

# BASQUE HYDROGEN CORRIDOR

THE FAST TRACK TO THE HYDROGEN ECONOMY

EUROPEAN HYDROGEN  
ENERGY CONFERENCE



# TABLE OF CONTENTS

01

**CONTEXT**

02

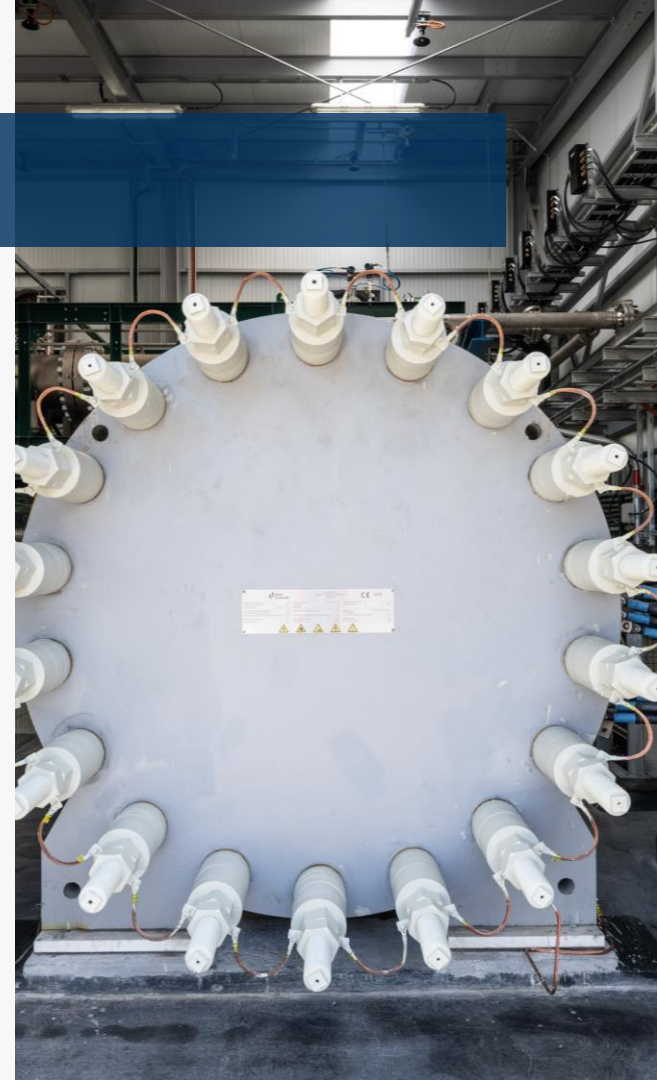
**BH2C**

03

**AWARDS AND  
PARTNERSHIPS**

04

**ACHIEVED  
MILESTONES**



The Basque Country has all the elements to consolidate a region for a hydrogen ecosystem

