International Association of Oil & Gas Producers

FACT SHEET | FEBRUARY 2020

Scaling up hydrogen in Europe

Hydrogen in a nutshell

- Reaching climate neutrality by 2050 will require **the right regulatory framework for scaling up** technologies to reach deeper emission cuts.
- **Hydrogen from natural gas with carbon management technologies** such as CCS and pyrolysis has the potential to develop a commercial market for clean/low-carbon hydrogen.
- Hydrogen could effectively facilitate the **decarbonisation of the gas system and connected sectors**.

What can the EU do?

- **Adopt a technology-neutral approach to scaling up hydrogen**, ensuring all low-carbon technologies can fulfil their potential.
- Support the development of CO_2 capture, transportation and storage and the full range of low-carbon gas options in the **future revision of gas market rules**.
- Facilitate the cross-border transport of CO_2 and hydrogen through the **Connecting Europe Facility** (CEF) and **Trans-European Networks – Energy** (TEN-E) Regulation.
- Lift legal and administrative barriers to the **introduction of hydrogen into the gas grid**.

Hydrogen applications

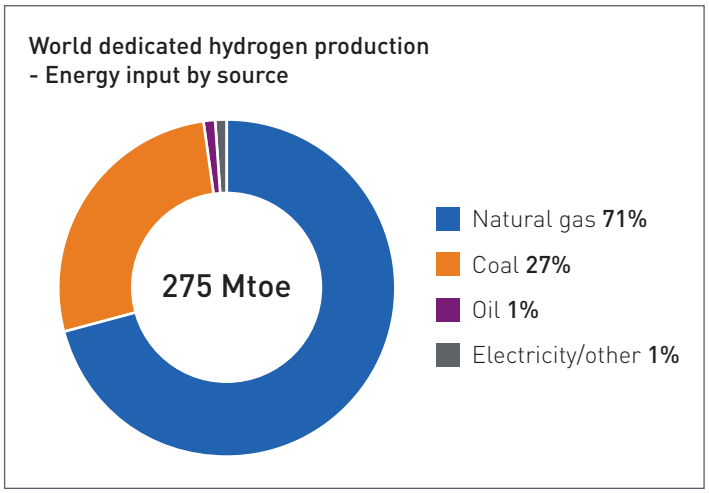
As a feedstock in the **chemical, refining and steel industry**, and as low-carbon fuel in energy-intensive processes

Used into the gas grid to decarbonise **residential and commercial heating**

In **passenger cars**, as well as **heavy** and **long-haul road** and **maritime transport**

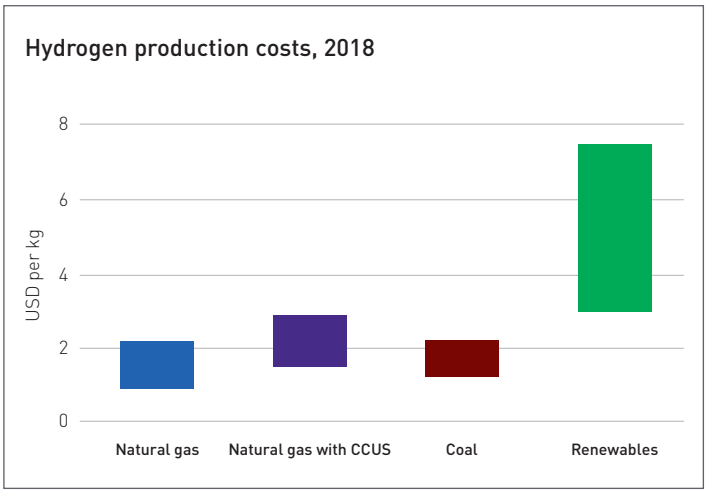
In the **power sector**, supporting the transition towards net-zero emissions

How we produce hydrogen today



Source: IEA (2019)

The potential of CCS applied to hydrogen production



Source: IEA (2019)

Today, the **main source of hydrogen production is natural gas reforming**, which produces hydrogen and CO_2.

