

MidTerm Event: Linking Hydrogen Power Potentials

Hamburg, Germany

22 October 2025

Programme

- 10.30 Welcome & LIHYP project introduction**
Ingrid Klinge and Stevie Atterbury, New Energy Coalition (NL), Project Leader
- 10.45 Making hydrogen possible with the interregional roadmap!**
- Puzzling with interregional roadmaps - *Dirk Schaap, Province of Drenthe (NL)*
 - Discussion
- 12.00 Closing the Gaps - Retrofitting Hydrogen Vehicles**
- Impulse on hydrogen retrofitting gap analysis - *Jens Erik Helbo Andersen, Hydrogen Valley (DK)*
 - Discussion



www.interregnorthsea.eu/lihyp

Programme

- 13.00 Lunchbreak (for registered participants)**
- 14.00 Become a first mover on the Hydrogen Networking Platform and gain practical experience from the LIHYP pilot projects!**
- Impulse on Hydrogen Networking Platform - *Andreas Stroink, H2 Region Emsland (DE)*
 - Elevator Pitches of the LIHYP pilots - *various project partners*
- 15.00 Meet the LIHYP partners!**
Networking & Drinks



www.interregnorthsea.eu/lihyp

Welcome & LIHYP Project Introduction

Linking Hydrogen Power Potentials

- Programme: Interreg VI B North Sea Region
- Budget: ca. 5 Mio
- Funding: ca. 3 mio
- Duration: 48 month (until summer 2027)
- Funding: 60 % average

LIHYP Partners & Region

Leadpartner:

New Energy Coalition
Drivers of Change

aconium

BENTHEIMER EISENBAHN AG

BMÖ
clever versorgt

CIRCOE
CONSEIL & INNOVATION EN LOGISTIQUE

DLR
Institut für Vernetzte Energiesysteme

Eurowind Energy™

Groningen Airport Eelde
Luchthaven van het Noorden

H₂Region EMSLAND

HYDROGEN VALLEY®

IDIT
Institut du Développement International des Transports et de la Logistique

kiwa

RÉGION NORMANDIE

OLEC
Energie bewegt den Nordwesten

P&E
P&E LOWLANDS BV

provincie Drenthe

transdev
the mobility company

university of groningen

CARL VON OSSIETZKY universität OLDENBURG

URBAN WATERWAY LOGISTICS

WaterstofNet



Goal of the Project

1. Integration of existing hydrogen capacities into a comprehensive energy system

Through the implementation of an H2-NSR platform involving stakeholders and market participants, the goal is to provide access to essential information and data for all relevant parties.

2. Development of business opportunities

By connecting the regional and national hydrogen valleys that have emerged in recent years, new business opportunities can be created and scaled.

3. Demonstration of a regional green hydrogen infrastructure in the transport sector (broadly defined)

This includes showcasing how green hydrogen can be applied across various modes of transport and logistics within the region.

4. Creation of regional roadmaps

These roadmaps will support companies and regional governments in decision-making processes and ultimately lead to an interregional roadmap.

6 Pilots

- **France Rouen:** Retrofit and integration of a hydrogen-powered coach (H2 buses)
- **Belgium Ghent:** Hydrogen-powered battery for a riverboat operating in Ghent
- **Netherlands – Groningen:** Development of a multitool system for hydrogen integration at Groningen/Eelde airport
- **Germany – Bad Bentheim:** Research into a hydrogen-powered freight train
- **Germany – Oldenburg:** Hydrogen-powered cargo bike and development of supporting infrastructure
- **Denmark – Hobro:** Direct connection of a hydrogen refueling station to an onshore wind installation

HYDROGEN IN HAMBURG

www.mediaserver.hamburg.de / Maxim Schulz

HYDROGEN PROJECTS IN HAMBURG



Hamburg

HYDROGEN IN HAMBURG

- cornerstone for comprehensive decarbonization of industry and the energy transition
- Objectives:
 - Increase green hydrogen production for local industries
 - Rapid connection to existing hydrogen pipeline systems
 - Support urban climate targets
- ➔ Establish Hamburg as an important hydrogen centre in Germany and Europe
- ➔ Integrated approach for all stages of the value chain
- Starting point: 2021: 12 companies develop the Hydrogen network in Hamburg

HYDROGEN IN NORTHERN GERMANY

Northern German Hydrogen Strategy

- Framework conditions
 - Ideal generation capacities for wind power
 - Seaports as import, logistics and value creation centres
 - Large and cross-sector demand- Suitable formations for storage
- Objectives:
 - By 2030, continuous development of an H2 infrastructure in northern Germany to enable sufficient import and transport of H2 or its derivatives
 - Creation of a roadmap for vocational and academic education and training by networking stakeholders to initiate priority measures
 - Public relations: about potential, projects and activities in Northern Germany

TIMELINE HYDROGEN PROJECTS IN HAMBURG

July:
Opening
H2-
TechCenter



October:
Announcemen



November:
Opening of
the
production
facility for 24V
fuel cell
systems



July:
Start of test field
for hydrogen-
powered port
logistics



September:
Opening of the
Stack
Manufacturing
& Development
Centre



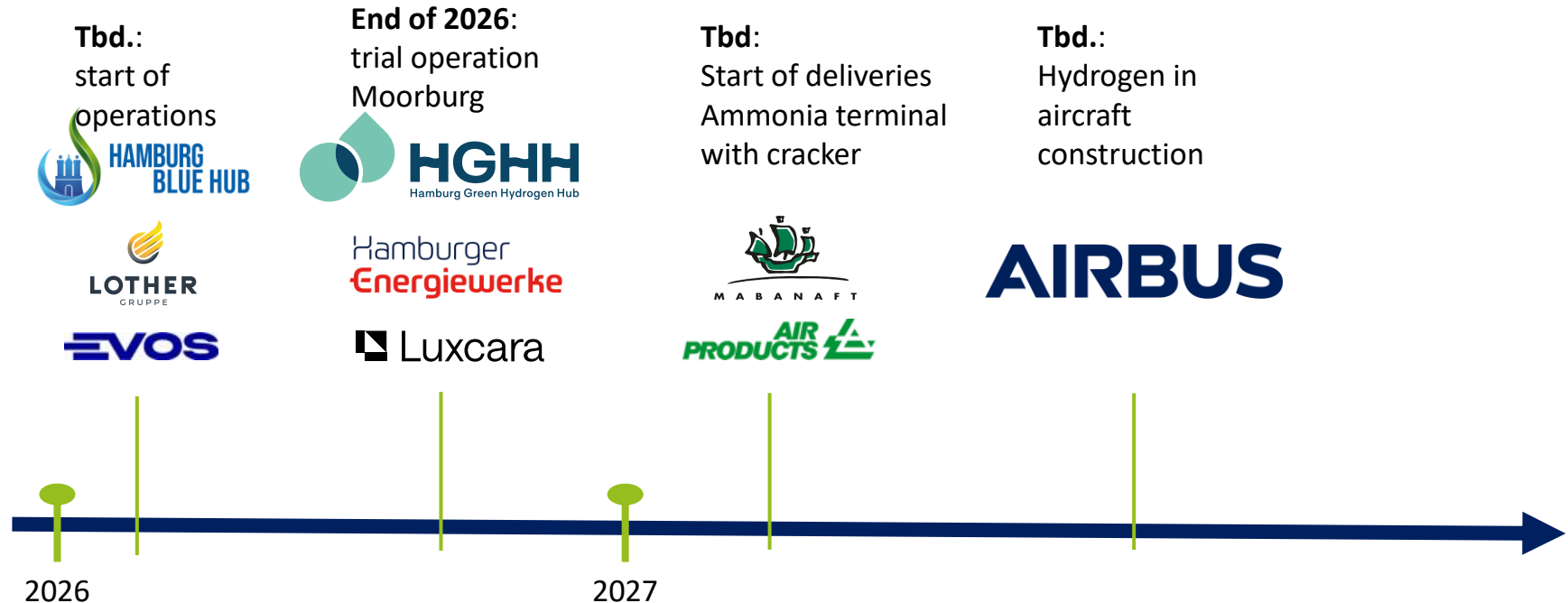
October:
Premiere of
Europe's
largest
hydrogen trade
fair in Hamburg



2023

2024

ZEITSTRAHL HAMBURGER PROJEKTE



HYDROGEN IN AIRCRAFT CONSTRUCTION IN HAMBURG

- Hamburg is at the forefront of developing hydrogen infrastructure for aircraft construction
- Initiatives: Hydrogen Aviation Lab and Interreg BSR project HyAirport
- Objective: create a sustainable aviation fuel alternative, particularly for short and medium-haul flights
- Lab is equipped with test systems and a fuel cell, focusing on ground-based hydrogen processes
- BSR HyAirport project: focus on the development of necessary infrastructure for hydrogen use in aviation

HYDROGEN STAKEHOLDER IN HAMBURG



Hamburg

STAKEHOLDER IN HAMBURG



Project developers and users of renewable energies

- Energy suppliers in the renewable energy sector,
- hydrogen infrastructure,
- grid and storage projects
- Strong multinational focus (purchasing and procurement) High market dynamics



Manufacturer/supplier for EE

- International headquarters and branches
- Product development & project management
- International sales
- Material procurement (logistics, interfaces)
- Supply & supplier management

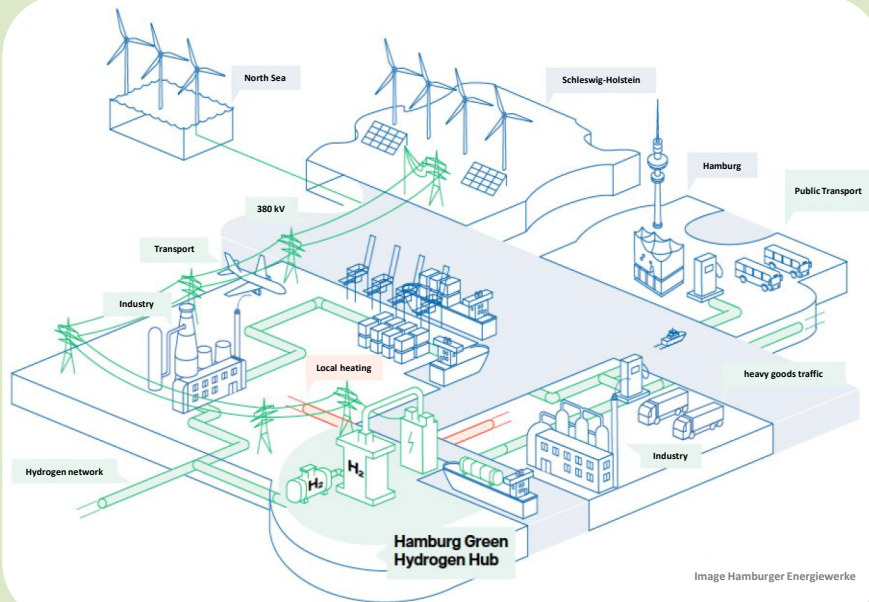


Service providers, SMEs and universities

- Leading in the field of certification (projects)
- EE/hydrogen legislation and regulatory framework (national/international)
- Financing and insurance
- Technical services/engineering
- Components, special applications

