



Oman's gH2 strategy

Oman's gH2 journey

Shared infrastructure

Localization

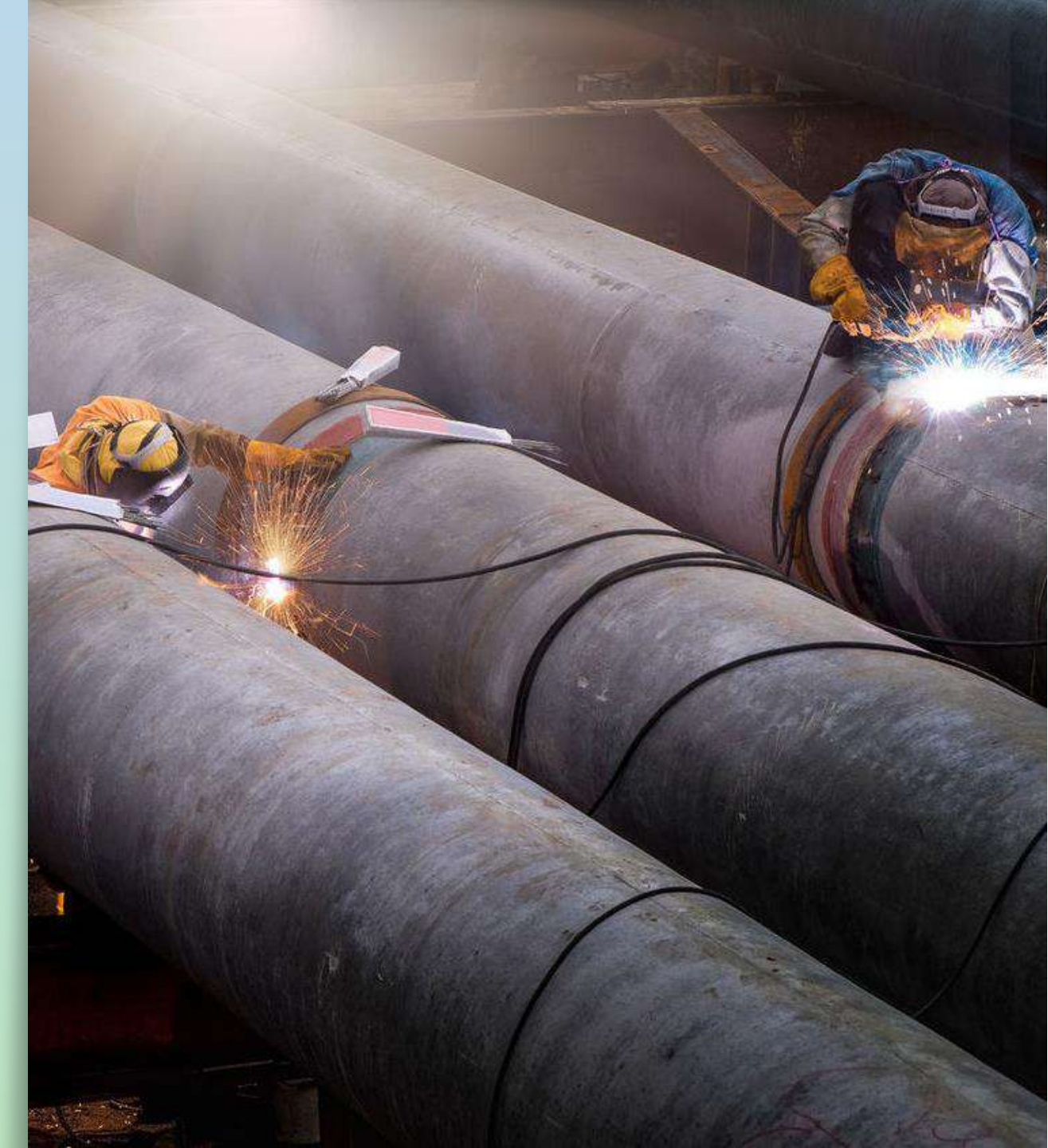
Investing in Oman

Way Forward

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

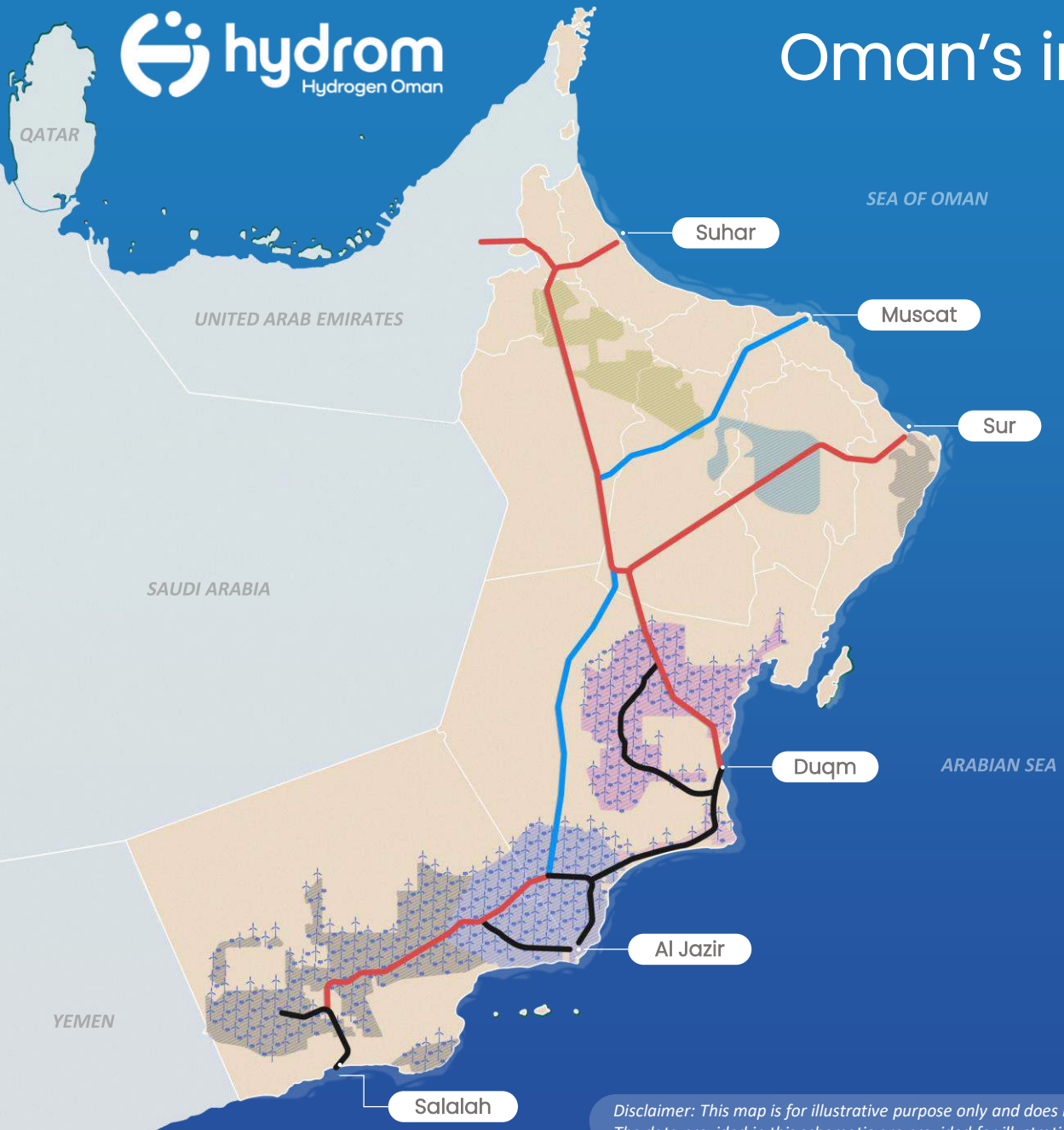
- **Optimal configuration** and conditions being further assessed and defined through **technical studies**

