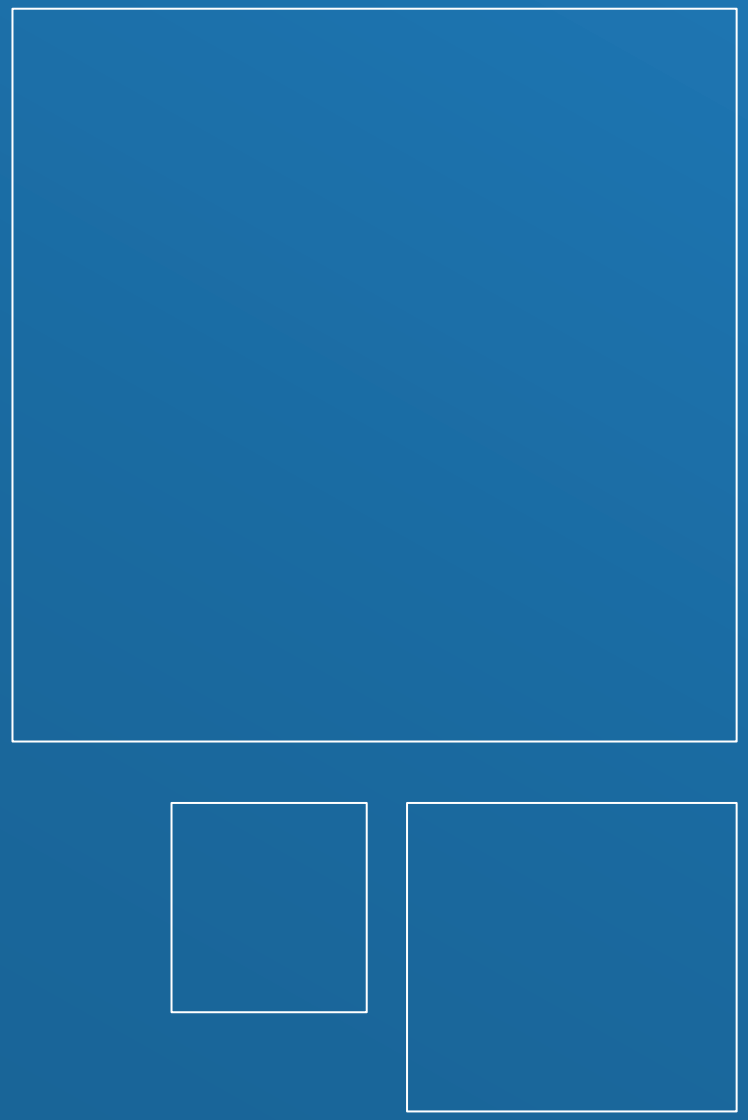
Oman Green Hydrogen Strategy

Oman Round Table 2023

Berlin | JANUARY 2023

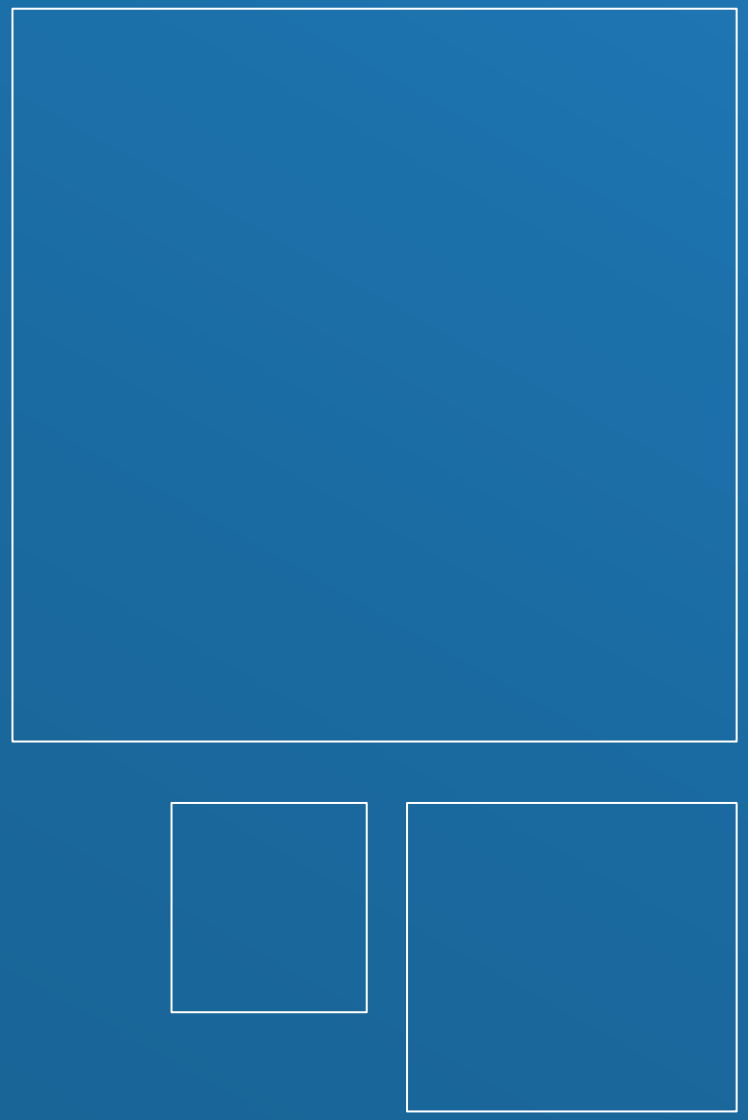


Green Hydrogen Market Overview

Oman Green Hydrogen Strategy

Auction Process and Investment Opportunities