PRODUCTION AND DISTRIBUTION: HAMBURG GREEN HYDROGEN HUB UND HH-WIN

100 MW hydrogen electrolysis plant



- Location at the former Moorburg coal-fired power plant
- Green hydrogen production (from wind and solar energy) expected to start in 2027
- One of the largest electrolysis plants in Europe
- Funding granted by Important Projects of Common European Interest (IPCEI) in February 2024
- Partners: Hamburger Energiewerke, Luxcara
- Connection to the 380 kV transmission grid and 110 kV local distribution grid
- Connection to the Hamburg hydrogen industry network
- Liquefaction plant, trailer loading station and filling into tube trailers planned
- Proximity to hydrogen consumers: industry, logistics, heating
- Potential as a model region in Hamburg and northern Germany for the development of a hydrogen economy



Hamburger
Energiewerke



HH-WIN

Hamburg Hydrogen Industry Network

- Approximately €123 million in IPCEI
- 60 km pipeline network (part of the H2 core network)
- Completion of 40 km in 2027
- Connection to HyPerLink I in 2027
- Further expansion stages planned

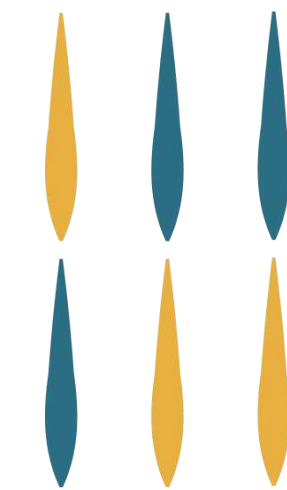
HYDROGEN CHALLENGES IN HAMBURG



Hamburg

HYDROGEN CHALLENGES IN HAMBURG

- lack of an comprehensive, permanently reliable regulatory basis
- regulations are restrictive and complex in their design and difficult to implement in practice, esp. since Germany faces particular challenges due to its electricity mix
- regulations are not permanent, but are subject to change as part of the planned revision (expected in 2028), which further limits planning security
- required documentation under the certification regulations is very time-consuming and represents a considerable hurdle, especially for small and medium-sized enterprises
- complex approval procedures for hydrogen-related facilities
- risk of a significant increase in the price of hydrogen if grid free obligation takes effect



Interreg
North Sea



Co-funded by
the European Union

LIHYP

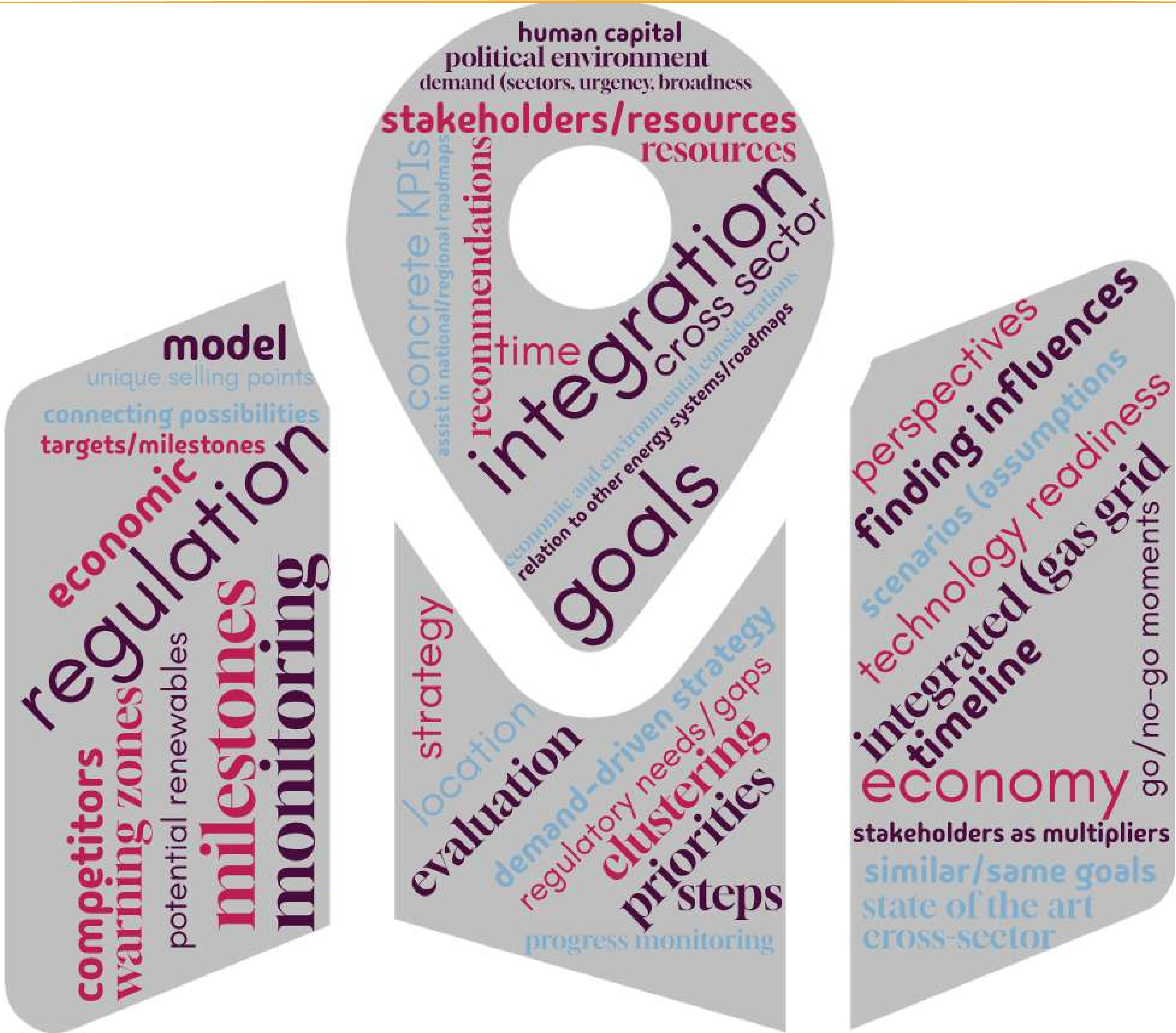
Workpackage 4

Puzzeling Roadmaps

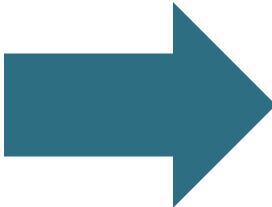
Hamburg Tech Expo
October 22, 2025

Arnoud Boerkoel & Dirk Schaap

Ambition Vision
Roadmap
Direction
Strategy
Financial plan

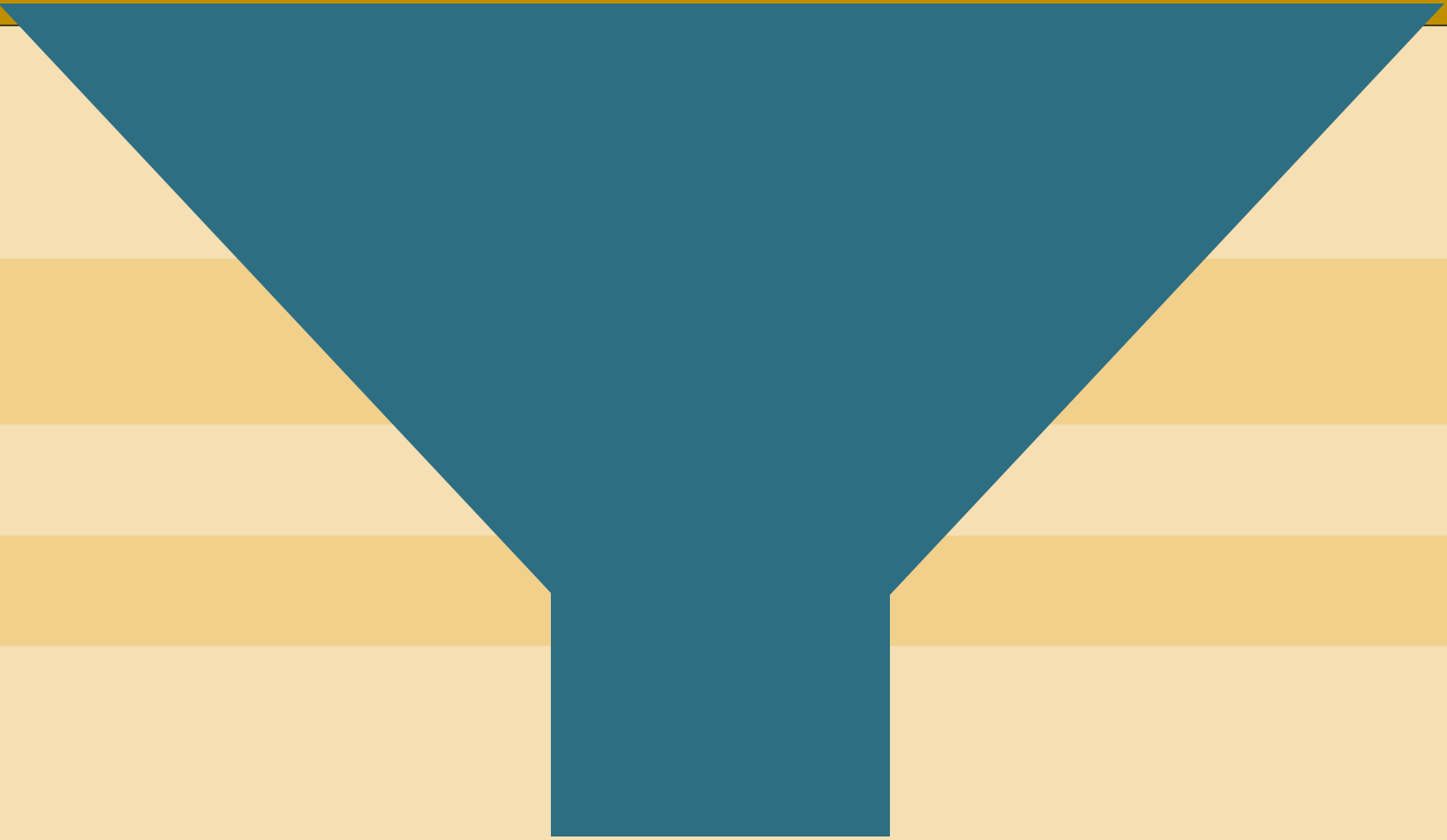
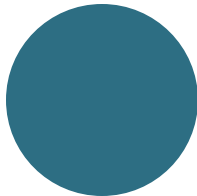


