Interreg Co-funded by the European Union

Alpine Space

H2MA

KLIMA PARTNER Südbaden

Deliverable D.3.3.1

Comparative Lessons for Transferability

Activity 3.3

September 2025

DOCUMENT CONTROL SHEET

Project reference	
Project title	Green Hydrogen Mobility for Alpine Region Transportation
Acronym	H2MA
Programme priority	Carbon neutral and resource sensitive Alpine region
Specific objective	SO 2.1: Promoting energy efficiency and reducing greenhouse gas emissions
Duration	01.11.2022 – 31.10.2025
Project website	https://www.alpine-space.eu/project/h2ma/
Lead partner	KSSENA

Short description

H2MA brings together 11 partners from all 5 Interreg Alpine Space EU countries (SI, IT, DE, FR, AT), to coordinate and accelerate the transnational roll-out of green hydrogen (H2) infrastructure for transport and mobility in the Alpine region. Through the joint development of cooperation mechanisms, strategies, tools, and resources, H2MA will increase the capacities of territorial public authorities and stakeholders to overcome existing barriers and collaboratively plan and pilot test transalpine zero-emission H2 routes.

Document details	
Full document's title	Comparative Lessons for Transferability
Version	V2
Author/s	XY
Organization/s responsible	KPO
Delivery period	07/31/2025

IMPRINT

This document is issued by the consortium formed for the implementation of the **H2MA** project, and made by the following partners:

- PP1 (LP) Energy Agency of Savinjska, Saleska and Koroska Region (SI)
- PP2 BSC, Business Support Centre, Ltd, Kranj (SI)
- PP3 EUROMETROPOLE DE STRASBOURG (FR)
- PP4 Lombardy Foundation for the Environment (IT)
- PP5 Cluster Pole Vehicule du Futur (FR)
- PP6 Turin Metropolitan City (IT)
- PP7 Climate Partner Upper Rhine Valley (DE)
- PP8 4ward Energy Research Ltd (AT) in cooperation with Reiterer & Scherling GmbH
- PP9 Lombardy Region (IT)
- PP11 Italian German Chamber of Commerce Munich-Stuttgart (DE)
- PP12 Codognotto Italia (IT)

Responsible Partner/s for the compilation of this document

- PP7 Climate Partner Upper Rhine Valley (KPO)

EXECUTIVE SUMMARY

This deliverable summarises the lessons learned and strategic recommendations from the joint training workshops (and seminar) held across Austria, France, Germany, Italy, and Slovenia; undertaken within Activity 3.3 of the H2MA project. The workshops supported the regional green hydrogen mobility by engaging stakeholders on infrastructure, policy, and technology.

More specifically, the deliverable presents the background, scope, and methodology of the capacity-building activities. It offers an overview of the workshops' design, implementation, and stakeholder participation, while also showcasing the analysis of key insights and strategic recommendations developed through this process.

The lessons learned are the following:

- ★ Regional cooperation is critical for aligning infrastructure and policies across borders.
- ★ Investor confidence relies on regulatory clarity and long-term policy stability.
- ★ Economic barriers (e.g., high costs and infrastructure gaps) are significant obstacles.
- ★ Integration of industrial hydrogen needs with mobility strategies is essential for economic viability.
- ★ The H2MA Tool needs refinement to meet practical user requirements.
- ★ Workshops successfully raised awareness and built initial stakeholder networks.

Based on feedback and partner reports, the deliverable identifies key challenges and opportunities and proposes actionable recommendations to support continued collaboration and accelerate deployment.

The recommendations are the following:

- ★ Enhancing the H2MA Tool to better meet the needs of stakeholders.
- ★ Developing clear, regionally aligned regulatory roadmaps to provide investor certainty.
- ★ Integrating industrial hydrogen use cases alongside mobility-focused planning.
- ★ Fostering continued capacity-building initiatives to strengthen cross-border cooperation and stakeholder networks.

Together, these insights and recommendations provide a solid basis for advancing green hydrogen mobility and fostering a coordinated, sustainable energy transition across the Alpine region.

CONTENT

1. INTRODUCTION

The H2MA project represents a coordinated effort across the Alpine region to accelerate the deployment of green hydrogen mobility solutions, contributing to Europe's broader energy transition goals. Recognising that successful deployment depends not only on technological innovation but also on stakeholder alignment and capacity building, the project placed significant emphasis on organising joint training workshops throughout 2025.

These workshops have been designed to introduce key stakeholders to the regional hydrogen deployment strategy and the H2MA masterplan. More specifically, the stakeholders have been categorised in the following way:

- ★ Public authorities
- ★ Energy/transport agencies
- ★ H_2 infrastructure providers
- ★ Research institutions
- ★ Green H_2 producers

Beyond information dissemination, the events aimed to engage participants through interactive demonstrations of the H2MA Tool, promote cross-sector dialogue, and collect practical feedback to enhance the project's strategic and operational frameworks.

Drawing on consolidated reports from all partner-led training sessions, this deliverable provides a comprehensive analysis of collective outcomes. It highlights shared lessons learned, assesses the impact of capacity-building efforts, and captures stakeholder perspectives on the utility and limitations of the H2MA Tool and strategy.

Ultimately, it serves as both a reflection on how the training activities have shaped regional collaboration and a roadmap for future initiatives to support the advancement of green hydrogen mobility across the Alpine region.

2. METHODOLOGY AND WORKSHOP

As already stated, within the H2MA project's Activity 3.3 "Joint training workshop to build the capacities of green H_2 mobility businesses, stakeholders, and policymakers", a series of workshops have been convened; the workshops have been organised by the H2MA partners (and partner organisations), from March to June 2025.

These sessions were carefully designed to present the national strategies and pertinent regional action plans regarding green hydrogen deployment , share the H2MA masterplan, and highlight the project's Tool.

The H2MA Tool and masterplan can be described in the following way:

- ★ **H2MA Tool:**

  An interactive digital platform focusing on route planning, infrastructure staging, and scenario modelling.

- ★ **H2MA masterplan:**

  A comprehensive strategic document that sets out the vision, deployment strategy, and policy framework for hydrogen mobility in the Alpine region.

Both elements are essential parts of the H2MA project, however, they serve different purposes; the Tool is **practical** and **operational**, while the masterplan is **strategic** and **policy oriented**.

→ **The convened workshops (and seminar) are the following:**

1. **Austria (4ER & COD) – Styria workshops:**

   The main workshop was carried out on the 29th of April 2025 as part of a larger event dedicated to hydrogen applications in heavy goods transport, which took place at the renewable gas field, one of the largest electrolyses in Styria. (Current Austrian developments and examples of sustainable energy technologies, 2025). This setting provided an optimal environment to ground theoretical discussions in real-world (hydrogen) infrastructure realities.

   H2MA partner 4ward Energy Research GmbH (4ER) led the development of the workshop in cooperation with Codognotto Italia (COD), which combined a presentation of the main results of the H2MA project (masterplan and Tool), along with open dialogue sessions. The event provided a valuable opportunity to engage with key stakeholders from multiple sectors, including renewable energy producers, infrastructure providers, local authorities, research organisations, general public, enterprises, which are interested in investing in hydrogen infrastructure, energy agency(ies). The Styrian Energy Agency, member of the H2CE (Interreg Central Europe Project), was also present, so that an exchange of these two projects could be carried out as well (H2CE, 2025).

In addition, online meetings have been carried out to train additional stakeholders, which have not been able to participate at the main workshop.

2. **Germany Baden-Württemberg (KPO and ITALCAM) – Freiburg workshop:**

   The joint training workshop, in Germany, has been carried out together with the matchmaking workshop (A3.4) and in cooperation between the project partners ITALCAM and KPO. The workshop has been carried out on May 28th, 2025, at the headquarters of badenova AG & Co. KG, regional energy provider and grid operator.