hydrom Hydrogen Oman



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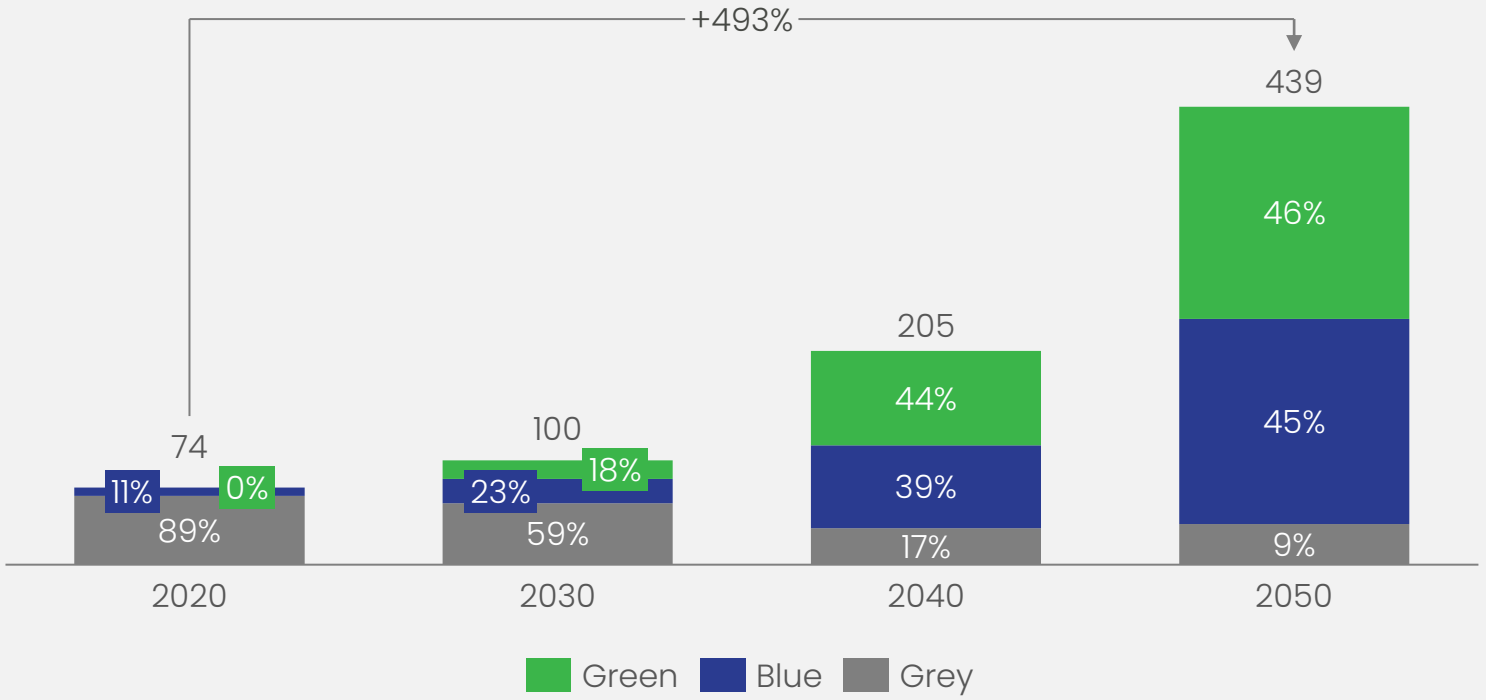
H2 today fully fossil-based, but significant low-carbon hydrogen penetration and growth to come in next decades

Global hydrogen production (Mtpa)



