



Hydrogen market overview 2024

Driving the shift from hype to reality

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Our speakers



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Commitments: Hydrogen

Global spend on producing hydrogen for energy purposes from now until **2050 will be \$6.8trn**

At least 60 countries have published or are drafting hydrogen strategies

Global target: add up to additional capacity of 160–210 GW by 2030 (IEA)

Manufacturing capacity in 2023 up to 20 GW/year; needs to be around upwards of 100 GW/ year

CURRENT CAPACITY PER COUNTRY

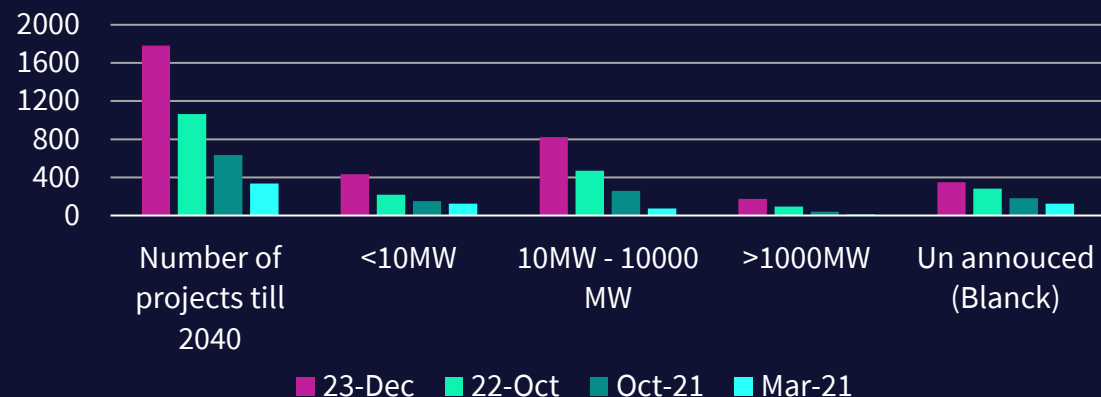
Country	Government initial investment kick start industry	Additional targeted green H2 capacity by 2030 (approximate)
Australia	US \$1.3billion	95GW
UK	US \$300 million	10GW
India	US \$2billion	125GW
USA	IRA + US \$2billion hubs	67 GW
UAE		10GW (green and gray)

*Hydrogen Market Size, Share & Growth Report, 2022-2032 (gminsights.com)



Where are we today – trends

Global H2 project until 2040



Hydrogen sector continues to grow

Maintained growth of 40% YoY

Reduced growth in near-term projects > 10 MW (by 10%)

Sector still in infancy with only 4% of projects > 10MW having FID (2 % less than last year – 10 more by #)