   Abfallwirtschaft und Stadtreinigung Freiburg GmbH (ASF) contributed practical expertise by sharing operational insights from managing one of the country's largest hydrogen-powered fuel cell truck fleets, currently numbering 25 vehicles. Their participation underscored the workshop's dual emphasis on both strategic planning and hands-on operational realities (ASF, 2025).

   This event attracted 31 participants representing renewable energy producers, infrastructure providers, local authorities, research institutions, transport enterprises, and regional energy agencies. The agenda featured five presentations showcasing local hydrogen projects, a practical demonstration of two hydrogen-powered trucks, and a detailed introduction to the H2MA project and its deliverables, including the H2MA Tool and masterplan.

3. **France, Mulhouse (PVF and EMS) – Regional policy workshop:**

   On June 12, 2025, Cluster Pole Vehicule du Futur (PVF) and Eurométropole de Strasbourg (EMS) took part in the Euro Supply Chain trade fair in Mulhouse, where they presented the results of the H2MA project and demonstrated the use of the H2MA Tool in a dedicated workshop. The trade fair attracted over 100 exhibitors and more than 1,100 visitors, primarily from the transport and logistics sectors (Euro Supply Chain, n.d.).

   PVF and EMS held a presentation on the project, followed by a workshop that allowed for deeper engagement with participants. While attendees found the mapping Tool and masterplan to be a valuable starting point, they pointed out limitations such as data gaps for certain regions (including Switzerland) and the Tool's complex interface. While the potential of the Tool was widely recognised, the stakeholders agreed that it still has room for improvement and is not yet fully mature. Nonetheless, there was a shared understanding of the Tool's value in supporting the development of hydrogen mobility infrastructure across the region.

   Moreover, the workshop also highlighted the importance of aligning national and regional hydrogen strategies, with the goal of overcoming fragmentation. Key challenges, barriers, and proposed solutions were presented, and participants showed strong interest in accessing the project's deliverables, online. The participants explored information on governance, barriers, solutions, stakeholder collaboration, hydrogen refuelling station (HRS) locations, and mobility routes.

4. **Lombardy (RL and FLA) – Regional strategies workshop:**

   On June 11, 2025, a workshop was held to present the regional strategy for hydrogen deployment, developed as part of the H2MA project, alongside the H2MA masterplan. Participants had received the regional strategy in advance, with the option to provide feedback during the workshop. Earlier project activities had included the distribution of the H2MA masterplan, with active efforts to collect stakeholder input. The event attracted a diverse group, including academics, industry leaders, and key actors from the hydrogen sector.

   This workshop followed a previous event on May 5, 2025, organised in collaboration with European Federation of Agencies and Regions for Energy and Environment (FEDARENE) and the Italian Hydrogen Association (H2IT), which also focused on hydrogen awareness and featured the regional hydrogen deployment strategy. The event gained media attention and was attended by three regional ministers (AISBL, 2025) (Italian Hydrogen Association, 2021).

   Moreover, the stakeholders showed significant interest in the development of a hydrogen strategy for the Alpine region, with notable participation from major companies planning hydrogen initiatives in Lombardy. However, fostering an interactive dialogue to better gauge their interest in the development pathway proved challenging. More specifically, the stakeholders were more focused on the lack of a structured hydrogen strategy, which could serve as a reference for their corporate projects, rather than engaging with the Tool and masterplan.

5. **Slovenia, Solkan (KSEENA) – Infrastructure and policy workshop:**

   On June 6, 2025, Energy Agency of Savinjska, Šaleška and Koroška Region (KSSENA) organised the second edition of a joint training and matchmaking event in Solkan, Nova Gorica district. This event brought together stakeholders from the Consortium of Local Energy Agencies of the Republic of Slovenia (KLEAS) and other key parties, with a focus on presenting the H2MA approach, the Tool, and the replicability of the developed methods (The Slovenian Energy Agency, 2025).

   KSSENA, as the project coordinator, hosted and moderated the event, which included presentations of the H2MA planning Tool and the green H_2 route masterplan for the Alpine space. The discussions also delved into the current challenges in establishing hydrogen infrastructure in Slovenia and the opportunities emerging from ongoing initiatives and pilot projects.

   Two interactive workshops within Activities 3.3 & 3.4 provided a platform for participants to explore the project's findings, as well as to discuss the continuation of H2MA activities after the project's conclusion.

The event highlighted Slovenia's current setbacks in hydrogen production and demand but also showcased the potential of H2MA's Tool in guiding the country's mobility sector towards a greener, hydrogen future. While the stakeholders acknowledged the theoretical value of the H2MA resources, they noted that practical application was limited due to Slovenia's underdeveloped hydrogen ecosystem.

In specific, the event showcased the need for concrete pilot projects, a dedicated national hydrogen strategy, and regulatory clarity to drive the transition from theory to practice. Stakeholders agreed that future actions should focus on securing policy commitment, financial support for pilot projects, and fostering continuous collaboration among local and national actors to implement effective hydrogen initiatives.

Moving forward, participants concluded that Slovenia's ability to leverage the knowledge gained from H2MA will depend on overcoming the existing barriers and establishing the necessary infrastructure to support green hydrogen mobility.

6. **Slovenia, Kranj (BSC and KSEENA) – Joint training and matchmaking workshop:**

On May 28, 2025, Business Support Centre, Ltd, Kranj (BSC) organised a dual event, combining activities 3.3 and 3.4 of the H2MA project. The event attracted stakeholders from a variety of sectors, including hydrogen technology experts, energy providers, and policymakers.

The session offered an overview of key H2MA project deliverables, such as the H2MA planning Tool, and featured insights into several projects, such as AMETHyST, HyEfRe, and NACHIIP; which aim to bolster hydrogen infrastructure across Europe (Space, 2022) (Europe, 2024) (North Adriatic Clean Hydrogen Investment Platform (NACHIP) to strengthen the North Adriatic Hydrogen Ecosystem, 2023).

The event provided the participants with the opportunity to engage in a matchmaking workshop, where various experts from shared knowledge and fostered collaboration on hydrogen technology investments. Despite the theoretical nature of some H2MA resources, which stakeholders acknowledged were not immediately applicable in the Slovenian context, the event sparked valuable discussions about the challenges and opportunities in developing Slovenia's hydrogen economy.

More specifically, the stakeholders recognised that while the Tool/material offered by the H2MA project provided a useful starting point, there may be gaps in real-world applicability; particularly in terms of providing actionable information for investors. The workshop also highlighted the need for practical, hands-on learning from existing hydrogen projects and pilot initiatives.

Moreover, the workshop showcased the importance of focusing on developing a self-sufficient hydrogen economic ecosystem in Europe, rather than relying on imports, which could expose the continent to external risks. The event also prompted discussions on financing models and the need for clear regulatory frameworks to support green hydrogen development.

In addition, the stakeholders agreed on the need for continued dialogue, regular matchmaking events, and the creation of detailed, practical resources; such as a step-by-step guidebook for investors navigating the Slovenian regulatory environment.

7. **Turin, Piedmont, Italy (CMTO) – Capacity building seminar on green hydrogen mobility for local authorities in Piedmont:**

On 12 September 2025, the Metropolitan City of Torino (CMTO) hosted a training seminar aimed at strengthening the capacities of local public officers and stakeholders involved in the deployment of green hydrogen mobility infrastructure across the Piedmont region. The event brought together representatives from various organisations, including the Italian Association of Engineers for Traffic and Logistics (AIIT), the National Association of Local Authorities (ANCI), and municipal officials from across Piedmont (TIS ROMA 2024, 2024), (National Association of Italian Municipalities (ANCI), 2025).

