SUSTAINABLE PLACES 2024

23-25 September 2024

Luxembourg

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

R2M RESEARCH TO MARKET SOLUTION

Green Hydrogen and Society

WORKSHOP

Hydrogen Awareness and Perception:
Practical Strategies for Public Engagement

Dr Aaron Jensen
Institute for Methods Innovation (IMI)

Dr Fanie van Rooyen
Institute for Methods Innovation (IMI)

HyPOP

Green Hydrogen and Society workshop

Hydrogen Awareness and Perception: Practical Strategies for Public Engagement

September 25th from 11:00 to 12:30 CET

Dr Aaron Jensen
Institute for Methods Innovation (IMI)

Dr Fanie van Rooyen
Institute for Methods Innovation (IMI)

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AIM:

Understanding public awareness and perceptions around hydrogen technologies in the EU

As part of HYPOP, the Institute for Methods Innovation (IMI), Environment Park (ENVI) and other partners were commissioned to investigate the current **public understanding of hydrogen and fuel cell technologies in EU countries**.

This was done in order to determine the best **practical strategies for public engagement** on hydrogen energy, transport and infrastructure.

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Tasks:

- Conduct a **secondary analysis** of a previously conducted Public Opinion Survey to inform public engagement
- Conduct an analysis of public engagement with hydrogen technologies on **social media** across the EU27 countries, with a specific focus on the EU13 countries

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Secondary data analysis of previously conducted Public Opinion Survey

Awareness of Hydrogen Technologies survey report (Gallup 2023)

- Initiated and funded by the Clean Hydrogen Partnership
- Public opinion survey conducted in autumn 2022 in 27 EU countries to analyse and assess European citizens' attitudes and knowledge of hydrogen technologies
- Representative sample of 25,934 citizens aged 15 and above from all EU Member States

Secondary data analysis of previously conducted Public Opinion Survey

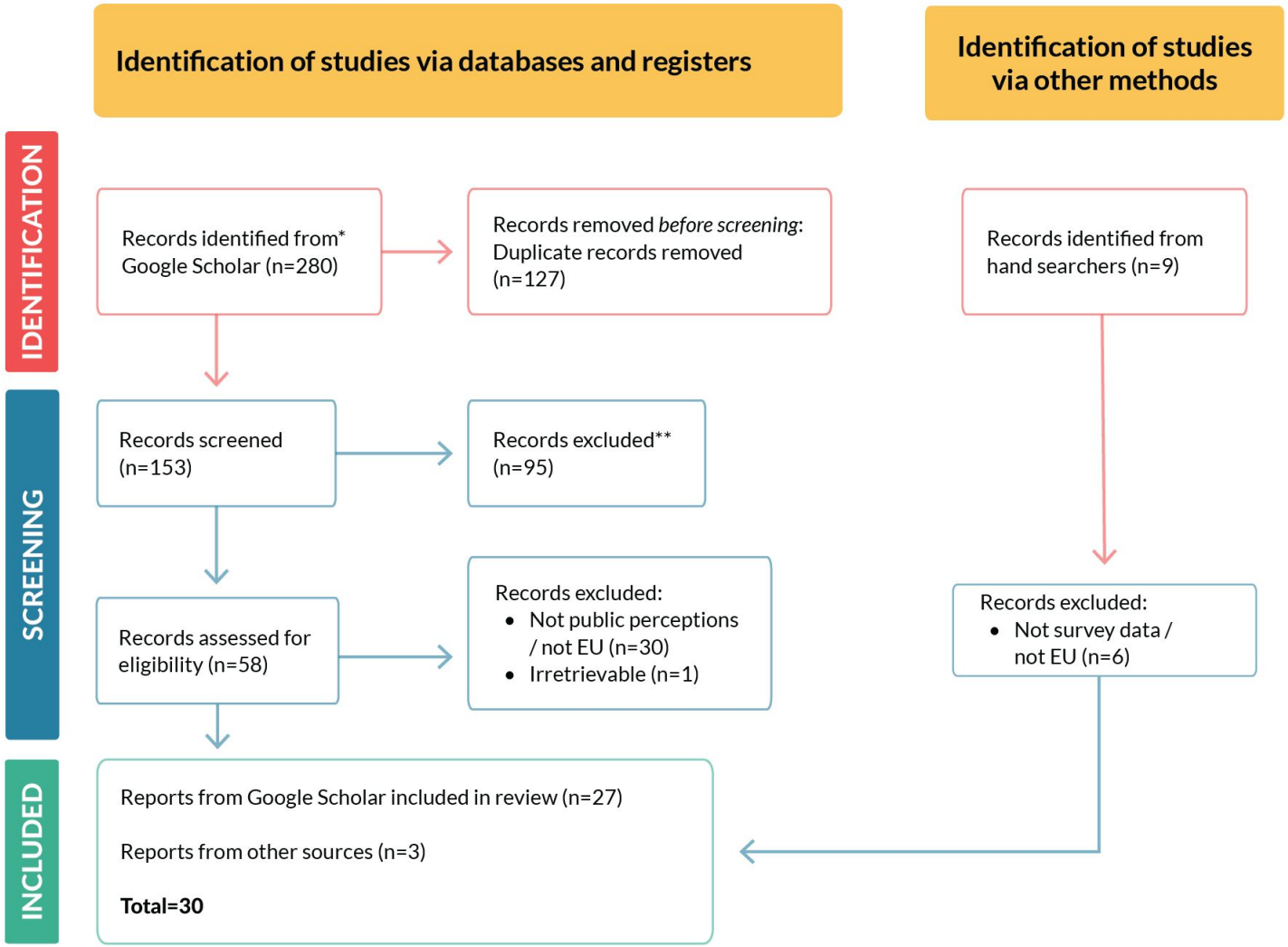
Objective

Gain baseline understanding of public opinion on hydrogen implementation in EU countries in terms of technology understanding and acceptance, to inform development of public engagement co-creation workshops.

Work done

- **Literature review** on public perceptions and reactions to hydrogen technologies
- Review and analysis of existing **Public Opinion Survey** and country-specific fact sheets
- Identification of the **main individual-level determinants** of public understanding and acceptance of H2 technologies
- Review of survey data **analytically relevant** to the public understanding of hydrogen technology in the EU27

Literature review on public perceptions and reactions to hydrogen and fuel cell technologies



Literature review on public perceptions and reactions to hydrogen and fuel cell technologies

Table 1: Relevant sources of survey data with analytical relevance

#	Source type	Title	Link
1	**Journal article**	Unknowing but supportive? Predispositions, knowledge, and support for hydrogen technology in the Netherlands	https://doi.org/10.1016/j.ijhydene.2010.03.091
2	**Journal article**	The role of attitudes in technology acceptance management: Reflections on the case of hydrogen fuel cells in Europe	https://doi.org/10.1016/j.jclepro.2018.03.266
3	**Journal article**	Dynamic effects on the acceptance of hydrogen technologies—an international comparison	https://doi.org/10.1016/j.ijhydene.2008.02.068
4	**Journal article**	Are French people ready to accept hydrogen underground storage? An answer through the distance from object model	https://doi.org/10.1016/j.ijhydene.2023.02.077
5	**Journal article**	Hydrogen in future energy systems: Social acceptance of the technology and its large-scale infrastructure	https://doi.org/10.1016/j.ijhydene.2021.05.160
6	**Journal article**	Let's go green with hydrogen! The general public's perspective	https://doi.org/10.1016/j.ijhydene.2012.02.126
7	**Journal article**	Knowing hydrogen and loving it too? Information provision, cultural predispositions, and support for hydrogen technology among the Dutch.	https://doi.org/10.1177/0963662512453117
8	**Journal article**	Public acceptance of hydrogen in the Netherlands: Two surveys that demystify public views on a hydrogen economy	https://doi.org/10.1177/0270467606290308
9	**Journal article**	A survey of Finnish energy engineering students' knowledge and perception of hydrogen technology	https://doi.org/10.1016/j.ijhydene.2018.04.098

Literature review on public perceptions and reactions to hydrogen and fuel cell technologies

> *For those culturally predisposed to favour hydrogen technology the addition of adequate knowledge leads to more favourable judgments of hydrogen technology.*

> *...participants with negative perceptions of hydrogen were more likely than those with positive perceptions to take action against plans to store hydrogen near their homes.*

> *...the research has shown that public acceptance of hydrogen is very vulnerable to perceptions of decreased safety and thus can be easily swayed by any negatively coloured information presented by the media.*

> *Trust is vital to a transition to hydrogen as it is a critical aspect of two parts of a transition: safety and information.*

Literature review on public perceptions and reactions to hydrogen and fuel cell technologies

Overview of the findings

- Support for hydrogen, but lack of detailed understanding and public awareness
- In Latvia, Germany, and Poland, public support for hydrogen exists despite a low depth of knowledge
- In the Netherlands, cultural predispositions like environmental concern and trust in technology significantly influence support for hydrogen
- Universal call for strategic educational campaigns and clear communication on hydrogen's benefits and safety
- Local infrastructure projects face challenges due to the "Not In My Back Yard" attitude

Literature review on public perceptions and reactions to hydrogen and fuel cell technologies

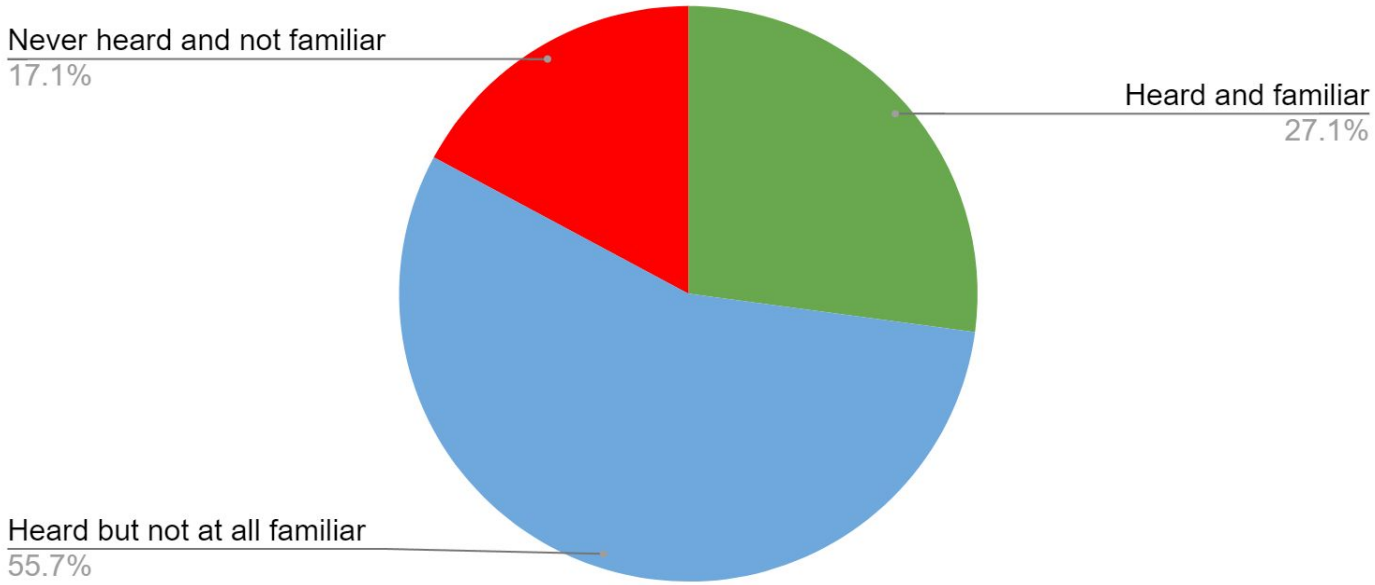
Overview of the findings (cont.)

- Spain and Italy show strong support for hydrogen in public transport, cautious approaches prevail in Germany and the Netherlands regarding residential hydrogen infrastructure
- In Poland and Germany, perceptions vary on hydrogen's reliability and cost-effectiveness
- Increase in European enthusiasm for hydrogen technologies, but concerns about costs and infrastructure persist
- Research gaps exist for Malta, Cyprus, and Sweden, although upcoming datasets may fill these gaps

Overall awareness levels

- Notable trend that more respondents had heard of hydrogen energy than those who have never heard of it

- **General awareness of hydrogen energy but a lack of in-depth knowledge**

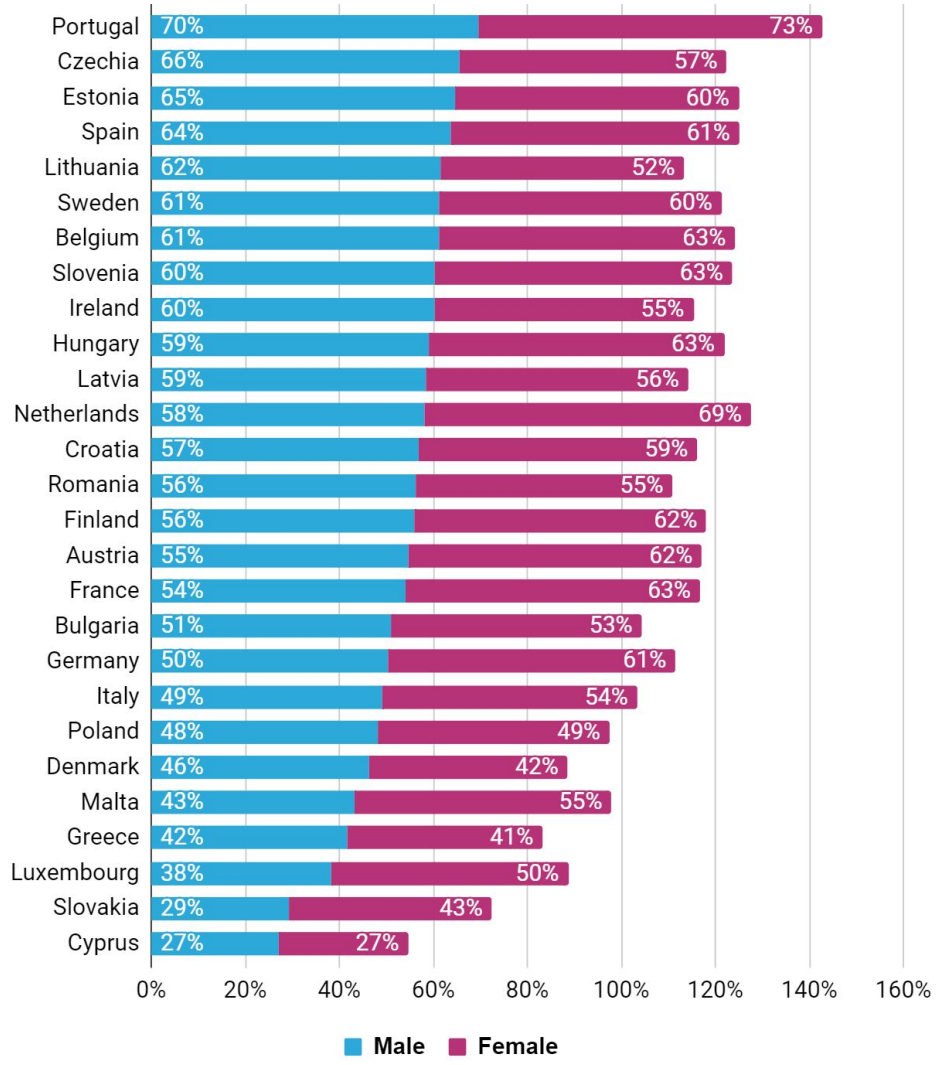


Secondary analysis of public perceptions and reactions to hydrogen

The role of gender in public perceptions and reactions to hydrogen

- Hydrogen familiarity response distribution by country and gender (Heard but **not familiar** with hydrogen energy)

- While women are nearly as aware as men of hydrogen as an energy source, they feel **less acquainted** with the specifics