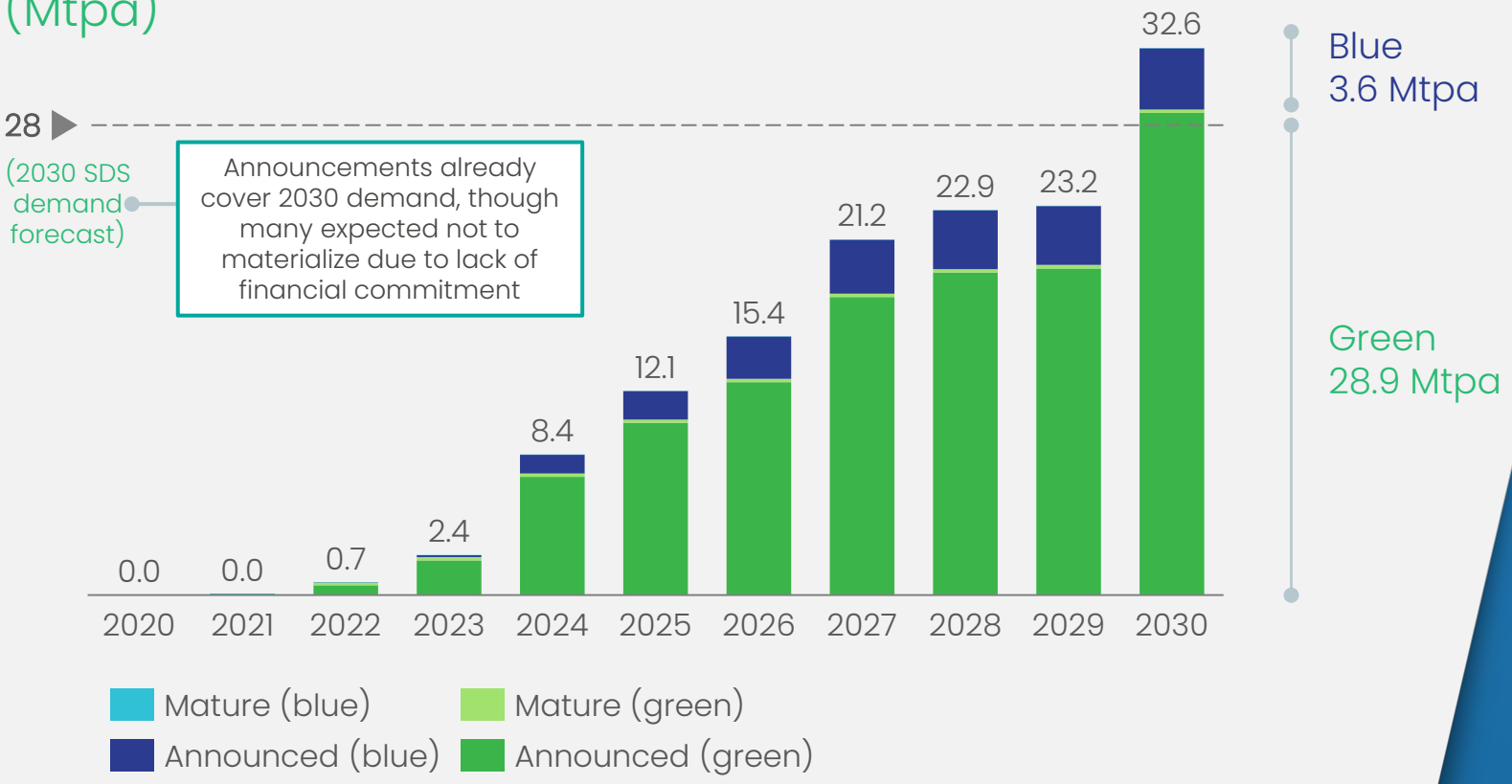
~400 Mtpa

low-carbon hydrogen production expected by 2050

1. Hydrogen-derivative fuels are normalized to hydrogen equivalent 2. Production technology split & grey production volume taken from IEA SDS global hydrogen production forecast (last updated in Sep 2020) in SDS scenario; Green & blue volumes based on BCG Global H_2 demand tool; Note: scenario used SDS = Sustainable Development Scenario
Source: IEA; Irena; BCG Global H_2 Demand Model – Feb 2022 (updated for Repower EU latest announcements)

Supply: 900+ projects in pipeline with ~33 Mtpa capacity by 2030; though most in announced stage

Cumulative hydrogen production pipeline by status[1] (Mtpa)



Note: Only includes projects with known capacity from 2020-2030 (i.e., 87% of total low-carbon hydrogen projects)
1. "Mature" refers to projects that are in operation/under construction/commissioning. "Announced" projects are in feasibility/FEED stage.
Source: GlobalData

900+ Projects in pipeline today

Strong market momentum, with 900+ projects

Majority of pipeline constituted by green hydrogen projects

Only ~4% of the projects have reached FID stage or are under construction

25+ countries have released hydrogen ambition

Key learnings from low-carbon H_2 country strategies

Decarbonizing industry as first priority

Most actionable change in the short-run is replacing grey H_2 in industry with low-carbon H_2

Targets and policies centered around supply

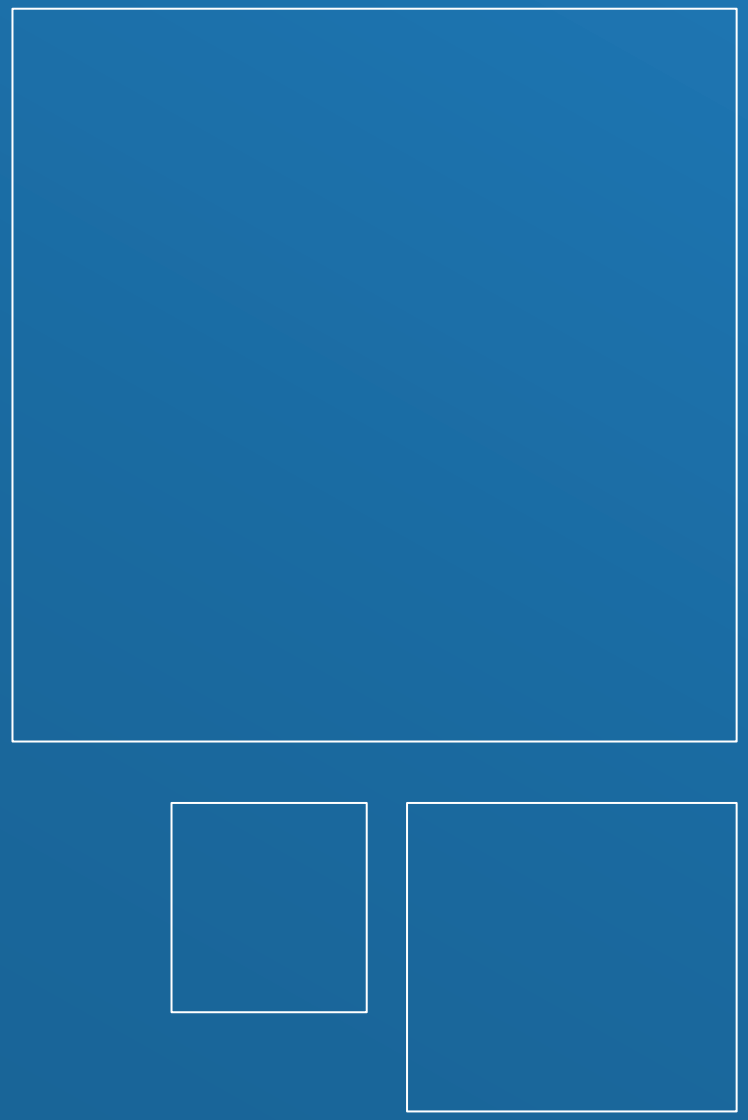
Supply targets being set (e.g., X GW of electrolyzers by 2030), while demand support largely lacking

