

THE FAST TRACK TO THE HYDROGEN ECONOMY

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Repsol Hydrogen Vision and Strategy

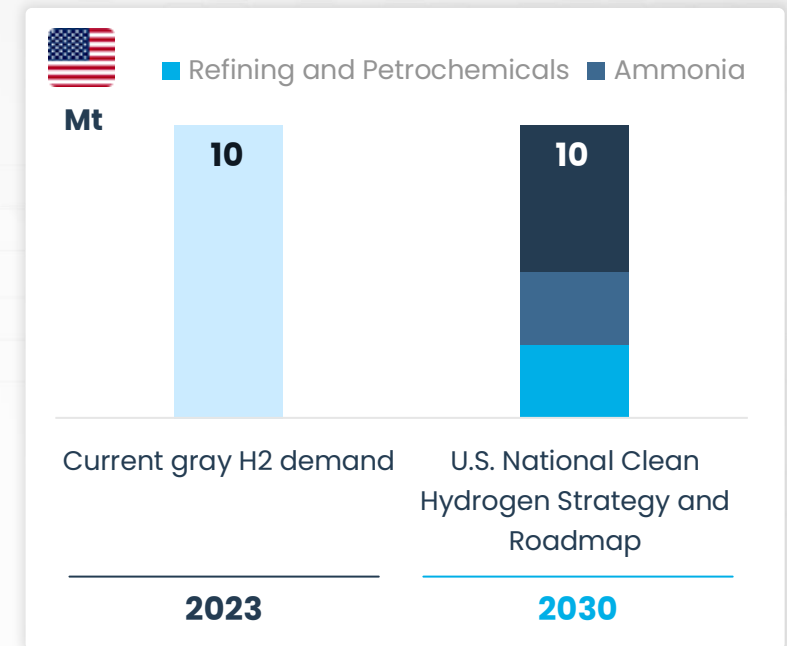
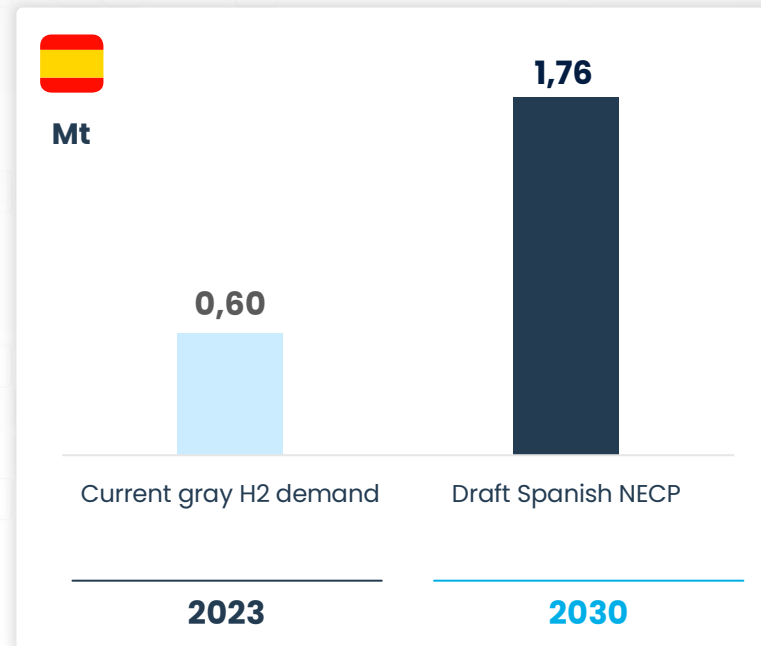
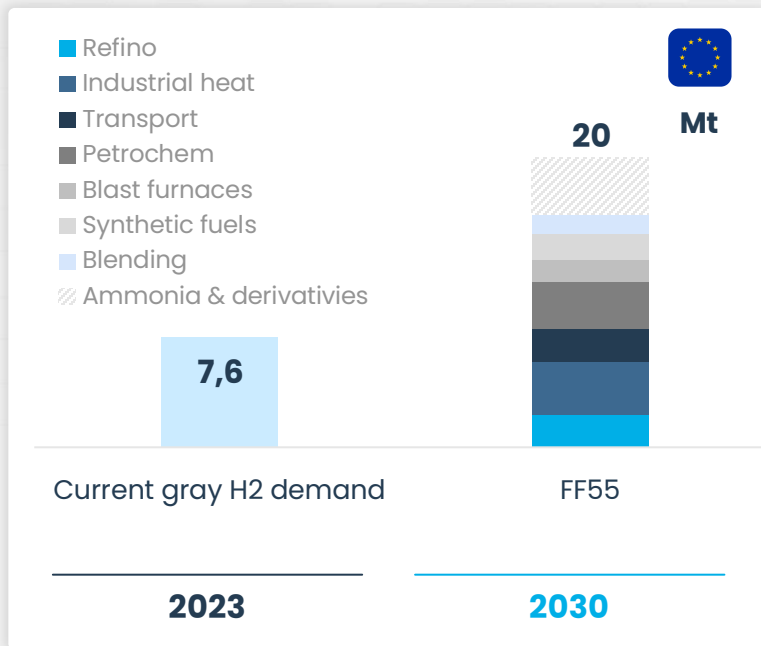
Tomás Malango,
Director of Renewable Fuels & Circular
Economy, Repsol





