
CMES
Col·lectiu per a un nou model
Energètic i Social Sostenible
INDOX
Thinking Energy
INDOX

INDOX AT A GLANCE

MORE THAN 150 WORKERS
> 25 ENGINEERS

3 FACILITIES
>40.000 m²

TURNOVER > 25 M€
CAGR > 10 %

DELEGATION IN 7 COUNTRIES
EXPORT TO MORE THAN 50 COUNTRIES

BUSINESS AREA

GREEN HYDROGEN

TANKS

LNG, GAS AIR, LPG & FUEL

PROCESS ENGINEERING

TRAILERS

LNG, GAS AIR, LPG & FUEL

PRODUCTS:
KEY FACTS IN OUR HISTORY

8 March 1967
INDOX

2016
NEW INDOX.

2018: New Facilities in Fonolleras

2022: Delivery more than 200 tanks

1996:
First Cryiogenic Trailer

2017:
CRYOGENIC TANK MULTILAYER

2019: New Facilities for O&M

PROCESS ENGINGEERING
KEY FACTS IN OUR HISTORY

8 March 1967
INDOX

1999-CESPA BCN:
First LNG Station to fill 25 MAN Trucks daily without pumps.

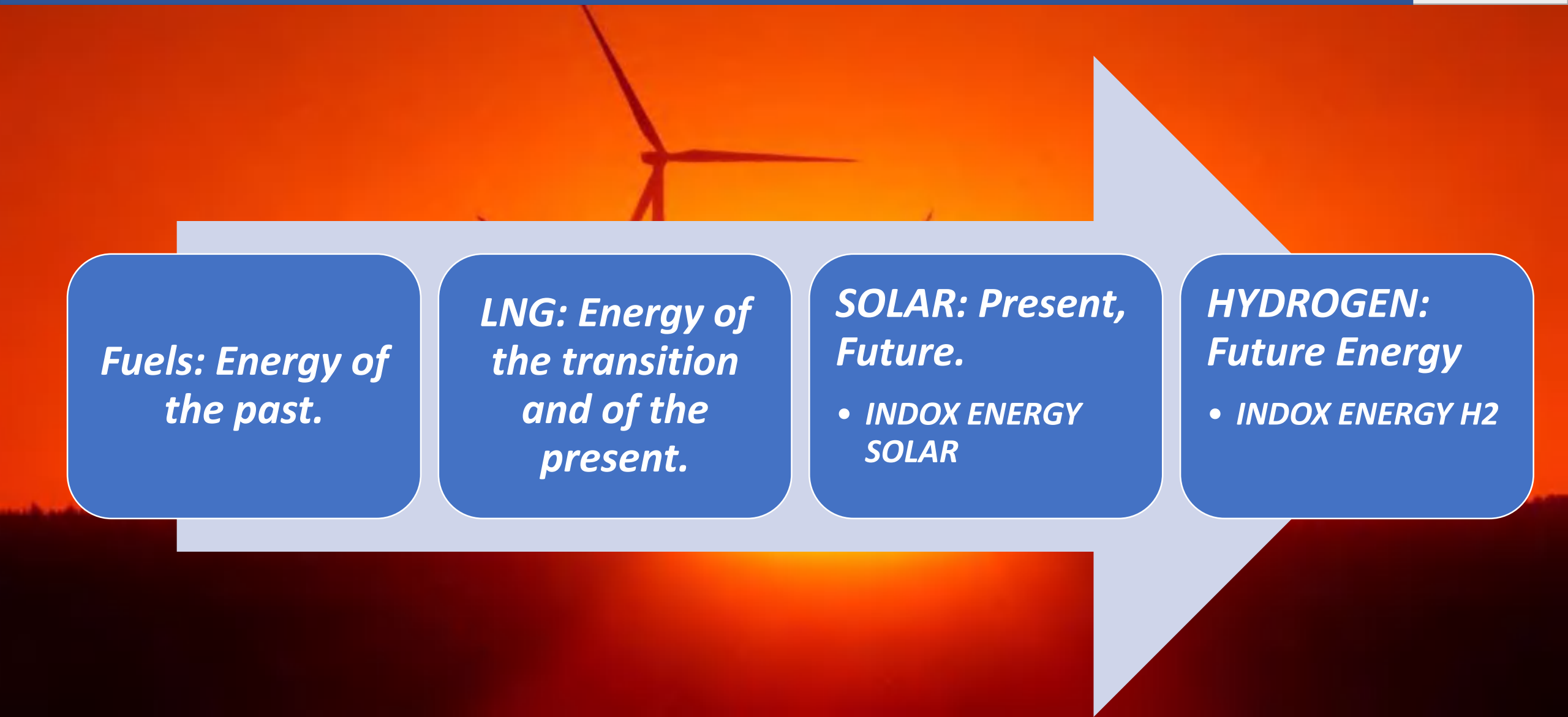
2011-TLF:
First TLF in SouthAmerica to suply the biggest PSR: 25.000 Nm3/h at 70 bar

1998-PSR:
More than 1,400 plants, to use for cogeneration power plants

2000-ARGONON:
First inland barge on dual fuel

2015-Liquefaction:
First plant 200 Tn/day in Equador

NEW ENERGY VISION



Fuels: Energy of the past.

LNG: Energy of the transition and of the present.

SOLAR: Present, Future.

- ***INDOX ENERGY SOLAR***

HYDROGEN: Future Energy

- ***INDOX ENERGY H2***

HYDROGEN: WHY NOW ?