Project basics LiHyp – design of the project



Part	Contact person	Interpretation of			
General – program lead	Ingrid Klinge / Stevie Atterbury (New Energy Coalition - Netherlands)				
Work package 1: Platforms	Tim Husman (Energy Hub Emsland - Germany and university Oldenburg)				
Work package 2: Pilots		Pilot and analysis for retrofitted H2 <u>long haul busses</u>	Rouen	France	
		PEL living lab CHP installation for city logistics	Gent	Belgium	
		GAE Development and implement <u>multitools</u> for H2 <u>airport</u>	Groningen Eelde	Netherlands	Jeroen Kamphuis
		BMO Development and local energy hub for <u>city cargo</u>			
		H2 pilot train Emsland North-West Germany	Emsland	Germany	
		EWE pilot offshore wind system integration		Denmark	Jens Erik Helbo Anderson
Work package 3: Regulation and Policy	Jens Erik Helbo Andersen (Hydrogen Valley, Denmark)				
Work package 4: Roadmaps	Provincie Drenthe; Netherlands				
Communication (all WP)	Marion Rohjans (Olec, Oldenburg, Germany)				

Project basics – WP4

Work Package	Project activity (task) or Sub activity	
4.1	Collection of (external) policy goals/ambitions/targets and development of <u>top down</u> roadmap (3x reports, updated yearly) (NATIONAL)	
4.2	Extraction and enrichment of platform data and development of <u>bottom- up</u> roadmap (3x reports, updated yearly) (REGIONAL)	
4.3	Assessment of pilot learnings (3x reports, yearly reports)	
4.4	Assessment of regulatory learnings (3x reports, yearly reports)	
4.5	Development of interregional dynamic roadmaps (Consolidation and comparison of bottom-up and top-down findings) (3x reports, updated yearly)	
4.6	Interview on policy effectiveness (2 interviews & 1 enquete per pilot region; 15x)	
4.7	Com activity: Internal Event: Stakeholder Integration and discussion of result and policy suggestions (2x per year, starting after first year)	
4.8	Com activity: External events (Dissemination of Roadmaps in public events; 16x)	
Output: 5 Regional roadmaps		
Output: 1 North Sea Region roadmap towards meeting the fit 55 targets, including regional roadmaps (One NSR roadmap, consist 5 Lihyp regional roadmaps)		

Presentation outline

- WP4.1 National Roadmaps
- WP4.2 Regional Roadmaps
- WP4.3 Pilot perspective
- WP4.5 Development of an interregional roadmap

4.1 National Roadmaps

Responsible authorities and status of National Roadmaps

Country	Responsible Authority(ies)	Key Role / Notes
Belgium	Federal Ministry of Energy	Strategy developed in 2021 , in consultation with the regions.
Denmark	Ministry of Climate, Energy, and Utilities	Formal government policy, developed in 2020 with input from industry and research institutions.
France	Ministry of Ecological Transition, Ministry of Economy, National Hydrogen Council, ADEME	Interministerial governance developed in 2024 , updated in 2025 . Strong role for ADEME in implementation.
Germany	Bundesministerium für Wirtschaft und Klimaschutz (BMWK), NOW GmbH	Strategy is formally adopted in 2020 , updated in 2023 . NOW GmbH coordinates implementation and subsidy programs.
Netherlands	Ministry of Climate and Green Growth, National Hydrogen Program (NWP)	Roadmap is a public-private collaboration drafted in 2022 . Non-binding. National Hydrogen Program (NWP) acts as a connector and accelerator.

Shared Ambitions

All five North Sea countries see **Hydrogen as a key enabler** for:

- **Climate neutrality by 2050**, complementing electrification.
- **Decarbonizing industry and heavy transport.**
- **Infrastructure development:** European pipeline integration (**European Backbone**) in support of a hydrogen market.
- **Public-private collaboration:** Strong involvement of governments, industries, and research institutions.

Key Differences

- **Belgium & Netherlands:** Focus on import/transit hubs (Ports) and repurposing gas infrastructure, European pipeline integration, focus on production with offshore wind.
- **Denmark:** Focus on green hydrogen export, production with offshore wind.
- **France:** Nuclear hydrogen, with centralized hubs and a 4,400 km pipeline network by 2030.
- **Germany:** domestic production (10 GW by 2030) with 50–70% imports, focus on industrial demand and European pipeline integration.

Common Challenges

- **Regulatory fragmentation:** Slow EU harmonization (certification, permits).
- **Financing risks:** Strong reliance on subsidies (EU, National, regional) and uncertain long-term investments.
- **Infrastructure delays:** Permitting bottlenecks, construction setbacks, rising prices and financial uncertainties (risks).
- **Import dependence:** Supply security risks, especially for countries with limited domestic production.
- **Uncertain demand:** demand is lacking or prices are too high for off-takers

Conclusions and Insights

- **Develop local hydrogen eco-systems and hydrogen hubs** (H2 Hollandia (NL); Green Hydrogen Hub Vejle (DK); H2-Starter Lörrach, Baden-Württemberg (DEU))
- **Harmonize regulations** (EU certification, permitting).
- **Accelerate infrastructure** (Delta-Rhine Corridor, European backbone).
- **Stimulate demand and harmonize demand policies** (mandatory quotas for industry and mobility).
- **Strengthen financing** (long-term contracts, stable public-private partnerships).
- **Monitor and evaluate progress** (annual reports with KPIs).

4.2 Regional Roadmaps

Commonalities Between Regional Hydrogen Approaches

- **No roadmaps:** but policies and support schemes in place
- **Ambitions:** All regions view hydrogen as a key to decarbonization, particularly in industry, heavy transport, and energy storage.
- **Focus Areas:** Pilot projects and locally produced hydrogen form the foundation for scaling up
- **Infrastructure:** Expansion of pipelines, hubs, and refueling stations is a priority, but often face delays due to permits and financing.
- **Collaboration:** Cross-border collaboration (Germany- Denmark, Belgium-Netherlands) is considered essential for success.

Challenges 1

- **Subsidies:** dependence on EU subsidies (IPCEI, Interreg, CHP) and public-private partnerships; uncertainty about National subsidies and support
- **Government:** policy uncertainty (REDIII implementation, national regulations, support instruments) hinders implementation.
- **Regulation:** fragmentation and slow harmonization at the EU level.
- **Value chains:** supply and demand must grow simultaneously; without certainty of offtake or supply, projects remain stalled.

Challenges 2

- **Local vs. National Integration;** regions aim for autonomous, local hydrogen chains, but depend on national/European backbones and policies. (Delta-Rhine Corridor, European Hydrogen Backbone).
- **Infrastructure:** delays in development of pipelines and storage.
- **Import Dependence:** uncertain supply chains (Germany, Netherlands, Belgium)

Conclusions regional roadmaps

- **Commonalities:** no formal regional roadmaps, but policies and programs in place; all regions see hydrogen as a complement to electrification, focusing on industry, mobility, and storage.
- **Collaboration, financing, and regulation** are critical success factors.
- **Differences:** determine the approach
 - Position of projects in the value chain (import; export; end-use)
 - energy mix (nuclear; wind; gas (with CCS); to a lesser degree solar)
 - scale (local; National; Cross-border is still lacking/very limited)
- **At the regional level things are happening**