H2 demand expectations on both sides of the Atlantic

Current gray H2 consumption vs Low emission H2 demand in 2030 by source, use & geography



*Internal calculation from Gestión Regulatoria's model. Note: Low carbon hydrogen = green hydrogen + blue hydrogen + biological hydrogen production from photosynthesis. Production and demand are considered equal at a global level. Assumptions: conversion: 0.355 tonnes per toe. MTM= Multitech Scenario, APS= Announced Policies scenario, NZE= Net Zero Emissions scenarios. Source: RePowerEU U.S. National Clean Hydrogen Strategy and Roadmap and Spanish National Energy and Climate Plans official data.





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H2 market development approaches on both sides of the Atlantic



Regulatory developments are still ongoing. The support mechanisms are different, but there is a certain alignment on key H2 concepts.

-  Demand
-  Supply
-  Tech approach
-  Regulation

EUROPE



- **RED III** by 2030: 42% RFNBOs in industry, and 14.5% GHG savings in transport & 5.5% adv.bios & RFNBOs in transport (min. 1% RFNBO)
 - E-fuels targets in Refuel Aviation.
 - EU ETS expansion and CBAM for pricing carbon on imports
 - CCfD for industrial decarbonization- in development
 - Alternative Fuels Infrastructure targets for H2 refuelling
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- Support mechanisms for H2 production: H2 Bank auctions. National auctions in development.
 - CAPEX support mainly the Innovation Fund and State Aid.
-
- Only support for electrolytic H2 meeting strict requirements of RFNBO
-
- Temporal correlation: monthly until 2030, hourly since then.
 - Geographical correlation: same bidding zone.
 - Additionality: RES generation installed in the last 3 years, with grandfathering clause for installations

USA



- Demand policies are mainly in the hands of Federal States.
 - Carbon pricing is only developed in California, and partially in other States.
-
- IRA H2 production credit (“S.45V”): 10 year credit period and credit range 0.12–3 USD/kgH2 depending on CO2 footprint and the fulfillment of wage/apprenticeship requirements.
 - CAPEX support by BIL grants and contracts for H2 hubs, research, lower costs manufacturing & H2 refueling in corridors and ports.
-
- Technology neutral approach: includes electrolytic , nuclear and SMR with CCS.
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- Matching: annual until 2028, hourly by then.
 - Deliverability: located in the same region.
 - Incrementality: RES generation installed in the last 3 years.