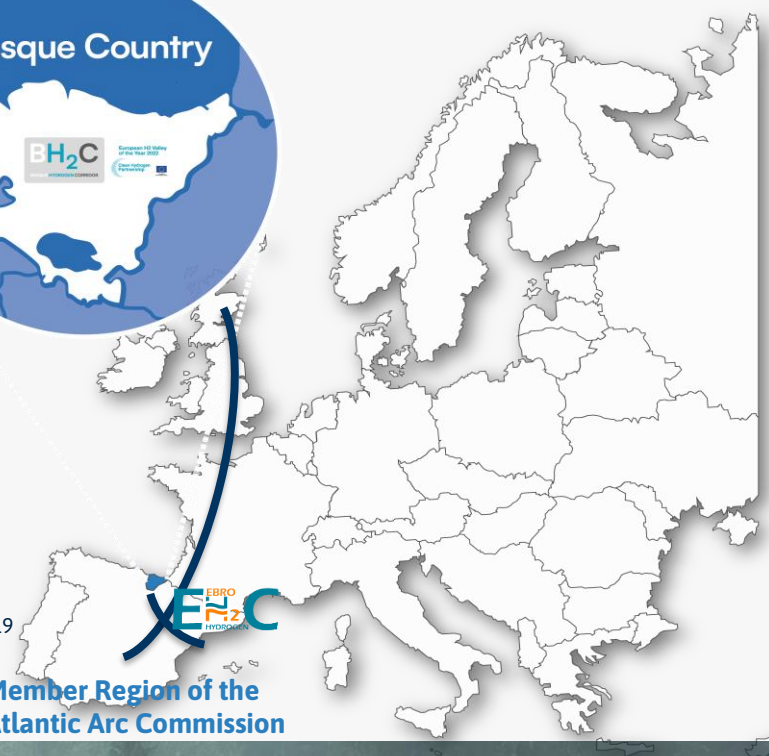
## A COMPLETE VALUE CHAIN

**Technological and Industrial** hub with capabilities in the engineering and manufacturing of equipment for the value chain



## STRATEGIC LOCATION

On an **international transport hub (TEN-T, TEN-E)**, with an industrial port and refinery.



## INDUSTRIAL OPPORTUNITY

**25%** of Basque Country GDP

Strategic industrial sectors to decarbonize



Industrial Emissions 2019

# The Basque Hydrogen Strategy drives the creation of a hydrogen production, distribution and consumption ecosystem in the Basque Country

The strategy establishes a series of **targets for 2030**



## PRODUCTION

- Installed electrolysis capacity of **300 MW**
- 100% of all hydrogen produced of renewable or low-carbon origin
- Annual production of **2,000 t/year of syngas**

## END USES

### Industry

- 90% of hydrogen consumed in industry as feedstock to be of renewable or low-carbon origin
- Hydrogen accounting for 5% of total energy consumption in the industrial sector

### Transport and mobility

- Fleet of **20 hydrogen buses** in the Basque Country
- Fleet of **450 goods transport vehicles** of varying sizes
- Network of **10 public access hydrogen refueling stations**



# Petronor's strategy to deploy 112.5MW of electrolysis capacity until 2026

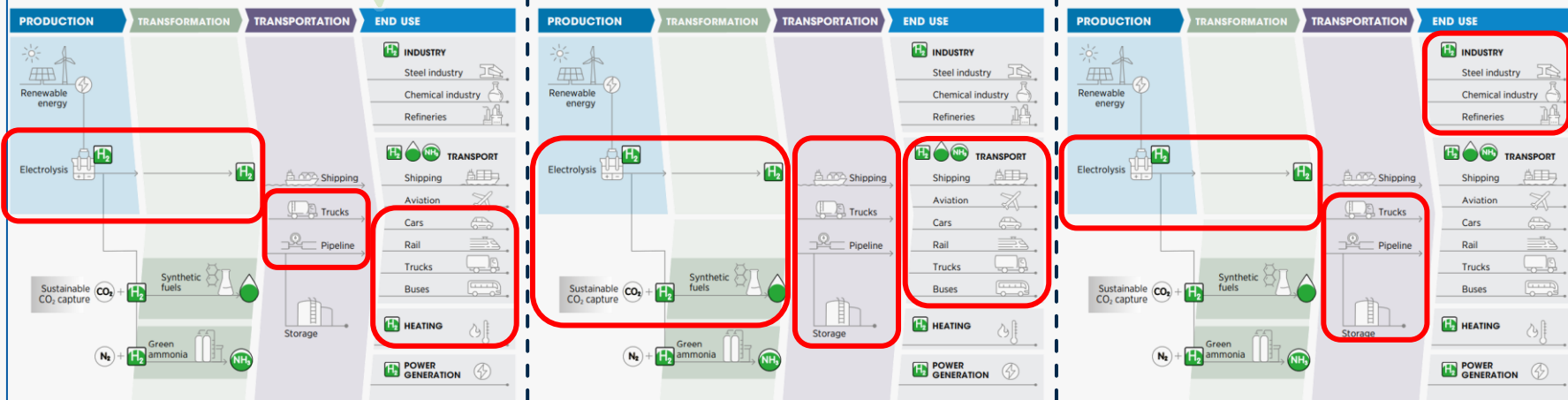
Planned commissioning date

10/2023



2Q/2025

2Q/2026



## 2.5 MW Electrolyser

- Hydrogen Mobility, Abanto Technology Park
- Distribution by pipeline
- Distribution by road
- Pilot in residential applications and EIC services