4.3 Pilot Perspective





Refuel station
Handest Hede

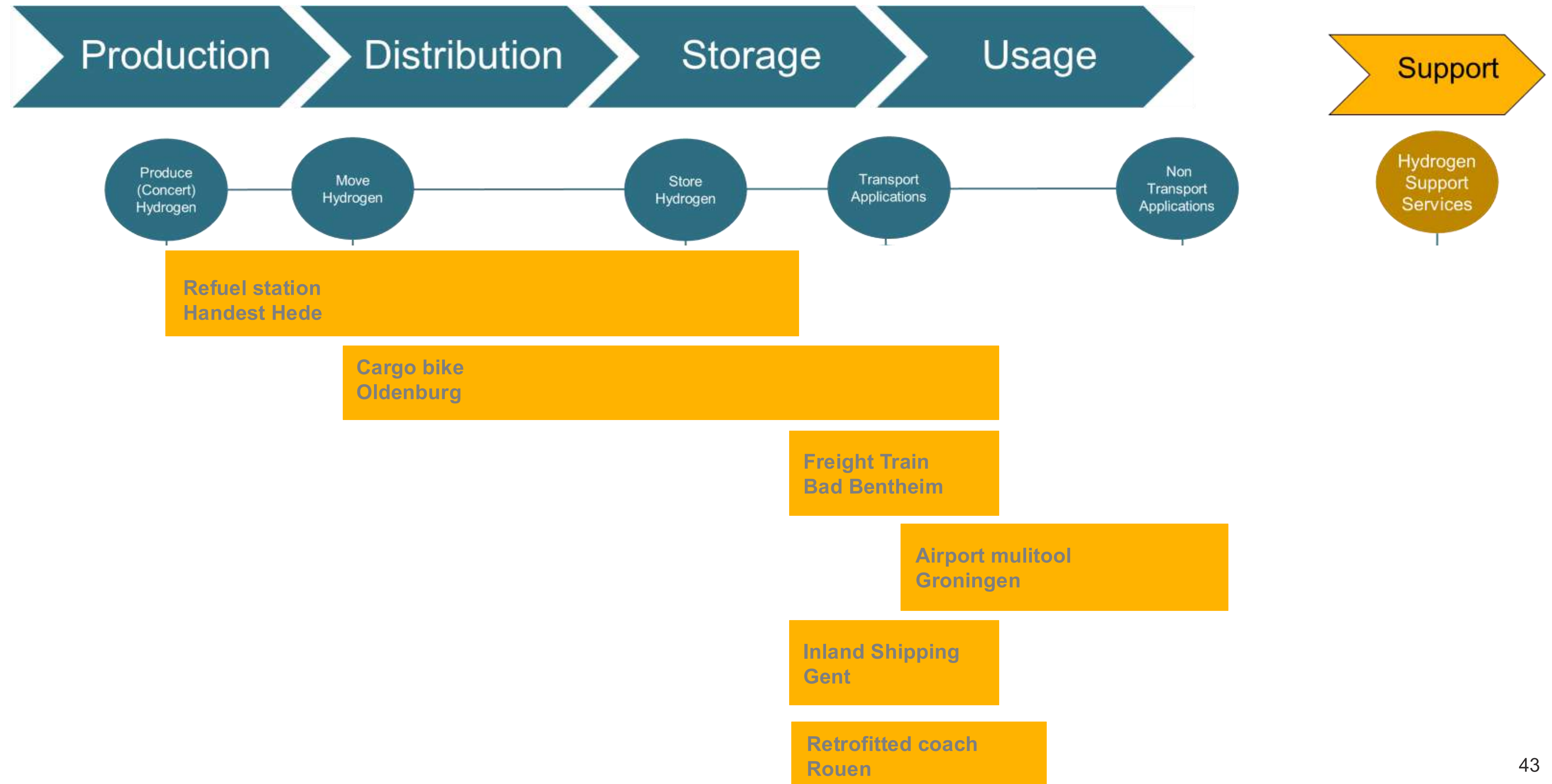
Cargo bike
Oldenburg

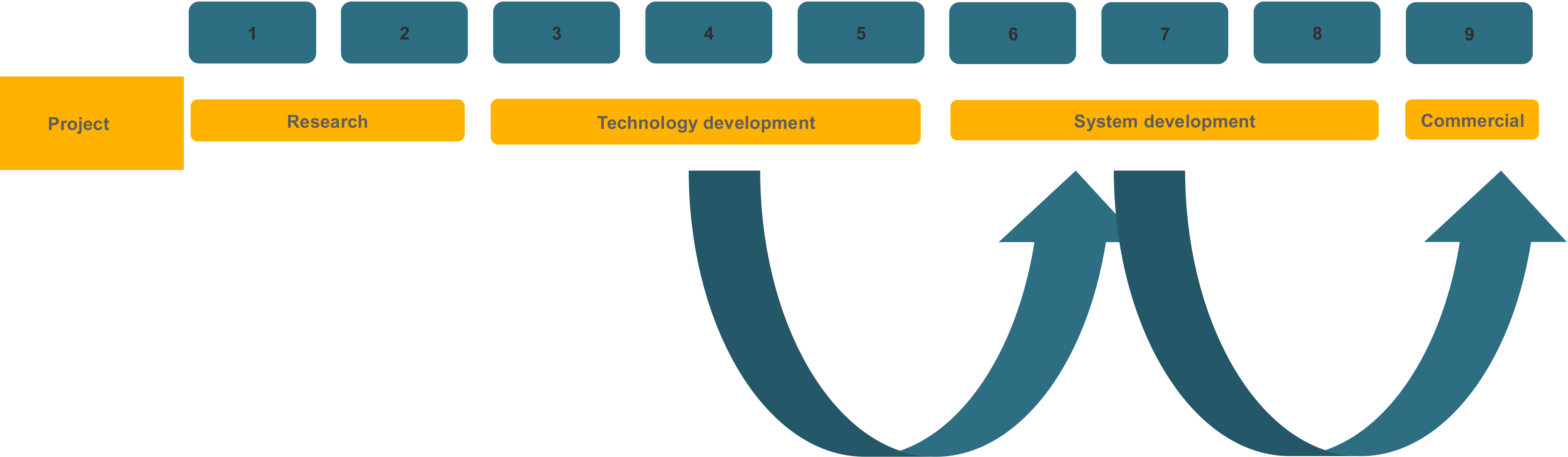
Freight Train
Bad Bentheim

Airport mulitool
Groningen

Inland Shipping
Gent

Retrofitted coach
Rouen





4.3 Pilot Origins

- Zero emission goals
- Business opportunity
- Where batteries do not provide in demand (time/power)
- City centers (zones for low/no cars/emissions)
- Net congestion / surplus capacity

4.3 Roadmap inspiration

- By business opportunities
 - European + private funding
 - Focus on own product / system
- Regional roadmaps
 - European + private + regional funding
 - Part of a system

4.3 Pilot challenges

- Legal / regulation
- Green hydrogen?
- Refuelling - standardization
- Supply and demand
- Positive Business case

4.4 Legal Perspective

4.5 Interregional Roadmaps

4.5 Interregional roadmap outline

- **Strategic Vision & Objectives**
- **Harmonized Policy & Regulation**
- **Economic & Environmental Viability**
- **Technological Progress & Innovation**
- **Ecosystem Development: Hubs**
- **Collaboration & Human capital**
- **Dynamic Progress Monitoring**

4.5 Interregional roadmap outline

- Strategic Vision & Objectives
- Harmonized Policy & Regulation
- Economic & Environmental Viability
- Technological Progress & Innovation
- **Ecosystem Development: Hubs**
- Collaboration & Human capital
- Dynamic Progress Monitoring

Proposed topics for a regional NRS roadmap, the creation of scalable regional value-chains

Topic	Key Action
Strategic Vision	Shared NSR objectives and KPIs
Policy & Regulation	Harmonization, accelerated permitting, integrated financial support (subsidies along the value chain)
Economic Viability	Creation of value-chains, long-term contracts and joint procurement
Infrastructure	NSR Infrastructure Fund for pipelines and storage
Technological Innovation	NSR Innovation Program for pilots and knowledge sharing
Collaboration	NSR Hydrogen Alliance and multi-stakeholder platform
Financing	Joint subsidy instruments (administration) and joint applications (IPCEI, CEF, CHP)
Education	NSR Hydrogen Academies and training funds
Monitoring	NSR Hydrogen Monitor with real-time data
International Leadership	NSR Export Strategy and trade missions

NSR Hydrogen Value Chain Collaboration Opportunities

Value Chain Element	Key Cooperation Areas
Production	Offshore wind + electrolyzers, blue hydrogen + CCS
Infrastructure	Cross-border pipelines, port hubs
Storage	Salt caverns,(crossborder) transport infrastructure and offshore storage
Transport	Liquid hydrogen shipping, pipeline networks
Industrial Demand	Steel, chemicals, refineries
Mobility	Shipping, trucking, fueling stations
Policy & Regulation	Certification, permitting, safety standards
Financing	IPCEI, CEF, CHP, SDE++, PtX funds, public-private partnerships
Research & Innovation	R&D centers, pilot projects
Public Acceptance	Awareness campaigns, training programs

Questions, Statements and Discussion

***Hubs are a necessity
for the development of a H2 market***

***Hydrogen Hubs are the best way to
scale-up a European H2 market***

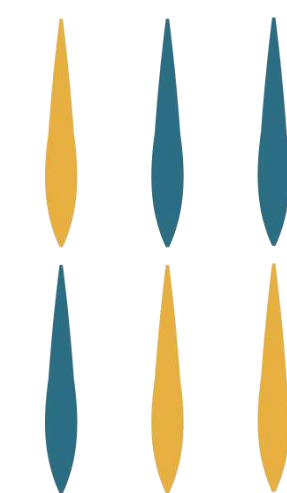
***(Inter)regional roadmaps aid in creating
economically viable value chains***

Regional hydrogen ecosystems are a necessary condition for relevant training and education.

***The national focus should be on
decentralized local energy hubs***

And less on large-scale centralized hydrogen hubs





Interreg
North Sea



Co-funded by
the European Union

LIHYP

Closing the Gaps – Retrofitting Hydrogen Vehicles

Speaker: Jens Erik Helbo Andersen

Date: 22nd of October 2025, Hamburg

Agenda

- Participants in the work package
- What is this work package about?
- Why the work package chose to address the topic of H2 retrofitting of commercial vehicles?
- Analysis of national regulations
- Conclusions



WaterstofNet

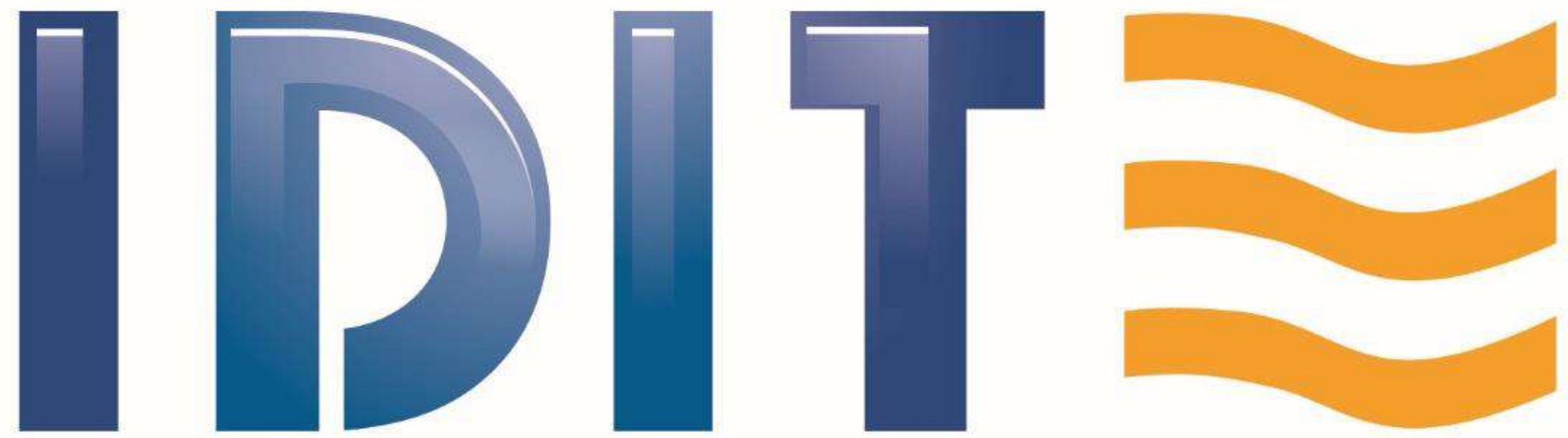
Belgium

- Knowledge and collaboration platform for hydrogen in the BeNeLux
- Coordinates the Hydrogen Industry Cluster, Belgian Hydrogen Council and RH₂iNE
- Track record of hydrogen demonstration projects along the hydrogen value chain



Denmark

- Driving the adoption of green hydrogen and Power-to-X (PtX) from production to offtake
- Engaged in numerous innovation projects with local and global partners across the hydrogen value chain
- Offers flexible collaboration models – From advisory roles to full project management or communication support



INSTITUT DU DROIT INTERNATIONAL DES TRANSPORTS ET DE LA LOGISTIQUE

France

- Legal expert partnering in major EU research & innovation projects
- Provides legal and regulatory expertise on transport, logistics, mobility, and energy transition
- Contributes to projects on hydrogen and low-carbon mobility
- Involved in autonomous and multimodal transport initiatives
- Supports the governance of sustainable mobility
- Works with European universities, ports, and logistics actors to align innovation with the legal framework



DLR

**Deutsches Zentrum
für Luft- und Raumfahrt**
German Aerospace Center

**Institute of
Networked Energy Systems**

Germany

- Part of the German Aerospace Center (DLR), focusing on system-oriented energy research and sector coupling of electricity, heat, and mobility-based renewables
- The Department of Urban and Building Technologies develops and integrates innovative technologies and components for energy systems
- Conducts research and prototype development to enable hydrogen-based energy supply in highly urbanized regions



Netherland

- Kiwa technology offers an extensive portfolio of innovative and sustainable energy solutions supporting the energy transition
- Acts as an indispensable knowledge partner through years of experience and forward-looking innovation
- Collaborates nationally and internationally to advance sustainability

What is this work package about?

- Regulation and legislation
- Supporting the other work packages e.g.
 - Pilots
 - Roadmaps

Our communication activities target decision-makers in the North Sea Region, engaging national energy agencies, ministries, and branch organizations. This broader engagement aims to establish new cross-border hydrogen value chains, providing solutions and recommendations at both national and EU policy levels. Work Package 3 activities support LIHYP pilots, contribute to 'shape WP4 Roadmaps.

