



## Journée bretonne Hydrogène

Recherche - Développement – Formation

29/05/2024

Benoit GUENOT

To respect the Paris agreement,  
many companies have committed  
to reduce their CO<sub>2</sub> emission by

**50%**  
in 2035



# 20%

of annual emissions  
avoided due to H<sub>2</sub>  
in 2050



# H<sub>2</sub> answering major needs

- **Decarbonize key Material: Fertilizers, Steel...**

Green H<sub>2</sub> used as feedstock in a decarbonized economy

- **Facilitate intermittent energy (sun, wind) integration to the mix (storage)**

Allow a larger % of green energy (transport and store)

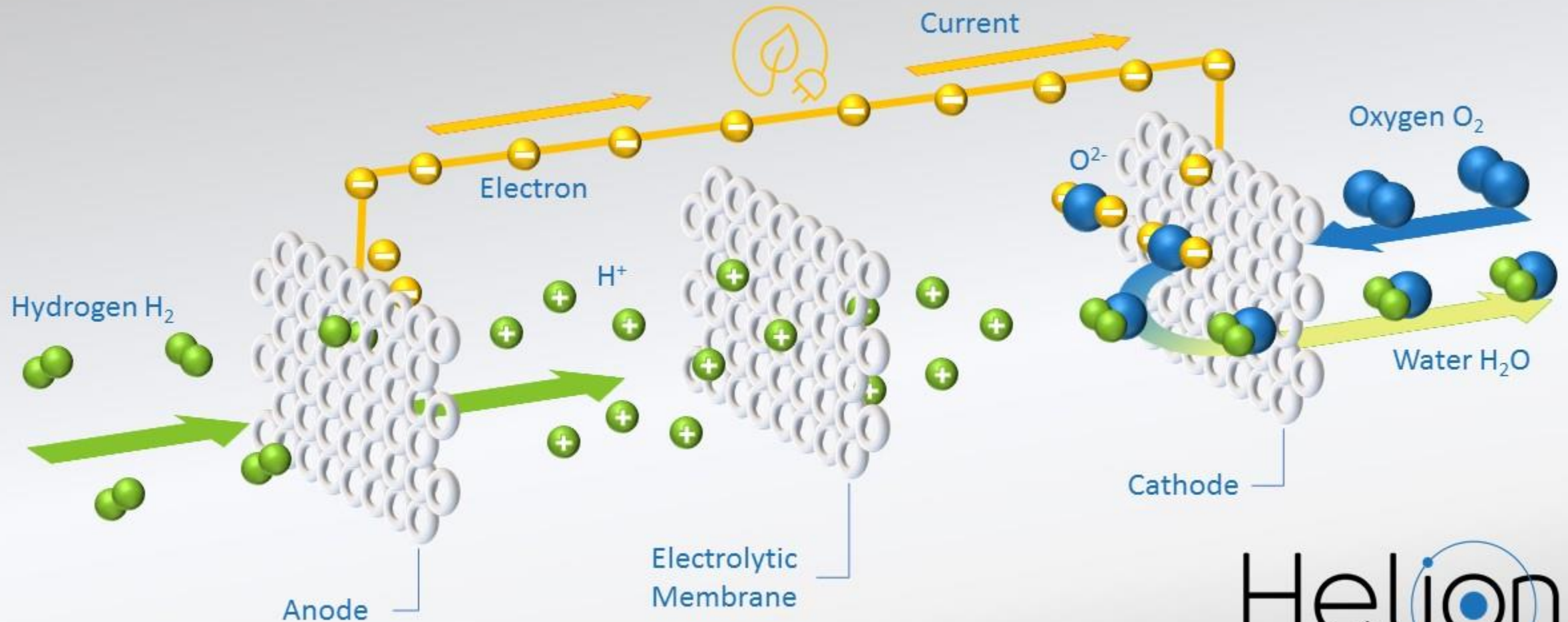
- **Bridge Renewable Energy to Sustainable mobility**

Electrification of heavy-duty, long-range applications  
(Complementing Battery solutions)

