

Can industrial standards help the safe rollout of hydrogen?

Philippe Cornille



“EIGA” ?



why focusing on standards ?



where to find the standards that you need ?



what is industry doing to support a safe rollout ?

This is EIGA

Membership

170 members in 40 countries

Products

Industrial, medical, food grade gases

Organisation

Non-profit association



Standardisation

Industry & International standards

Network

European & Global

Mission

SAFETY is in our genes

International Harmonisation Council

H₂ standards & development

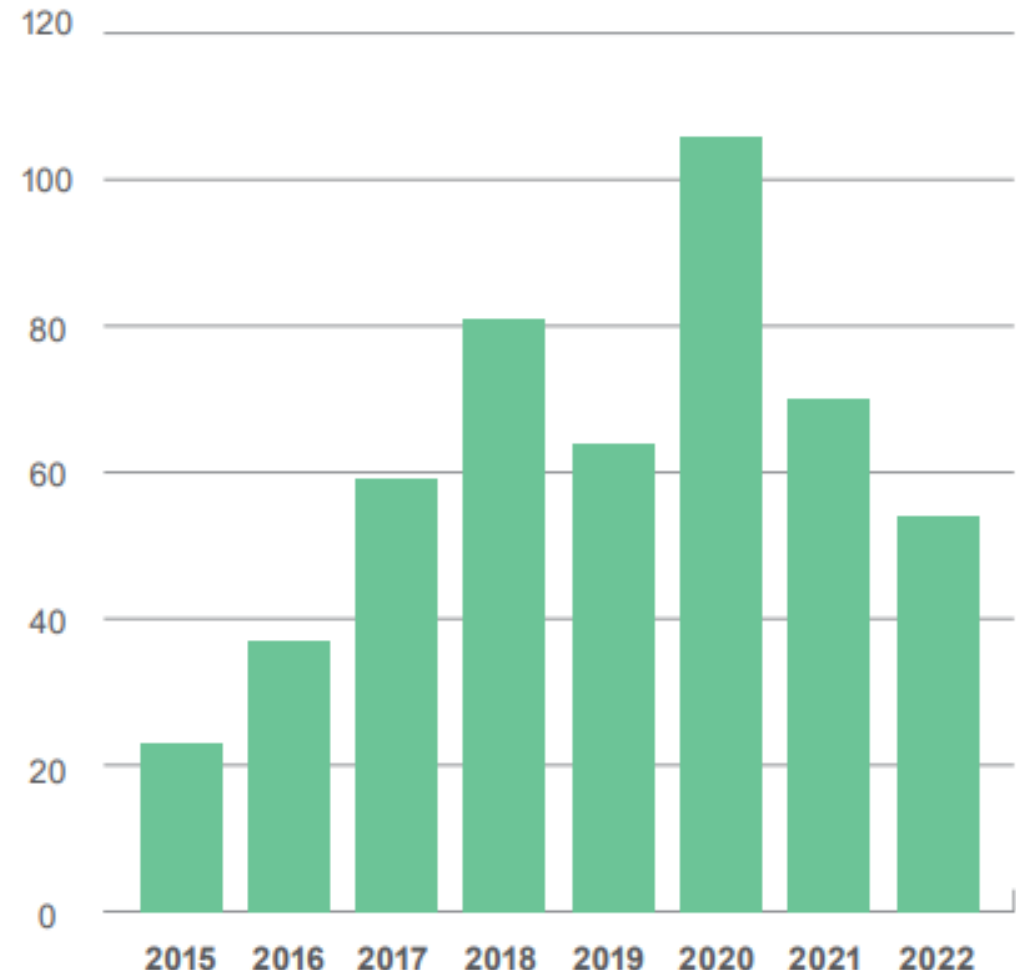
EIGA shows leadership in hydrogen Safety and Technology, pan-European and at global scale:

- Participation in CEN/CENELEC and ISO United Nations WP.06

And in the International Harmonisation Council developing standards such as:

- 74 harmonised standards, including
- Safety distances
- Operation best practices and decommissioning
- Transport vehicles interface connections

The Number of EIGA Publications





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How standards help

- 1 Improve public safety, prevent people getting hurt, damage
- 2 Create interoperability that enables scaling-up
- 3 Simplify the process to make installation faster
- 4 Prevent onerous regulation

Why standards ?