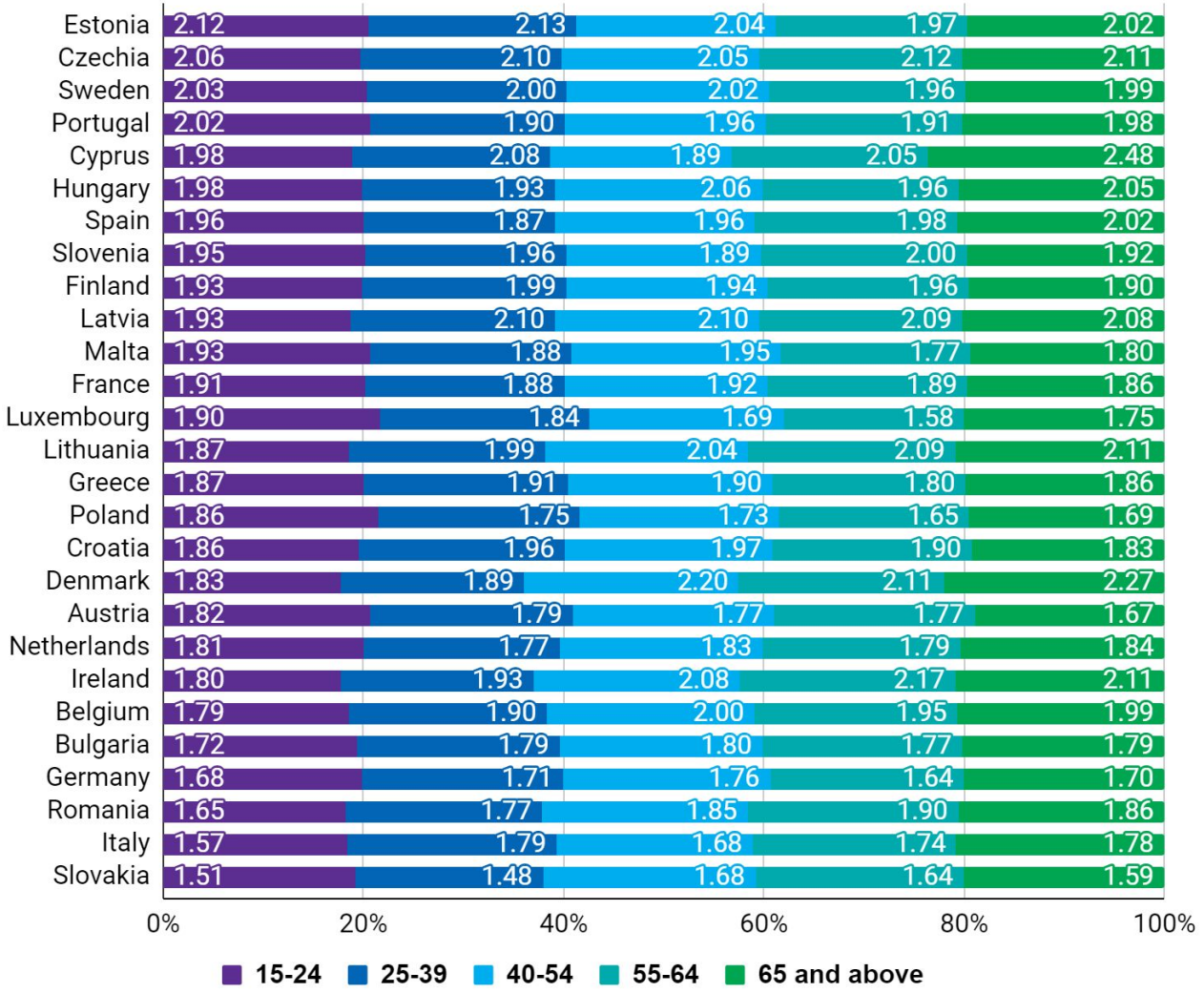


Secondary analysis of public perceptions and reactions to hydrogen

The role of age in public perceptions and reactions to hydrogen

- Hydrogen familiarity with mean scores by country and age

- Familiarity **does not drastically change with age** in most countries

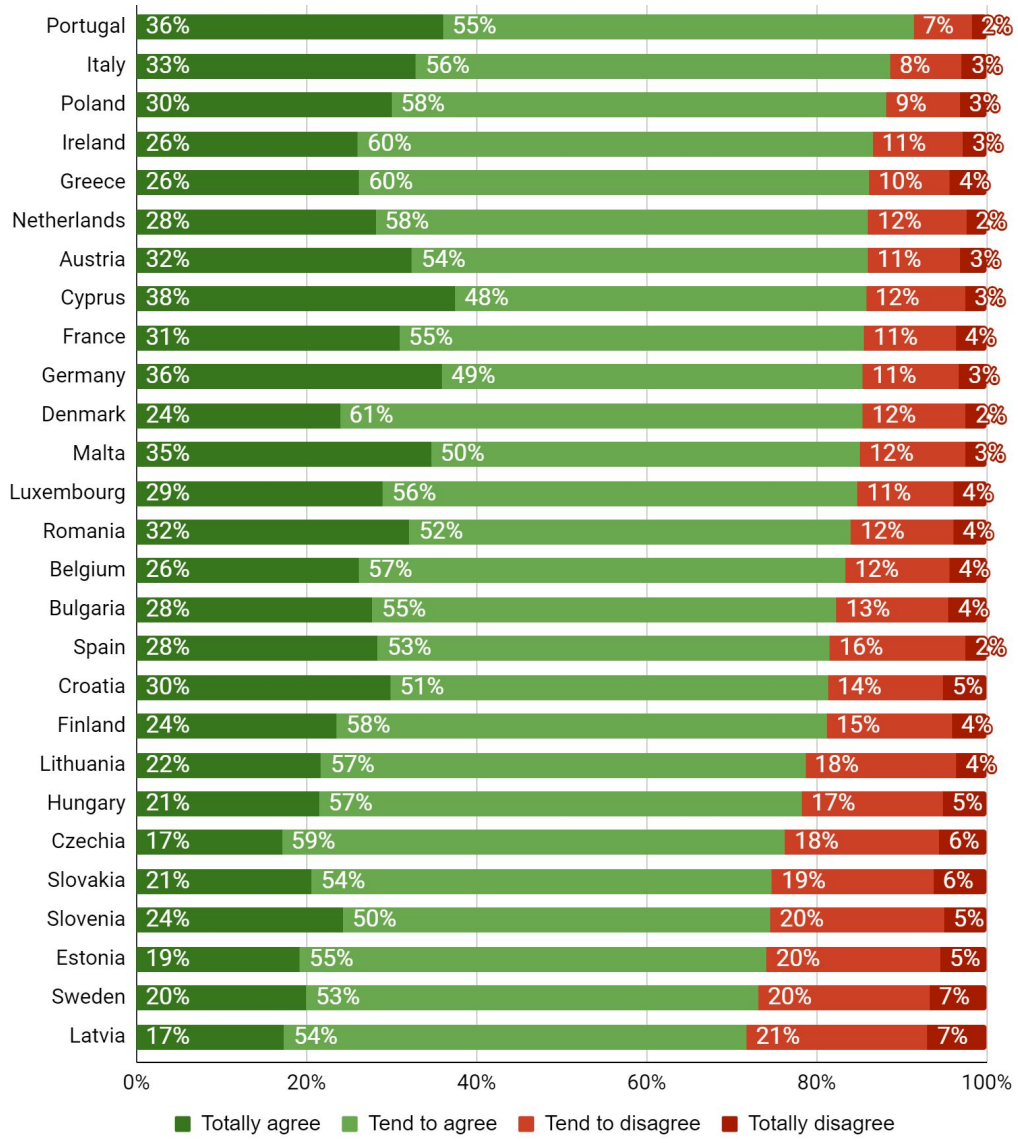


Secondary analysis of public perceptions and reactions to hydrogen

Overall views of hydrogen energy and technologies

- Hydrogen is seen as a **good solution for reducing energy dependence** (Trends by country)

- Mostly **positive views and broad acceptance of hydrogen** as a potential energy solution across most countries

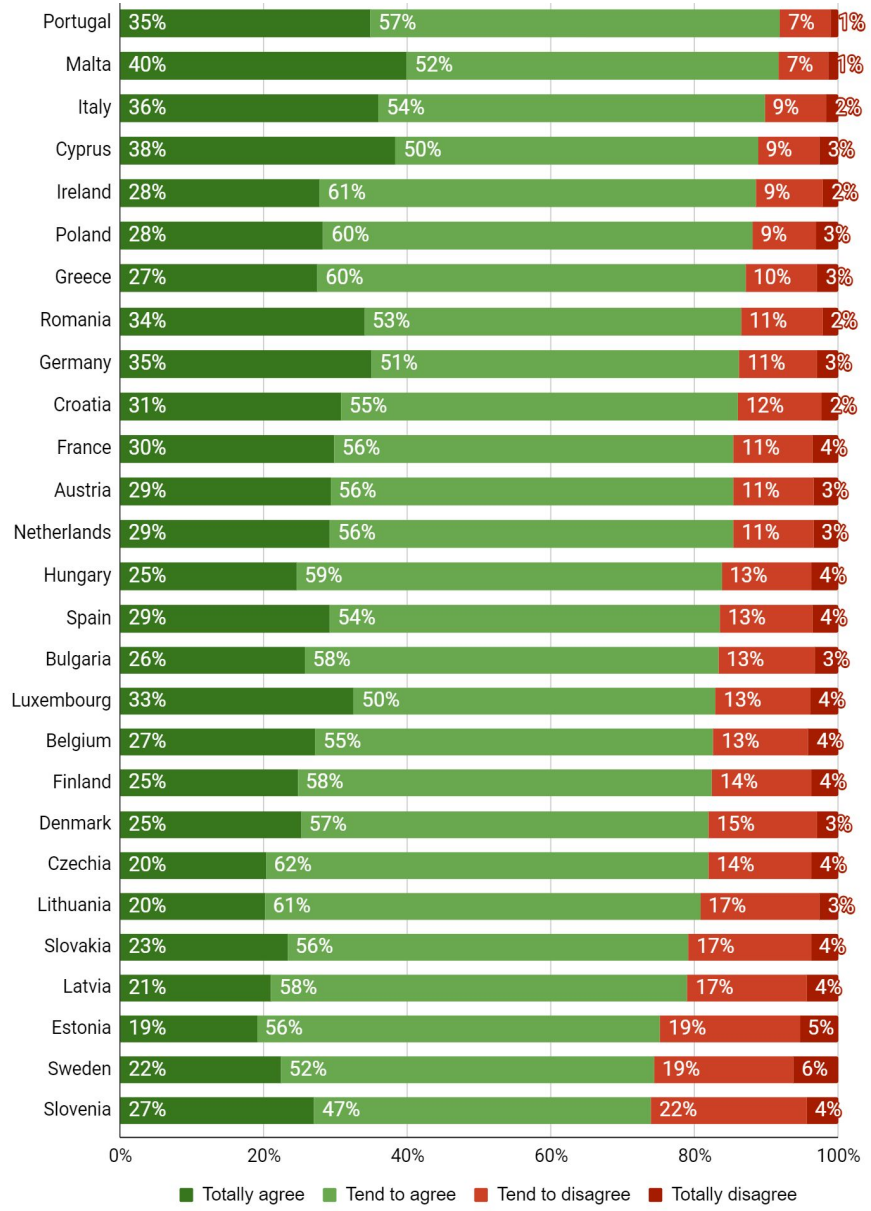


Secondary analysis of public perceptions and reactions to hydrogen

Overall views of hydrogen energy and technologies

- Hydrogen is a **sustainable** energy source (Trends by country)

- Broad acceptance of hydrogen as a sustainable energy source across countries

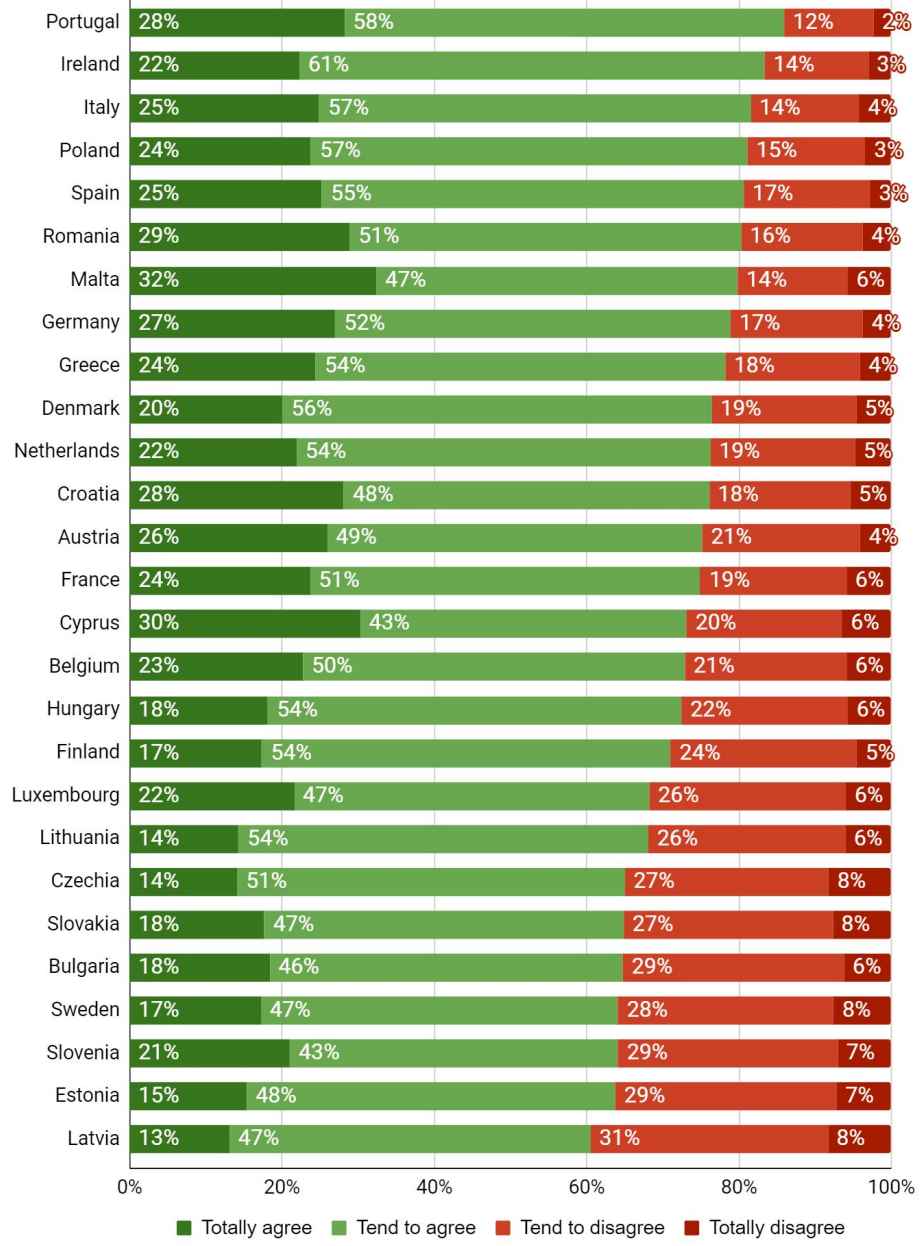


Secondary analysis of public perceptions and reactions to hydrogen

Overall views of hydrogen energy and technologies

- Hydrogen's **safety** compared to other energy sources (Trends by country)

- Western European countries showed higher agreement levels with hydrogen safety than Eastern Europe

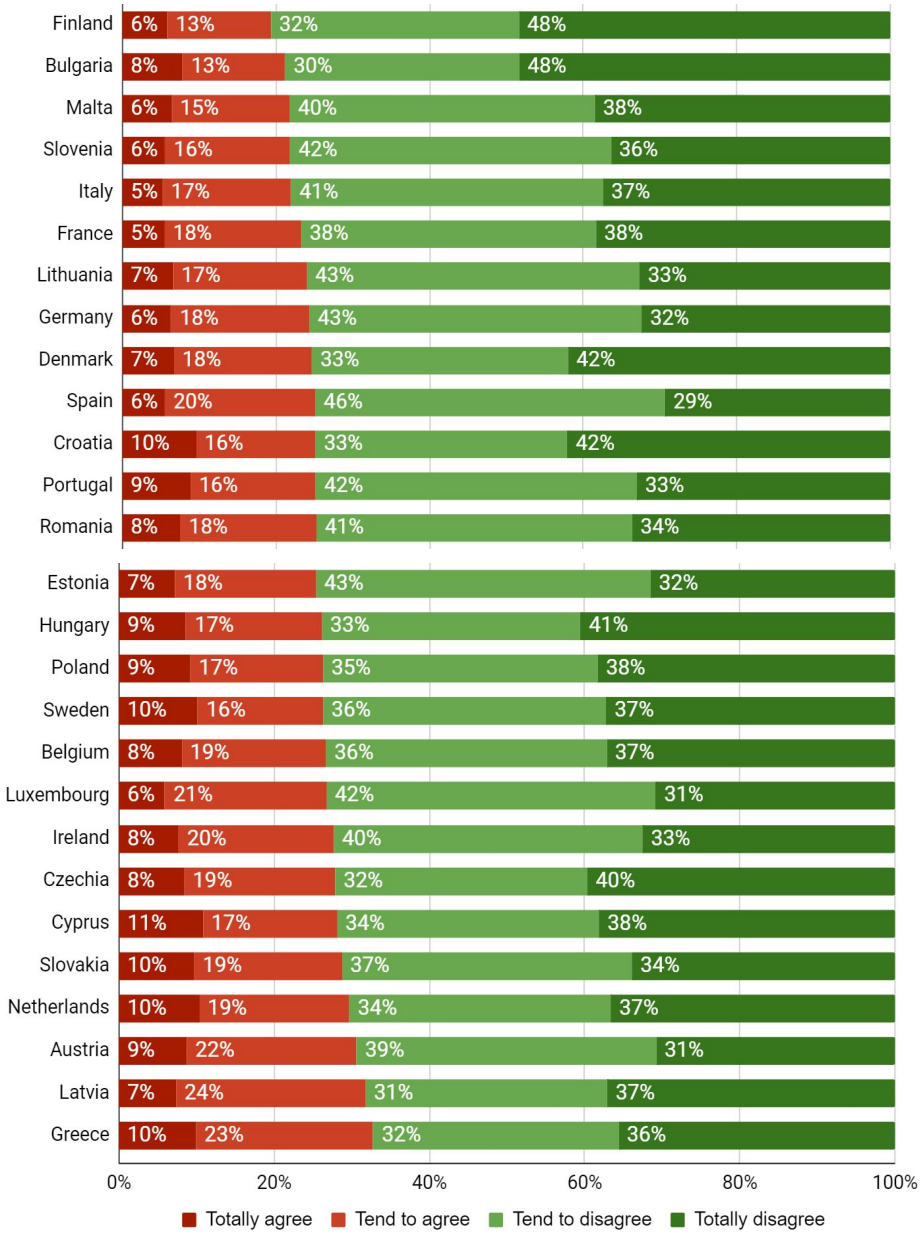


Secondary analysis of public perceptions and reactions to hydrogen

Overall views of hydrogen energy and technologies

- Hydrogen is as polluting as diesel or gasoline (Trends by country)

- Broad perception that hydrogen can be a **cleaner alternative** to traditional fossil fuels



Identification of the main individual-level determinants of public understanding and acceptance of FCH technologies