Creation of hydrogen clusters

Large demand clusters can springboard H_2 industry via economies of scale & sector coupling synergies

Growing international cooperation

Bilateral agreements allow for knowledge sharing and de-risking national hydrogen investments



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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

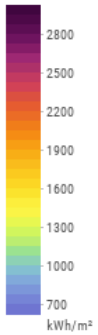
Create a Green H_2 sector with a competitive LCOH for export markets and attractive for Foreign Direct Investments

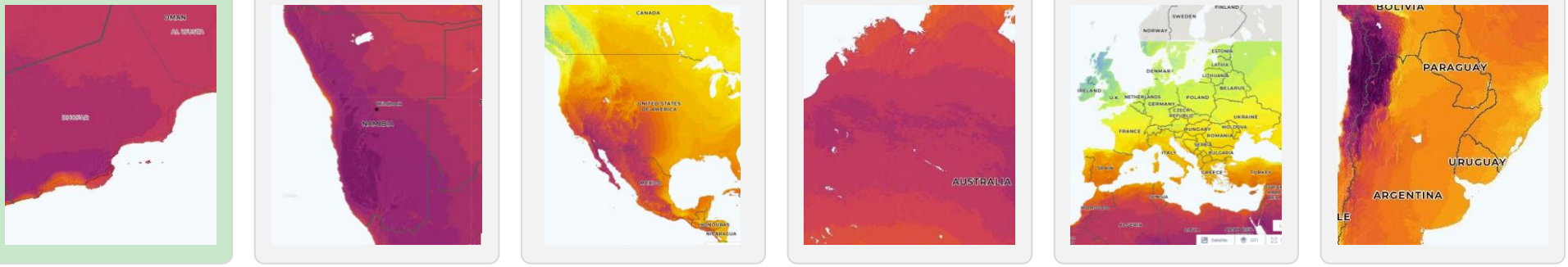
Support innovation and ensure capabilities development for Oman

Oman with very strong renewable conditions is well positioned for green economy development

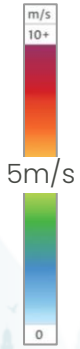
Oman | Namibia | USA | Australia | Europe | Chile

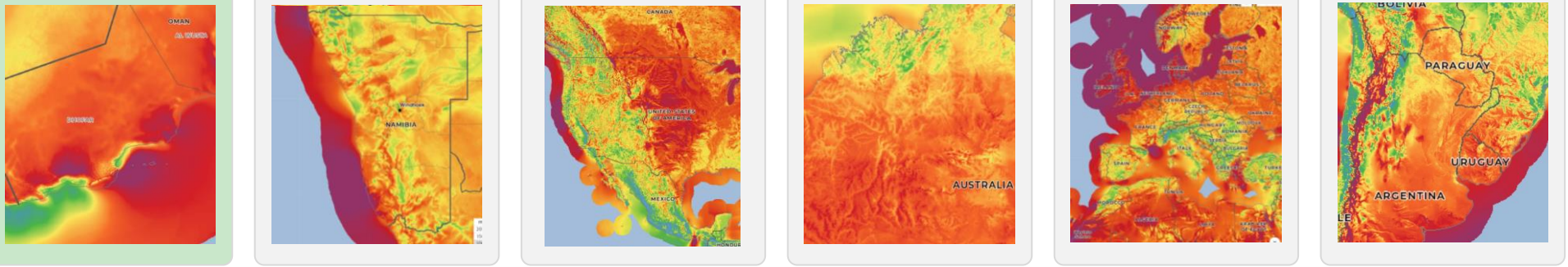
Solar PV potential (kWh/m^2)





Wind speed (m/s)



