



DECEMBER 2024

# UAE Hydrogen Backbone

**A Vision of Hydrogen Pipeline  
Infrastructure across the UAE  
towards 2040**

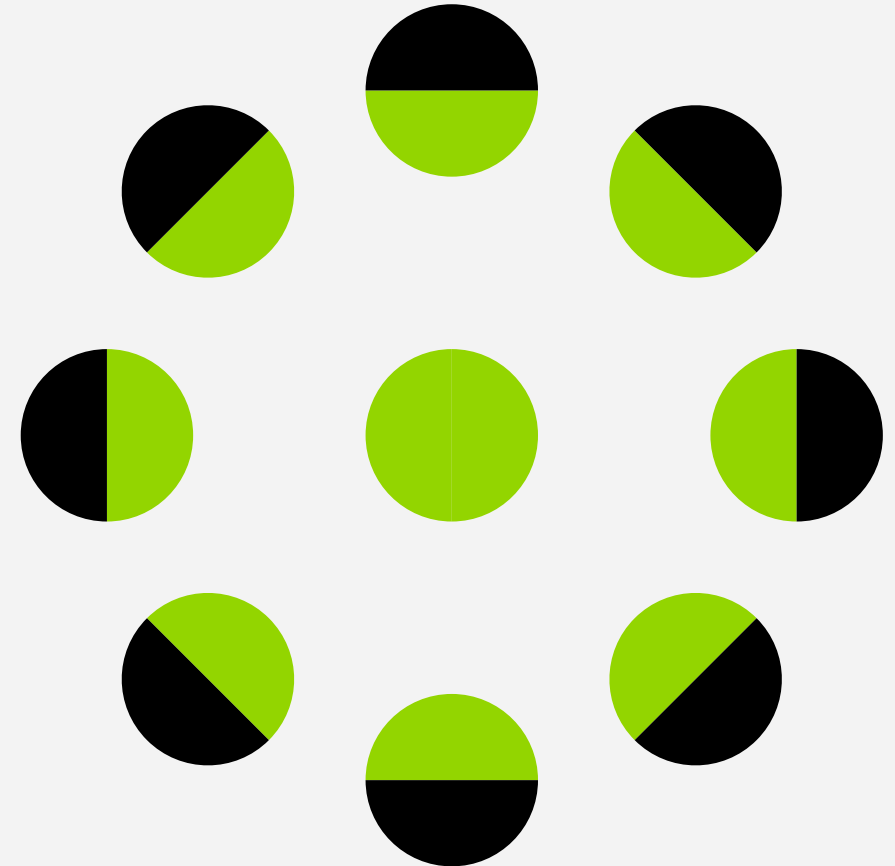
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# Executive Summary

By 2040, the UAE’s hydrogen transmission network can span 2,200 km of repurposed and new pipelines.