Work done

- Deeper analysis of data from the Public Opinion Survey (Gallup In. 2003), focusing on key survey questions and using statistical tests like Generalised Linear Models to assess predictor variables
- To establish a robust framework for **identifying demographic and behavioural variables** that significantly contribute to public opinions on hydrogen

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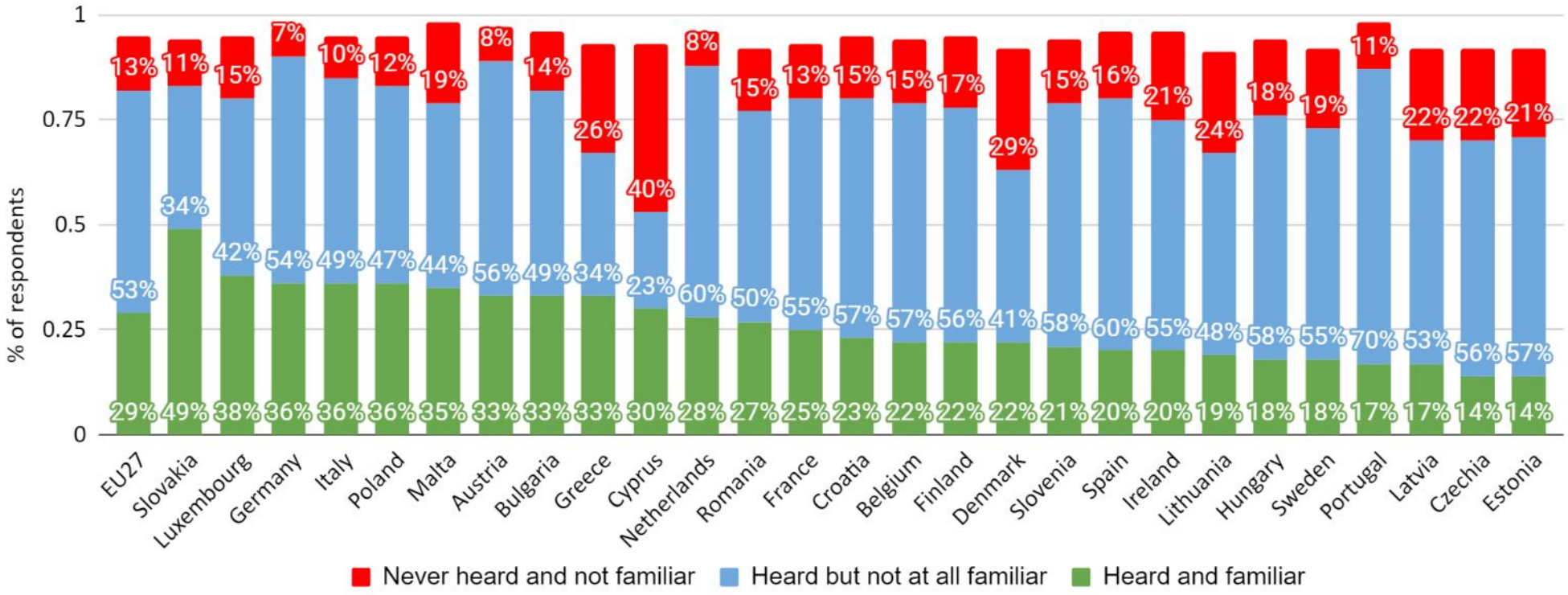
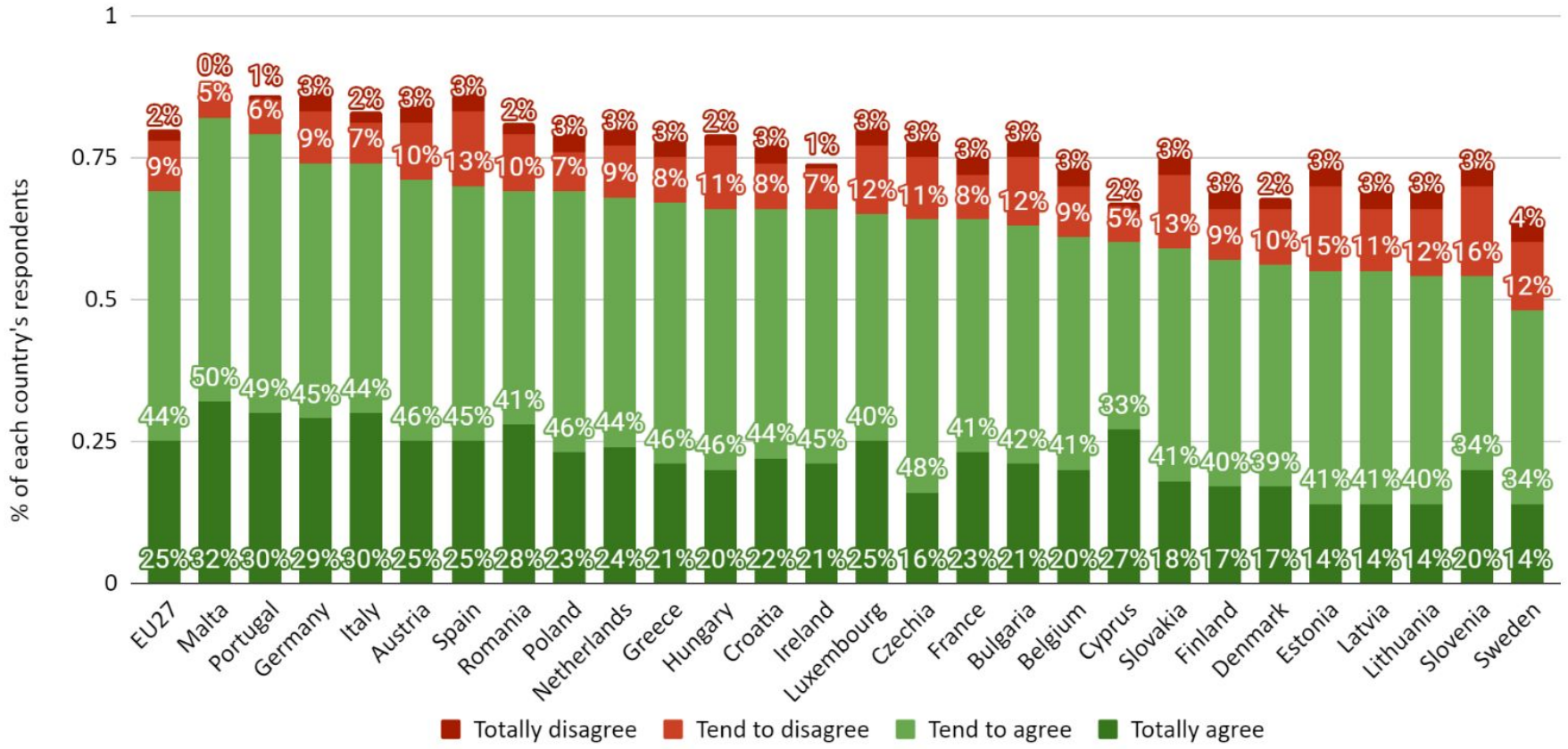
Identification of the main individual-level determinants of public understanding and acceptance of FCH technologies

Awareness of hydrogen technology ('heard of' and 'familiar')



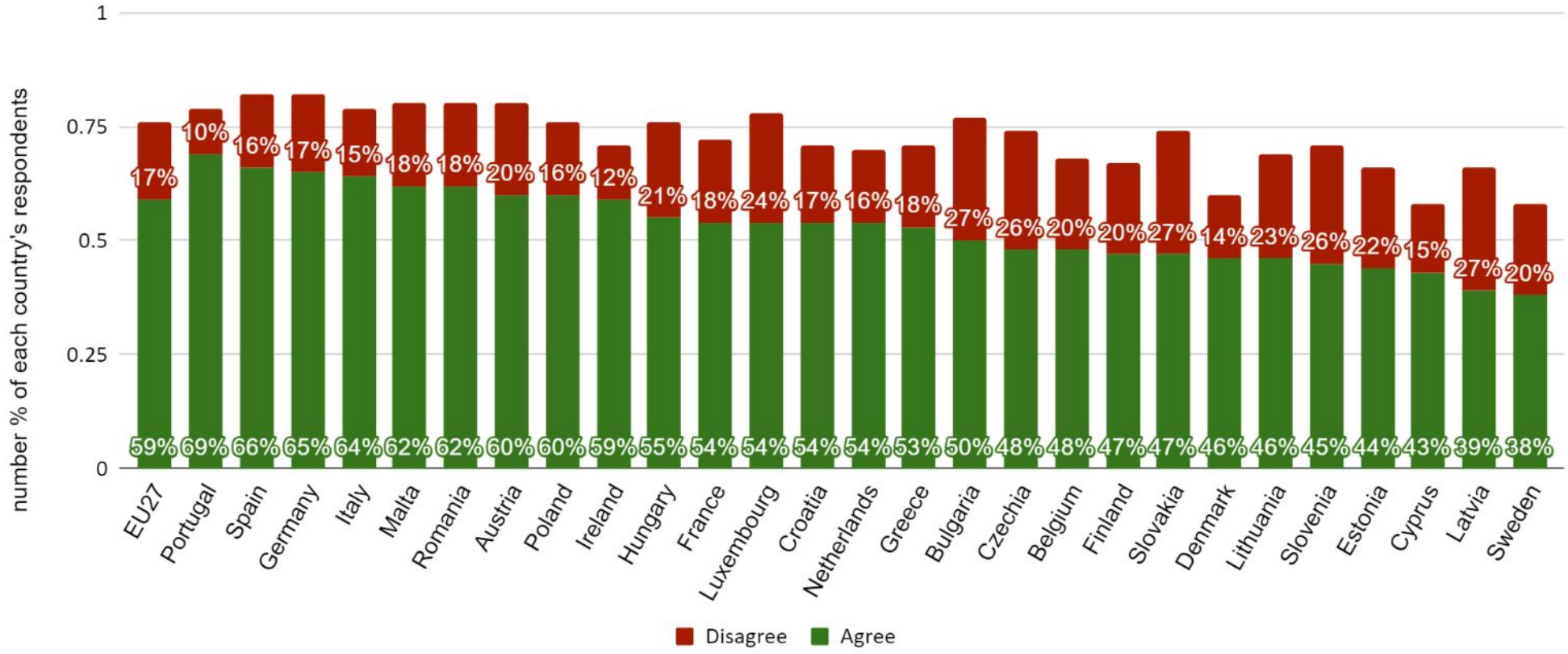
Identification of the main individual-level determinants of public understanding and acceptance of FCH technologies

Views of hydrogen as a sustainable energy source



Task 2: Identification of the main individual-level determinants of public understanding and acceptance of FCH technologies

Responses as to whether hydrogen is viewed as being as safe as other energy sources



Identification of the main individual-level determinants of public understanding and acceptance of FCH technologies

Findings summary

- Regional influences are minor, but education significantly enhances support for hydrogen
- High environmental concern scores linked to lower awareness of hydrogen's role in transport, heating, and industrial applications
- Individuals with high environmental concern scores perceive hydrogen positively in reducing energy dependency and environmental impact
- Enhancing understanding of hydrogen's environmental implications could shape public opinion positively
- Social media use currently has limited impact on attitudes towards hydrogen

Implications for public engagement

Recommendations:

- Develop and implement education programs tailored to specific regions and demographics
- Prioritise educational efforts in countries with lower awareness and negative perceptions
- Enhance social media's role in spreading accurate information
- Address safety concerns
- Emphasise hydrogen’s environmental benefits

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Analysis of public engagement with H2 via social media across the EU27 countries

Objective

Gather information to create a social media snapshot of public engagement with hydrogen in EU

Work completed

Analysis of social media content and search trends to inform future public engagement efforts

Data collection:

- Platforms: Facebook, X, Reddit, YouTube
- Timeframe: October 2023 to January 2024

Weekly searches were conducted with the focus on identifying **keywords, hashtags, users and relevant discussions/comments**

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Analysis of public engagement with H_2 via social media channels across the EU27

Key findings

Geographic variability and event-driven peaks

- Public interest in hydrogen technology varied across the EU27
- Engagement levels were influenced by national policies and initiatives, local events, industry conferences or government announcements
- Socio-political factors influence the public perception of hydrogen technology

Topic-specific interest

- Public interest in different aspects of hydrogen technology varies
- There is a higher interest in technological aspects (e.g., hydrogen fuel cells and vehicles)
- There is a lower engagement with infrastructure and policy topics

Implications from all findings

Practical public engagement strategies should:

- **Deepen understanding** of hydrogen fuel cells, -vehicles, processes, and hydrogen energy technologies in **simple terms**
- Address **misconceptions, economic and safety concerns** about hydrogen, ie. reputation for 'explosiveness' and worries over infrastructure in residential areas ('Not In My Backyard' phenomenon)
- Adapt initiatives to fit the **demographics and regional context** of each country, ensuring they resonate with diverse EU communities
- Actively include women to increase awareness and **decrease gender disparity**

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Implications (cont.)

Practical public engagement strategies should:

- Showcase **real-world examples** of successful EU hydrogen implementations to demonstrate viability and benefits, to convert awareness into informed support
- Highlight **environmental benefits** and safety features of hydrogen technologies as a sustainable energy solution
- Involve industry experts, academics, NGOs, community members, and policy makers to enrich discussions, share expertise, and increase **transparency and trust**

Implications (cont.)

Recommendations for social media:

- Leverage event-driven peaks (such as policy announcements, local projects) and communicate accurate information to address knowledge gaps and counter misconceptions (transparency)
- Geographic (and socio-political) variability requires tailored strategies in different EU partner countries
- Target demographics showing lower awareness
- Emphasise H2 environmental and safety benefits
- Collaborate with partner organisations to increase reach
- Continuously monitor public engagement and sentiment

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Thank you for your attention!

Dr Aaron Jensen
Chief Operations Officer
Institute for Methods Innovation

Dr Fanie van Rooyen
Communications Officer
Institute for Methods Innovation

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Q&A

25th September 2024, Online
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The Hydrogen Revolution: Social and technical aspects for a sustainable transition towards hydrogen economy

25th September 2024, 11 am

CNH2 and hydrogen mobility: the example of Green Hysland Project

María Panadero

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- Introduction to Green Hysland project
- Permitting on Green Hysland project
- Other examples of Green Hydrogen Mobility

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- **Introduction to Green Hysland project**
- Permitting on Green Hysland project
- Other examples of Green Hydrogen Mobility

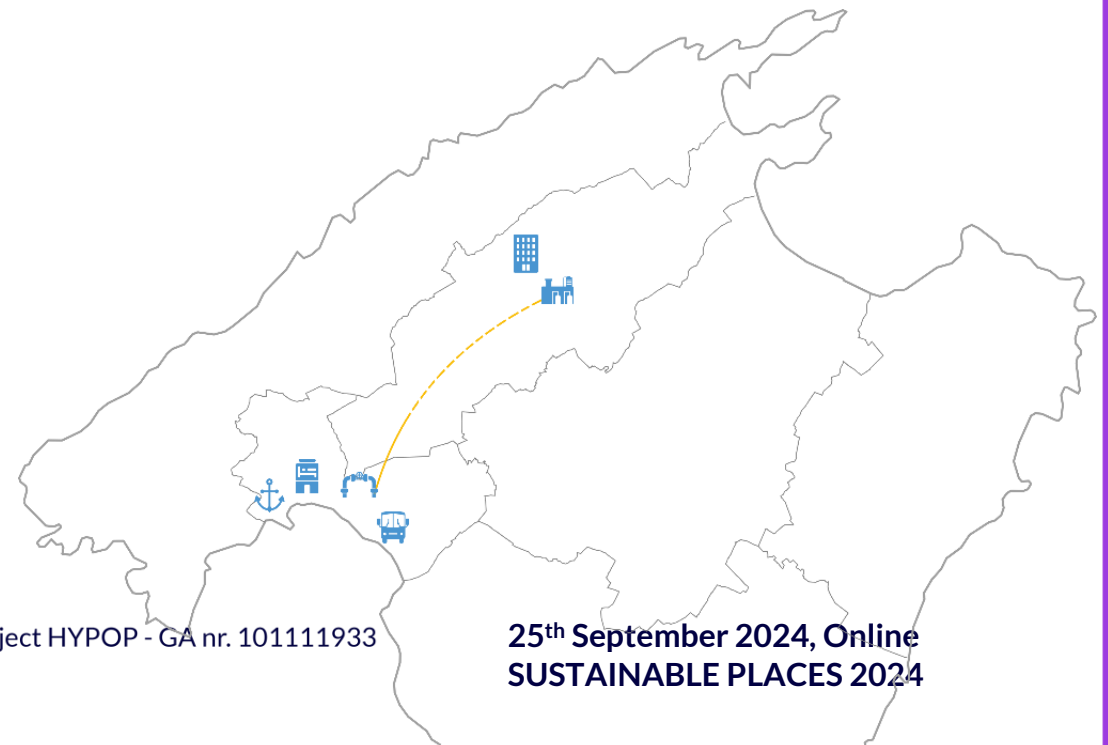
CNH2 and hydrogen mobility: the example of Green Hysland Project

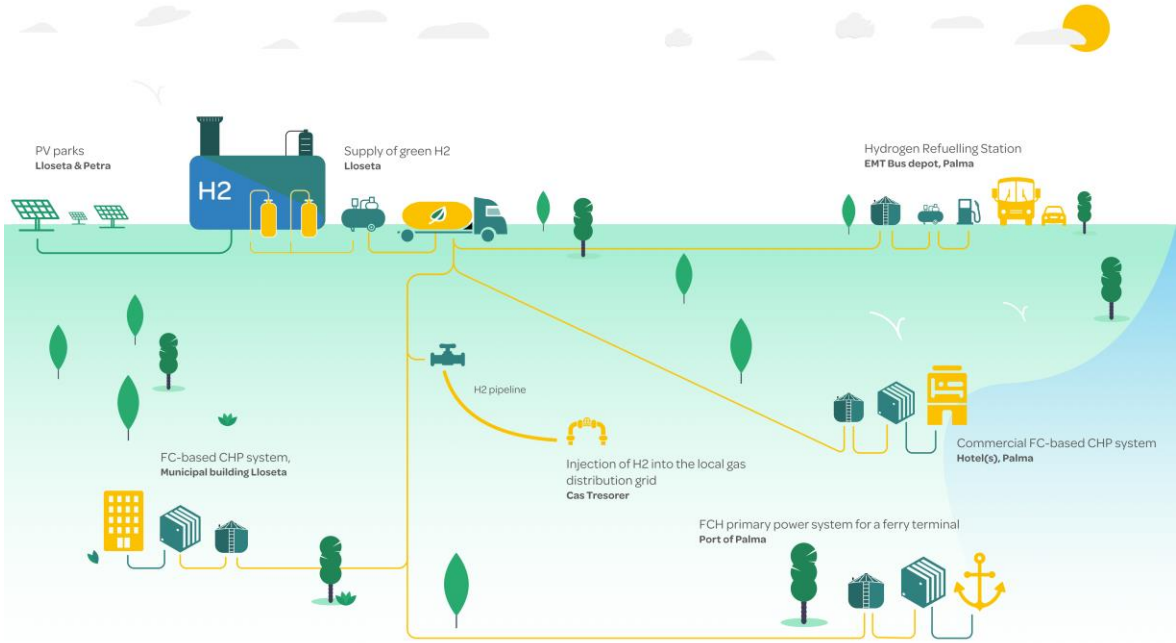
GREEN HYSLAND

Funding: CLEAN HYDROGEN PARTNERSHIP (GA nº 101007201)

Introduction to Green Hysland project

Green Hysland project aims to deploy a fully functional **hydrogen ecosystem on the island of Mallorca (Spain),** making the island the first H_2 hub in Southern Europe.