The seminar provided a comprehensive overview of the H2MA Tool and masterplan, highlighting the current and planned investments in hydrogen refuelling stations (HRS) within the Alpine region and their role in meeting EU AFIR standards (Alternative Fuels Infrastructure, 2025). The participants were introduced to technical and regulatory aspects crucial for the planning, permitting, and safe deployment of hydrogen infrastructure, with an emphasis on accelerating local authorisation processes and addressing common misconceptions regarding hydrogen safety.

In addition to technical training on the H2MA Tool, the seminar featured detailed discussions on cross-border coordination for HRS deployment, enabling more efficient trans-Alpine logistics and supporting the development of zero-emission transport corridors. The session encouraged dialogue among public officers and regional stakeholders on harmonising policies and regulations to foster a supportive environment for hydrogen mobility.

Feedback from participants indicated that the seminar successfully enhanced their understanding of the hydrogen economy, relevant permitting procedures, and the wider policy context at EU and national levels. Attendees also identified clear opportunities to apply the knowledge gained within their respective roles, including sustainable mobility planning and fostering cooperation with private sector actors.

Overall, the seminar reinforced the importance of continued capacity-building efforts and suggested improvements such as the development of more user-friendly, web-based tools to support the ongoing decision-making process. The stakeholders expressed the need for regular updates on infrastructure deployment to maintain momentum and ensure effective implementation of green hydrogen initiatives in the region.

The H2MA partners collaborated on ensuring that all relevant stakeholders were actively involved in the workshops and the seminar, fostering a synergistic environment for sharing knowledge and refining the H2MA Tool and strategy. While the project's focus remained on in-person interactions and consultations, efforts were made to capture feedback and ensure the inclusion of diverse regional perspectives, which helped to furtherly shape the development of the Tool and the broader capacity-building strategy.

3. CAPACITY BUILDING AND STAKEHOLDERS' PERSPECTIVES

The training workshops and the seminar significantly contributed to developing stakeholder capacity and fostering an ecosystem conducive to green hydrogen mobility. Attendees reported that the events offered valuable opportunities to deepen their understanding of hydrogen refuelling infrastructure requirements and to explore the complexities of route-based infrastructure planning within a cross-border context.

The events also facilitated knowledge exchange on the current status of (green) hydrogen mobility in the Alpine region, including sharing best practices from other European regions and emphasising the importance of cross-border collaboration to overcome fragmented markets. This broadened perspective was seen as crucial for aligning investments and policy actions across different jurisdictions.

Despite these gains, the translation of training into direct, practical application remains a work in progress. The stakeholders acknowledged the strategic value of training but were cautious about integrating the H2MA Tool into their operational or policy development workflows, without further enhancements. The demand for more practical guidance, including regulatory roadmaps, financial incentives, and market development strategies, has been evident.

Moreover, economic challenges emerged as the dominant barrier to scaling up hydrogen mobility; while technical hurdles are generally manageable, stakeholders emphasised that uncertainties around financial viability, policy consistency, and infrastructure availability pose significant risks to investors and operators. Examples of such challenges include the announced closure of Austria's public hydrogen refuelling stations by the end of 2025, the lack of certified workshops for hydrogen truck maintenance, and concerns about the resale value of hydrogen vehicles.

Private sector participants stressed that long-term, concrete commitments from public administrations, particularly in terms of funding and regulatory certainty, are critical to sustaining momentum. These commitments would not only encourage new projects but also facilitate the integration of hydrogen initiatives into broader industrial and transport development strategies.

4. LESSONS LEARNED AND RECOMMENDATIONS

The collective insights gathered from the series of training events across the Alpine region have provided a solid foundation for understanding how to enhance future capacity-building initiatives and accelerate hydrogen mobility development. The lessons reflect the diverse perspectives of industry actors, policymakers, researchers, and local authorities engaged throughout the process.

4.1 Summary of lessons learned and strategic needs

To synthesise the outcomes of the various training workshops held across the Alpine region, the following table presents a consolidated overview of the most frequently reported lessons.

These themes reflect recurring insights gathered from stakeholder feedback, workshop observations, and post-event reports. By identifying the common strengths, challenges, and capacity-building needs, this thematic summary supports a thorough understanding of what worked well and what areas require targeted improvement across different regional contexts.

→ **Colours used:**

- ★ Green – Strongly present
- ★ Blue – Needs improvement
- ★ Red – Missing

Lessons learned	Countries				
	Austria	**Germany**	**Italy**	**Slovenia**	**France**
Regional cooperation	Strong cooperation noted.	Active collaboration via 3H2-network	Moderate regional cooperation.	Limited cooperation.	Active cross-border focus.
Policy alignment	Policy alignment observed.	Strategy alignment with EU goals.	Early-stage policy development.	Need for clear national strategy.	Strong alignment with EU policies.
Tool usability	Needs further refinement.	Needs further refinement.	Tool too general.	Limited applicability at this stage.	High-level interest in the Tool.
Practical Tool use	Practical applications limited.	Used for strategic planning.	Focus on regional needs.	Not yet applicable.	Practical use in early stages.
Regulatory clarity	Good regulatory clarity.	Clear policies for mobility.	Needs more regulatory clarity.	Regulatory challenges identified.	Ongoing policy discussions.
Investor support	Lacked clear incentives.	Strong policy support for investors.	Early investor engagement.	Need for national strategy to attract investors.	Strong policy incentives for investors.
Economic barriers	High infrastructure costs.	High cost and investment risks.	Infrastructure barriers noted.	High investment costs.	Fuelling infrastructure gaps.
Industrial H_2 demand	Limited focus on mobility.	Growing focus on mobility but mainly on industry.	Focus on mobility solutions.	Focused on mobility, not industrial demand.	Focused on mobility solutions.
Capacity building	Strengthened stakeholder networks.	Increased awareness through the workshops.	Local examples reinforced. Improved training for local authorities.	Capacity building for future growth.	Strong interest in knowledge exchange.

Table 1: Lessons learned per country

→ **The lessons learned are the following:**

1. **Regional cooperation is essential:**

   One of the most consistent insights is the critical importance of regional cooperation. Hydrogen mobility, by its nature, transcends national borders and sectoral silos. Effective implementation depends on harmonising strategies across the Alpine countries, fostering transparent data sharing, and coordinating infrastructure roll-out plans.

   Without this collaborative spirit, individual efforts risk leading to fragmentation and inefficiency; the workshops underscored the need for joint governance mechanisms and shared platforms that enable stakeholders to align priorities, pool resources, and resolve cross-border logistical challenges.

2. **Planning should encompass all hydrogen uses:**

   While the H2MA project's primary focus was on hydrogen mobility, stakeholders emphasised that future strategies and tools should expand to fully incorporate the industrial hydrogen demands.

   The integration of both mobility and industrial uses into planning frameworks will create synergies and optimise the utilisation of hydrogen supply chains, from production to end use.

   This holistic approach will improve the economic viability of hydrogen infrastructure and foster multi-sector engagement, making the transition more feasible and resilient.

3. **Investor confidence depends on policy clarity:**

   Private sector stakeholders repeatedly highlighted that the catalysts to unlocking substantial investments are the stable and transparent regulatory frameworks. Ambiguities or sudden policy shifts undermine investor confidence and stall project progression.

   Moreover, clear financial support mechanisms, including **grants**, **subsidies**, and **long-term incentives**, are indispensable. These measures should be communicated effectively and aligned with regional and national strategies to reduce the perceived risks.

   Without such clarity, green hydrogen projects struggle to achieve economic feasibility, particularly in the early stages of market development.