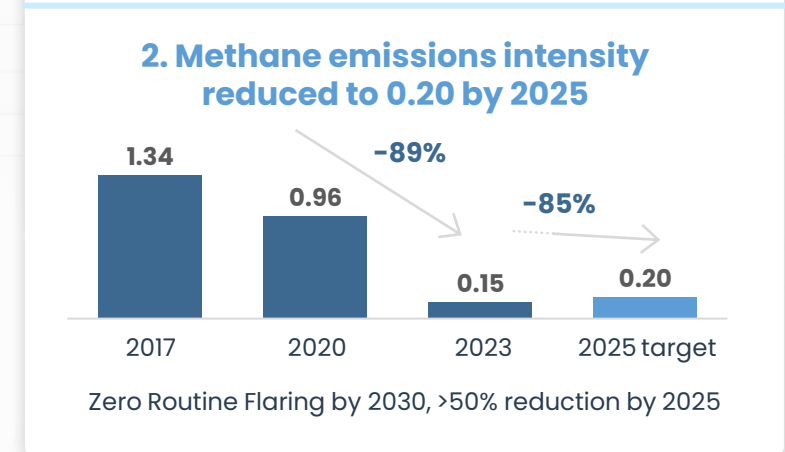
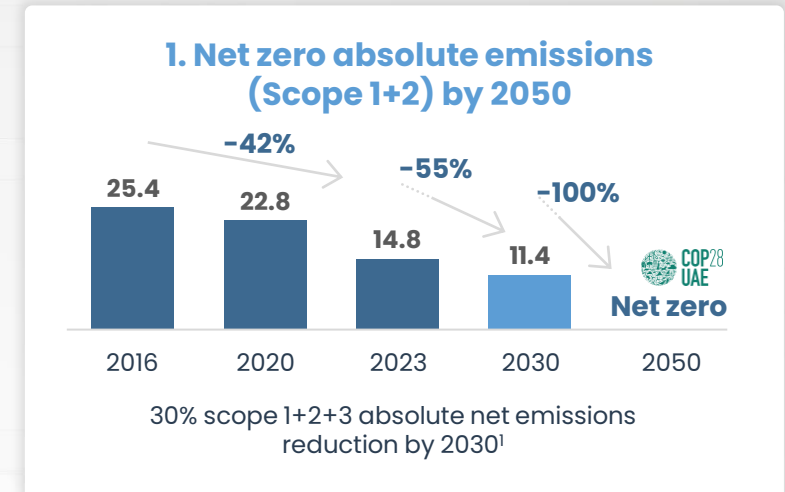
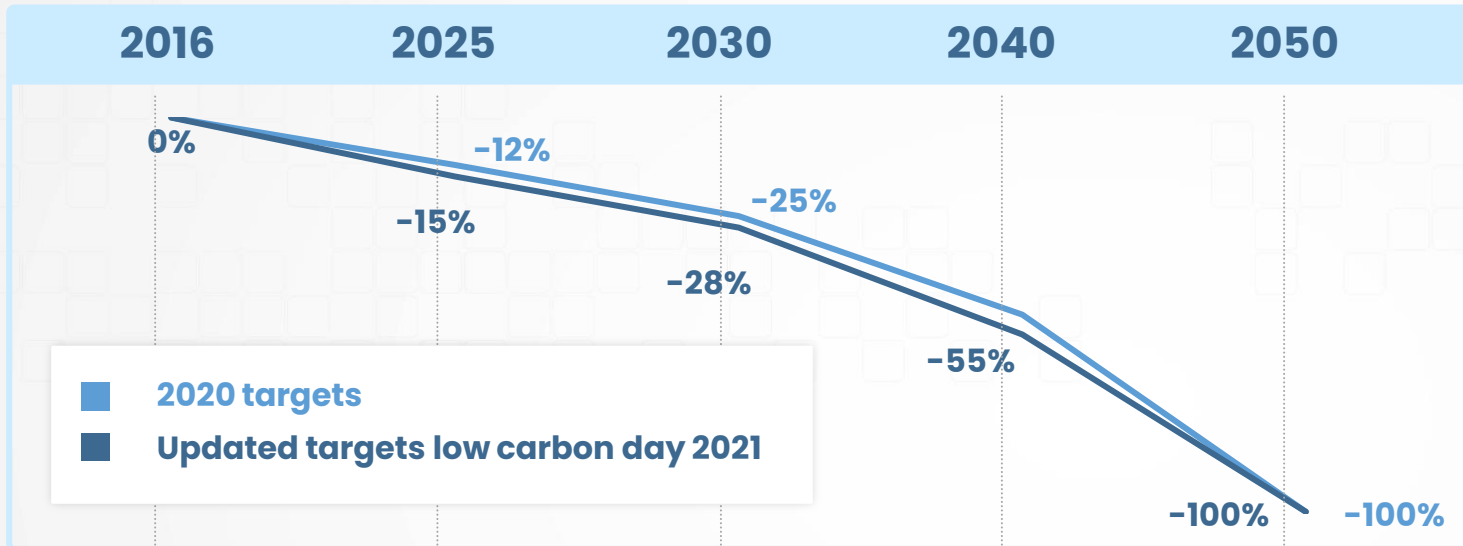
Convergence