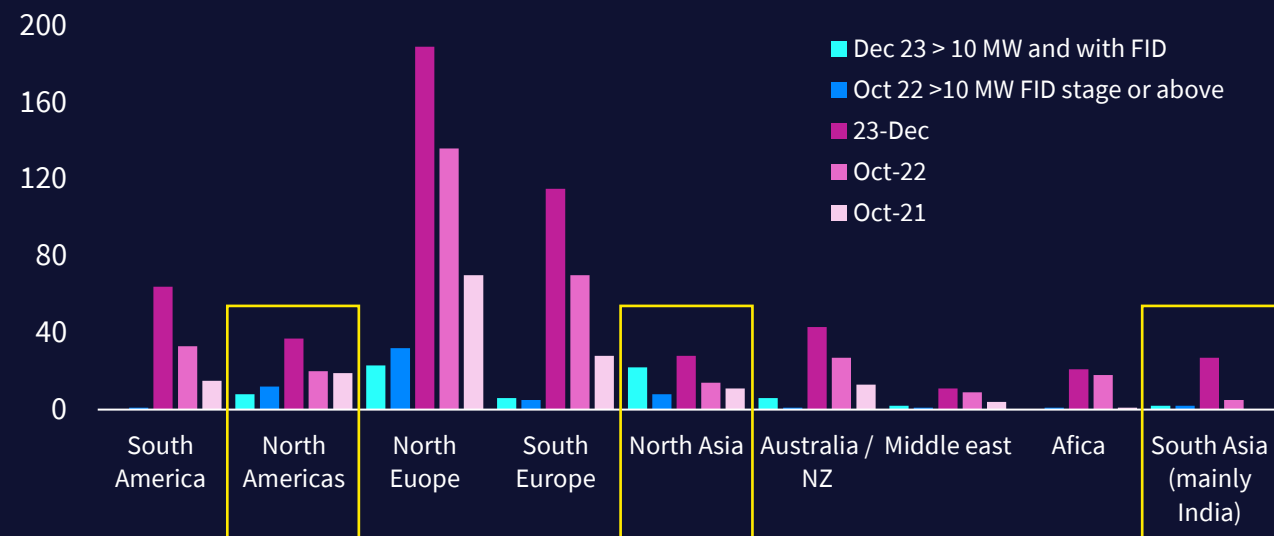
Growth continues in Europe

Largest growth in India, China, and South America

Incentive led to increase in project announcement but not execution

	# Total	Growth in 12 months
Number of projects till 2040	1780	40%
Projects >10MW in next 5 years	536	38%
Projects >10MW with FID	69	9%

Projects >10MW in next 5 years per region



Where are we today – trends

	2023	2022
Projects greater than 10 GW	16	8
Projects greater than 10 GW in next 5 years	1	1



Land

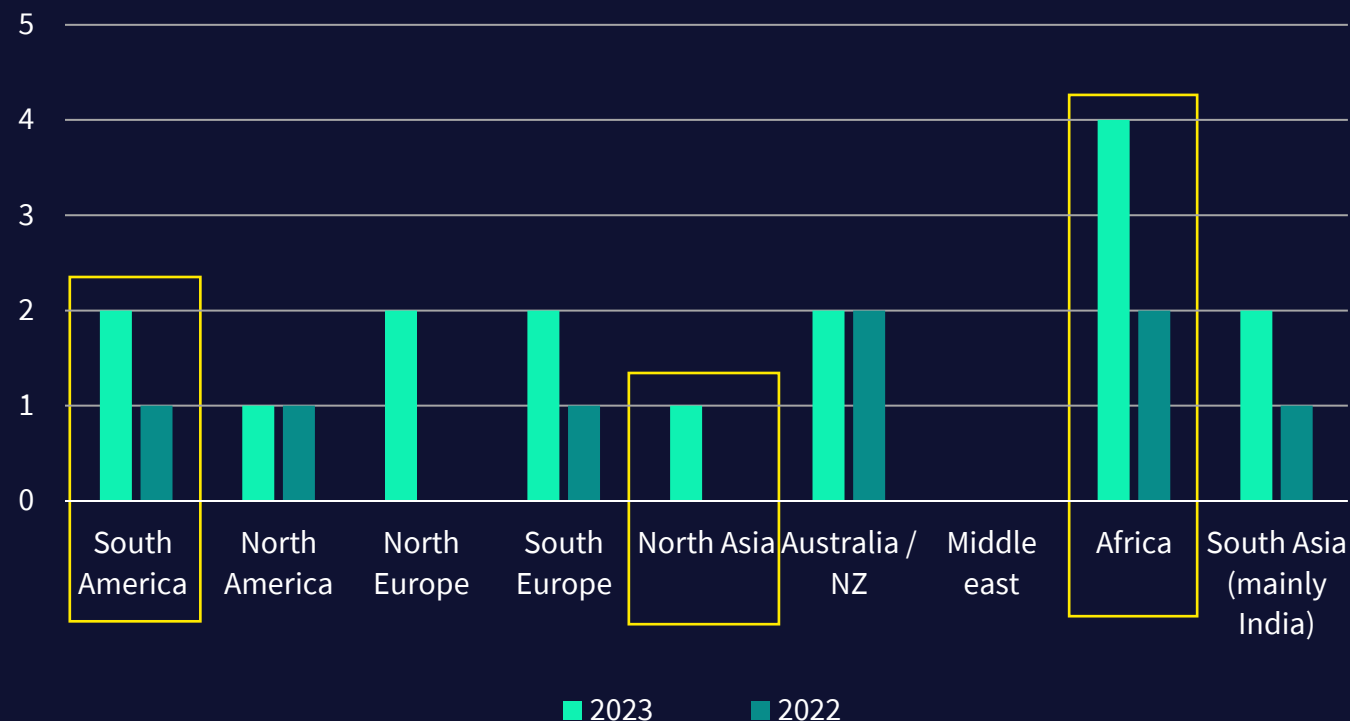


Natural resources in abundance (sun, wind)