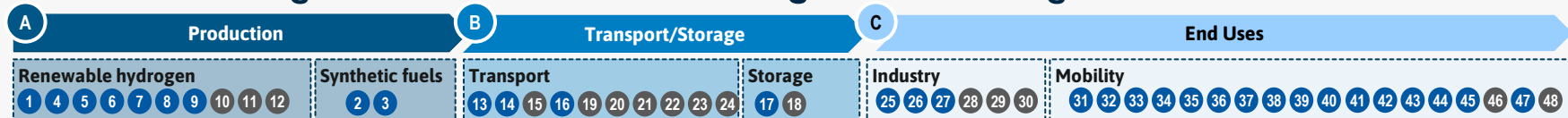
## 10 MW Electrolyser

- Decarbonisation hub: Synthetic fuels plant
- Kerosene
- Diesel
- Petrol

## 100 MW Electrolyser

- Feedstock Applications for Industrial Processes:
  - Refineries
  - Steel Industry
- Industrial Heating

# The Basque Hydrogen Corridor develops 52 strategic projects along the entire value chain



Production		Transport/Storage		End Uses							
Renewable hydrogen		Synthetic fuels		Transport		Storage		Industry		Mobility	
1 4 5 6 7 8 9 10 11 12		2 3		13 14 15 16 19 20 21 22 23 24		17 18		25 26 27 28 29 30		31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48	
<h3>Production</h3> <ol style="list-style-type: none"> <li>2.5MW electrolyser for mobility</li> <li>10 MW electrolyser</li> <li>DEMO synthetic fuels plant - e-fuels</li> <li>Renewable H2 production by electrolysis (100MW)</li> <li>Green H2 plant in Bizkaia (BenortH2)</li> <li>Project for the production of on-site generation systems</li> <li>High quality hydrogen production through urban waste valorisation (HyValue)</li> <li>Green H2 from biogas from municipal solid waste</li> <li>Technological development and manufacturing of state-of-the-art electrolysers</li> <li>Digital twin for computing application quantum in H2 generation plants (GDH2)</li> <li>Development and scale-up of state-of-the-art electrolyser with solid oxide technology</li> <li>Technologies to boost the H2 economy (H2Basque)</li> </ol>			<h3>Transport, Distribution and Storage</h3> <ol style="list-style-type: none"> <li>H2 pipeline </li> <li>Design and industrialisation of valves for renewable gases </li> <li>Demonstration of H2 leak detection and monitoring systems (Optychs) </li> <li>Design and development of compressed H2 transport and supply equipment for heavy duty vehicles. </li> <li>H2 storage in salt caverns </li> <li>Development of solutions for underground Hydrogen storage in salt caverns (H2SALT) </li> <li>Study of the behaviour of H2 in distribution networks (H2SAREA) </li> <li>Key technologies for liquid Hydrogen carriers (EkarriH2) </li> <li>Multi-layer hybrid metal structures for use in contact with hydrogen (H2Mat) </li> <li>Growing virtual pipeline engineering and production capabilities </li> <li>Key Technologies for Hydrogen Storage and Transport (ONTZHI) </li> <li>UnLOHCKed </li> </ol>			<h3>Use in Industry</h3> <ol style="list-style-type: none"> <li>Project FeXI: use of H2 to decarbonize the industrial sector </li> <li>Renewable energy-powered H2 production plant </li> <li>H2 as an alternative to natural gas in the Iron and Steel Industry </li> <li>H2 as an alternative fuel in melting and heat treatment furnaces </li> <li>Aluminium industry based on new H2-intensive technologies and processes (GHemak) </li> <li>Advanced solutions for the integration and optimal operation of H2-based devices (ErabilH2) </li> </ol>					