- **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

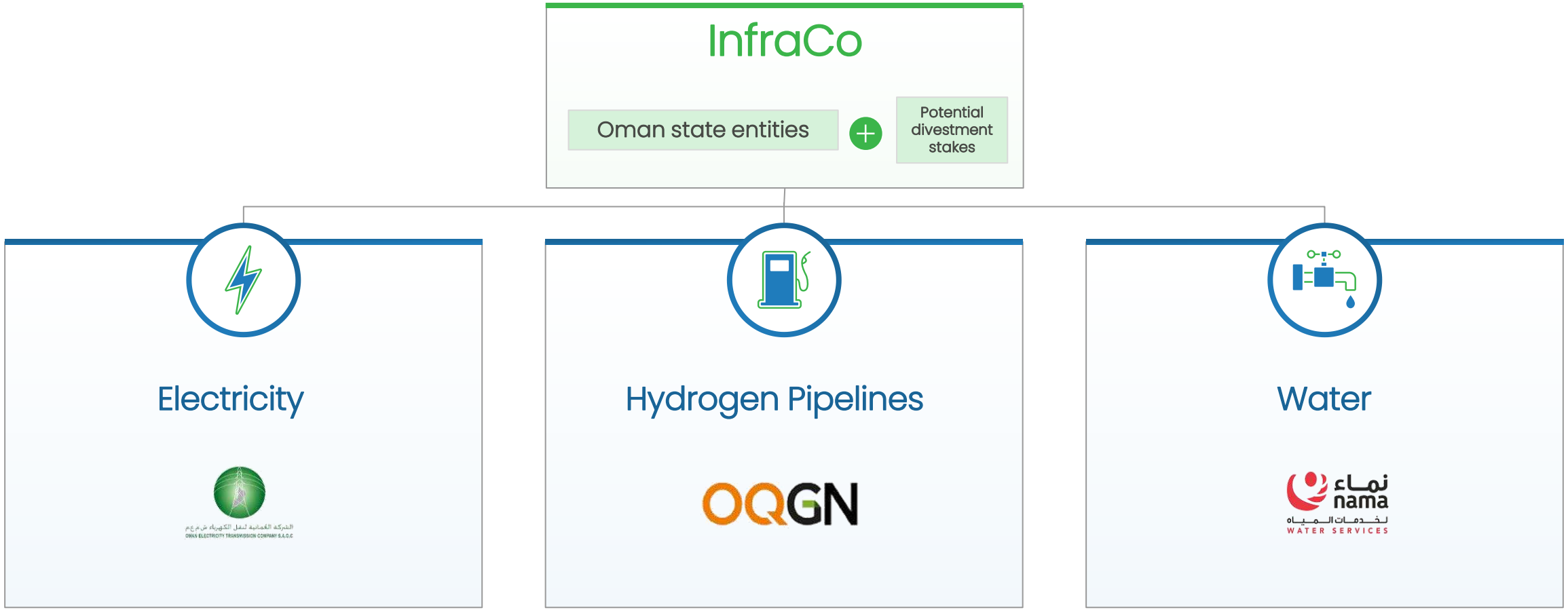
2030 | 2040 | 2050

Green Hydrogen Hub | Wind and Solar plants

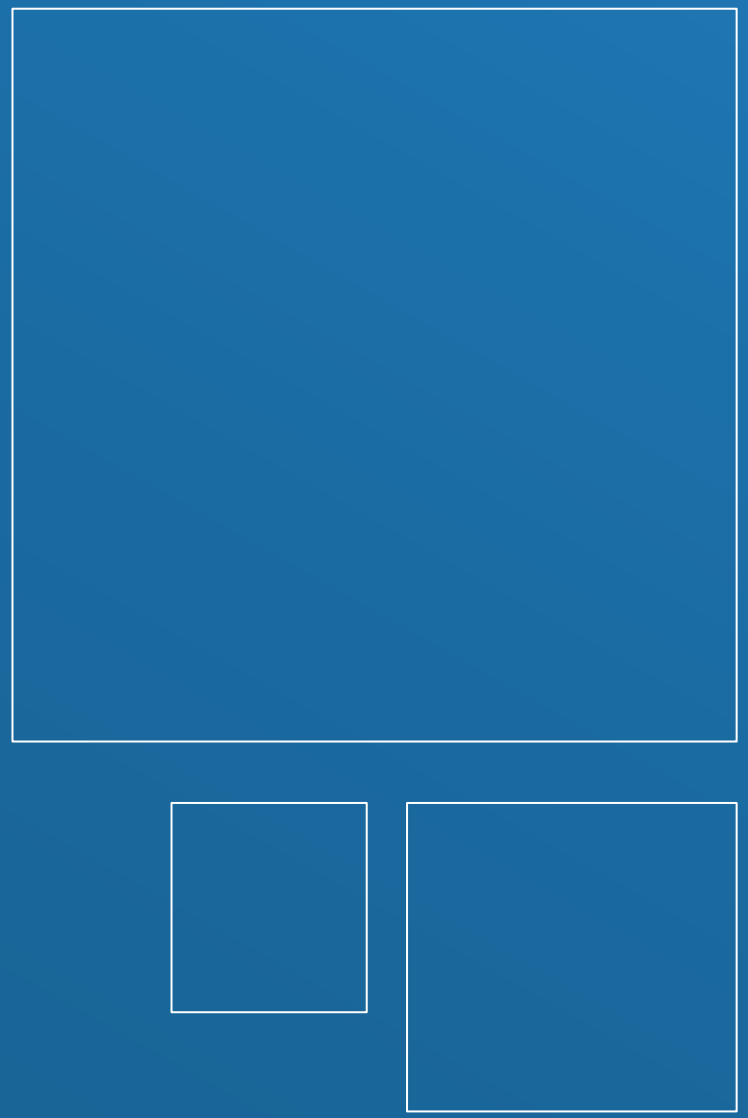
Disclaimer: This map is for illustrative purpose only and does not necessarily accurately reflect international borders.
The data provided in this schematic are provided for illustration purposes only. Hydrom is not responsible for the misuse or misinterpretation of the data.

InfraCo. has been established in December 2023 with national champions allocated for each of the three infrastructure packages,

Illustrative



Source: Expert input; team analysis



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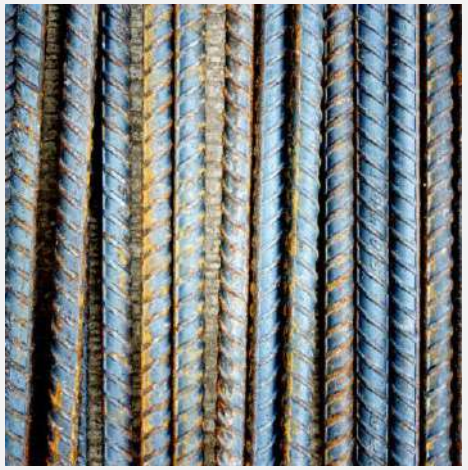
ICV & Domestic Industry Development are key goals of Oman in its path to developing a green hydrogen ecosystem

In Country Value (ICV)

Domestic Industry Dev.

