GREEN HYSLAND

Deployment of a H2 ecosystem on the Island of Mallorca

Green Hysland x H2Ports Webinar: Decarbonizing the Maritime Sector

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Clean Hydrogen Partnership

This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking (now Clean Hydrogen Partnership) under Grant Agreement No 101007201. This Joint Undertaking receives support from the European Union's Horizon 2020 Research and Innovation programme, Hydrogen Europe and Hydrogen Europe Research.

Hub Baleares: "Power to Green Hydrogen Mallorca" - Context

Al acuerdo firmado a finales de 2018 por Enagás, Acciona y Cemex, para el desarrollo de una planta de generación de hidrógeno verde, se ha unido también Redexis

El Govern de las Islas Baleares, **Francina Armengol** y el conceller de Treball, Comerç i Indústria, **Iago Negueruela,** junto con Enagás, Acciona, Cemex y Redexis presentaron el martes 7 de mayo el proyecto 'Power to Green Hydrogen Mallorca'. La iniciativa cuenta con la implicación directa del Instituto para la Diversificación y el Ahorro Energético (IDAE).

Grupo de asistentes a la presentación pública del proyecto en Mallorca.

This initiative is part of an agreement between the Ministry of Industry, Trade and Tourism and the Balearic Government with Enagás, Acciona, CEMEX and Redexis to **reindustrialise** Lloseta (Mallorca).

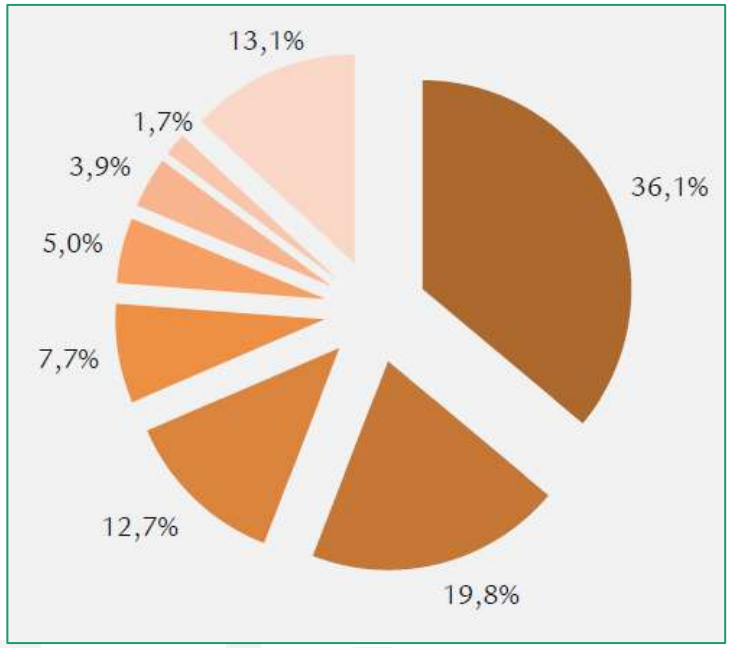
The project includes the development of a **green hydrogen** production plant from renewable photovoltaic energy. Green hydrogen will have **multiple applications** on the island, including the **fuel supply** to a fleet of **fuel cell buses** and **fuel cell vehicles**, the generation of **heat and power** for commercial and public buildings, the supply of **auxiliary power for ferries** and **port operations** and the creation of a **HRS**.

The project includes **green hydrogen injection** into the island's gas pipeline network, through a **Guarantee of Origin System**, contributing to decarbonise the gas supply.

