



Role of IRENA in supporting Hydrogen Economy

Jaidev Dhavle

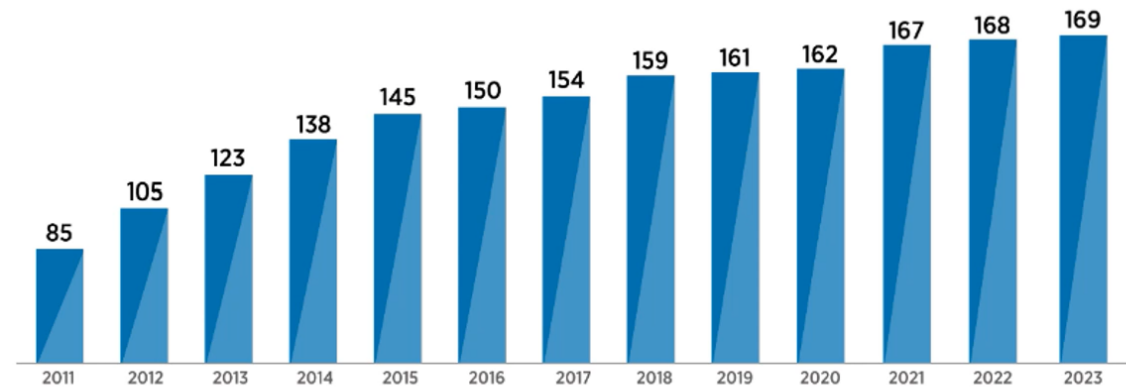
Associate Programme Officer

IRENA Innovation and Technology Center

IRENA Key Facts

- » Established in 2011
- » Headquarters in Masdar City, Abu Dhabi, UAE
- » IRENA Innovation and Technology Centre – Bonn, Germany
- » Permanent Observer to the United Nations – New York, USA

169 Members and 16 States in Accession



Mandate

To promote the widespread adoption and sustainable use of **all forms of renewable energy** worldwide



Bioenergy



Geothermal Energy



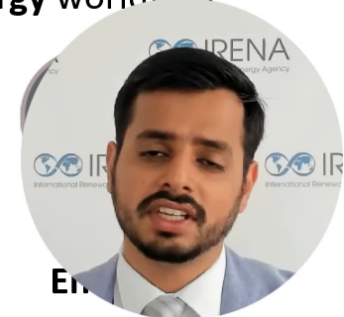
Hydropower



Ocean Energy

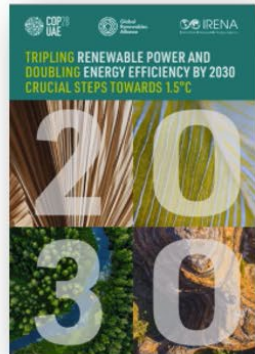


Solar Energy



En.

COP28 UAE Consensus – Includes tripling renewable electricity capacity by 2030



IRENA worked closely with our **Member States in 2023** to support three key commitments for 2030:

- **G7** Offshore wind (150 GW) and solar (1TW)
- **G20** 3x renewable power
- **COP28** 3x renewable power and 2x EE by 2030

IRENA Tasked with Monitoring Progress of UAE Consensus Renewable Energy and Energy Efficiency Goals by COP28 Presidency