Use in Mobility		Cross-cutting	
<ol style="list-style-type: none"> <li>H2 mobility distribution logistics </li> <li>H2 vehicle filling test bench and calibration lab </li> <li>Use of H2 in transporting coke </li> <li>Bizkaia bus fleet </li> <li>Gipuzkoa bus fleet </li> <li>Araba bus fleet </li> </ol>	<ol style="list-style-type: none"> <li>Use of H2 at Bilbao airport </li> <li>Test laboratory for full stacks and on-board PEM FC systems for automotive and heavy vehicles </li> <li>H2 bus development project </li> <li>H2 intercity train </li> <li>H2 train in passenger service </li> <li>Biofuel Reformer (Methanol) Project </li> </ol>	<ol style="list-style-type: none"> <li>Use of synthetic fuel (PtL) in gas turbines </li> <li>Development of a new 100% hydrogen engine for boat propulsion (H2MOTORSEA) </li> <li>Investment in light hydrogen powered vehicles (&lt;3,500kg MMA) </li> <li>H2-powered river boat project (H2Ocean) </li> <li>Solution for propulsion with H2 in light and semi-heavy load electric vehicles with fuel cell (FCEVLDTRUCK) </li> <li>Cryogenics, Fuel Cells and Combustion of H2 (CRIPICOM) </li> </ol>	<ol style="list-style-type: none"> <li>Living LAB - Abanto Technology Park </li> <li>H2 Industry Platform </li> <li>H2 Knowledge Centre </li> <li>Decarbonisation analysis with H2 Industrial, Services and Residential sectors </li> </ol>

Deployment **68%**

**32%** R&D

# The Basque Hydrogen Corridor brings together 73 companies along the entire value chain

## Production



**ABC COMPRESIONES** **Basque Hydrogen S.L.** **enagas**

**H2SITE** **Hy five** **IDOM**

**ietecology** **MULTIVERSE** **NOVARGI**

**Petronor** **REPSOL** **sener**

**TECNICAS REUNIDAS** **TUBACEX**

## T&D and Storage



**ABC COMPRESIONES** **AMPO** **CALVERA Hydrogen**

**REPSOL** **enagas** **fg** **H2SITE**

**lumiker** **nortegas** **orkli**

**TAMOIN** **team group** | engineering consulting

## End Uses

**ArcelorMittal** **BEFESA** **CELSA GROUP** **NERVACERO** **ghi**

**NIPPON GASES** **Nemak** **sarralle** **sener** **sidenor**

**TUBACEX** **TUBOS REUNIDOS**

**"AERO-FERR"** **AJUSA** **MURUETA** **avanza** **Ellogistik, S.A.** **CAF**

**CALVERA Hydrogen** **CIE Automotive** **EDAIR TECHNOLOGIES** **ferrovial** **Guascor Energy** **H2SITE**

**MURUETA** **IRAZABAL** **Irizar** **ITP Aero** **OLIVER** **DESIGN** **optimus3D**

**Petronor** **REPSOL** **SKV GROUP** **Talgo** **WÄRTSILA**

© Basque Hydrogen Corridor



**132.5 MW**  
of **electrolysis**  
capacity



**21,000 tonnes**  
per year of **H<sub>2</sub>**



**8,000 l**  
per day of **synfuels**

# BH2C



**Investment of**  
**EUR 1.1 billions**  
over the period 2023-2026

Born in 2021 to create *a hydrogen ecosystem* in the Basque Country that, based on specific *projects* and actions with a *public-private collaboration*, will enable progress in the decarbonisation of the *energy, mobility* and different *industrial sectors*



## Net-Zero Basque Industrial Super Cluster aims to accelerate the path towards net zero emissions in the Basque Country, promoting the decarbonization of energy supply and energy efficiency in industrial sectors



- SuperCluster because it **integrates the Industrial Clusters** that already operate in Euskadi
- **Collaboration and** commitment between the Government and the **main energy companies** operating in the region
- With an initial focus focused on **five industrial sectors** but the objective of reaching all
- Search for **common objectives** that allow the **development of technologies** for the energy transition



