Coordination and Support Action SET4H2

Mapping of R&I projects on hydrogen and fuel cells at EU level

D4.2

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List of abbreviations and acronyms

List of abbreviations

Abbreviation	Long form
ALK	Alkaline electrolysis
CAPEX	Capital expenditures
CHJU	Clean Hydrogen Partnership
CHP	Combined heat and power
CSA	Coordination and support action
DG RTD	Directorate-General for Research and Innovation
DRI	Direct reduced iron
EoL	End of life
ERA	European Research Area
EU	European Union
FID	Final investment decision
GW	Gigawatt
H2V	Hydrogen valley
HRS	Hydrogen refuelling station
IWG	Implementation Working Group
kt	Kilo tonne
MI	Mission Innovation

N	Sample size
N.A.	Not applicable, no information
IP	Implementation plan
OPEX	Operational expenditures
PEM	Proton exchange membrane electrolysis
PFAS	Per- and polyfluoroalkyl substances
PGM	Platinum Group Metals
R&I	Research and Innovation
SET Plan	Strategic Energy Technology Plan
SMR	Steam methane reforming
SOE	Solid oxide electrolysis
SRIA	Strategic Research and Innovation Agenda
TRL	Technology Readiness Level

Acronyms of CSA SET4H2 consortium partners

AEA: Österreichische Energieagentur - Austrian Energy Agency

BGH2A: Balgarska Asotsiatsia za Vodorod, Gorivni Kletki I Sahranenie na Energia (Bulgarian Hydrogen, Fuel Cell and Energy Storage Association)

EUREC: Association of European Renewable Energy Research Centers

DGEG: Direção-Geral de Energia e Geologia (Directorate General for Energy and Geology)

DLR: Deutsches Zentrum für Luft- und Raumfahrt e.V.

HER: Hydrogen Europe Research

MUR: Ministero dell'Università e della Ricerca

UNIBO: Alma Mater Studiorum – Università di Bologna

Executive summary

Deliverable D4.2 *Mapping of R&I projects on hydrogen and fuel cells at EU level* describes initial work on creating an overview of hydrogen-related research and innovation (R&I) activities in Europe. The authors used publicly available data from European programmes such as Horizon Europe, Horizon 2020, and the 7th Framework Programme, as well as complementary sources from the Clean Hydrogen Partnership and Mission Innovation. The aim is to support the IWG Hydrogen in assessing the status quo of hydrogen technologies and identifying research gaps in order to develop targeted and effective R&I activities.

The report presents two key outcomes:

Database of Hydrogen R&I Projects (2007–2024)

A database of 763 projects was compiled using data from CORDIS and the European Commission's *Hydrogen Monitoring Flash* (2024). These projects cover hydrogen production, transport, storage, end-use applications, and cross-cutting issues and will be used by the IWG to identify research gaps. The initial analysis of the database showed that Joint Undertakings resp. European Partnerships, particularly for Clean Hydrogen and Clean Aviation, play a central role by managing over half of all EU hydrogen R&I funding. Despite progress in technology development, in particular for electrolysers, fuel cells and mobility applications, system integration elements such as hydrogen valleys, transport infrastructure, skills, and public acceptance measures remain underrepresented in funded projects.

Focus Topic: Hydrogen Valleys

Hydrogen valleys – integrated regional ecosystems covering production, distribution, and multiple end-uses – are emerging as key drivers of the EU's clean hydrogen economy. A dedicated database of 85 hydrogen valleys was developed through desk research, surveys, and interviews. The valleys are unevenly distributed, with Spain, Germany, Italy, Portugal, France, and the Netherlands hosting most initiatives. Collectively, these projects aim to produce more than 3.6 million tonnes of hydrogen per year, mainly through renewable-powered proton exchange membrane electrolysis and alkaline electrolysis. The database will serve to guide the IWG's support towards a greater number of hydrogen valleys in Europe that are more interconnected.

Funding patterns show that EU-supported hydrogen valleys average €140 million in total investment, with around €22.5 million from EU funds per project. Nationally or regionally funded valleys, while much larger in scale, receive a smaller proportional share of public support. This underscores the need for better coordination and blending of EU and national funding mechanisms.

Case studies such as the Mid-Sweden Hydrogen Valley and Germany's HyLand initiative illustrate different governance models - from bottom-up regional collaboration to nationally coordinated networks - and highlight the importance of stakeholder engagement, capacity building, and regulatory coherence for regional hydrogen ecosystem development.

National and EU funding schemes must be considered not only as isolated instruments but as components of an integrated innovation ecosystem. When aligned effectively, these mechanisms can collectively bridge the so-called "valley of death" that many technologies face when moving beyond initial research stages. The report concludes that while hydrogen R&I in Europe has expanded significantly, further efforts are required to strengthen system integration, align national and EU funding pathways, and support regions lagging behind in hydrogen ecosystem development.

1. Introduction

The European Union has firmly anchored its climate ambitions in law, committing all Member States to achieve climate neutrality by 2050. This binding target, set in motion by the 2015 Paris Agreement[1] and formally enshrined in the European Climate Law of 2021[2], defines the EU's pathway toward a sustainable, low-carbon future. Central to this vision is the European Green Deal, launched in 2019[3], which lays out a broad and transformative agenda to decarbonise the economy, modernise industry, and safeguard environmental integrity.

The most recent addition to this agenda is the Clean Industrial Deal[4], which aims to drive deep emission cuts in energy-intensive sectors while accelerating the adoption of clean technologies across all stages of production. It is part of the EU's Competitiveness Compass[5] which outlines strategic measures to foster innovation, enhance industrial resilience, and position Europe at the forefront of the global green transition.

Among the most promising enablers of this transition is hydrogen. As a versatile, zero-emission energy carrier, hydrogen has the potential to revolutionise sectors that are hard to electrify, such as heavy industry and the transport sector. It offers a scalable solution for reducing dependency on fossil fuels while enhancing energy system flexibility. With energy production and consumption accounting for roughly 75% of the EU's greenhouse gas emissions[6], decarbonising the energy sector is not just a priority, it is a prerequisite for climate neutrality. In this context, hydrogen stands out as a critical lever in reshaping Europe's energy landscape and securing a cleaner, more resilient future.

Against this backdrop, task 4.2 serves to gain an overview of the past and ongoing developments in hydrogen technologies at different technology-readiness-levels in order to identify research priorities and gaps. The results across the different segments of the value chain (production, transport, storage, applications and cross-cutting issues) will help to substantiate our activity fiches in the implementation plan (IP). Based on the data available from European platforms and programmes such as CORDIS, Mission Innovation and the Clean Hydrogen Partnership, task 4.2 builds a database of R&I projects on fuel cells and hydrogen technologies at EU level. Hydrogen-related projects will be categorised and updated where necessary.

Deliverable 4.2 "Mapping of R&I projects on hydrogen and fuel cells at EU level" will start analysing trends and feed into Deliverable 4.3. "Report on technologies development trends from projects monitoring" for a more in-depth data analysis and interpretation, as well as into Deliverable 2.5 "Integration of ERA Pilot SRIA priorities in the Hydrogen IP" for developing R&I activities.

[1] United Nations, 2015. The Paris Agreement.
[2] Regulation (EU) 2021/1119 of 30 June 2021 ('European Climate Law').
[3] Communication COM(2019) 640 final of 11 December 2019: The European Green Deal.
[4] Communication COM(2025) 85 final of 26 February 2025: The Clean Industrial Deal.
[5] Communication COM(2025) 30 final of 29 January 2025: A Competitiveness Compass for the EU.
[6] EC, 2025. Energy and the Green Deal.

2. Database of R&I projects

2.1 Methodological approach

Due to the publication of the Hydrogen Monitoring Flash by DG RTD in February 2024[7], it was possible to identify hydrogen R&I projects in the CORDIS repository more easily. We used the same sample of 776 projects funded under the 7th Framework Programme, Horizon 2020 and Horizon Europe, as well as the same categorisation that was used in the Monitoring Flash. The earliest projects date from October 2007 and the latest from September 2024, while the majority of projects are between 2008 and 2023. The funding figures (funding scheme, title, start/end date, maximum contribution, etc.) and the categorisation (technology domain, subdomain) were contained in two separate documents and had to be merged using the lookup table function (see Tab. 1). All data was compiled and analysed in an Excel spreadsheet, e.g. by using criteria-based search and filter functions and pivot tables. Searching for projects concerned with PFAS (per- and polyfluoroalkyl substances), for instance, is possible using the IF function: {=IF(COUNT(SEARCH({"PFAS";"fluori";"fluoro";"ionomer"};H16))> 0; "yes"; "no")}.

Following a consistency check, 13 deserted datasets were excluded from the analysis, resulting in a final sample size of 763 projects.

Table 1: Column headers in both data sources.

Hydrogen Monitoring Flash Categorisation (*pdf)	**CORDIS Funding Information (*xlsx)**	
R&I Framework Programme	**ID**	frameworkProgramme
Project Number	Acronym	masterCall
Technology Domain	Status	subCall
Technology Subdomain	Title	fundingScheme
CORDIS Link	startDate	Nature
	endDate	Objective
	totalCost	contentUpdateDate
	ecMaxContribution	rcn
	legalBasis	grantDoi
	Topics	
	ecSignatureDate	

An update of the database is planned for Q1 2026 in order to cover more of the Horizon Europe funding period (2021-2027). It will be also checked whether the database can be converted into a more efficient and performant data format, such as Microsoft Access (*accdb).

2.2 Analytical results

This report serves as a complementary analysis to the Hydrogen Monitoring Flash, which provided a broad overview of European R&I projects in the hydrogen sector. That publication identified emerging trends across a wide range of hydrogen-related activities, including renewable hydrogen production

[7] European Commission, 2024. Hydrogen Monitoring Flash.

using electrolysis, the development of hydrogen valleys, infrastructure for hydrogen distribution and storage, and the integration of hydrogen in hard-to-abate sectors to reduce emissions.

The Hydrogen Monitoring Flash highlighted the strong focus of EU R&I funding on hydrogen-powered mobility. Over €1.8 billion has been allocated to projects advancing hydrogen fuel cell technologies in aviation, road, rail, and maritime transport. The report also underscored the central role played by Joint Undertakings, particularly the Clean Hydrogen and Clean Aviation initiatives, which function as institutionalised public-private partnerships and collectively manage more than half of the hydrogen-related R&I funding in Europe.

A notable finding from the report was the surge in hydrogen R&I activity, with over €800 million invested in projects launched in 2023 alone. These efforts are part of a broader portfolio of EU instruments designed to support the development and deployment of hydrogen technologies and accelerate progress toward the EU's climate neutrality goals.

However, it is also obvious that system-integrating elements such as hydrogen valleys – a more recent funding concept – and transport infrastructures, as well as non-technical measures to prepare a level-playing field for innovative hydrogen solutions or to increase skills and public acceptance are rather underrepresented in the funding portfolio (see Fig. 1). This is partly due to the greater need for cross-border cooperation on these issues, which takes more time to establish, and to the newly developing market, which requires strong supply and demand centres. The majority of projects (60%) is already closed or terminated (see Fig. 2).