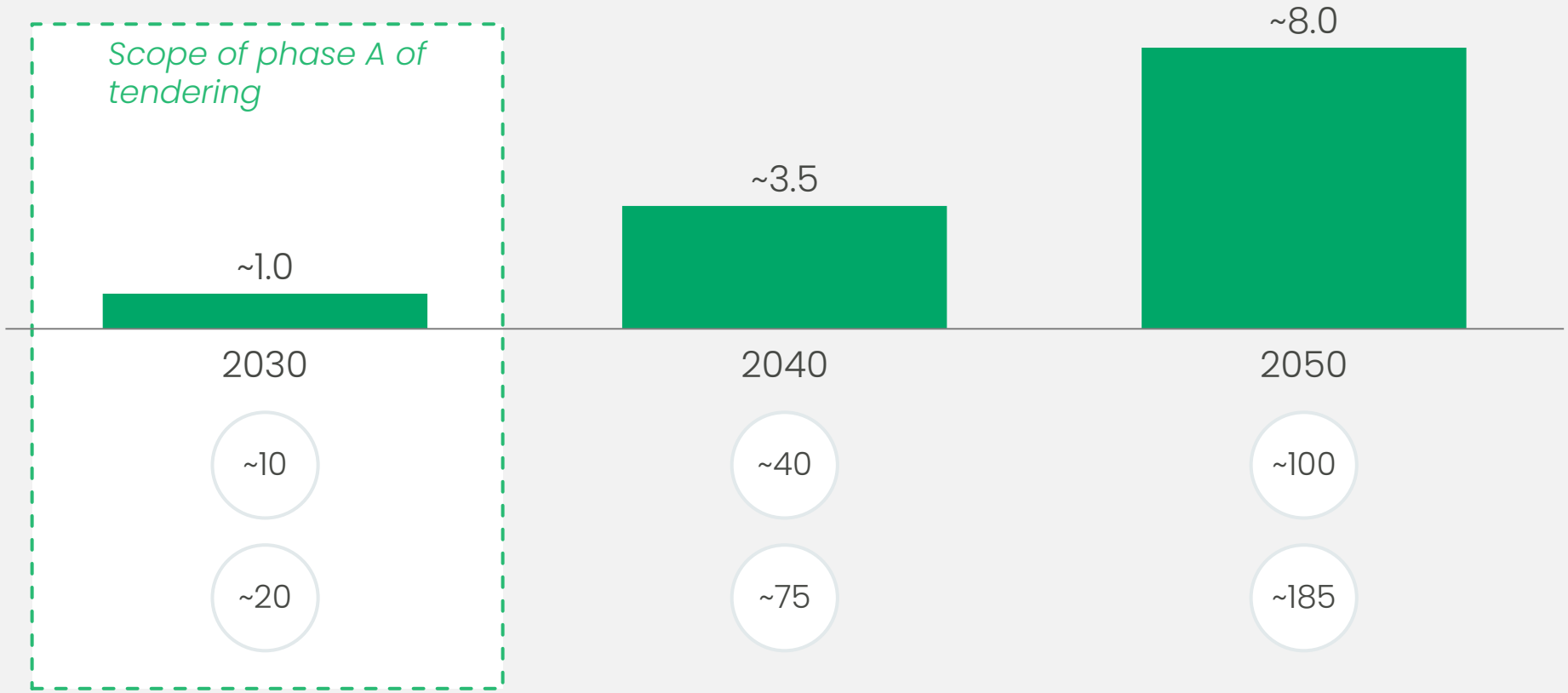


Note. Global tilted irradiation at optimal angle
Source: Global solar atlas, Global wind atlas (July '22)

Oman has ambitious production targets until 2050, to cover both export and local demand – scope of phase A of tendering is to fulfil 2030 ambition

Green H_2 production ambition for Oman in 2030-50 (Mtpa)

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



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 (2ºC). Source: Team analysis

Cumulative investments by 2050 required in Oman Green H_2 Economy

~$140B

~OMR 54B

Equivalent to ~$5B annual investment, similar to current annual capex investment in Oil in Oman

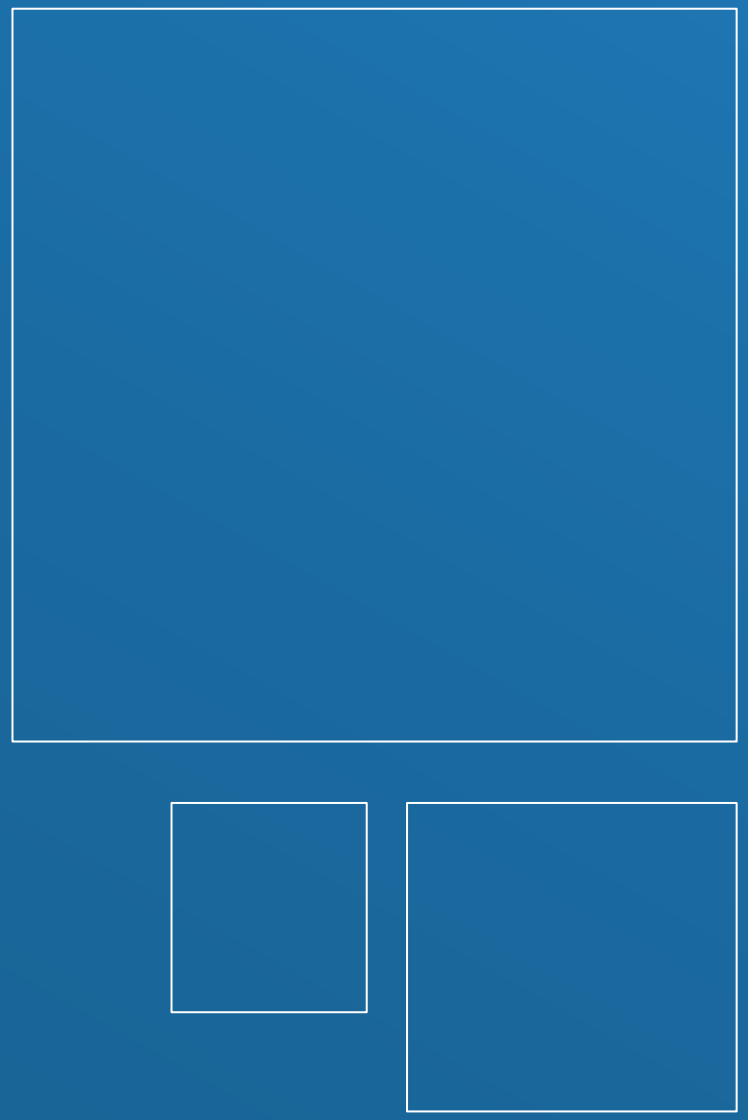
Investments required in solar panels, wind turbines, electrolyzers, derivative synthesis, storage, transport, water desalination, etc.