Source: Green Hysland Project (https://greenhysland.eu/)

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CNH2 and hydrogen mobility: the example of Green Hysland Project

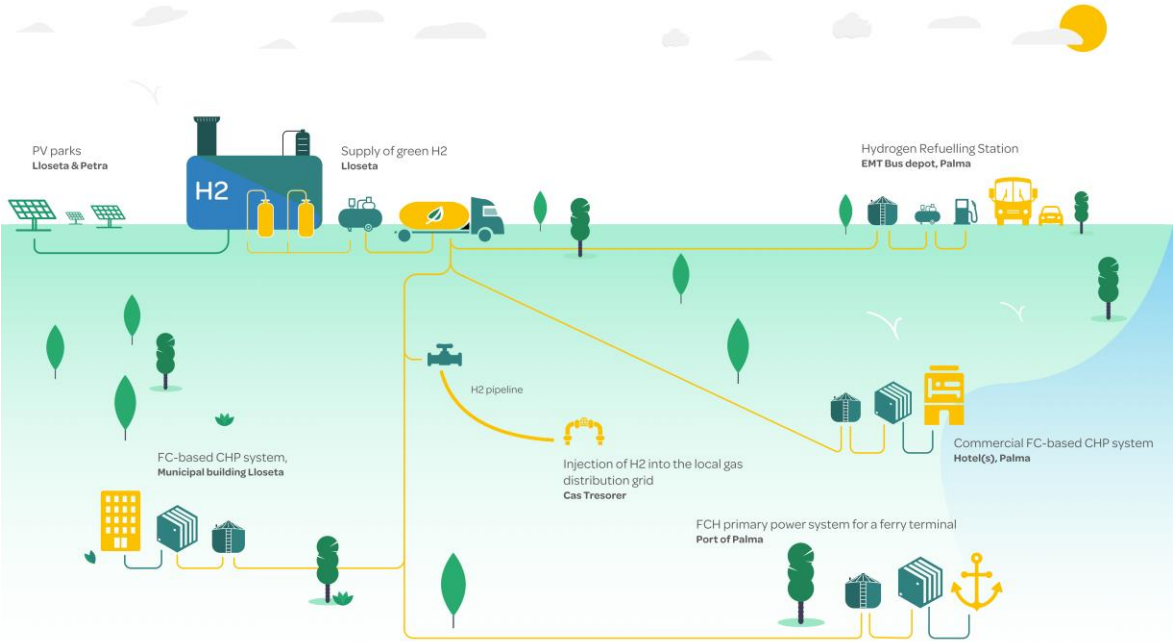
Funding: CLEAN HYDROGEN PARTNERSHIP (GA nº 101007201)

GREEN HYSLAND

Introduction to Green Hysland project

It is based in the integration of 6 deployment sites:

- Electrolysis plant (Lloseta) connected to local PV plants
- Electricity supply at the port of Palma
- Injection of H2 into the local gas grid
- m-CHP application at a commercial building (Hotel)
- m-CHP application at a public building
- Mobility uses (buses and cars)



Source: Green Hysland Project (https://greenhysland.eu/)

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GREEN HYSLAND

Introduction to Green Hysland project

Regarding mobility, two hydrogen applications are considered:

- 5 Fuel Cell powered buses
- Fuel Cell powered vehicles in Palma (Toyota Mirai) to be leased/rented in and around Palma.

A transport refueling infrastructure (HRS) will be also developed within this project.

Source: https://www.toyota.es

Source: Green Hysland project

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- Introduction to Green Hysland project
- **Permitting on Green Hysland project**
- Other examples of Green Hydrogen Mobility

Permitting on Green Hysland project - General

The production of hydrogen has followed different normative which can be classified in:

- **Land use:** Hydrogen production can only be carried out on land designated as industrial (Municipal and regional urban planning).

- **Environment:** Balearic adaptations to permitting procedures (Environmental Impact Assessment, Strategic Environmental Assessment, Integrated Environmental Authorisation, etc.) deriving from European Directives.
  - i.e., Law 12/2016 of 17 August, of Environmental Assessment of the Balearic Islands.

- **Industrial security:** Regulations for low/high voltage, pressure equipment, chemical storage, fire protection, etc. have been followed.

Permitting on Green Hysland project – Cars & HRS

For the FC vehicles and the HRS no information about permitting procedures have been found yet in the frame of this project.

Permitting on Green Hysland project – Hydrogen buses

PLATAFORMA DE CONTRATACIÓN DEL SECTOR PÚBLICO

The purchase of the hydrogen buses has been carried out by tender.

Requirements:

- Quantity: 5 units
- Powered by: Electric traction with asynchronous or synchronous motors
- Length of the vehicles: 11.5 - 12.5 meters
- Overall width: <2.55 m. (not including rear-view mirrors)
- Overall height: 3.5 m. max including possible air conditioning equipment.
- Manoeuvrability: The outside turning diameter between walls shall be a maximum of 22 metres
- Fuel tanks: Fuel cell vehicles will have sufficient fuel capacity to be able to travel distances of up to 350 km without refuelling under normal driving conditions. Additional tanks will be offered as an option.

Source: https://www.solarisbus.com/

Permitting on Green Hysland project – Hydrogen buses

PLATAFORMA DE CONTRATACIÓN DEL SECTOR PÚBLICO

The purchase of the hydrogen buses has been carried out by tender.

Some of the documents to be submitted were:

- **Environmental Product Declaration (EPD):**
  - In accordance to the Product Category Rules for PUBLIC AND PRIVATE BUSES AND COACHES PRODUCT CATEGORY CLASSIFICATION.
  - List of banned and declarable substances
- **Declaration of compliance with REACH (EC 1907/2006)**
- **Declaration of responsibility** -> Recycling of all components and parts of the vehicle
- **Self-declaration of the manufacturer** -> Compliance of the EU EPC Criteria applicable to transport

Source: https://www.solarisbus.com/

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- Permitting on Green Hysland project
- **Other examples of Green Hydrogen Mobility**

CNH2 and hydrogen mobility: the example of Green Hysland Project

Other examples of Green Hydrogen Mobility

FCH2RAIL (2021-2024)

Objective: To develop, build, test, demonstrate and homologate a scalable, modular and multi-purpose fuel cell hybrid PowerPack applicable to different railway applications (regional trains, freight locomotives and shunting locomotives).

Role of CNH2:

- Develop, build and test a test bench for the FCHHPP.
- Develop and operate a prototype of a HRS
- Propose a regulatory framework for H2 in rail vehicles

FCH2RAIL

visit us
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Funding: CLEAN HYDROGEN PARTNERSHIP (GA n° 101006633)

Source: © CAF. FCH2RAIL Project (https://www.fch2rail.eu)

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CNH2 and hydrogen mobility: the example of Green Hysland Project

Other examples of Green Hydrogen Mobility

H2PORTS (2019-2024)

Objective: To provide efficient solutions for a fast evolution towards a low carbon and zero-emission sector in the port industry. To develop three pilots to bridge the gap between prototypes and pre-commercial products:

- A reach stacker powered with hydrogen.
- A yard tractor equipped with a set of fuel cells.
- A mobile Hydrogen supply station for guaranteeing the continuous working cycles of the abovementioned equipment.

H2 PORTS

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Funding: CLEAN HYDROGEN PARTNERSHIP (GA nº 826339)

Source: H2PORTS Project (https://h2ports.eu/)

CNH2 and hydrogen mobility: the example of Green Hysland Project

Other examples of Green Hydrogen Mobility

Andalusian Guidelines (2024)

Report emitted by Andalusian government with the aim of clarifying the normative currently applicable to any hydrogen installation.

It takes into account that regulations for H2 are still under development.

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Other examples of Green Hydrogen Mobility

Andalusian Guidelines (2024)

Regarding mobility:

- It explain the different uses of hydrogen in transport and mobility (land, sea or air transport)
- It defines some concepts (i.e., the difference between «hidrogenera» and «hidrolinera».
- It gives some insight into the paperwork involved in the production, storage and transport of hydrogen (among others): i.e., European Agreement concerning the International Transport of Dangerous Goods by Road.

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María Panadero

National Center of Hydrogen (CNH2), Spain

maria.panadero@cnh2.es

Consultancy and Training Unit

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The Hydrogen Revolution: Social and technical aspects for a sustainable transition towards hydrogen economy

25th September 2024, 11 am

Tailoring Social Life Cycle Assessment Frameworks to Hydrogen-Related Systems and Target Audience

S.K.R. Maddula, J. Dufour, D. Iribarren (IMDEA Energy)

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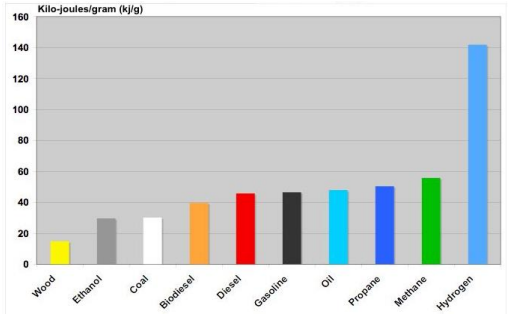
- SDGs and social dimension

CONTEXT

- FCH systems

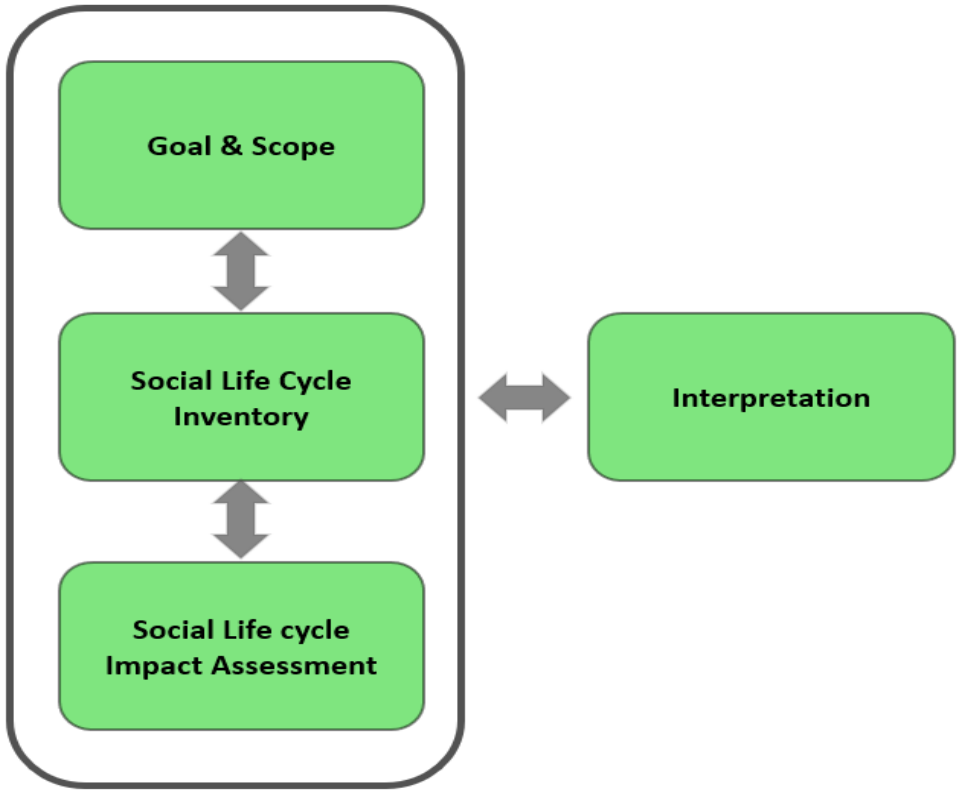


$$2H_2 + O_2 \rightarrow 2H_2O$$

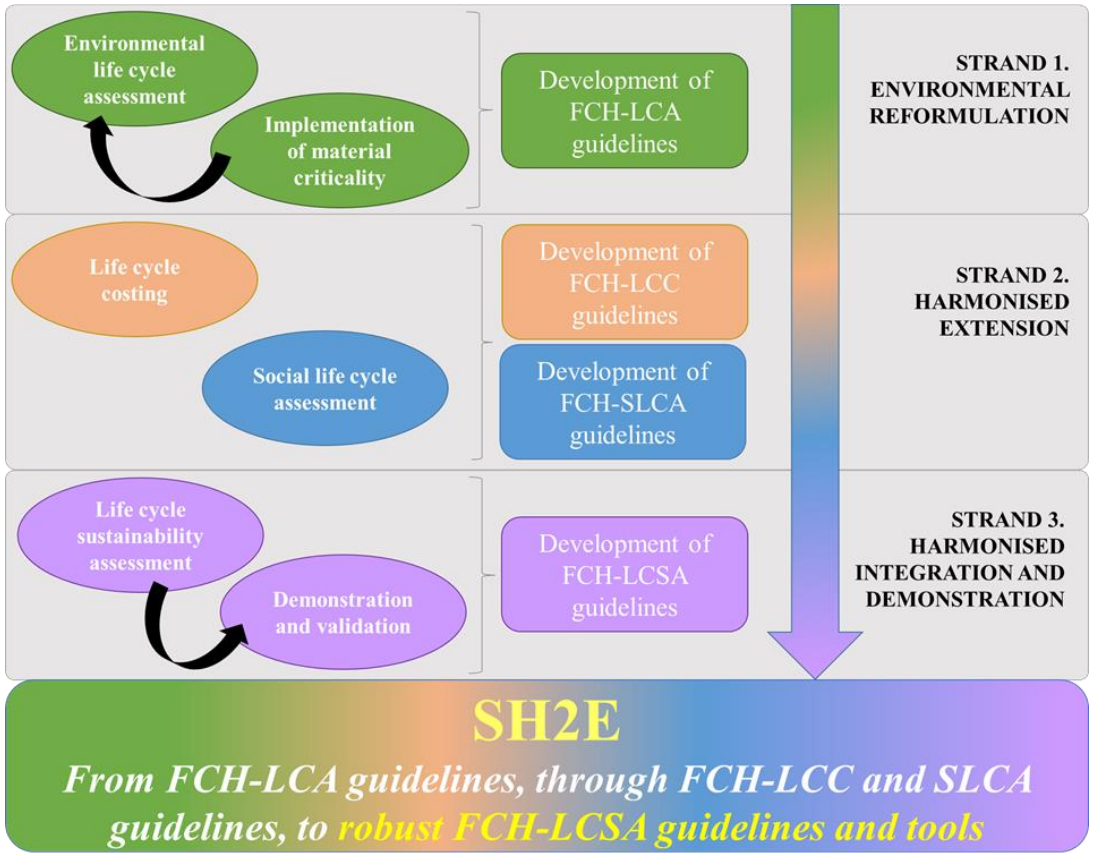
Identification of hotspots and bottlenecks along the hydrogen supply chain under environmental, economic and social aspects