## A Vision of Hydrogen Pipeline Infrastructure

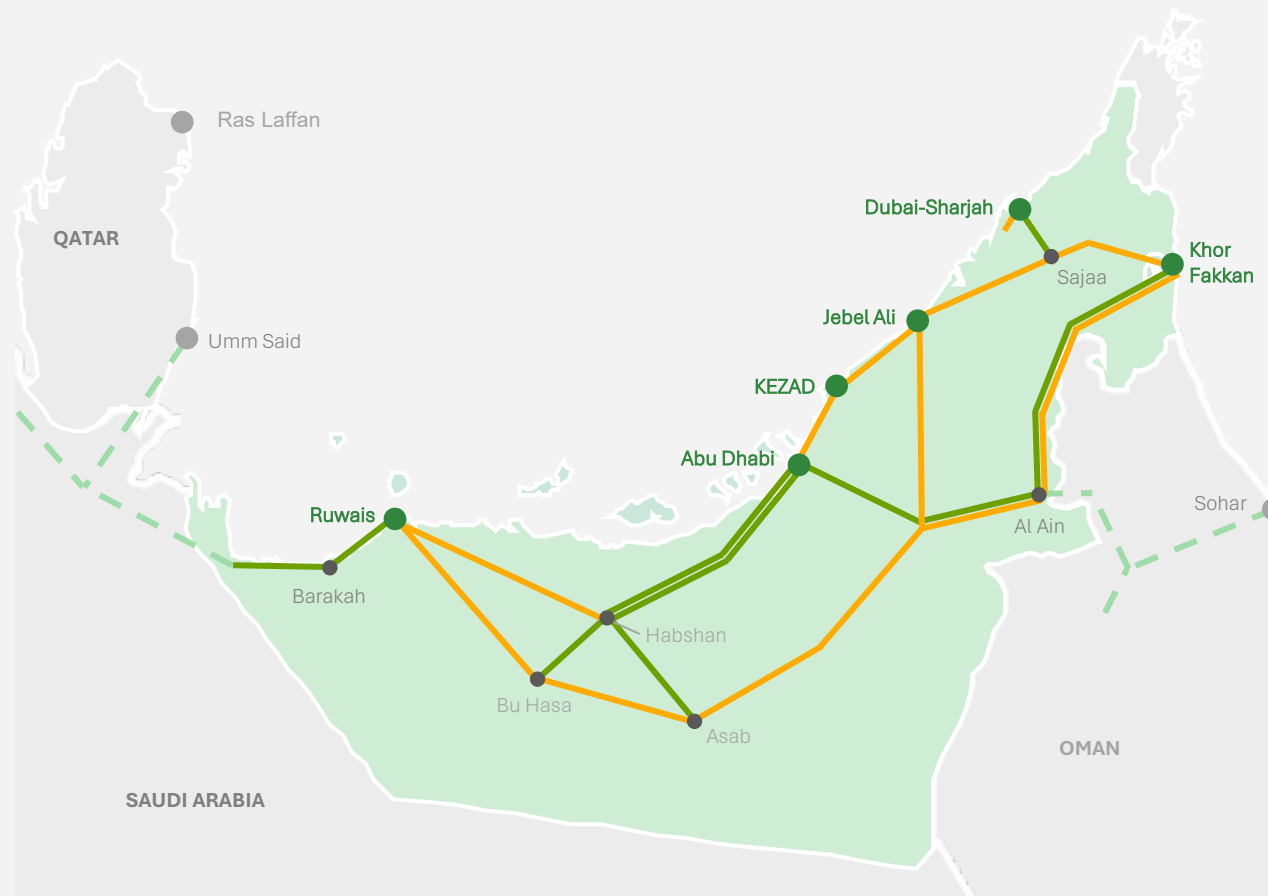
- This report presents a **vision of hydrogen pipeline infrastructure** across the UAE towards 2040, offering snapshots of the development of a **dedicated hydrogen network** by 2030, 2035 and 2040.
- The proposed hydrogen backbone would interconnect and benefit from, the UAE’s extensive offshore **blue hydrogen** potential, its vast **solar PV** resources, its untapped offshore **gas storage** potential, and its strategic **import & export** terminal infrastructure.

## Evolution of the UAE’s Hydrogen Pipeline Network

- **By 2030**, the UAE’s hydrogen network is expected to remain relatively limited, at under **<100 km** of pipeline, and largely in and around front-runner hydrogen oases.
- **By 2035**, the hydrogen transmission network is expected to grow significantly to roughly **500 km**, interconnecting supply and demand across four (4) oases, with both new and repurposed pipelines.
- Continued expansion is expected by **2040**, growing to **2,200 km** - 1,300 km of new pipeline and 900 km of repurposed pipeline. The network expands to all oases and export terminals, as well as potential interconnectors to neighbouring GCC countries.

## Requirements for a National Hydrogen Network

- The development of a UAE hydrogen network requires **greater clarity** on supply-demand market developments, and regulatory & licensing processes, as well as an integrated energy system planning approach across both gas and electricity networks.



**Hydrogen Transmission Network by 2040**

- H2 Pipeline | Repurposed
- H2 Pipeline | New
- H2 Pipeline | Import / Export
- Industrial Oases
- Important Network Site




# Introduction


Hydrogen pipeline infrastructure will play a critical role in enabling the development of a hydrogen economy.


## The Role of Hydrogen Transmission Infrastructure


- Around the world, a growing number of **national governments** and **gas infrastructure companies** are developing plans for the construction of national hydrogen transmission networks.
- The prospect of dedicated **hydrogen networks** is largely based on the potential to repurpose existing gas transmission networks for hydrogen transport, as well as the construction of new hydrogen pipelines.