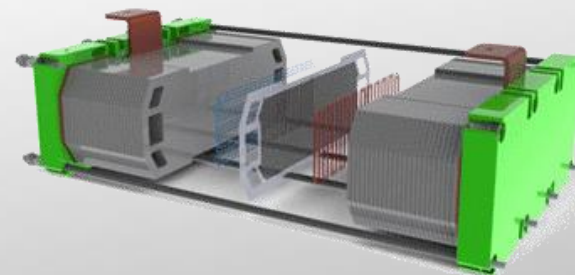
Today's presentation

Helion  
HYDROGEN POWER  
by ALSTOM

# H<sub>2</sub> in Fuel Cells: how it works



Several cells in series: Fuel Cell Stack  
Main component of the Fuel Cell System



**Helion**  
HYDROGEN POWER  
by **ALSTOM**



# Helion builds on a strong H<sub>2</sub> record since 2001



30<sub>MW</sub>

capacity

15<sub>bn€</sub>

shareholder

40

projects delivered

120+

m€ already spent in R&D



# HELION's track record

## An unrivalled participation in H<sub>2</sub> projects

### In France



#### ENSOSP

HYresponse  
Training platform  
for H2 risks



#### CEA

50kW back up fuel  
cell generator for  
the CEA



#### PIRIOU

200 kW fuel cell for  