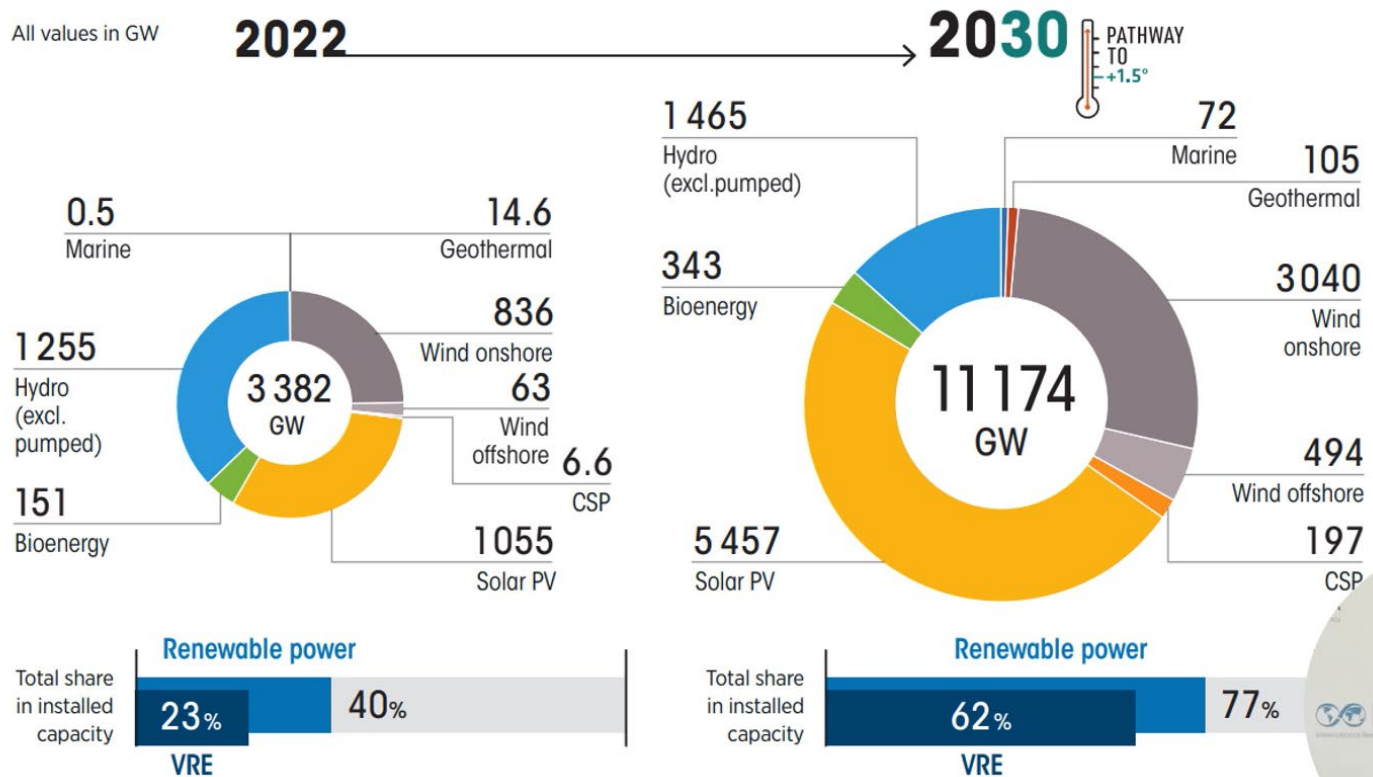
13 May 2024 | Press Releases



2024 – IRENA has s



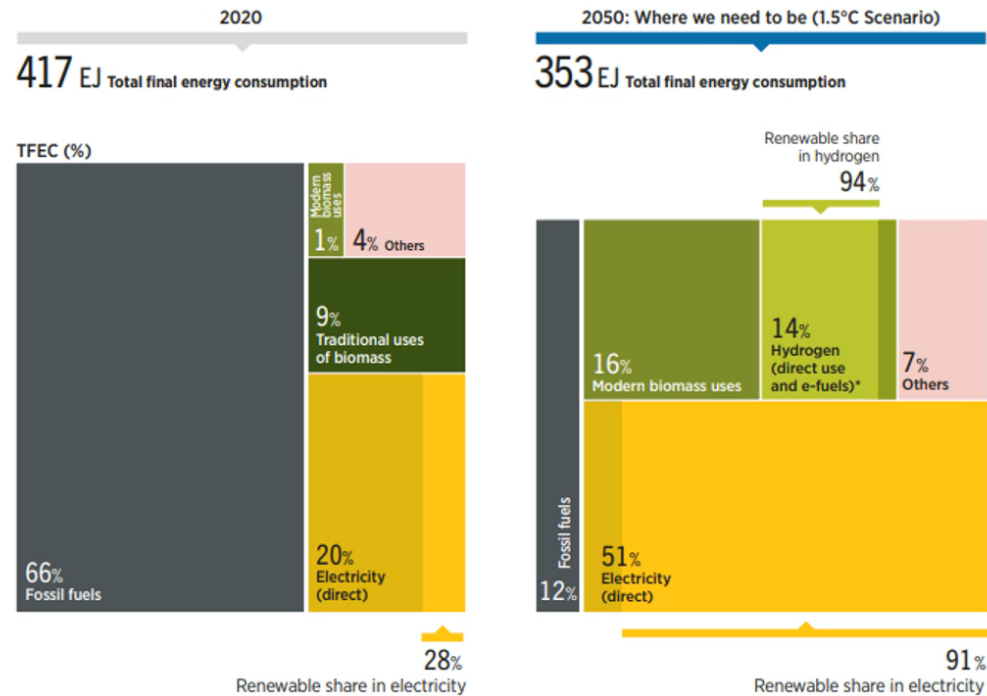
Global renewable power capacity in the tripling pledge, 2022 and 2030



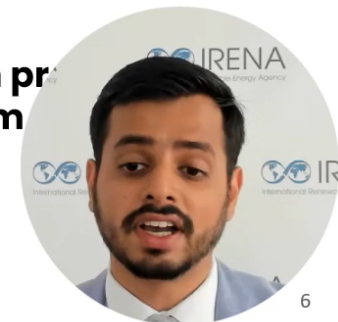
Source: IRENA (2024), Tripling renewable power by 2030: The role of the G7 in turning targets into action

On the role of hydrogen in IRENA's 1.5°C Scenario

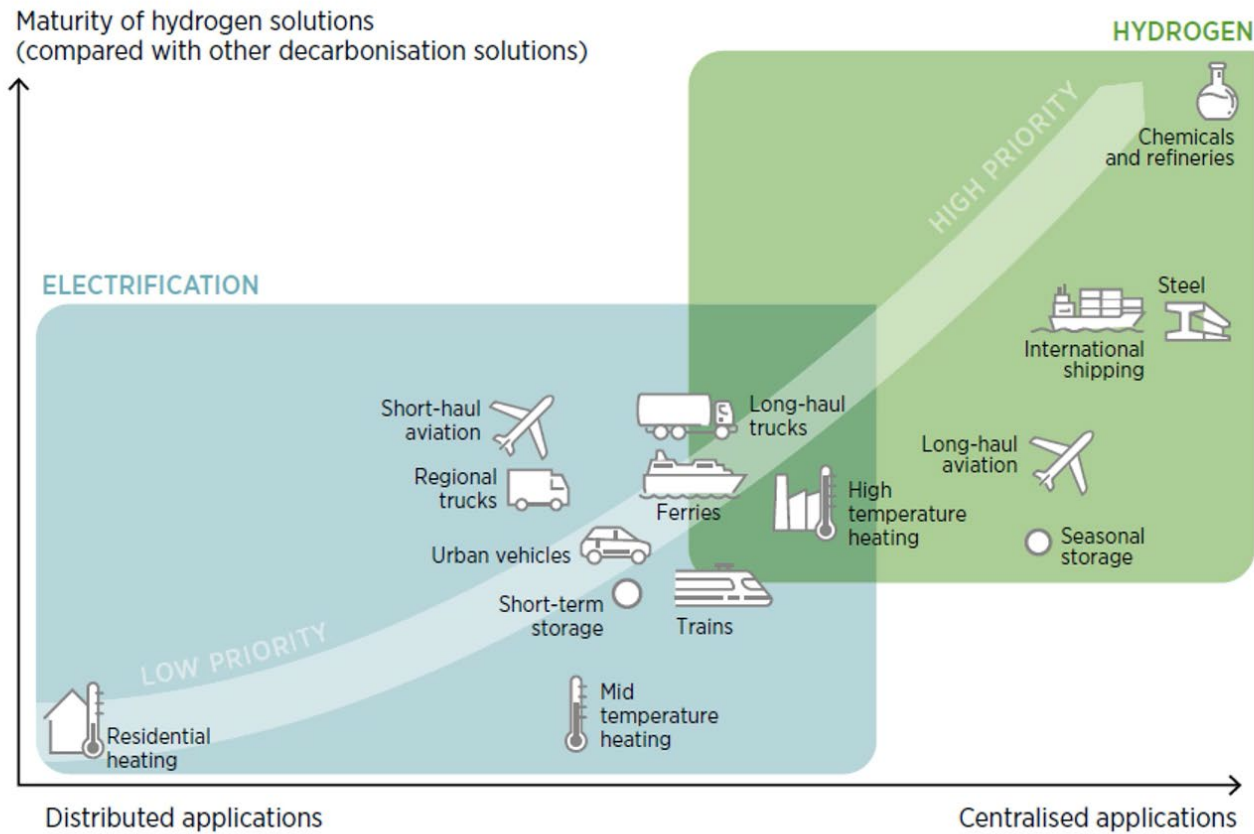
Breakdown of total final energy consumption by energy carrier in 2020 and 2050 under IRENA's 1.5°C Scenario:



- By 2050, **electricity becomes the main energy carrier**, accounting for more than half of the global final energy consumption.
- Hydrogen and hydrogen derivatives make up around **14% of total final energy consumption by 2050**.
- **94% of hydrogen production should come from**

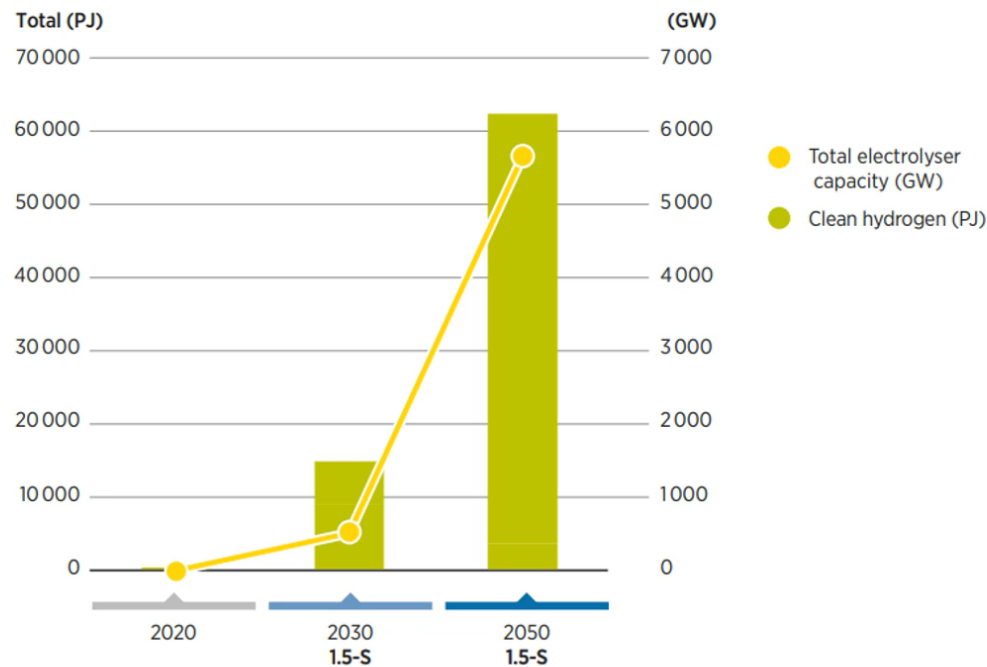


Priority uses for hydrogen across the energy system



Scaling hydrogen production will be a major challenge

Global clean hydrogen supply in 2020, 2030 and 2050 in IRENA's 1.5°C Scenario.



Notes: 1.5-S = 1.5°C Scenario; GW = gigawatt; PJ = petajoule.

Source: IRENA, 2023. World Energy Transitions Outlook 2023: 1.5°C Pathway, Volume 1

- Most of **today's hydrogen production is fossil-derived** (mostly natural gas, but also coal)
- Most global hydrogen **production in 2050 should come from renewables**
- The electricity requirement for **green hydrogen in 2050 is comparable to today's global electricity consumption.**
- From **~ 1 GW to >5700** electrolyser capacity by 2050



Overall Support Provided by IRENA

1- Data and Tools

Statistics



Resource Assessment



Renewable Readiness Assessment



2- Analysis

Outlook/Socio-Economics



RE-Development Nexus



Technology and Policy Innovations



3- Capacity Building/TA

NDC Support



Long-Term Energy Planning



Auctions and Policy Support



Energy for Healthcare – Country Assessments in Sub-Saharan Africa



4- Project Facilitation

Climate Investment Platform

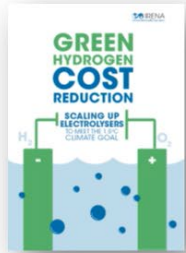


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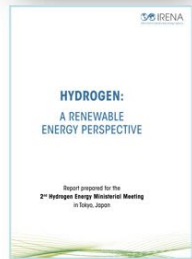


Need for a full value chain approach - IRENA's analysis

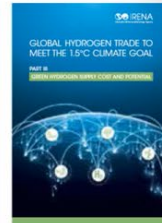
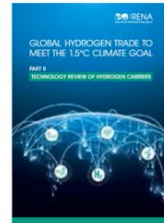
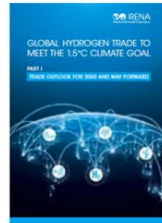
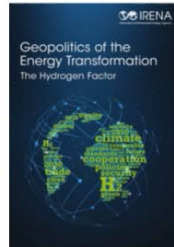
Supply