## Hydrogen Network Plans in Leading Jurisdictions

 In the **Netherlands**, in 2022, the national government instructed Gasunie, the Dutch gas transmission operator (TSO), to develop a plan for a hydrogen network. The network, which began construction in late-2023, is expected to consist of **1,400 km** of pipeline by **2030**.

 In **Germany**, the national government worked collaboratively with the German gas TSOs to develop a comprehensive national hydrogen strategy. The strategy includes a target of **1,800 km** of repurposed and new hydrogen pipelines by **2027-2028**.

 In **Spain**, Enagas, the Spanish gas TSO, developed a hydrogen network plan totaling **1,500 km** of pipeline infrastructure **by 2030**, made up of two (2) hydrogen transmission corridors and a subsea hydrogen interconnection with France.

 In **Oman**, Hydrom, Oman's green hydrogen orchestrator, set out a master plan for approximately **2,000 km** of pipelines **by 2050**, connecting Oman's key economic and industrial zones.





# UAE Hydrogen Context

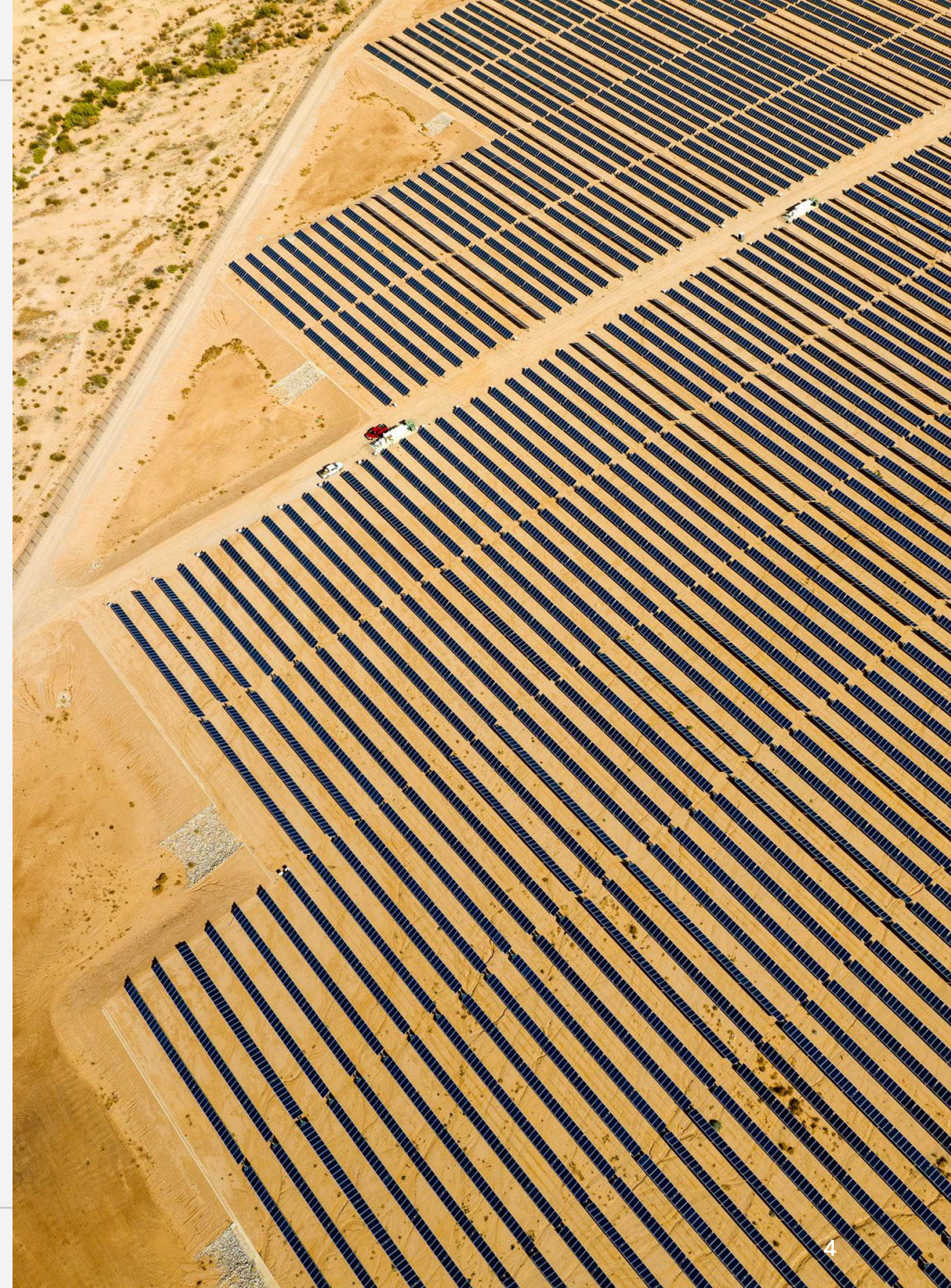
Energy regulators and policy-makers across the UAE recognise the future role of hydrogen infrastructure.