What kind of standards ?



Mandatory



Accepted by all



Self regulation

Why focus now on standards ?

Broader community

From B2B to B2C

From B2B to B2P

More applications

From established applications to innovative new applications

→ Standardisation

From industry self regulation to international standardisation



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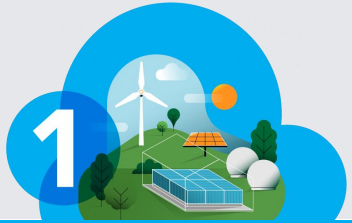


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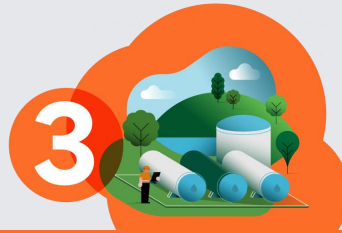
Hydrogen Safety Ecosystem



PRODUCTION



CONDITIONING



STORAGE



TRANSPORT



APPLICATIONS



PRODUCTION

Safe production at industrial scale



From huge production plants to portable electrolyzers

Publications

[EIGA Doc 251 – Overview of H₂ Production Methods](#)

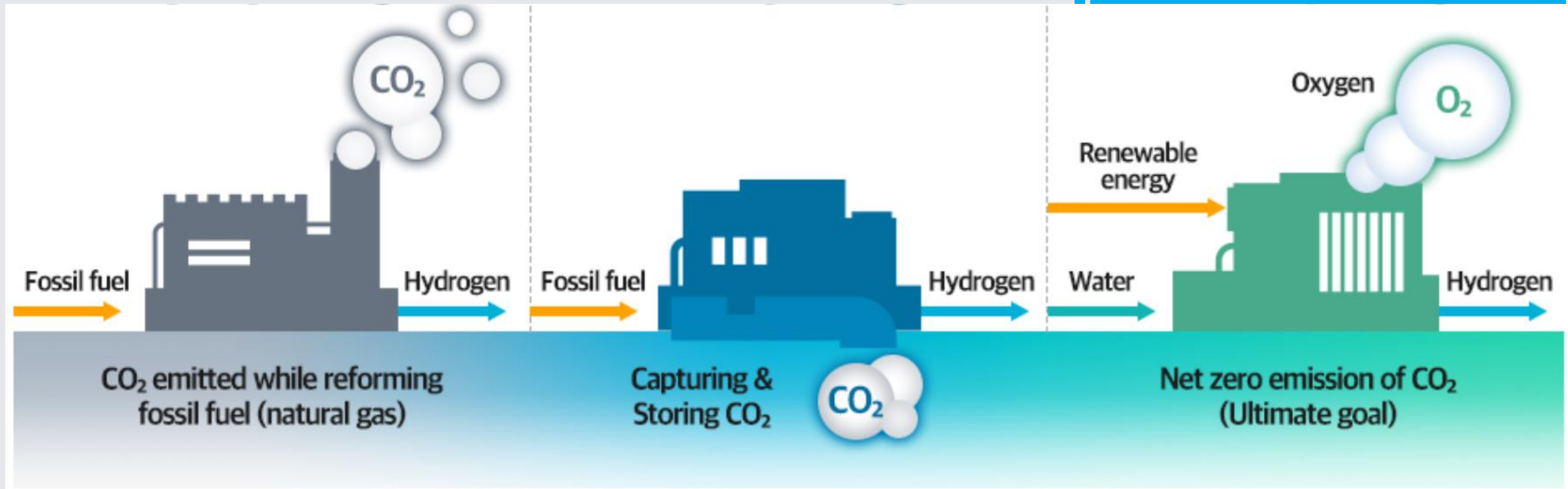
[EIGA Doc 242 – Safety of Hydrogen and Carbon Capture](#)

