UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Ministry of Trade & Industry
وزارة التجـــارة والصـــناعة

EGYPT
GEIPP
GLOBAL ECO-INDUSTRIAL PARKS PROGRAMME

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Economic Affairs SECO

MODULE 1: HYDROGEN MARKET

Development of Roadmap for Green Hydrogen Ecosystem in the SCZone (Sokhna). Training

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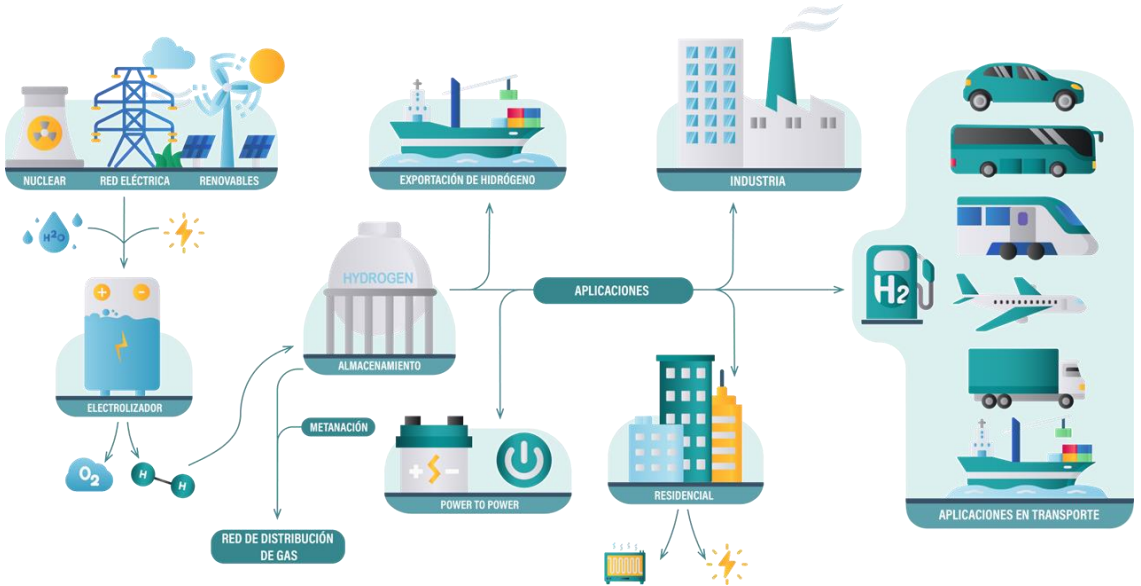
LEADERS IN HYDROGEN TECHNOLOGIES

- We are **LEADERS** nationwide.
- +20 years of EXPERIENCE in the Hydrogen sector.
- **+100 PROJECTS** successfully launched.
- **HIGHLY QUALIFIED** professionals.
- Spanish **REFERENCE COMPANY** in Hydrogen and fuel cell technologies.

- *Energy*
- *Gas*
- *Infrastructures*
- *Transport and mobility*
- *Renewable energies*
- *Engineering*
- *Aeronautic sector*
- *R&D centers and universities*



On-demand consulting services along the entire hydrogen value chain

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Specialised Consultancy Services

Strategic Consultancy

Technical Consultancy

Project Consultancy

CONCEPTUAL DESIGN

Definition and deployment of technology roadmaps, strategic plans and sectorial and regional studies to develop **operational deployment strategies for hydrogen technologies.**

PRE-FEASIBILITY

Specialise assitance in **project evaluation**, including **sizing** of mayor equipment and **techno-economic feasibility analysis**.

FINANCING

Support in the design of the project and the preparation of technical and economical **documentation** and strategic alignment for its **submission to subsidy programmes.**

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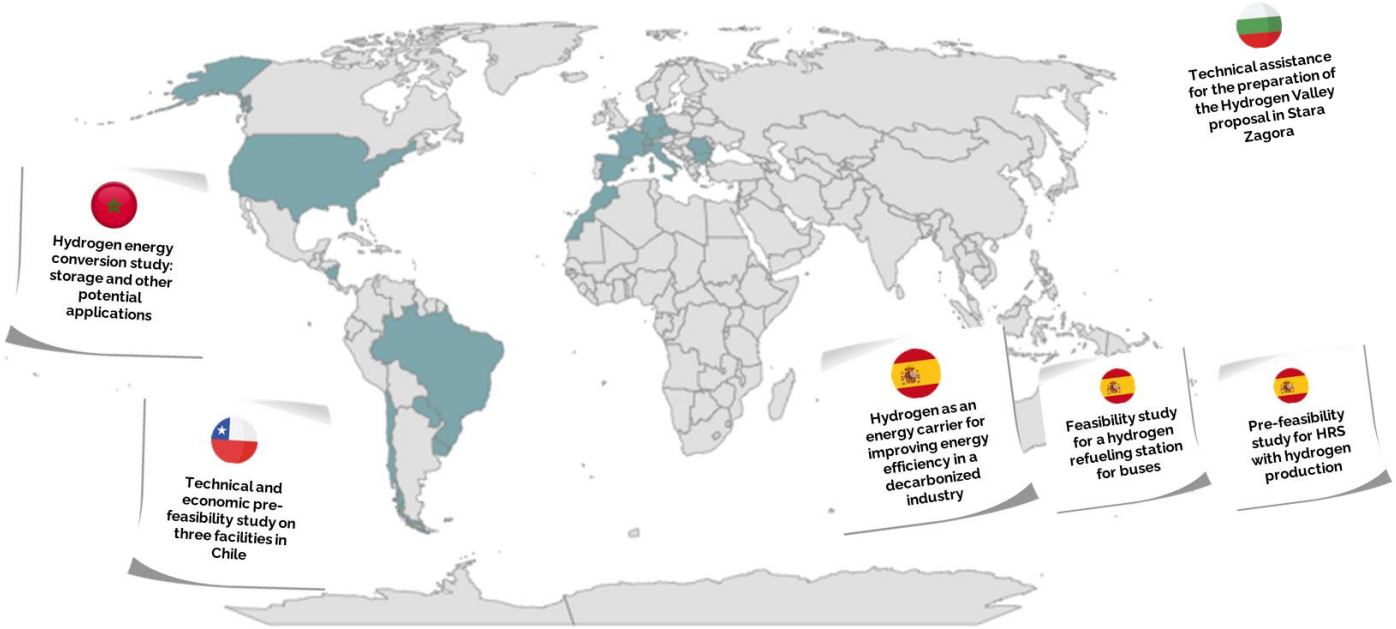