- Assessment

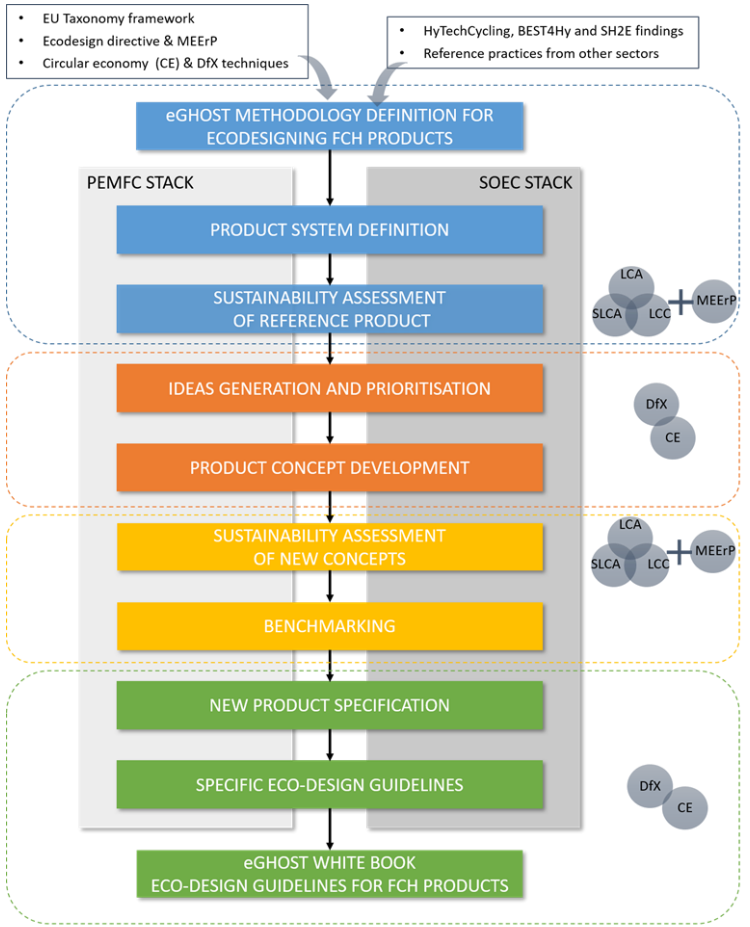

Environment
LCA
SLCA
LCC
Society
Economy


Goal & Scope
Social Life Cycle Inventory
Social Life cycle Impact Assessment
Interpretation

➢ Recent contributions to FCH-SLCA

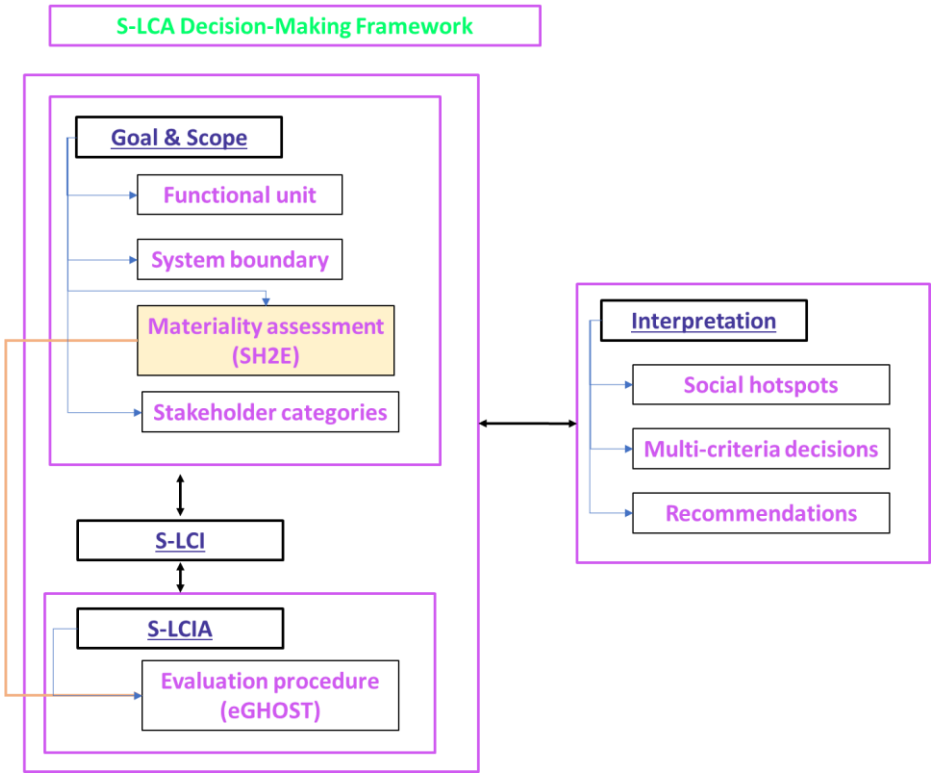


SH2E



eGHOST

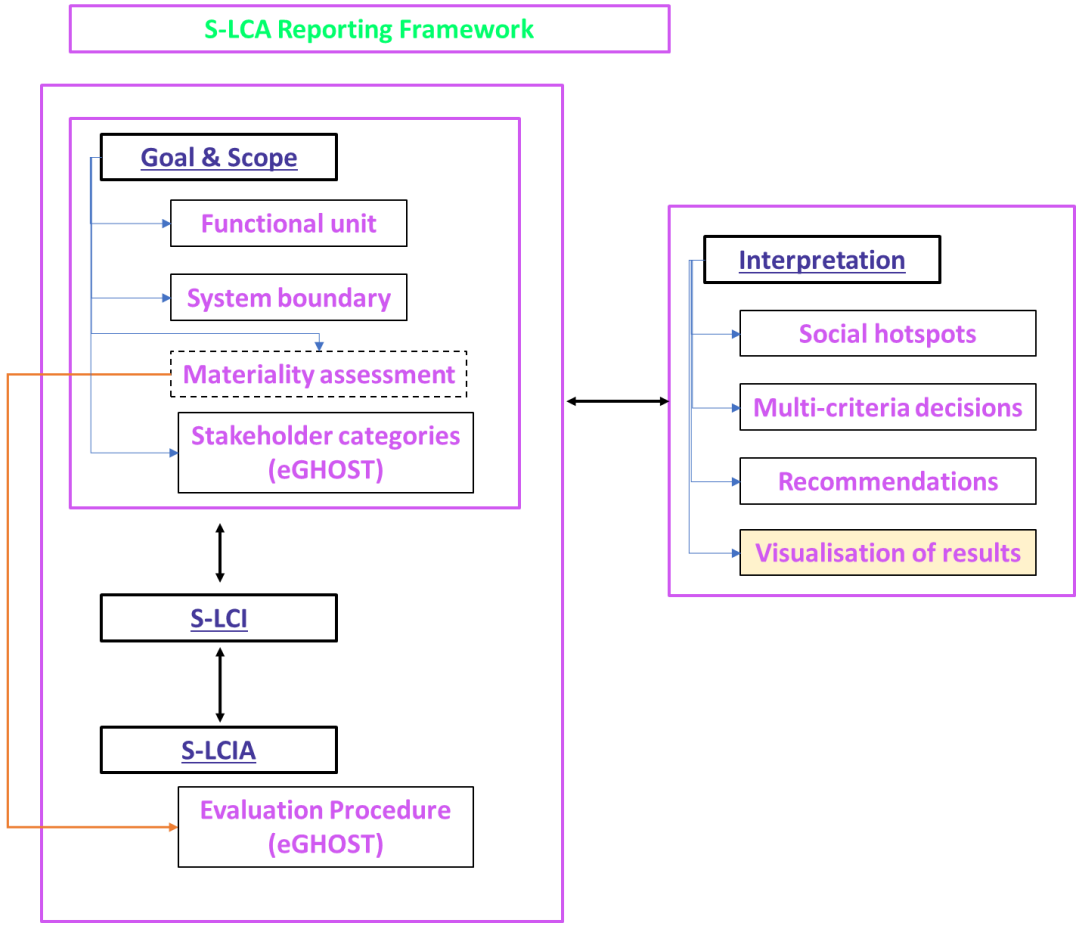
- New contributions within HYPOP
  - HYPOP D4.1: Training material for S-LCA addressed to decision-makers (R; PU; July 2024)
    - HYPOP MS4.1: FCH-tailored S-LCA approach targeted at decision-makers



Proposed framework for S-LCA of FCH systems for decision-makers

The HYPOP S-LCA framework for decision-makers emphasises crucial features such as materiality assessment, social hotspot analysis, and multicriteria decision-making

- New contributions within HYPOP (D4.1)



Proposed framework for S-LCA of FCH systems for reporting to citizens

The HYPOP S-LCA framework for reporting (particularly to citizens) specifies default stakeholder categories, impact subcategories and social indicators, and it integrates visualisation techniques to provide individuals with a better grasp of the social factors involved

➢ New contributions within HYPOP (D4.1)

Proposed framework for S-LCA of FCH systems for reporting to citizens

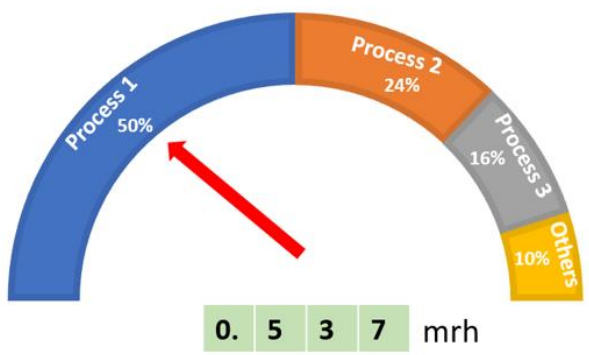
1 NO POVERTY	8 DECENT WORK AND ECONOMIC GROWTH
3 GOOD HEALTH AND WELL-BEING	
5 GENDER EQUALITY	
8 DECENT WORK AND ECONOMIC GROWTH	

Fair salary: Minimum wage, per month

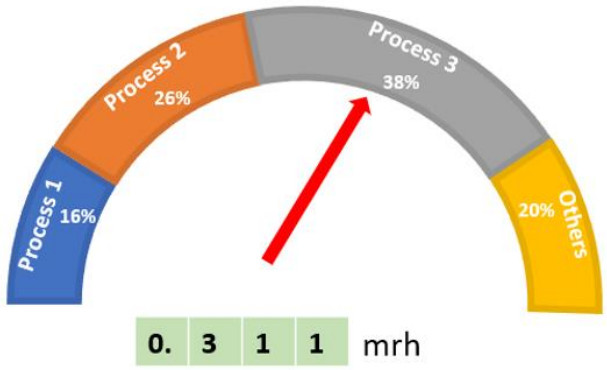
Health and safety: Health expenditure

Discrimination: Gender wage gap

Child labour: Children in employment, total
Forced labour: Frequency of forced labour
Contribution to economic development: Contribution of the sector to economic development



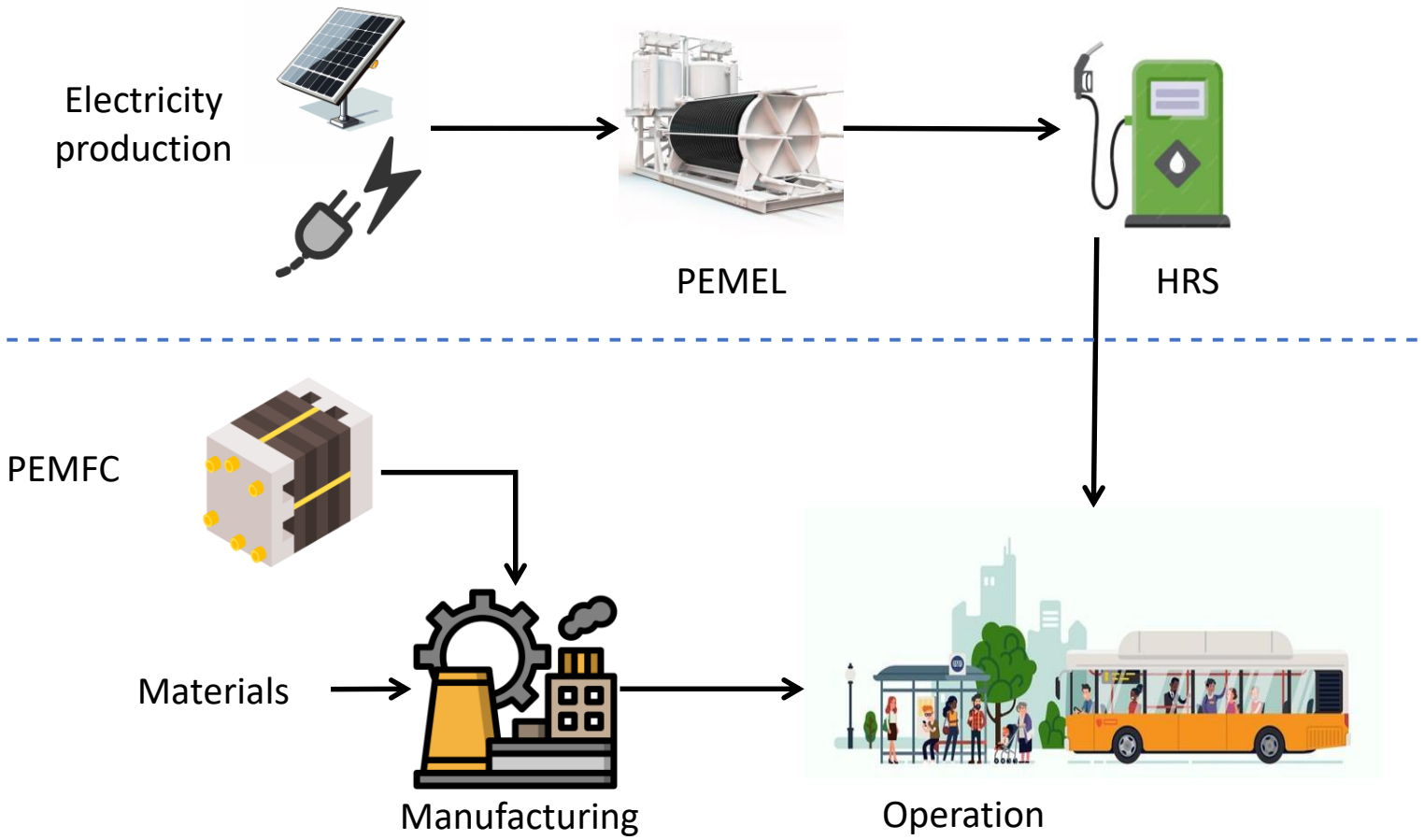
Children in employment (total)



Minimum wage

NEXT STEPS

- Hydrogen production case study in HYPOP: hydrogen refuelling station with onsite hydrogen production
- Hydrogen use case study in HYPOP: bus transport
- HYPOP D3.1: S-LCA of two selected hydrogen systems and set of indicators for citizenship (R; PU; March 2025)



TAKE-HOME MESSAGES

- FCH-SLCA frameworks individually designed to meet the requirements and viewpoints of the intended audience
- The proposed frameworks are recommended to be robustly integrated with LCA and LCC approaches in order to increase the depth and breadth of evaluations
- Benchmarking with relevant case studies is advised for contextual clarity
- S-LCA is becoming an important approach for the assessment of FCH supply chains, but still with a strong potential for improvements requiring further effort to robustly support decision-makers, citizens and other stakeholders such as policy-makers

Diego Iribarren

Systems Analysis Unit, IMDEA Energy

diego.iribarren@imdea.org

25th September 2024, Online
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www.hypop-project.eu

info@hypop-project.eu

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HYPOP PROJECT EVENTS – SAVE THE DATE

Engagement workshops are coming…STAY TUNED!

- **October 9-11, 2024 Italy**
  «Fueling Tomorrow» event in Bologna
  HYPOP (Environment Park) and H2IT seminar on permitting & safety
- **October 7-8, 2024, Poland**
  PCHET 2024 Conference Gdynia
  HYPOP (RIGP) and hydrogen associations seminar on permitting, safety, certification
- **October 8, 2024 Spain**
  PMH2 Conference
  HYPOP (CNH2) “Encuentro Sectorial of Hidrógeno”
- **October 10, 2024 Spain**
  CNH2 Headquarter
  HYPOP (CNH2) Seminar on permitting, safety, certification
- **October 21-23, 2024 Sweden**
  SETAC Europe 26th LCA Symposium
  IMDEA, S-LCA first results
- **Nov/Dec 2024, Public Engagement Workshops online** (IMI, APRE)

  Raising Awareness of Hydrogen: Best Practices from the HYPOP Project
  Engaging Non- Technical Audiences: Best Practices for Energy Communication

European Hydrogen Week 2024

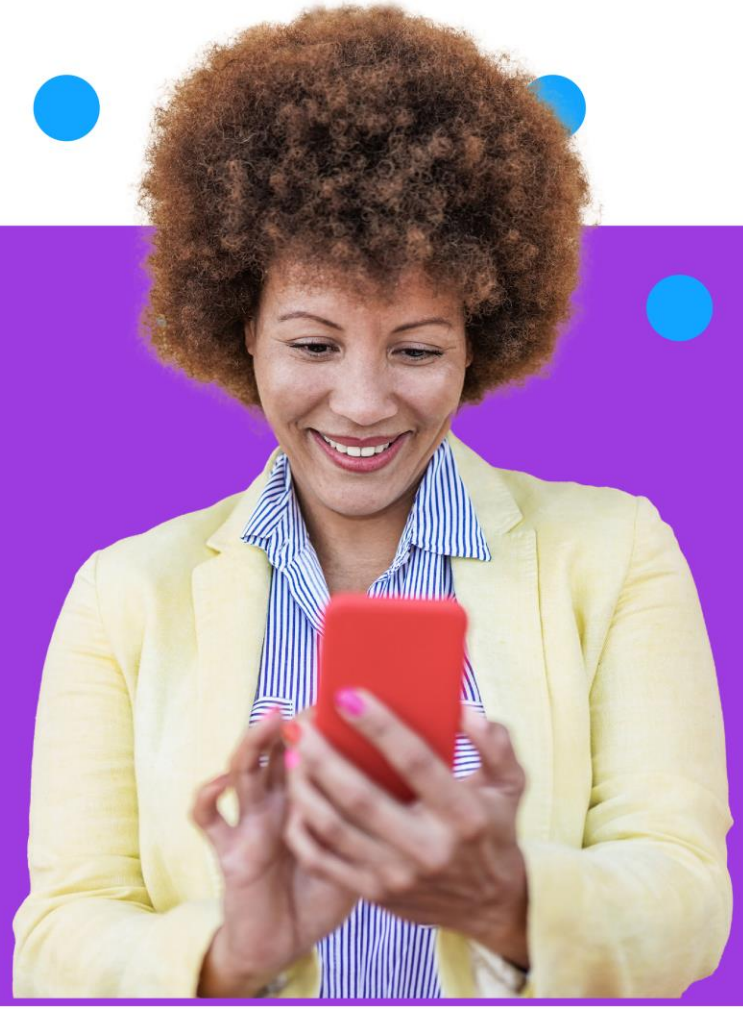
- **18th – 22nd of November, H2WEEK 2024**
  Project Boot at the EU Project Pavilion

- **19th of November, H2WEEK 2024**
  HYPOP WORKSHOP on permitting, safety, certification

European Hydrogen Week

18-22 November 2024
Brussels, Belgium
euhydrogenweek.eu

Join our community!