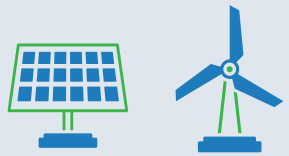
Local Employment	Education & research	Domestic sourcing[1]	Upstream industries development	Downstream industries development



Opportunities exist across green H2 value chain in Oman

Value chain

Energy generation & H2 Production



Solar panels

Wind turbines

CUI

Electrolysis

H2 transport

H_2O transport

Electr. transmission

H2 Industrial use

Non-exhaustive

Refining

Steel

Shipping

Chemicals

H2 Derivatives and Fuels

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)

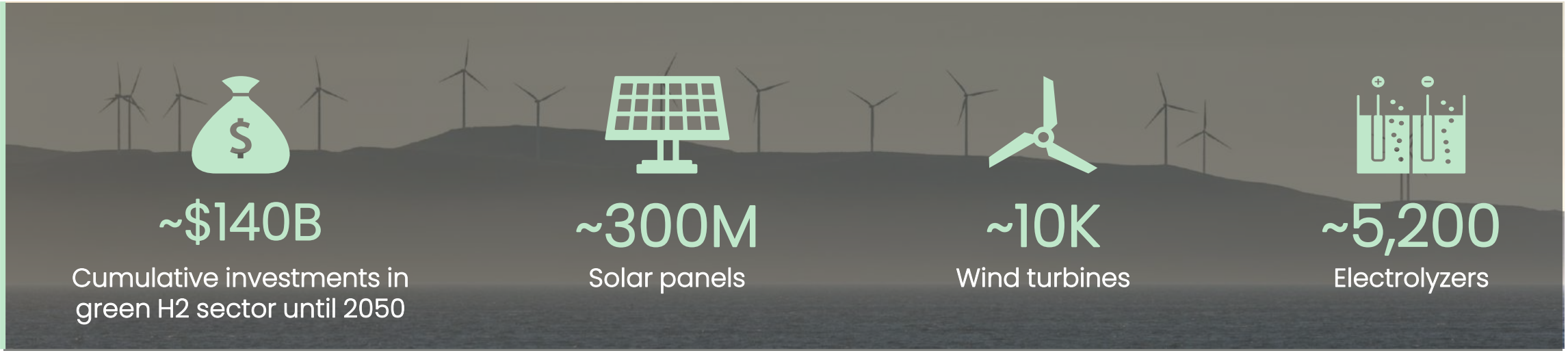
Respective raw materials production can be developed locally (e.g., glass, steel)

Decarbonized products to be sold for export

Decarbonized products to be utilized locally

Oman can become a H2 commercial & logistics hub

Massive installation of H2 assets requiring production of raw materials & components from adjacent industries



~$140B
Cumulative investments in green H2 sector until 2050

~300M
Solar panels

~10K
Wind turbines

~5,200
Electrolyzers

~44 Mtpa
Concrete

~25 Mtpa
Steel

~950 ktpa
Plastic

~5.1 Mtpa
Glass

~850 ktpa
Aluminum

~500 ktpa
Copper

~450 ktpa
Silicon

~45 ktpa
Nickel

Short- and medium-term localization of opportunities

Short-term opportunities

Up to ~5 years from today

- Wind turbine manufacturing of components (eg tower segments, blades)
- Iron ore pellet and hot briquetted iron production
- Logistic solutions, services and infrastructure
- Solar PV assembly
- Electrolyzer assembly