[EIGA Doc 244 – Liquid Hydrogen Pump Installations](#)

[EIGA Doc 246 – Guideline for Small Scale Hydrogen Production](#)



1



largest electrolyser

World's Largest Renewable hydrogen electrolyzer for mobility and industry



ELYgator

An Air Liquide Solution

ELYGATOR

INNOVATION

APPLICATIONS

LOCATION

CLIMATE

WHY AIR LIQUIDE?

ELYgator, planned to be operational by 2024, will be one of the biggest electrolyzers in the world, producing hydrogen with renewable electricity. Air Liquide aims to take another big step in energy transition with ELYgator, which is today among the finalists of the first round of the European Innovation Fund and will submit an application for the final EU-IF round in June 2021.

Air Liquide

The new electrolyser, a 20MW PEM electrolyser, doubles the capacity of the existing electrolyser in Fukushima, Japan

27 January 2021 12:04 GMT UPDATED 27 January 2021 12:04 GMT

By Leigh Collins

World's Largest Green Hydrogen Project Unveiled in Saudi Arabia

Air Products, the world's leading hydrogen producer, is to power a huge green hydrogen plant using 4 GW of renewable electricity.



Linde to build 'world's largest electrolyser' to produce green hydrogen

Industrial gases giant to build 24MW PEM electrolyser at Leuna in Germany by the second half of 2022

13 January 2021 13:46 GMT UPDATED 13 January 2021 13:53 GMT

CONDITIONING

Best practices for
purification,
pressurisation,
liquefaction

2



@ 1000 bar pressure or -260°C

2



Hydrogen gas has a very low density at ambient temperatures and pressures, therefore conditioning is required to allow practical distribution, storage and handling.



CONDITIONING

Purification

2



CONDITIONING

80-10-01-Y01-D08

PSA fles 8
21 m³

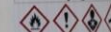
Syngas



80-10-01-Y01-D10

PSA fles 10
21 m³

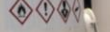
Syngas



80-10-01-Y01-D11

PSA fles 11
21 m³

Syngas



Publications

EIGA Doc 102-07 – Hydrogen
Compression, Purification and Cylinder
Filling

STORAGE

Securing safe storage at scale

3



High pressures, high flows and high capacities



Once conditioned, the practical storage of the hydrogen can be implemented to stage the molecules for further distribution or delivery to a use application. Industrial storage can be by compressed gas cylinders, cryogenic tanks, caverns or by cryogenic pressure vessels.





Safety Design Experience



Publications

EIGA Doc 6 – Safety in Storage, Handling and Distribution of Liquid Hydrogen

TB 42 – Welded Gaseous Hydrogen Vessels and Hydrogen compatibility

STORAGE

TRANSPORT

Safe and efficient transportation and distribution

4



Road, rail, sea, air and pipelines

4



The distribution of hydrogen from sources of production to use applications can take several different forms. Gas pipelines can transport the molecules on a continuous basis. Hydrogen can be packaged in containers that are swapped full for empty at the use site.



TRANSPORT

Dangerous Goods Transport



Publications

TB 19 – Safety Considerations in Case of Fire of Composite Cylinders or Tubes Used in Trailers

TB 43 – Secondary Identification Hydrogen Vehicle at Dispenser

APPLICATIONS

Feeding opportunity, fueling the future



Hydrogen as energy and hydrogen for feedstock



Our hydrogen economy



Publications

[EIGA Doc 211 – Hydrogen Vent Systems for Customer Applications](#)

[EIGA Doc 247 – Hydrogen Overview – Storage, Distribution, Applications](#)

Access to safety information on | x +

← → ↻ https://www.h2safety.info

Hydrogen Safety

Search for something...