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3: Poll

Hide results

Show Polls

The Hydrogen Revolution: Social and technical aspects for a sustainable transition towards hydrogen economy

25th September 2024, 11 am

HYdrogen Public Opinion and acceptance, HYPOP Project Introduction

Marianna Franchino, ENVIRONMENT PARK

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HYPOP Project Objective

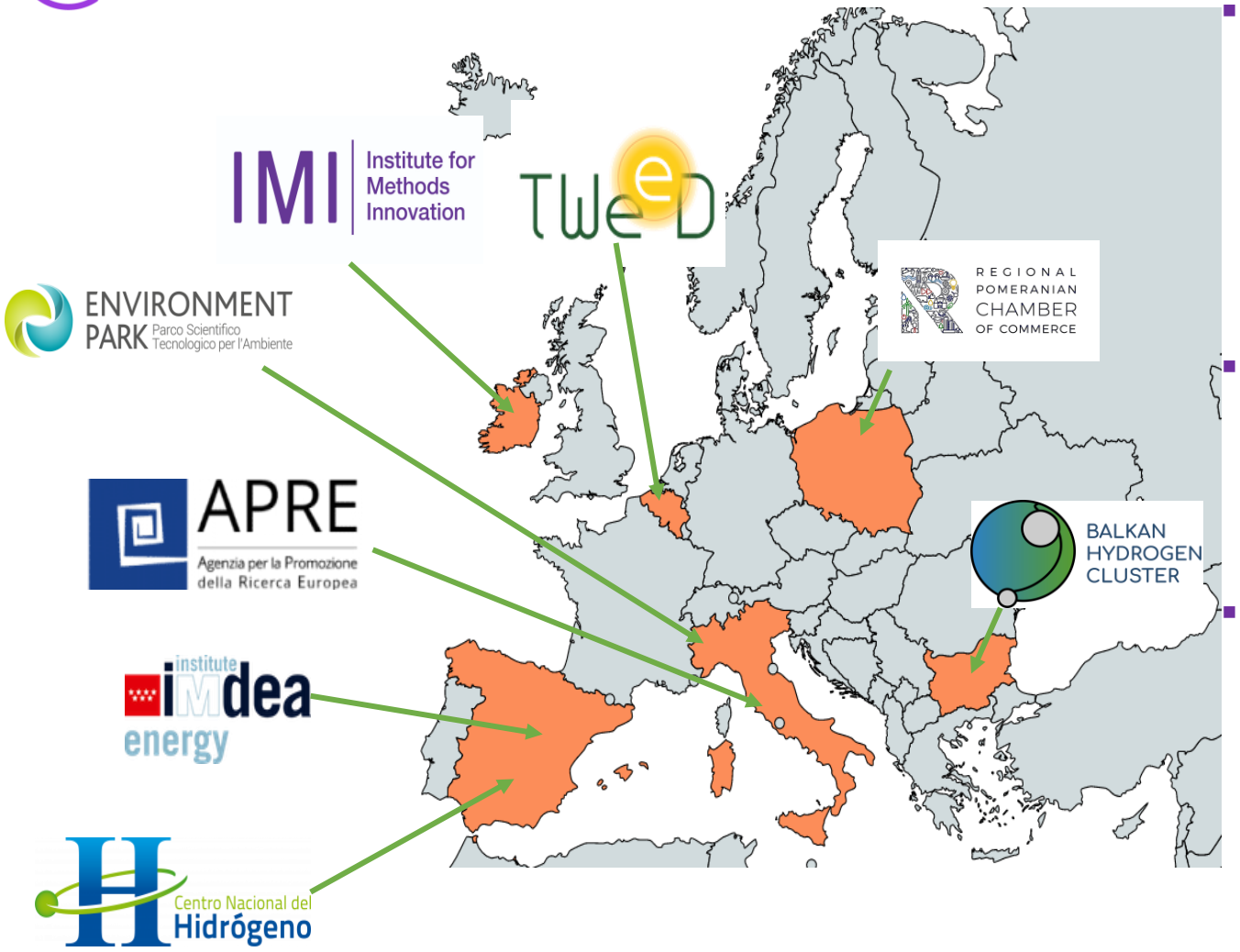
HYPOP – **Hydrogen Public Opinion and Acceptance**, is a project funded by the Clean Hydrogen Partnership under the European Horizon Europe programme.

Overall objective is to **raise public awareness and trust towards hydrogen technologies and their systemic benefits**, through the following activities:

- the preparation of **guidelines and good practices** that will help to define more effectively how citizens, consumers/end users, and stakeholders can be involved in the implementation of Hydrogen technologies;
- the **creation of a social platform** collecting communication materials (videos, news, scientific papers) on new hydrogen technologies, developed according to the early findings of the public engagement activities;
- the **definition of indicators** to be used for Hydrogen Social Life Cycle Assessment for public acceptance and informed decision-making.

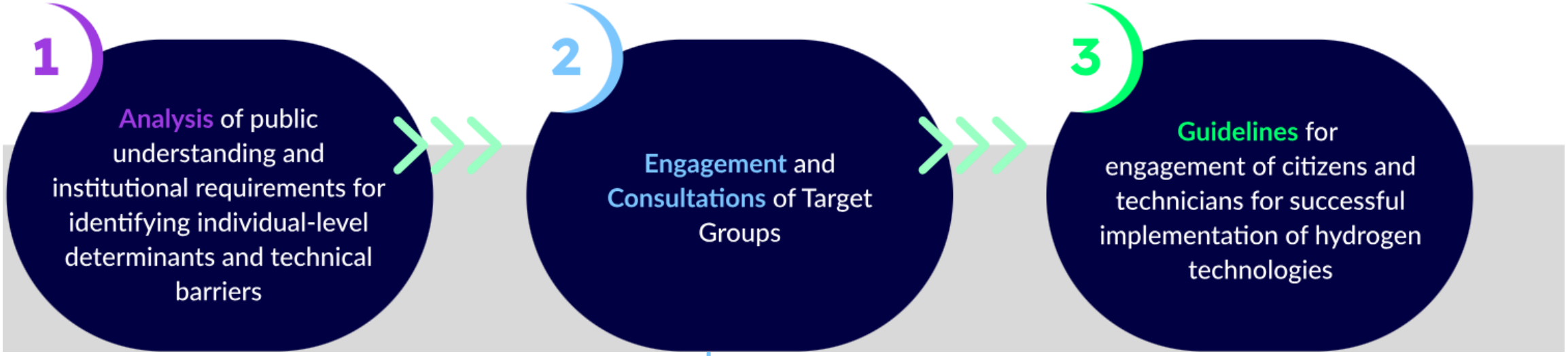
HYPOP will focus on two applications: **residential and mobility**, which will enter into the daily life of people.

HYPOP Project Consortium



- **4 Hydrogen Clusters:**
  - Environment Park
  - Cluster TWEED (Wallonia and Brussels)
  - The Pomeranian Regional Chamber of Commerce (RIGP)
  - The Balkan Hydrogen Cluster
- **3 Research Organisations:**
  - Institute for Methods Innovation (IMI)
  - The IMDEA Energy Institute (IME)
  - Centro Nacional del Hidrógeno (CNH2)
- **1 strategic communication and stakeholder engagement specialist**
  - the Agency for the Promotion of European Research (APRE)

Project Overview



Data from surveys, social & mass media; current **local regulations**

Workshops
Social media

- **Guidelines:** how to best involve citizens & public stakeholders & communicate to them
- **Social Life Cycle Assessment indicators**
- **Communication toolkit**
- **Web platform with videos presenting upcoming hydrogen technologies**

Active poll

0

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Image by Pexels

1. Based on your personal experience, which factors mainly influence the public opinion about hydrogen technologies? 2-3 words

HYPOP Project Target Groups

CITIZENS

- Citizens
- Consumers/end users
- Communication experts

STAKEHOLDERS

- First responders
- Permitting entities
- Certification bodies
- Decision makers

Social Analysis

Technical Analysis

SOCIAL ANALYSIS

What does people think about hydrogen?

- **H2implementation level in different EU countries (policy, social frameworks etc).**
- **Secondary data analysis previously conducted public opinion surveys** (e.g. Gallup Survey run by the Clean Hydrogen Partnership) to be used as baseline understanding of the public opinion regarding H2 implementation in EU countries in terms of technology understanding and acceptance.
- **Analysis of public engagement with H2 via social media across the EU27** to understand engagement and communication strategy.

Final development of a public informative and engagement strategy.

Active poll

0

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Image by Pexels

2. Have you heard about public engagement activities with citizens/end-users? Select one or more options

Living Labs

0%

Informative sessions

0%

Public consultations

0%

Communication campaigns via radio/tv

0%

Social Media Campaigns

STAKEHOLDERS ANALYSIS

Understanding of different EU approaches on:

- **Permitting**
- **Safety**
- **Certification**

for the installation of hydrogen technologies.

Understand gaps and barriers, differences, but also best practices.

Demo projects, hydrogen valleys have been analysed.

ENGAGEMENT ACTIVITIES

Co-creation workshops targeted for the 2 target groups:

- **Public engagement workshops**: to inform citizens and increase public trust in H2 implementation;
- **Stakeholders' engagement workshops**: inform and present the main results from the task on requirements' lists for permitting, safety and certification. In particular authorities issuing permitting and authorisations, first responders and certification bodies will be involved.

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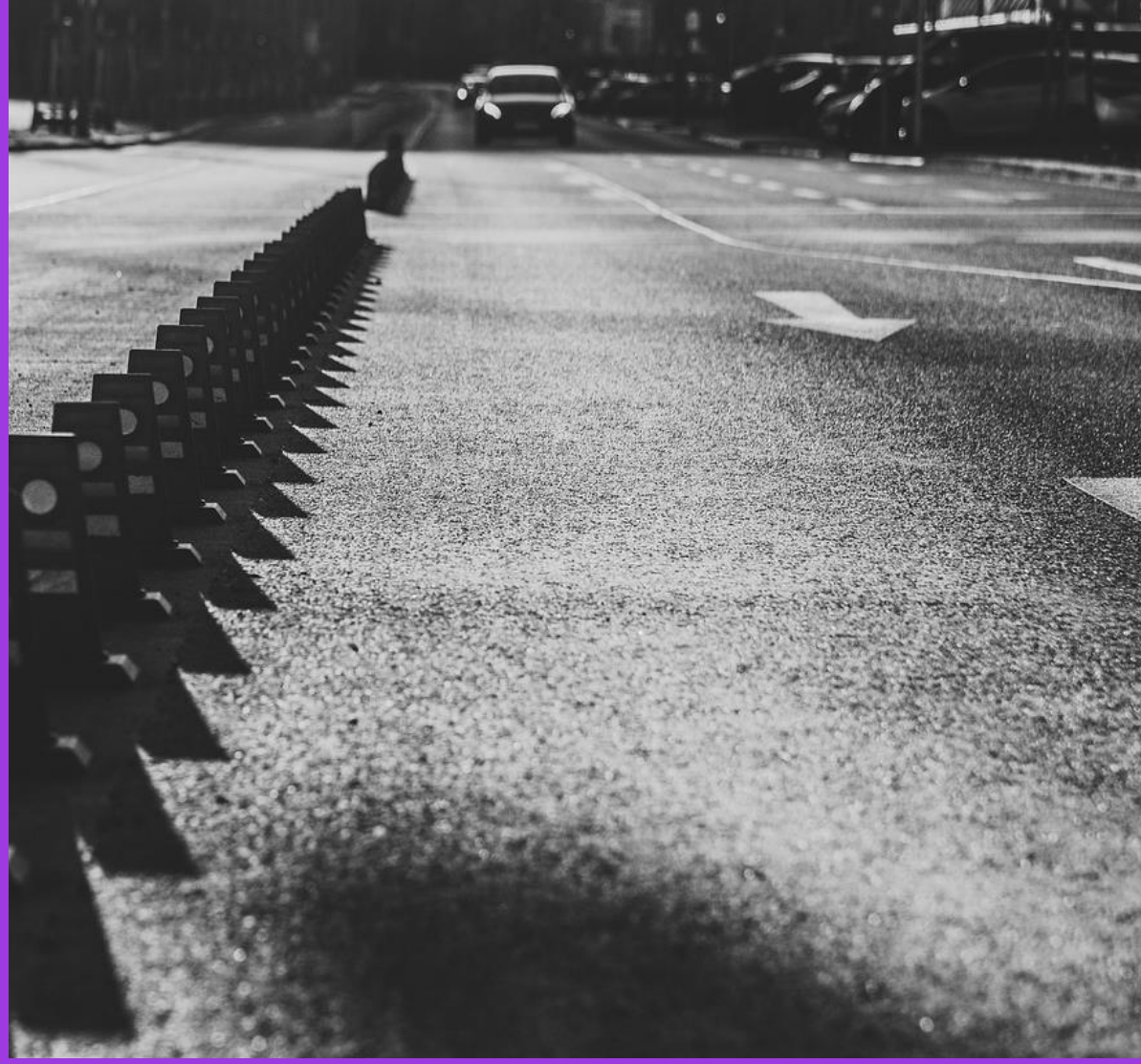
HYPOP Project OUTCOMES

GUIDELINES AND GOOD PRACTICES FOR H2 ACCEPTANCE

- **Public Engagement** on H2 technologies' implementation
- **Safety Requirements for H2 tech installation**
- **Permitting Requirements for H2 tech installation**
- **Certification Requirements for H2 tech installation**

Social Life Cycle Assessment indicators

- Socio-economic and environmental indicators for public acceptance and informed decision-making.



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HYPOP Project OUTCOMES

CALL TO ACTION!
Contact us for collaborations, videos/materials to promote in our platform!!

WEB PLATFORM – demo projects, initiatives and much more

EVERYWH2ERE

REMOTE

REFLEX

H2IT
ASSOCIAZIONE ITALIANA IDROGENO

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

ERIAN

cea liten

FUNDACIÓN PARA EL DESARROLLO DE LAS NUEVAS TECNOLOGÍAS DEL HIDRÓGENO EN ARAGÓN

UNIVERSITÀ DI TORINO

Politecnico di Torino

RINA

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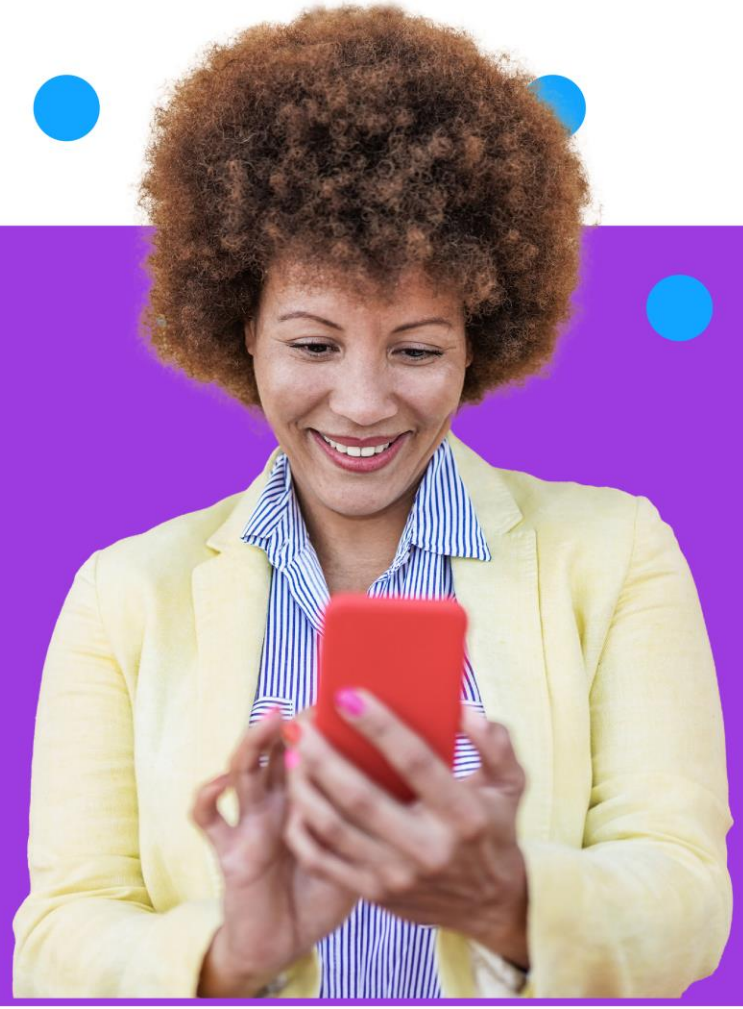

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ENVIRONMENT PARK

Marianna Franchino

marianna.franchino@envipark.com

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The Hydrogen Revolution: Social and technical aspects for a sustainable transition towards hydrogen economy