Commitment to our **Net Zero** path with firm short-term targets

Carbon intensity indicator reduction targets

gCO₂/MJ reduction, %



1. MtCO₂e, % 2. CH₄ emissions/market gas, v/v%







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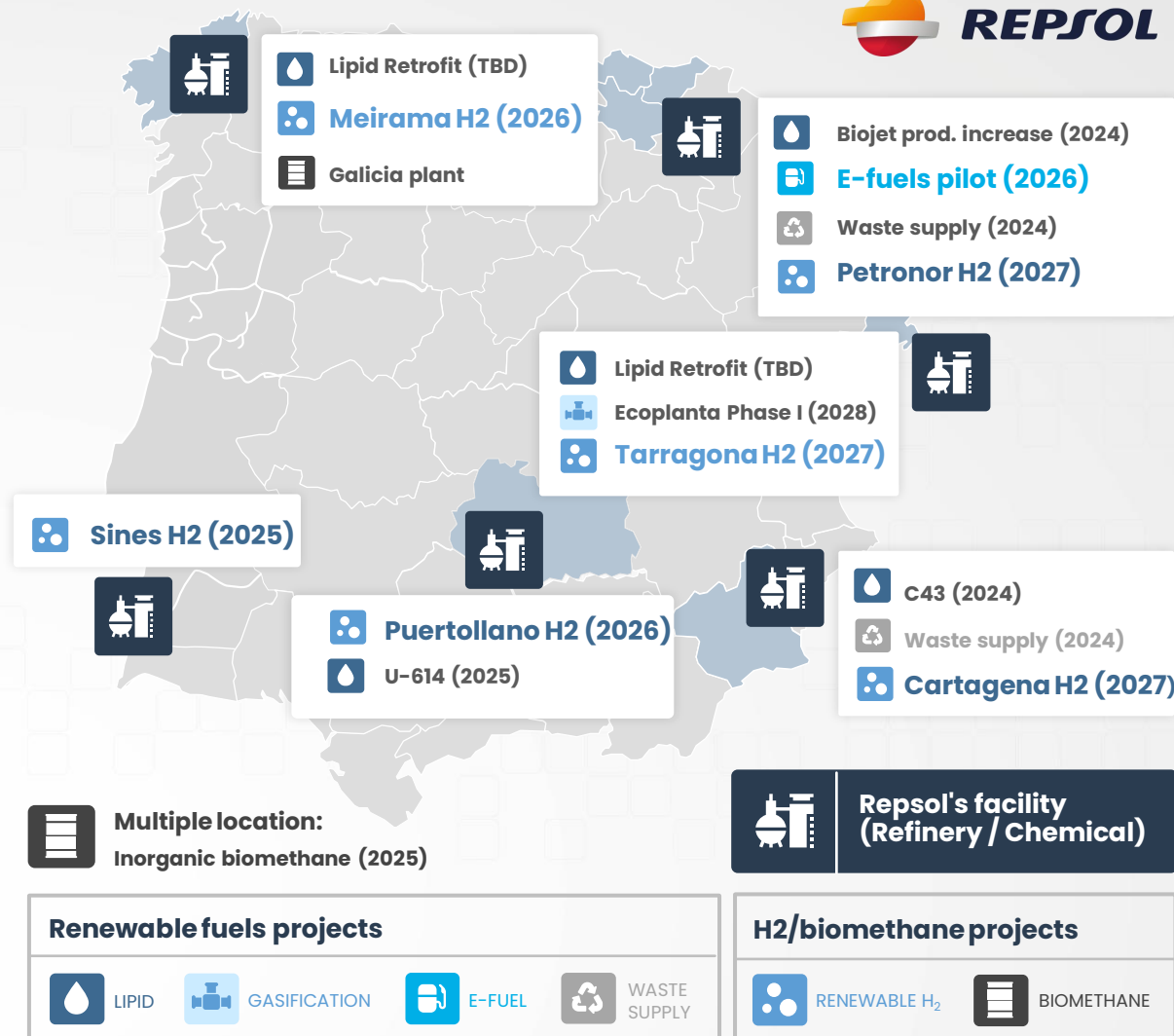