Clean or low-carbon hydrogen can be produced from a range of sources, including renewable electricity, natural gas reforming with CCS, and biomass (including biogas).

Less than 0.7% of hydrogen produced today can qualify as "low-carbon" or "clean" hydrogen.

Available CO_2 capture technologies for hydrogen production from natural gas can achieve **capture rates of over 93%**.

The European certification scheme CertifHy therefore classifies hydrogen from natural gas with CCS as "low-carbon".[1]

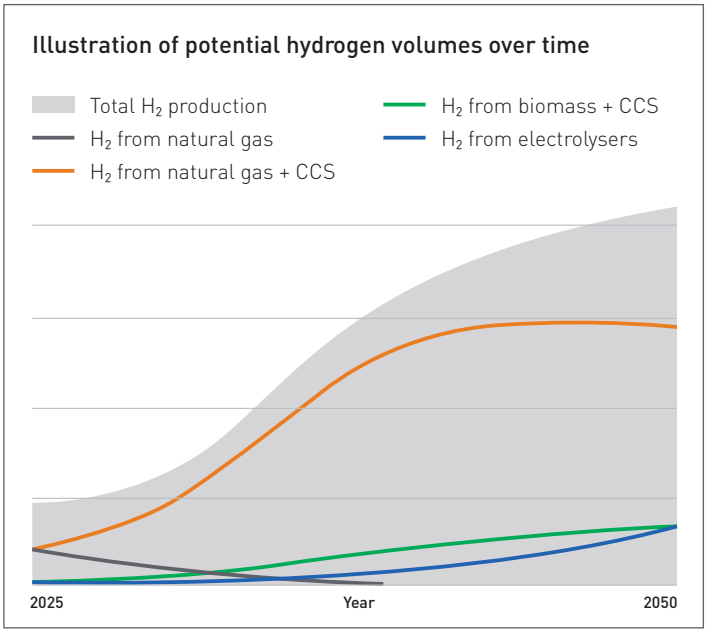
Even when combined with CCS, investment costs for producing hydrogen from natural gas are significantly lower than those for electrolysis from renewable electricity.[2]

Industrial-scale production of low-carbon hydrogen is possible with today's technology, and has potential to deliver **substantial emission reductions in the near-term**.

Kicking off a hydrogen market

Technologies for hydrogen production are complementary

- CCS and pyrolysis applied to large-scale production of hydrogen from natural gas can help establish a commercial market in Europe.
- With infrastructure and markets in place, the integration of hydrogen from renewable electricity will be increasingly easier and faster as costs fall.
- Together with hydrogen produced with excess renewable electricity, it can help balance power grids and serve as a battery.

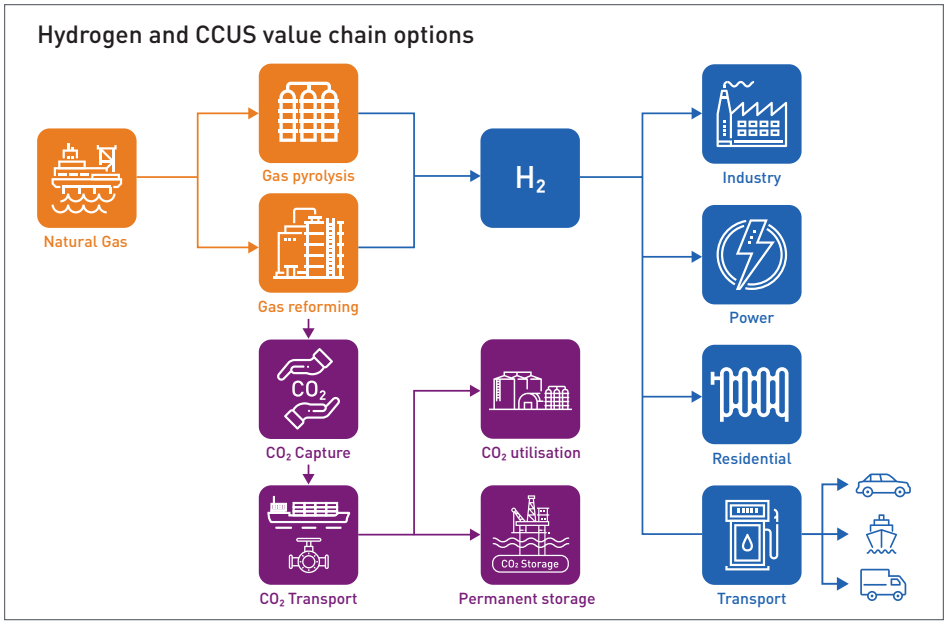


Source: SINTEF/IFPEN "Hydrogen for Europe" pre-study (2019)