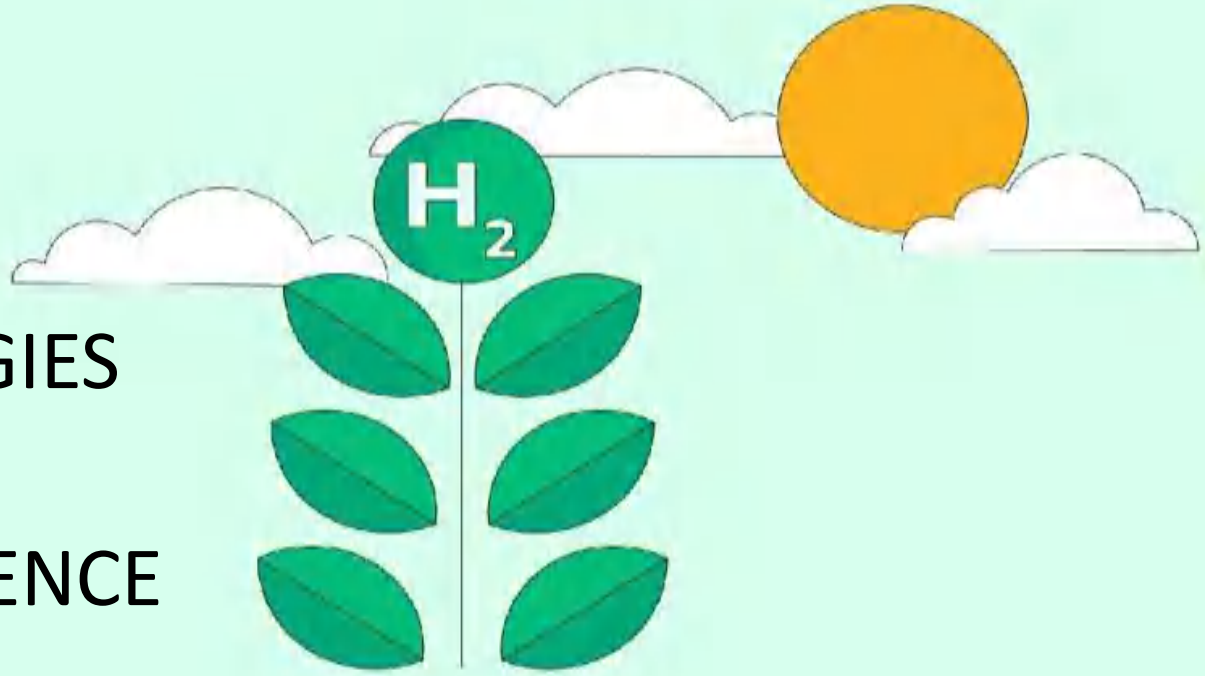
DECARBONIZATION

CHEAP RENEWABLE ENERGIES

FOSSIL FUEL INDEDEPENDENCE

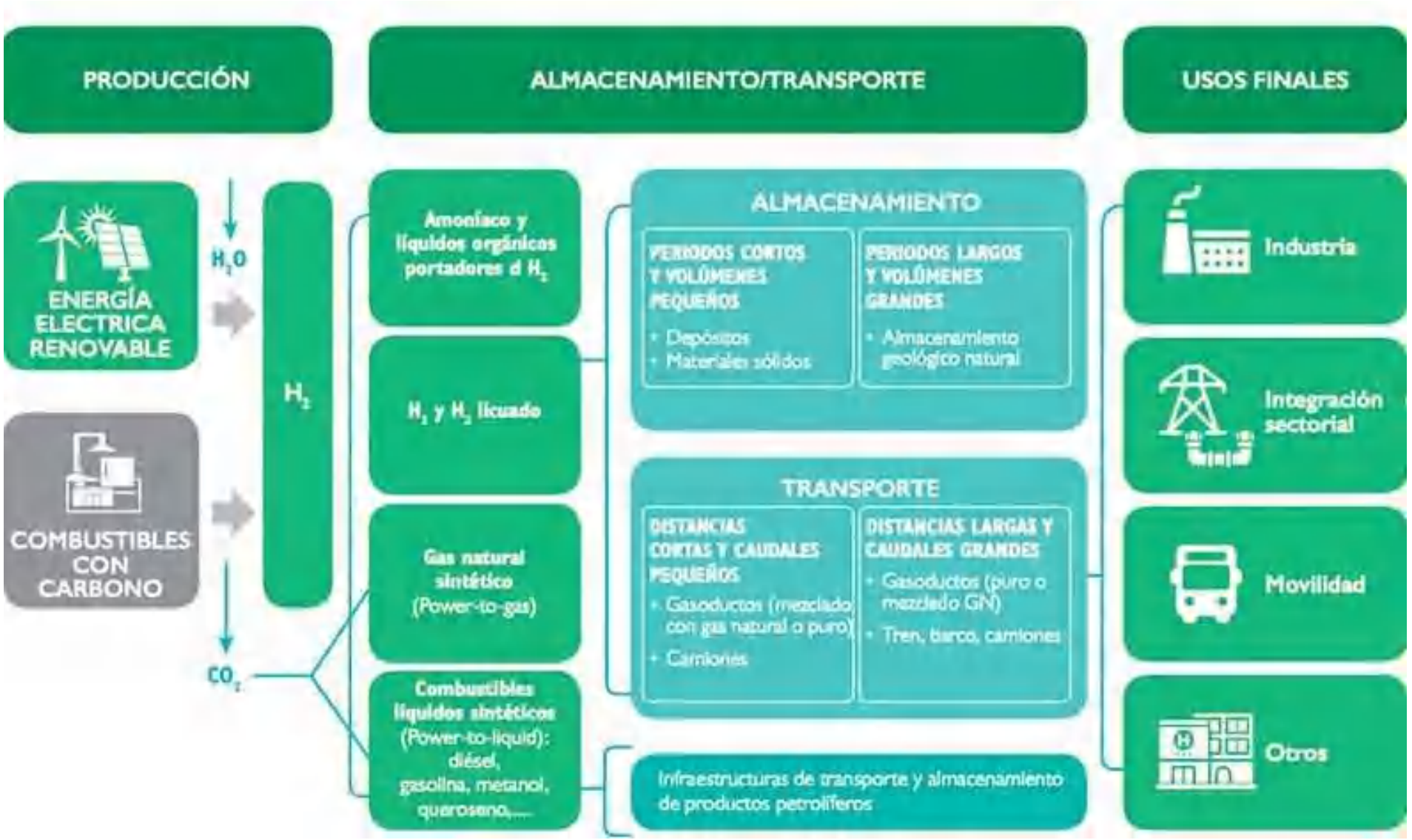
FOSSIL FUEL PRICES / WAR IN UKRAINE

NEXT GENERATION EU FUNDINGS



HYDROGEN VALUE CHAIN

HYDROGEN VALUE CHAIN



HYDROGEN COLORS

ACTO DELEGADO UE

https://energy.ec.europa.eu/delegated-regulation-union-methodology-rfnbos_en

The rules for producing renewable hydrogen

(Renewable fuels of non-biological origin)