a dredger. Start of  
operation in 2023



#### ZENT

5kW energy storage  
solution for Avignon  
data center



#### CMA-CGM

Trials for power  
supply of 2 reefers  
in Marseille



#### L'EQUIPAGE

Technical study for the  
HYBarge project  
(the 1<sup>st</sup> H2 barge)



#### IP ENERGY

World 1<sup>st</sup> back up  
data center in  
Aix en Provence



#### UNIVERSITE CORSE

MYRTE project, the  
largest H2 ecosystem in  
France in 2022



#### SNCF

SPACT project, a  
80kW fuel cell on  
a locomotive



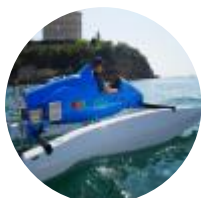
#### DGA

80kW fuel cell  
powering an off-  
highway truck



#### IFREMER

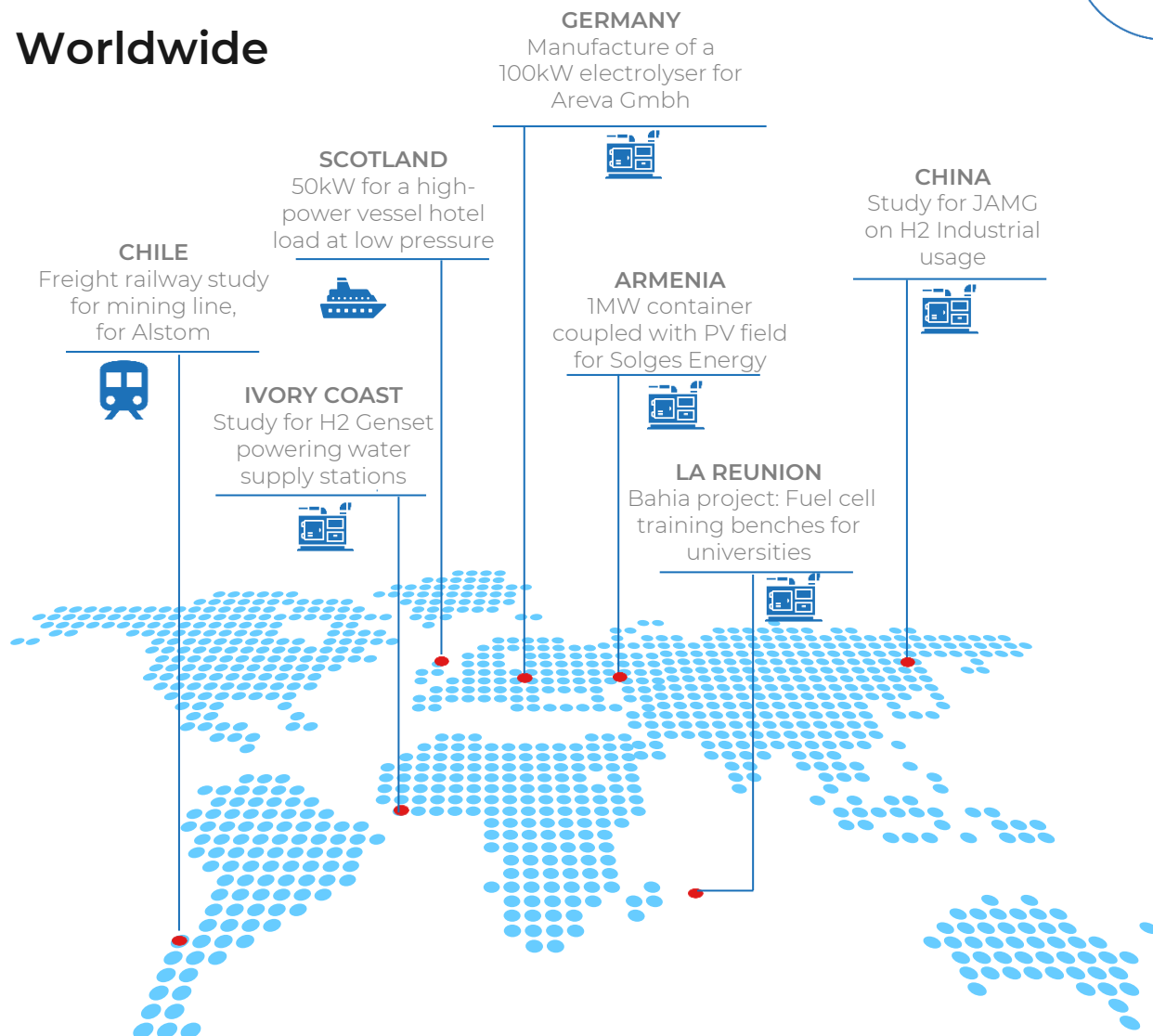
Testing fuel cells for  
unmanned underwater  
applications