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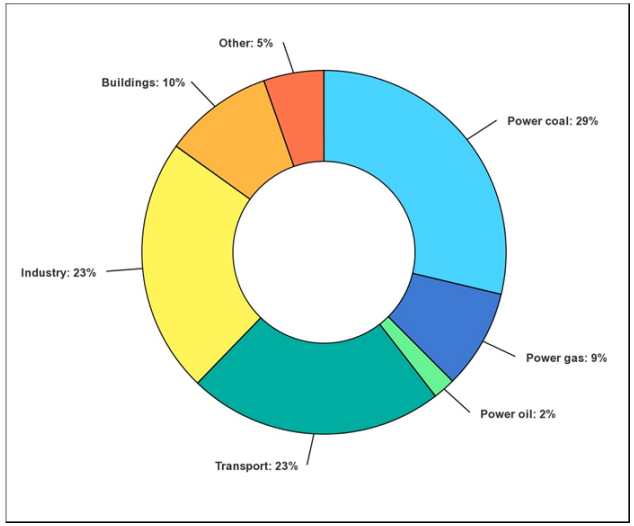
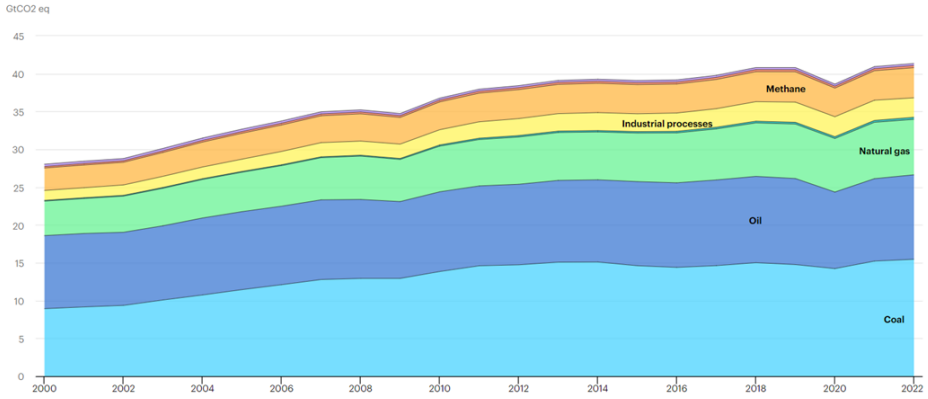
Why hydrogen? Why now?

Global energy-related CO2 emissions by sector, 2022



Energy related greenhouse gas emissions, 2000-2021



Why hydrogen? Why now?

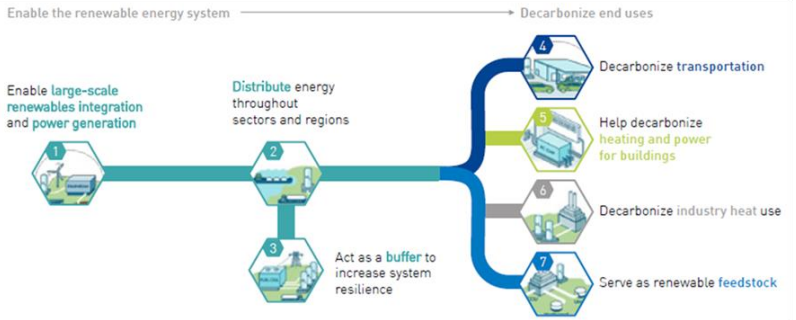
COP21 • CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

2019

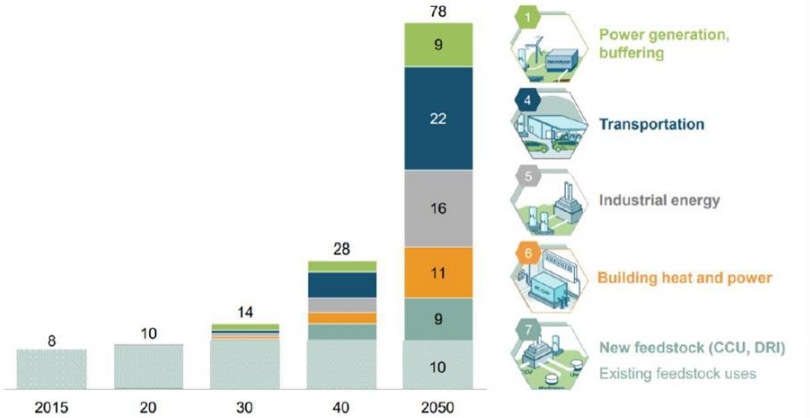
2020

Why hydrogen? Why now?

Sectors that hydrogen can decarbonize



Potencial global energy demand supplied with hydrogen in the EU, Exajoule (EJ)



Source: CH-JU

Why hydrogen? Why now?

Drivers of renewed interest in hydrogen

Stronger push to limit carbon emissions

10
Years remaining in the global carbon budget to achieve the 1.5°C goal

66
Countries that have announced net-zero emissions as a target by 2050

Falling costs of renewables and hydrogen technologies

80%
Decrease in global average renewable energy prices since 2010

55x
Growth in electrolysis capacity by 2025 vs. 2015

Indicators of hydrogen's growing momentum

Strategic push in national roadmaps

70%
Share of global GDP linked to hydrogen country roadmaps to date[1]

10 m
2030 target deployment of FCEVs announced at the Energy Ministerial in Japan