Medium-term opportunities

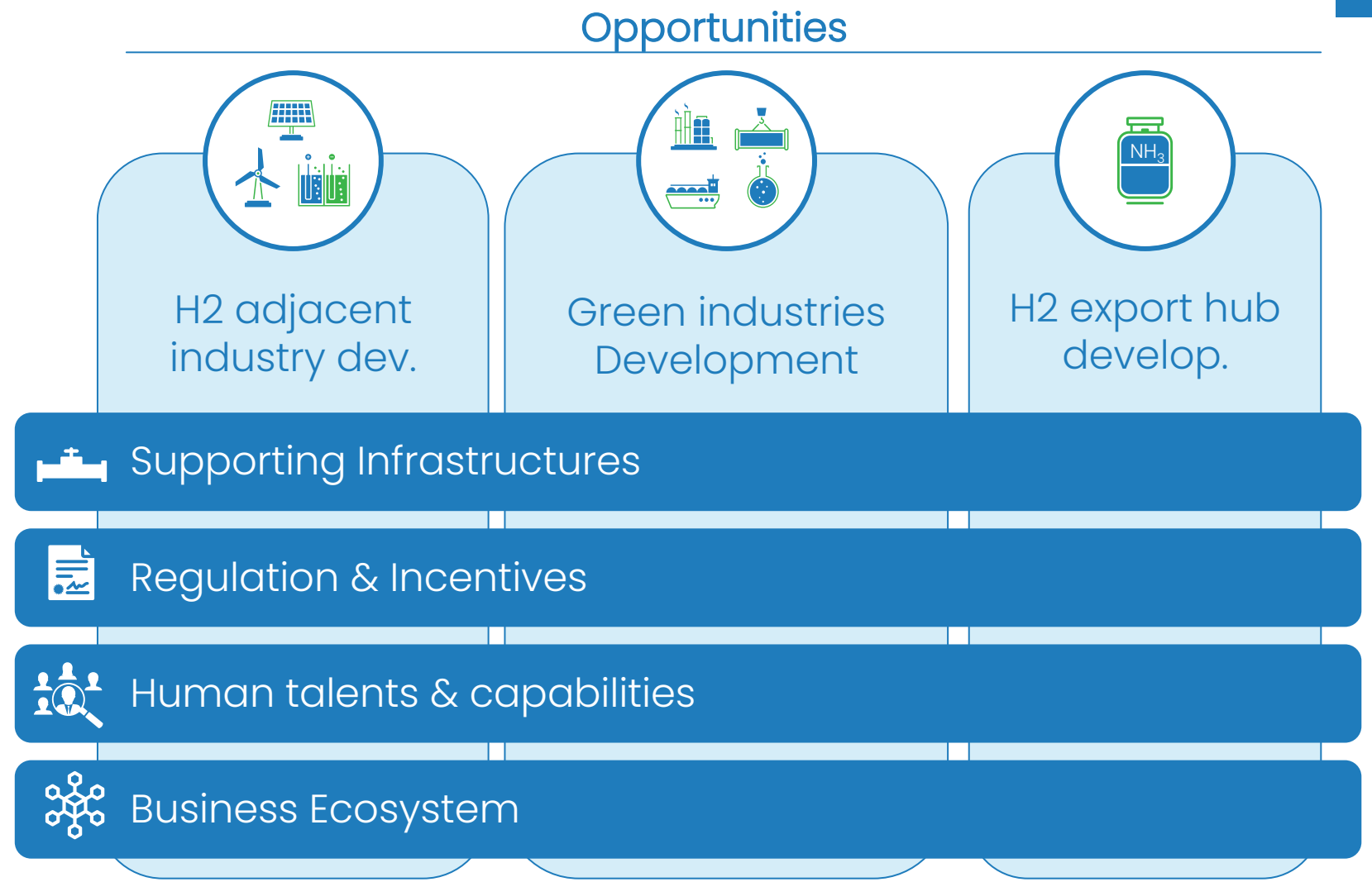
5+ years from today

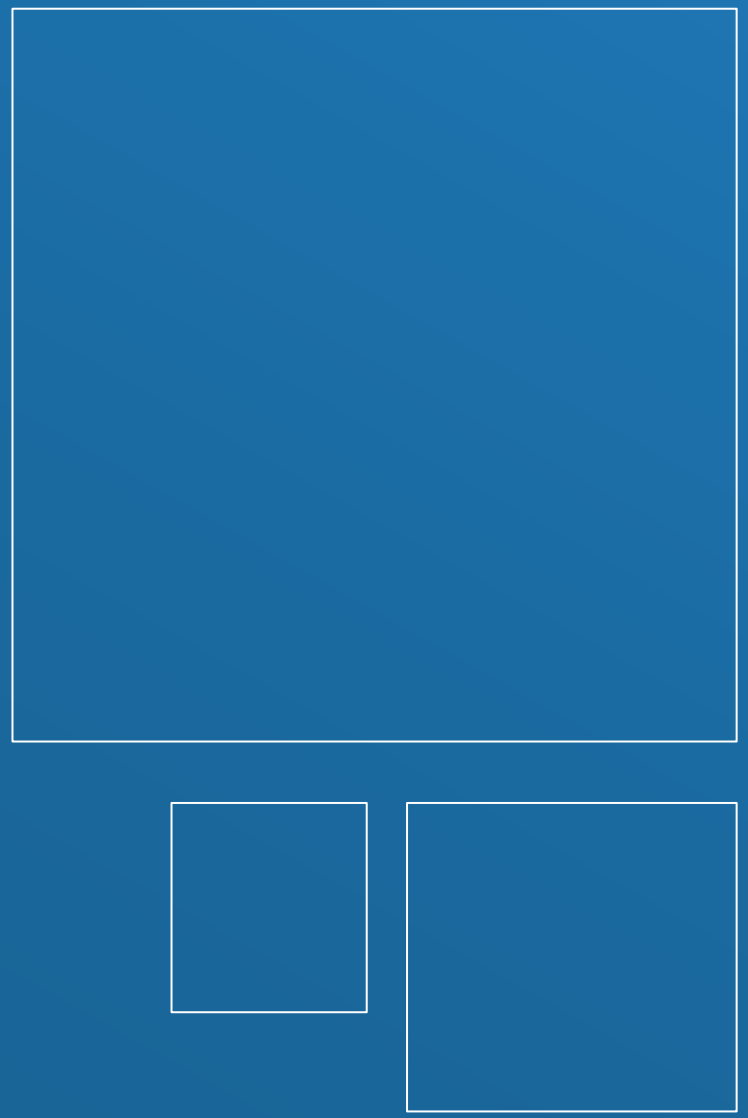
- eFuel production
- Electrolyzer manufacturing
- Green Steel production

Support the **development of those key low carbon technologies** for Oman and rest of the world

Four key enabling factors to capture the opportunities to localize the business in Oman