Leveraging Repsol sites to develop profitable transformational projects and leading renewable platforms

A focused roadmap with a highly attractive project pipeline

Fuels platform Strategic rationale Main Risk



 LIPID	High margin business, taking advantage on retrofit of existing assets to accelerate production and lock-in attractive feedstock	Feedstock availability
 BIOMETHANE	Become a relevant biomethane producer by securing feedstocks and development capabilities through alliances, and leveraging Repsol's optionalities created by RED mandates to decarbonize mobility sector	Market development
 RENEWABLE HYDROGEN	Leading H2 production in Iberia, geared to decarbonize our own consumption , and benefit from a synergistic compliance of RED, Refuel Maritime & Refuel Aviation mandates	Technology scale-up
 GASIFICATION	An early adopter strategy enables access to premium markets of advanced biofuels & RFNBOs with bio-methanol	Technology scale-up & market development



Renewable fuels projects

-  LIPID
-  GASIFICATION
-  E-FUEL
-  WASTE SUPPLY

H2/biomethane projects

-  RENEWABLE H₂
-  BIOMETHANE



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Existing Industrial use of H2 is the anchor demand for the introduction of renewable H2 into **new applications**

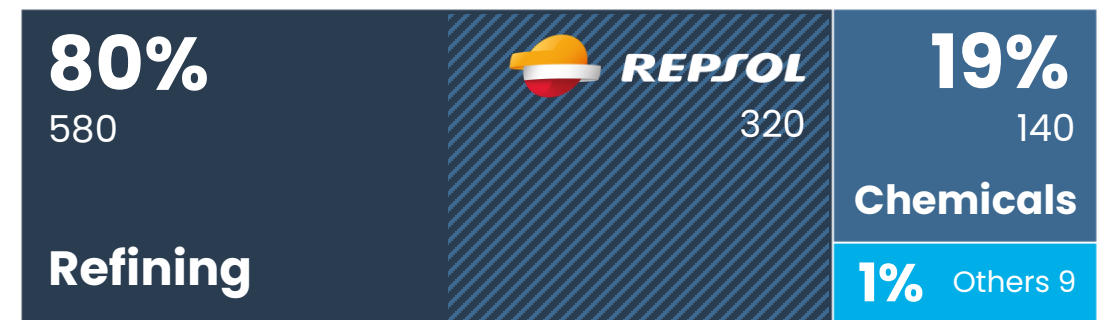
 Europe **9 M tons**



- Europe's H2 market represents 9% of world market, is the 4th largest consumer region
- Current H2 supply, based on fossil fuel origin, covers mainly refinery and ammonia uses

Demand 2022 Source: Platts, Europe

 Spain **730 ktons**



- Spain's H2 market driven by refinery end-use
- Repsol H2 consumption represents 60% of Spanish refining demand

Demand 2022 Source: Platts, Spain



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Current legislation converts transport fuels into the leading sector in the industry to create market for RFNBOs