## National Strategic Vision

- The **UAE National Hydrogen Strategy**, issued in 2023 by the Ministry of Energy & Infrastructure (MoEI), positioned the UAE as a top global producer of low-carbon hydrogen as early as 2031, and defined near-term demand and supply targets.
  - The strategy recognised the importance of developing a **hydrogen transmission network** for the creation of a local and export market and noted that transmission pipelines are the cheapest alternative for transporting large volumes of hydrogen.
  - The strategy added that the UAE has the infrastructure and experience to establish **low-cost hydrogen transmission corridors** and storage facilities to facilitate hydrogen exports and meet local demand.

## Hydrogen Policies & Regulations

- The **Abu Dhabi Low Carbon Hydrogen Policy**, issued in 2024 by the Abu Dhabi Department of Energy (DoE), defined the high-level governance and industry structure that will guide and support hydrogen development activities across Abu Dhabi.
  - The policy also noted that hydrogen transmission pipelines, in the future, are likely to be a **natural monopoly arrangement** that, in due course, would be regulated by the DoE.
  - The policy added that the DoE would develop a **licensing framework** for hydrogen activities across the value chain, including for hydrogen transport.





# Natural Gas Transmission Network

The UAE’s natural gas transmission network spans approx. 3,200 km, primarily serving critical power & water production plants and heavy industry.

## Extensive Transmission Pipeline Network across the UAE

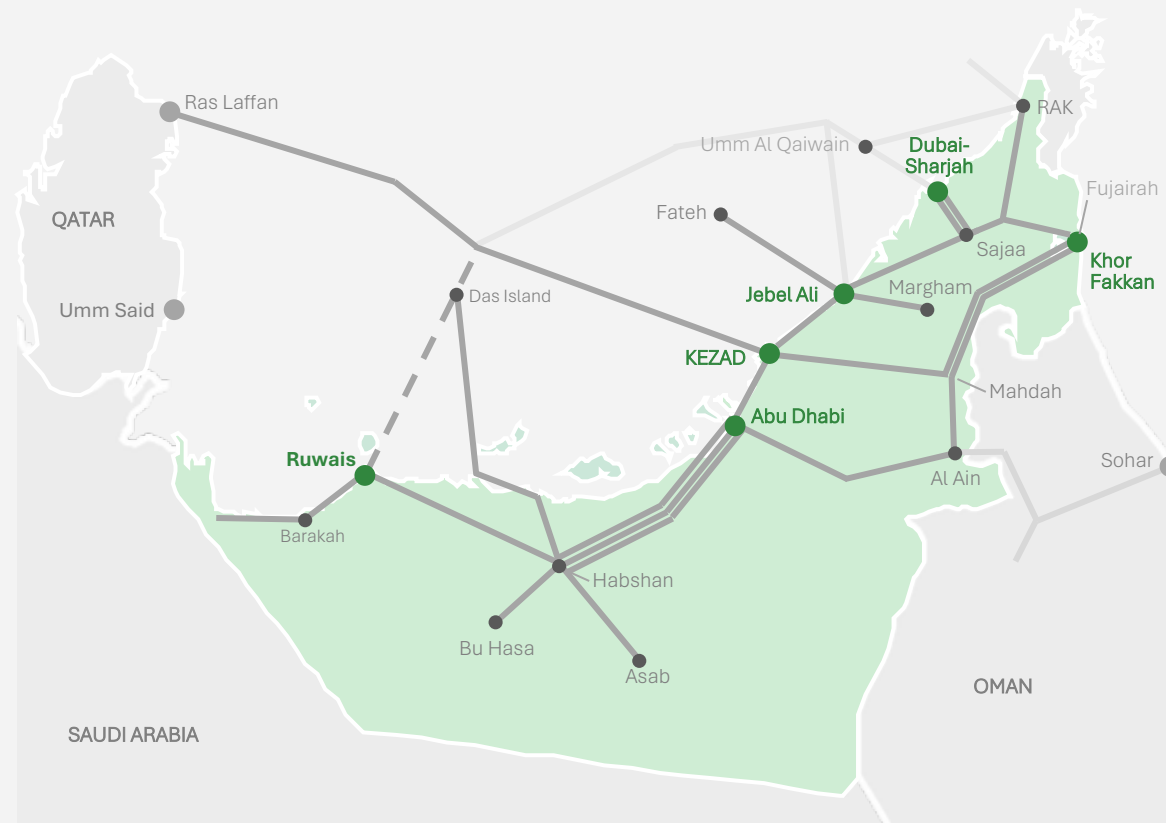
- The UAE’s natural gas transmission networks extends **across all seven (7) Emirates** transporting gas from **offshore and onshore gas fields** to major power & water production facilities across the entire country, as well as major industrial facilities.
- The gas network also includes **key interconnections** with two neighboring countries: **Qatar**, via the Dolphin Pipeline, and **Oman**, via the Al Ain-Al Buraimi pipeline.