4. **Training primarily supports awareness and ecosystem building:**

   While hands-on engagement with the H2MA Tool was limited among the participants, the workshops successfully fulfilled the function of raising awareness and paving the way for an active, interconnected ecosystem of hydrogen stakeholders.

   Due to the fact that it lays the groundwork for future collaboration, knowledge exchange, and coordinated action, this network-building aspect should be promoted.

   The sessions cultivated a shared understanding of challenges and opportunities, empowering participants to advocate more confidently for hydrogen mobility within their own organisations and regions.

5. **Urgent need to accelerate infrastructure deployment:**

   The stakeholders highlighted the pressing need to deploy hydrogen refuelling stations (HRS) along TEN-T corridors to comply with EU AFIR targets. Planning and investment efforts should be coordinated across regions to address the high costs and operational challenges of HRS deployment.

6. **Regulatory complexity requires harmonisation and capacity building:**

   Differences and ambiguities in permitting and safety regulations across Alpine countries pose barriers to efficient project approvals. Clearer, harmonised regulatory frameworks and targeted training for local authorities are necessary to streamline authorisation processes and dispel misconceptions about hydrogen safety.

7. **Hydrogen is one element in a broader decarbonisation mix:**

   Participants recognised hydrogen's strategic role primarily in logistics and heavy transport but emphasised that it complements other clean energy solutions. Coordinated policies should, therefore, reflect hydrogen's role within a diversified approach to mobility decarbonisation.

The following matrix synthesises the core lessons learned from the H2MA training workshops, mapping them according to their **current maturity** within the project and their **relevance to stakeholders** moving forward. This visual tool helps distinguish between well-established insights and those requiring further exploration, allowing for a more strategic prioritisation of future capacity-building efforts.

The key insights/lessons learned have been categorised in the following manner:

- ★ **Cross-border cooperation:**

  High relevance and high maturity.

- ★ **Stakeholder ecosystem building:**

  High relevance and low maturity.

- ★ **Integration of industrial use cases:**

  High relevance and low maturity.

- ★ **Economic risk awareness:**

  High relevance and low maturity.

- ★ **Regulatory templates:**

  High relevance and low maturity.

- ★ **Capacity building soft skills:**

  Low relevance and low maturity.

- ★ **H2MA Tool awareness:**

  Low relevance and high maturity.

- ★ **Urgent need to accelerate infrastructure deployment:**

  High relevance and low maturity.

- ★ **Regulatory complexity requires harmonisation and capacity building:**

  High relevance and low maturity.

- ★ **Hydrogen is one element in a broader decarbonisation mix:**

  High relevance and medium maturity.

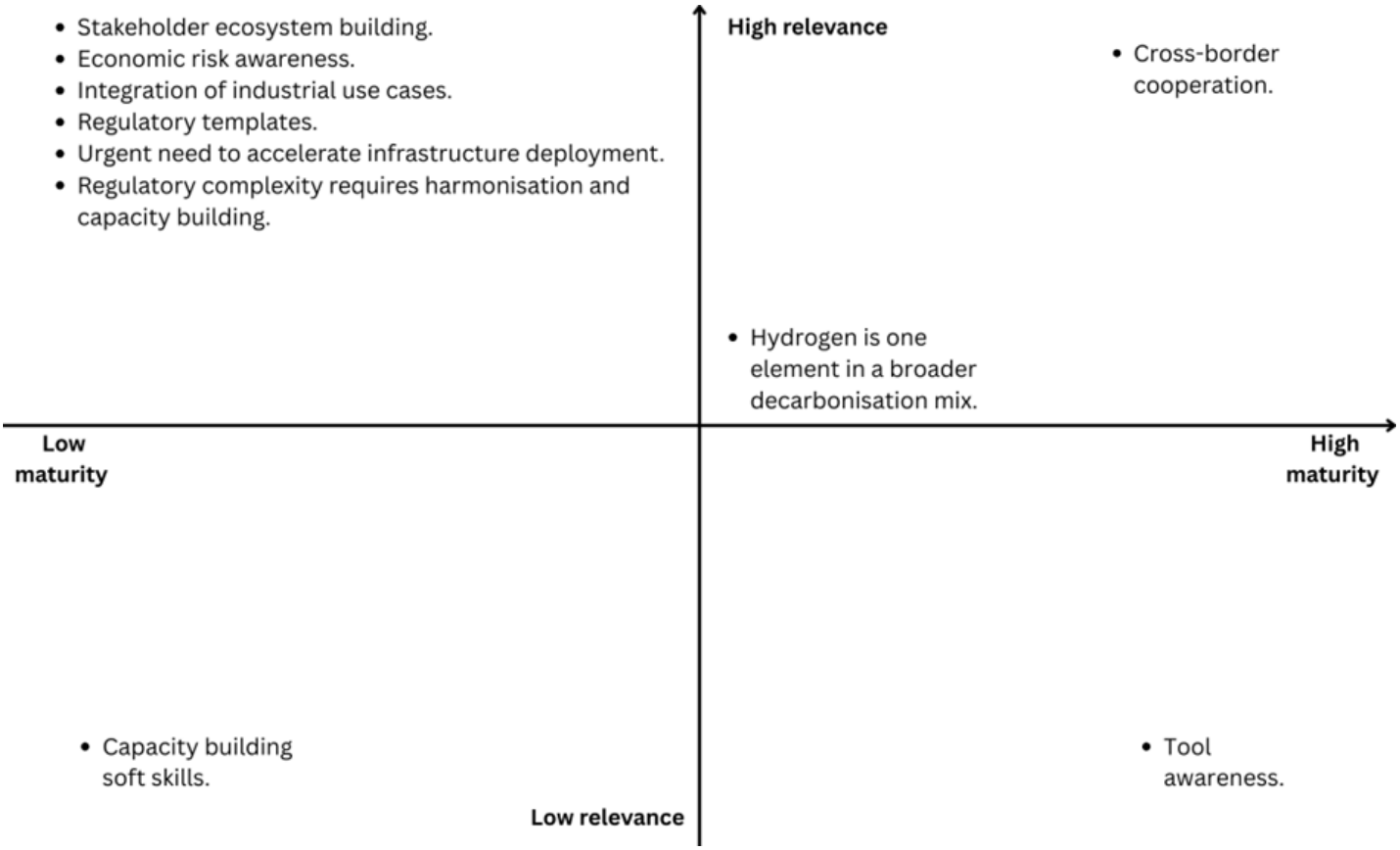

Figure 1: Relevance and maturity matrix

The following summary highlights the key thematic areas identified during the H2MA workshops (and seminar) that are critical for advancing hydrogen mobility. These themes emerged from extensive stakeholder feedback and workshop discussions, reflecting the main focus points for future development. The thematic areas are the following:

★ **Regulatory clarity and financing:**

Clear regulatory frameworks and effective financing mechanisms are essential to provide confidence and drive investment in hydrogen mobility projects.

★ **Regional cooperation:**

Collaboration between regions and countries fosters policy alignment, knowledge sharing, and coordinated efforts to accelerate the hydrogen economy.

★ **Capacity building and soft skills:**

Developing human capital through training, education, and the cultivation of soft skills ensures a workforce capable of supporting the hydrogen transition and effectively managing the related challenges.

More specifically, the need to train local public officers on permitting and safety procedures to prevent delays and misunderstandings during hydrogen infrastructure deployment.

★ **Industrial hydrogen integration:**

Integrating hydrogen solutions within industrial sectors is vital for scaling demand and creating a sustainable hydrogen ecosystem.

★ **Tool refinement and practical material:**

Improving decision-making tools (such as the H2MA Tool) and providing practical, user-friendly resources help stakeholders apply hydrogen technologies effectively.

The request for more practical, region-specific guidance and better integration of the Tool with widely used platforms (e.g., Google Maps) to improve usability and decision-making.