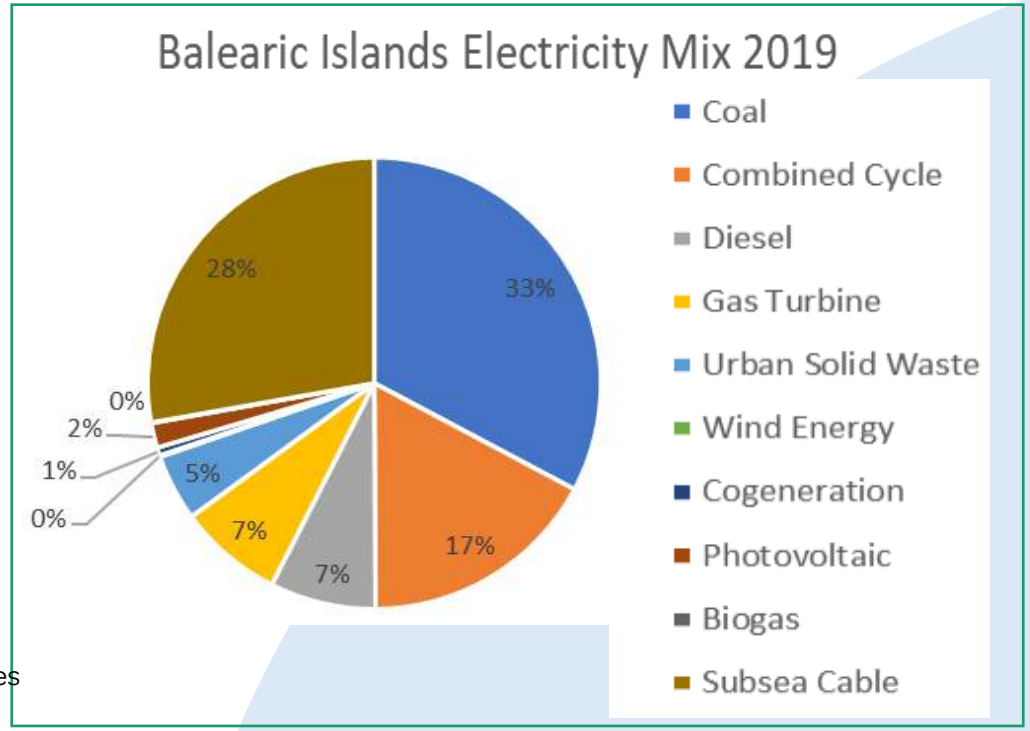
On 24/05/2019 the Balearic Government approved the declaration of the Power to Green Hydrogen Mallorca Project as **a Strategic Industrial Project.**

GREEN HYSLAND - Showcase

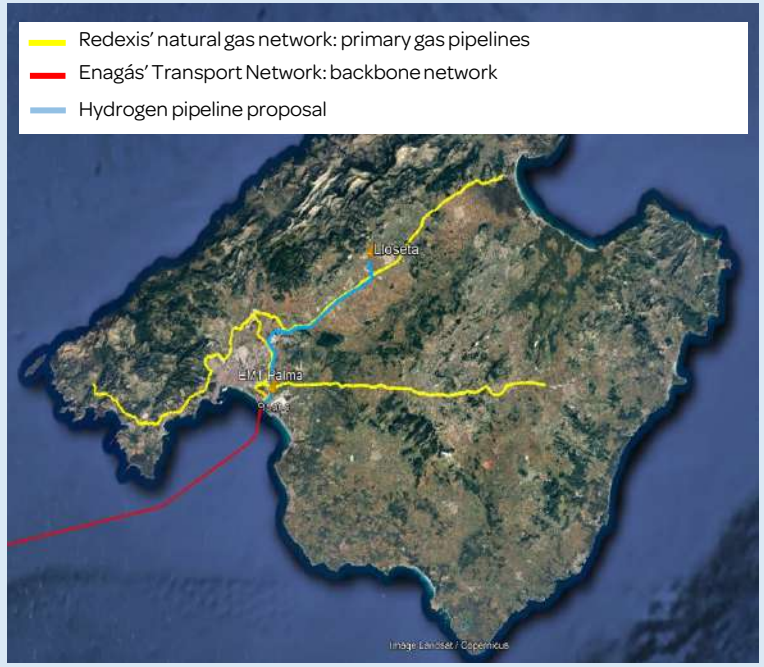
11,947,382 tourists visited Mallorca in 2018



Source: "El turismo a les Illes Balears. Annuari 2018". AEITB.