### Impact on GDP

2B€ to 3B€ (>2030)  
(3%-5% of the GDP on 2021)



### Impacto on employment

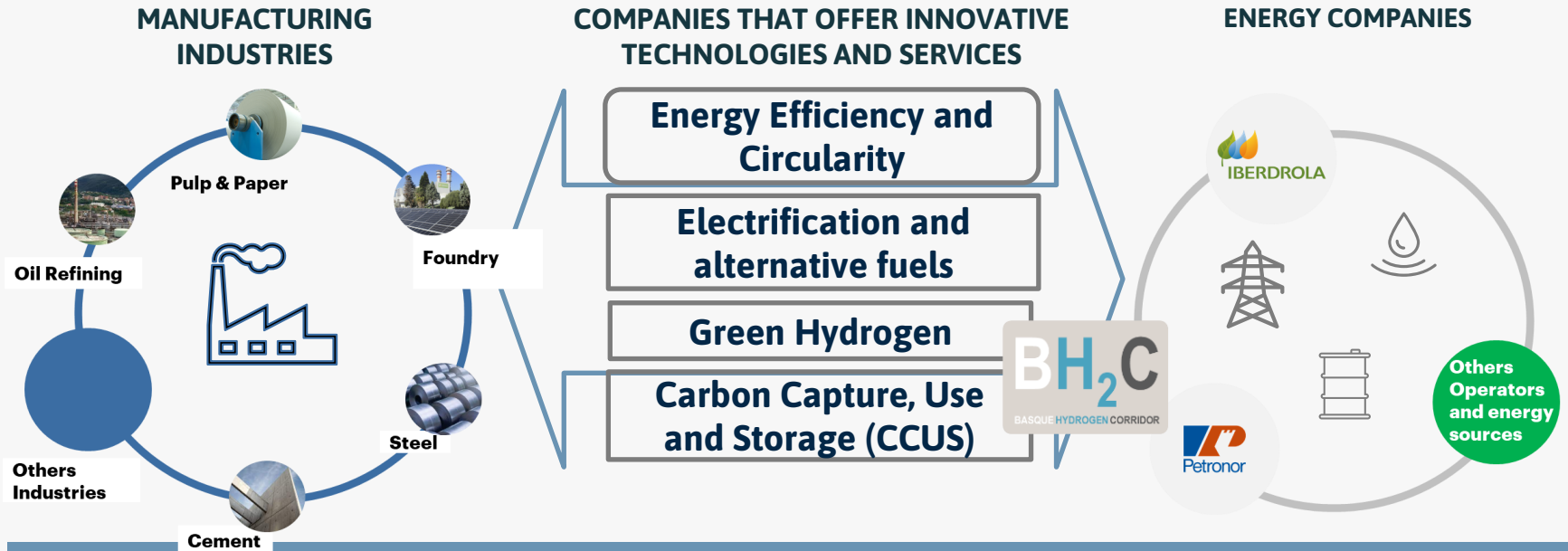
20k to 30k (>2030)  
(2-3% of jobs in 2021)



### Emissions reduction

100% reduction of emissions generated by energy consumption in the industry in 2050

The SuperCluster aims to develop a solid and innovative industrial ecosystem in which technological innovations serve as a key driver of the energy transition and decarbonization



Basque Network of Science, Technology and Innovation

International collaborators (WEF, EPRI, MIT...)