Illustrative





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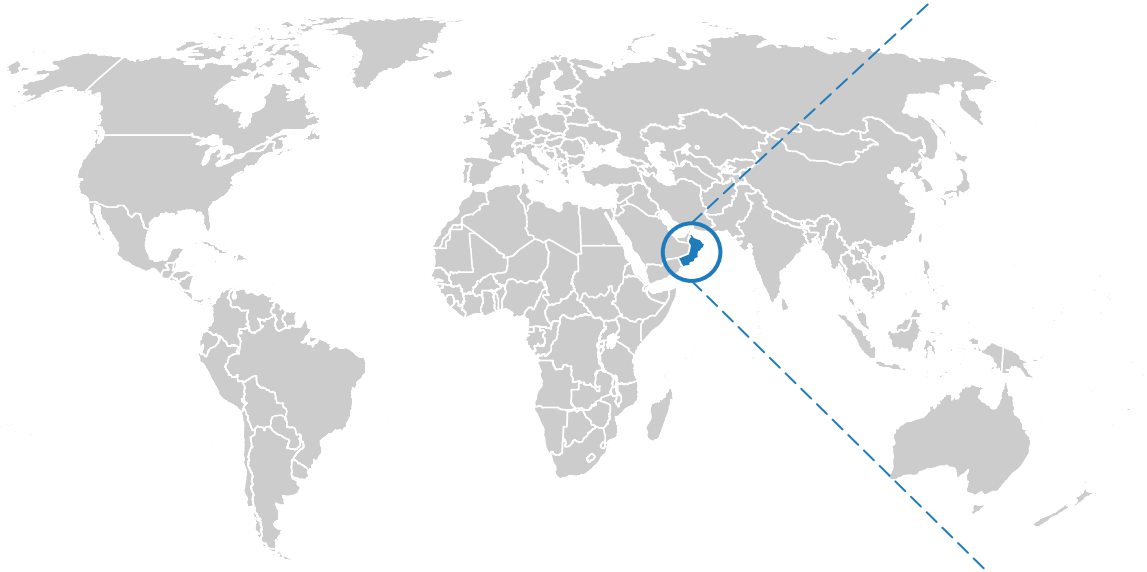
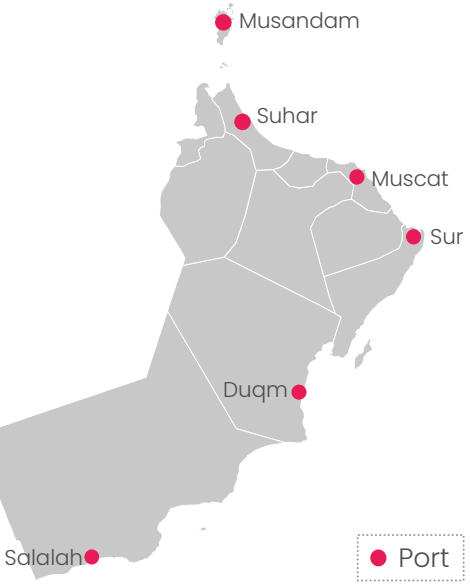
Economically and politically stable, Oman is an attractive destination for investors with a highly competitive offer





5.1M
population in 2023

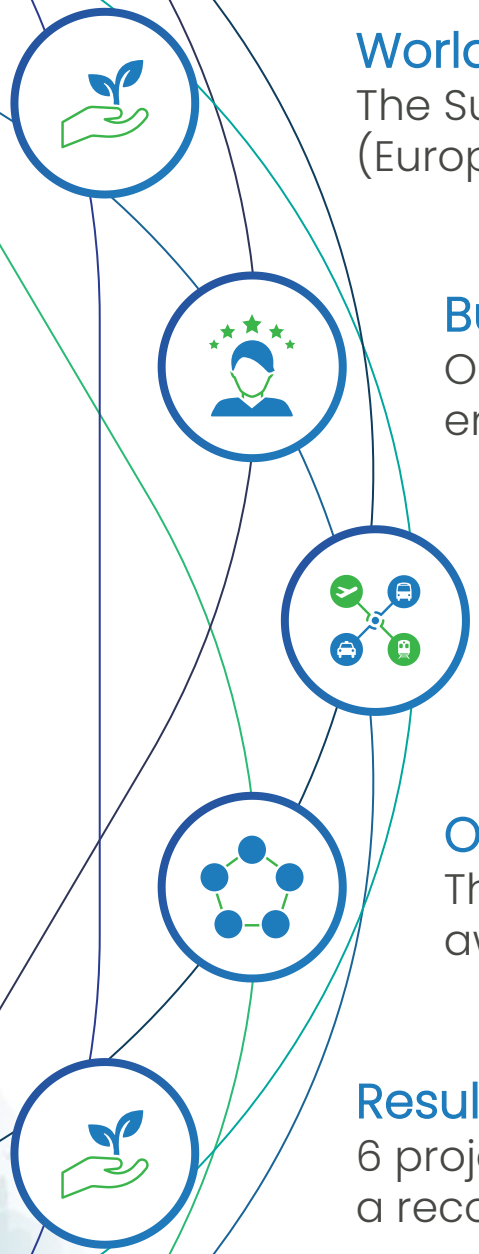
309,500 km²
area

$88B
GDP of 2021

Top 35%
countries by political stability index[1]

1. Oman political stability index 0.51 (2021) on a scale of -2.5 to 2.5. Political stability index includes corruption perceptions, political rights, civil liberties, competitiveness, cost of starting a business, shadow economy. Source: National Centre for Statistics and Information in Oman, The Global Economy