★ **Stakeholder ecosystem and awareness:**

Raising awareness and engaging a diverse stakeholder ecosystem strengthens networks and supports the growth of hydrogen initiatives.

★ **Technical innovation and pilots:**

Advancing technical innovation through pilot projects validates technologies, reduces risks, and demonstrates the viability of hydrogen mobility solutions.

4.1.1 Economic and financial barriers and opportunities

Economic and financial considerations emerged as critical factors influencing the development and deployment of green hydrogen mobility solutions across the participating regions. Stakeholders consistently highlighted the lack of detailed quantitative data, cost estimates, and solid financial frameworks as major barriers limiting the practical application and scaling of hydrogen technologies. The identified key economic challenges include:

★ **High upfront capital expenditure (CAPEX):**

The investment required for hydrogen production facilities, distribution infrastructure, and refuelling stations remains substantial, often exceeding the budget capacities of SMEs and public entities (Fernando, 2025).

★ **Operational expenditure (OPEX) uncertainties:**

Running costs, including maintenance, hydrogen storage, and logistics, are not yet fully predictable due to limited operational experience and market data (What is OPEX (Operational Expenditure)? Examples and Strategies, 2025).

★ **Market price discrepancies:**

The H2MA Tool calculates hydrogen costs based on production expenses rather than prevailing or projected market prices, limiting its relevance for investors seeking economically viable projects.

★ **Financing gaps:**

Stakeholders emphasised the need for targeted financing schemes, including **grants**, **subsidies**, and **incentives** tailored specifically for hydrogen projects to mitigate investment risks and attract private capital.

Additionally, feedback from the Torino seminar emphasised that uncertainty around the economic viability of hydrogen investments can lead to delays in local permitting and decision-making. Providing local authorities with clearer financial insights and planning tools could help overcome hesitation and support faster project deployment.

Despite these challenges, the project's capacity-building activities helped raise awareness of potential economic opportunities linked to developing a resilient hydrogen ecosystem. More specifically, the discussions underscored the importance of:

★ **Creating clear financial roadmaps and investment guidelines:**

Tools and resources that provide step-by-step guidance on **project financing**, **permit acquisition**, and **expected returns** can empower investors and reduce uncertainty.

★ **Promoting market-driven investments:**

Encouraging business models that ensure **positive return on investment (ROI)** is vital for the long-term sustainability of hydrogen mobility initiatives (White, 2025).

★ **Leveraging pilot projects for cost data and risk reduction:**

Implementing real-world demonstrations will generate **valuable operational data**, support **business case validation**, and build **confidence** among policymakers and financiers.

Integrating comprehensive economic and financial analyses into future project phases is essential to bridge the gap between theoretical frameworks and practical implementation. This approach will enhance the operational value of project tools and facilitate the transition toward scalable, economically viable green hydrogen mobility solutions.

4.2 Recommendations for enhancing project tools and activities

Drawing on the feedback and observed challenges during the training, several concrete recommendations emerged; they aim to improve the usability and impact of the H2MA project's Tool and materials, in the following ways:

1. **Develop a web-based, more user-friendly version of the H2MA Tool:**

   The existing version of the H2MA Tool was appreciated for its strategic insights but limited by accessibility and data granularity[1].

   The stakeholders expressed a strong preference for a web-based platform that allows seamless updates, easier navigation, and more interactive features.

   Incorporating cost assessments, industrial hydrogen demand forecasts, and highly localised regional data would significantly boost its practical value for both project planners and policymakers.

   Additional feedback highlighted the need for a more accessible interface; the Tool should be made available through common platforms or web applications. This would allow for easier exploration of HRS planning scenarios and route-based analysis.

2. **Streamline and modularise the masterplan document:**

   The original masterplan, although comprehensive, it has been considered as lengthy and dense by many evaluators.

   To facilitate consultation, it is recommended to create a modular structure with concise executive summaries, clear chapters focused on specific themes or regions, and embedded hyperlinks to detailed technical annexes.

   Such an approach would cater to diverse user needs, from brief overviews to in-depth research.

3. **Provide practical support materials:**

   Beyond strategic frameworks, stakeholders expressed a clear need for hands-on implementation guidance.

   Developing regulatory guides, policy templates, and step-by-step implementation roadmaps could help bridge the gap between strategy and practice.

   Moreover, there is a strong need for regulatory guidance tailored to local authorities; a set of simplified documentation and real-world examples of environmental and safety permitting procedures, are needed.

[1] Data granularity is a valid measure of how detailed data are.

These resources would serve as indispensable tools for navigating complex regulatory landscapes, identifying funding opportunities, and managing project risks.

4. **Ensure regular updates and ongoing maintenance:**

   The value of the H2MA Tool and documents depends heavily on their currency; participants emphasised that maintaining and regularly updating the Tool, post-project, is critical to sustain their relevance and encourage continued use. Establishing a dedicated support mechanism or integrating the Tool into regional energy platforms could ensure their longevity.

4.3 Stakeholder-recommended follow-up actions

To translate the momentum from training into tangible progress, the stakeholders identified several priority actions:

1. **Secure firm policy and financial commitments:**

   Concrete, long-term commitments from public authorities are necessary to underpin hydrogen infrastructure development. These include dedicated funding streams, streamlined permitting processes, and clear policy targets that reinforce the investors' certainty.

2. **Address immediate market barriers:**

   Urgent challenges such as the closure of existing hydrogen refuelling stations, lack of certified maintenance workshops for hydrogen vehicles, and concerns over vehicle resale values threaten to derail the early market adoption. Targeted interventions are needed to remove these obstacles and maintain user confidence.

3. **Foster continuous knowledge exchange:**

   The workshops highlighted the benefits of regular dialogue among stakeholders. Establishing ongoing forums, working groups, or digital platforms for knowledge sharing will nurture the collaborative ecosystem and accelerate innovation diffusion across the Alpine region.

5. SUGGESTED NEXT STEPS

Building on the H2MA project's foundation, the next phase should strategically broaden the impact of hydrogen mobility initiatives across the Alpine region by focusing on the following priorities:

1. **Innovation in financing and business models:**

   Exploring new financing mechanisms, such as public-private partnerships, green bonds, and blended finance solutions, will be essential to overcome the economic barriers.

   Encouraging the incorporation of innovative business models, such as green hydrogen-as-a-service or shared infrastructure schemes, can lower the entry barriers for smaller operators and promote scalability.

2. **Enhanced cross-sector integration:**

   Future activities should intensify the integration of hydrogen mobility with other sectors, such as renewable energy generation, industrial production, and urban planning. This systemic approach can optimise resource use, align infrastructure development with broader decarbonisation goals, and create multi-use hydrogen hubs.

3. **Capacity building beyond technical training:**

   By evolving capacity building to include soft skills, such as stakeholder negotiation, cross-border regulatory navigation, and project financing, will empower the local actors to better manage complex hydrogen projects. Offering mentorship programs, peer-learning networks, and targeted workshops, on these topics, can accelerate the project maturity.

4. **Piloting next-generation technologies:**

   The encouragement of pilot projects that incorporate emerging hydrogen technologies, such as advanced electrolysers, fuel cell innovations, and digital infrastructure management tools, will help validate technical feasibility and business viability, thus reducing the risks for early adopters.

5. **Strengthening policy advocacy and harmonisation:**

   The next steps should emphasise coordinated policy advocacy efforts at regional, national, and EU levels to harmonise regulations, incentives, and standards. This alignment will help create a predictable investment environment and prevent the regulatory fragmentation that hinders cross-border projects.