About Contact

DISCOVER THE

Hydrogen Safety Ecosystem

Here is your easy access to safety information on hydrogen. In support of a safe roll-out of hydrogen. Intended for all, from start-ups and established companies, over engineers and inventors, to legislators and policy officers, and many more.



www.h2safety.info
www.eiga.eu



Regulatory impact

EIGA supports regulations.

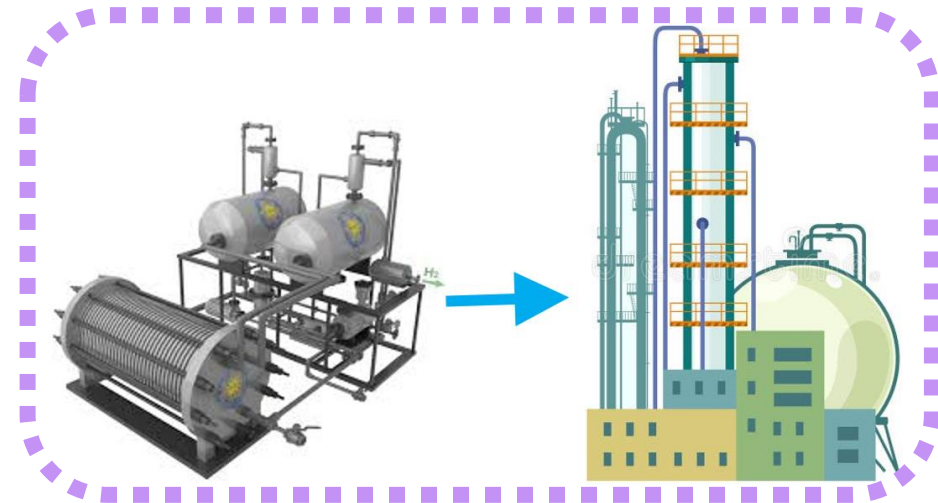
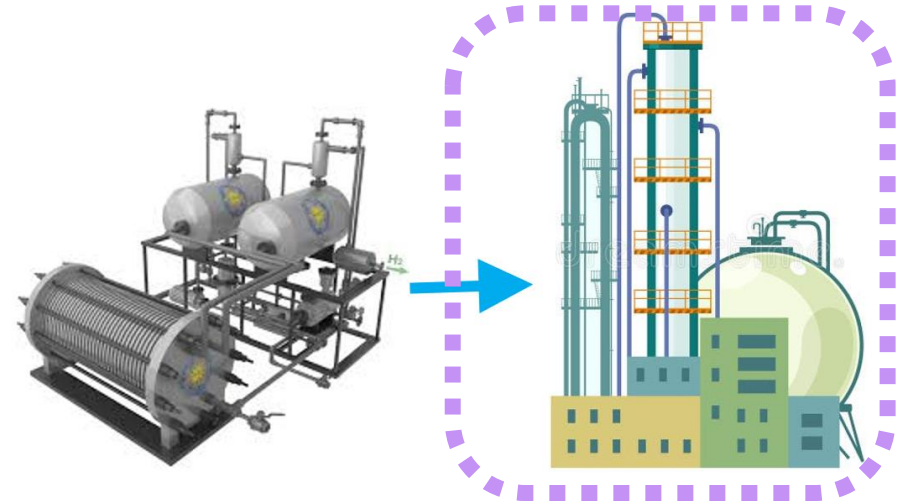
We enhance our industry standards and positions through:

- pre-normative work
- guidance to regulations
- creating a level playing field
- liaison & collaboration with industries, associations, regulatory bodies and forums