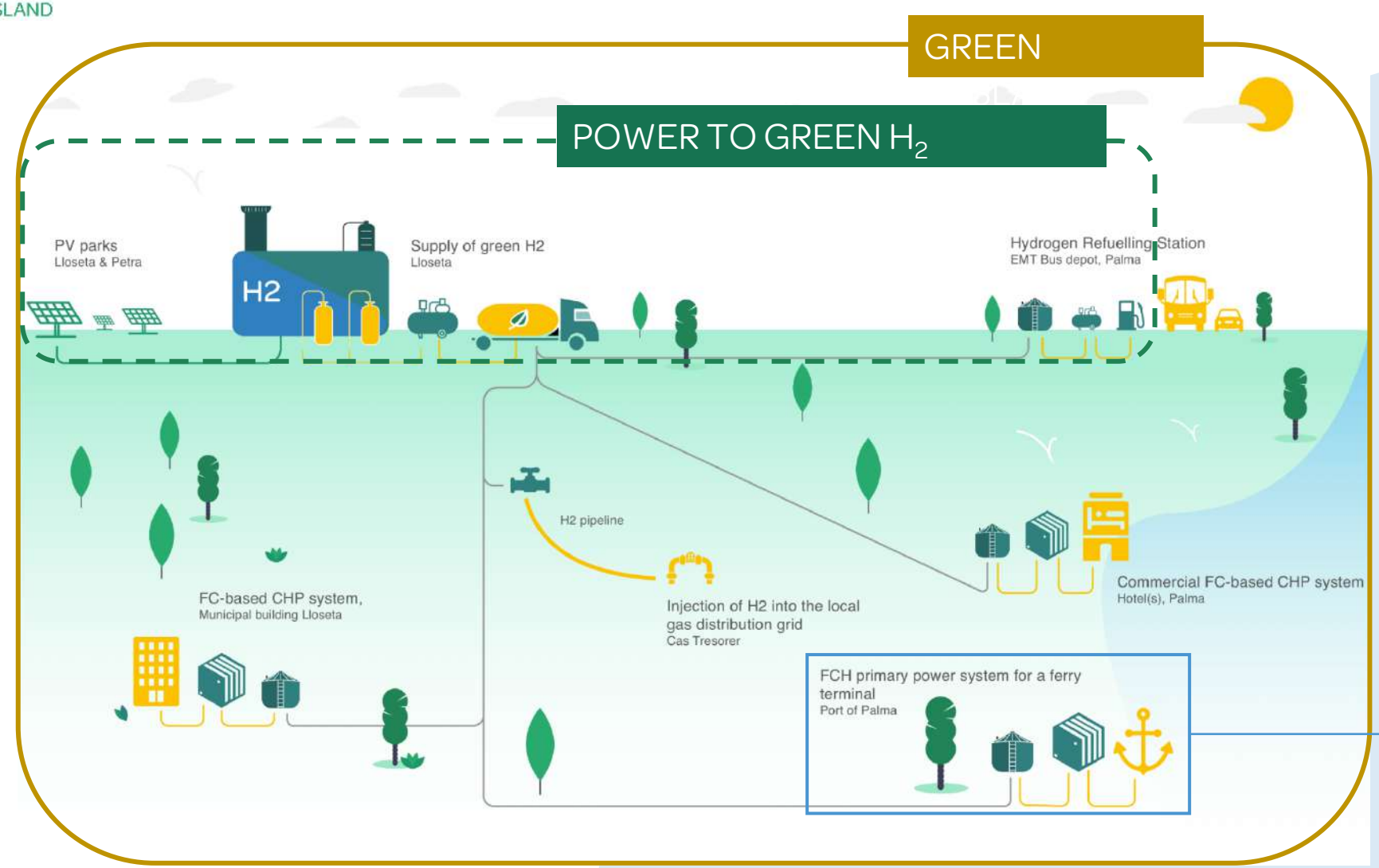
Source: REE Annual Report 2018.



Source: Enagás

Development of a **"H_2 ecosystem"** which can be replicated across other islands and remote territories in the EU and beyond