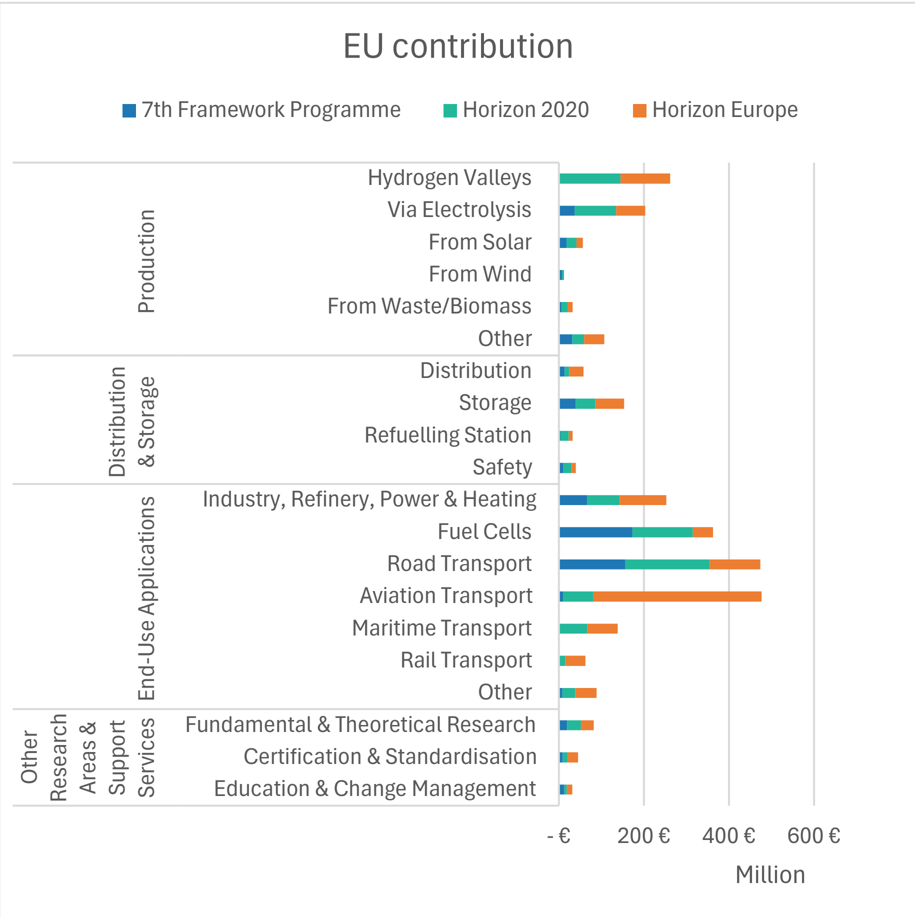

Figure 1: EU funding of hydrogen R&I projects between 2007 and 2024 (pivot analysis, N=763).

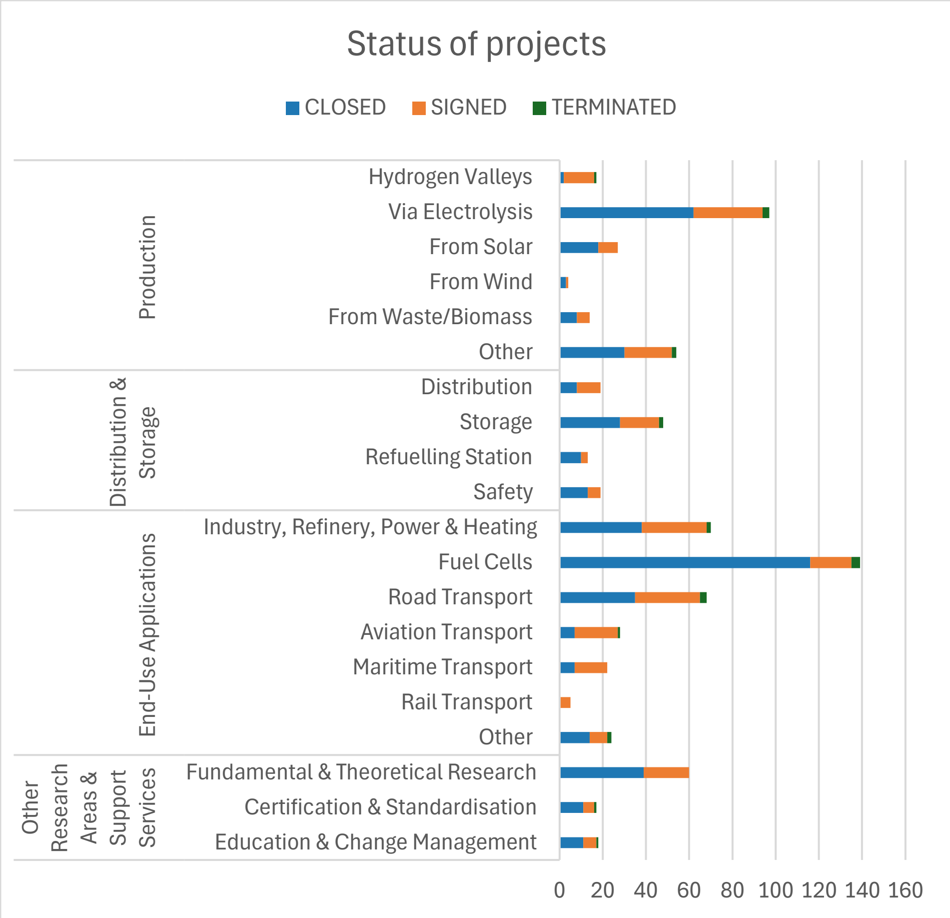

Figure 2: Status of R&I projects (pivot analysis, N=763).

The database is a useful tool to monitor the developments in hydrogen R&I and to start assessments on research gaps. We use a combination of different search terms to identify the most relevant projects in the database (see Tab. 2). The project descriptions will be further investigated in work package 2 to substantiate research demands defined in the activity fiches of the Implementation Working Group on hydrogen (IWG).

Table 2: Examples for search terms to identify R&I projects.

Research topic according to selected activity fiches	Terms used for the search in the title and objective description	Results
PFAS	"PFAS";"fluori";"fluoro";"ionomer"	Title: 3 Objective: 22
Recycling	"recyc";"recov";"reuse";"EoL";"end-of-life";"dispos";"waste";"circular";"critical";"PGM";"platinum"	Title: 34 Objective: 252
Emerging technologies	"emerg";"next";"electroly";"TRL"	Title: 90 Objective: 342
Supply and demand	"mapping";"model";"simulat";"import"	Title: 24 Objective: 306

Understanding the Advancement of Technologies from Low to High TRL: Key Drivers and Funding Dynamics

In order to effectively accelerate European innovation – an imperative underscored by the Draghi Report[8] – it is essential to gain a deeper understanding of how technological concepts evolve from fundamental research (low Technology Readiness Levels, or TRLs) to market-ready solutions (high TRLs). This progression is particularly relevant in the context of hydrogen technologies, where the path from lab-scale innovation to commercial deployment is often complex, resource-intensive, and influenced by multiple interdependent factors.

A critical element in this transition is the **role of funding mechanisms**. Different types of financial support, from early-stage research grants to large-scale demonstration project funding, play distinct and complementary roles in enabling technological maturation. National and EU funding schemes must be considered not only as isolated instruments but as **components of an integrated innovation ecosystem**. When aligned effectively, these mechanisms can collectively bridge the so-called "valley of death" that many technologies face when moving beyond initial research stages.

Case studies offer valuable insight into how technologies can evolve through **coordinated support**. For example, the VHyGO and H2Ouest3 projects, initially funded through France's national agency ADEME, served as important precursors to the EU-funded AdvancedH2Valley project. This pathway exemplifies a successful **scaling-up trajectory**, wherein early-stage national funding laid the groundwork for broader EU investment and project consolidation at a higher TRL.

More intricate evolution pathways, such as those demonstrated by Austria's Underground Sun Storage and Underground Sun Conversion initiatives, both of which ultimately contributed to the development of USS2030 and the EUH2STARS project, highlight the value of **long-term, multi-phase project planning**. These examples illustrate how fundamental R&D can be gradually transformed into strategic infrastructure, when supported by sustained, sequenced investment at both national and EU levels.

Conducting a **systematic mapping and analysis** of such project trajectories is vital for identifying the factors that drive successful technology advancement. These may include:

- Strategic alignment between national and EU funding programmes
- Continuity and duration of funding across TRL stages
- Strong project governance and stakeholder coordination
- Availability of demonstration infrastructure and pilot sites
- Clear policy signals and regulatory support

By identifying these success factors, policymakers and funding bodies can design more **effective and targeted support mechanisms**. This would not only enhance the efficiency of public investment in innovation but also foster **greater synergy between national and European efforts**, ultimately accelerating the commercialisation of key hydrogen technologies.

Such insights are essential to ensuring that Europe remains at the forefront of the global hydrogen economy and innovation landscape.

[8] European Commission, 2024. The future of European competitiveness. Part A.

3. Focus topic: Hydrogen Valleys

3.1 Hydrogen and the EU's Clean Energy Vision: The Strategic Role of Hydrogen Valleys

In order to realise hydrogen's potential for a successful transition to a net-zero economy, the EU has been increasingly fostering the development of hydrogen valleys in recent years. These are integrated regional ecosystems where hydrogen is produced locally, distributed through dedicated infrastructure, and consumed by nearby industries, transport systems, and communities. They represent a practical and scalable approach to deploying hydrogen across the value chain an in a defined geographical area.

By promoting hydrogen valleys, the EU is not only scaling up clean hydrogen technologies but also anchoring them in regional economic ecosystems, ensuring that innovation and decarbonisation go hand in hand. The ultimate aim is to foster innovation, stimulate economic growth, and contribute to climate targets through systemic and cross-sectoral collaboration.

In this way, hydrogen valleys can play a crucial role in:

- Accelerating high-TRL hydrogen innovations
- Connecting supply and demand at a local level
- Demonstrating the viability of hydrogen technologies in real-world settings
- Supporting regional development and industrial competitiveness
- Advancing the EU's energy and climate objectives

This chapter also outlines four key objectives underpinning the hydrogen valley model.

- **Encouraging Collaboration Across Public and Private Stakeholders:** A central aim of Hydrogen valleys is to bring together a wide array of stakeholders, including public authorities, private companies, research institutions, and civil society. By fostering public-private partnerships, these initiatives aim to overcome market fragmentation, align regulatory frameworks, and pool resources for greater impact. Government support, combined with industrial leadership, ensures that strategic investments in infrastructure and innovation are both viable and aligned with policy objectives. This collaborative approach also facilitates knowledge sharing and capacity building, accelerating the overall maturity of hydrogen technologies.

- **Integrated Hydrogen Ecosystems:** Hydrogen valleys are designed as integrated ecosystems where various components of the hydrogen value chain co-exist and function synergistically. These ecosystems include hydrogen production (often from renewable sources), storage systems, distribution networks, and end-use applications across multiple sectors. The integration helps to optimise resource efficiency, reduce energy losses, and create a closed-loop system that enhances the economic and environmental sustainability of hydrogen as an energy carrier. By localising the full value chain, hydrogen valleys also reduce dependency on external supply chains and contribute to regional energy security.

- **Scaling Up Hydrogen Technologies:** A key goal of hydrogen valleys is to demonstrate the scalability of hydrogen technologies in real-world settings. Pilot projects and demonstration sites within the valleys serve as testbeds for innovation, allowing stakeholders to validate technologies, de-risk investments, and build operational experience. These projects also provide valuable data and insights that can inform national and international policy and investment strategies. By showcasing the viability and replicability of hydrogen solutions, hydrogen valleys contribute to building investor confidence and accelerating broader market adoption.