25th September 2024, 11 am

Companies, universities and public entities are key to raising public awareness

Simon Habran - Cluster TWEED – Belgium case

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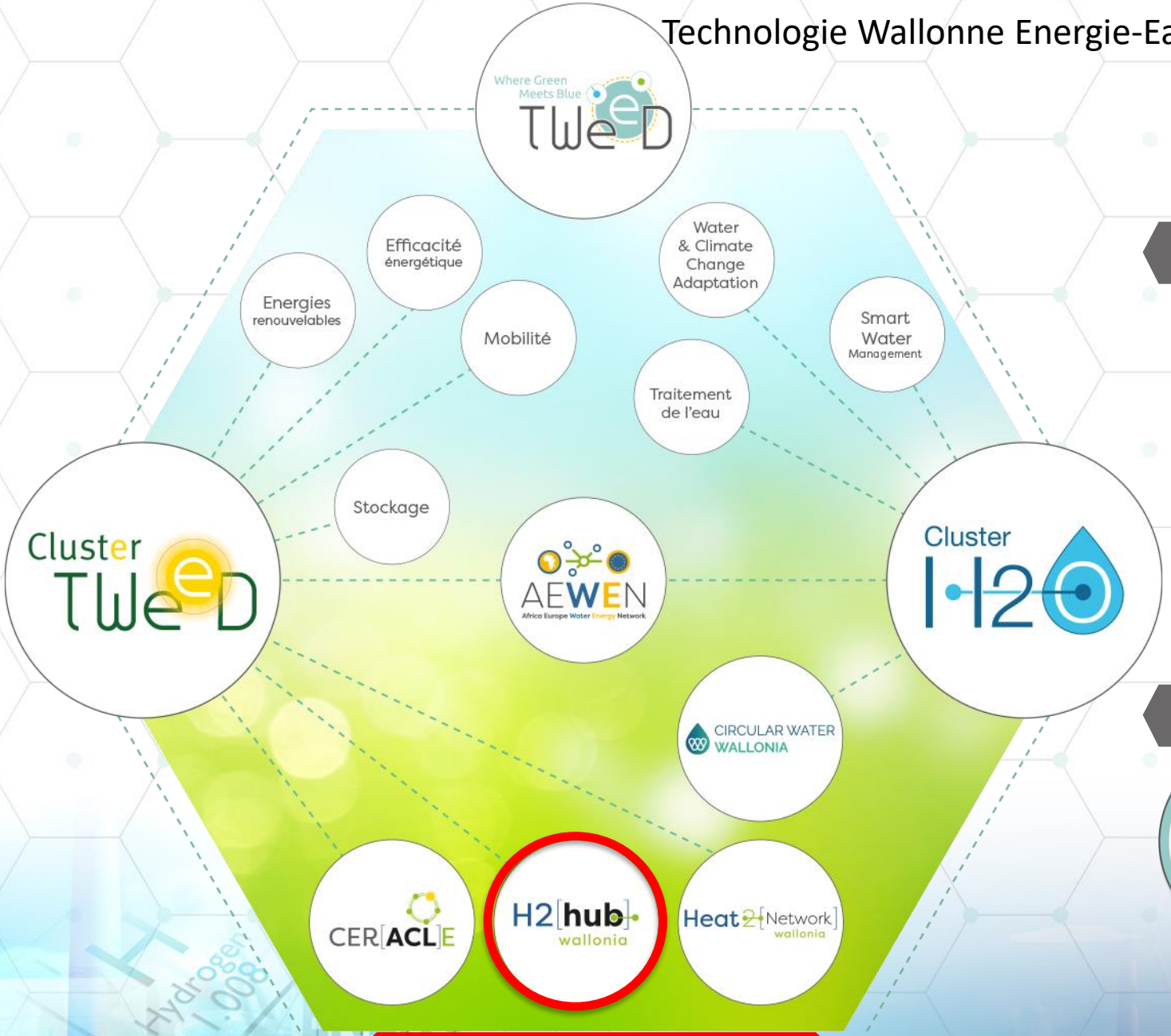
Technologie Wallonne Energie-Eau & Environnement Durable



Mapping

Innovation

Networking

International

Knowledge

Partnerships

Contact: shabran@clustertweed.be

H2Hub

- The new ecosystem of the energy transition

Companies, universities and public entities are key to raising public awareness

- Companies
  - Develop the **new technologies** and thus the **new market**
  - The citizen **must see this new market** to accept it.
- Research, Education & training infrastructures
  - Develop new courses that will attract students to this new sector => **improve awareness of students**
  - Develop new skills and knowledges
- Public entities
  - Attractivity of the new market => subsidies, tax incentives, penalties will help and force companies to enter this new market
  - Safety rules => **Target of 0 accident for the public acceptance.**
- Clusters
  - Improve collaborations between this 3 actors
    - e.g. : companies need new competences and training infrastructures need the feedback of companies to develop new courses
    - e.g.: companies need new long term directives and appropriate regulations to adapt their activities

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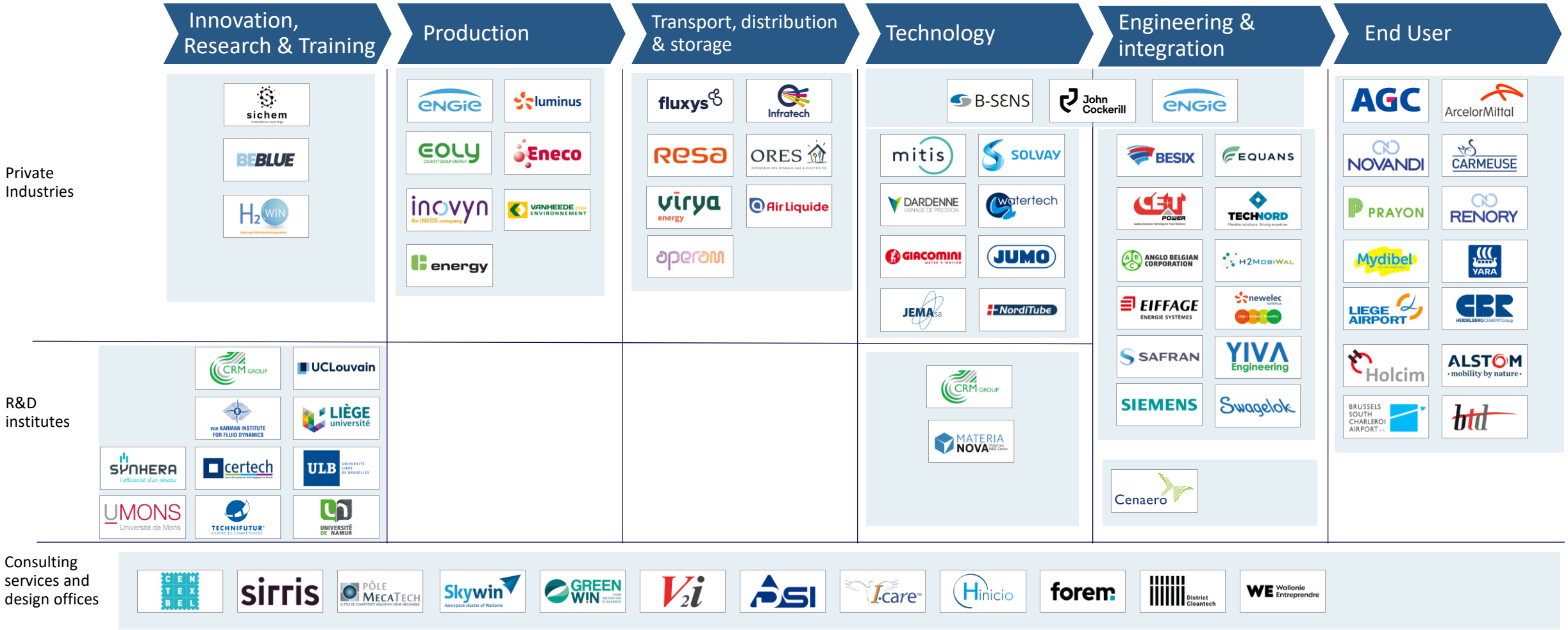
Value Chain in Wallonia



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Companies - Production projects in Wallonia

WalHyco

- H2 production by water electrolysis (5MW)
- Wind and photovoltaic power
- Refuelling station for 22 lorries
- Actors: Colurylt, Vyri E, Spadel, AbInBEv

H2C-Mouscron

- Hydrogen production through water electrolysis
- Production of biomethane from potato waste
- 4 dual fuel trucks + 4 fuel cell trucks + 3 tractors + 3 refuse trucks
- Actors: Luminus, Mydibel Fresh

Wind2Truck W2T

- H2 production by water electrolysis (1.25MW)
- Wind power 60%, photovoltaic 30% and grid 10%.
- 10 fuel cell trucks
- Actor: Luminus

John Cockerill

- Gigafactory (1GW electrolysis production capacity)
- Development of the H2 technology value chain in the EU

Columbus

- Power to Methane: combining CO2 captured during lime production with green H2 to produce e-methane
- Actors: Carmeuse, John Cockerill

HYPSTER

- Hydrogen propulsion technologies
- *Actors: Safran, Beblue, V2i, Gotech, Uliège, Sirris*

ZELLIE

- Hydrogen production Water electrolysis (5MW)
- 1 H2 barge + 1 fuel cell barge
- Vyria, Eoly E, Renory

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Companies - Production projects in Wallonia

- **Difficulties** to finalize these projects

  - Permitting and unclear safety measurements extend deadlines
    - One objectif of HyPOP project is:
      Clear guidance on safety and certification and support to obtain permits and authorisations for installing H2 technologies
      - Make an inventory of what is currently in place in Europe countries
      - Write a draft guideline
      - Approve the draft with stakeholders
      - Provide a validated guideline

  - **Bad business cases**
    - Need of **CAPEX and OPEX supports**
    - Larger projects to have **economies of scale**
      => combine different actors/projects to develop a hydrogen valley

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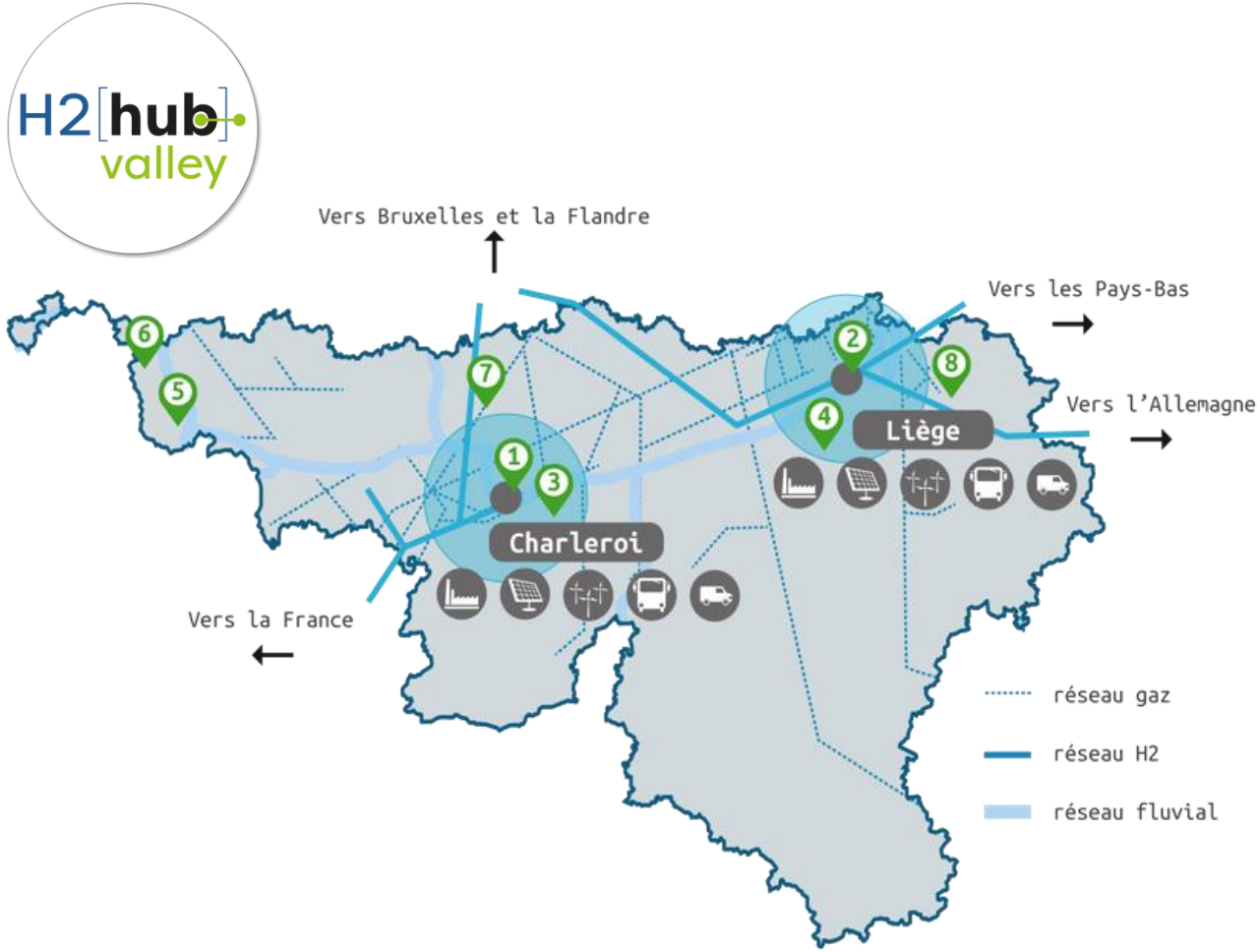
Companies – H2 valley in Wallonia

Hydrogen Valley in Wallonia : Key Focus Areas

- **Prioritized Applications** : Specific industries and heavy transport, including trucks and ships.
  - **Industry Decarbonization** : Targets high-energy-consuming sectors such as non-metallic minerals (glass, cement, lime), chemistry (chemicals, fertilizers), and metallurgy, with initiatives for CO2 conversion using hydrogen.
  - **Mobility and Transport** : Aims to position Wallonia at the center of European hydrogen corridors for highways and rivers, enhancing heavy and river transport, as well as aeronautics sector decarbonization.



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Public entities – Validation of the H2 valley

The Walloon region has the ambition to become a hydogen valley

- Several official communications
- Included in the Walloon strategy
- May 23, walloon gouvernment validates a call of tenders
  - Budget: 25M€
  - Production: 1000T/an
  - Quality: law carbon and 100% renewable in 2035
  - Location: maximum 10km of the european hydrogen backbone and 2 axes of the TEN-T core network
  - Closed: 15/09/2024

COMMUNIQUÉ

Le Gouvernement wallon met tout en œuvre pour favoriser l'émergence d'une filière d'hydrogène vert en Wallonie et souhaite la faire reconnaitre comme une « vallée de l'hydrogène » stratégique au niveau européen. En effet, l'hydrogène est un vecteur énergétique de choix pour décarboner certains secteurs économiques difficilement électrifiables mais également pour stocker de l'énergie et ainsi pallier l'intermittence des énergies renouvelables.

Dans le cadre du Plan de relance wallon, un plan stratégique spécifique à cette filière d'hydrogène prend progressivement forme avec le concours de nombreuses parties prenantes. En décembre dernier, le Gouvernement en adoptait le 1er volet consacré à la définition d'une vision d'ici 2050 et d'objectifs stratégiques à l'horizon 2030. Aujourd'hui, il a validé la constitution d'un organe de gouvernance dynamique et inclusif dont le rôle sera de structurer et de fluidifier les interactions entre les différentes parties prenantes impliquées dans cette filière en Wallonie. Il veillera également à inscrire la Wallonie dans la dynamique européenne des vallées de l'hydrogène.