Industry alliances and momentum growing

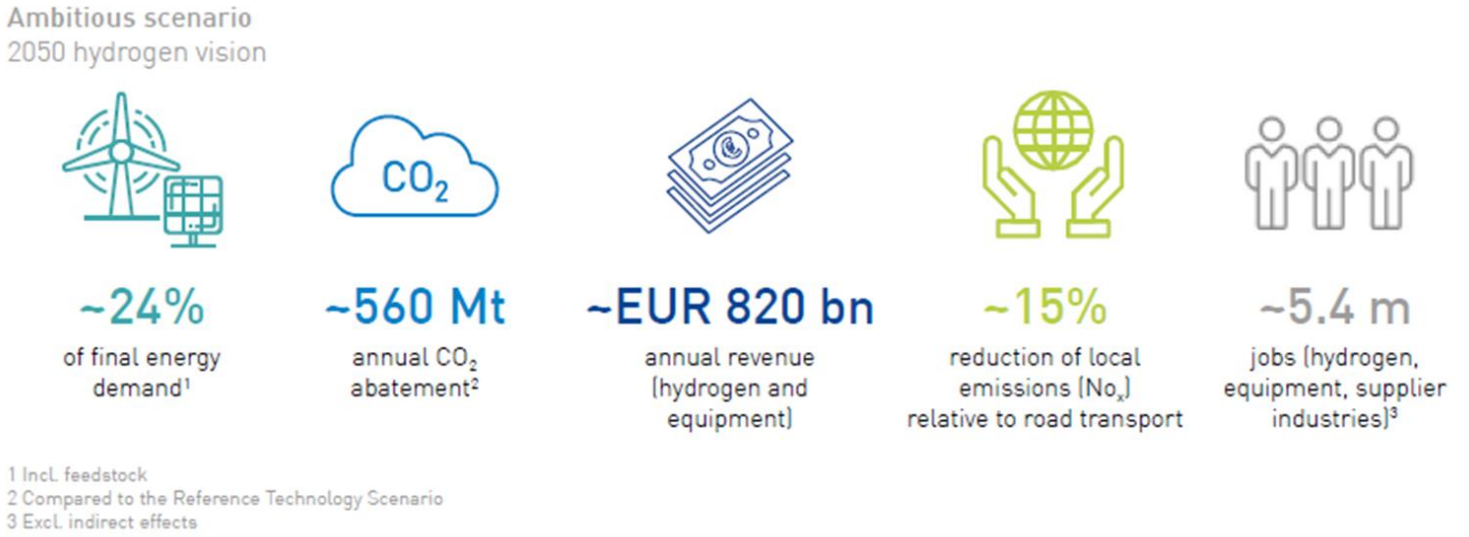
60
Members of the Hydrogen Council today, up from 13 members in 2017

30+
Major investments announced[2] globally since 2017, in new segments, e.g. heavy duty and rail

1. Based on 18 country roadmaps announced as of publication
2. Not exhaustive

Source: Hydrogen Council

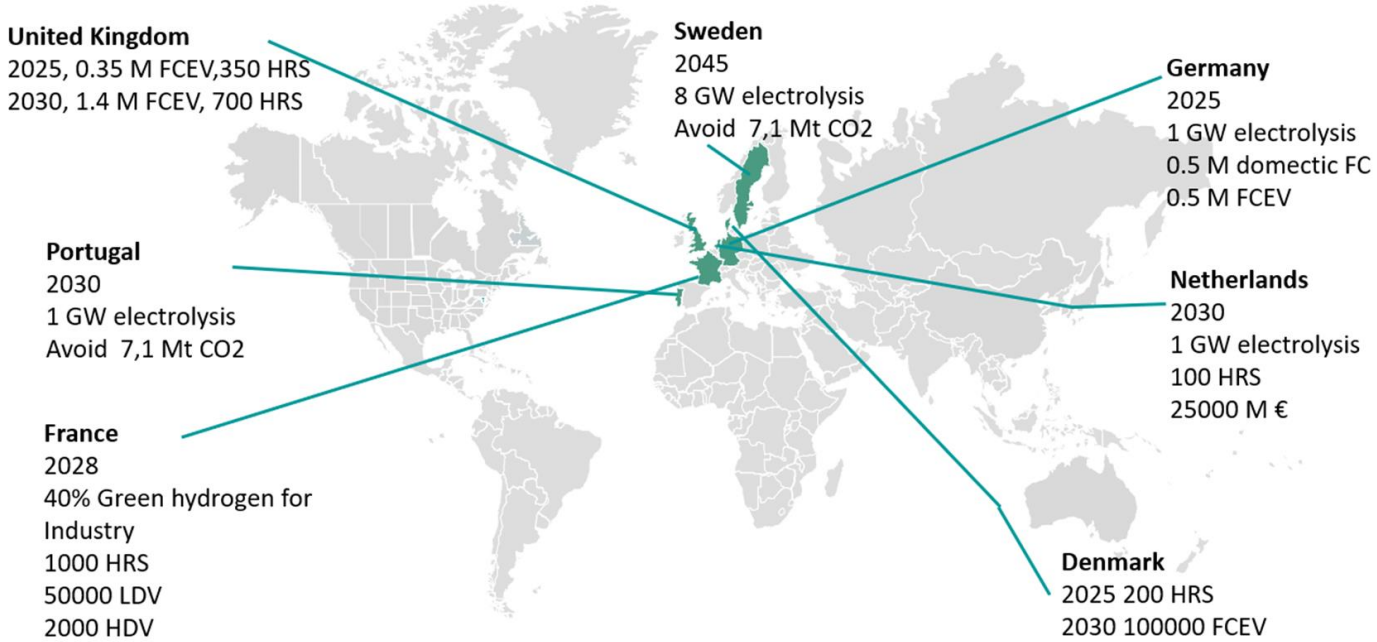
Why hydrogen? Why now?