# Awards

Awarded **European H2 Valley** of the year 2022 by the Clean Hydrogen Partnership (CHP)



Recognised and certified as a **global Hydrogen Valley** flagship by Mission Innovation and the Clean Hydrogen Partnership



**Two IPCEI recognitions:**

- Electrolyser factory in Bizkaia – Sener (Hy2Tech)
- 100MW large-scale electrolyser – Petronor (Hy2Use)

by the European Commission



# H2 Valley Partnerships

## Ebro Hydrogen Corridor



## Comunidad de Trabajo de los Pirineos (CTP)



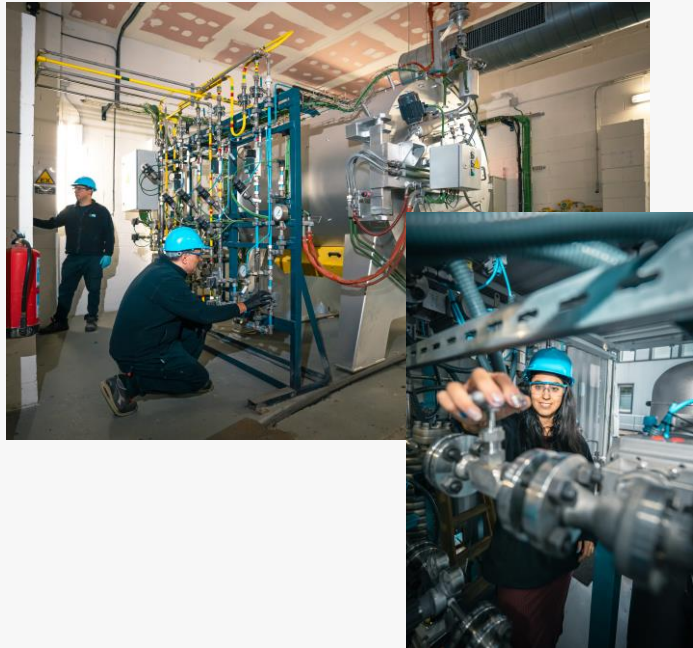
Communauté de Travail des Pyrénées  
Comunidad de Trabajo de los Pirineos  
Comunautat de Treball dels Pirineus  
Comunitat de Treball dels Pirineus  
Pirinioetako Lan Elkarte



# GREEN H2 PRODUCTION

The world's first membrane production plant to obtain hydrogen

2,5MW alkaline electrolyser



# TRANSPORT & DISTRIBUTION

100% hydrogen distribution network



Optimal behavior of current gas networks for use with 20% hydrogen verified



# END USES: STEEL INDUSTRY

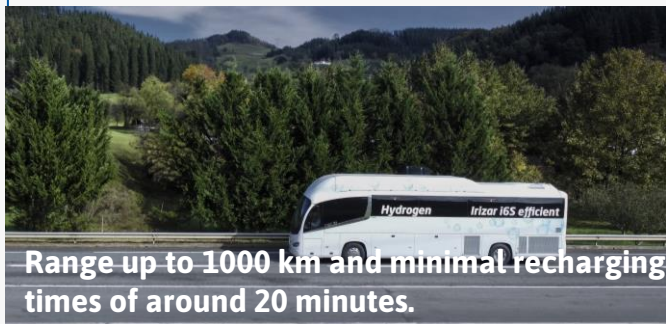
Reheating furnace prototype for the evaluation of hydrogen combustion technologies

First ladle preheating station capable of running entirely on Green Hydrogen



# END USES: MOBILITY

**Irizar i6S Efficient Hydrogen  
2024 Coach of the Year in Spain**



Range up to 1000 km and minimal recharging times of around 20 minutes.

**First Hydrogen Train on the  
Spanish railway network**



**Hydrogen technology applied to  
sustainable railway mobility  
integrating the entire value chain**



**Urbino 18 hydrogen and Urbino 12  
hydrogen commercial busses**



**Beyond the H2Valley concept: Cross – cutting activities help the Basque ecosystem identify projects, train professionals and develop technology**

## Industry Platform: Hydrogen Sector Forum



## Abanto Technology Park

## H2 Knowledge Centre



# More than 150 companies participating in the Hydrogen Sector Forum

The hydrogen sector forum of the Basque energy cluster is the meeting point for companies and stakeholders willing to share their knowledge and proposals



An initiative designed to energize the sector, facilitating the exchange of information and knowledge between members and other organizations active in the hydrogen economy in the Basque Country, and identifying opportunities for collaboration.



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**Coordinator:**



**Collaborating clusters:**





# THANKS!



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