Hydrogen production: what colour?

	Commonly used term	Process	Carbon output
	"Grey" hydrogen	• Natural gas-to-hydrogen conversion • Electrolysis based on high-carbon electricity	+ CO_2 is emitted
"CLEAN/LOW-CARBON"	"Blue" hydrogen	• Natural gas-to-hydrogen conversion with CCS	± 0 CO_2 is captured and stored
		• Methane pyrolysis	± 0 No CO_2 is emitted, solid carbon is produced
	"Green" hydrogen	• Sustainable biomass-to-hydrogen conversion	0 Biogenic CO_2 is emitted
		• Water-splitting (electrolysis/photoelectrocatalytic) based on renewable electricity	0 No CO_2 is emitted
	Carbon negative hydrogen	• Sustainable biomass-to hydrogen-conversion with CCS	- Biogenic CO_2 is captured and stored
		• Biomass pyrolysis	- No biogenic CO_2 is emitted, solid carbon is produced

Carbon is: + added, ± 0 near zero, 0 zero, - removed



The potential of hydrogen

- Based on available electricity, biomass and natural gas resources, Europe has the potential to produce 3562 TWh of hydrogen per year, reducing annual European emissions by **875 Mt CO_2**.
- This could provide **20% of the emission cuts needed to reach climate neutrality by 2050**.[3]

Sources:

[1] See www.CertifHy.eu
[2] IEA (2019). The Future of Hydrogen
[3] SINTEF, IFPEN (2019). Hydrogen for Europe pre-study.

About IOGP

The International Association of Oil & Gas Producers (IOGP) is the voice of the global upstream industry. Oil and gas continue to provide a significant proportion of the world's energy to meet growing demands for heat, light and transport.

Our Members produce 40% of the world's oil and gas. They operate in all producing regions: The Americas, Africa, Europe, the Middle East, the Caspian, Asia and Australia.

We serve industry regulators as a global partner for improving safety, environmental and social performance. We also act as a uniquely upstream forum in which our members identify and share knowledge and good practices to achieve improvements in health, safety, the environment, security and social responsibility.

Our Members in Europe

AkerBP, bp, BVEG Bundesverband Erdgas, Erdöl und Geoenergie e.V., Cairn, CNOOC, Chevron, Chrysaor, ConocoPhillips, eni, equinor, ExxonMobil, Hess, Molgroup, Neptune Energy, NOGEPA, Norsk olje&gass, OMV, Oil&GasUK, olie gas danmark, PGNiG, PremierOil, Repsol, Shell, Spirit Energy, Suncor, Total, Tullow Oil plc, vår energi, wintershall dea, woodside

Our Associate Members in Europe

AkerSolutions, Baker Hughes, OPITO, Schlumberger, TechnipFMC

Contact:

Nareg Terzian, Senior Manager, Strategic Communications & Media, T: +32 2 790 77 73, M: +32 470 90 59 62, E: ntz@iogp.org

Registered Office
City Tower
Level 14
40 Basinghall Street
London EC2V 5DE
United Kingdom
T +44 (0)20 3763 9700
reception@iogp.org

Brussels Office
Avenue de Tervuren 188A
B-1150 Brussels
Belgium
T +32 (0)2 790 7762
eu-reception@iogp.org

Houston Office
19219 Katy Freeway
Suite 175
Houston, TX 77094
USA
T +1 (713) 261 0411
reception@iogp.org

For more information about oil and gas issues, visit
www.iogp.org