- **Decarbonisation of Multiple Sectors:** Hydrogen valleys play a crucial role in decarbonising several sectors simultaneously. These include heavy industry (such as steel and cement), transport (including freight, maritime, and aviation), heating, and power generation. By providing a clean and versatile energy vector, hydrogen helps to replace fossil fuels and reduce greenhouse gas emissions across these sectors. This multi-sectoral impact aligns with climate neutrality goals and enhances the systemic value of hydrogen technologies. Furthermore, integrating hydrogen into various economic activities helps to create green jobs and stimulate regional development in a sustainable way.

Currently, there is no universal definition of a hydrogen valley. There are, however, many similarities between them. The European Commission observed and concluded that they often share the following characteristics[9]:

A - Large in scale: The project scope goes beyond mere demonstration activities. It contributes to building a clean energy transition and the decarbonisation of industrial sectors. It has a long-term perspective and the system is sustainable. It will therefore entail at minimum a two-digit multi-million-euro investment. It typically includes several subprojects that make up the larger valley 'portfolio'.

B - Clearly defined geographic scope: Hydrogen valleys are hydrogen ecosystems that cover a specific geography. Their footprint can range from a local or regional focus to a specific national or international region.

C - Covering multiple steps in the hydrogen value chain: These steps range from hydrogen production (and often even dedicated renewables production) to the subsequent storage of hydrogen and distribution to off-takers via various modes of transport.

D - Supply to various end sectors: Hydrogen valleys usually showcase the versatility of hydrogen by ideally supplying several hard-to-abate sectors in their geography such as mobility, industry, and end-use energy. Thus, hydrogen valleys are ecosystems or clusters where various final applications share a common hydrogen supply infrastructure.

Additionally, being the main implementer of the 50 valleys by 2030 goal of the European Commission, the **Clean Hydrogen Partnership (CHJU)** defines hydrogen valleys in much the same way, using the same four pillars[10]. The Partnership also uses this definition to allocate funding – only applicants who fulfil the criteria will be considered in a call[11]. The Partnership also expects valleys to produce at least 500 tonnes of hydrogen per year (small-scale) or 4000 tonnes per year (large-scale).[12]

The **Mission Innovation (MI) Hydrogen Valleys platform**, managed by the Clean Hydrogen Partnership, uses the same four criteria plus two additional ones. To be included, projects must produce their hydrogen with a low-carbon footprint and be under project development in the form of an advanced feasibility study for example.

Hydrogen valleys have been supported with European funding since Horizon 2020. However, there is a broader of spectrum of funding opportunities ranging from EU to national and regional level.

- **Horizon Europe** funds hydrogen projects across all stages – from research and development to demonstration and market deployment. This is particularly relevant for hydrogen valleys

[9] Commission Staff Working Document SWD(2024) 159 final of 24 June 2024: Towards a roadmap for accelerating the deployment of Hydrogen Valleys across Europe: challenges and opportunities.
[10] Clean Hydrogen Partnership, 2025. Hydrogen Valleys.
[11] European Commission. 2025. EU Funding & Tenders Portal. Large-scale Hydrogen Valley.
[12] European Commission. 2025. EU Funding & Tenders Portal. Small-scale Hydrogen Valley.

aiming to integrate and scale hydrogen technologies. Key opportunities lie within Pillar II (Climate, Energy and Mobility cluster) and its Clean Hydrogen Partnership, as well as Pillar III through the European Innovation Council. Additional support is available via Open Innovation Test Beds and other public-private partnerships.

- The **Clean Hydrogen Partnership** is the successor of the Fuel Cells and Hydrogen Joint Undertaking I and II. Starting in 2021 and running until 2027, the public-private partnership allocates a budget of €2 billion euro. It consists of three stakeholders – the European Commission, Hydrogen Europe (representing industry interests) and Hydrogen Europe Research (representing research interests).[13] Within its yearly funding calls, the Partnership has already started to fund hydrogen valleys in 2019 and has so far supported 20 valleys with funding[14].

- The **Innovation Fund** plays a crucial role by supporting up to 60% of relevant project costs. For large-scale projects, this includes the additional capital expenditures (CAPEX) and operational expenditures (OPEX) over ten years post-operation, while for small-scale projects, it covers CAPEX. The remaining costs must be financed by project promoters through private or public sources. Grants are available, and additional funding can be accessed via blended finance through the Green Transition Product, with €100 million allocated via InvestEU. This support can also be combined with Breakthrough Energy Catalyst financing, with clean hydrogen as a key focus area. Innovation Fund grants are not considered State aid, though any additional public funding must comply with EU rules.

- In addition to EU-level instruments, **national and regional funding** plays a critical role in the development of hydrogen valleys. Many governments across Europe have established dedicated funding schemes, incentives, and strategic programs to support hydrogen technologies as part of their energy transition and industrial policy goals. These may include direct grants, tax incentives, loan guarantees, and co-financing opportunities aimed at de-risking investments and stimulating local innovation. Regional authorities often provide targeted support to align hydrogen valley projects with local economic development plans, infrastructure needs, and workforce strategies. Such funding is vital for bridging gaps not covered by EU programs and for ensuring the long-term integration of hydrogen into regional energy and industrial systems.

3.2 Scope and methodology

Hydrogen valleys are an increasingly critical component of the hydrogen economy and a key enabler of high-TRL innovation. While the Hydrogen Monitoring Flash briefly touched on hydrogen valleys, mapping them against project participants and outlining some financing mechanisms, this coverage was limited in scope and the underlying data partly outdated. In order to provide a more targeted and complementary contribution to the Monitoring Flash, the scope of Deliverable 4.2 has been refined to focus on the role and evolution of hydrogen valleys in Europe.

A dedicated database of hydrogen valley projects has been created, examining their role across the hydrogen value chain, and identifying cross-regional trends within the EU. This comprehensive assessment provides insights into the current status of hydrogen valleys and their contribution to advancing EU energy and climate policy objectives.

[13] Clean Hydrogen Partnership, 2025. Who we are.
[14] Clean Hydrogen Partnership, 2025. Hydrogen Valleys.

The analysis is based on data collected through extensive desk research, using publicly available online sources from the Mission Innovation Hydrogen Valley platform[15], Clean Hydrogen Partnership website[16], CORDIS repository[17], as well as additional information provided by SET Plan Member States, national hydrogen associations and individual projects through surveys or interviews. We followed a stepwise approach to update and amend information on hydrogen valleys identified via Mission Innovation (MI) and CHJU (see Tab. 3). All projects were screened according to the four criteria laid out by the European Commission. Only hydrogen valleys located in the EU and in associated countries on the European continent were included in the analysis. Valleys that verifiably not exist anymore were excluded. The final list of 85 projects can be found in the Annex.

Table 3: Stepwise approach to set up a database on hydrogen valleys.

Research steps	Sources	Results (without duplicates)
(a) Desk research	13.1.2025: Mission Innovation Hydrogen Valley platform (102 European hydrogen valleys) and CHJU website (20 entries: 6 large and 14 small hydrogen valleys) were used as a starting point of the search, CORDIS and other websites or reports were used to revise and update MI and CHJU data	79 valleys
(b) Survey	7.3.2025: 48 contacts (IWG member state representatives) received a list of 79 hydrogen valleys (a)	6 responses
(c) Interviews	03/25-05/25: interviews by phone or email with IWG member state representatives and hydrogen valley coordinators	14 interviews
(d) Analysis	Spreadsheet file used in Excel and QGIS	85 valleys (a+b+c)

[15] Clean Hydrogen Partnership, 2025. H2 Valley Map. https://h2v.eu/hydrogen-valleys.
[16] Clean Hydrogen Partnership, 2025. Hydrogen Valleys.
[17] European Commission, 2025. CORDIS – EU research results.

3.3 Analytical results

Hydrogen Valleys in Europe - Overview

This report is based on the analysis of 85 hydrogen valleys across the European continent, offering a broad overview of the current landscape. These valleys are geographically diverse, covering nearly the entire European Union including associated countries and reflecting the growing interest and investment in hydrogen at both national and regional levels.

The findings presented here are drawn from publicly available sources as well as data shared directly with the authors. While every effort has been made to compile accurate and up-to-date information, it is important to note that this analysis is neither exhaustive nor fully comprehensive. Some data points remain incomplete due to the evolving nature of the projects and varying levels of transparency across initiatives. This is also reflected in the project status. At the time of data collection, 11% of the hydrogen valleys were reported to be in the concept development phase or run feasibility studies, 41% were before or directly after the final investment decision (FID), 15% were under construction, and only 8% in operation (see Fig. 3). For 21 valleys, no status was reported.

Nevertheless, the insights provided in the following sections offer a valuable snapshot of the state of hydrogen valleys in the Europe. They help identify emerging trends, highlight regional dynamics, and point to areas where further development and coordination may be needed. The complete list of hydrogen valleys considered in this report is included in the Annex.

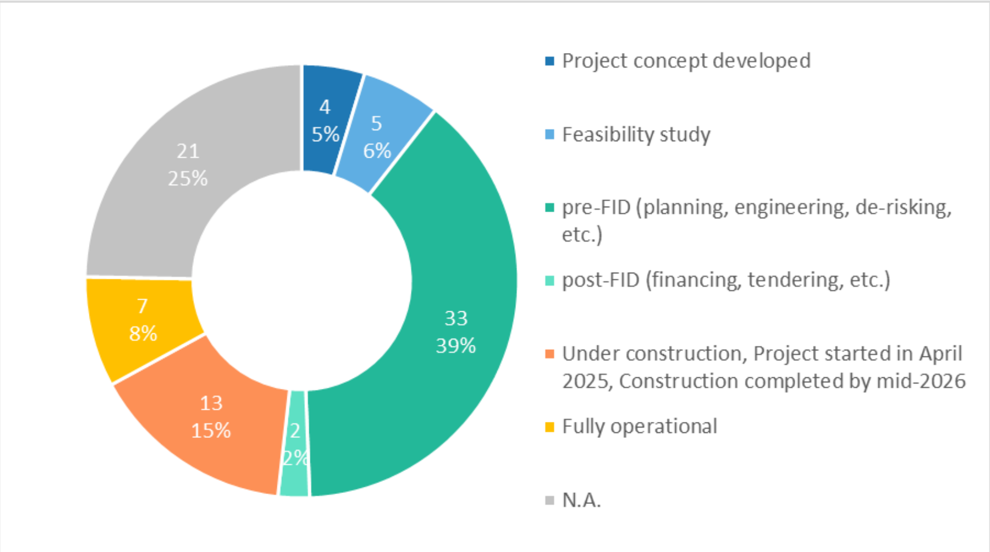

Figure 3: Project status (N=85).

The geographical pattern of developing hydrogen valleys shows a clear concentration in more industrialised countries. Spain (17+1 cross-border) and Germany (13+2 cross-border) stand out as the leading countries, hosting the highest number of hydrogen valley projects. They are followed by Italy (7), Portugal (6), France (5+1 cross-border), and the Netherlands (5), which also demonstrate strong national commitments to advancing hydrogen ecosystems (see Fig. 4).

Despite these frontrunners, the majority of EU Member States currently have fewer than three hydrogen valleys either in operation or in the planning stages. Especially, the Baltic and West Balkan regions need to catch up with the developments in other parts of Europe. The map shows that while hydrogen is gaining momentum across Europe, the level of deployment remains uneven, with significant opportunities for further expansion and collaboration, particularly in regions that are still in the early stages of hydrogen adoption.