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Research, Education & Training infrastructures

- Cluster TWEED is partner of different projects
  - European project : Green SKHy (NWE interreg)
    - Identified new skills and competences
    - For the 1st Deliverable: identified a need of a clear regulation to establish the right certification training

    ⇒ **align and complementary to the HyPOP project**

  - Federal project
    - BE-HyFE: mapping of research and innovation centers in Belgium
    - BHC Task 5: mappinp of education and trainings in Belgium

  - Regional project: e-WallonHy
    - Coordinate and mapping all innovative projects
    - Maping all competences thanks to Virtual-lab

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Thank you for your attention

CLUSTER TWEED

Simon Habran

shabran@clustertweed.be

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The Hydrogen Revolution: Social and technical aspects for a sustainable transition towards hydrogen economy

25th September 2024, 11 am

Current Safety and Permitting approaches for Hydrogen technologies integration at EU level

Mattia Miglietta (Environment Park)

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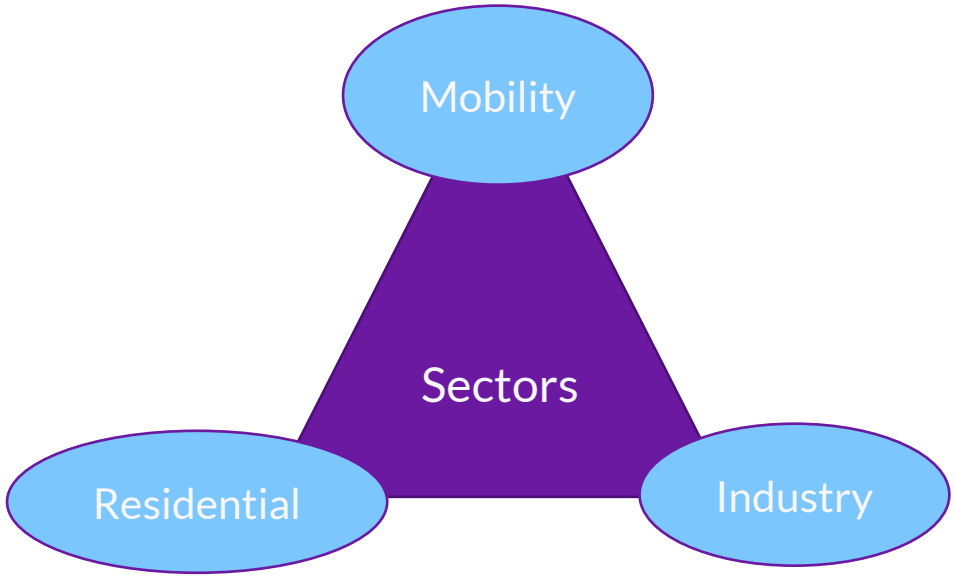
Framework of research



Analysis of **Safety and Permitting requirements** at EU level for Hydrogen technologies implementation

To support EU Hydrogen Economy through guidances based on best practices

Cross related aspects as drivers of Hydrogen Value Chain

MOBILITY

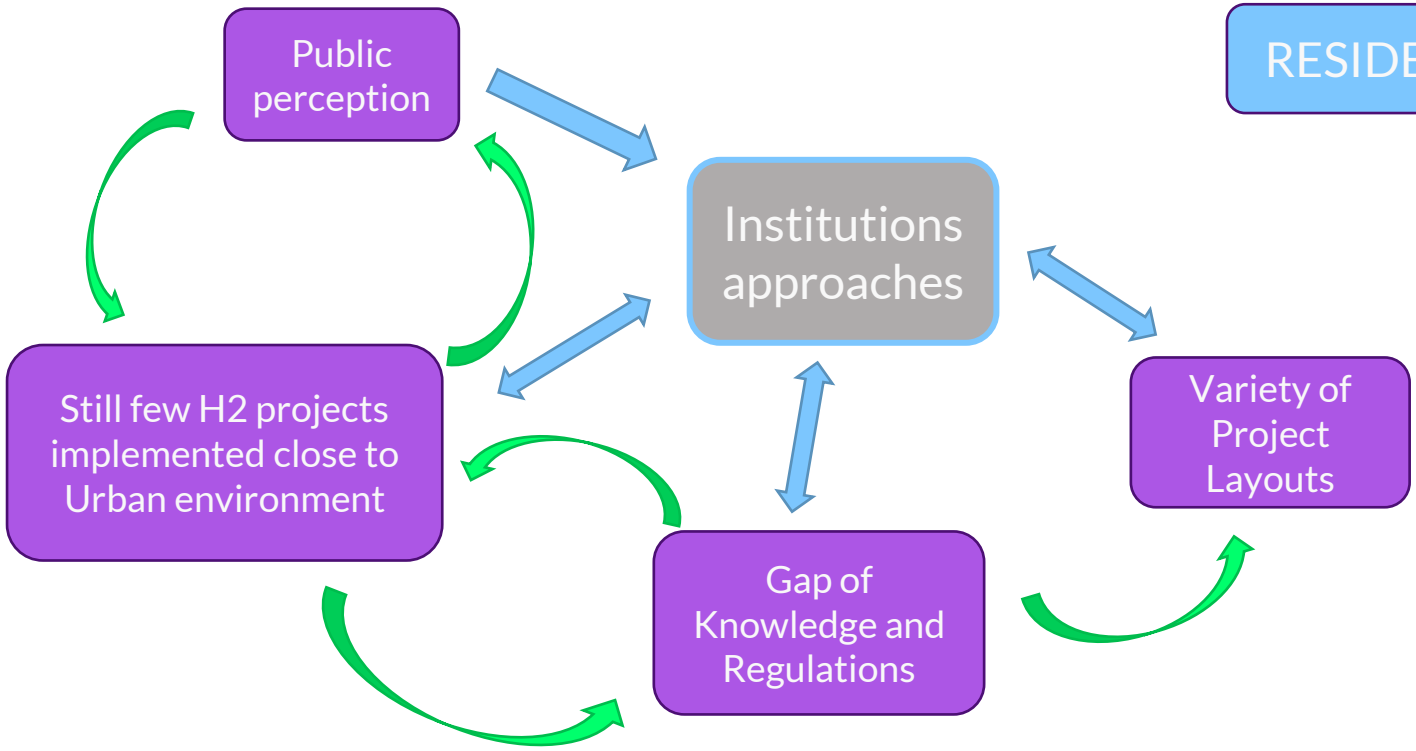
RESIDENTIAL

SAFETY

- Performance-based approach
- Prescriptive approach

PERMITTING

- Environmental legislation
- Safety legislation
- Spatial planning



Application of H_2 technologies: success story in H_2 mobility

Hydrogen Refuelling Station in Bolzano (Italy)

- Need of a containment structure for each hazardous component of the plant
- No differences for safety distances of H_2 technologies
- Strict provisions from HRS regulation

Hazardous elements	Protection distances	Internal safety distances	External safety distances
Compressors	15 m	\	30 m
Storage units	15 m	15 m	30 m
Box of the tube trailer	15 m	15 m	30 m

Hazardous element	Protection distance	Internal safety distance	External safety distance
Dispensing unit	15 m	12 m	30 m

HRS scale up of the plant from 350 to 700 bar

HOW?

- Risk analysis
- Interaction with first responders
- Explaining to institutions past accidents affecting H_2 perception
- Comparison with other safety approaches around EU
- Interaction with permitting authorities for compliancy with spatial planning

Customized protocols for Safety, Permitting and Certification

Containerised and mobile Hydrogen Refuelling station without on site production

- **Technical documentation for the HRS prototype**:
  - Development of the Project according to related technical regulation (if available)
  - Evaluation and acceptance from an official engineering association
  - Development of a maintenance plan
  - Development of Technical documentation for the Fire fighters
- **Installation of the prototype on the selected site**
- Obtaining a **operation certificate** from an authorised engineer
- Installation of pressurised gas and low voltage. The **certification is issued by an authorised company**
- **Inspection of the installation** by a control body, which issues an inspection certificate
- **Collection of all documentation and certifications**

Application of H_2 technologies: Barriers to H_2 in urban areas

Reversible SOFC for Cogeneration in Residential environment (Italy)

- HAZOP risk analysis (for safety, required by Fire Fighters)
- Fire Fighters support to identify the applicable regulations for fuel cells and storage (gap of H_2 regulation for storage residential application)
- Prescriptive application of Natural gas Storage regulation

SOFC (as micro-CHP) standard grid connection procedures and application of regulation NO BARRIER for FC

With containment structure

Storage with safety of degree 1:			
Storage capacity	Protection distance	Internal safety distance	External safety distance
4th category	5 m	\	10 m
3rd category	5 m	\	20 m
2nd category	5 m	\	25 m
1st category	5 m	\	30 m

Without containment structure

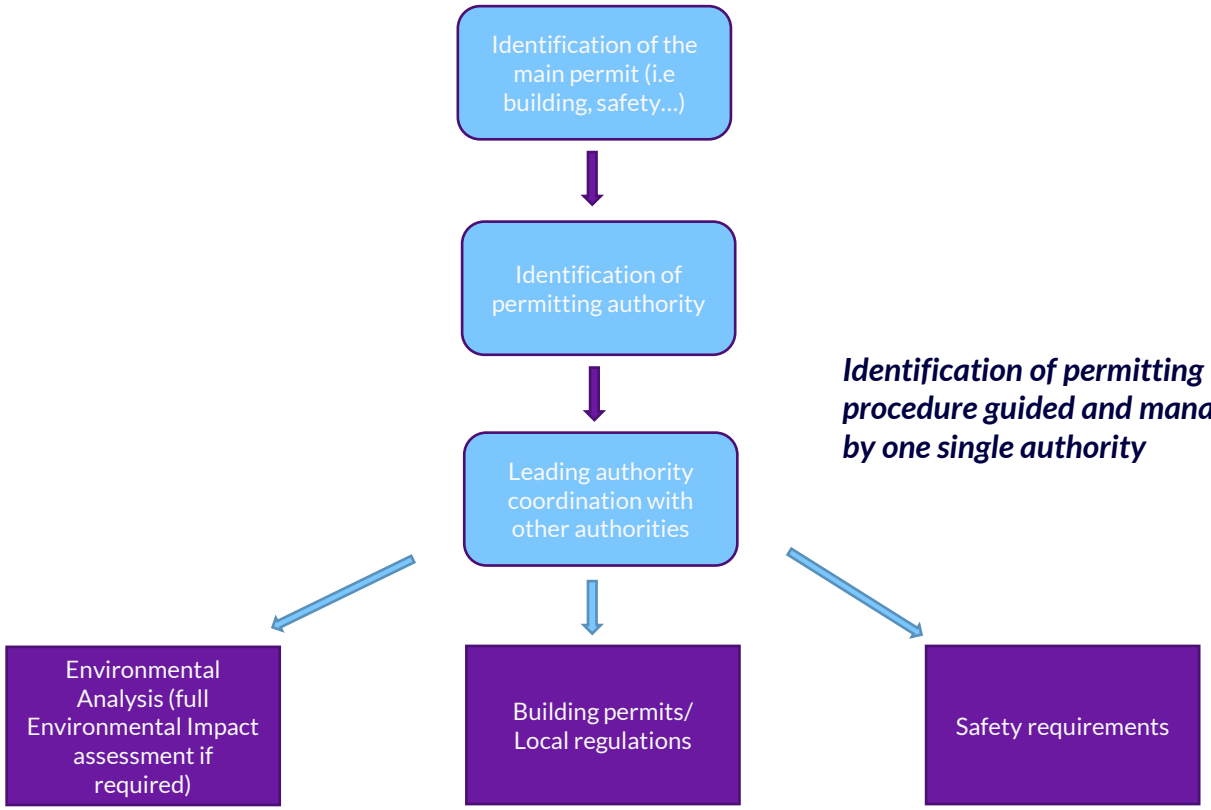
Storage of 4th category with no safety degree associated:			
Storage capacity	Protection distance	Internal safety distance	External safety distance
4th category	20 m	20 m	30 m

ISSUES associated to H_2 storage:

- High economic burden for the containment structures needed
- Complex to identify urban areas compliant with safety distances for H_2 storage

Guidelines to support institutions and stakeholders

Example of simplified permitting procedure for H_2 production projects (Swiss approach)



Identification of permitting procedure guided and managed by one single authority

Documentation provided according to the type of permit

Different types of guidance documents issued:

- Permitting guidelines issued by local authorities
- National guidelines for permitting
- Industrial guidelines for safety management

Further developments needed

Why it worked

- Performance based safety approach as an alternative:
  a) Stakeholders can rely on risk assessment procedures, technical standards and technical recommendations
  b) Safety measures defined by the manufacturers (if regulation gap is present)
- Simplified permitting procedures defined to boost hydrogen projects
- Common guidelines for safety and permitting

Why it did not work

- Existing regulatory gaps
- Unclear permitting procedures
- Low attention for emerging sectors (i.e residential)

Mattia Miglietta

Environment Park

mattia.miglietta@envipark.com

25th September 2024, Online
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Thank you for your attention!

www.hypop-project.eu

info@hypop-project.eu

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Poland case:
from education to the hydrogen valleys

25th September 2024, 11 am

Zaneta Klostowska, Director of Cluster of Hydrogen Technologies, Regional Pomeranian Chamber of Commerce; Expert in innovationa and market developement for hydrogen technologies, TUV SUD

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Costs of the energy transition in Poland by 2040: PLN 1.5 trillion.

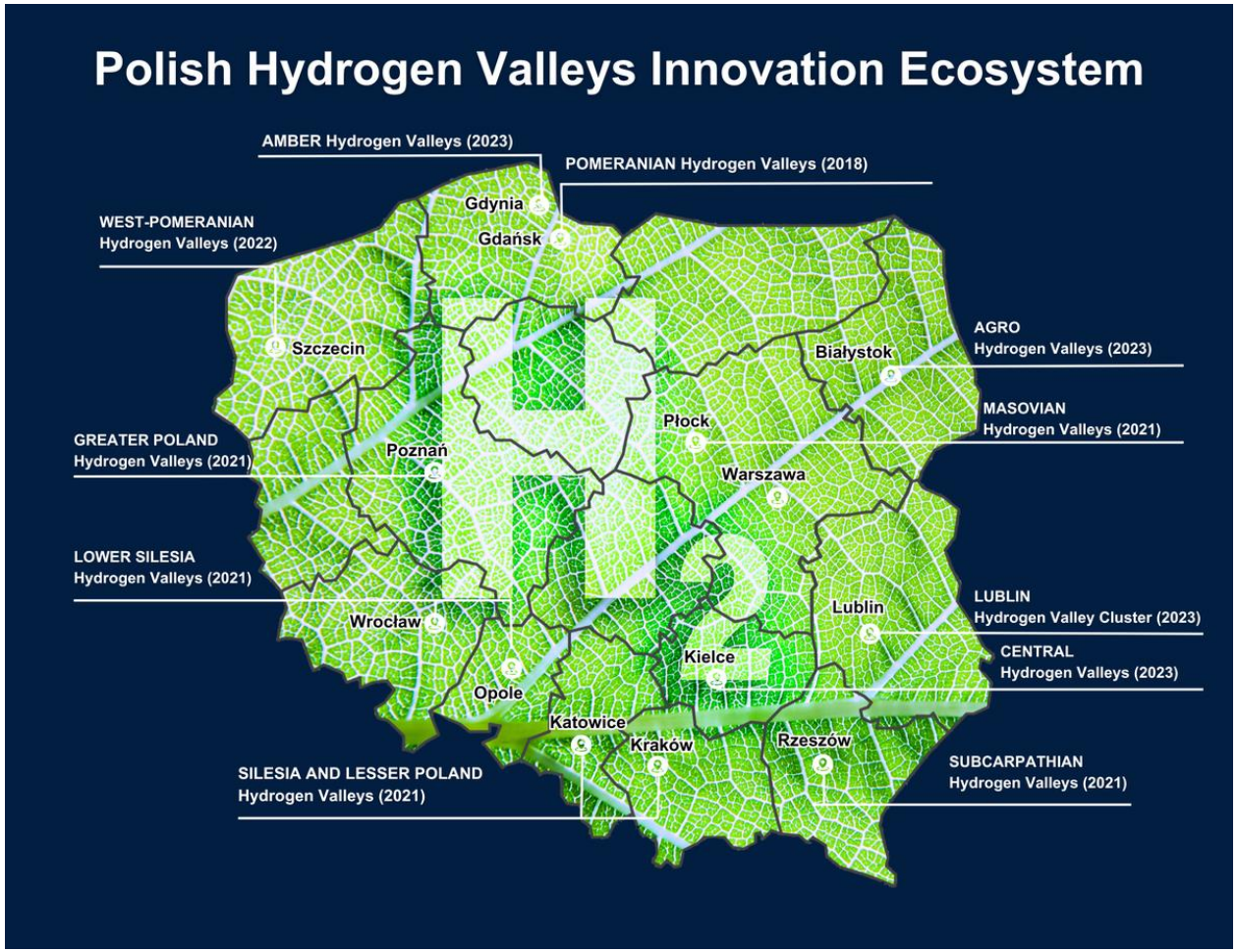
Obstacles:

- Technological,
- Financial,
- Legal,
- Competence,
- Human resources.

Source: Polish Green Transformation, European Commission reports.

The challenges of the energy transition – hydrogen valleys

Poland's targets by 2030: 32% of energy from RES in the national mix.

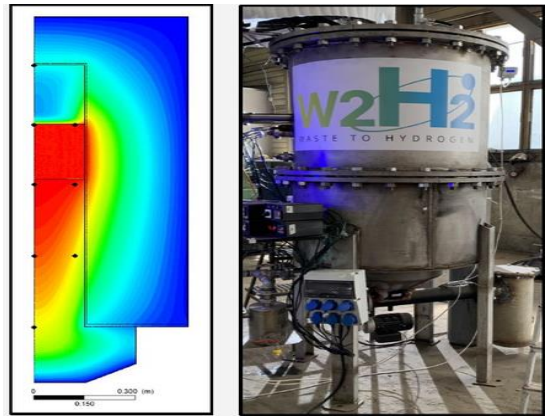


Electrolyser capacity
By 2030, the hydrogen valleys will integrate 2 GW of electrolyser capacity to support green hydrogen production.

Key Hydrogen Valleys
Poland is developing five major hydrogen valleys, including the Silesian, Lower Silesian, and Greater Polish Valleys.

Central Hydrogen Valley
The Central Hydrogen Valley aims to produce 54,000 kg of hydrogen annually, supported by 2 GW of wind and solar capacity.

Hydrogen Valleys as a centre for innovation in hydrogen technology



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40% of employees in the RES sector will have to undergo additional training by 2025.

Most sought-after professions:

- Renewable energy engineers
- Installers and service technicians of RES installations
- Energy project management specialists
- Automation engineers and IT specialists
- Electromobility specialists

Fostering Hydrogen and Green Technology Experts

Hydrogen education programs
Key technical universities like Technical University of Gdansk are integrating hydrogen technology into their curricula to prepare future experts.

Industry partnerships
Collaboration between academia and industries like KGHM and Grupa Azoty fuels Poland's hydrogen expertise development.

Government-supported research
Research and innovation in hydrogen are supported through national programs and EU-backed projects.

ŻANETA KŁOSTOWSKA

CLUSTER OF HYDROGEN TECHNOLOGIES; TUV SUD

Z.KLOSTOWSKA@KALSTERWODOROWY.PL

25th September 2024, Online
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www.hypop-project.eu

info@hypop-project.eu

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