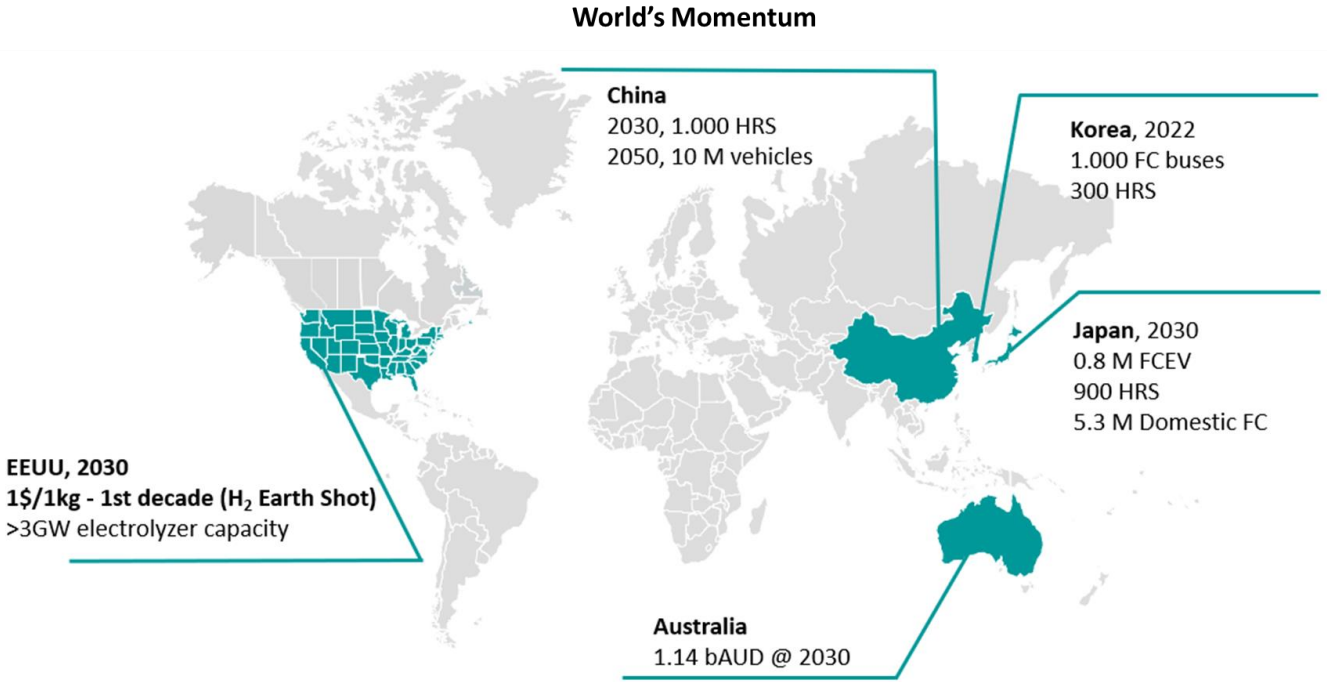
Source: CH-JU

Why hydrogen? Why now?

European´s Momentum



Why hydrogen? Why now?



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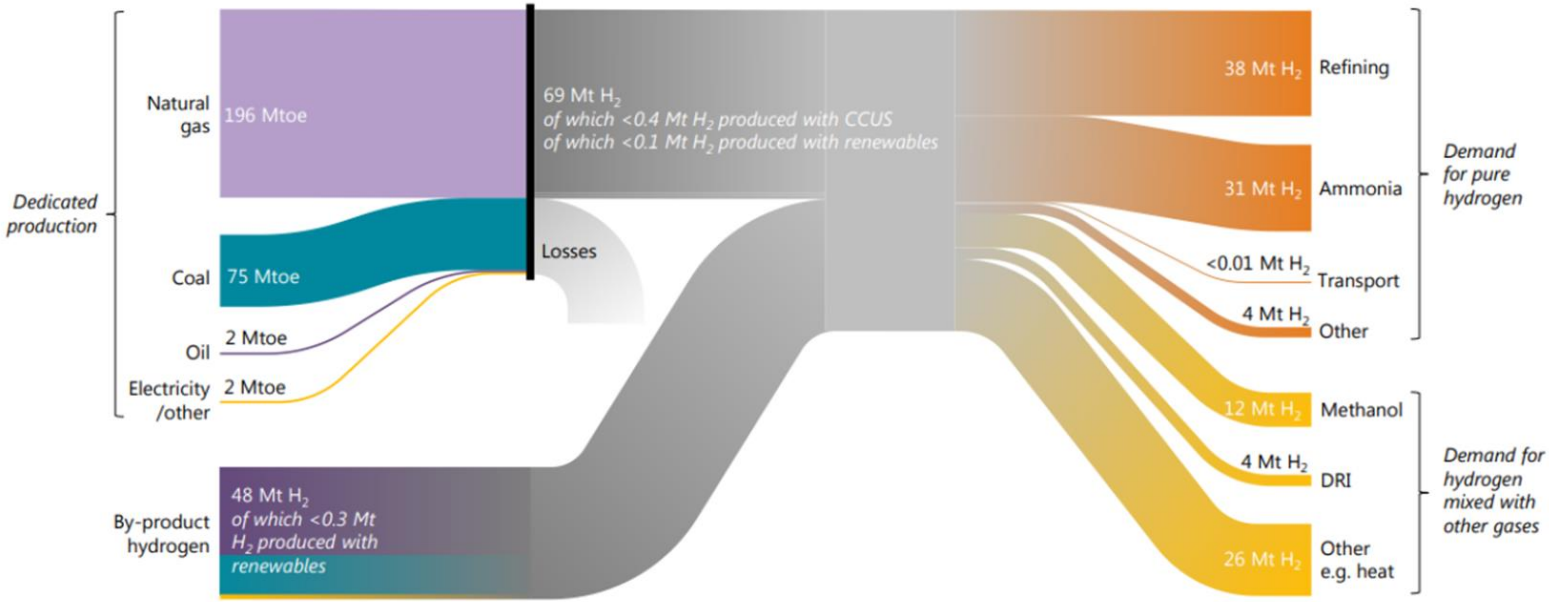
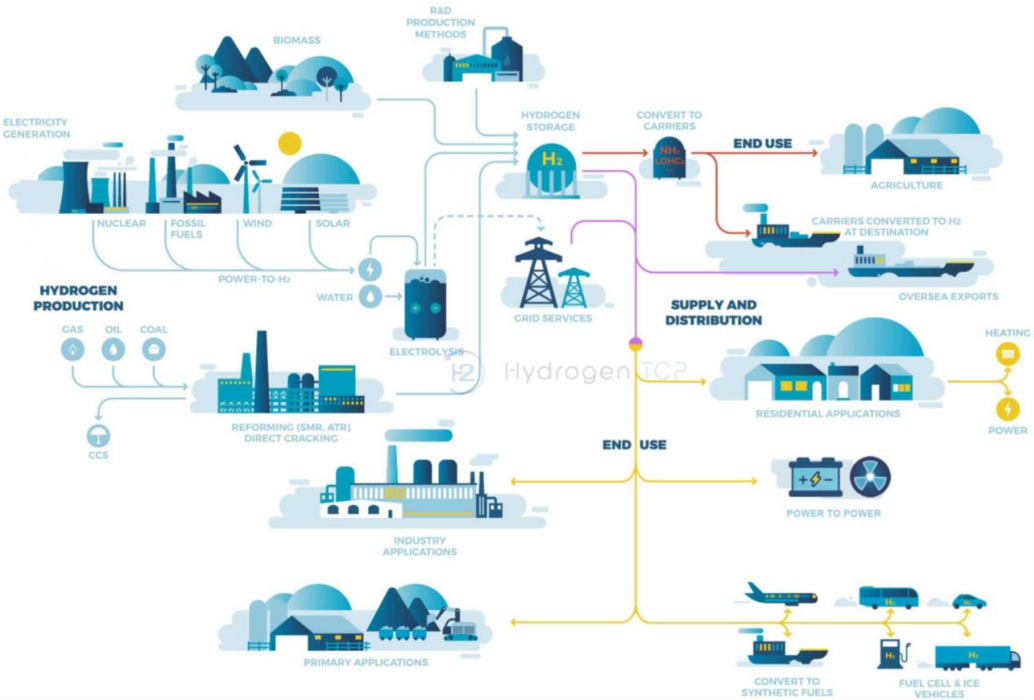
Hydrogen value chain / P2X