6. **Building public awareness and social acceptance:**

   Raising public awareness through targeted campaigns, community engagement, and transparent communication, regarding hydrogen safety and benefits, is crucial for social acceptance. As a result, empowering citizens as active stakeholders will foster supportive environments for infrastructure deployment.

7. **Establishing data sharing protocols and digital twins:**

   Implementing standardised data-sharing frameworks and developing digital twins[2] of hydrogen infrastructure, can enhance the planning accuracy, operational efficiency, and scenario modelling capabilities. Such tools will enable the real-time monitoring and adaptive management of green hydrogen mobility networks.

8. **Long-term visioning and scenario planning:**

   Conducting iterative scenario planning exercises that incorporate evolving market trends, technological advances, and climate policies, will help stakeholders anticipate both challenges and opportunities. This foresight-driven approach will ensure resilience and adaptability in strategic decision-making.

   By embracing these future-oriented actions, the H2MA project can transition from foundational capacity building to catalysing an innovative, integrated, and resilient hydrogen mobility ecosystem. This approach will pave the way for sustainable transportation transformation across the Alpine region and beyond.

[2] A digital twin is a virtual, data-rich model of a physical object, system, or process that receives real-time data, allowing for continuous monitoring, simulation, testing, and analysis to optimise performance and predict progression.

6. CONCLUSIONS

The H2MA joint training events have contributed to the advancement of green hydrogen mobility within the Alpine region. By convening a diverse array of stakeholders (including policymakers, industry leaders, researchers, and regional authorities) the project has contributed to shaping a shared strategic perspective and supported initial steps toward a collaborative, cross-border hydrogen ecosystem.

These capacity-building efforts have raised awareness of hydrogen's potential, clarified the regulatory and infrastructural challenges involved, and emphasised the importance of coordinated regional planning. The workshops and seminar highlighted that while the conceptual frameworks and digital tools developed under H2MA provide valuable strategic orientation, their direct practical application remains limited without complementary measures.

Significantly, the events revealed that the success of green hydrogen mobility hinges on overcoming the economic, institutional, and technological barriers. Financial uncertainties, policy instability, and market hesitations currently impede the transition from strategy to implementation. Therefore, ongoing public commitment and targeted financial mechanisms are vital to sustain stakeholder engagement and drive deployment.

Moreover, the evolving feedback points to a pressing need for more user-centric tools and modular, accessible documentation, which can bridge the gap between high-level strategy and on-the-ground project development. Integrating these resources, such as the H2MA Tool, workshop materials, and stakeholder feedback, into structured, ongoing knowledge-sharing mechanisms (e.g. cross-border working groups or digital collaboration platforms) can improve their practical uptake and support continuous capacity building across the Alpine region.

Ultimately, H2MA's results' continuity will depend on its ability to translate strategic insights into concrete actions that reduce emissions and transform the Alpine transportation sector. By building on these lessons, refining the H2MA Tool, and maintaining solid stakeholder networks, future initiatives can accelerate the region's transition towards a resilient, and decarbonised hydrogen economy.

7. ANNEX

This chapter presents the partners' reports regarding each of the workshops (and seminar) that have been described earlier in the deliverable. The following table presents an overview of the workshops by region/country:

Region/Country	Partner(s)	Stakeholder types	Addressed themes	Outcomes
Austria (Styria)	4ER, COD	Public sector, business actors.	Policy engagement, H2 use cases.	Call for clearer regulations and cross-sector coordination.
Germany	KPO, ITALCAM	Mobility stakeholders, municipalities.	Technical feasibility, investment needs.	Identified the need for stronger pilot project support.
France (Mulhouse)	PVF, EMS	Private companies, regional planners.	Stakeholder coordination, long-term H2 vision.	Strengthened network-building and stakeholder engagement.
Lombardy (Italy)	RL, FLA	Local authorities, SMEs, public agencies.	Ecosystem coordination, funding instruments.	Tool seen as useful for long-term planning.
Slovenia (KSEENA)	KSEENA	Local energy agencies, municipalities.	Regulatory awareness, H2MA Tool, capacity building.	Emphasis on need for practical support and pilot projects.
Slovenia (BSC Kranj)	BSC Kranj	Experts, investors, policy makers.	Investment barriers, permitting, technical options.	Proposed development of investor guidebook for H2 rollout.
Italy (CMTO, Turin)	CMTO	Public officers, mobility planners, engineers, local authorities.	HRS permitting, regulatory complexity, infrastructure planning.	Proposed harmonisation of procedures and improved training for local authorities.

Table 2: Workshops' overview

7.1 Introduction

This section presents a summary of the training workshops conducted under Activity 3.3 of WP3, aimed at building capacity for green hydrogen mobility among public authorities, energy and transport agencies, infrastructure providers, producers, and other relevant stakeholders.

The workshops focused on furtherly familiarising the participants with the H2MA Tool, associated resources, and implementation strategy(ies). Feedback from these sessions has been gathered to identify the lessons learned, highlight successes and challenges, and inform future training efforts.

Based on the input from all partners, this report compiles the collective experiences and insights shared by participants, providing valuable guidance for replicating and improving capacity-building activities in the green hydrogen mobility sector.

7.2 Austria, Styria-4ER and COD

→ **Methodology:**

The joint training workshop has been carried out together with the matchmaking workshop (A3.4) and in cooperation with the project partner COD. The main workshop was carried out on the 29th of April 2025 as part of a larger event dedicated to hydrogen applications in heavy goods transport, which took place at the renewable gas field, one of the largest electrolyses in Styria.

During this event, the project was introduced, and the results (H2MA tool, H2MA masterplan, etc.) were presented and subsequently discussed. The Styrian Energy Agency, member of the H2CE (Interreg Central Europe Project), was also present, so that an exchange of these two projects could be carried out.

The following stakeholder groups could be reached: RES producers, infrastructure providers, local authorities, research organisations, general public, enterprises, which are interested in investing in hydrogen infrastructure, energy agency(ies).

In addition, online meetings have been carried out to train additional stakeholders, which have not been able to participate at the main workshop.

→ **Effectiveness of the Training Tools:**

1. How effective are the H2MA resources (tools and masterplan developed during the project) in addressing the specific needs of stakeholders related to green hydrogen mobility?

Stakeholders have shown great interest in route planning and have found the H2MA tool helpful in providing an overview of which hydrogen infrastructure is needed at which expansion stage. However, they have also pointed out some significant weaknesses, so that the effectiveness of the H2MA masterplan and the H2MA tool for its practical implementation was questioned.

Weaknesses which were discussed:

1. **Industrial Hydrogen Demand:** When determining the necessary electrolysis capacities, the mobility sector is considered isolated. The industrial sector is not considered. However, it can be assumed that this sector will have a significant hydrogen demand in the near future. The different use cases of hydrogen and the potential synergies between these fields of application should therefore not be ignored.
2. **Geographical and Regional Disconnection**: Since the individual regions are not consistently connected, the plan is expected to have only a limited effect. The lack of cohesion across regions could hinder the seamless implementation of green H_2 infrastructure, as logistical challenges and connectivity issues may arise.
3. **Disparity in Regional Data**: The significant differences in regional data, such as road networks and infrastructure, pose challenges to the overall validity and effectiveness of the results. Without a standardised approach to data collection and analysis, the plan's outcomes may not accurately reflect the unique needs and constraints of each region.
4. **Limited Coverage**: The plan's scope is also limited, with only small parts of the Alpine region being covered. This restricted coverage reduces the potential impact of the plan, as it might fail to address key areas or create sufficient infrastructure for a widespread transalpine green H_2 roll-out.
5. **Insufficient Regional Planning Detail**: While supra-regional planning makes sense at a high level, the plan’s foundation in regional planning lacks sufficient detail. A detailed, tailored approach at the regional level is essential to account for local complexities and ensure that the roll-out is effective in each specific area.
6. **Missing considerations of costs:** An important consideration not addressed in the plan is the cost of infrastructure roll-out. The financial implications of building the necessary infrastructure for a transalpine green hydrogen (H_2) network are a critical factor in determining the feasibility and scalability of the project. Without a clear assessment of the costs involved in infrastructure development, the plan lacks a comprehensive view of the investment required for a successful green H_2 transition.