Four different roles to drive the Hydrogen economy in Oman, performed by different Omani entities

Roles	Policy maker & Regulator		Orchestrator		Infrastructure	Developer				
H_2 value chain	Country Strategy & policies	Regulations	Tender, land & infrast. mgmt	Off-take coordina-tion	Transport & Storage	Financing	Renewable/ Power systems	H_2 production	Derivatives	Shipping
Omani entities involved	وزارة الطاقة والمعادن Ministry of Energy and Minerals		hydrom		hydrom *Downstream orchestrator:* الهيئة العامة للمناطق الاقتصادية الخاصة والمناطق الحرة Public Authority for Special Economic Zones and Free Zones *Infrastructure providers:* OQ Networks, التحكم الفنية لنقل الكهرباء, مجيس MAJIS, marafiq	International developers + OQ *Alternative Energy*				اسياد ASYAD

Hydrom with a clear role in orchestrating the sector

- Masterplan the green hydrogen sector in Oman
- Delineate government owned land areas
- Structure large scale green hydrogen projects
- Manage the process to allocate projects to developers
- Oversee the execution of green hydrogen projects
- Facilitate the development of common infrastructure
- Enable the development of connected ecosystem industries
- Manage the data repository on wind and solar resources



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3 zones in Central/South Oman have been chosen to develop Green H_2

Zones

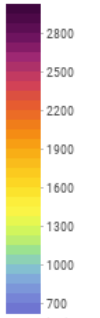
1

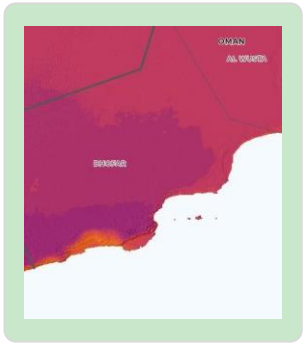
2

3

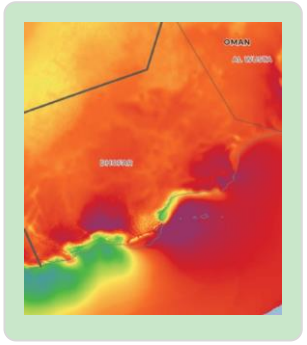
Oman

Solar PV potential[1] (kWh/m²)





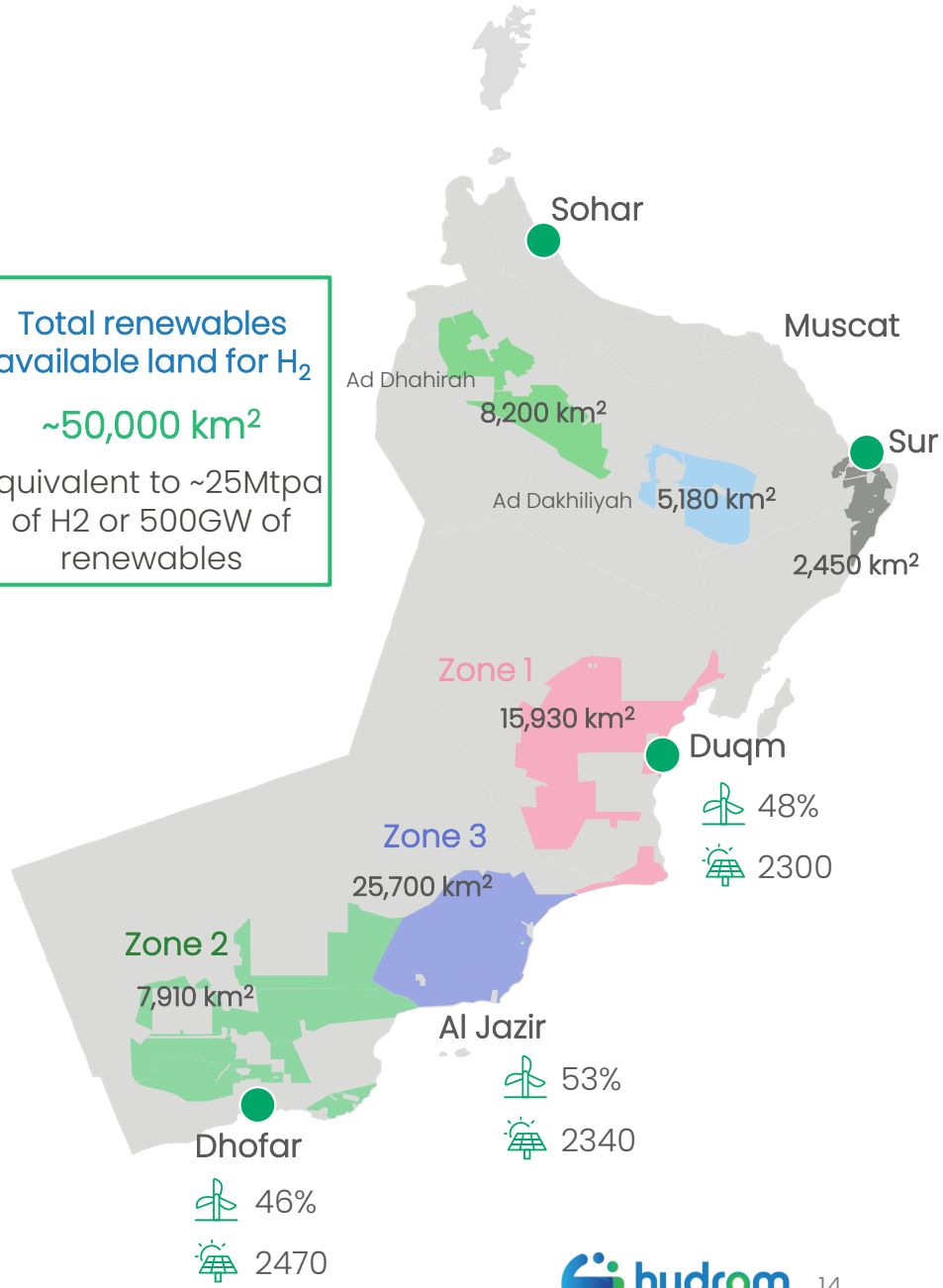
Wind speed (m/s)