Export potential

Mega Project > 10 GW in next 5 years



But let's take a reality check

From the total number of projects > 10 MW expected to be under construction in 2023, only 30% by number and 27% by MW (945mw) reached FID

Better than previous years where number was around 16%

Key projects in

China (2 > 100 MW operational)

Denmark

Norway

Germany

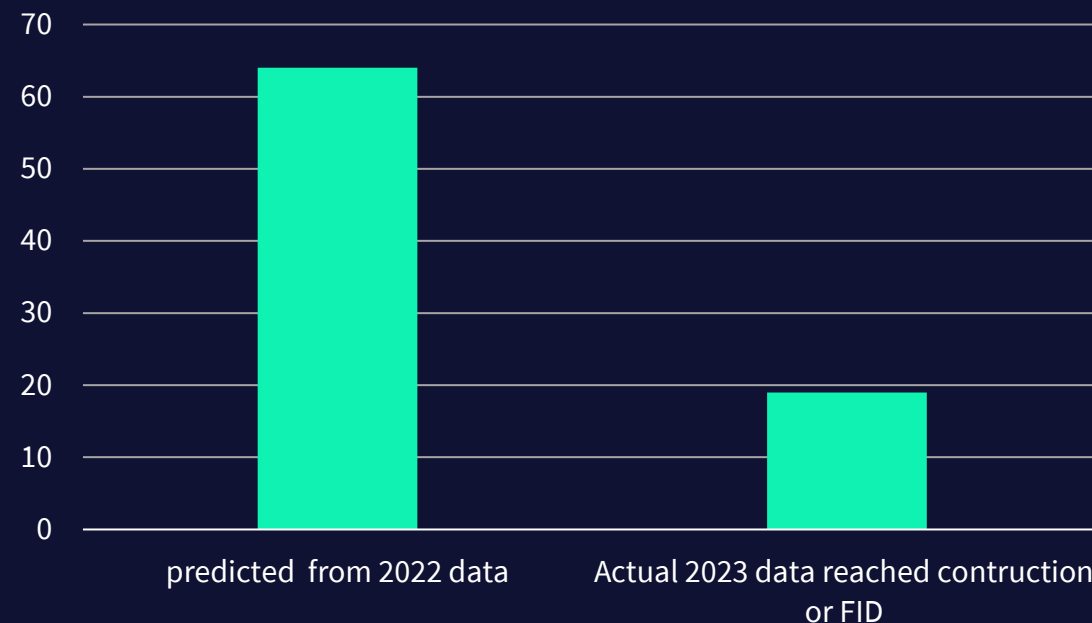
USA

Canada

India

Brazil

Projects due to complete > 10 MW 2023



Some current circumstances

Fueling stations for domestic cars



Three quarters of hydrogen refuelling stations in South Korea closed amid H2 supply crash

Drivers face hours-long wait for limited fuel at few sites still open, with reports that some vehicles have had to be towed

23 November 2023 13:11 GMT UPDATED 23 November 2023 13:11 GMT
By Polly Martin



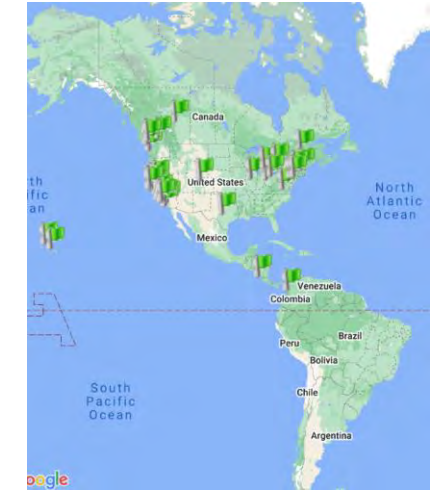
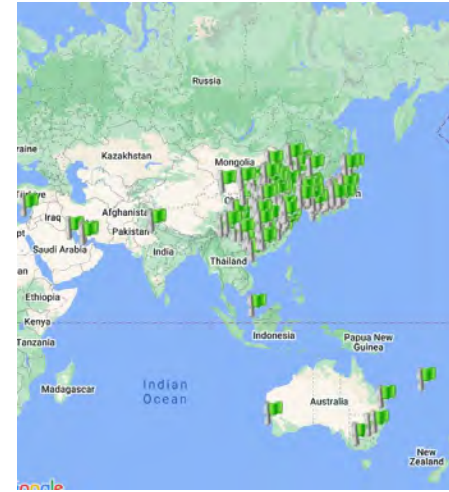
Shell to permanently close all of its hydrogen refuelling stations for cars in California