5 Oman Value Drivers to succeed in the gH_2 business



World-class resources & strategic location

The Sultanate of Oman, strategically located between two key H_2 demand centers (Europe & Asia) has earmarked 50'000 km^2 of land with prime natural resources

Business friendly environment

Oman is economically & politically stable, with long-term partnership in the energy sector and is home to a young and talented local workforce

Available tier-1 infrastructure & logistics

International companies looking to localize their business can get access to developed infrastructures & connections to international trade routes

Open, structured & transparent process to develop H_2 projects

The Sultanate has defined an open and transparent auction process to award H_2 projects supported by a well-defined sector governance

Results oriented and fast-moving Omani H_2 sector

6 projects awarded from the first round of Public Auction & Legacy Initiatives in a record time, positioning Oman as one of the world's leading gH_2 hubs

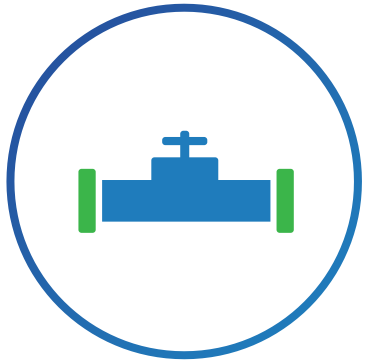
Five potential roles for international players to play in Oman and contribute to the growth of green H_2 economy

H2 project developers

H2 financial partners

H2 equipment providers (OEMs)