Total renewables available land for H_2

~50,000 km²

Equivalent to ~25Mtpa of H2 or 500GW of renewables



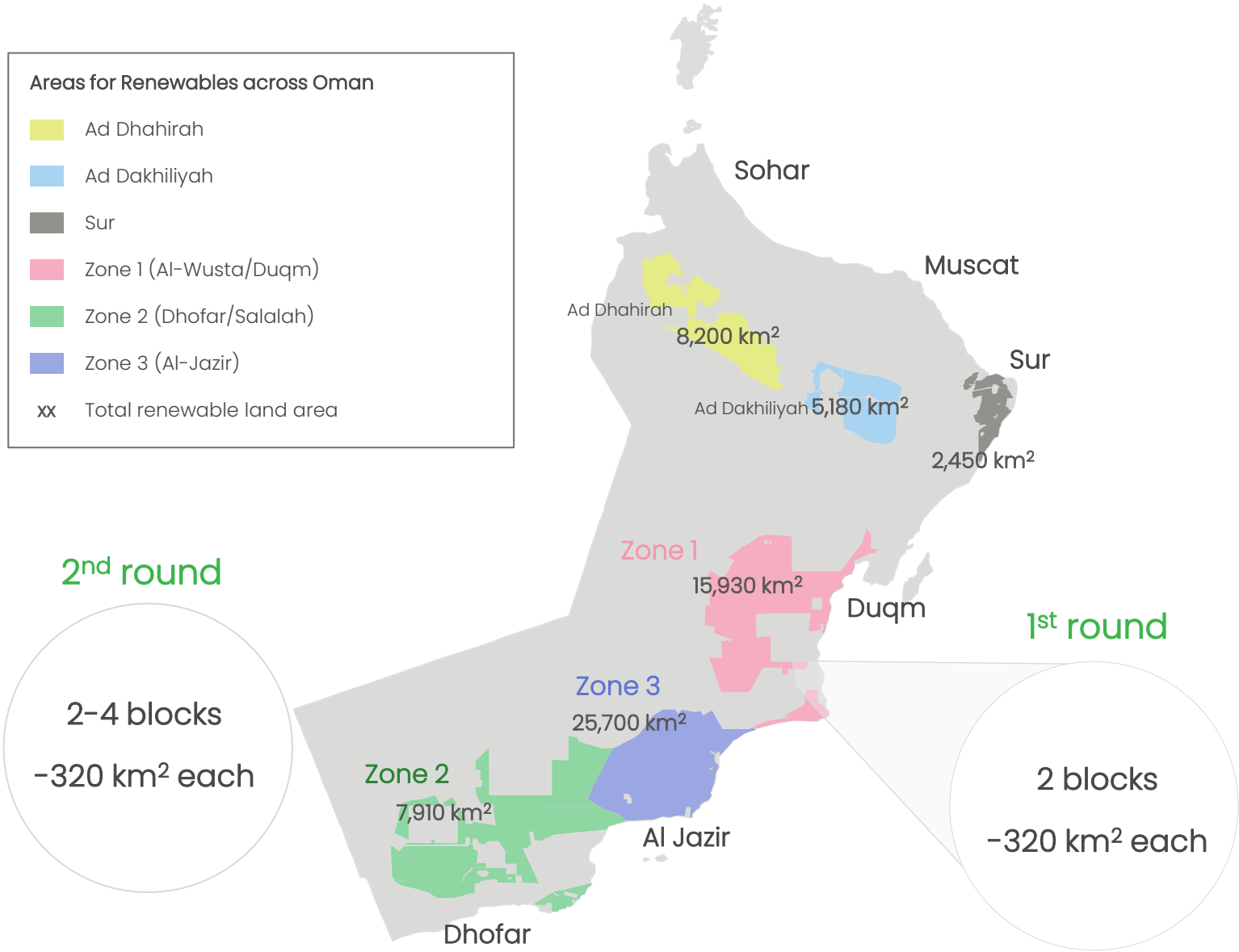
Areas for Renewables across Oman

- xx Total renewable land area
- Industrial or commercial ports (freezones under OPAZ jurisdiction)
- Wind capacity factor (%)
- Solar irradiation[1] (kWh/m²)

1. Highest wind potential areas mapped at 200m
Source: Global Wind Atlas, Global Solar Atlas

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

For phase A of tendering, 2 blocks in Zone 1 and 2-4 blocks in Zone 2 have been selected in order to meet 2030 production target