This oversight may result in unrealistic expectations regarding the speed and scope of implementation, as the cost factor is essential for evaluating the viability of various regions and technologies. Addressing the financial aspects would enhance the plan's practicality and ensure that sufficient resources are allocated for the infrastructure needed to support the green H_2 roll-out.

2. Were the training materials and tools user-friendly and accessible to all participants, including those with limited prior knowledge of green hydrogen technologies?

H2MA Tool: The user-friendliness of the H2MA tool is okay for an open access tool. However, there are some points which could be improved. Moreover, the stakeholders would have preferred a web application.

H2MA Masterplan: The stakeholders found the H2MA masterplan to be too long and not very clearly structured. They would have preferred a compact document that summarises the key content briefly and concisely and refers to other documents for further information.

→ **Relevance to Stakeholders and Policymakers:**

3. Did the training activities help the stakeholders to better understand the regulatory and policy frameworks required to support green H_2 mobility adoption?

We hope so. There was at least a fruitful discussion during the joint training workshop.

4. Did the tool and resources developed during the H2MA project assist stakeholders in identifying opportunities for advancing green hydrogen mobility? Or if not directly applied, how do stakeholders rate the potential of the H2MA resources for that?

The tool and other resources helped participants gain a better understanding of the future hydrogen infrastructure requirements under different development scenarios. The existing infrastructure visualised on the maps was also highlighted positively.

Additionally, stakeholders believe that the project could provide added value for the development of hydrogen mobility, particularly with regard to transnational networking and awareness-raising measures.

However, they feel that the results are too general or not detailed enough to enable specific projects or measures to be initiated at a regional level (see question 1). Added value is seen as being more effective at a higher level.

Although the project addresses important barriers (security of infrastructure expansion, lack of specialised personnel for workshops, resale value), investors will continue to have reservations as long as these are not resolved. Furthermore, the decision by ÖMV to close all public hydrogen refuelling stations in Austria by the end of 2025 for economic reasons has exacerbated these concerns.

→ **Practical Application and capacity building:**

5. Did the stakeholders provide specific examples on how the training tools could be applied in their current work or policy development?

The stakeholders have agreed to look at the tool and the other resources in detail after the workshop and to examine possible applications in their company. However, there are some reservations due to the limitations listed in question 1.

6. What specific skills or knowledge did attendees gain through the training that will enable them to make a greater impact in the green H_2 mobility sector?

See question 7

7. What are the key lessons learned from participating in this joint training program that could be useful for future capacity-building efforts in green hydrogen mobility?

For the Gabersdorf site:

Information on the future refuelling capacities required on the nearby A9 motorway and the expansion plans for the Austrian hydrogen network. These details will be considered when deciding whether to install a hydrogen refuelling station at this location in the future.

General:

- General insights into the status quo of hydrogen mobility (for those participants who are not yet very familiar with the topic).
- Route suggestions include the necessary infrastructure for various expansion scenarios in Styria.
- Status quo and best practice examples from other countries.
- The relevance of regional cooperation.
- The need to consider all fields of application, rather than viewing the mobility sector in isolation (in Austria, for example, the current focus is clearly on industry).

8. How could the training tools and activities be improved to better meet the needs of businesses, stakeholders, and policymakers in the future?

The training tools and activities are good, but the tool itself should be further developed to better meet the needs of businesses, stakeholders, and policymakers:

- The shortcomings mentioned in question 1 should be addressed.
- The tool should be a web application.

9. In your stakeholder's point of view, what actions or initiatives should follow the training to ensure that the lessons learned are applied effectively in the real world?

From a stakeholder perspective, the results and resources of the H2MA project make an important contribution to advancing hydrogen mobility and creating awareness in this regard. However, further measures and, above all, political certainty regarding the expansion of the future hydrogen infrastructure are necessary to trigger actual investment.

The news published a few days before the workshop, that the operator of the Austrian hydrogen refuelling stations (ÖMV) has decided to close all refuelling stations by the end of this year because the economic operation was not possible, has further unsettled potential investors. The production of hydrogen is still being strongly promoted, but the primary aim is to meet the needs of the Austrian industry. Mobility currently plays a subordinate role.

It was also noted that the lack of specialist garages/workshops capable of repairing H_2 trucks and the questionable resale value (especially in regions outside the EU) are major barriers.

7.3 Germany, KPO and ITALCAM

→ **Methodology:**

The joint training workshop has been carried out together with the matchmaking workshop (A3.4) and in cooperation between the project partners ITALCAM and KPO. The workshop was carried out on May 28th, 2025, at the headquarters of badenova AG & Co. KG, regional energy provider and grid operator.

Part of the agenda where five presentations of hydrogen projects carried out by local stakeholders alongside with a demonstration of two hydrogen powered trucks. (see agenda).

The H2MA project was introduced, and the results (H2MA tool, H2MA master plan, etc.) were presented and subsequently discussed with 31 participants.

The following stakeholder groups could be reached: RES producers, infrastructure providers, local authorities, research organisations, general public, enterprises, which are interested in investing in hydrogen infrastructure, energy agency.

→ **Effectiveness of the Training Tools:**

1. How effective are the H2MA resources (tools and masterplan developed during the project) in addressing the specific needs of stakeholders related to green hydrogen mobility?

Besides the EU-hydrogen strategy and the German hydrogen strategy a hydrogen roadmap for Baden-Württemberg was published in 2020. Furthermore, also based partly on the H2MA tool, a regional hydrogen strategy for the region Südbaden was published in November 2024.

Therefore the stakeholders in the region are not directly relaying on the H2MA tool itself when planning hydrogen infrastructure, instead the use the regional hydrogen strategy for the region Südbaden, which is partly based on outcome from the H2MA tool and the H2MA masterplan.

The benefit of the H2MA tool and the H2MA masterplan in creating the regional hydrogen strategy was obvious for the stakeholders. But after presenting the tool in detail, weaknesses of the simulation tool where strongly discussed and doubts about the effectiveness of both the H2MA masterplan and the tool in terms of practical implementation were highlighted.

The discussed weaknesses of the plan highlight several key issues. Firstly, the current approach isolates the mobility sector when determining electrolysis capacities, overlooking the growing hydrogen demand from the industrial sector. This omission is critical, as the potential synergies between the mobility and industrial sectors should not be ignored.

Additionally, the lack of consistent regional connections limits the overall impact of the plan, potentially leading to logistical challenges and hindering the smooth implementation of green hydrogen infrastructure across different regions. Another issue is the significant variation in regional data, such as road networks and existing infrastructure, which complicates the effectiveness of the plan. Without a unified approach to data collection and analysis, it’s difficult to ensure that the plan accurately reflects each region’s unique needs and constraints.

The plan’s limited geographic coverage further exacerbates the issue, as it only addresses small parts of the Alpine region, which reduces its potential impact. This narrow scope may exclude critical areas and fail to build the necessary infrastructure for a widespread transalpine hydrogen rollout. Furthermore, while high-level supra-regional planning is useful, the plan lacks sufficient regional detail to address local complexities.

A more tailored, region-specific approach is essential for ensuring effective deployment. Lastly, the plan fails to account for infrastructure costs, which is a major gap. Without a clear cost evaluation, it’s difficult to assess the feasibility and scalability of the project, and unrealistic expectations could arise regarding timelines and investment requirements. Incorporating cost considerations is crucial to ensure that sufficient resources are allocated for the green hydrogen rollout.