Jake Stones and Andrea Battaglia (ICIS)

If a company aims to produce renewable hydrogen, it must do so via one of the following pathways outlined below:

The hydrogen plant is **directly connected** to a renewable asset. The renewable asset cannot come into operation earlier than **36 months** before the hydrogen plant

If the proportion of renewable power exceeds **90%** over the previous calendar year in the bidding zone where the hydrogen plant is operating

Hydrogen production takes place in a bidding zone where the emissions intensity of the grid is lower than **18gCO2e/MJ**. However, the hydrogen plant must acquire a **renewable PPA**, temporal and geographical correlation also apply

Power supply can be considered renewable if taken from the grid during **an imbalance period**. The power is either redispatched, or avoids redispatch

A **renewable PPA** is signed for the supply of power, and the principles of additionality, temporal and geographical correlation apply

Associated principles for the production of renewable hydrogen

Principle	Conditions	Exemptions
Additionality Article 5	The renewable asset came into operation not earlier than 36 months before the hydrogen plant. It also cannot have received operating or investment aid	Principle of additionality shall not apply until 1 January 2038 to hydrogen plants that come into operation before 1 January 2038
Temporal correlation Article 6	Up to 31 December 2029: Hydrogen production occurs **within the same calendar month** as the renewable power was generated under the renewable PPA From 1 January 2030: Hydrogen production occurs **within the same hour** as the renewable power was generated under the renewable PPA	Temporal correlation is considered always met if the hydrogen production occurs within the one-hour period where the clearing price for power resulting from the Day-ahead market is lower than or equal to €20/MWh, or lower than 0.36 times the EU ETS
Geographical correlation Article 7	**Considered met if one of the following are fulfilled:** • The renewable asset and hydrogen plant are in the same bidding zone • The renewable asset and hydrogen plant are located in interconnected bidding zones. The renewable asset is located in a bidding zone where the power price is equal to or higher than that of the hydrogen plant • The renewable asset is located in an offshore bidding zone to the hydrogen plant	

HYDROGEN MARKET

Full de Ruta de l'Hidrogen

El pla que presenta el Ministeri per a la Transició Ecològica i el Repte Demogràfic té per objectiu fomentar l'ús de l'hidrogen verd per aconseguir la neutralitat climàtica.

Principals magnituds pel 2030

- 8.900 M€ en inversions
- 4 GW de potència instal·lada d'electrolitzadors
- 25% del consum energètic de la indústria
- 100 - 150 d'hidrogeneres d'accés públic

European Hydrogen Strategy

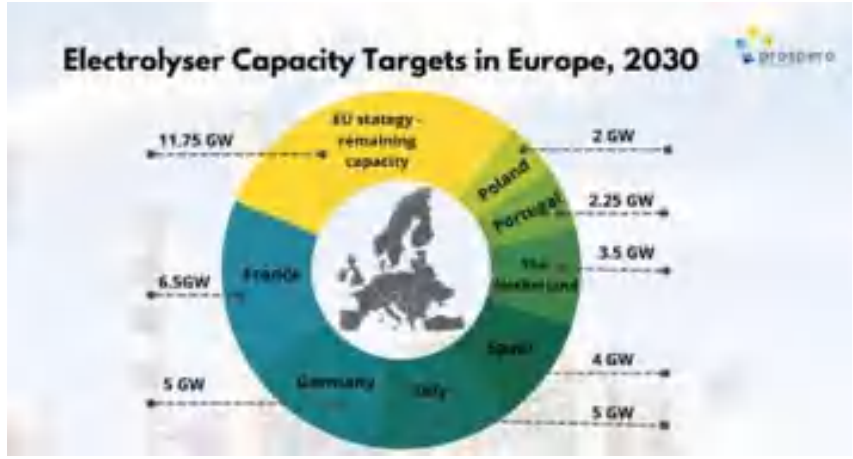
The Strategy, adopted in 2020, boosts green hydrogen production in Europe and makes it a priority to foster economic growth.

Today to 2024 > **2025 – 2030** > **2030 – ...**

Installation of **6 GW of electrolysers in the EU**, with the aim of reaching **1 million tonnes of green hydrogen**.

Generation of 40 GW and production of 10 million tons of green hydrogen.

Large-scale deployment of green hydrogen.

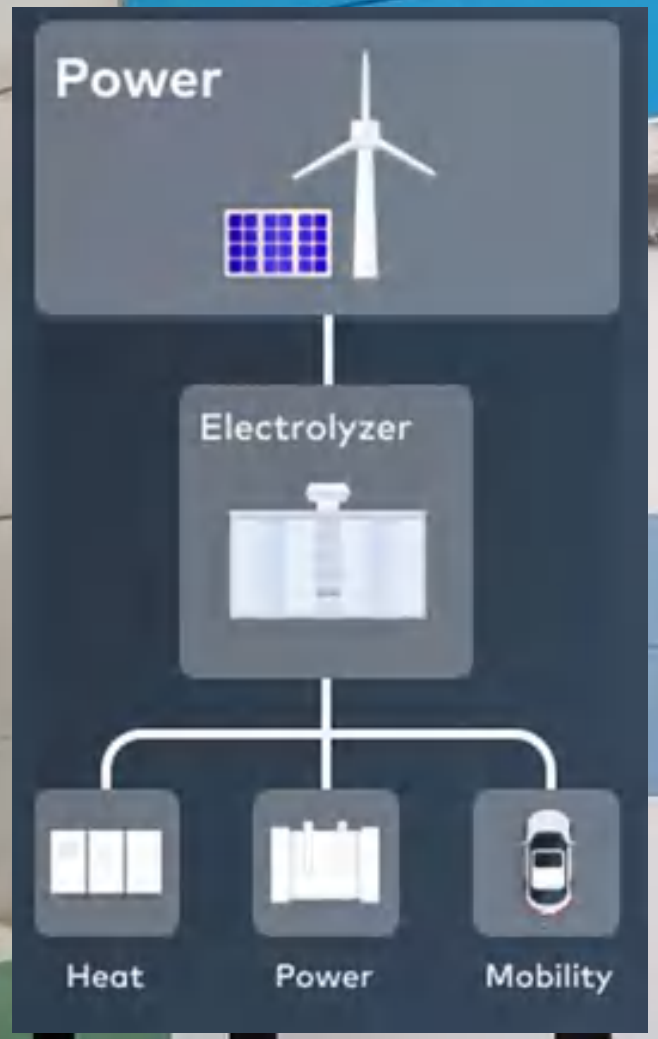


Source: Frost & Sullivan (2021). TOP 50 EMERGING TECHNOLOGIES. 2021 EDITION

InHy SOLUTIONS

INDOX: FIRST SME IN CATALONIA TO PRODUCE HYDROGEN FOR SELFCONSUMPTION

H_2 APPLICABILITY CASES



POWER TO GAS:
Natural gas replacement in industrial uses (burners, boilers, ovens, etc.)