#### ENSAM

5kW fuel cell on a  
catamaran, winner of the  
zero CO2 emission prize

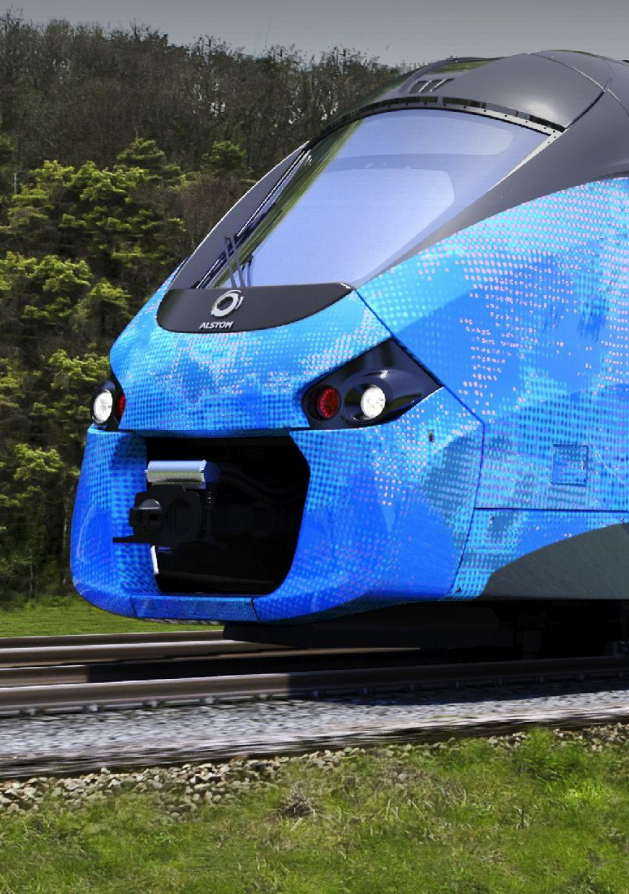
### Worldwide





1 → 4  
fuel cell markets

Helion  
HYDROGEN POWER  
by ALSTOM







**100  
kW**



**200  
kW**



**400  
kW**



Gas H2



Liquid H2



Methanol



Ammonia



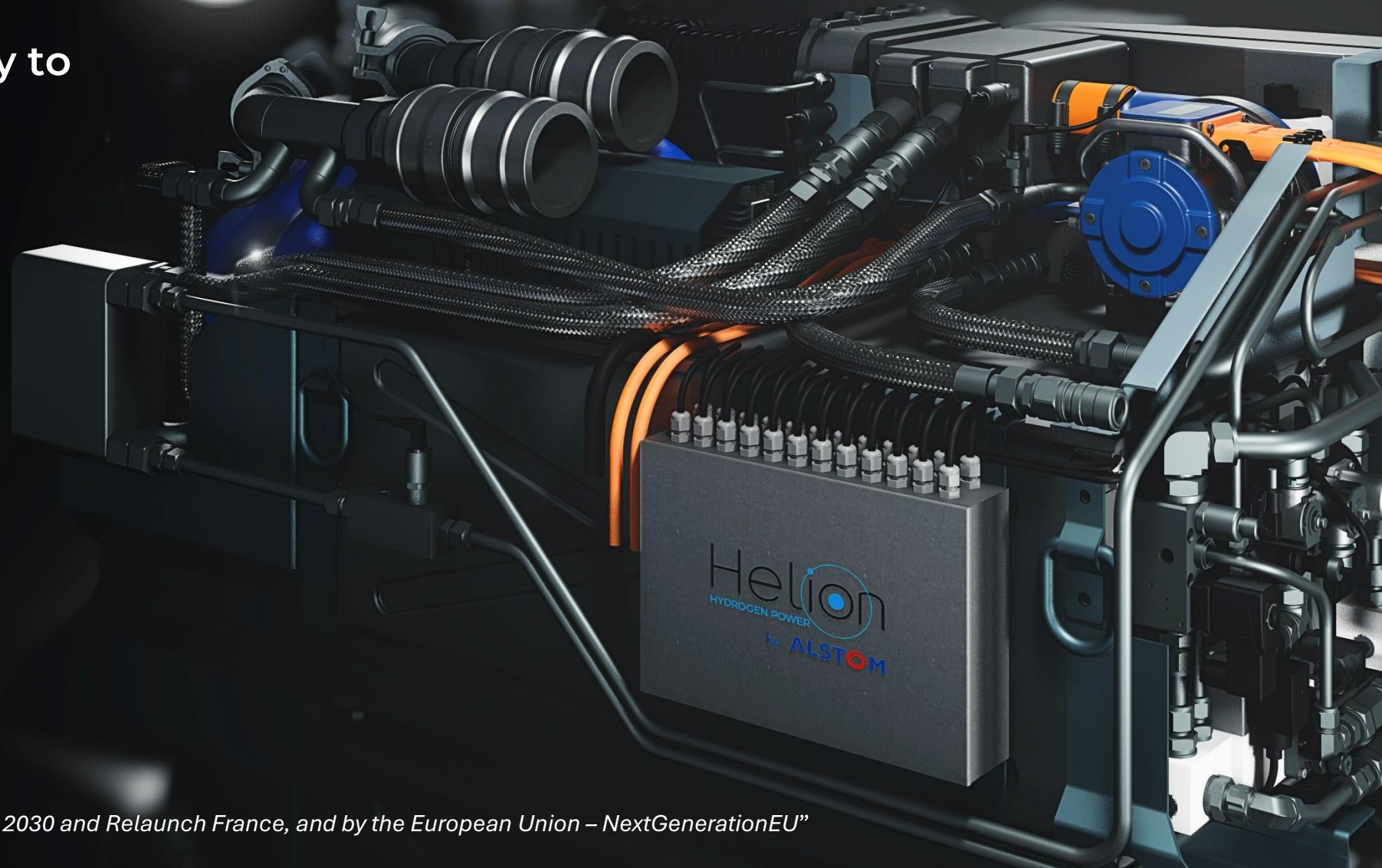
Hydrosil



# Helion developing a Fuel Cell Power Unit suited for Railway

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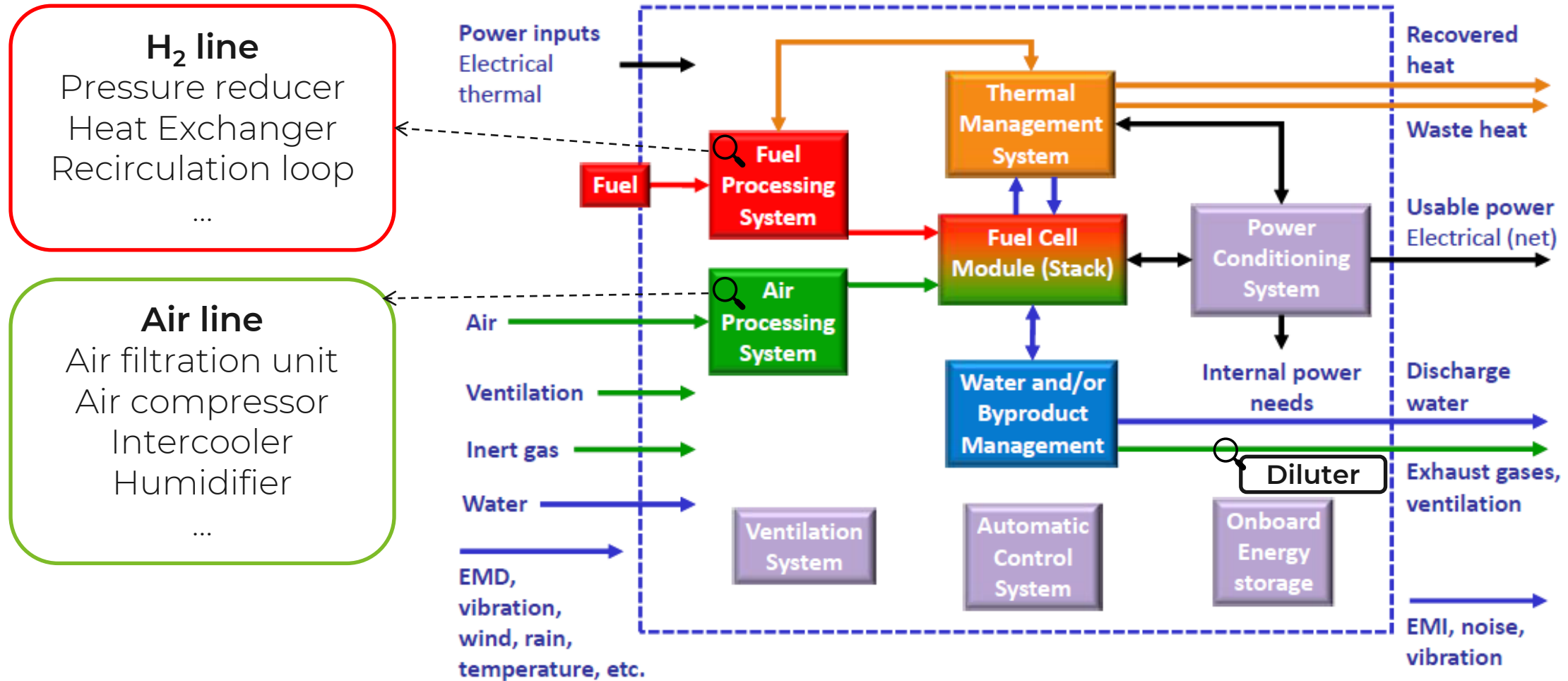
- Railway compliance key to meet Alstom needs
- *Framework: European project IPCEI Hy2Tech<sup>2</sup>*



Funded by the French State in the frame of France 2030 and Relaunch France, and by the European Union – NextGenerationEU<sup>2</sup>

# FCPU for Railway incorporates many components

- The reaction at stake sounds simple, but requires Advanced Engineering
- Beyond the FC stack, the FCPU involves a wealth of auxiliaries and actuators