Level Playing Field

- Different regulation
- on same equipment
- risks distorting the LPF





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www.h2safety.info

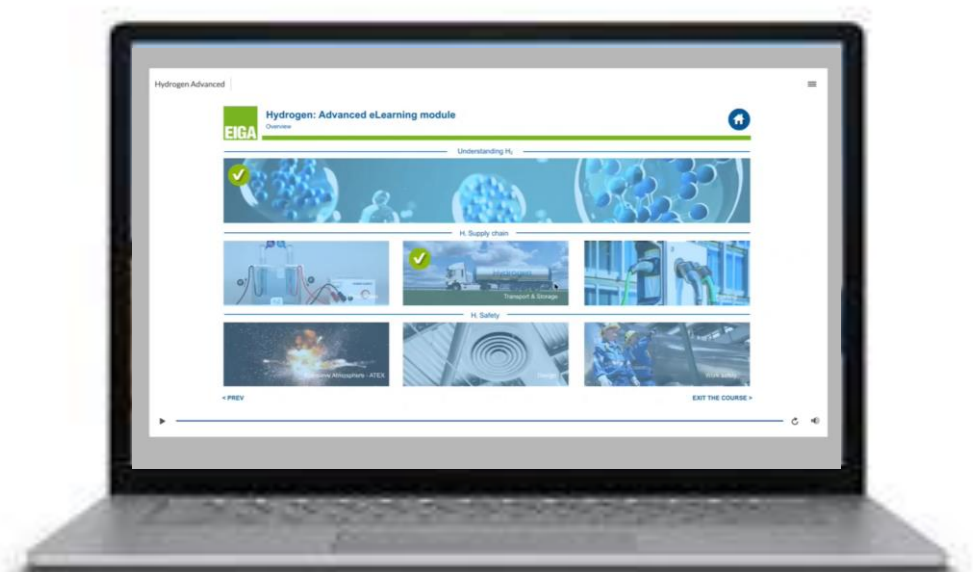
DISCOVER THE Hydrogen Safety Ecosystem

Access to safety information on hydrogen. In support of the development of hydrogen. Intended for all, from start-ups and companies, over engineers and inventors, to legislators and policy officers, and many more.



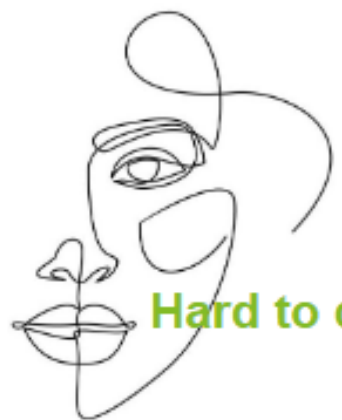
ElGA offers free training materials:

- e-learning: Basic & Advanced self-training modules
- Safety, technical, operational and regulatory industry standards
- emergency response e-learning: H₂ dos & don'ts for operators, drivers, emergency services