H2 industrial off-takers



Infrastructure developers

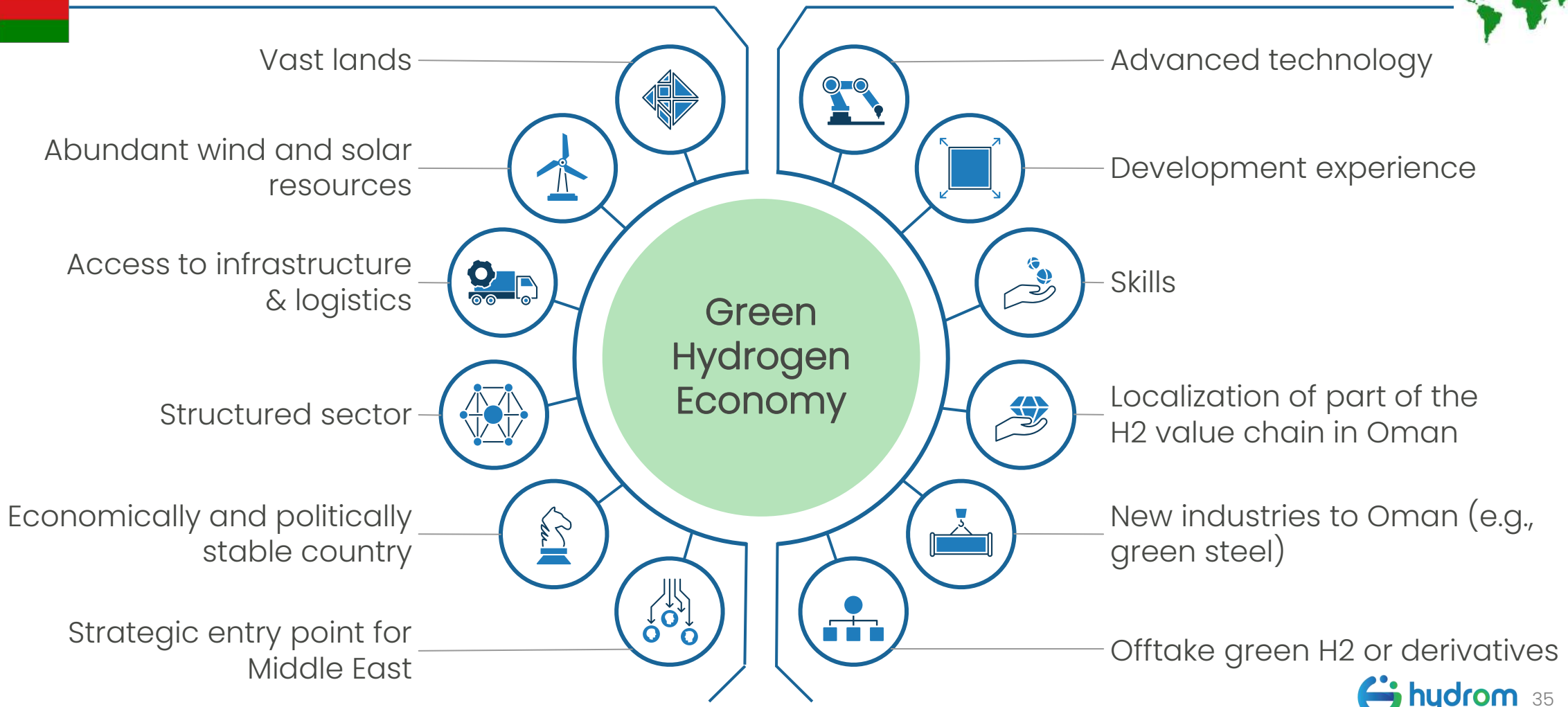
Production equipment

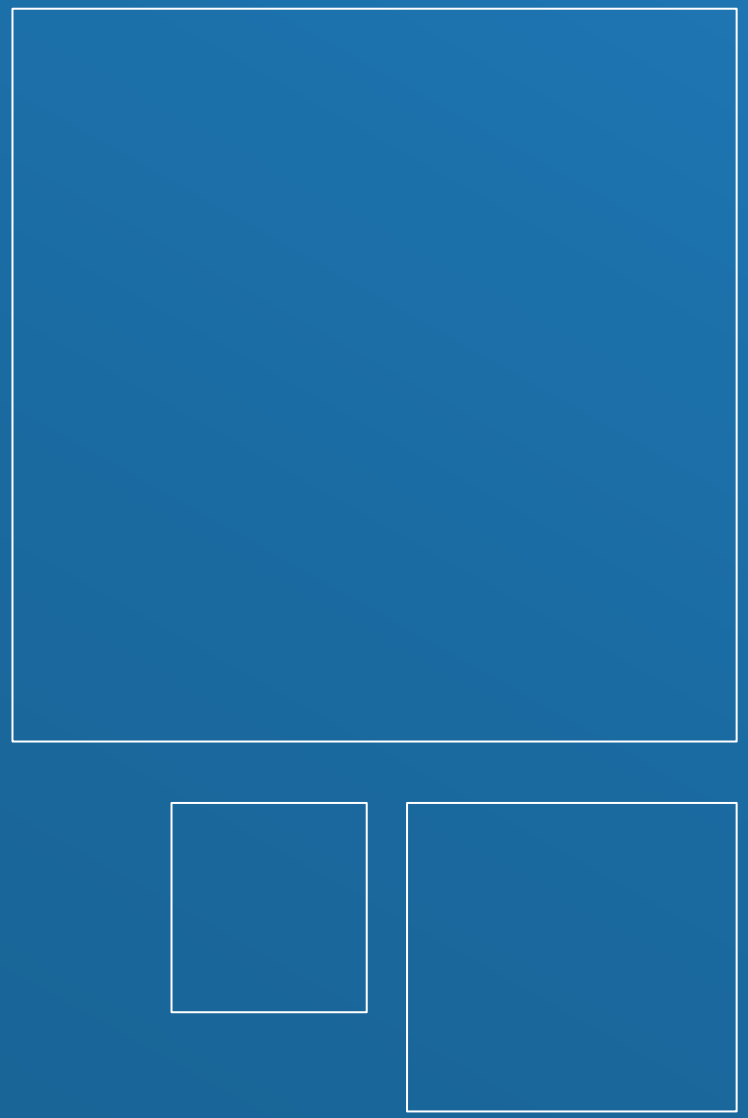
Technical skillset

R&D capabilities

Knowledge-based workforce

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





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Oman while decarbonizing its economy is capturing growth opportunities offered by the transition

3 key steps to unlock Oman energy transition opportunities

Develop masterplan for gH_2 and broader energy transition opportunities

Define comprehensive In-Country Value strategy

Define champions and local and international partners to drive masterplan goals

1. National In-Country Value
Source: Team analysis

Energy transition can unlock multiple opportunities across industries for Oman

Industrial and technological hub

Oman can provide abundant access to cheap energy, particularly gH_2 and low-cost power

This will become a key input for industries with both flexible and less flexible power demand (e.g., data mining and green steel, respectively)

Mining hub

Mining industry creating a positive feedback loop

- Operations powered by renewable energy
- Resulting minerals used in renewables value chain, increasing deployment