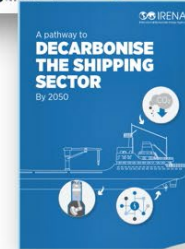
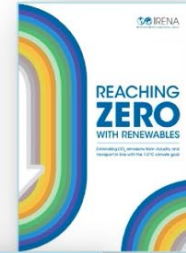
Sector coupling



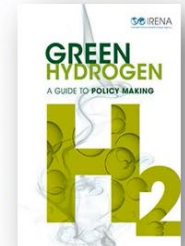
Trade



Demand



Cross cutting & Innovation Frameworks and Policies



IRENA “QI for Green Hydrogen” Project Overview

Outcome: The major stakeholder groups have sustainably increased the coordination amongst each other, are informed about the role of Quality Infrastructure (QI) and support the development of QI in line with identified priority areas for the sustainable production and trade of global green-hydrogen as well as selected derivatives.

Apr 2022

Output 1: Quality Infrastructure Roadmap. **Output 2: National Case Study and Action Plan .** **Output 3: Stakeholder network established.**

Completed

Activity cluster 1: Desk study conducted
A desk study on global green hydrogen production and trade as well as selected derivatives is conducted: **(Deliverable: Internal document on desk study results)**

Ongoing

Activity cluster 2: One national case study and recommended action plan piloted
The global information of the desk study (activity 1) is piloted and applied in a national context. **(Deliverable: Documentation of national case study, including action plan)**

Ongoing

Activity cluster 3: Roadmap is developed
The information created under activity one and two is summarised in a publication on the contribution of quality infrastructure to the development of green hydrogen production and trade. **(Deliverable: Roadmap is published)**

Planned

Activity cluster 4: Ad-hoc advice provided on how to implement recommendations of developed action plan
Advise is offered to support the pilot country stakeholders in the implementation of first recommendations (follow up from activity 2). **(Deliverable: Documentation of follow up meetings and record of advice provided including results)**

Activity cluster 5: Communication Strategy Developed and Implemented
Deliverable: Document describing the communication strategy, documentation of communication measures.

Activity cluster 6: Stakeholder Network Created
Deliverable: Documentation of stakeholder network meetings

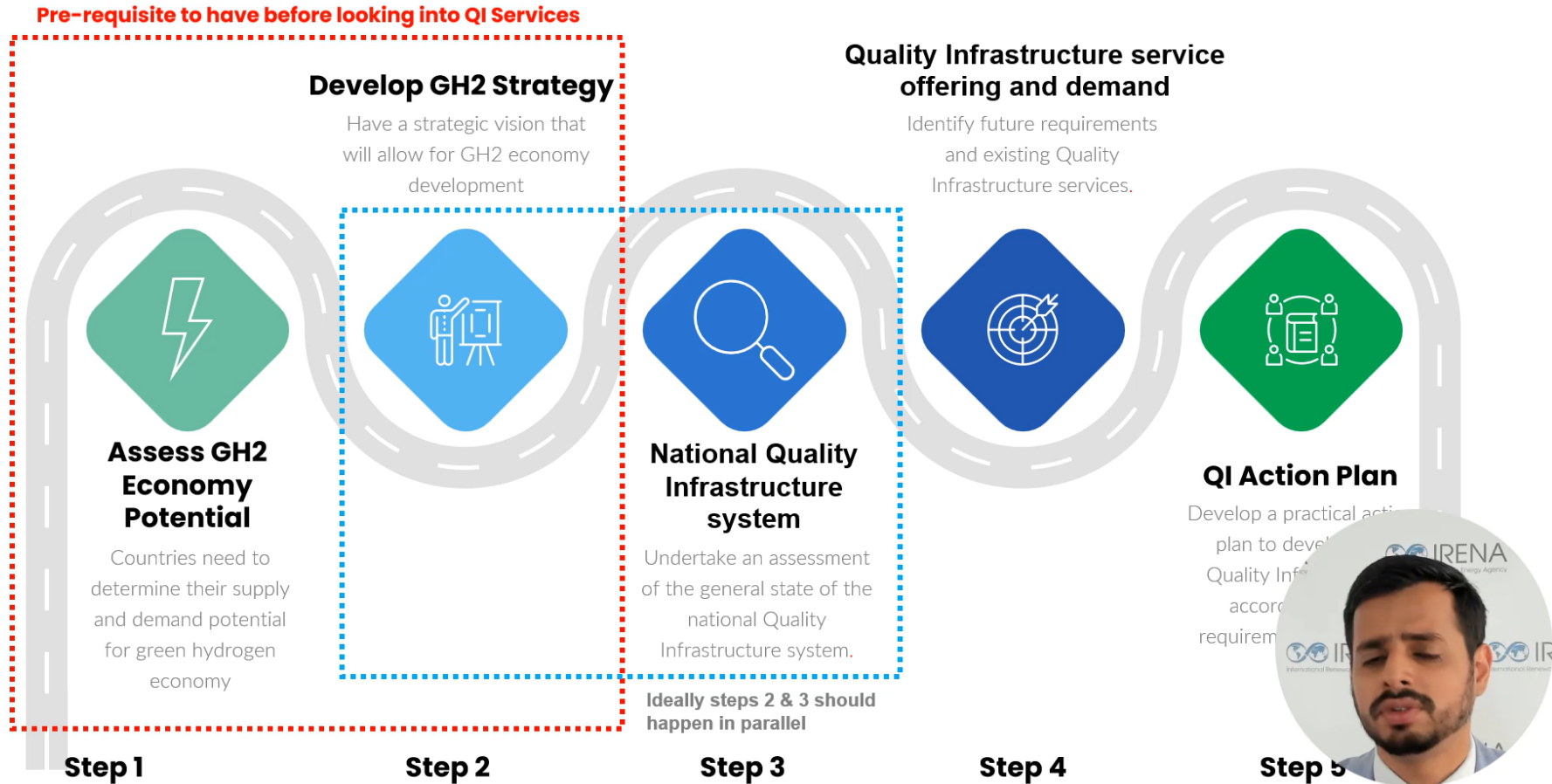


Project Duration

Jan 2024

QI for GH2 ROADMAP

This is the general roadmap approach that IRENA is proposing that any country should follow to ensure that they can develop a quality infrastructure ecosystem for safe and sustainable production of green hydrogen. This approach has been applied to this case study.