Oil major cites 'supply complications and other external market factors' in decision to exit market for light-duty H2 vehicles in the US

8 February 2024 15:15 GMT UPDATED 14 February 2024 10:02 GMT
By Polly Martin

Less demand
Technology issues
Ramp down
FIRST MOVER ALWAYS RISK

Supply shortages



BMW Shifts Focus to Hydrogen Power

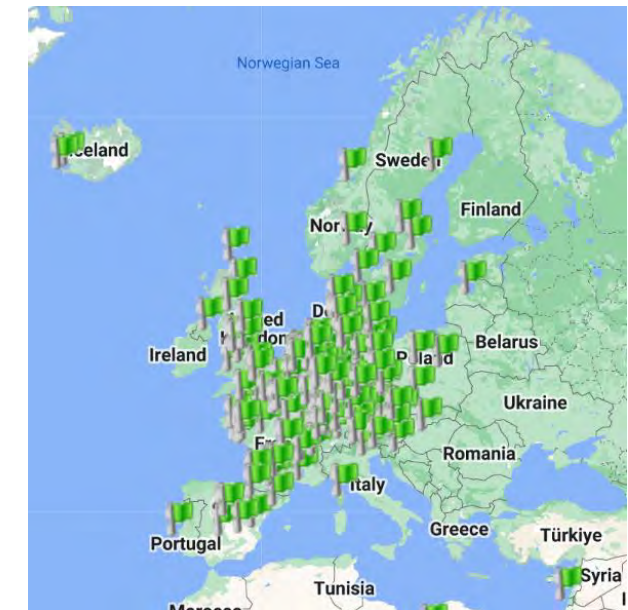
Elizabeth Puckett
February 7, 2024 · 2 min read



[Read the full article on Motorious](#)

Ushering in a new era of sustainability.

In a significant shift within the automotive industry, **BMW is reportedly pivoting** away from electric vehicles (EVs), turning its attention to hydrogen fuel cell technology as a groundbreaking alternative for sustainable transportation. Amid the burgeoning popularity of EVs, hydrogen-powered vehicles, which have largely been in the background, are now



How to make this a reality

Know the risk

Manage the risk

Know the risks

Market challenges

Technology & supply chain

Hydrogen production isn't new – the scale and required cost point is new and requires innovation

Diversified & new supply chains carry risk

Plants are in less common locations – leading to personnel challenges and skills gaps

Regulations & standards

Regulations and standards are needed to cover:

- Production
- Storage
- Transportation
- Fuelling and distribution

Holistic regulations and standards are currently limited in scope

Minimal marketplace knowledge relating to best practices

Social licence to operate

Hydrogen projects will have a public impact – consider gas blending and fuel stations

Previous disasters cause negative perceptions

Lessons learnt from the “Not in my backyard” effect and low public acceptance

Competency gap

Limited specific expertise

Lack of knowledge of standard/ regulations

Demand across sectors still high

Hydrogen simplest molecule but differences need to be respected

Potential impacts

Lack of trust could prevent scale-up leading to

- Delays
- Supply chain risks & additional costs
- First-mover disadvantage

Lack of clarity around regulations delays development

- Delays
- Highly complex regulatory landscape
- Reduced cross-region/border training
- Increased costs

Poor public perception of hydrogen projects

- Delays
- Additional costs
- Corporate reputation could be damaged

Supply chain growth: Needs

Hydrogen compressor market – **double in 10 years**

Hydrogen pressure vessels market – growth **18.1% CAGR**, reaching a value of **£900 billion in 2027** + innovation in composite vessels