## Parallel Transmission Pipelines along Key Corridors

- While much of the network is made up of single transmission pipelines, **parallel pipelines** are found in two (2) corridors:
  - **Habshan to Abu Dhabi**, with the Habshan-Maqta twin pipelines (52-in.) and the Habshan-Umm al-Nar pipeline (24 to 30 in.); and
  - **Mahdah to Fujairah**, with the Taweelah-Fujairah pipeline (48-in.) and the Al Ain-Fujairah pipeline (24 in.) meeting north of Al Ain.

## Gas Supply to Key Power, Water, and Industrial Facilities

- The gas network serves **large power & water production plants** across the entire country, from the **Umm al-Nar** and **Taweelah** complexes near Abu Dhabi city and KEZAD, respectively, to the **Fujairah F1-F3** complex in the East Coast.
- The gas network also serves **key industrial sectors**, including steel, aluminum, cement, and petrochemical facilities, largely in Abu Dhabi and Dubai.



### Natural Gas Transmission Network in 2024

- Gas Pipeline | Operational
- Gas Pipeline | Not Operational or Unknown Status
- - Gas Pipeline | Under Development
- Industrial Oases
- Important Network Site

# Hydrogen Transmission Network by 2030

By 2030, hydrogen infrastructure is only expected to develop in and around front-runner oases.

## Early Pipeline Infrastructure Limited to Key Oases

- By **2030**, the UAE’s hydrogen network is expected to remain relatively limited, at likely **less than 100 km**. Most of the early development of pipeline infrastructure is expected to occur at **Ruwais, Abu Dhabi (AD), KEZAD** and **Jebel Ali** – in order to connect hydrogen production to nearby offtakers.
- Initially, most - if not all - of the local hydrogen transmission networks are expected to be **new pipelines**, nevertheless, the repurposing of natural gas pipelines may also be piloted.
- At **Ruwais**, newly-built transmission infrastructure transports blue hydrogen produced at **centralised SMR plants** to the nearby ADNOC Refinery complex as well as nearby petrochemical facilities.
- At **AD, KEZAD** and **Jebel Ali**, new transmission infrastructure is, in contrast, used to transport hydrogen produced from **grid-connected electrolysers** to offtakers.

## Pipeline Infrastructure Built and Sized for the Future

- The construction of transmission infrastructure takes **2-3 years** and is sized based on **long-term planning forecasts** (>10-15 years).
- This means that while hydrogen demand may be quite limited in 2030, the 2030 infrastructure snapshot may be a more appropriate reflection of longer-term demand projections.