QI Assessment: Identification of necessary and future services

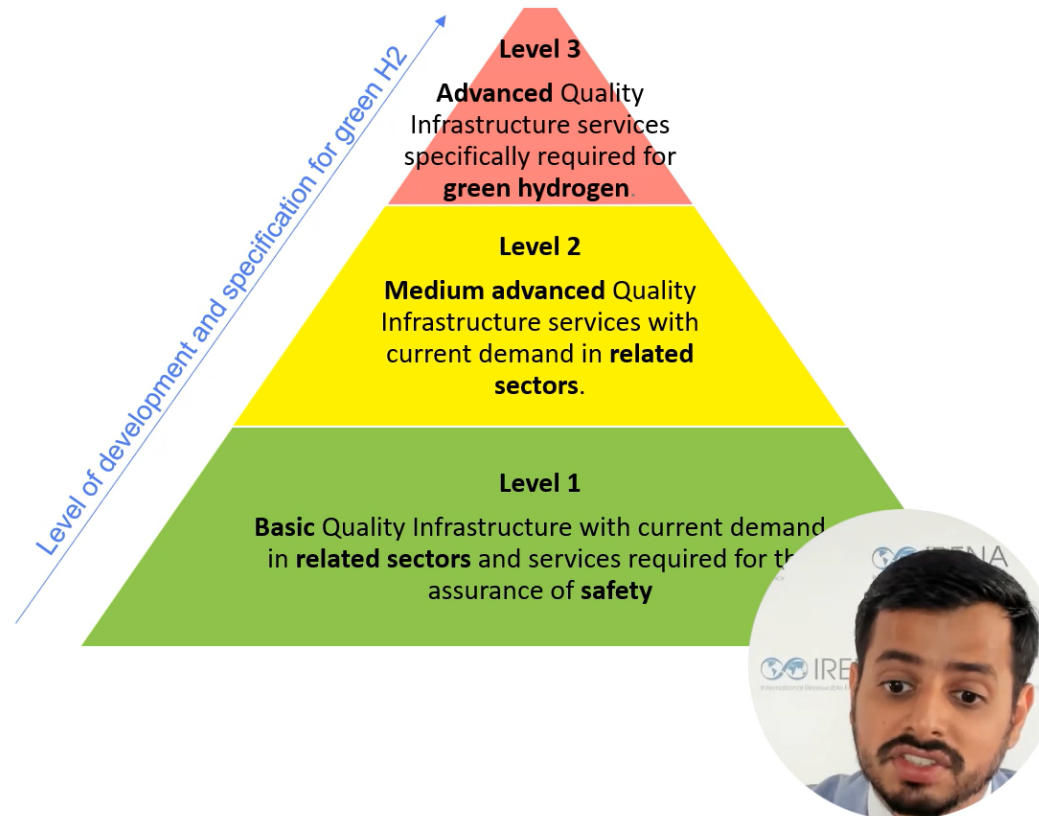
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Use the **Quality Infrastructure service checklist** to identify the services **required nationally** on the **three levels of the pyramid**.

- Complete and specify the service checklist if required.
- Consider services required along the value chain to assure **safety, quality and sustainability**.

Aspects to be covered for the required services identified:

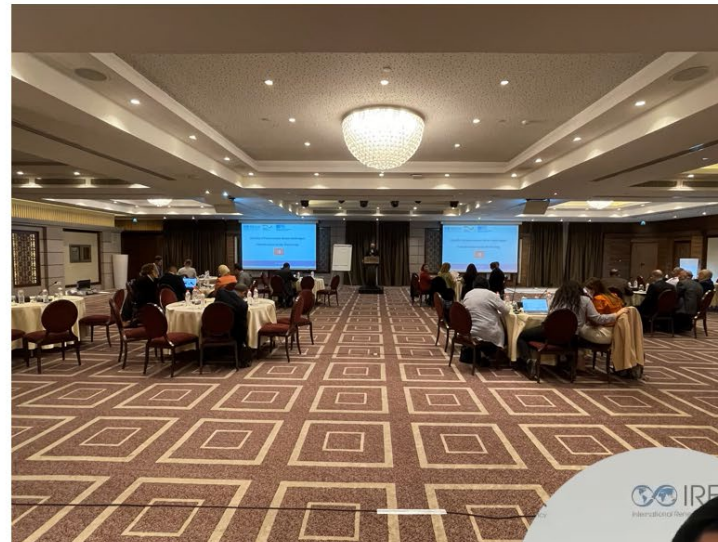
- **Current demand**.
- Future **market potential**.
- Potential **income generation** and **financing** requirements to develop and maintain the services of the Quality Infrastructure.



Rationale and Expectations in preparing Case Study

- The **Country (Tunisia)** will benefit from this project by receiving **analytical application, development of recommendations, and a tailored and country specific QI action plan** aligned with national goals and receive the required political support and buy-in

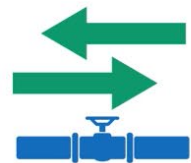
- The national case study covers the following:
 - National market and export potential for hydrogen.
 - Relevant national stakeholders.
 - National quality, sustainability, and safety requirements.
 - Status of quality infrastructure in country.