POWER TO ELECTRICTY:
HVAC for buildings with high energy demands (hospitals, central offices, schools, universities)

POWER TO FUEL:
Fleets of industrial vehicles, buses or forklifts

WE BELIVE IN HYDROGEN

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Industrials de Catalunya

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HOW IT WORKS

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KEY FACTS OF OUR H_2 PLANT

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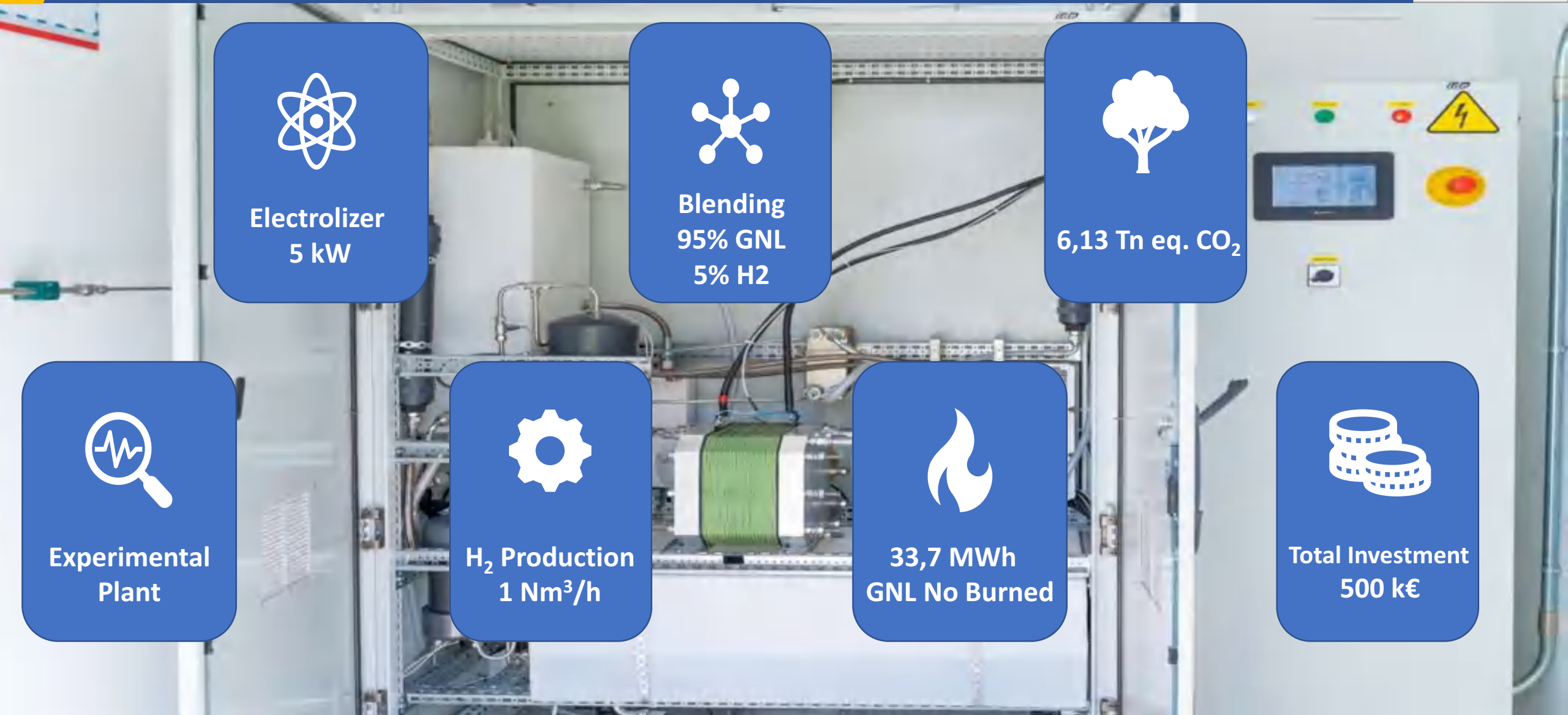