What you should know about hydrogen

Chemical and physical properties



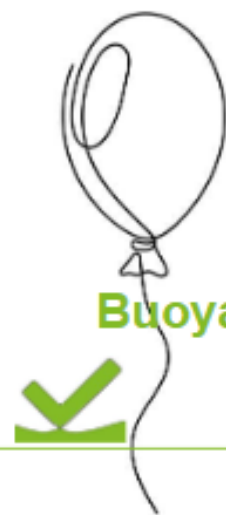
Hard to detect



Very small molecule



Ignites easily



Buoyant



Very cold liquid

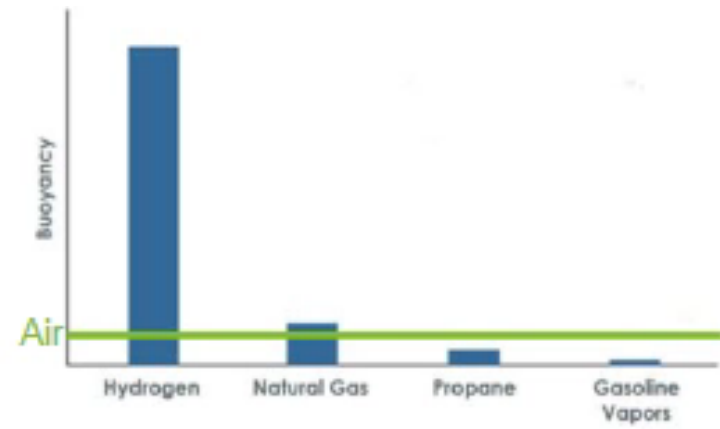
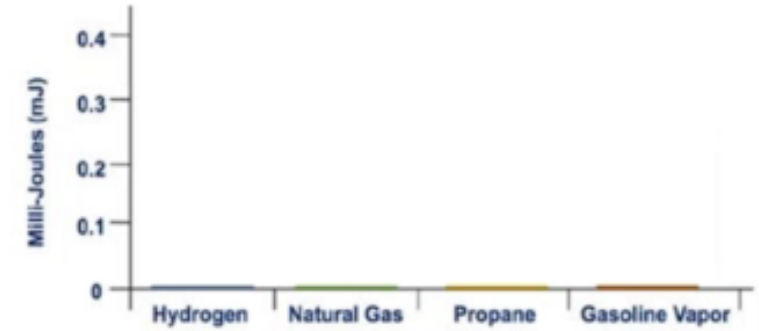


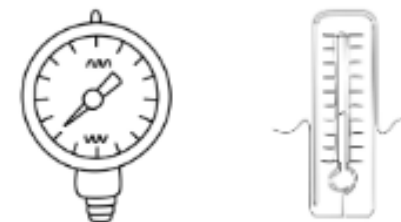
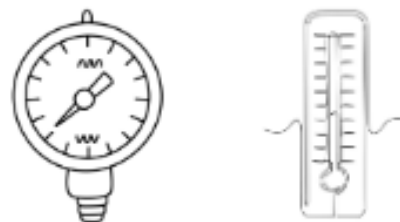
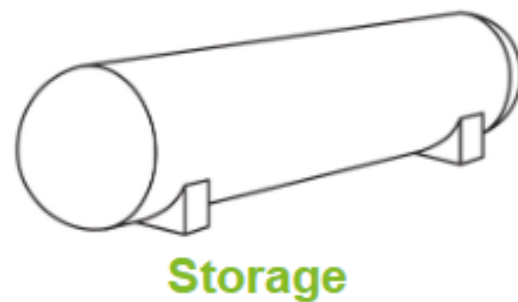
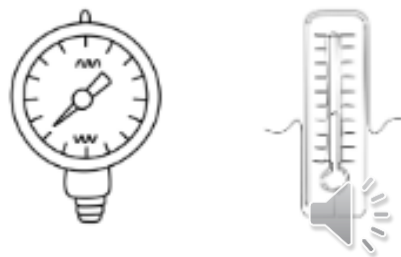
Flame hard to detect