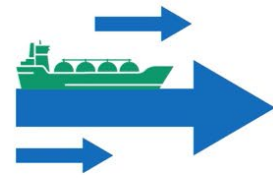
About a quarter of the global hydrogen demand could be internationally traded



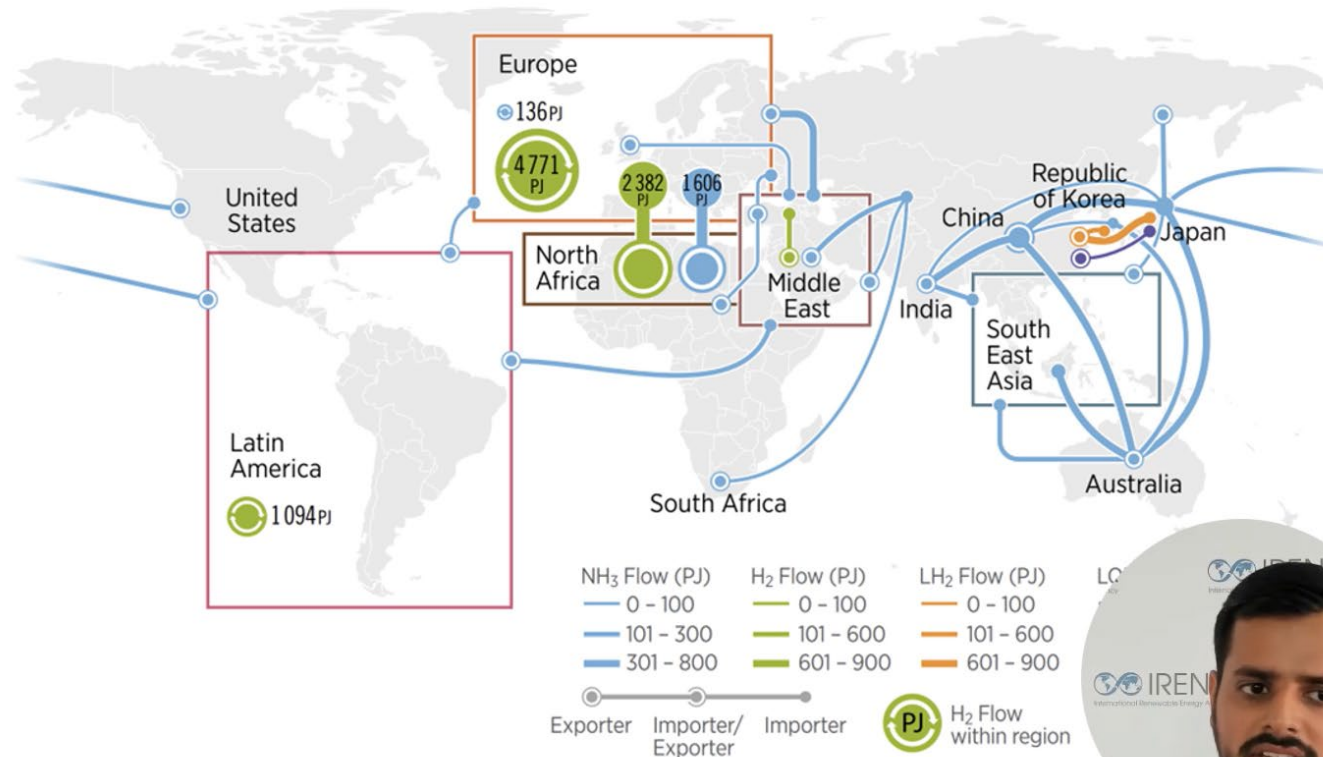
By 2050, international trade could satisfy about 1/4 of the total global hydrogen demand in IRENA's 1.5°C scenario.



55% of this hydrogen would be traded via pipelines.

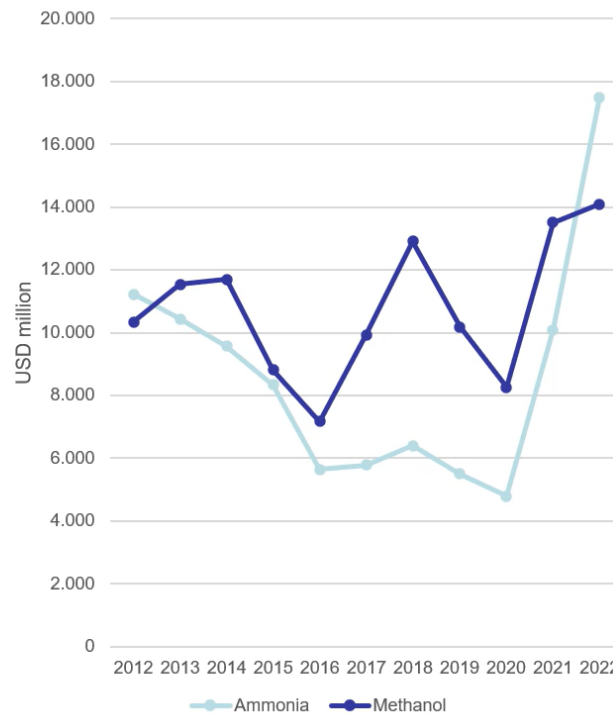
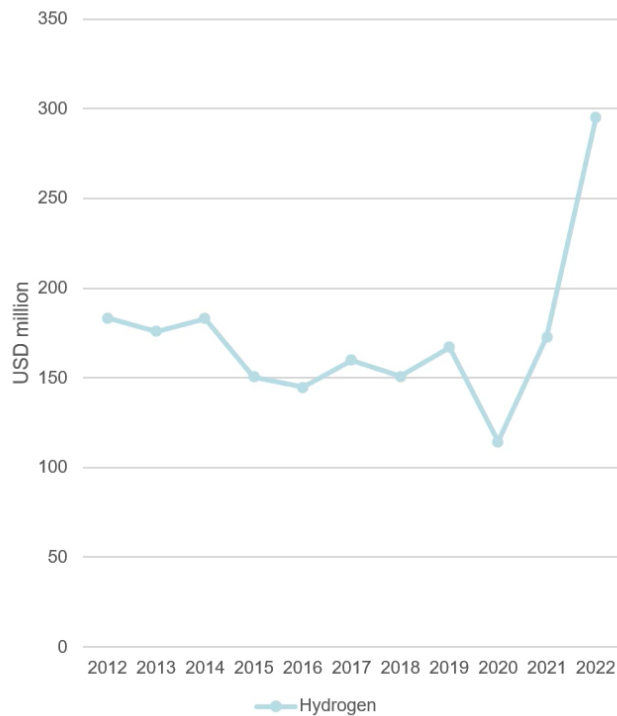