Electrolizer
5 kW

Blending
95% GNL
5% H2

6,13 Tn eq. CO_2

Experimental Plant

H_2 Production
1 Nm^3/h

33,7 MWh
GNL No Burned

Total Investment
500 k€

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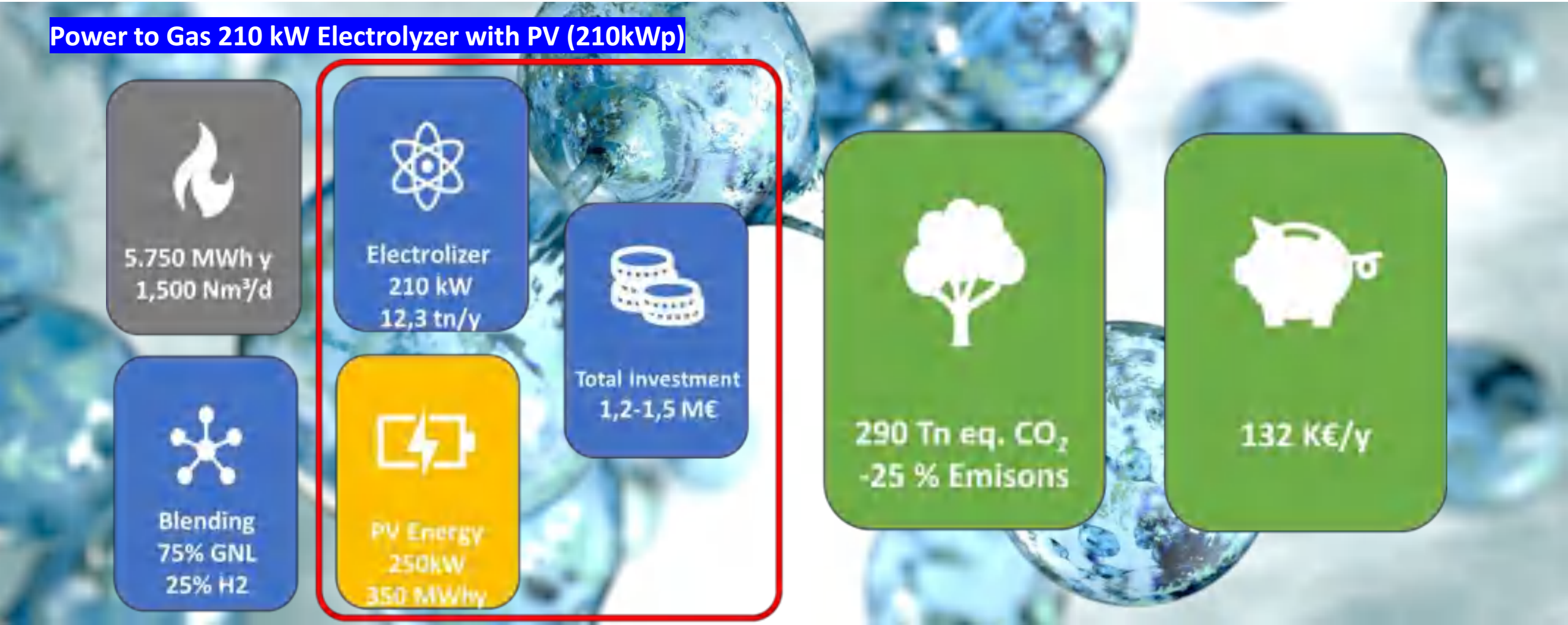
POWER TO GAS - CASE STUDY

Case study: <u>Decarbonization in a pharmaceutical company</u> (Blending with natural gas)

Substitution of natural gas used in industrial processes.



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POWER TO GAS - CASE STUDY

Case study: <u>Decarbonization in a food industry</u> (Blending with natural gas)

Substitution of natural gas used in industrial combustion processes.

Current situation:

Natural gas consumption

3.644 MWh/y
52 Nm^3/h

Cost of natural gas

~ 640.000 €/Y

Working hours

6.000 h/y

CO_2 emissions

663 tn eq./y

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POWER TO GAS - CASE STUDY

Case study: <u>Decarbonization in a food industry</u> (Blending with natural gas)

Substitution of natural gas used in industrial combustion processes.

Future situation: Power to Gas 50 kW Electrolyzer with PV (100kWp)

Natural Gas

43 Nm³/h

Hydrogen

9 Nm³/h

Blending

83% GNL
17% H2

PV Installation

100 kWp
163 MWh/y

Electrolyzer

50 kW
4,75 tn H_2/y

Total Investment

445.120 €

Lifetime

13 years

CO_2 emissions

550 Tn eq. CO_2
-17 % Emissions

Savings

85.583 €/y

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POWER TO GAS - CASE STUDY

Enginyers Industrials de Catalunya

Other blending examples with H2 in Industry

La planta de BMW de Leipzig sustituirá el gas natural por el hidrógeno verde para el proceso de pintado

por Esther De Aragón | Oct 20, 2022 | Industria, Información | 0 Comentarios

Green hydrogen will power production of Japanese whisky Hakushu

Using renewable electricity, Suntory will produce hydrogen to supply heat for distillation and fuel its buses and trucks.

Stadtwerke Hassfurt goes for hydrogen cogeneration

Stadtwerke Hassfurt, a German local utility, has realised a groundbreaking project for renewable regional energy supplies. It generates its own hydrogen from local renewable electricity and uses electricity.

Hydrogen blending for natural gas-fired turbines

Long Ridge Energy showcases successful use of clean hydrogen power

The Long Ridge Energy power plant terminal in Hannibal, Ohio USA

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POWER TO ELECTRICTY - CASE STUDY MICROSFT 3 MW FUELL CELLS

'We built a vision'

Microsoft turned to PEM fuel cells as a potential solution to the backup diesel generator challenge in 2018. ***PEM fuel cells are commonly used in the automotive industry because, like diesel engines, they are quick to turn on and off, and can follow a load up and down***. That fast reaction and load following capability is well suited for backup power at datacenters, Monroe noted.

"We started looking at the projections of the costs and the availability of hydrogen and we started to really believe that this might be a solution. And, so, we built a vision. It took us from a rack to a row to a room to a datacenter," he said.