Electrolyzers manufacturing capacity

Today – up to 20 GW / year today

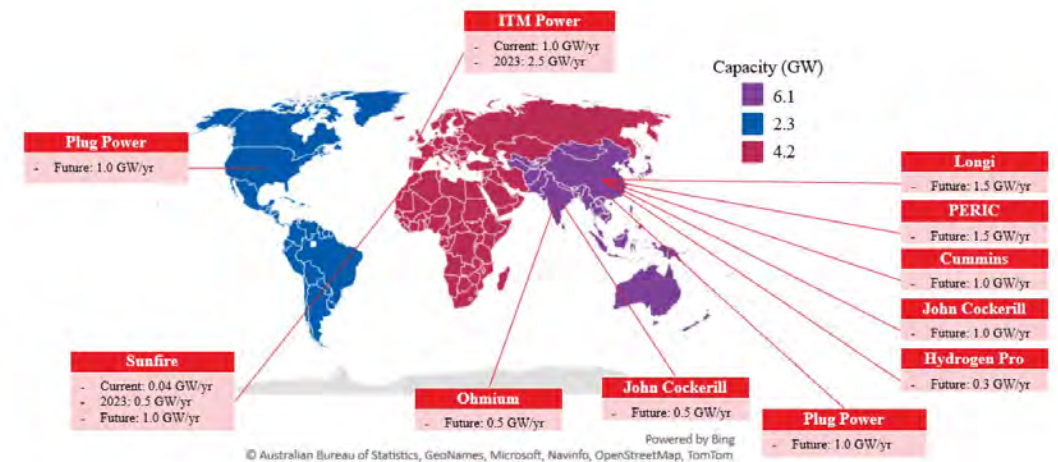
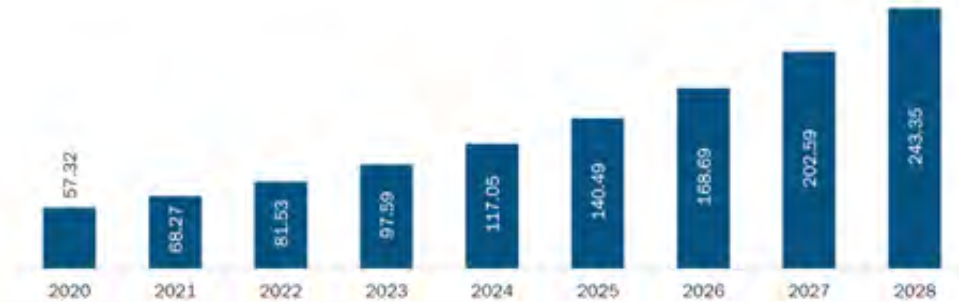
Predicted by 2030 – > 100 GW a year

Manufacturers are not where projects are!

Others: Pressure Vessel Composite Materials Market– Revenue and Forecast to 2028 (US\$ Million)

The pressure vessel composite materials market for others segment was valued at US\$ 68.27 million in 2021 and is expected to grow at a CAGR of 20.0% during the forecast period to reach US\$ 243.35 million by 2028.

Others: Pressure Vessel Composite Materials Market– Revenue and Forecast To 2028 (US\$ Million)



Supply chain growth: Needs

Training



1

Cross sector /
industry
upskilling



2

Collaboration /
partnership



3

Standards
road mapping



4

AiP – Supporting
to get product
to market



5

Different financing approach / thinking

Banks



Industry



Government



Consumer



Goal is decarbonization
There is a **BIGGER** Picture

Stakeholder engagement

Education

Social license

Right technical due diligence – redefined with new goals

Consistent “trusted” incentives – lobbied and informed by us all

Regulations immaturity and inconsistency

Fortescue, Woodside hydrogen hopes in doubt after US rule change

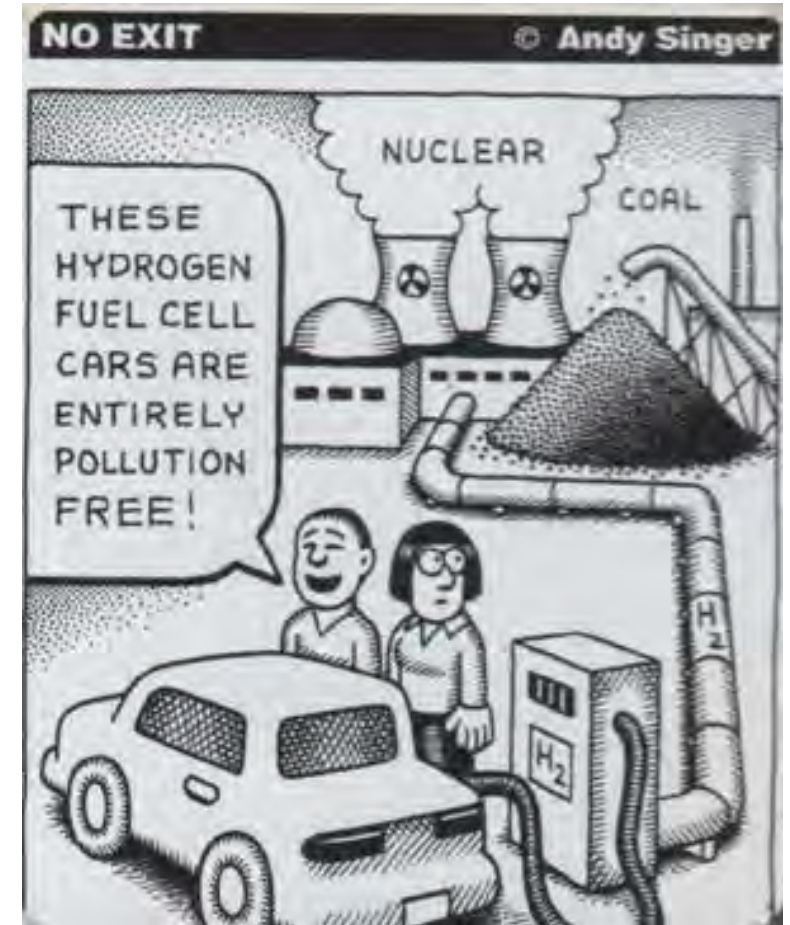
Repsol freezes hydrogen investment in northern Spain on regulatory uncertainty