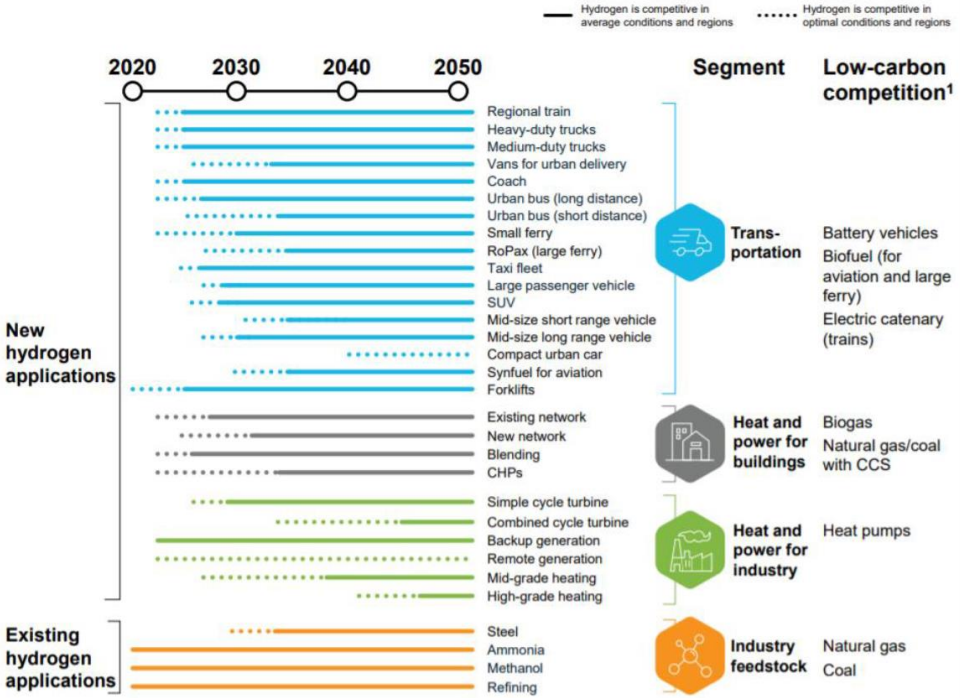
Source: IEA

Hydrogen value chain / P2X



- **P2H**: Power to Heat
- **P2T**: Power to Transport
- **P2Ch**: Power to Chemical
- **P2I**: Power to Industry
- **P2P**: Power to Power

Hydrogen value chain / P2X



Source: Hydrogen Council

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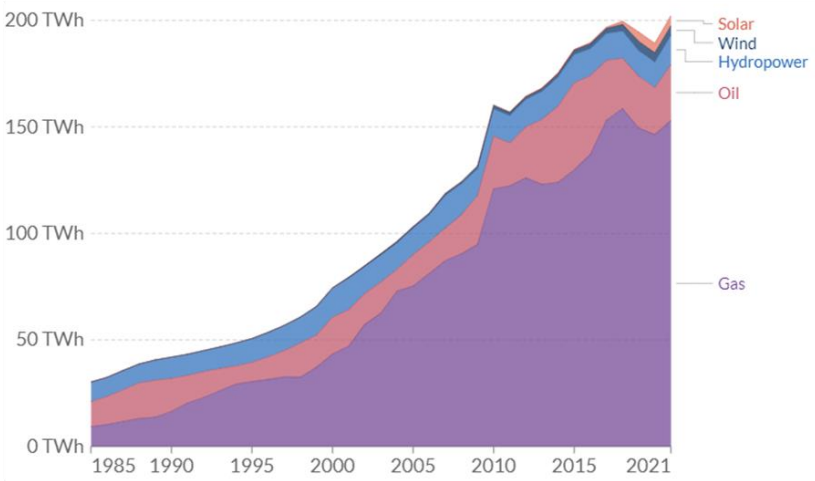
Egypt´s situation