H2

→ **Upgrading (Hydrotreating)**

→ **Conversion (Hydrocacking)**

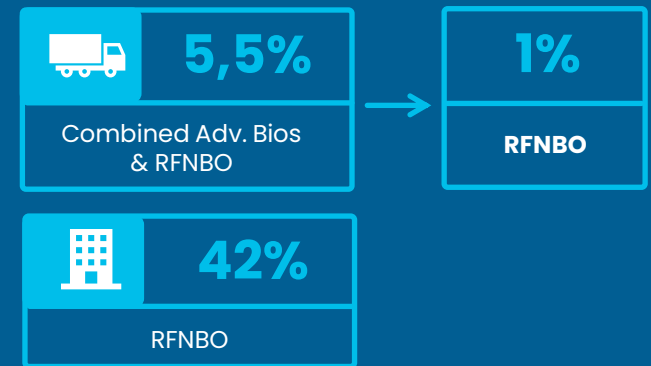
→ **Feedstock (Synthetics)**

→ **Conventional fuels**
Whit Renewable H2 embeded

→ **Biofuels**

→ **E-Fuels**
E-Methanol
e-Ammonia

✓ Legislation



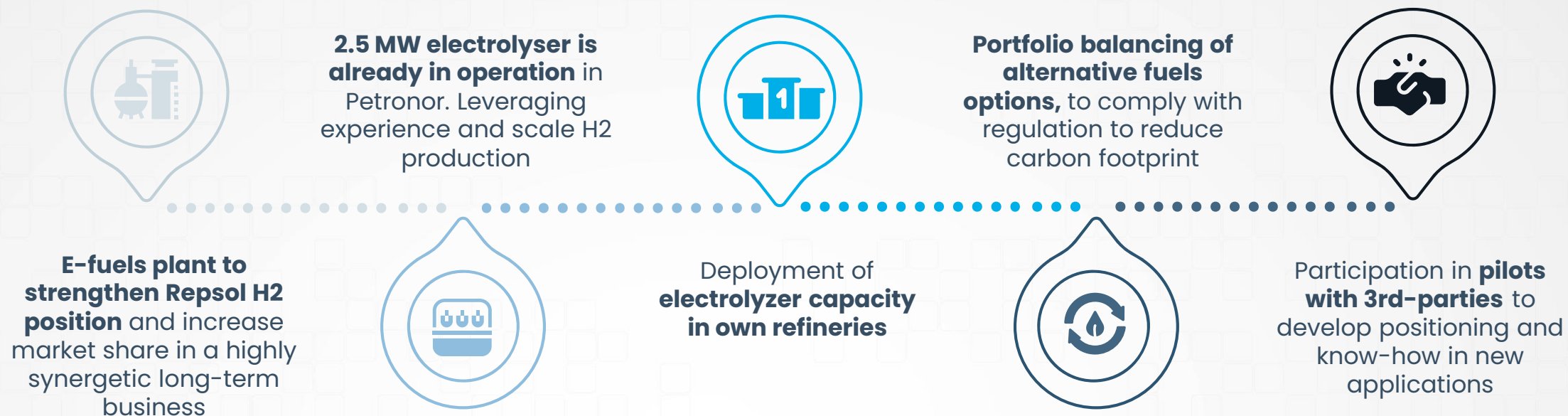
EU legislation (mainly RED-III and Refuel Aviation) favor RFNBOs uses in refinery processes, contributing to transport binding sub –target.



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Repsol renewable H2 ambition