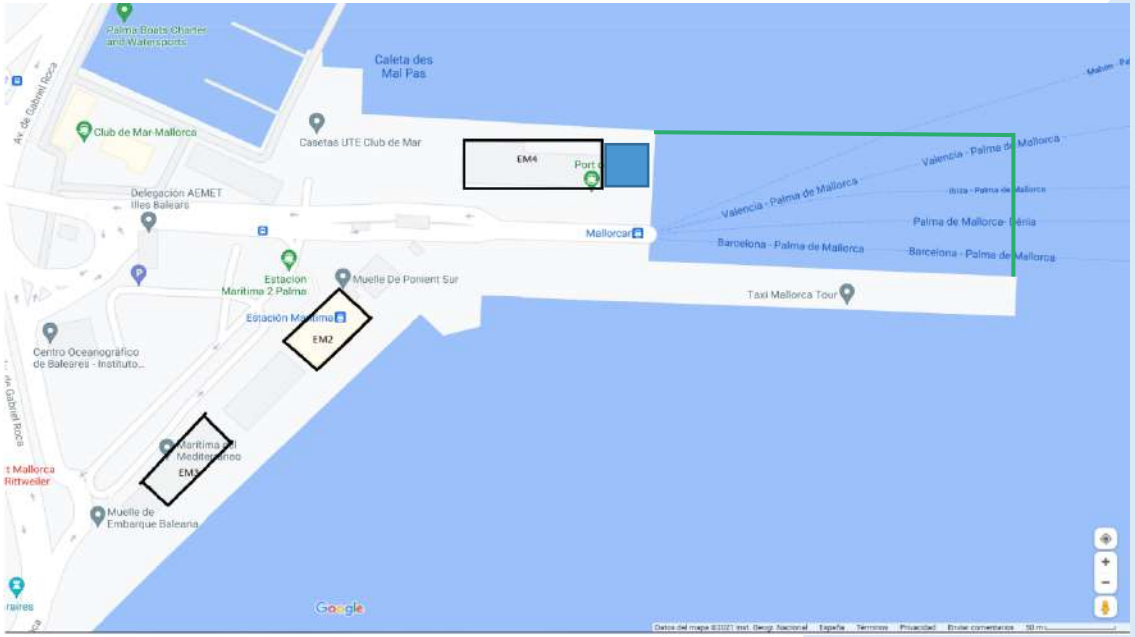
GREEN HYSLAND Concept



- Deployment of 100kW FC- based system
- Supply electricity for critical infrastructure at the Port of Palma (100kWe): 40tpy H2
- 588kWh per year of green energy.
- Savings: 470 tpy of CO2 emissions

Port Authority of the Balearic Islands

- Public entity: depends on the Ministry of Transport
- Managing 5 main ports in Balearic Islands:
  - Palma - La Savina (Formentera)
  - Alcudia
  - Ibiza - Mahón



The EM4 will expand 30% approximately and will install:

- 100kW PV
- 100kWe FC

In the event of surplus energy (EM4), it will be discharged into the port network (EM1 & EM2)

Ports de Balears
Autoritat Portuària de Balears

Fuel Cell installation at the Port of Palma

EM4 Site layout and preliminary engineering design

General layout and hazardous areas

- Hazardous area
- Maintenance area
- Defined perimeter
- Slaiding gates

Security aspects: EM4 is considered a vulnerable element.

Actions to reduce risk:

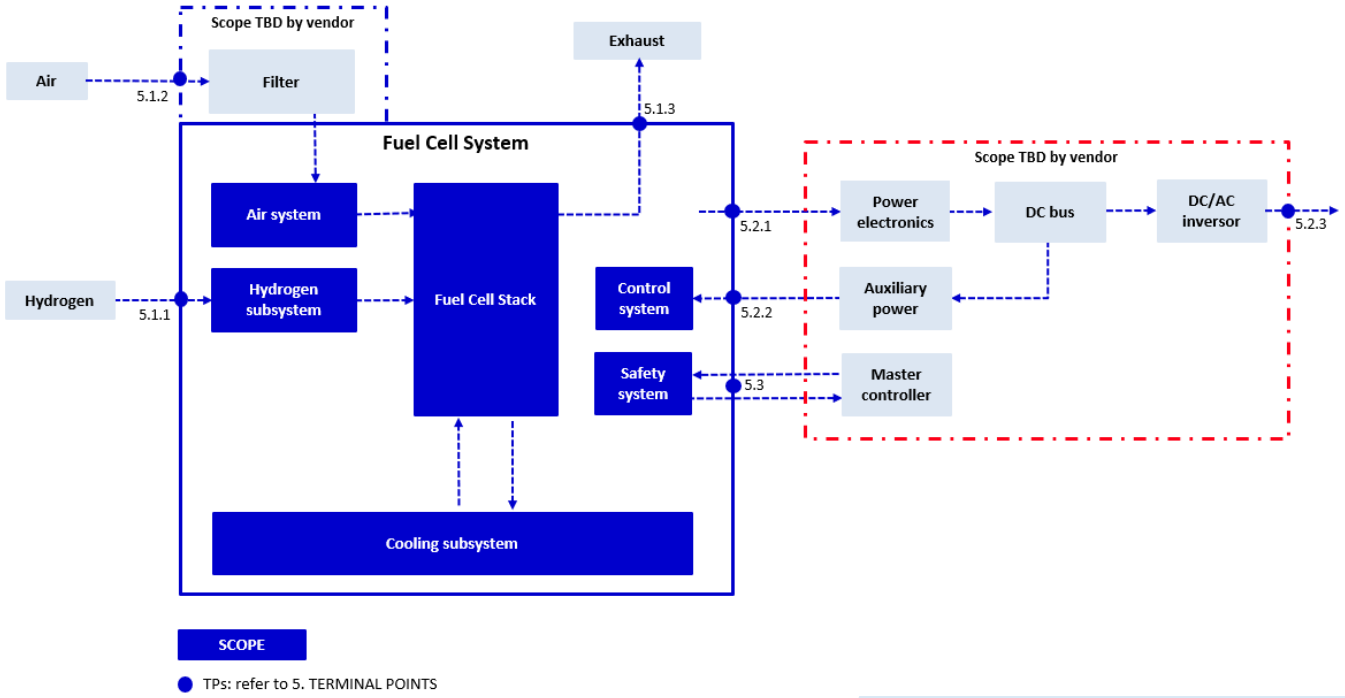
- Discharge H2 during low operating hours.
- Include the emergency manual in the PEI of the port.
- Execute the security measures of the detailed study of overpressures:
  - Design of retaining walls to withstand overpressure and thermal radiation.
  - Walls between the accident-generating equipment and the vulnerable elements, supporting 172mbar overpressure and 35kW/m2 radiation.

ITEM	DESCRIPTION
1	H2 storage
2	100 KW Fuel Cell
3	Discharge panel
4	H2 discharge area
5	Entry
6	Exit
7	Access gateway

Ports de Balears
Autoritat Portuària de Balears

Fuel Cell installation at the Port of Palma

Control of the battery with a PLC via ethernet cable to the communications room of EM4.



CAPEX			
1.	Civil		
1.1		Earth- moving	3,348.44 €
1.2		Concrete	70,141.10 €
1.3		Total	73,489.55 €
1.4		Unaccounted items (10 %)	7,348.95 €
1.5		Total increased	80,838.50 €
2.	Equipment		
2.1		Fuel Cell (100 kWe)	620,000.00 €
3.	BOP		
3.1			124,000.00 €
		Total	824,838.50 €

Delivery times ≈ 14 months
Supply guarantee: 3 years
Maintenance: 3 years

Ports de Balears
Autoritat Portuària de Balears

Parallel studies

Study on the decarbonisation of the sea-ferry stations at ports of Mallorca, Ibiza and Menorca *(led by ENERCY and supported by PORTS DE BALEARS, COTENAVAL and HYE)*

During 2022 the data collection of energy consumption on different ferry stations will be carried out.

The study will include how the:

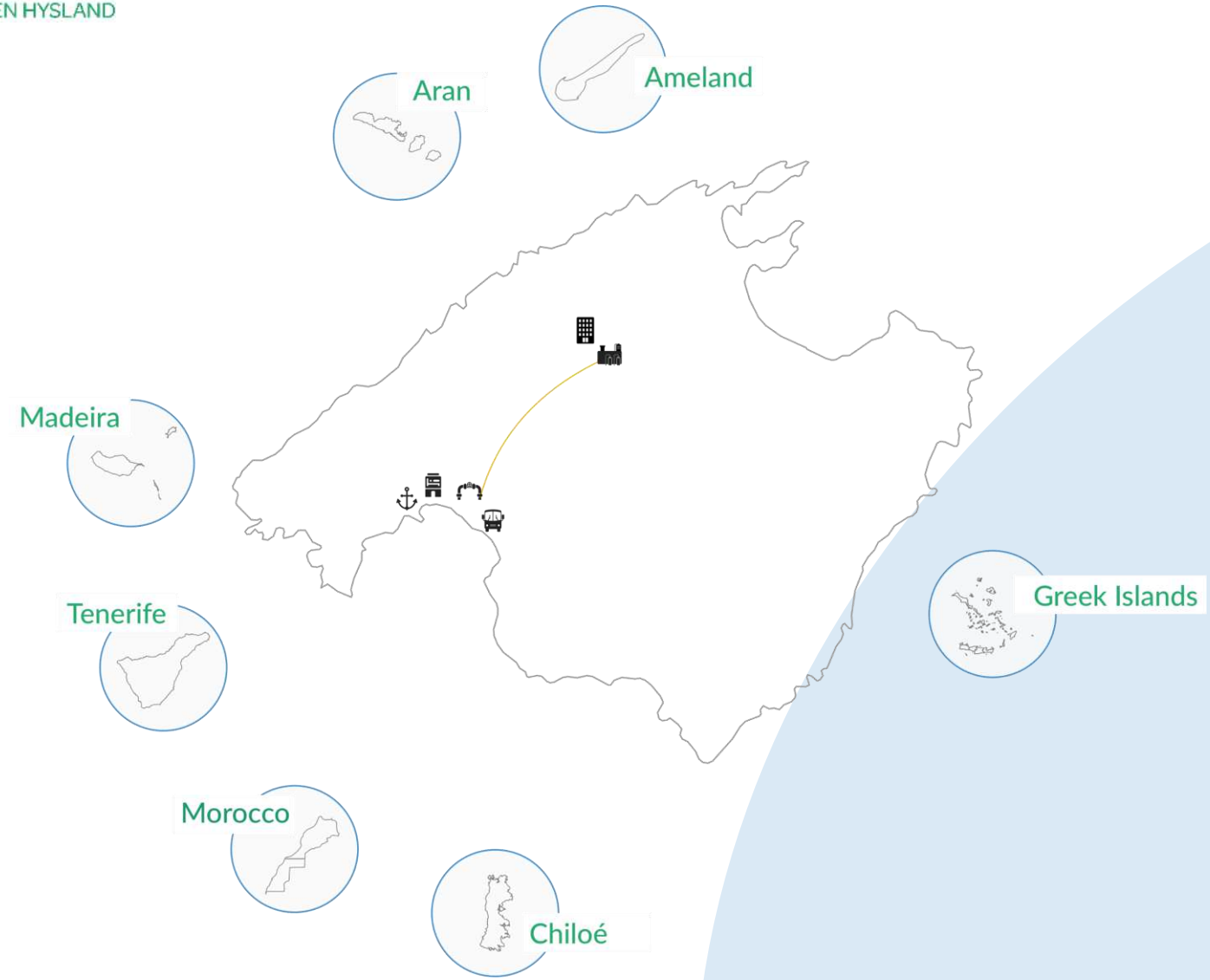
- Integration of **renewable energies**
- Energy storage through **green H2** and its use in fuel cells

Can contribute to the decarbonization of these ferry stations.

Study on the development of cold ironing at the port of Palma *(led by PORTS DE BALEARS and supported by COTENAVAL and ENERCY)*

Techno-economic assessment on the use of fuel cells for cold ironing application in Mallorca.

Replication of H_2 ecosystems to other EU island territories and beyond



Observers:

- Orkney Islands Council
- Valencia Port Foundation
- Scottish H2 & Fuel Cell Association
- Aran Islands Energy
- Port of Melilla
- Corsica Chamber of Commerce
- RINA Services
- Wärtsilä
- CEMEX

- + 19 Letters of Support

Key figures

Development of a **sustainable large-scale island-based H_2 hub** in Mallorca

15 MW
PV energy

Avoided carbon footprint: more than **21,000 tpy**

New **direct and indirect employment ecosystem** associated to **hydrogen**

Development **a long-term roadmap** to lay the path for a local & regional based economy towards 2050

Scalability and **Replicability**

Estimated **investment**
50 M€

10 M€
Funding from the Clean Hydrogen JU

≈ 2.5 M€
Funding from IDAE for PV plants

Thank you and follow us on:

https://greenhysland.eu

Green Hysland EU Coalition for H2 deployment in Islands

https://youtu.be/-u7RLspVuw4

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