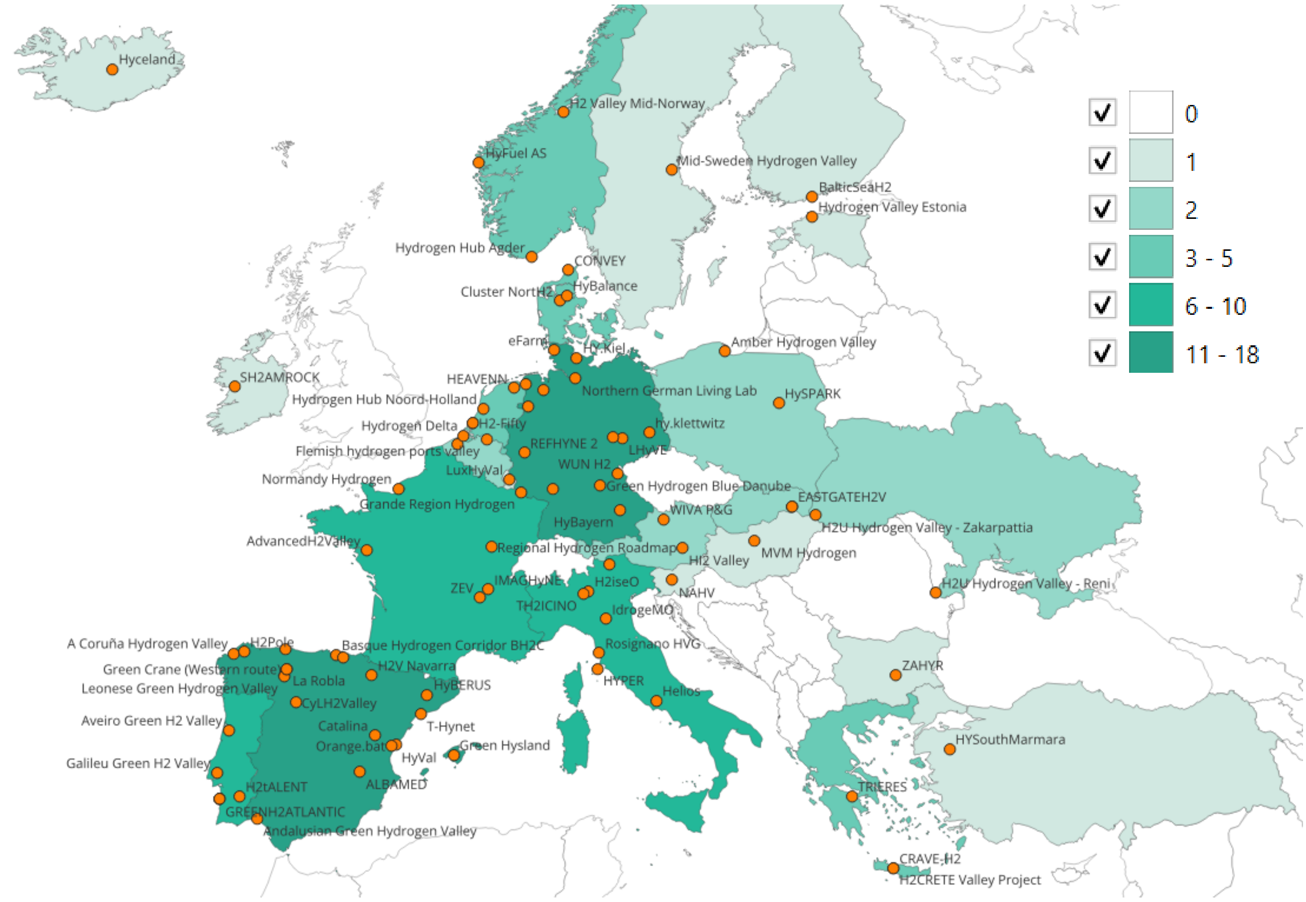

Figure 4: Map of hydrogen valleys in Europe (Colour range: 0-18 valleys per country, N=85).

Production Capacity

The hydrogen valleys across the EU with data on production targets (N=63) are projected to produce a total of over 3.6 million tons of hydrogen per year. This substantial production capacity underscores the growing scale and ambition of Europe's hydrogen economy and reflects the role of hydrogen valleys as key enablers of regional decarbonisation, innovation, and industrial transformation.

Hydrogen production within the valleys is predominantly based on renewable electricity, with an emphasis on Proton Exchange Membrane (PEM) electrolysis. This regional approach stands in stark contrast to the global hydrogen production landscape, where approximately 89% of hydrogen is still derived from fossil fuels via steam methane reforming (SMR), and a mere 1% is produced through electrolysis. Notably, the distribution between PEM and alkaline electrolysis (ALK) technologies in the valleys does not align with the current operational electrolyser manufacturing capacity across Europe. European production capacity is divided roughly equally, with 53% allocated to PEM electrolysers and 46% to alkaline systems[18]. As can be seen in Fig. 5 and Fig. 6, valleys tend to favour PEM electrolysers (47%) over alkaline electrolyser (28%).[19] A total of 57 hydrogen valleys provided information on hydrogen production pathways. Some data contained multiple entries.

[18] European Hydrogen Observatory, 2024.

[19] Ring chart: PEM: 37 mentions, ALK: 22, SMR: 7, SOE: 3, undefined water electrolysis: 10.

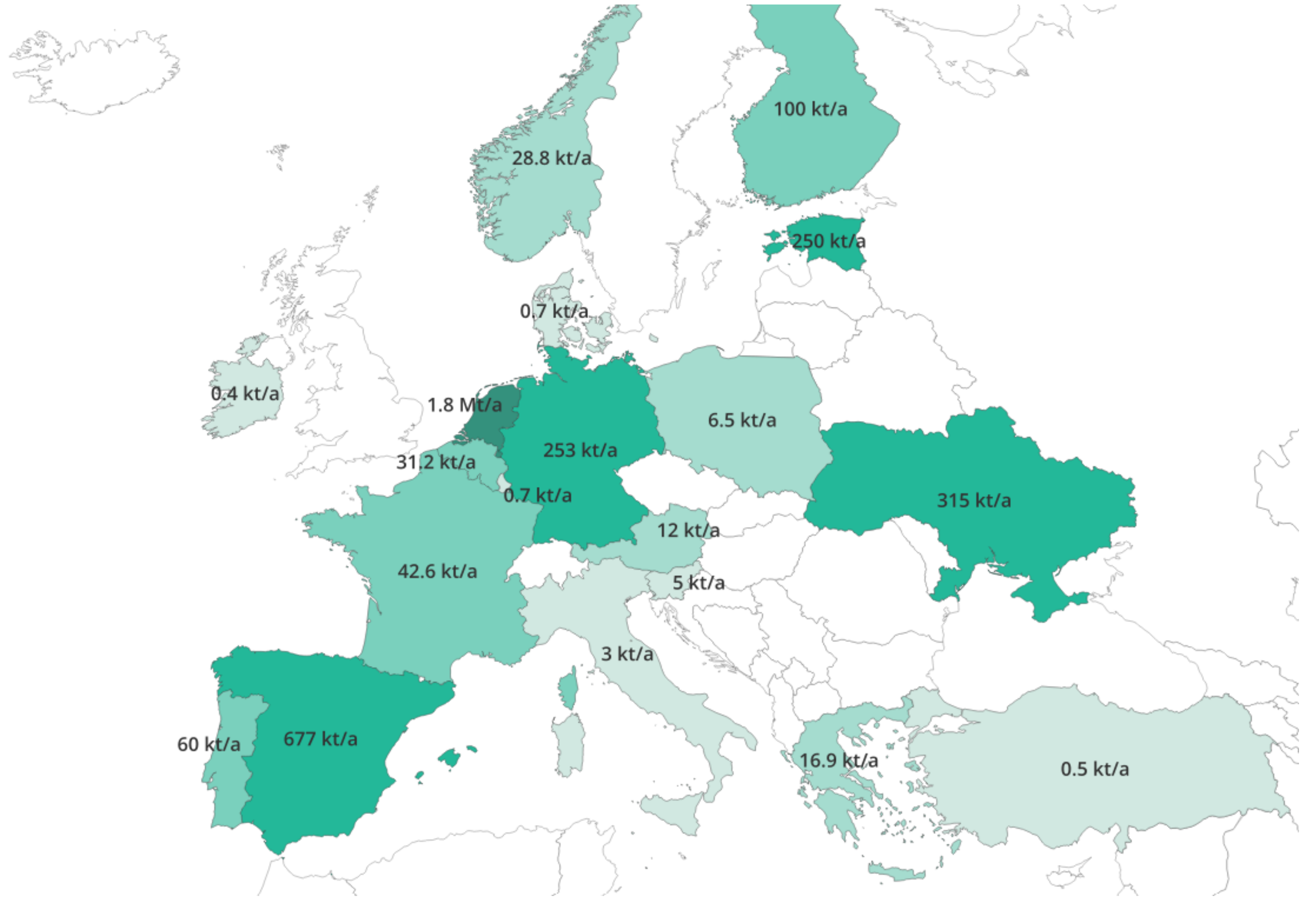

Figure 5: Hydrogen valley's planned hydrogen production capacity per country (N=19).

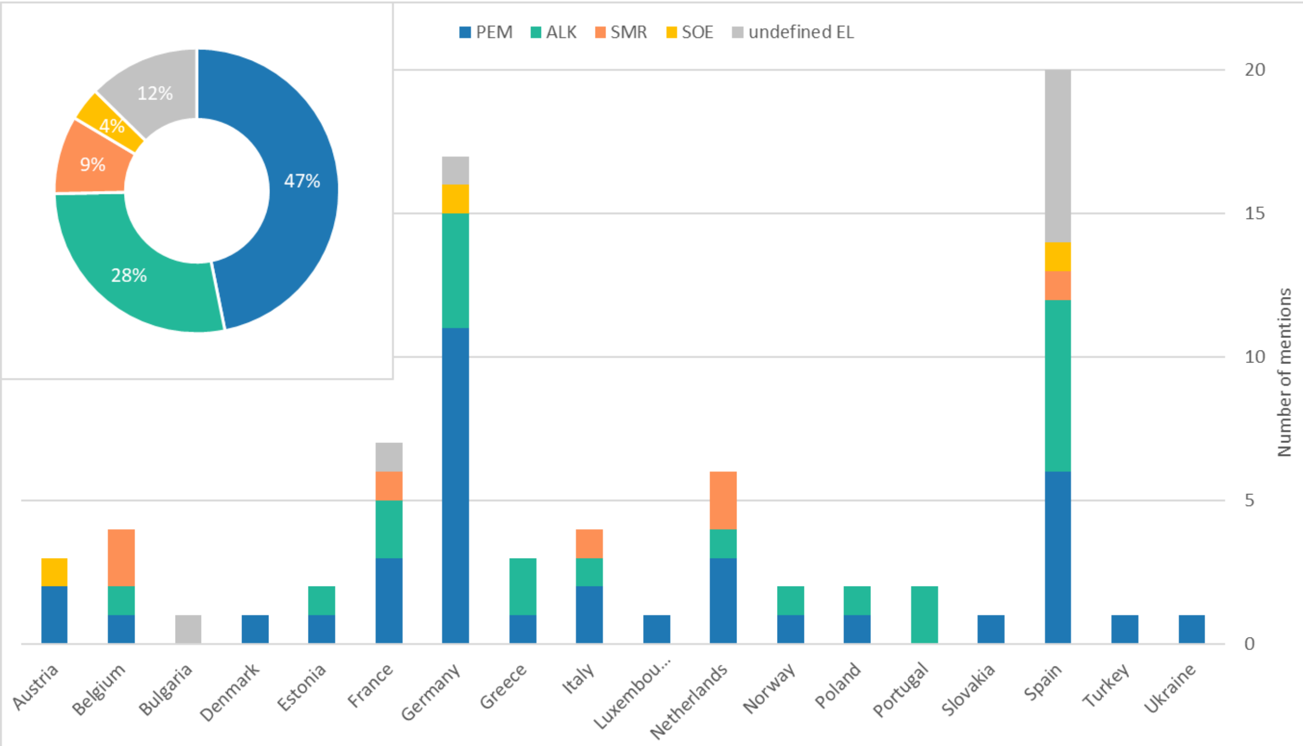

Figure 6: Hydrogen production pathways in European hydrogen valleys (N=57, 79 mentions).