https://news.microsoft.com/source/features/sustainability/hydrogen-datacenters/

Solutions

POWER TO ELECTRICTY - CASE STUDY

- Utility Substation Control and Communications Networks

- Zero-emission hydrogen power generator

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POWER TO FUEL - CASE STUDY

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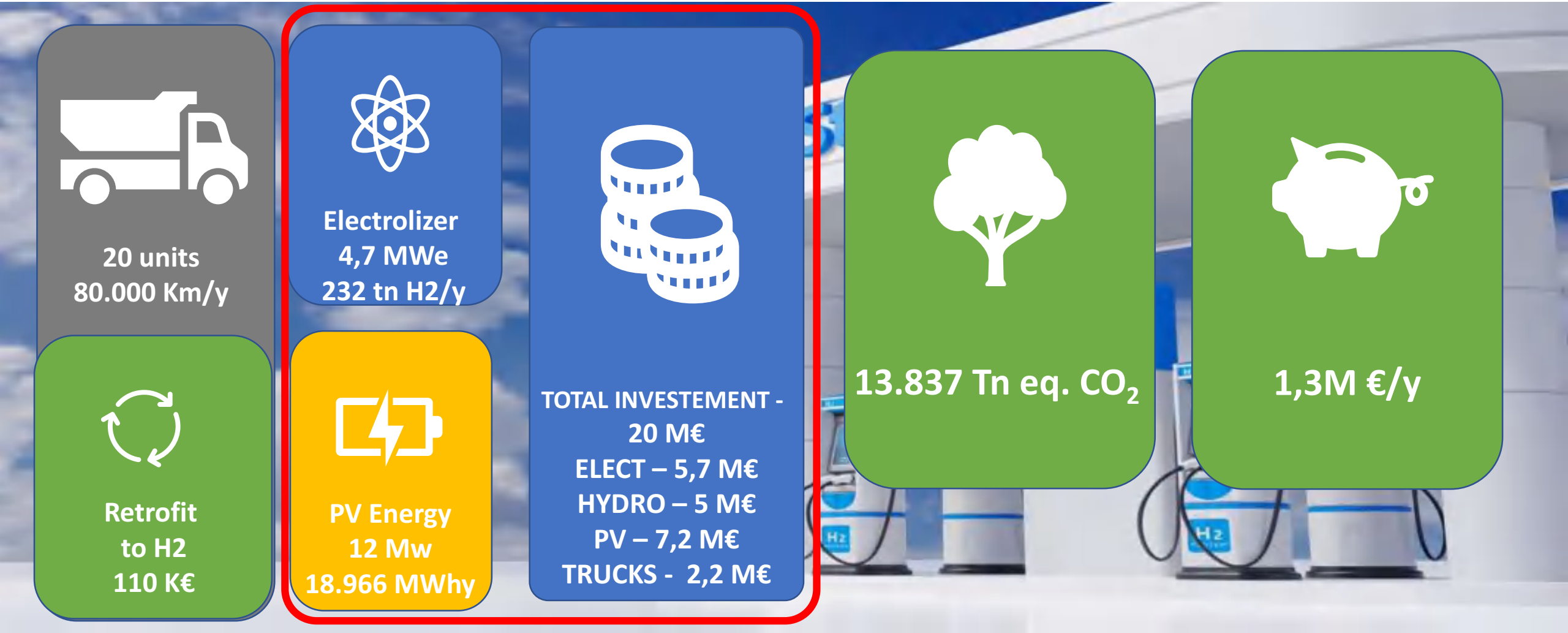
Case study: Fleet of 20 trucks retrofit from DIESEL to H2



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APPLICATION CASE: MOBILE HYDROGEN REFUELING STATION WITH HIGH PRESURE STORAGE

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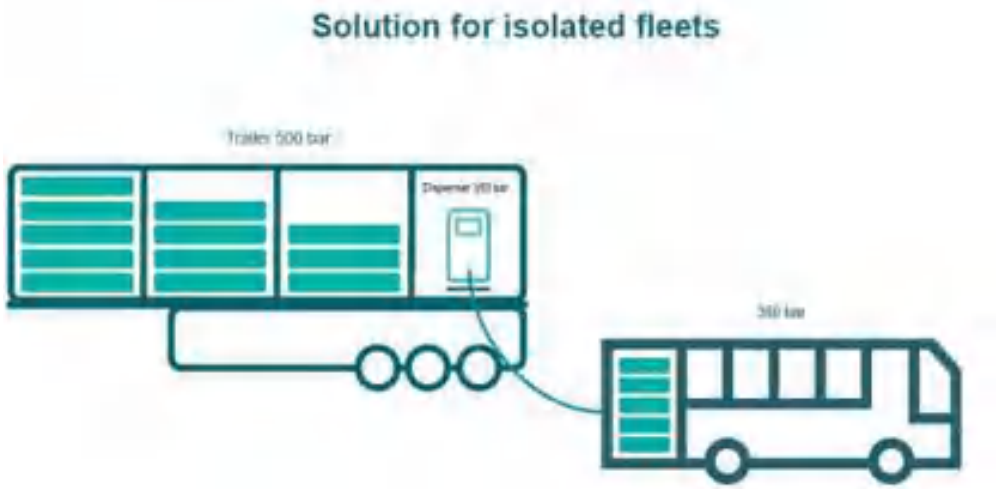

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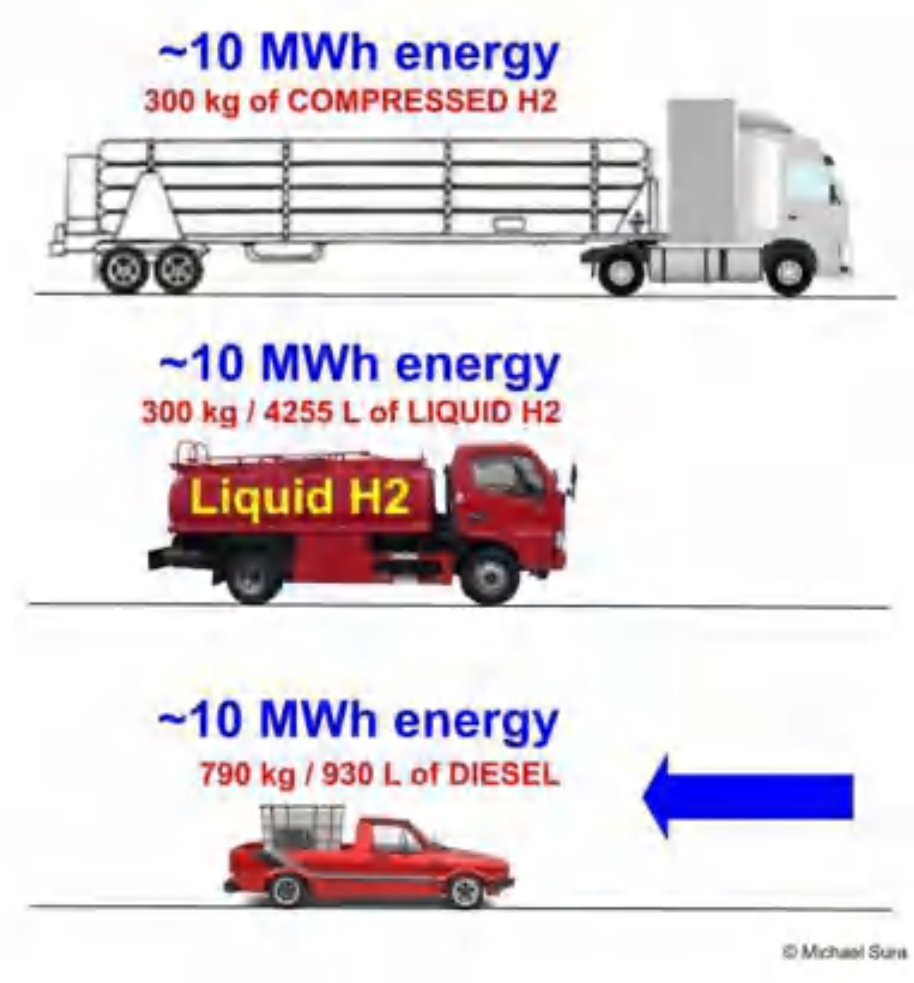
APPLICATION CASE: FORKLIFTS

HOW TO STORE HYDROGEN?