Fuel Cell Electric Vehicle (FCEV)

Hydrogen Internal Combustion Engine Vehicle (HICEV)

La pile à combustible



Le moteur à combustion H2



Why the work package chose to address the topic of H2 retrofitting of commercial vehicles?

Pilot – Transdev and the Normandy region

Retrofitted an Iveco Crossway bus

Here are some of its new features:

Extended range of 450 km

Silent operation.

Increased lifespan from 14 to over 20 years.



● UN SERVICE DE 380KM IDÉAL POUR PROUVER L'ATOUT AUTONOMIE DE L'HYDROGÈNE VS L'ÉLECTRIQUE



Evreux



33 000 voyages annuels
17 AR / jour du Lundi au Vendredi
en moyenne 4 AR / jour
les WE et jours fériés

Station du Vieil-Evreux

Why we chose to address the topic of H2 retrofitting of commercial vehicles?

The project to convert a diesel-powered Nomad bus into a hydrogen vehicle (retrofit) was launched in 2020 by Transdev, its partners, and the Normandy Region.

- Approved by the French government on 1 February 2024,
- On Monday, April 22, the Normandy Region and Transdev organized the first official journey (with passengers on board)

As part of the Interreg LIHYP project, and more specifically the Pilot work packages, the Normandy region is planning to carry out a diagnosis of the regional coach fleet in order to **identify the lines best suited** to the deployment of hydrogen solutions.

The Normandy Region will share its experience gained in the operational implementation of regulations relating to **retrofitting a prototype**.

Why the work package chose to address the topic of H₂ retrofitting of commercial vehicles?

- Transport urgently need to reduce their emissions
- LiHyp: opportunities to accelerate market introduction of hydrogen applications
- H₂ retrofit sector for commercial vehicles in the EU may be a relevant solution



What have we done so far?

Research into each of LiHyp's partner countries

REGULATED DOMAIN	BELGIUM		DANMARK		FRANCE		GERMANY		NETHERLANDS	
	EU or UN/ECE regulatory references mentioned in the national regulations	Additional requirements or exemptions provided for by national regulations	EU or UN/ECE regulatory references mentioned in the national regulations	Additional requirements or exemptions provided for by national regulations	EU or UN/ECE regulatory references mentioned in the national regulations	Additional requirements or exemptions provided for by national regulations	EU or UN/ECE regulatory references mentioned in the national regulations	Additional requirements or exemptions provided for by national regulations	EU or UN/ECE regulatory references mentioned in the national regulations	Additional requirements or exemptions provided for by national regulations
Electromagnetic compatibility	UN/ECE/ R10.05		UN/ECE/ R10.05		UN/ECE/ R10.05				UN/ECE/ R10	
Power of electric drive train	UN/ECE/ R85	(Decree 1968, art. 77bis)	UN/ECE R85		UN/ECE/ R85		UN GTR 13		UE 2021/535, Annex XIV or UN/ECE/R134	
Hydrogen system	UE 2021/535, Annex XIV	Tests and inspections shall be carried out by an approved technical service. A test report shall be drawn up.	UE 2021/535, Annex XIV or UN/ECE R134		UE 2021/535, Annex XIV or UN/ECE/R134					
Masses and dimensions	UE 2021/535, Annex XIII	The dimensions of the vehicle undergoing the conversion must not be altered by the conversion (Decree 1968, art. 77 bis). Special requirements laid down by the Brussels-Capital, Flemish and	UE 2021/535, Annex XIII EU 2019/2144		UE 2019/2144 This regulation refers to UE 2021/535, Annex XIII (Ann. III, 5-f)	Since its amendment in 2023, Decree of 20 March 2020 authorises the modification of the vehicle's weights and dimensions within certain limits (details in the report).				



- Situation of the H2 retrofit sector
- Regulations specific to H2 retrofitting
- Categories of vehicles
- Type of approval : individual approval of a retrofitted vehicle or prototype approval of a hydrogen kit
- International or European technical requirements (ex : UN/ECE R10, UE 2021/535, Annex XIV...)
- Additional national technical requirements
- H2 retrofit incentives

Analysis of national regulations

- Differences regarding the versions of **UN/ECE Regulations versions** to be complied with
- Differences between **national technical requirements**
 - ↳ Power of the electric powertrain
 - ↳ Authorized modifications to the dimensions (length, width, height, wheelbase, overhang and track)
 - ↳ Authorized modification to the mass of the base vehicle
- Differences between **national type approval systems** (individual approval of a retrofitted vehicle, prototype approval of a conversion kit)

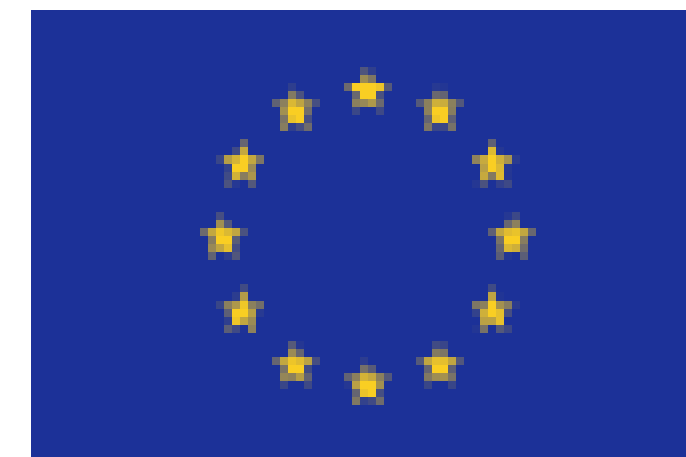


Conclusions

- **Absence of a European regulatory framework** harmonizing the technical conditions for hydrogen retrofitting of vehicles
- Only few Member States have introduced **dedicated regulations for H2 retrofitting** of commercial vehicles
- **Specific national technical requirements** that are not provided for in the legislation of other Member States
- **Differences between national regulations** (technical prescriptions, type-approval systems) may hinder the development of a European retrofitting industry

Conclusions

- **Demand from the retrofit industry** for European harmonization (ex : *Coalition Retrofit H2* in France)
- **Political will**
 - ☞ Regulation (EU) 2024/1610 : A forthcoming report (30th June 2025)
 - ☞ UNECE WP.29 : A new informal working group (IWG)
- H2 vehicle availability but **also green hydrogen affordability**
(Communication on the technological and market readiness of heavy-duty road transport vehicles, COM [2025] 260, 27.5.2025)



Read the Full Report



WP3.2 - Gap analysis regarding green hydrogen economy

Hydrogen Retrofitting of Commercial Vehicles



Scan to access the report

Lunch Break

Programme

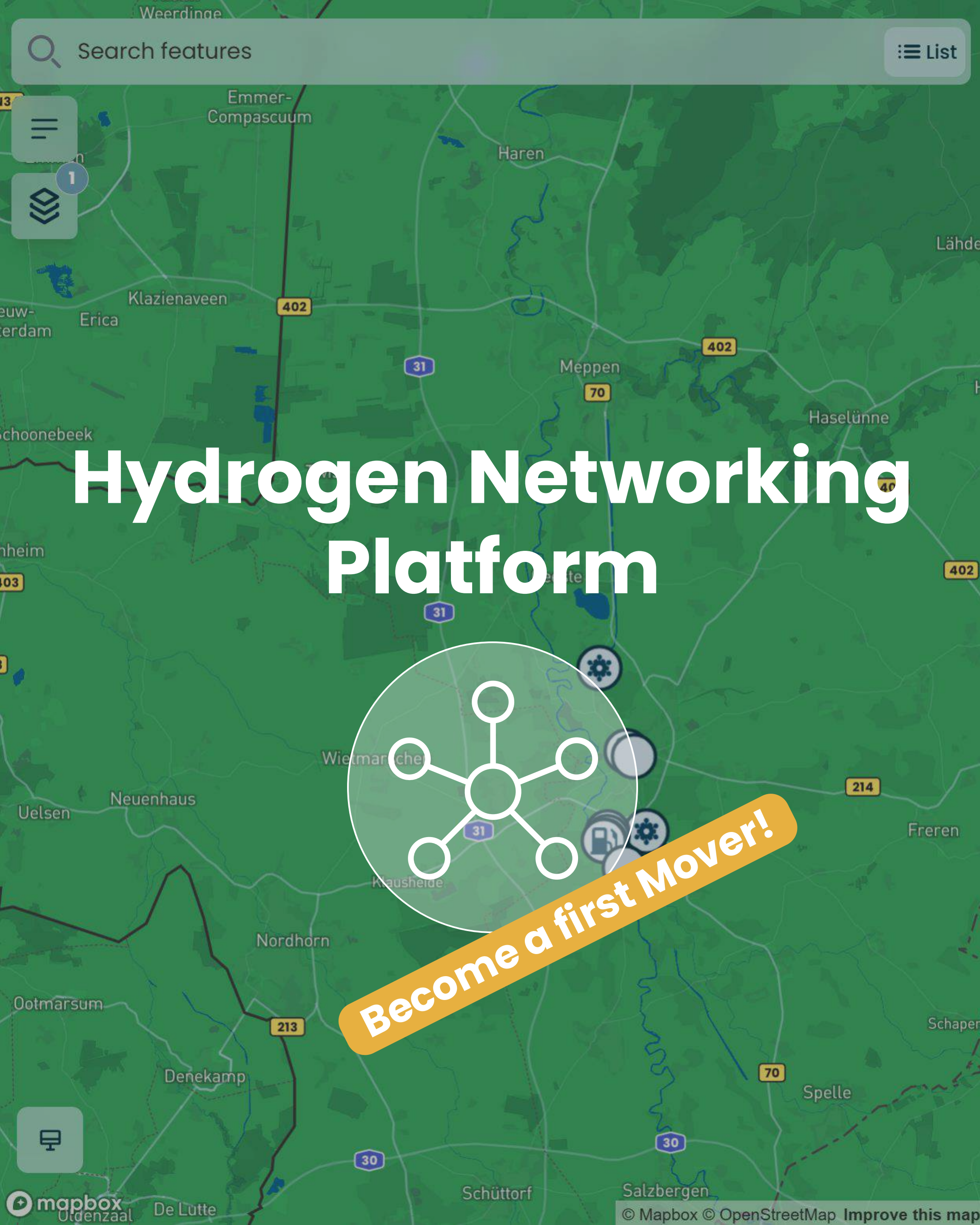
13.00 Lunchbreak (for registered participants)

14.00 Become a first mover on the Hydrogen Networking Platform and gain practical experience from the LIHYP pilot projects!

- Impulse on Hydrogen Networking Platform - *Andreas Stroink, H2 Region Emsland (DE)*
- Elevator Pitches of the LIHYP pilots - *various project partners*

15.00 Meet the LIHYP partners!
Networking & Drinks





Hydrogen Networking Platform

Become a first Mover!