Fuel Cell System according to IEC 62282-1





# Traxx shunter H4



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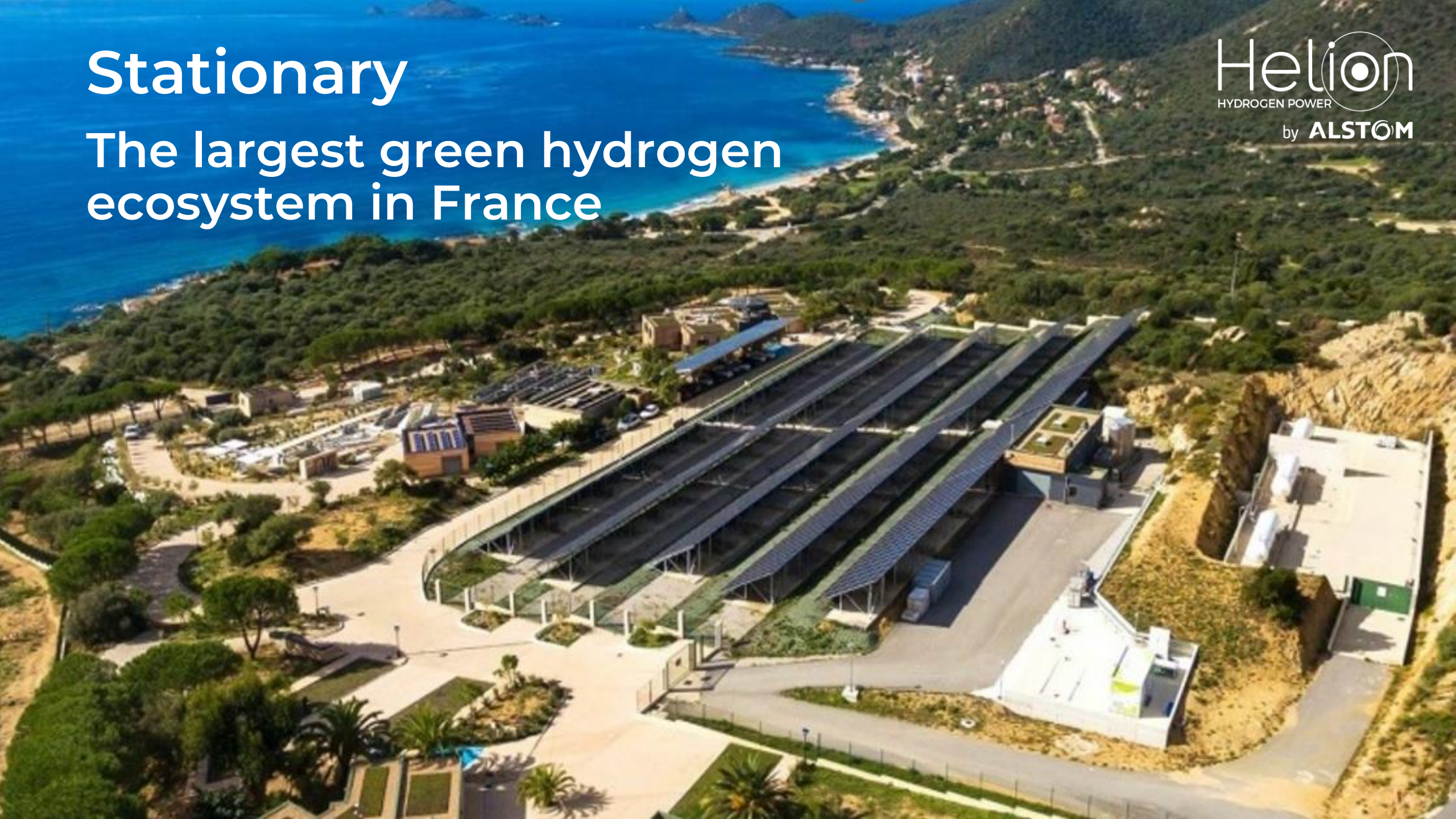
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# Stationary