Hydrogen Storage

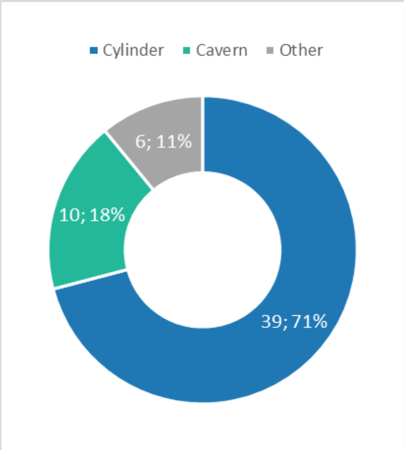

Figure 7: Hydrogen storage technologies (N=49, 55 mentions).

Hydrogen storage technologies are intrinsically linked to both transportation methods and the maturity of the respective technologies. Compressed hydrogen storage, for instance, is already well-developed and operates at a high Technology Readiness Level, making it a reliable and widely adopted solution. In contrast, large-scale underground hydrogen storage in salt caverns or depleted gas fields remains in the early stages of development and is highly site-dependent, often requiring extensive geological assessments and infrastructure investment[20]. One of the practical advantages of compressed gas storage is its versatility: hydrogen cylinders can be readily integrated into mobile transport systems, such as being mounted on trucks, thereby eliminating the immediate need for dedicated refuelling infrastructure. Given these considerations, it is unsurprising that the majority of hydrogen valleys (71% based on 55 mentions) currently favour cylinder-based storage solutions, as they offer flexibility and logistical simplicity especially for short-distance transport (see Fig. 7).

Transport of Hydrogen

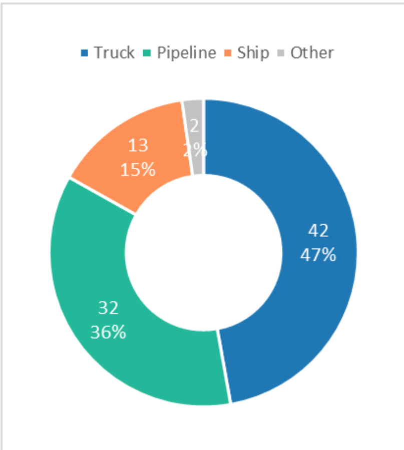

Figure 8: Hydrogen transportation (N=56, 89 mentions).

Across the hydrogen valleys, strategies for the transport of hydrogen reflect a pragmatic balance between infrastructure availability, project scale, and cost-effectiveness. Currently, over 47% of hydrogen valleys focus primarily on road-based transportation, i.e. trucks to distribute hydrogen to end-users (see Fig. 8). Meanwhile, approximately 36% of initiatives are planning or implementing dedicated pipeline infrastructure, which, while capital-intensive, offers long-term efficiency for high-volume, continuous supply. Notably, several regions are adopting a hybrid model that combines both trucking and pipelines. A significant number of hydrogen valleys (15%) also aim at using ships to transport hydrogen, with more than a quarter of valleys indicating that they use this transportation method.

[20] Mehr, A.S. et al., 2024.

Hydrogen End-Use Applications

Mobility emerges as the predominant focus among the hydrogen valleys, with over 42% of projects planning to supply hydrogen for mobility applications, including fuel for cars, buses, trucks, and maritime vessels. This underscores a strategic prioritisation of the transport sector as a key area for decarbonisation and highlights the growing recognition of hydrogen as a viable clean fuel alternative capable of supporting emissions reduction targets. Industrial applications represent the second most common end-use, with 32% of valleys directing hydrogen toward sectors such as refining, steel manufacturing, and the chemical industry – industries that are traditionally hard to abate and require high-temperature processes well-suited to hydrogen fuel. Lastly, approximately 25% of valleys allocate hydrogen for energy-related purposes, including stationary fuel cell systems and injection into the natural gas grid, reflecting a broader interest in integrating hydrogen into energy systems to enhance flexibility and resilience. Regional differences in hydrogen use are shown in Fig. 9.

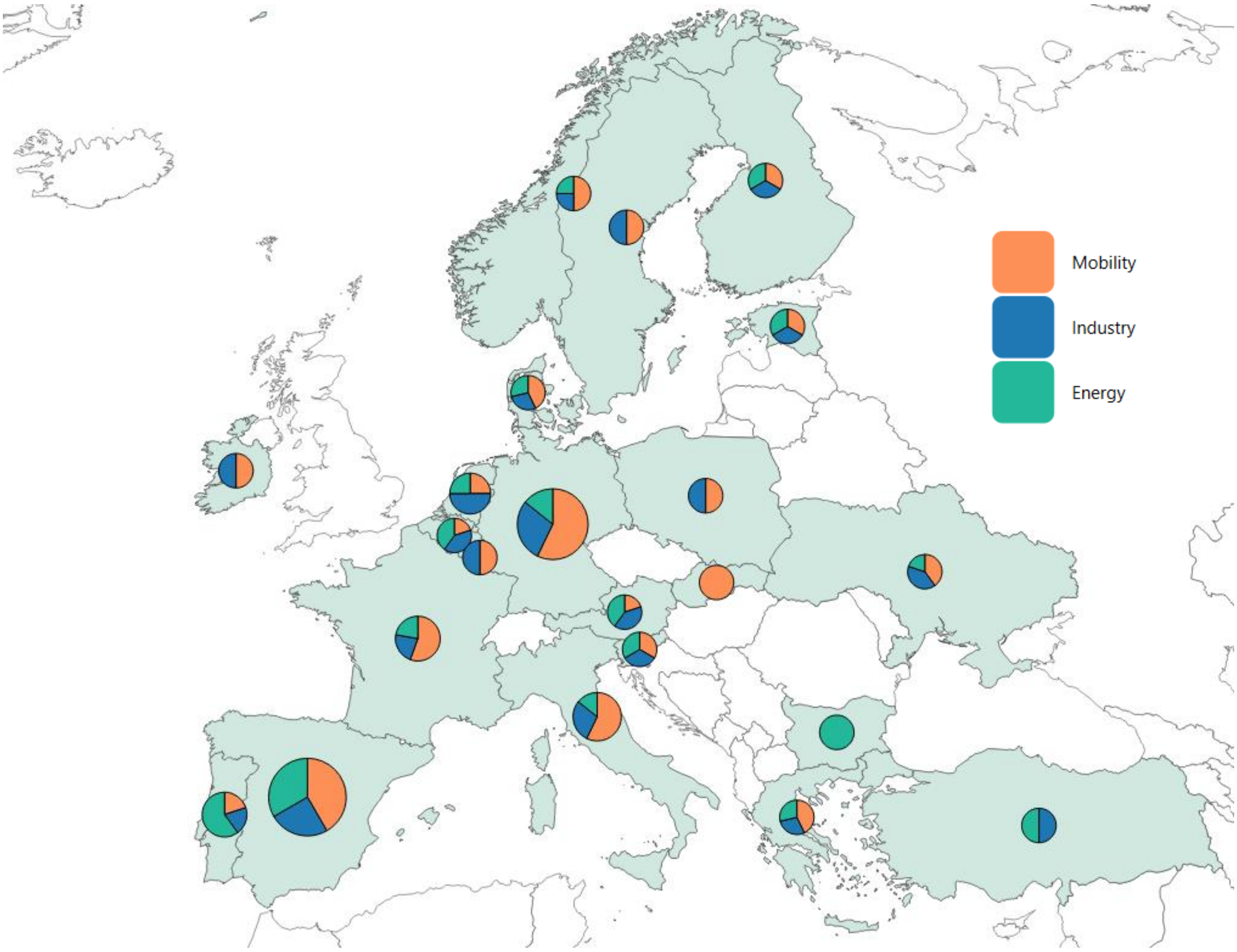

Figure 9: Hydrogen end-use applications (N=60, size of pie charts is related to the number of hydrogen valleys).

Energy Applications

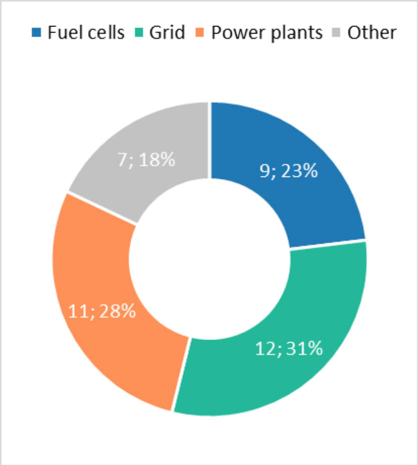

Figure 10: Energy applications (N=26, 39 mentions).

Within the subset of hydrogen valleys that have designated energy as a principal end-use sector, a notably diverse array of hydrogen applications is being explored. Approximately a quarter of these initiatives are pursuing the use of hydrogen in stationary fuel cells, reflecting a growing interest in decentralised, low-emission power generation solutions, particularly in industrial and commercial environments (see Fig. 10).

Another third aim to inject hydrogen into existing natural gas networks, thereby facilitating the gradual decarbonisation of gas grids and enabling hydrogen blending as a transitional strategy.

Another quarter of hydrogen valleys are focused on the direct combustion of hydrogen in gas turbines, leveraging its high energy content to produce heat or electricity, often in combined heat and power (CHP) configurations. This distribution illustrates the multifaceted role hydrogen is poised to play in future energy systems, both as a direct energy carrier and as a means of integrating renewable energy into established infrastructure.

Industrial Applications

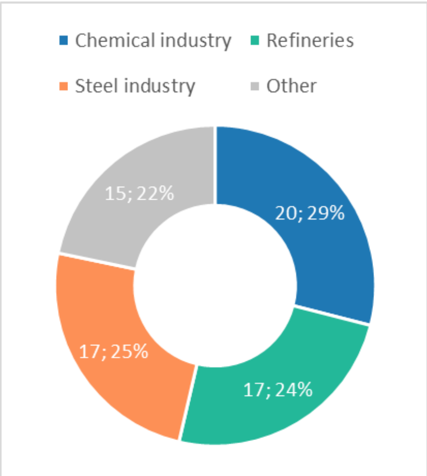

Figure 11: Industrial applications (N=39, 69 mentions).

Hydrogen deployment for industrial purposes within the hydrogen valleys is relatively balanced across several key sectors, reflecting its versatility as both an energy carrier and a feedstock. Approximately 29% of the valleys targeting industrial end-uses want to use renewable or low-carbon hydrogen in the chemical industry, where it can fulfil dual roles: as a low-carbon feedstock in the synthesis of ammonia, methanol, and other base chemicals, and as a clean energy vector for process heat. (see Fig. 11)

A comparable share of around 25% is focusing on the steel sector, underscoring hydrogen's potential to significantly reduce carbon emissions in one of the most energy- and carbon-intensive industries. This aligns with broader efforts to decarbonise hard-to-abate sectors through innovative technologies such as direct reduced iron (DRI) processes utilising green hydrogen.