STORAGE AND TRANSPORT



Storage

THE STORAGE DILEMA?
INOVATION: OPTIMIZATION CONDITIONS H_2

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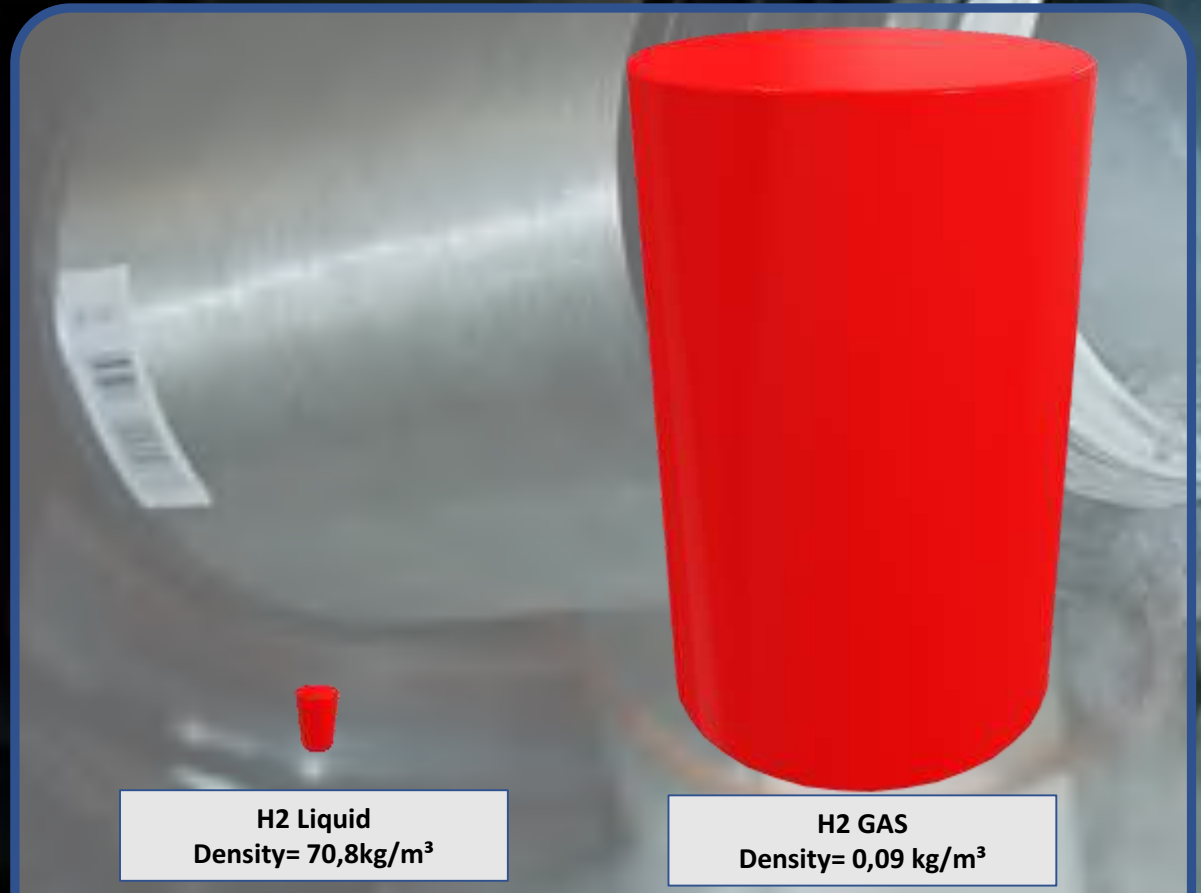


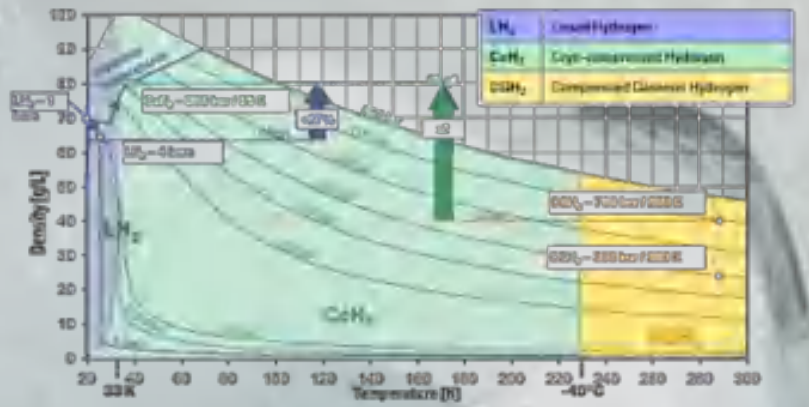
SAME ENERGY IN THE THANKS→
GAS TANKS 786 TIMES BIGGER THAN THE LIQUID

THE CHALLENGE → STORAGE AND TRANSPORT LH2

INDOX R+D TEAM is working on CRYOGENIC H2

- APPLY A PROJECT TO MITECO :
- PROJECT COST 650.000 €
- SUBSIDIRIES NEXT GENERATION: 450.000 €

- Optimize storage/transport conditions
- Cryogenic H2? At -250º? Vs Compression at 100 bars + up to -190º. ?
- University/reference centers agreements
- Let's be pioneers….again