Electricity production by source, Egypt

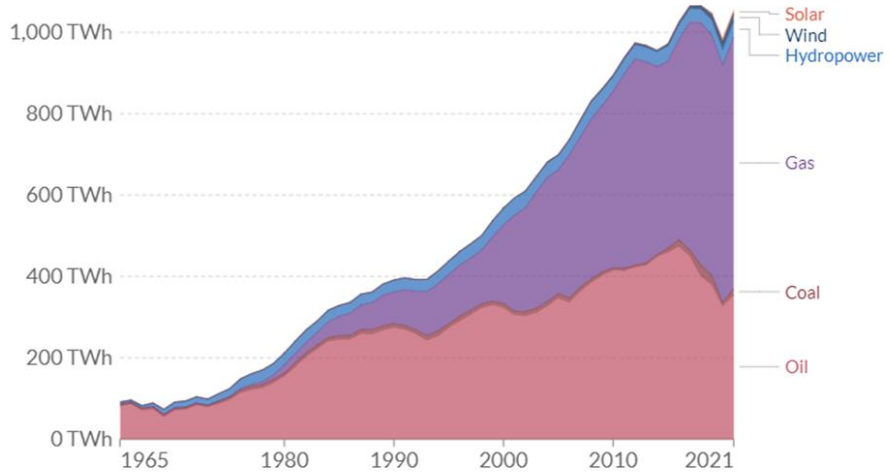


Share of primary energy from low-carbon sources

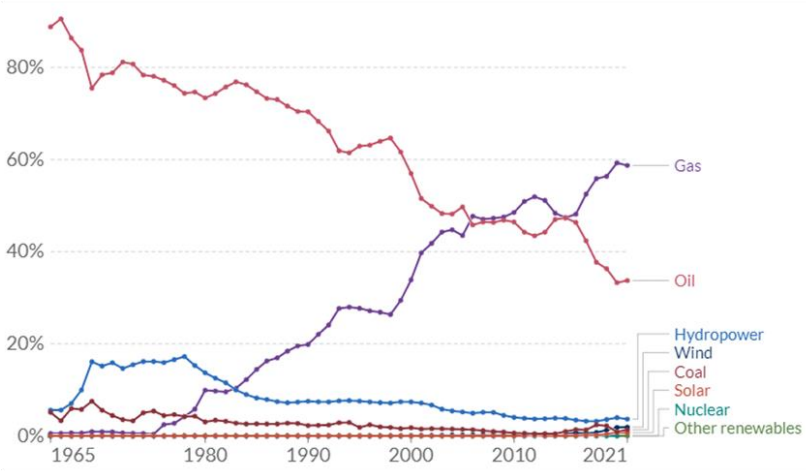
Source: Ourworldindata

Egypt´s situation

Energy consumption by source, Egypt



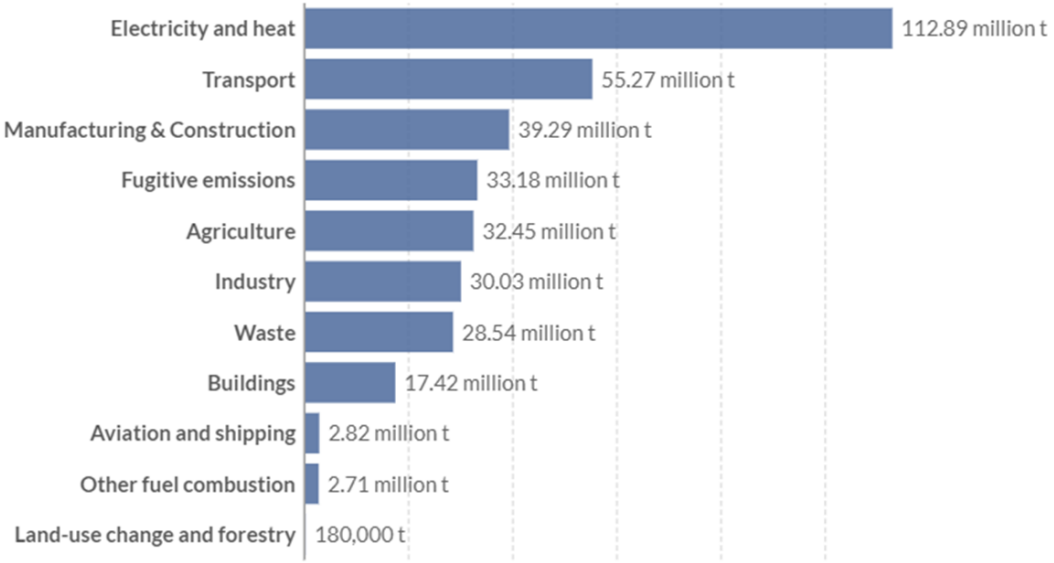
Share of energy consumption by source



Source: Ourworldindata

Egypt´s situation

Greenhouse gas emissions by sector, Egypt, 2019



Source: Ourworldindata

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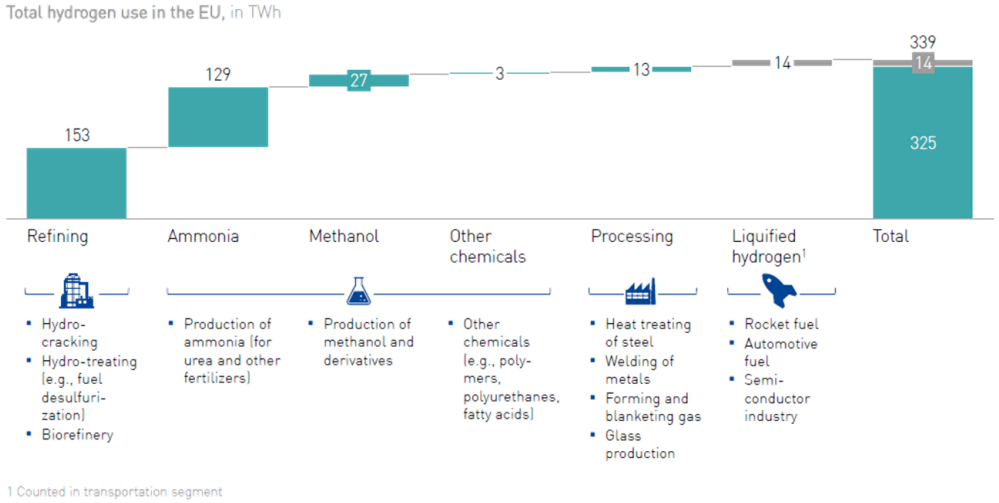
Current and future H2 applications

Current Industry

There are currently many industries, such as refineries and fertilizer companies, that need hydrogen to operate. This hydrogen has historically been gray and comes from fossil fuels. The most immediate use of green hydrogen will be to supply these industries.