Similarly, 24% of the valleys are planning to supply hydrogen to refineries, aiming to decarbonise conventional refining processes, such as hydrocracking and desulfurisation, and to support the development of low-emission fuels.

Mobility Applications

Among the hydrogen valleys prioritising mobility as a key end-use sector, hydrogen deployment is most prevalent in public transport, with the majority of projects focusing on fuel cell buses (26%). This preference is driven by the operational suitability of buses for centralised refuelling, predictable routes, and high daily mileage, making them an ideal early-use case for hydrogen technologies (see Fig. 12).

Trucks and light duty vehicles are reported applications in 25% of the hydrogen valleys. Passenger cars account for 22% of mobility-related applications, indicating growing interest in extending hydrogen fuel cell solutions to the private transport sector, albeit at a slower pace due to current limitations in refuelling infrastructure and vehicle availability.

Maritime and rail applications represent smaller shares, with hydrogen being used in approximately 10% and 4% of valleys, respectively. The comparatively lower adoption rates in these sectors can be attributed to several technical and economic barriers. For maritime applications, ongoing concerns around safety, particularly in confined and offshore environments, remain a significant challenge. Guidelines for the safe design and operation of hydrogen-fuelled vessels are still under development[21]. Similarly, the use of hydrogen in rail systems, especially for long-haul or non-electrified routes, faces high capital costs and complex infrastructure requirements, which currently limit widespread deployment.

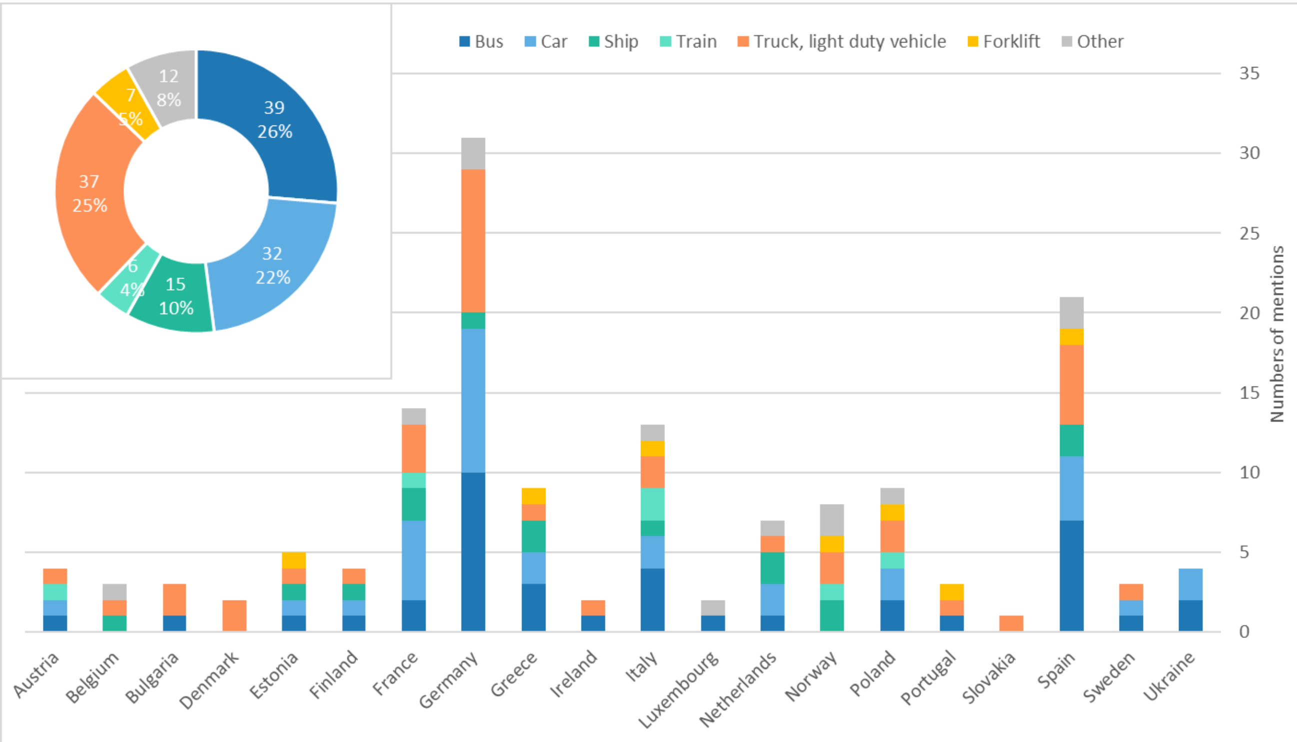

Figure 12: Application in mobility (N=50, 148 mentions).

[21] Maritime Technologies Forum, 2024.

Funding Analysis

Hydrogen valleys that benefit from EU funding report an average total investment volume of around €140 million, with the EU contributing an average of €22.56 million per project (see Fig.13). In comparison, valleys that receive support from national or regional governments tend to involve significantly larger investment volumes, averaging around €810 million per project. Of this, an average of €52 million is provided through national or regional public funding. Despite the notably higher overall investment levels in nationally funded projects, the relative share of public funding is proportionally lower. On average, national or regional governments contribute just around 6% of the total project investment, whereas EU-funded projects receive a higher proportional contribution, with EU support accounting for 16% of the total investment. These figures suggest that while national-level projects often operate on a larger financial scale, EU-funded initiatives benefit from a comparatively stronger public funding ratio. The authors need to draw attention to the fact that this data is not perfect – valleys might have included funding received for single projects instead of just listing the funding received for the coordination of the valleys therefore reporting higher numbers in some cases. Nonetheless, the data can be seen as indicative of general trends.

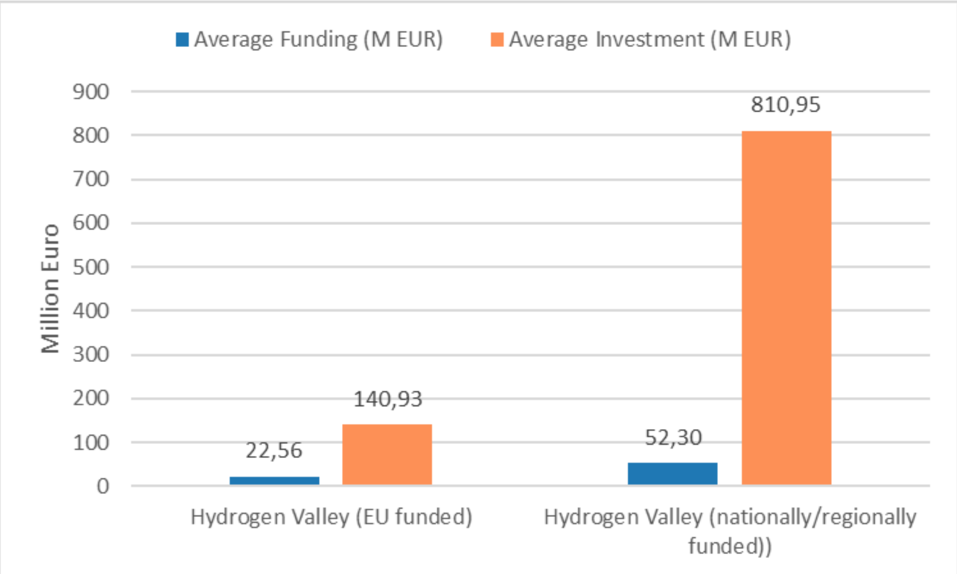

Figure 13: Differences in the average investment volumes and public funding contributions for hydrogen valleys receiving EU Funding (N=24) or national/regional funding (N=17).

In total, hydrogen valleys across the EU have received around €542 million in European funding. Of this amount, €250 million[22] has been allocated through the CHJU over the years and €240 million for current (until 2024) projects, making it the single most significant EU funding instrument supporting these initiatives. Out of 85 valleys, the partnership has supported 19 valleys, equalling over 20%. The substantial contribution from CHJU highlights its central role in advancing the hydrogen valley idea and accelerating the deployment of hydrogen technologies across the continent. As a key pillar of the EU's hydrogen strategy, CHJU serves not only as a financial enabler but also as a catalyst for collaboration between public and private stakeholders. It is noteworthy that none of the valleys analysed reported confirmed funding from both EU and national sources specifically allocated to the valley as a whole (as opposed to funding for individual projects within the valley). This absence of dual-source funding may be indicative of incompatibilities between funding instruments, or a lack of clarity and guidance on how to effectively combine different funding streams. The findings suggest a need for improved coordination between national and EU funding schemes, as well as clearer communication and support mechanisms to facilitate the blending of complementary resources.

[22] Clean Hydrogen Partnership, 2025. Hydrogen Valleys.

Country Analysis

For selected countries hosting multiple hydrogen valleys, a country-specific analysis has been conducted in the sections below. This aims to provide a clearer picture of the current state of play within each national context, highlighting regional priorities, progress, and strategic directions in the development of hydrogen ecosystems.

France

There are currently six hydrogen valleys being developed or active in France (see Fig. 14). The AdvancedH2Valley, Normandy Hydrogen, Regional Hydrogen Roadmap, ZEV - Zero Emission Valley, IMAGHyNE: Hydrogen valley across the French region of Auvergne-Rhône-Alpes, and CEOG (Centrale Electrique de l'Ouest Guyanais). The valleys average around €218 million of total investment volume of which on average a contribution of €73 million comes from the EU. One of the hydrogen valleys is located in French Guinea, an oversea territory, and therefore not shown in the map.

Together, they aim to produce 43,330 tons of hydrogen per year (cross-border production not counted for any of the country analyses). This represents 6.3% of the planned production volume in France's national strategy for 2030[23]. All of the valleys are planning on using either PEM or alkaline electrolysis powered by renewable or low-carbon energy. About 60% of the valleys rely on trucks to transport the gas and two are building pipelines as well. 83% of the valleys will supply hydrogen to mobility, focusing on cars but also including trucks and buses. The valleys plan on using both 700 bar and 350 bar refuelling stations. Other end-uses are split between back-up fuel cell generators for energy and the chemical industry.