Co-funded by
the European Union

LIHYP

Linking Hydrogen Power Potentials

Dr. Tim Husmann, Ali Amin Rezaei,
Phileas Scheffer, Andreas Stroink



Carl von Ossietzky
Universität
Oldenburg



Agenda



What is LIHYP? – Building an Interregional Hydrogen Economy
Together!



LIHYP Platform - Become a first mover on the Hydrogen Networking
Platform!



LIHYP Pilot Projects – Gain powerful insights and practical
experience.



What is LIHYP?



3.5 Years
(2023 to 2027)

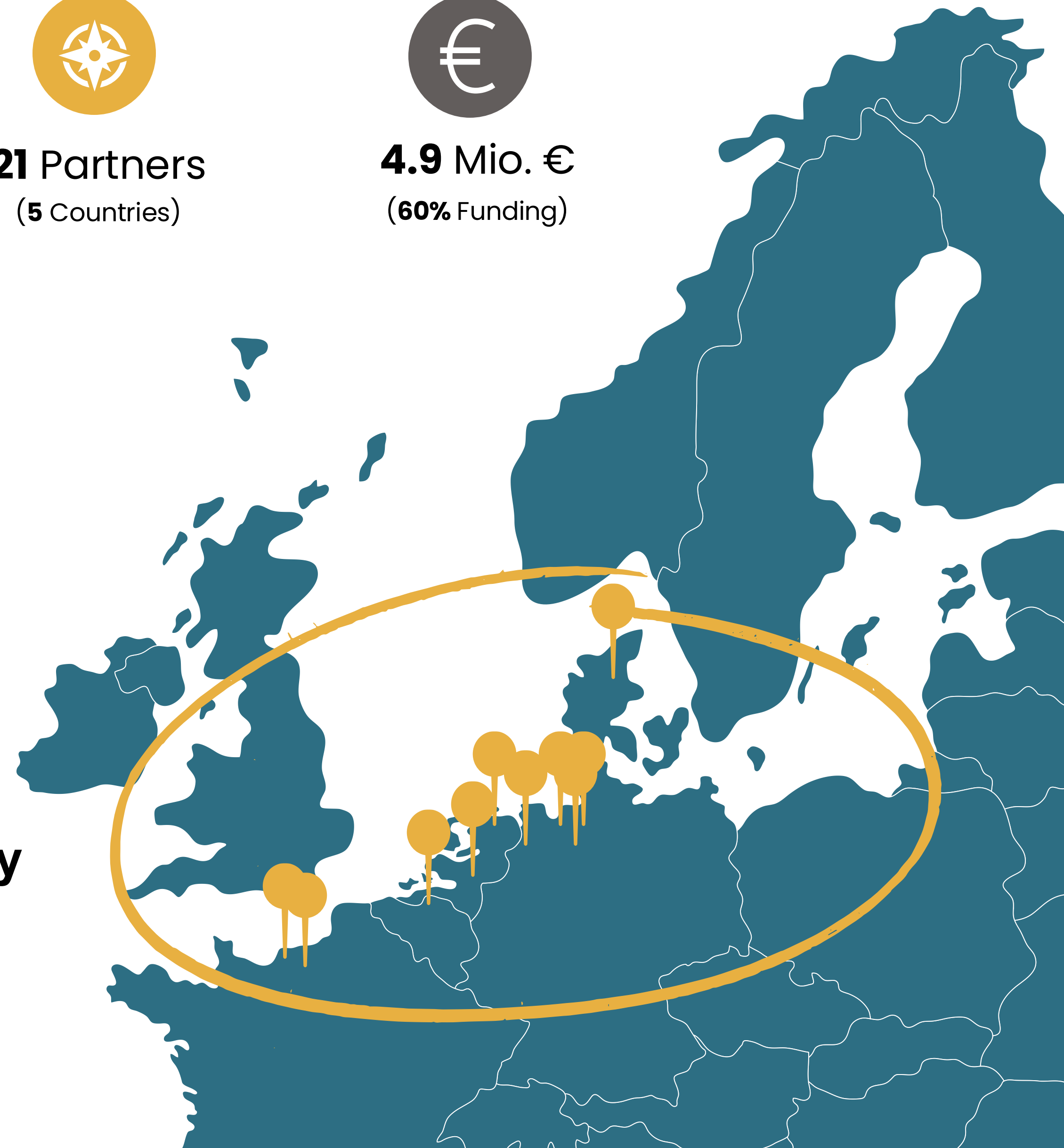


21 Partners
(5 Countries)



4.9 Mio. €
(60% Funding)

- Connects **regional activities** across NSR
- Promotes **Knowledge Exchange & interregional cooperation**
- Special focus on **SMEs**
- Accelerates the **market introduction** of hydrogen applications
- Supports the **European Hydrogen Economy**



Key Activities



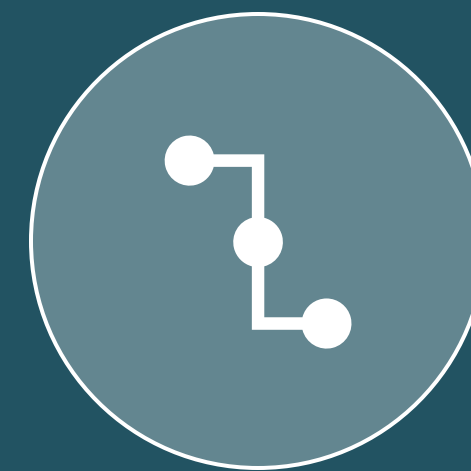
**LIHYP Hydrogen Networking
Platform**



LIHYP Pilot Activities



**Regulations for Green Hydrogen
Integration**



Interregional H₂ Roadmaps

LIHYP Pilots



Hydrogen driven freight train in the cross-border region DE/NL



Hydrogen Valley Airport – Groningen Airport Eelde



Normandy's retrofitted coach



Development of a local Energy HUB for city cargo



Hydrogen Refueling Station connected directly Wind/PV site



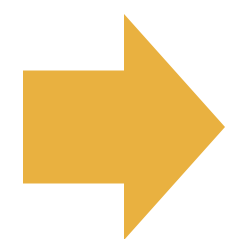
Living Lab Belgium





LIHYP Hydrogen Networking Platform

- Development of the map-based **LIHYP Hydrogen Networking Platform** with focus on the NSR
- Focus on small and medium-sized enterprises (**SMEs**)
- Connect regional hydrogen activities by companies, clusters, and research institutions (*best & bad practices, hydrogen sources, products, services, research, etc.*).



Objective: Promote interregional cooperation, thereby strengthening the European hydrogen economy!

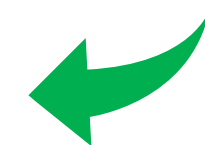
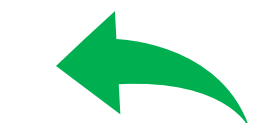
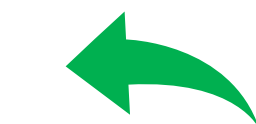


What will the platform offer?

Contact Information

Projects

Suppliers



LIHYP Platform



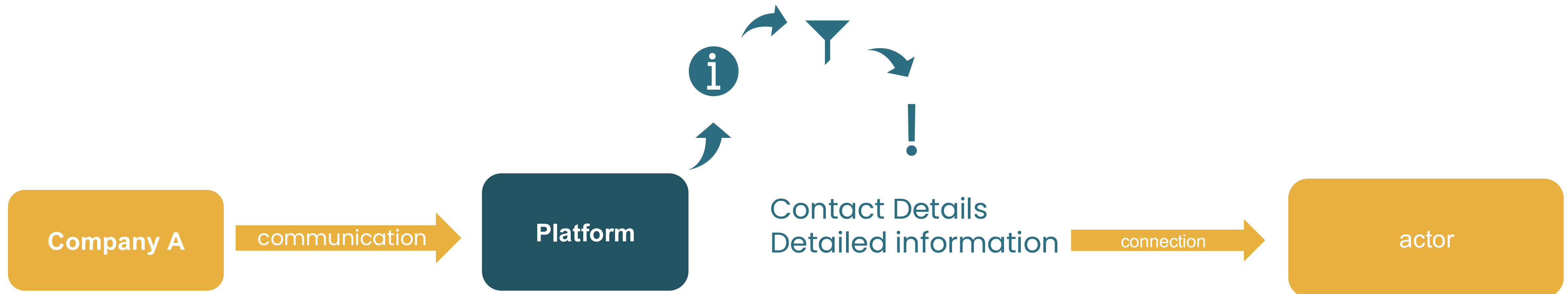
**Products and
Services**

Research

**Regulations,
Roadmaps**

Infrastructure

How does it work?



Case Study



KEYOU



Munich



Engineering company



Transdev



France



Retrofit Coach



Fa. Bucker & Essing



Lingen (Ems)



Engine retrofitter



???



BE/FR/DK/NL?



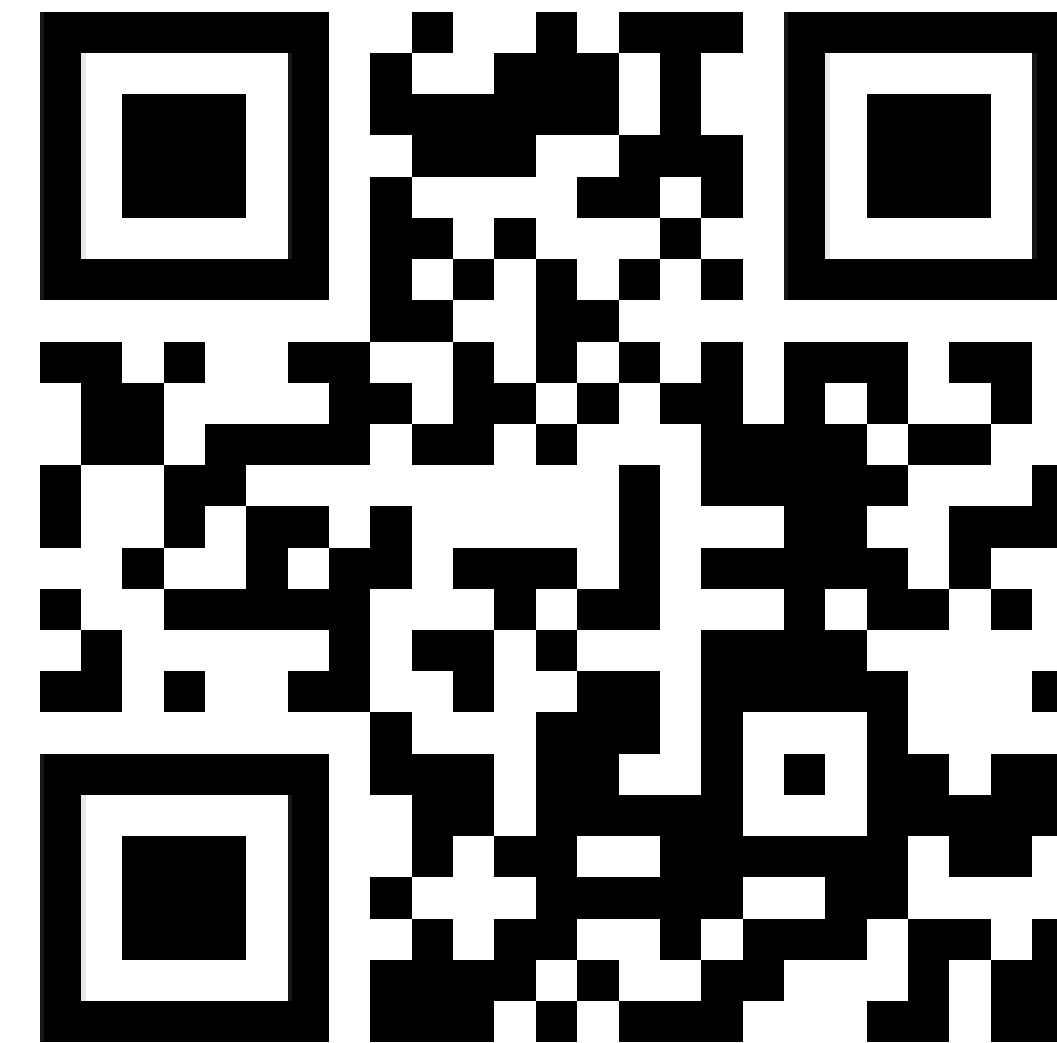
OEM



LIHYP Platform Preview

- **Advanced Access**

Become a first mover!