## The largest green hydrogen ecosystem in France

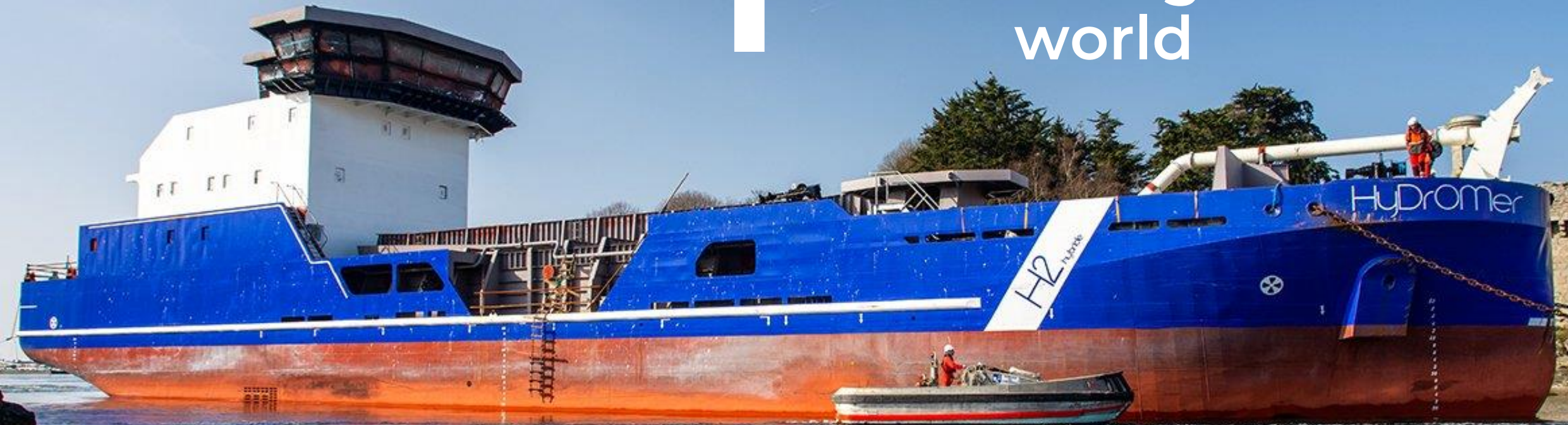
Helion  
HYDROGEN POWER  
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# 1<sup>st</sup>

hydrogen  
dredger in the  
world





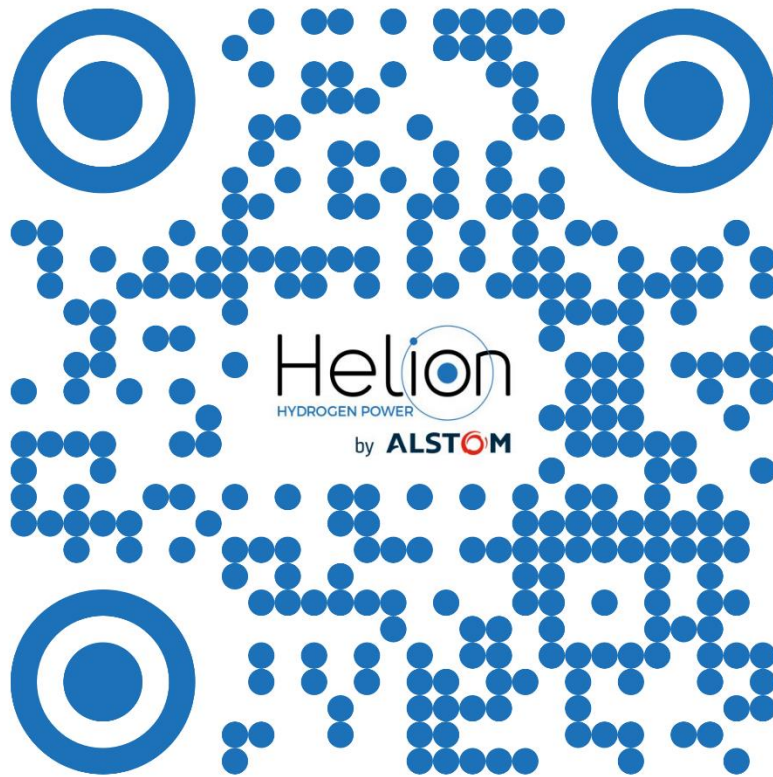
Now going industrial

30MW  
capacity

Greenfield new factory  
in 2024

Supported by a  
€15bn  
industrial world leader





Domaine du Petit Arbois  
Bâtiment Jules Verne  
Avenue Louis Philibert – CS 10656  
13547 Aix-en-Provence cedex 04  
France

[www.helion-hydrogen-power.alstom.com](http://www.helion-hydrogen-power.alstom.com)