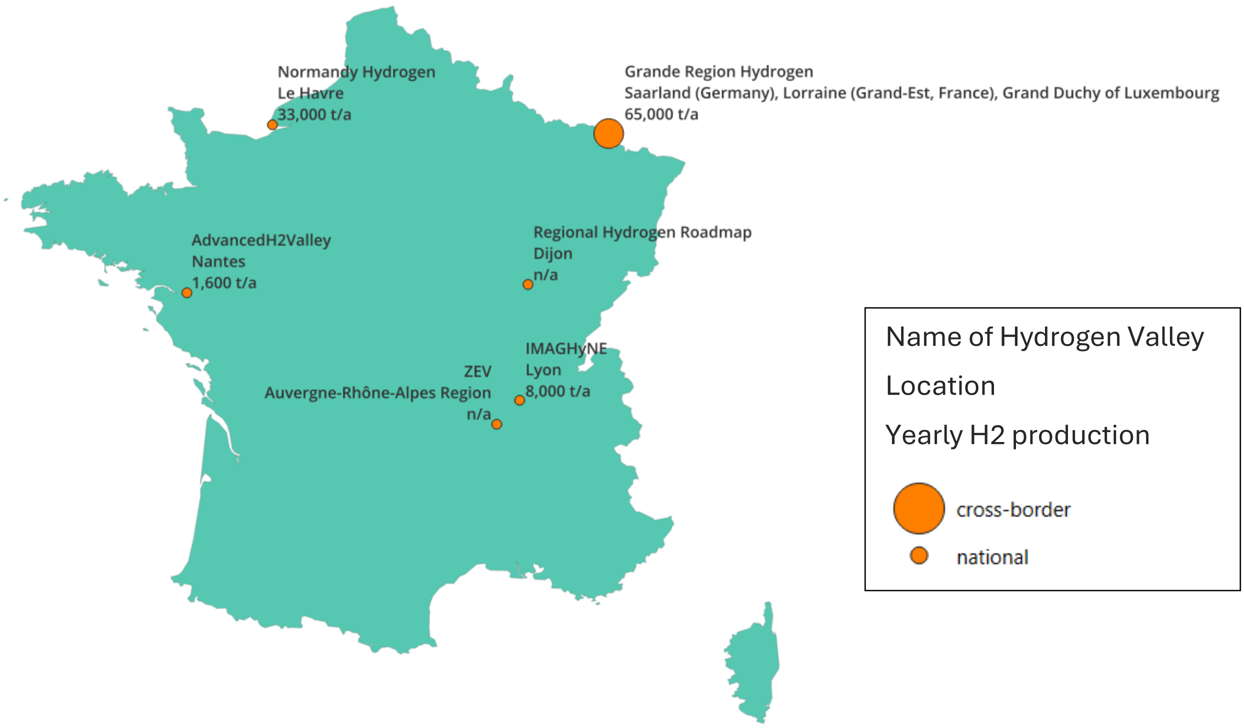

Figure 14: Hydrogen valleys in France (N=6).

[23] France Hydrogène, 2023. National Hydrogen Strategy.

Germany

14 hydrogen valleys are being developed or are operating in Germany: Clean Hydrogen Coastline, eFarm, Grande Region Hydrogen EEIG, H2NORD GmbH & Co. KG, H2Rivers, HY.Kiel, hy.klettwitz, HyBayern, Hydrogen Valley Emsland, LHyVE Leipzig Hydrogen Value chain for Europe, Norddeutsches Reallabor (NRL) - Northern German Living Lab, REFHYNE 2, Energiepark Bad Lauchstädt and the Wunsiedel Hydrogen Valley (see Fig. 15). These valleys have an average investment volume of €270 million. Of this, an average of €32 million is funded by the EU and an average of €49 million is supplied by national or regional funding.

The valleys aim to produce 172,662 tons of hydrogen per year, supporting the 10 GW capacity goal of the German national strategy. [24] The hydrogen will be produced mostly through PEM electrolysis with some additional alkaline and solid oxide (SOE) electrolysers operating. Interestingly, there is little data on energy sources for the German valleys. 8 of the valleys will use trucking to transport Hydrogen while almost half plan to use pipelines, with some using a hybrid approach.

Similar to France, a big majority of 12 out of 14 are providing hydrogen to mobility focusing on cars and trucks. More than half of the valleys are providing the gas through 700 bar refuelling stations. Steel production and refineries make up most of the end-users in the industry. Interestingly, none of the valleys include an energy end-use.

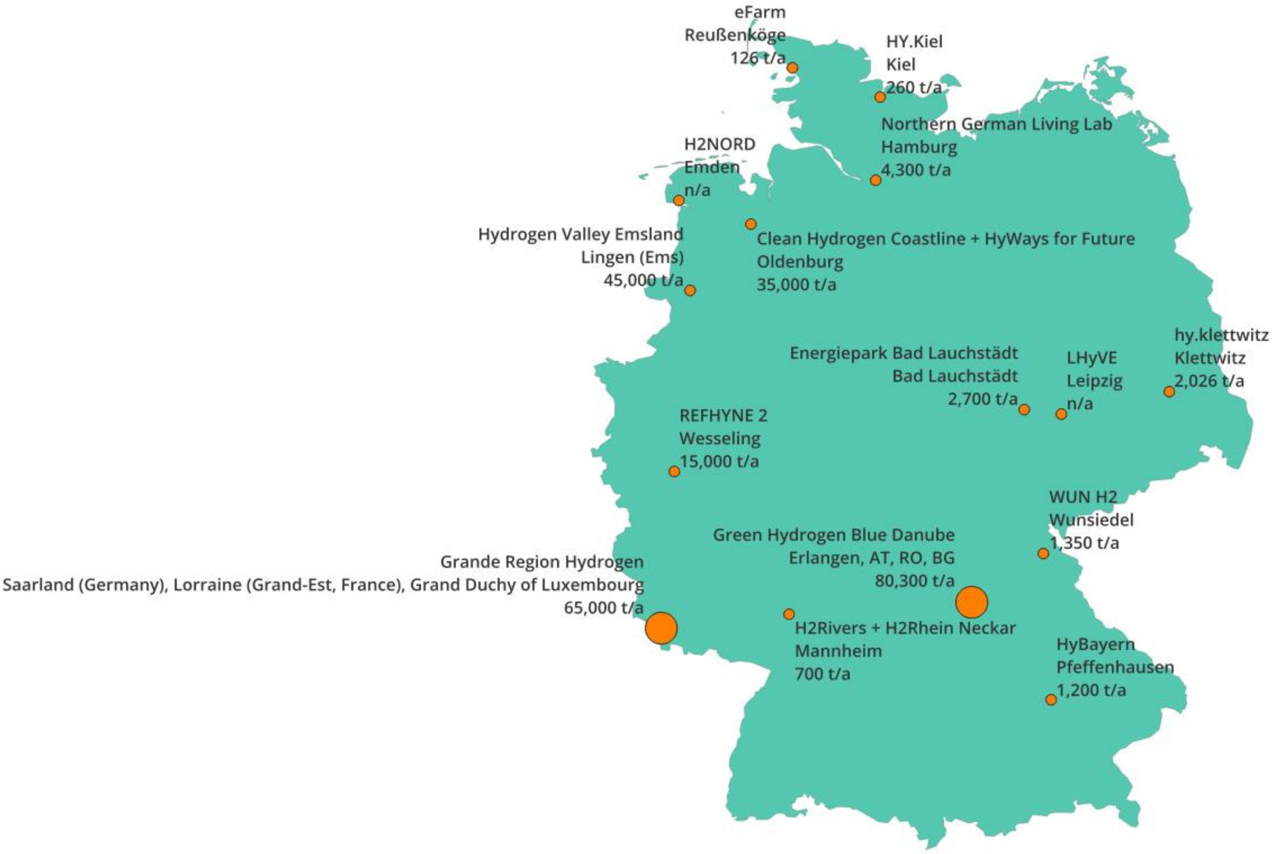

Figure 15: Hydrogen valleys in Germany (N=15).

[24] Federal Ministry for Economic Affairs and Climate Action Germany, 2023. National Hydrogen Strategy Update.

Netherlands

In the Netherlands, five hydrogen valleys are currently under development or in operation: Europe's Hydrogen Hub: H2 Proposition Zuid-Holland/Rotterdam, H2-Fifty, HEAVENN, Hydrogen Delta, and Hydrogen Hub Noord-Holland (see Fig. 16). Two large valleys contribute to a high average investment volume of €2,114 million. Unfortunately, little public information on EU or national funding is available despite the €20 million the HEAVENN project has received from the CH JU.

The valleys aim to produce an impressive 1,798,700 tons of hydrogen per year and their installed electrolyser capacity will bring the Netherlands a step closer to its 4 GW installation goal[25]. The gas will be produced through electrolysis but also through steam methane reformation with carbon capture, utilisation, and storage. Most of the valleys opt to transport hydrogen via pipelines.

End-uses are split between industrial use as feedstock and for mobility for a variety of purposes (cars, trucks, buses, ships).

Figure 16: Hydrogen valleys in the Netherlands (N=5).

[25] Ministry of Economic Affairs and Climate Policy Netherlands, 2020. Government Strategy on Hydrogen.

Portugal

Portugal currently has six valleys under construction or in operation: Aveiro Green H2 Valley, Galileu Green H2 Valley, GREENH2ATLANTIC, MadoquaPower2X (Sines Energy Hub), Sines Hydrogen Valley, and H2tALENT: Alentejo, Portugal (see Fig. 17). As in the Netherlands, two larger projects drive up the average investment sum to €770 million. The average contribution from EU funds is €20 million.

The production goal is 60,316 tons of hydrogen per year, contributing to achieving Portugal's 2-2.5 GW goal for hydrogen production capacities until 2030[26]. Most of the valleys will utilise alkaline electrolysis using renewable energy and rely on both pipelines and trucking to transport the gas to the end-users.

Interestingly, for Portuguese valleys, mobility plays a secondary role behind the energy sector for end-use. About half of the applications will utilise hydrogen either for injection into the gas grid or directly to power turbines.

Figure 17: Hydrogen valleys in Portugal (N=6).

[26] Directorate-General for Energy and Geology Portugal, 2020. National Strategy for Hydrogen.

Spain

Spain is pursuing the implementation of 18 projects: Andalusian Green Hydrogen Valley, Basque Hydrogen Corridor BH2C, BenortH2, Green Crane (Western route), Green Hysland, HyVal, Orange.bat, Leonese Green Hydrogen Valley, HyBERUS, Catalina, A Coruña Hydrogen Valley, Tarragona Hydrogen Network (T-Hynet)- CATALUÑA, Asturias H2 Valley, H2V Navarra Valley, H2Pole, La Robla, ALBAMED, and CyLH2Valley - Clean Hydrogen Valley in Castilla y León (see Fig. 18). The average investment volume for the valleys is €842 million. The average EU funding received is around €23 million and the average national funding is €71 million while applications for an average of €170 million per project are still ongoing. This data from Spain shows that projects seem to desire higher public funding than they are receiving.

The valleys' total production goal comes to 676,669 tons of hydrogen per year, supporting Spain's ambitious goal of 12 GW installed capacity by 2030[27]. All the valleys aim to use renewable energy to power a mixture of PEM, alkaline and SOE electrolysers. The transport of the gas is split between pipelines and trucking.

For end-uses, mobility is again a popular choice as well as utilising the gas in stationary fuel cells and in gas grids. For industrial end-uses, steel manufacturers are on top of the list, next to the chemical industry.

Figure 18: Hydrogen valleys in Spain (N=18).

[27] Ministry for Ecological Transition and the Demographic Challenge Spain, 2024. Plan Nacional Integrado de Energía y Clima.

Case Study: Mid-Sweden Hydrogen Valley

The Mid-Sweden Hydrogen Valley: A Regionally Driven Model for Hydrogen Transition

The Mid-Sweden Hydrogen Valley stands out for its distinctive, bottom-up approach to hydrogen ecosystem development. Unlike many other hydrogen valleys, which are often structured around large-scale grants or formalised project consortia, this initiative is led by the Regional Development Administration of Region Gävleborg. The region has fostered a collaborative framework that brings together public and private stakeholders through a strategic advisory board rather than a traditional project management team. Costs are jointly shared among participants, and the initiative relies heavily on regional coordination and cross-sector cooperation. This strong collaborative spirit – whether between start-ups and established firms, power producers and end-users, or among large industrial players seeking EU funding – has emerged as a key success factor.