register.lihyp.eu

Gain Practical Experience from the LIHYP Pilot Projects

Pilot Activity in Bentheim (Germany)

Hydrogen driven freight train in the cross-border region DE/NL

[Read more](#)

Pilot Activity in Gent (Belgium)

Living Lab Belgium

[Read more](#)

Pilot Activity in Groningen (The Netherlands)

Hydrogen Valley Airport - Groningen Airport Eelde

[Read more](#)

Pilot Activity in Handest Hede (Denmark)

Hydrogen Refueling Station connected directly Wind/PV site

[Read more](#)

Pilot Activity in Normandy (France)

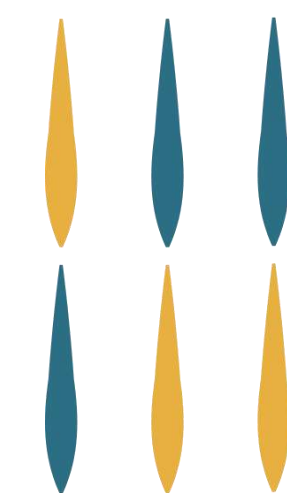
Normandy's retrofitted coach

[Read more](#)

Pilot Activity in Oldenburg (Germany)

Development of a local Energy HUB for city cargo

[Read more](#)



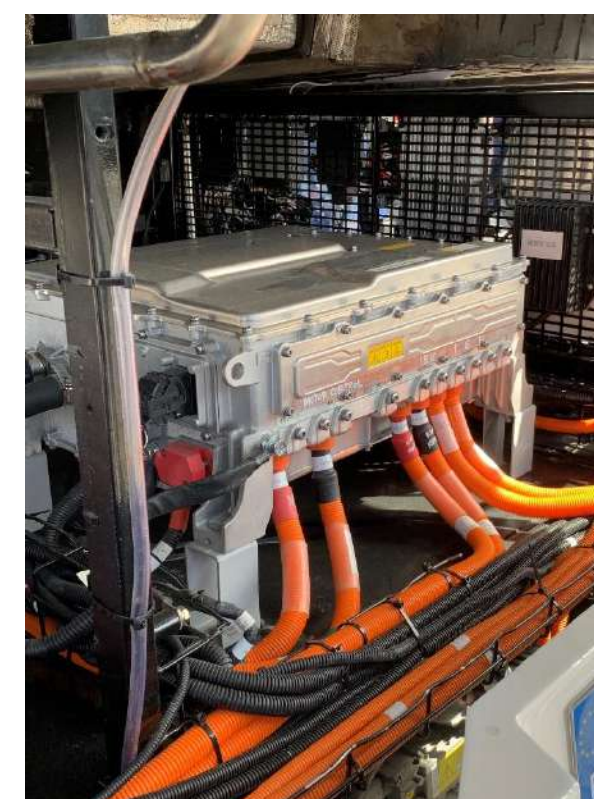
Interreg
North Sea



Co-funded by
the European Union

LIHYP

Hydrogen Pilot Project – Normandy



French pilot

Overall Objective:

- Test and demonstrate the benefits of hydrogen retrofit for regional transport.
- Compare hydrogen vs. electric range.
- Lay the groundwork for a regional deployment plan for H₂ coaches.

Context:

- First trial in France of a diesel coach converted to a hydrogen-electric engine.
- Normandy is the pioneer region for hydrogen in France (a network of 10 H₂ stations launched in 2016 through the EAS-HyMob project).

Pilot Line:

- Rouen ↔ Évreux (380 km/day, 30 kg H₂/day)



Hydrogen Coach

-  The vehicle used is a standard coach converted to run on hydrogen — a first in France. This retrofit preserves long driving range while drastically reducing pollutant emissions.
-  The coach operates between Rouen and Évreux, offering around 450 km of range and enhanced passenger comfort (less noise, smoother ride).
-  Refueling with hydrogen takes less than 30 minutes at the Évreux station. This demonstrator shows that hydrogen is a credible solution for long-distance regional travel.



Key Benefits:

- Significant reduction in CO₂ and pollutant emissions
- Improved service quality for passengers
- Promotion of local expertise and the Normandy hydrogen industry
- A technological showcase at both the regional and national levels

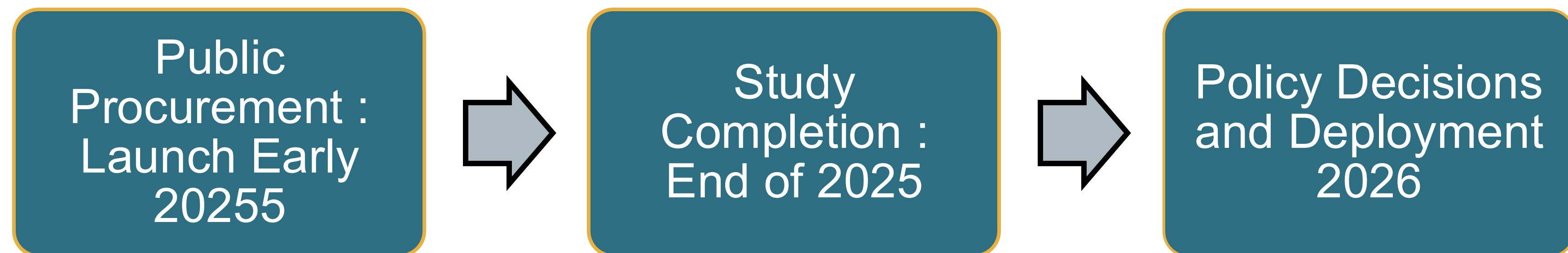


Hydrogen Deployment Study in Normandy

Objective: Assess the conversion of the entire regional coach fleet to low-carbon solutions.

Study Steps:

- Fleet diagnostic, analysis of routes and depots
- Identification of the most suitable powertrains (focus on hydrogen)
- Cost estimation for conversion
- Development of an action and financing plan

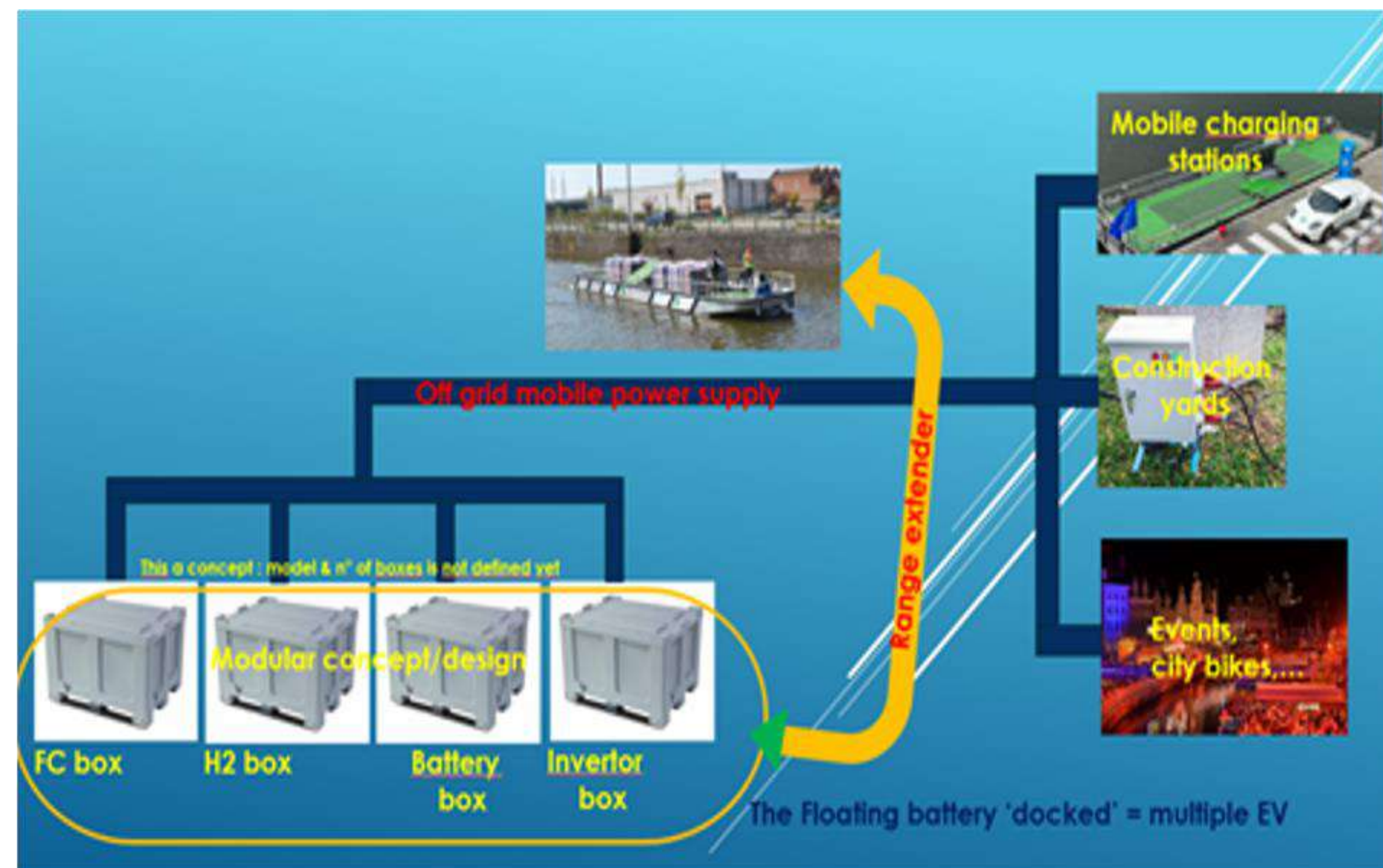


Key Stakeholder Benefits:

- Real-world operational feedback
- Economic and regulatory models
- Technological selection criteria
- Contribution to the decarbonization of regional mobility

Living lab regarding CHP installation for city logistics in Ghent

The Floating Battery



CREATING THE ENERGY TRANSITION TOGETHER

Activities of PEL within WP2:

1. Demonstration of a modular concept of the power supply on location, regarding fueling city bikes and using fuel cells in urban boats.
2. Design and testing of that power supply.
3. Feasibility study of the practical usage of the power supply, including a study of an A-to-Z hydrogen-based energy flow (from solar panel to user, using hydrogen as an energy carrier).
4. Development of an educational concept.