Total Phase A

4-6 blocks

~1900 km²

=

1 Mtpa of H_2

2030 production target [15]

Oman expects developers to deliver integrated projects with infrastructure to be shared between projects

Project scope for Developers

Projects are expected to be integrated and develop the full H_2 value chain

- Renewables generation
- H_2 production
- H_2 Derivatives conversion
- Off–take

Project parameters have been defined and shared with bidders (e.g., duration of 47 years since award, incentives scheme, Oman take)

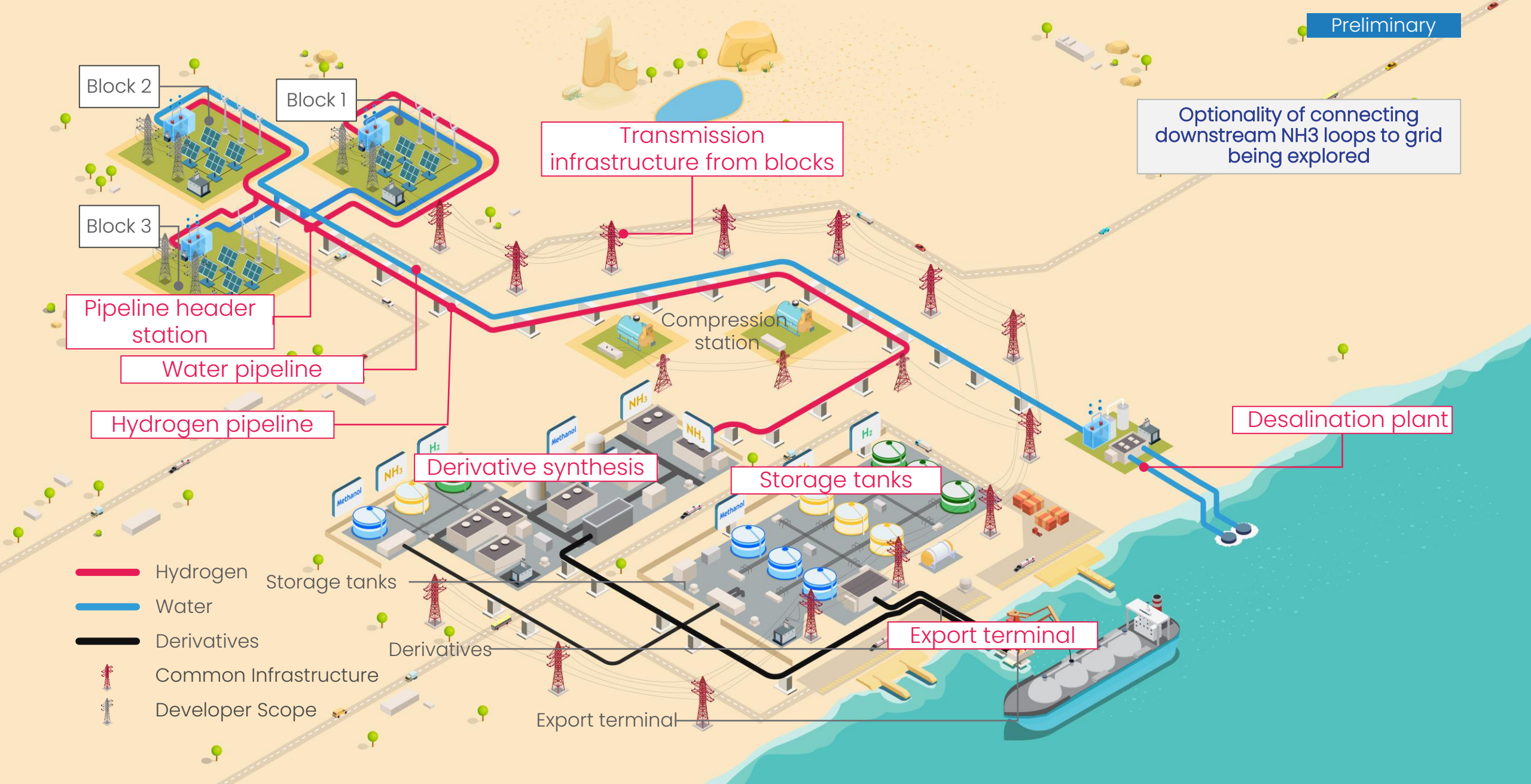
Developers are expected to bid as consortia and partner with a Government owned entity post award

Shared Infrastructure

Infrastructure will be common to the H_2 projects

- Optimal configuration and conditions being further assessed and defined through a technical study

In parallel, we are currently designing the shared infrastructure



Compressed timeline designed to position Oman among the global frontrunners in gH2 & respond to int'l investors' interest

Today

Round 1P public auction (Duqm)
2 blocks

Nov. 2022	Dec. 2022-Jan. 2023			Feb.-Mar. 2023	Mar. 2023
RFQ release	Application & Qualification	Request for Proposal release	Bid submission	Project evaluation	Award & Announcement

Qualification has no deadline. As soon as applicant is qualified it receives RFP (bid submission deadline remains unchanged)

Round 2P public auction (Dhofar)
2-4 blocks

Apr. 2023	May-Jul. 2023		Aug.-Oct. 2023		Nov.-Dec. 2023	
Announce-ment	RFQ release	Application & qualification	Request for Proposal release	Bid submission	Project evaluation	Award & Announcement

THANK YOU

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