Bunkering & logistics hub

Opportunity for Oman to become a hub for shipping given

- It will be producing hydrogen & derivatives
- It will have ports located along major trade routes

Agricultural hub

Excess electricity and water from gH_2 production leveraged to increase Oman's agricultural output

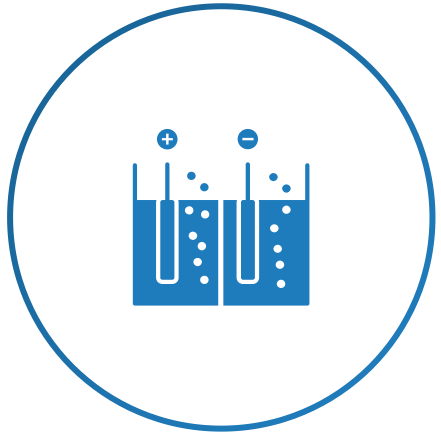
Clean-powered greenhouses increasing throughout Oman, along with crops and cattle

Tourism hub

Sustainable tourism operations flourishing throughout the country as suppliers decarbonize their operations (e.g., with zero-emission buildings, circular practices) and natural landscapes are preserved

Source: Team analysis

Three strategic objectives for Hydrom in the next 5 years to fulfill its orchestrator role of the gH2 sector



Award blocks to meet production targets and support gH2 projects move forward

Actively support the creation of an enabling ecosystem (shared infrastructure, logistics, capabilities)

Maximize value creation for Oman through upstream and downstream industries localization

Oman can become a global sustainability leader

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

hydrom
Hydrogen Oman

Together, we deliver a green, resilient and sustainable future