=> Activity 1, Goal achieved!



Installation of the fuel cell with its safety gas train and Linde hydrogen storage cylinder into the box of a cargo bike.

- Performance:
 - Power output: 1–2 kW (depending on selected voltage).
 - Autonomy: 8 hours.
- Testing:
 - Initial testing in our workshop.
 - Public demonstration during the event in Ghent on April 25, 2025.





Several applications

1. Range extension of Urban distribution vessels.

To extend the sailing range, we can connect our Energy Box with the battery pack on board and in this way be taken a few hours longer depending on the number of Swap boxes on board.

2. Energy bringing where it is needed.

By placing our energy box on the deck of the ship and connecting it, a large power bank is created that can be used where necessary.

Some applications that we want to test are e.g. Construction sites

3. Energy on shore. In Ghent there is a great need for charging places for e-cars/e-bikes. Placing a charging infrastructure (energy box) in the cityscape is subject to strict regulations. Our solution can be used to catch the shortage of these charging places.

Link of this achievement with Activity 2

This design is the forerunner, or “little brother,” of the development under Activity 2, namely:

- Designing, building, and testing a floating hydrogen power supply.
- Components: fuel cell, hydrogen storage, batteries, and power electronics (inverters).
- Entirely installed in modular energy boxes.



- **At this moment, we are assembling the Energy Box in our workshop !**

Event in Ghent on April 25, 2025

<https://stad.gent/nl/ondernemen/nieuws-evenementen/disco-slotevent>



CREATING THE ENERGY TRANSITION TOGETHER

Questions?



LIHYP WP2 – Status Report Oldenburg Pilot



Arrangement of fuel cell cargo bike mobility concept and operation test at a logistics company, application of green hydrogen



Deutsches Zentrum
für Luft- und Raumfahrt

Supporting development of H₂ supply, Know-How: H₂-infrastructure, security-relevant and technical aspects, gas quality analysis of H₂ for fuel cells



Energie bewegt den Nordwesten

Communication, workshops, data acquisition, potential analysis, roadmap 2030



Pilot cargo bike Oldenburg, © DLR



Pilot Oldenburg – a nice place to be



Development of a green H2 Hub to operate a **fuel cell cargo bike**.
Detection of real **green hydrogen costs** for applications.



Cargo Bike for Delivery

- Eco-friendly transportation for the „last mile“
- Application of an E-cargo bike with additional fuel cell
 - Range extender and longer operation time
 - Fast fueling
 - Operation at low temperatures possible
 - Heating of driver's cabin
 - Emission reduction when applying green hydrogen

E-Cargo Bike with Fuel Cell Range Extender from DLR

Cargo bike type: Velove Armadillo with FC-system

FC: DLR - Institute for Technical Thermo Dynamics

300 W stack

300 bar tank, fueling by overtopping
from another hydrogen gas bottle

FC: Recharger, range extender

→ Cargo bike will be tested in-house the
DLR and will be analysed in the
laboratory

→ First refilling tests are successful



RYTLE X - E-Cargo Bike with Fuel Cell Range Extender

- Cargo bike type: RYCTL MovR3 with FC-system
- FC: H2Range
- FC power 500 W stack
- Storage hydrogen in 200 bar exchangeable gas bottle, < 3 min fuelling/exchanging
- FC: Recharger, range extender, > 120 km range, + 50 % range vs. battery
- - 60 % weight vs. battery
- - 20 °C operation without losses (preheater)
- Relatively low costs
- Relatively simple maintenance

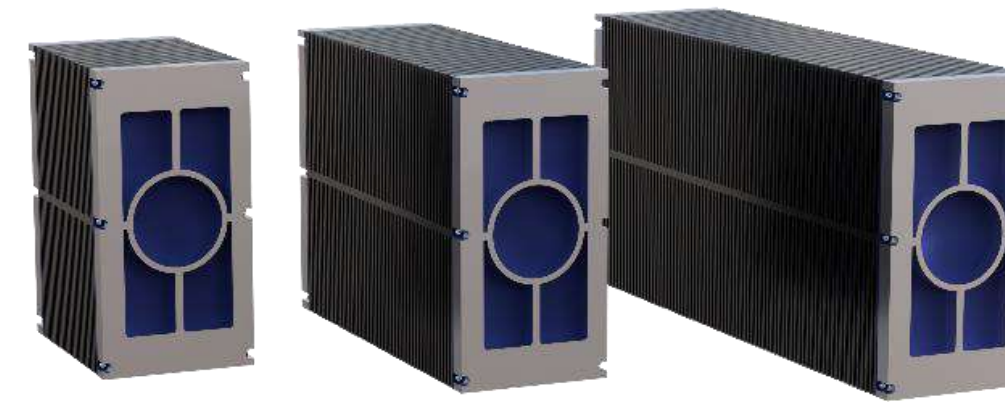


Figure: Top: H2Range stacks; Bottom: E-cargo bike with FC-range extender, Source: H2range, nucleus⁷



→ Planned application at a logistics company in Oldenburg starting in 2025

Pilot Oldenburg: Methodology of Investigations

- Characterisation of cargo bike in laboratory
- Technical demonstration of pilot in real operation at a logistics company
- H₂-gas analysis and investigation of influencing factors on gas quality
- Interviews with users (Expectations, requests, experiences,...)
- Data evaluation of the pilot operation
- Public awareness



© DLR



Pilot Oldenburg: Research Questions and pilot cooperation

**Infrastructure und hydrogen:
Fuelling strategy? Exchangeable gas bottle,
overtopping from hydrogen bottle,
hydrogen fuelling station? Stationary or
mobile?**

Safety concept?

User-friendliness?

Delivery of green hydrogen?

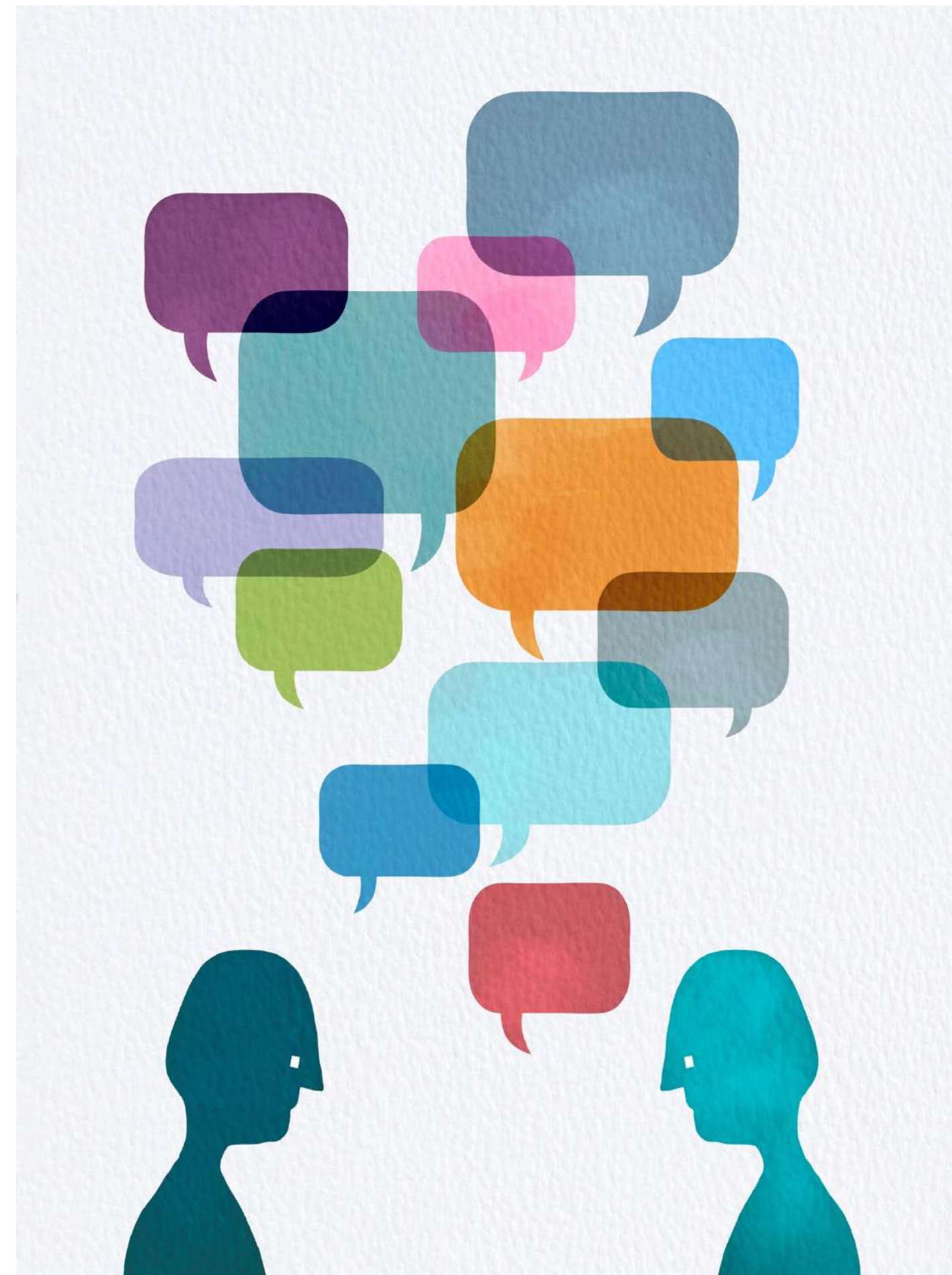
Manageability for employees?

**Vehicle miles traveled?
H₂-consumption?**

**Requirement
for fuelling functionality?**

**Legal regulations and conditions
of labour protection law?**

Meet the LIHYP Partners, Networking & Drinks





Join the LIHYP Community



[linkedin.com/showcase/project-lihyp-linking-hydrogen-power-potentials](https://www.linkedin.com/showcase/project-lihyp-linking-hydrogen-power-potentials)



[instagram.com/interreg_lihyp/](https://www.instagram.com/interreg_lihyp/)



[interregnorthsea.eu/lihyp](https://www.interregnorthsea.eu/lihyp)



<https://newsletter.energiecluster.de/f/24225-170619/>