45% of this hydrogen would be shipped, predominantly as ammonia.



Source: IRENA, 2022. Global hydrogen trade to meet the 1.5°C goal. Part I: Trade outlook for 2050 and way forward.

Tracking global imports in hydrogen and derivatives (ammonia and methanol)



- Trade of hydrogen and derivatives is **increasing since 2020**
- Current trade of **hydrogen is rather small compared to ammonia and methanol** – almost two orders of magnitude
- Hydrogen in the order of 300 million USD, while **ammonia and methanol in the order of 18 billion USD** respectively in 2022



Source: WTO and IRENA (2023) International trade and green hydrogen: Supporting the global transition to a low-carbon economy

Summary – Five Key Actions to Foster Green Hydrogen Trade



5. Increasing **international cooperation** through cross-borders dialogue and increased in joint capacity building programmes.



1. Addressing trade by **reducing tariffs and non-tariff barriers** on green hydrogen, electrolysers, derivatives and other products along the supply chain.

4. Using **sustainable government procurement** by purchasing low-carbon goods and services and stimulating innovative solutions.

2. Developing **sound quality infrastructure** by adopting national measures based on international standards and engaging in international standardization.

3. Implementing support policies via **targeted and non-discriminatory environmental subsidies** to help sustain growth in electrolyser capacity.



Members



Knowledge partners



Member's distribution by region and sector

Members by region



Members by sector

	Energy	20
	Industry Services	20
	Steel/Aluminum	4
	Chemicals	2
	Mining	2
	Waste & Water	1
	Capital	4
	Cross	4



Total 71 members and partners with IRENA as Alliance Secretariat host

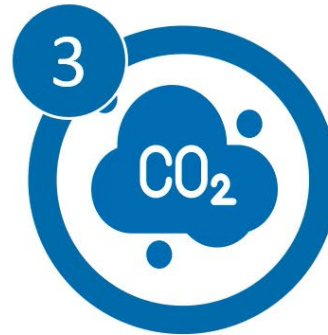
AFID Decarbonization Commitment



Increasing **production/output** of - carbon-free energy, incl. renewables and clean hydrogen



Increasing **offtake/usage** of green energy



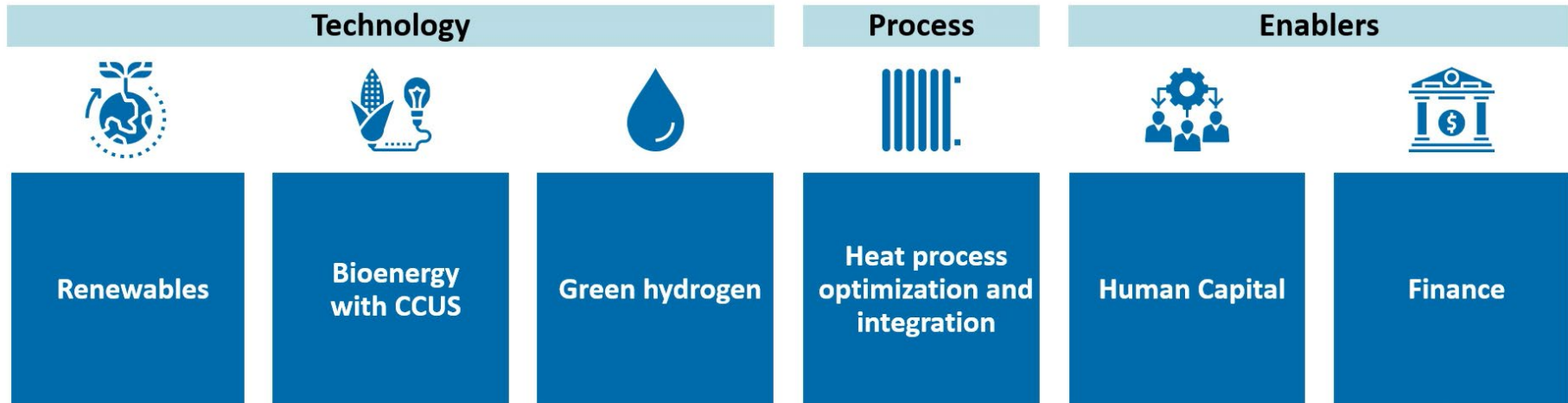
Reducing **scope 1 and scope 2** emissions directly¹. Engaging supply chain on reducing **scope 3** emissions



Increasing **investments** in decarbonization projects and transition



1) Through electrification, carbon removals, Energy efficiency and Heat Optimization and Storage



Through collective efforts of the industrial sector, the Alliance is accelerating the achievement of a net-zero industrial sector by 2050.