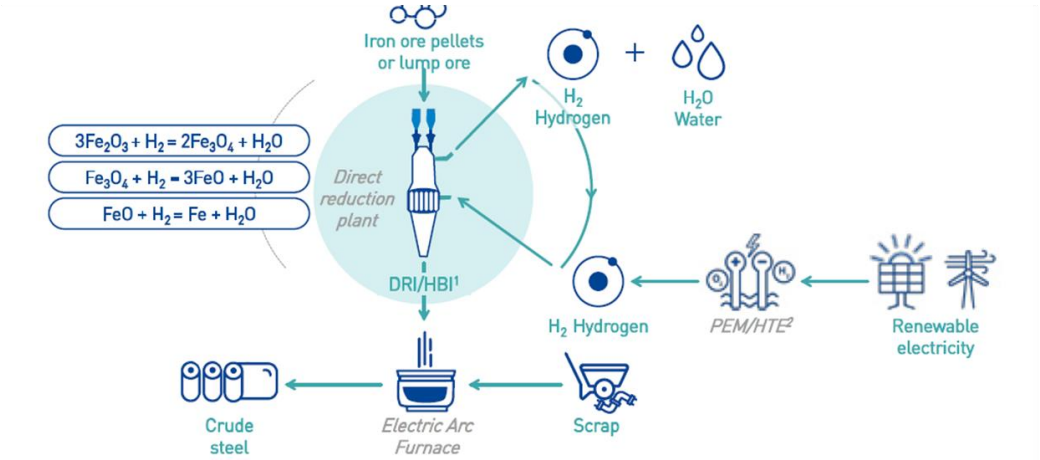


Source: CH-JU

Current and future H2 applications

Metallurgical Industry

In metallurgy, hydrogen could be used to reduce metal oxides and prevent oxidation during heat treatment processes.



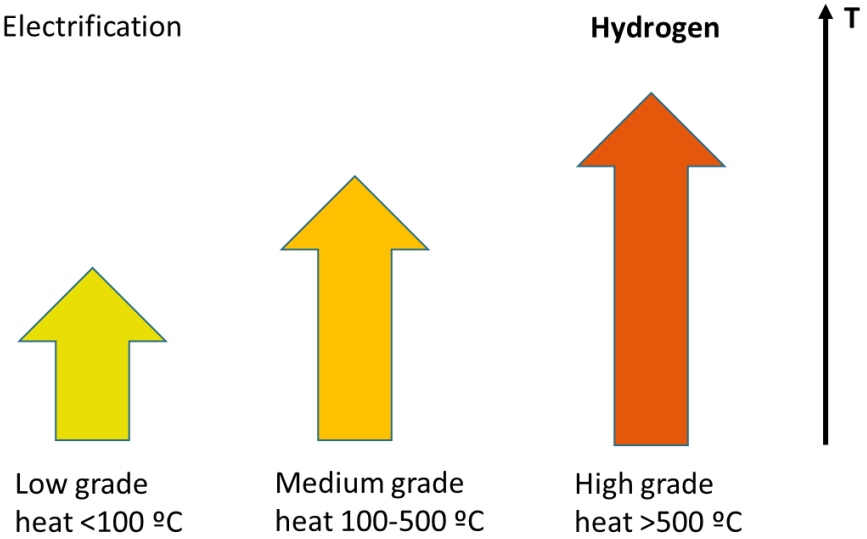
Source: CH-JU

Current and future H2 applications

Industrial heat demand

The energy demand required by industrial heat processes is one of the most emissions-intensive.

- Aluminum
- Cement
- Petro chemicals
- Refining
- Iron and steel
- Pulp and paper



Current and future H2 applications

Hydrogen as an enabler for renewables

To replace fossil fuels there is a need of a massive increase in renewable power generation as well as a far-reaching electrification of all en use sectors. What is the role of hydrogen in this grid management?

Storage

Directly balancing the grid requires different storage systems
Hydrogen:

- Long term energy storage
- High energy density

Smart Grids

- Energy back up in isolated networks.
- Storage of high energy density.

Sector Coupling

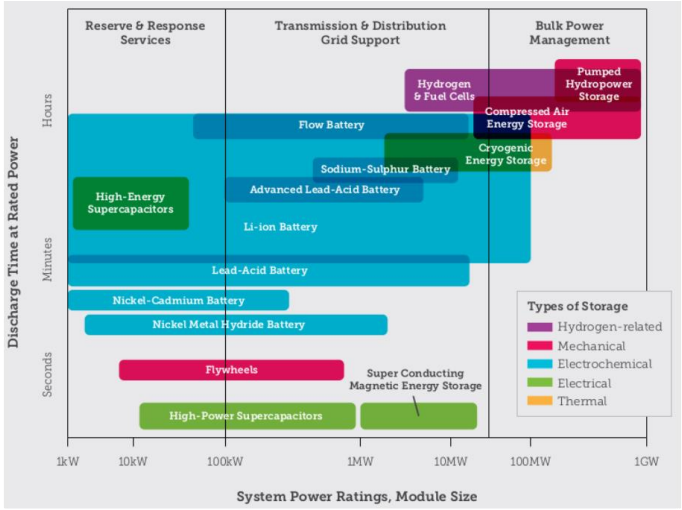
Sector coupling connects power generation directly with other demand sectors, such as transportation (P2G) or industry (P2H)

Transportation of energy

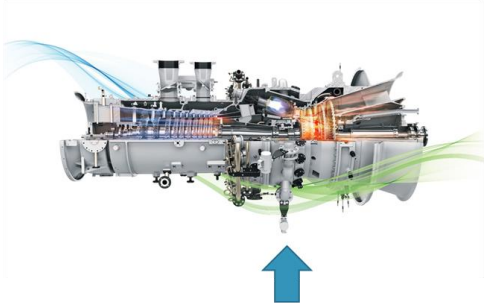
Power is often not generated close to centers of demand.
Electricity can be converted into hydrogen and transported in gaseous, liquid, or stored in other forms via pipelines or ships.