The transition in Mid-Sweden is primarily industry-driven, with the Regional Development Administration playing an enabling role by supporting risk-taking enterprises through regional funding instruments and assistance in securing European-level financing. However, the region faces challenges due to a lack of national policy alignment. To date, there is no dedicated national strategy or framework to support hydrogen uptake in Sweden, which has placed greater importance on the proactive role of the regional development plan.

Despite this policy gap, the valley has made notable progress. Major industrial actors such as Ovako and Alleima are already integrating hydrogen into steel production processes, demonstrating early adoption in hard-to-abate sectors. The region's longstanding focus on hydrogen for mobility is evidenced by the early installation of a 700-bar hydrogen refuelling station (HRS) in 2016, which has since been upgraded to support both 350 and 700-bar capacities. Additional stations are in development, with two more expected to become operational by 2025. This advancement has been catalysed by the active participation of key industrial stakeholders, including Volvo Trucks, Hitachi Energy, Power Cell and AGA Linden.

Unlike many other regions where FIDs pose a major hurdle, the primary bottleneck in Mid-Sweden is related to energy infrastructure. Specifically, limited grid capacity and prolonged application timelines for grid connection, reportedly stretching over several years, pose significant constraints on scaling up hydrogen production and accelerating the transition.

The Mid-Sweden Hydrogen Valley thus represents a compelling model of how strong regional governance, industrial initiative, and stakeholder cooperation can drive meaningful progress in the absence of national-level policy support. It also illustrates the critical importance of addressing systemic infrastructure challenges to unlock the full potential of regional hydrogen ecosystems.

Case Study: HyLand

Case Study: HyLand – National Support Network for Regional Hydrogen Economies in Germany

The *HyLand – Hydrogen Regions in Germany* initiative, launched in 2019 by the Federal Ministry of Digital and Transport, stands out as a leading example of how national policy can effectively stimulate regional hydrogen development. It is implemented as part of the National Innovation Programme for Hydrogen and Fuel Cell Technology (NIP II), which provides a comprehensive framework for the deployment of hydrogen technologies nationwide. Now in its second phase (HyLand II), the program supports municipalities and regions across Germany in the initiation, planning, and implementation of hydrogen-related strategies through a structured, competitive framework.

HyLand is organised into three progressive categories – **HyStarter**, **HyExperts**, and **HyPerformers** – each designed to match the varying levels of hydrogen readiness among participating regions. This tiered structure ensures that both emerging and more advanced regions receive tailored support, ranging from initial concept development to full-scale project deployment. To date, more than 54 regions and over 1,000 stakeholders have engaged with the HyLand network.

A critical success factor in the implementation of HyLand has been the designation of a permanent regional contact point in each project. These roles are typically assumed by municipal authorities or contracted organisations and are essential for the development of resilient and durable regional hydrogen networks.

One of HyLand's most notable strengths lies in its holistic and decentralised approach. The initiative offers coordination services, networking opportunities, and knowledge-sharing activities. Its publication of practical guidelines and studies has been particularly well received, helping to disseminate best practices and facilitate the transfer of insights across regions. On a national level, HyLand has established multiple formats for peer learning and exchange, including technical workshops with site visits, virtual networking meetings, and the annual HyLand Symposium. These forums enable structured learning across regions and significantly contribute to the diffusion of innovation and best practices. As a supra-regional network focused on hydrogen valleys, HyLand is unique and fills an urgent need for knowledge exchange. The success of the initiative is reflected in the high number of applications, signalling substantial demand for such targeted support mechanisms.

Regarding support from the EU, participants have specifically highlighted the quality of the Hydrogen Valleys website, the Hydrogen Valleys platform, and events such as the Hydrogen Valleys Days as effective tools for engagement and information dissemination. Moreover, the broader supporting framework provided by the European Commission and the Clean Hydrogen Partnership has been positively received.

Despite these strengths, some structural limitations remain. While HyLand can provide broad-based support in the areas of concept development and network building, its implementation capabilities, particularly within the HyPerformer category, are currently restricted to transport-related applications. This narrow scope limits the potential to unlock synergies across sectors such as energy and industry. Consequently, important cross-sector integration opportunities remain underutilised. A key recommendation emerging from stakeholder feedback is to support cross-sectoral market activation at the regional level.

Stakeholders have also identified broader needs at the national and EU levels. These include the need for better alignment of funding instruments with market-ready technologies, more predictable and transparent R&D financing, and regulatory innovation in areas such as hydrogen transport, certification, and cross-border integration. Additionally, enhanced communication between EU institutions and implementation agencies has been recommended to improve coordination and responsiveness.

HyLand represents an innovate model for national coordination supporting regional hydrogen ecosystem development, demonstrating how well-structured initiatives can drive local innovation, foster collaboration, and accelerate the adoption of hydrogen technologies. Its emphasis on networking, strategic support, and knowledge exchange offers valuable lessons for other countries and regions aiming to build integrated and resilient hydrogen economies.

4. Conclusion and Outlook

Deliverable 4.2 serves as a complementary analysis to the Hydrogen Monitoring Flash. The developed database is a useful tool to monitor the developments in hydrogen R&I between 2007 and 2024 and to start assessments on research gaps. Individual project descriptions will be further investigated in SET4H2 work package 2 to substantiate research demands defined in the activity fiches of the IWG (Deliverable 2.5 "Integration of ERA Pilot SRIA priorities in the Hydrogen IP"). Deliverable 4.2 will also feed into Deliverable 4.3. "Report on technologies development trends from projects monitoring" for a more in-depth data analysis and interpretation of trends. A follow-up update of the project database is planned for Q1 2026, which will help address current data gaps, capture more of the Horizon Europe funding period, and support evidence-based policymaking for the implementation of the Hydrogen IP.

Hydrogen valleys have emerged as powerful catalysts for accelerating high-TRL innovation and linking research outcomes with market-ready applications. They provide tangible, place-based frameworks for testing integrated hydrogen systems that connect production, storage, distribution, and end-use within a single ecosystem. The analysis conducted in D4.2 confirms that strong regional governance and effective public-private collaboration are critical success factors for their development. Initiatives such as Germany's *HyLand* programme demonstrate the value of structured national support networks, while regionally driven efforts like the *Mid-Sweden Hydrogen Valley* highlight how local leadership and cooperation can compensate for the absence of national strategies. Nevertheless, systemic bottlenecks – including grid capacity constraints, lengthy permitting processes, and fragmented regulatory frameworks – continue to hinder large-scale deployment. To accelerate progress, stronger alignment between national and EU funding frameworks, increased support for regions with a lower level of activity, and working on solving critical storage and transportation problems will be essential.

However, the findings of this report should be viewed in light of certain limitations. The available resources in the CSA did not allow for the systematic updating of all hydrogen valleys and for individual interviews with all of them. While more than 50 valleys were contacted, but not all of them responded or could be reached via known contact channels. No clear information on the current status of development was available for 21 hydrogen valleys listed on the H2V platform. Nevertheless, these valleys were included in the analysis but flagged as uncertain datasets. Furthermore, not all valleys provided complete information on production capacity, funding structure, or end-use sectors, which affects the comprehensiveness of the analysis. In some cases, interviewees may have reported funding data that mix project-level and valley-level financing, potentially leading to overestimations of total investment volumes.

Despite these constraints, the report provides a robust overview of the evolving hydrogen R&I landscape and offers valuable insights for future SET Plan activities. Findings could be used to support updates of the H2V platform in the future and to increase awareness among national and regional stakeholders via the IWG. An update of the hydrogen valley sample is planned for Q1 2026.

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Annex

Table 4: List of hydrogen valleys considered in the report.

Country, Name of Hydrogen Valley	Large CHJU valley	Small CHJU valley	Other valley	Total
Austria	**1**		**1**	**2**
HI2 Valley	1			1
WIVA P&G			1	1
Belgium			**2**	**2**
Flemish hydrogen ports valley			1	1
H2BE			1	1
Bulgaria		**1**		**1**
ZAHYR		1		1
Denmark		**1**	**2**	**3**
Cluster NorthH2			1	1
CONVEY		1		1
HyBalance			1	1
Estonia			**1**	**1**
Hydrogen Valley Estonia			1	1
Finland	**1**			**1**
BalticSeaH2	1			1
France	**1**	**1**	**3**	**5**
AdvancedH2Valley		1		1
IMAGHyNE	1			1
Normandy Hydrogen			1	1
Regional Hydrogen Roadmap			1	1
ZEV			1	1
Germany			**15**	**15**
Clean Hydrogen Coastline + HyWays for Future			1	1
eFarm			1	1
Energiepark Bad Lauchstädt			1	1
Grande Region Hydrogen			1	1
Green Hydrogen Blue Danube			1	1
H2NORD			1	1
H2Rivers + H2Rhein Neckar			1	1
HY.Kiel			1	1
hy.klettwitz			1	1
HyBayern			1	1
Hydrogen Valley Emsland			1	1
LHyVE			1	1
Northern German Living Lab			1	1
REFHYNE 2			1	1
WUN H2			1	1
Greece		**2**	**1**	**3**
CRAVE-H2		1		1
H2CRETE Valley Project			1	1

TRIERES		1		1
Hungary			**1**	**1**
MVM Hydrogen			1	1
Ireland		**1**		**1**
SH2AMROCK		1		1
Italy		**1**	**6**	**7**
H2iseO			1	1
Helios			1	1
Hydrogen Valley South Tyrol			1	1
HYPER			1	1
IdrogeMO			1	1
Rosignano HVG			1	1
TH2ICINO		1		1
Luxembourg		**1**		**1**
LuxHyVal		1		1
Netherlands	**1**		**4**	**5**
H2 Proposition Zuid-Holland/Rotterdam			1	1
H2-Fifty			1	1
HEAVENN	1			1
Hydrogen Delta			1	1
Hydrogen Hub Noord-Holland			1	1
Norway			**3**	**3**
H2 Valley Mid-Norway			1	1
Hydrogen Hub Agder			1	1
HyFuel AS			1	1
Poland		**1**	**1**	**2**
Amber Hydrogen Valley			1	1
HySPARK		1		1
Portugal		**1**	**5**	**6**
Aveiro Green H2 Valley			1	1
Galileu Green H2 Valley			1	1
GREENH2ATLANTIC			1	1
H2tALENT		1		1
MadoquaPower2X			1	1
Sines Hydrogen Valley			1	1
Slovakia		**1**	**1**	**2**
Black Horse			1	1
EASTGATEH2V		1		1
Slovenia	**1**			**1**
NAHV	1			1
Spain	**1**	**1**	**16**	**18**
A Coruña Hydrogen Valley			1	1
ALBAMED			1	1
Andalusian Green Hydrogen Valley			1	1
Asturias H2 Valley			1	1
Basque Hydrogen Corridor BH2C			1	1
BenortH2			1	1

Catalina			1	1
CyLH2Valley	1			1
Green Crane (Western route)			1	1
Green Hysland		1		1
H2Pole			1	1
H2V Navarra			1	1
HyBERUS			1	1
HyVal			1	1
La Robla			1	1
Leonese Green Hydrogen Valley			1	1
Orange.bat			1	1
T-Hynet			1	1
Sweden			**1**	**1**
Mid-Sweden Hydrogen Valley			1	1
Turkey		**1**		**1**
HYSouthMarmara		1		1
Ukraine			**2**	**2**
H2U Hydrogen Valley - Reni			1	1
H2U Hydrogen Valley - Zakarpattia			1	1
Iceland		**1**		**1**
Hyceland		1		1

Legend: **Cross-border Hydrogen Valley project**