In 2023, the Alliance members advanced on the targets and joint actions

Ignition & growth

- Operationalized the Alliance, mobilized industrial players in advancing collaboration on existing and new decarbonization initiatives among member
- Implemented a collaborative online workspace for joint actions to deliver impacts
- Conducted capacity building to support achievement of ambitious and measurable decarbonization targets



Progress & enhancement

- Supported achievement of ambitious and measurable decarbonization targets. Implemented joint initiatives and actions to achieve tangible results
- Shared knowledge and best practices throughout the year, including the IRENA Assembly and Innovation Week, NYC Climate Week & G20 CEM
- Successfully prepared four reports with key policy recommendations
- Expanded AFID to over 60 members & partners



Grand finale & closing

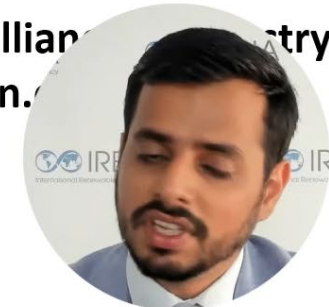


- Strong presence at COP28, showcasing commitment to climate action
- Adopted Decarbonization Commitment, reinforcing dedication to emissions reduction
- Quantified ambition for 2030, setting clear and measurable targets
- Held roundtable with 30+ CEOs in Dubai, fostering impactful discussions
- Held 6 working group events



<p>IRENA Insights: Global Geothermal Market and...</p> <p>IRENA insight WEBINAR SERIES</p> <p>30 min → GO</p>	<p>IRENA Insights: Pathways to Decarbonise the Shippin...</p> <p>IRENA insight WEBINAR SERIES</p> <p>30 min → GO</p>	<p>Building a Sustainable Future in Cities (Energy...</p> <p>10 min → GO</p>
<p>How to Decarbonise the Shipping Sector</p> <p>10 min → GO</p>	<p>Global hydrogen trade in 1.5 C scenario</p> <p>10 min → GO</p>	<p>Solutions for Decarbonising Heating in Buildings</p> <p>10 min → GO</p>
<p>How to decarbonise end-use sectors with renewable...</p> <p>Power to heating and cooling Power to hydrogen</p> <p>10 min → GO</p>	<p>Energy storage is key to unlocking renewable...</p> <p>5 min → GO</p>	<p>We must act now to decarbonize industrial heat...</p> <p>5 min → GO</p>

<https://www.allianceforindustrydecarbonization.org/>





IRENA's Collaborative Framework on Green Hydrogen brings together the global community

- Global platform to expedite the deployment of hydrogen.
- CFGH addresses critical issues faced by members in the hydrogen market, currently co-facilitated by Germany and the United Arab Emirates
- In 2023, broad representation with 144 participants from IRENA's membership.
- Expertise shared by external experts and insights from IRENA's analyses.
- Discussions include country interventions for in-depth understanding of global developments.
- In 2024, the CFGH focuses on the role of hydrogen derivatives



IRENA's CFGH Main Observations

	<p>The momentum towards planning green hydrogen remains strong, and hydrogen strategy launches have surged in recent years. Given the rapid evolution of the green hydrogen sector, updating strategies is crucial to address those development.</p>
	<p>Significant advancements in certification and standards include the unveiling of the ISO methodology for assessing greenhouse gas emissions at COP28. Despite the progress being made, however, challenges persist in trading hydrogen as derivatives.</p>
	<p>For truly sustainable green hydrogen value chains to be created, project planners must account for more than emissions. They must also consider local environmental impacts, including energy and water supply, as well as social factors like job creation and community involvement.</p>
	<p>The global pipeline of hydrogen pilot projects is nascent and concentrated in Europe and Asia. China, Germany, Spain and Australia account for 50% of planned or installed capacity; 46% of the capacity is still in the announcement phase (567 megawatts [MW]), with only 396 MW under development and 268 MW operational.</p>
	<p>High financing costs and access to finance remain key challenges in the many developing countries with significant renewable energy potential. Catalysing green hydrogen production in such countries would require de-risking, risk sharing and tailor-made financing mechanisms</p>
	<p>Fostering community involvement, and thus bolstering social acceptance, is critical in the implementation of new energy technologies. Especially for those that involve large-scale infrastructure development, such as that required to meet future green hydrogen. Peer learning from best practices will prove to be beneficial in this regard.</p>
	<p>Efforts to create demand need to be stepped up: There has been modest progress in creating demand for green hydrogen. It is important that both governments and companies send stronger collective demand signals by moving from target commitments to contracts. Identifying pre-defined off-takers is crucial.</p>
	<p>Regulatory support must be maintained, alongside bold policy making: Long-awaited developments like the adoption of Delegated Acts of the European Renewable Energy Directive made 2023 a pivotal year for bold policy making and deployment of public funding for green hydrogen.</p>



Overview of 2024 projects

Sustainable hydrogen production report

For the G7 Japan presidency, this project focuses on the **sustainability and benefits** of growing hydrogen and derivatives supply in and trade from developing nations

Innovation Outlook: chemicals

We are developing a technical paper on the opportunities and challenges in the decarbonisation of **high value chemical value chains**, where green hydrogen is a key feedstock

IFRET roadmapping

In addition to leveraging hydrogen certification work for IFRET, we are responsible for a workpackage focused on roadmapping **enabling measures for green hydrogen value chains in North Africa**



Joint trade report with WTO

Published at COP28, this report analyses current **trade flows** of hydrogen and derivatives, and makes recommendations on how open and free trade can be supported

Certification & QI projects

Across two related projects, we are developing our understanding of the status of emerging **certification and regulation** for hydrogen and derivatives, as well as **quality infrastructure (QI)** roadmaps for hydrogen value chains. Both projects consider the systems required to support international market development.

Collaborative Framework (CFGH)

With co-facilitators Germany and the UAE, IRENA is coordinating CFGH. In 2023 the CFGH discussed how to **grow global hydrogen supply and demand**





**THANK YOU FOR YOUR KIND
ATTENTION!**

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Collaborative Framework on Green Hydrogen



29 May 2024