Wide flammability range

Examples



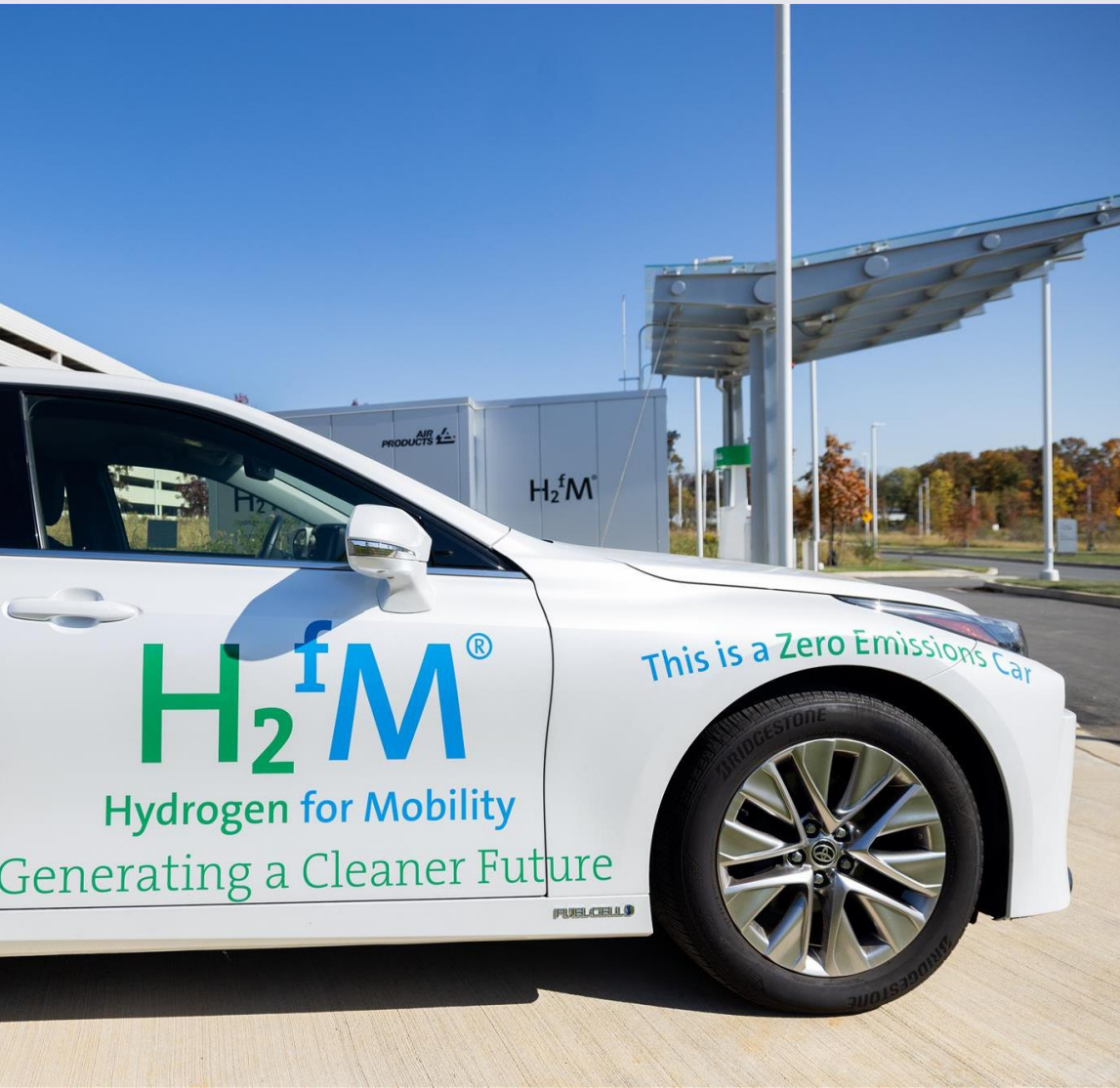


What would you do?

5 cases



CEN/CENELEC Hydrogen Technical Committees



The EU Commission has given a mandate to CEN/CENELEC to draft standards on hydrogen which will be referenced in legislation.

Each committee brings together the National Standardisation Bodies and National Electrotechnical Committees with more than 200,000 experts.

EIGA and its members participate in the hydrogen committees on Energy Systems & Management, Carbon Capture, Transportation, Utilisation and Storage, carbon accounting, mobility.

EIGA assures the convenorship of CEN/CLC/JTC 6 WG3 H₂ Safety.

ISO TC 197 Hydrogen Technologies Committee

Standardisation of systems and devices for the production, storage, transport, measurement, use of H₂.

Contributing to Sustainable Development Goals:

- Clean water and sanitation
- Affordable and clean energy
- Climate action



19

published ISO
standards

20

ISO standards under
development

34

Participating members

18

observing members

Key success factors for large-scale deployment of hydrogen



Technology for hydrogen deployment must be first-rate

EIGA has supported innovation technology development for over 100 years



The highest standards of safety must be respected

EIGA ensures high safety standards, sharing know-how and experience



Legislation supports an ambitious roll-out of hydrogen


EIGA advocates for clear legislation that supports a fair and safe roll-out



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Find out more



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