**Hydrogen Transmission Network by 2030**

- H2 Pipeline | Repurposed
- H2 Pipeline | New
- H2 Pipeline | Import / Export
- Industrial Oases
- Important Network Site

# Hydrogen Transmission Network by 2035

By 2035, hydrogen infrastructure expands significantly to interconnect supply and demand across 4 oases.

## Pipeline Corridor from Ruwais to Jebel Ali

- By **2035**, the hydrogen transmission network is expected to grow to **approximately 500 km**, including 350 km of new pipeline and 150 km of repurposed pipeline.
- This leads to the UAE’s four (4) major hydrogen oases - Ruwais, Abu Dhabi, KEZAD and Jebel Ali - becoming **interconnected**.
- The large buildout in transmission infrastructure occurs almost exclusively along the **Ruwais-Jebel Ali corridor**, enabling the transport of **blue hydrogen** production from Ruwais northbound to the other oases, complementing green hydrogen produced along the corridor.

## Major Pipeline Repurposing Works Begin

- One of the two (2) **Habshan-Maqta pipelines**, terminating near Abu Dhabi, is **repurposed** to transport hydrogen, while the second pipeline continues to transport natural gas to meet gas demand.
- New pipeline infrastructure is built parallel to the existing **Ruwais-Habshan** pipeline, as well as from **Abu Dhabi to KEZAD**, and onwards to **Jebel Ali**. These new pipeline segments are built parallel to the existing **Maqta-Taweelah** and **Taweelah-Jebel Ali** pipelines.

## Pipeline Infrastructure Emerges in Northern Oases

- By 2035, limited hydrogen infrastructure also develops locally in the two (2) northern oases - **Dubai-Sharjah** and **Khor-Fakkan** - however, without any connection to the Ruwais-Jebel Ali corridor.



### Hydrogen Transmission Network by 2035

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# Hydrogen Transmission Network by 2040

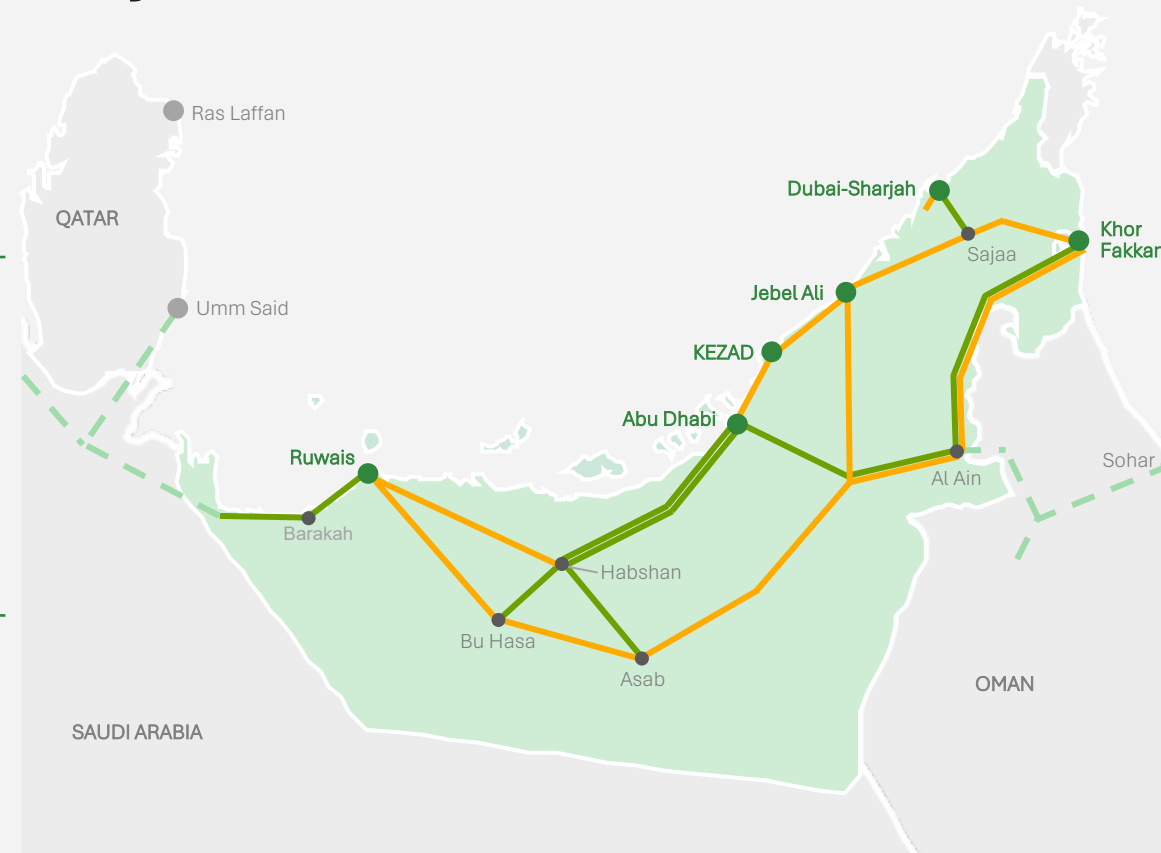
By 2040, an extensive hydrogen backbone develops, interconnecting all UAE oases, export terminals and potentially to neighboring GCC countries.