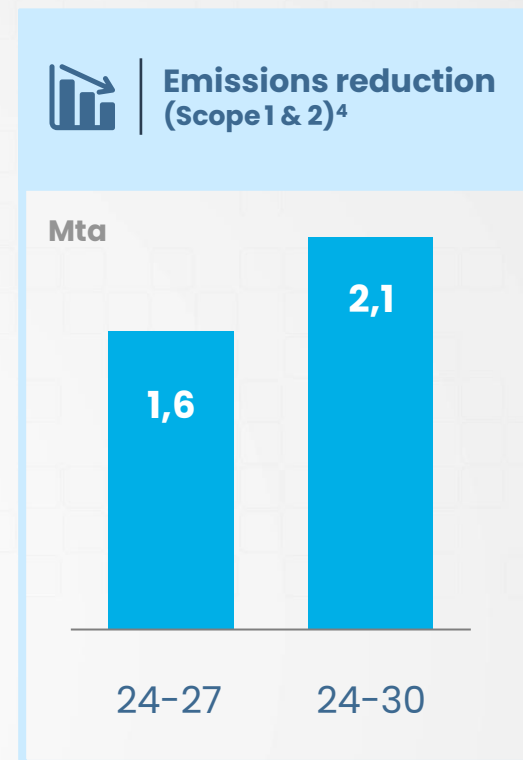
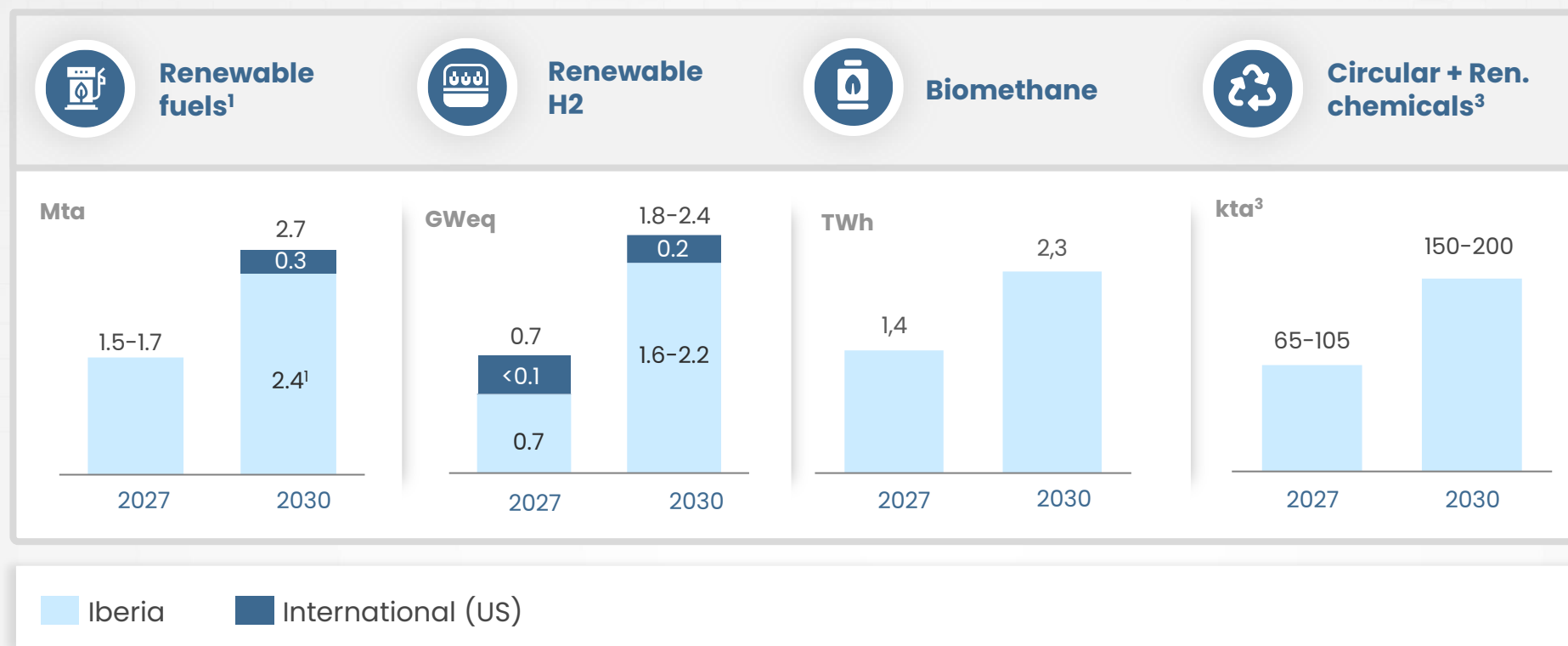


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Main Targets: Growth of low carbon business and progress in sustainability

Targets and Capex to be adapted according to opportunities driven by regulation and market development



1. Includes bioETBE and H2 as intermediate 2. Includes 0.2 GW equivalent capacity of biomethane SMR from 2025 3. Range between production and sales 4. Includes refining and chemicals facilities



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SHYNE (Spanish H2 Network) Evolution

SHYNE alliance made up of 30+ entities, from major companies to SMEs, research centers and universities.

SHYNE gathers organizations from different sectors aiming to promote renewable H2 across all the value chain in Spain and considering a variety of applications.



MISSION

Promote the **renewable H2 value chain** fostering the decarbonization of the Spanish economy and strengthening Spain as a relevant H2 actor



OBJECTIVES

- ✓ **Promote** creation of renewable **hydrogen projects**
- ✓ **Generate** an **ecosystem** that connects regional and national initiatives around renewable hydrogen
 - Speak with a **single voice** on critical issues for the development of H2 in Spain



ALLIANCE

- Advocacy
- Support for H2 valleys consolidation
- Milestones communication



ASSOCIATION

- Platform-project enabler
- Creating best practices and business standards
- Capacity generation: employment and training needs
- Communication of milestones development and position on critical issues
- Development of external contacts with H2 valleys, international forums



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Promoters



Partners and collaborators



SHYNE members

SHYNE establishes a solid presence that covers a large part of the value chain, with companies and entities of different sizes, sharing the same objectives.