Reuters

October 30, 2023 11:42 PM GMT+8 · Updated 4 months ago



The logo of Spanish energy group Repsol is seen at a gas station in Madrid, Spain September 7, 2022. REUTERS/Violeta Santos Moure/File Photo Purchase Licensing Rights



COO as an example – What is available now

EU & United Kingdom

Renewable Energy Directive (RED II) to promote green hydrogen with guarantees of origin to be counted against 2030 target
Some member states have a scheme in place, but a complete scheme is under finalization for all member states

North America

State / Province driven
– Schemes available in some others under preparation / road map developed



India

Policies in place, scheme under preparation

China

Scheme in Final preparation stage

SEA / Japan / Korea

Polices under preparation, no scheme available as of now

Australia

Policy and initial draft developed after public consultation

Africa / ME / South America

Road map is under preparation, but no schemes yet declared or under preparation for COO

+ other Industry and company specific schemes

Leanne Halliday – Need for transparency and governance across global supply chain

What's available now:

	Low carbon fuel standard	CertifHy	GreenH2Chain® by ACCIONA Energy
Public or private	Public/ Governmental	Private	Public/Governmental
Geographic scope	California, USA	Focus on European Economic Area (to be extended internationally)	Implemented in the Power to Green Hydrogen project, designed to create a green ecosystem on the island of Mallorca (Spain), can be applied internationally
Objective	Compliance with legal requirements	Consumer disclosure (currently voluntary; to be extended to comply with legal requirements in EU) Plans to expand from GOs to RFNBO certification	Consumer focused to easily measure their environmental impact, prove and share their achievement with interested stakeholder
Governance	California Air Resources Board	Stakeholder Platform	World's first platform based on blockchain technology for GO of hydrogen
Verification	Third-party verification for fuel pathways, otherwise: carried out by CARB	Certification bodies	Audit trail on blockchain
Quantification of emissions through	CI standard	Guarantee of Origin scheme for Green & Low Carbon Hydrogen. ISO14044 & ISO 14067 for GHG calculation, compliant with RED II Art. 19(7). Seeking AIB to become an EECS® Compliant Issuing Body (IB).	Hydrogen production is monitored and real-time data disclosed. Electrolyzer energy consumption monitored real-time, calculating CO2 emissions & automatically creating certificates of green hydrogen.

What's missing:

Voluntary

Key – benchmark criteria

Origin/product – not lifecycle (boundaries)

Major reason – manufacturers do not have the data for balance stages (benchmarks and simulation models (e.g. EIEO))

Note: Most guidelines cover the entire life cycle of the hydrogen supply chain (as ISO standards are used as reference)

Create a global “trusted” hydrogen trading market

COP28 – Declaration of Intent on Mutual Recognition of Certification Schemes
For Renewable and Low-carbon Hydrogen and Hydrogen Derivatives

30+ countries | Recognizing the key role of clean hydrogen in global decarbonization

Why **partner** with LRQA?



**Global reach, local
insight**



**Complete range of
services covering the
entire asset lifecycle**



**Leading hydrogen
expertise & insight**



**Extensive track record
supporting hydrogen
projects & initiatives**