## Early Pipeline Infrastructure Limited to Key Oases

- By **2040**, the transmission network expands across the entire country, reaching **2,200 km**, including 1,300 km of new pipeline and 900 km of repurposed pipeline. The expanded network interconnects all six (6) UAE oases, export terminals in KEZAD, Jebel Ali and Khor Fakkan, as well as potentially to Oman and KSA.
- The expansion of the network creates **two (2) distinct pipeline corridors**, a **Coastal Corridor** and an **Inland Corridor**, both originating in Ruwais and terminating in Khor Fakkan.

## Pipeline Infrastructure Built and Sized for the Future

- The **Coastal Corridor** represents an expanded Ruwais-Jebel Ali corridor and connects all six (6) oases, largely along the coast.
  - From 2035 to 2040, the corridor **expands northbound** to Khor Fakkan with new pipeline infrastructure (parallel to the existing Jebel Dhana-Sajaa and Sajaa-Fujairah pipelines) and **southbound** towards the KSA border by repurposing existing gas pipelines.
- The **Inland Corridor** runs loosely parallel to the Coastal Corridor, however inland, and running only through the Ruwais and Khor Fakkan oases.
  - The **southern segments** of the corridor are made up exclusively of new pipelines (via Bu Hasa and Asab), while the **northern segments** incorporate the repurposed Taweelah-Fujairah pipeline.
  - This corridor largely develops with the purpose of collecting green hydrogen production from the Al Dhafrah region, towards Al Ain, and along the border with Oman.



**Hydrogen Transmission Network by 2040**

- H2 Pipeline | Repurposed
- H2 Pipeline | New
- - - H2 Pipeline | Import / Export
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# Actions Required

The development of a UAE hydrogen network requires greater market and regulatory clarity, and an integrated energy system planning approach.

## National Pipeline Infrastructure Vision Through Integrated Energy System Planning

- Establishing and aligning on a **unified vision** of gas (natural gas, hydrogen and carbon) and electricity transmission infrastructure considering existing infrastructure, supply points, demand clusters as well as export centers (ports and interconnectors).
  - The unified vision should be **underpinned by a multi-stakeholder approach** combining Federal entities (Ministry of Energy & Infrastructure), Emirate-level entities (Department of Energy Abu Dhabi, Regulatory and Supervisory Bureau Dubai, etc.) and infrastructure owners (ADNOC, TAQA Transmission, DEWA, Etihad Water & Electricity, DP World, AD Ports, etc.).

## Hydrogen Policies & Regulations

- Defining licensing, network connection and project development **frameworks** for the different parts of the hydrogen (and carbon) value chain to provide **regulatory clarity** for investors and infrastructure companies to **navigate through the investment and financing landscapes**.

## Offtaker Orchestration

- Obtaining a **clearer view on local hydrogen demand** to inform infrastructure development pathways (and supply needs). This can be done via carrying out “call-for-interest” non-binding consultation with offtakers to understand hydrogen demand needs (where, how much, probability of materialising, etc.), similar to what Enagas (🟡) leveraged to define their hydrogen transport and storage visions.





# Contact Us

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