STORAGE AND TRANSPORT

LIQUID HYDROGEN

Hydrogen Storage Tanks

Transport Trailers

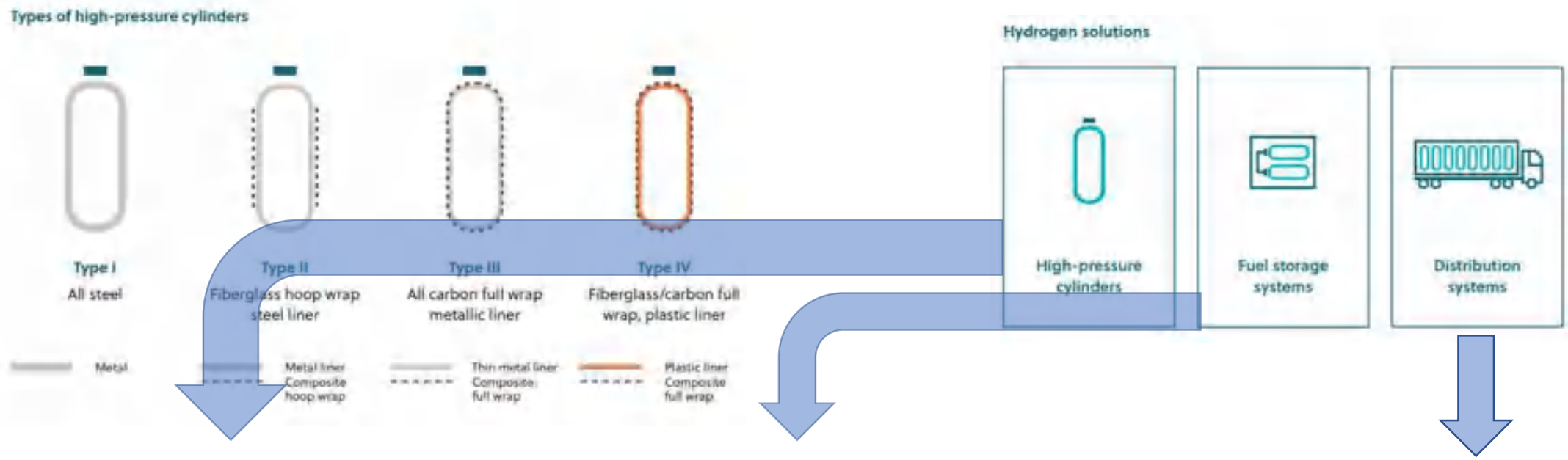
Mobile Recharger

Mobile Refueler

Hydrogen Generators & Liquefiers

LNG Storage & Distribution

HIGH PRESURE STORAGE



SUBSIDIARIES

Línea 1: Impulsar la **CADENA DE VALOR** innovadora y de conocimiento, con especial atención a las PYMEs. Entre otras medidas, se apoyará la construcción y mejora de instalaciones o la adquisición y desarrollo de equipos.

Línea 2: Creación de **CLÚSTERS O VALLES DE HIDRÓGENO RENOVABLE** que localicen en polos industriales a los principales consumidores de hidrógeno.

Línea 3: Desarrollo de **PROYECTOS SINGULARES PIONEROS** que combinen a escala comercial la producción y consumo de hidrógeno renovable.

Línea 4: Líneas de apoyo para la participación de empresas nacionales en proyectos y consorcios europeos (**IPCEI de hidrógeno**).

Un año después, en diciembre de 2021, se presentó el PERTE de energía renovables, hidrógeno y almacenamiento, que ya ha convocado ayudas por 400 millones de euros para proyectos pioneros y singulares de hidrógeno renovable y para la cadena de valor. "Se ha recibido una respuesta muy significativa que pone de manifiesto la madurez de nuestra cadena industrial", ha elogiado Ribera.

El Consejo de Ministros ha destinado 74 millones de euros a cuatro proyectos de hidrógeno renovable pertenecientes a las empresas H2B2, Nordex, SENER e IVECO, que se ubican en diferentes localizaciones de Andalucía, País Vasco, Navarra, Asturias, Castilla y León, Cataluña y la Comunidad de Madrid.

PROGRAMA PIONEROS

Hidrógeno renovable
Proyectos singulares y pioneros

ACTUACIONES INCENTIVABLES (1/3)

Las tipologías de actuaciones incentivables pueden ser:

a) Las instalaciones de producción y distribución de hidrógeno renovable, incluyendo la instalación de generación eléctrica renovable asociada (si está conectada físicamente);

b) Usos industriales;

c) Nuevos usos en trasporte pesado por carretera, marítimo, aéreo y/o ferroviario;

d) aplicaciones estacionarias innovadoras.

Inversión mínima de 1M€ por proyecto

Las actuaciones estarán orientadas al **despliegue de aplicaciones comerciales** y los proyectos deberán incluir de manera **integral** tanto la producción del hidrógeno renovable como su consumo para ser considerados elegibles. Es decir, cada proyecto pionero y singular **deberá integrar necesariamente la actuación a)** y **combinarlo** con una o más de las **actuaciones de los apartados b), c) o d).**

Instalaciones de producción y distribución de H2 renovable:

- Instalación de electrolizadores **(entre 0,5 y 20 MW)** y sistemas auxiliares.
- Instalaciones nuevas de generación eléctrica renovable dedicadas a la producción de H2 renovable (solo serán subvencionables instalaciones físicamente conectadas al electrolizador)
- Infraestructuras de almacenamiento, acondicionado y distribución.

Los beneficiarios potenciales de la ayuda deberán haber identificado y confirmado al (los) usuario(s) que esté(n) dispuesto(s) a **consumir de forma agregada al menos el 30 % del hidrógeno renovable producido anualmente**, debiendo acreditarse un "anclaje" o compromiso mínimo del consumo de hidrógeno, identificar y confirmar el compromiso, por medio de acuerdos vinculantes, memorandos de entendimiento u otro formato. Más del **80% del hidrógeno renovable producido anualmente** debe estar destinado a alguno de los usos finales que se describen en los apartados II a IV del Anexo I de la convocatoria (usos industriales, movilidad pesada, aplicaciones estacionarias innovadoras).

Usos industriales:

- H2 renovable como materia prima en sustitución del H2 gris
- Descarbonización de usos térmicos en la industria

Los equipos de consumo en industria solo serán elegible si se sustituye, a nivel de cada equipo individual consumidor, **al menos un 30% del consumo de combustible fósil** (en condiciones normales de operación) por hidrógeno renovable

Usos en movilidad pesada:

- Vehículos pesados (terrestre, ferrovial, marítimo, aéreo)
- Integración de hidrógeno mediante pila de hidrógeno, combustión interna 100% H2 y almacenamiento embarcado

Aplicaciones estacionarias innovadoras

- Puertos, aeropuertos, plataformas logísticas
- Sistemas de re-electrificación

CHALLENGE H2 INDUSTRY

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OFF TAKERS

TECHNOLGY OFFER

KNOWLEDGE & TALENT

PRICING


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