Current and future H2 applications

Future applications of hydrogen in the power grid



Huge storage to manage the electricity grid



Gas turbines for 100% hydrogen-fueled power generation

Current and future H2 applications

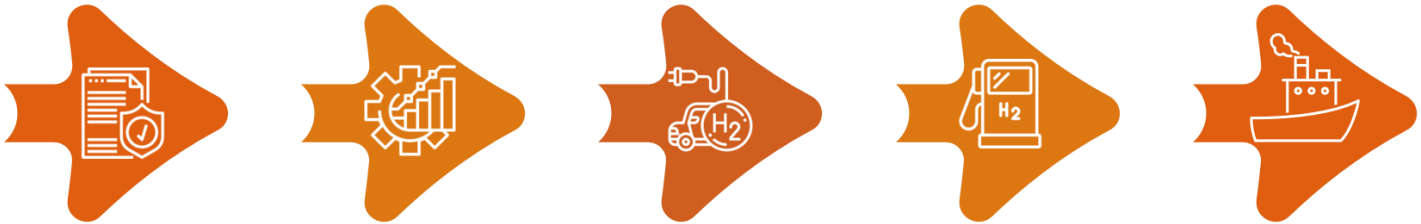
Transport

1st reason

Hydrogen provides a pathway to full decarbonization, where other technologies can only act as bridge

3rd reason

Hydrogen infrastructure is initially a barrier, nut it has significant benefits at scale compared to fast charging: faster refueling, more flexible load, less space requirements and similar investment costs



Hydrogen

Hydrogen is the most promising decarbonization option for trucks, buses, ships, trains, large cars, and commercial vehicles

2nd reason

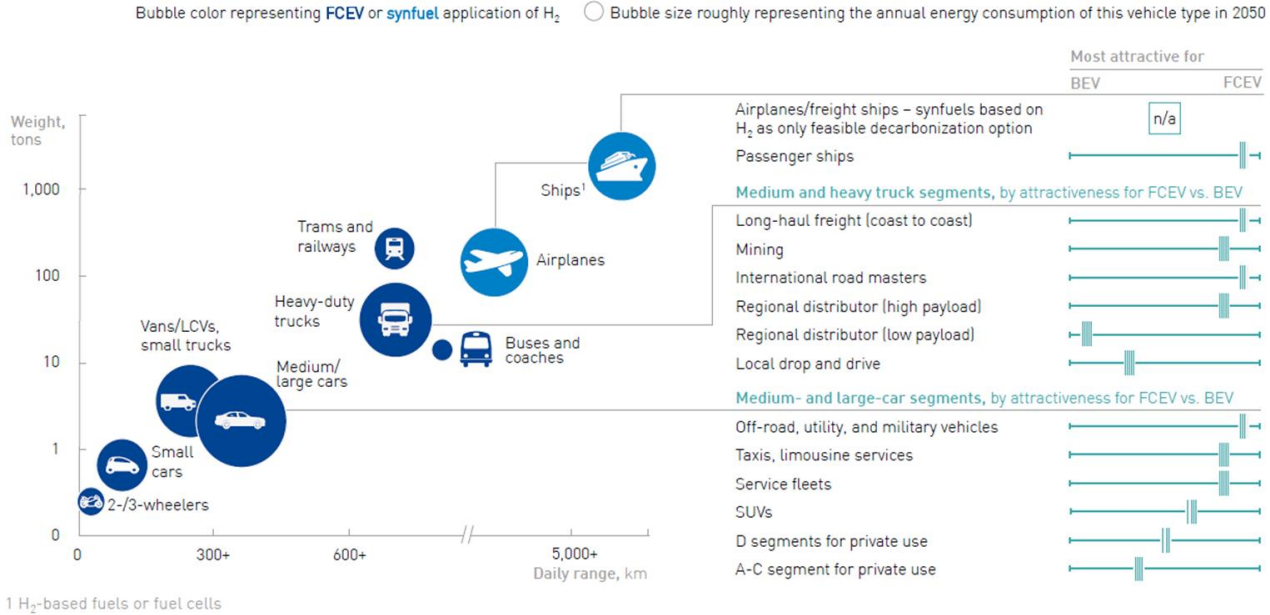
Hydrogen provides sufficient power for long ranges and high payloads due to its superior energy density.

4th reason

In addition to road transport, hydrogen is the best option for trains and ships, and hydrogen-based synthetic fuels (synfuels) can decarbonize aviation.

Current and future H2 applications

Transport



Source: CH-JU

Current and future H2 applications

Buildings

The building sector is one of the most energy-demanding sectors and the fuel most used for heating buildings is natural gas.

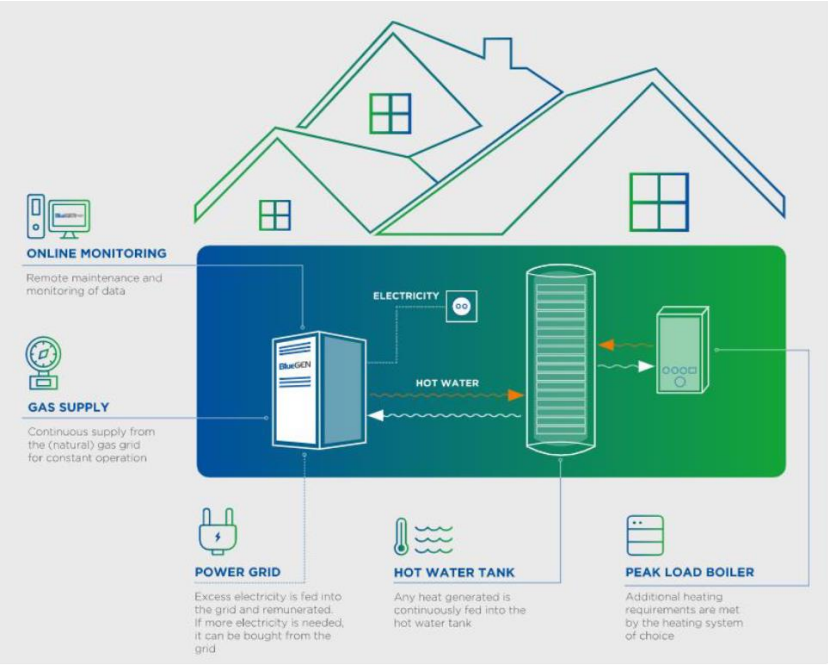
Heat pumps/hydrogen conversion devices

Blending hydrogen with natural gas

Upgrade entire gas networks to pure hydrogen.

Current and future H2 applications

Buildings



CHP systems using low-temperature fuel cells (PEMFC)
380,000 units in Japan

Source: Solid Power

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