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BH2C: Basque H2 Corridor



Mission

To create a **H2 ecosystem** in the Basque Country which, based on **specific projects** and actions and underpinned by a strategy of **public-private collaboration**, will enable progress to be made in the decarbonisation of the **energy, mobility** and various other **industrial sectors**.

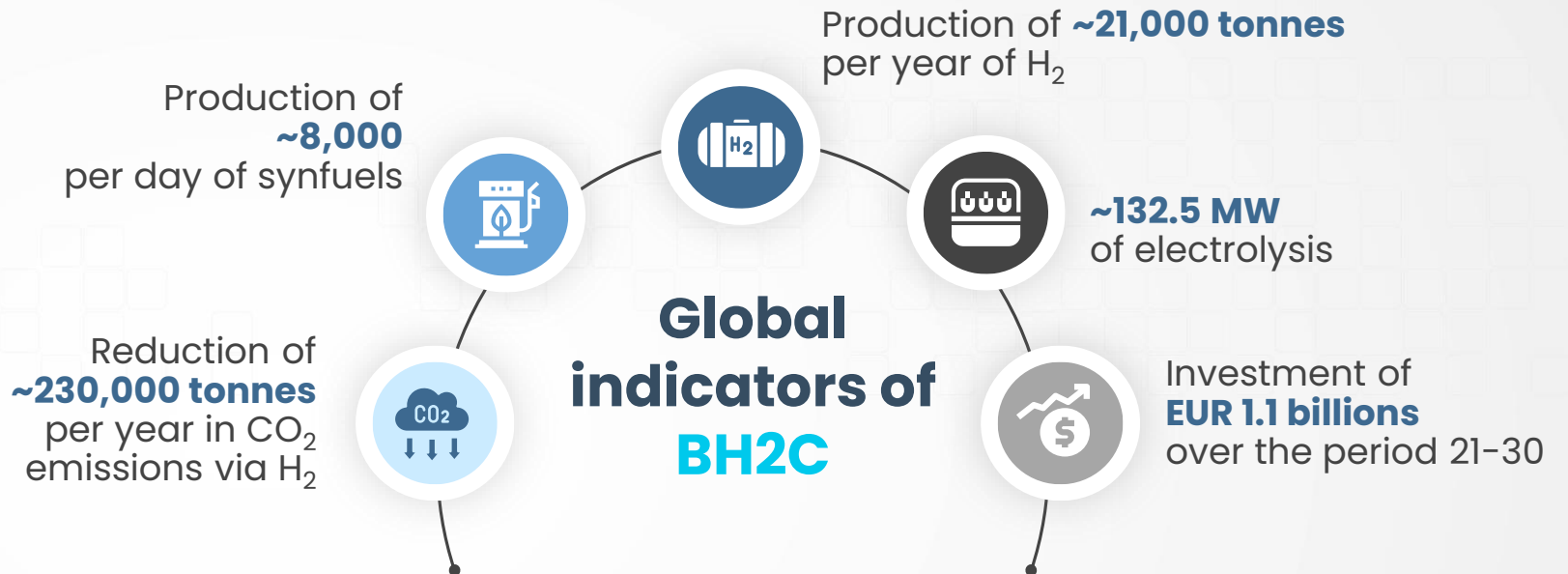
BH2C is a major project to develop a renewable hydrogen economy in the Basque Country.



Association of **73 members**



52 initiatives ongoing





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Petronor Electrolizer 2.5 MW



Objective

Initial phase to start deployment of hydrogen pipeline and mobility infrastructure.

To integrate, at an appropriate initial scale, different uses of H₂, as a test bed to help leverage regulation and as a basis for future larger-scale projects.



Refinery



Mobility logistics



Residential sector in the Abanto Technology Park



Hydrogen distribution by pipeline





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REPSOL

Thank you!