2. Were the training materials and tools user-friendly and accessible to all participants, including those with limited prior knowledge of green hydrogen technologies?

The user-friendliness of the H2MA tool should be improved. Additionally, stakeholders expressed a preference for a web application rather than the current format. Regularly updating the content of the tool, even after the project has been completed, was seen as essential for the future use of the tool.

The results of the masterplan have also been incorporated into the creation of the regional hydrogen strategy, meaning that the use of the original masterplan is less relevant for the stakeholders.

→ **Relevance to Stakeholders and Policymakers:**

3. Did the training activities help the stakeholders to better understand the regulatory and policy frameworks required to support green H_2 mobility adoption?

One participant in the workshop, the Managing Director of *Abfallwirtschaft und Stadtreinigung Freiburg GmbH (ASF),* reported that his company already operates 25 hydrogen-powered fuel cell trucks. The company has therefore overcome all the regulatory challenges involved in operating the vehicles.

The company therefore has one of the largest hydrogen fleets in Germany and Europe. The expertise and practical experience of the company had significantly greater added value for the stakeholders than the results of the H2MA tool and the masterplan.

4. Did the tool and resources developed during the H2MA project assist stakeholders in identifying opportunities for advancing green hydrogen mobility? Or if not directly applied, how do stakeholders rate the potential of the H2MA resources for that?

Thanks to the 3H2 network founded in 2022, which now has 87 industrial partners, state institutions such as e-mobilBW/Fuel Cell Cluster and the national and regional hydrogen strategies, important structures have already been in place in Baden-Württemberg.

These structures enable stakeholders to develop further in the field of hydrogen in a targeted manner. So the H2MA tool is not a direct benefit for the stakeholders but was used to improve the regional hydrogen strategy.

→ **Practical Application and capacity building:**

5. Did the stakeholders provide specific examples on how the training tools could be applied in their current work or policy development?

The stakeholders noted that international cooperation within the H2MA project is highly relevant, as the topic of hydrogen must be considered internationally. This cooperation also led to Klimapartner Südbaden being an active partner in the Interreg GreenSkHy project, which was also considered very important and expedient by the stakeholders.

As many of the stakeholders in the region are already well advanced in the field of hydrogen, the focus was therefore placed more on the international network character than on the added value of the H2MA tool.

6. What specific skills or knowledge did attendees gain through the training that will enable them to make a greater impact in the green H_2 mobility sector?

Different stakeholders like Fraunhofer ISE or greenventory are also working on simulation tools and where very interested to compare the different tools.

Most of the stakeholders where more focused on the regional hydrogen strategy, which is partly based on the results of the H2MA tool.

7. What are the key lessons learned from participating in this joint training program that could be useful for future capacity-building efforts in green hydrogen mobility?

The exchange of experiences between the workshop participants was seen as the most important added value. In addition, the specialist presentations revealed the latest findings from the various areas of hydrogen use in the mobility sector.

Bringing together stakeholders with different levels of expertise in the field of hydrogen is essential for the initiation of hydrogen projects. The workshop was therefore seen as a complete success, even if the usefulness of the H2MA tool was critically questioned.

8. How could the training tools and activities be improved to better meet the needs of businesses, stakeholders, and policymakers in the future?

As mentioned at point 6, different stakeholders which are also working on planning/ simulation tool will use the results to improve their tools, which will have a way bigger impact due to the financial and structural background. Therefore the results of the H2MA tool are used in an improved way the support the stakeholder even after the project end.

9. In your stakeholder's point of view, what actions or initiatives should follow the training to ensure that the lessons learned are applied effectively in the real world?

The international networks should be improved, and EU-wide standards should be implemented to foster an EU-wide ramp up of hydrogen infrastructure.

7.4 France, Mulhouse-PVF and EMS

→ **Methodology:**

PVF and Eurométropole de Strasbourg used the opportunity of a trade fair called Euro Supply Chain, which took place in Mulhouse on 12 June 2025, to present the H2MA results and the use of the H2MA mapping tool at a workshop. The trade fair was attended by transport and logistics professionals, with over 100 exhibitors and more than 1,100 visitors. PVF and EMS gave a half-hour presentation of the project, followed by a workshop to exchange views with interested participants.

→ **Effectiveness of the Training Tools:**

1. How effective are the H2MA resources (tools and masterplan developed during the project) in addressing the specific needs of stakeholders related to green hydrogen mobility?

The participants indicated that the mapping tool and masterplan are interesting for a first approach but have limitations that should be explored further: lack of data for certain zones (including Switzerland) and a certain complexity in using the tool. However, these tools are welcome because they provide a vision of hydrogen infrastructures on a large scale, which is absolutely necessary for better coordination of the deployment of H_2 transport in the Alpine region.

2. Were the training materials and tools user-friendly and accessible to all participants, including those with limited prior knowledge of green hydrogen technologies?

Overall, participants found the training material easy to use. Nonetheless, the mapping tool could be improved by making it directly usable online and accessible to everyone. For now, the tool must be downloaded from the H2MA website and run in a Windows environment, which is an obstacle to using the mapping tool. In addition, performance should be improved, as the tool is sometimes slow.

→ ***Relevance to Stakeholders and Policymakers:***

3. Did the training activities help the stakeholders to better understand the regulatory and policy frameworks required to support green H_2 mobility adoption?

Yes, the relevant stakeholders to the H_2 mobility in the alpine space, across all the involved regions were presented, as much as the necessity to have cohesion between the different national and regional H_2 strategies. Thus, the state of things, key barriers, challenges, and the solutions we envisaged were presented during the workshop. Participants seem to be very interested.

4. Did the tool and resources developed during the H2MA project assist stakeholders in identifying opportunities for advancing green hydrogen mobility? Or if it is not directly applied, how do stakeholders rate the potential of the H2MA resources for that?

Absolutely, stakeholders learned about access to all our deliverables online, were eager to read them through and have information already prepared and collected for them on the topics of governance, key barriers and challenges, which solutions we advise on, how to establish and with which actors to establish cooperation, where to install HRS, which mobility routes to use etc. Stakeholders could also agree that the potential of the tool is high, but that the tool itself might not be entirely mature enough. (See the limits of the tool above Q1 and Q2.)

→ **Practical Application and capacity building:**

5. Did the stakeholders provide specific examples on how the training tools could be applied in their current work or policy development?

The first interesting feedback from the participants was the chance to get access to information regarding the situation of H_2 mobility and transportation infrastructures in border regions and countries (inside the Alpine space). Transporters participating to the event also showed interest for the masterplan and the tool, to gain knowledge and compare with their present strategies/activities.

6. What specific skills or knowledge did attendees gain through the training that will enable them to make a greater impact in the green H_2 mobility sector?

Here are the main knowledge gained by the attendees:

- National and regional hydrogen regulatory and policy frameworks, as well as the key barriers and challenges faced to develop H_2 mobility in Alpine space and our following advised H2MA solutions.
- Scenario-based planification of H_2 routes. Using the masterplan and the tool, one can reduce risks in investing in the installation of H_2 infrastructure, having the knowledge of the most relevant locations to target. Thus, enhancing investment capacity.
- The necessity for public-private partnerships, and which relevant organisations to involve in the process in order to have the most efficient H_2 routes planning and development (ex. Local working groups).

→ **Lessons Learned and Recommendations:**

7. What are the key lessons learned from participating in this joint training program that could be useful for future capacity-building efforts in green hydrogen mobility?

We began the conference with an overview of H_2's green sector, followed by H2MA's objectives and results. This gave participants a general understanding.

We then offered interested participants a dedicated time to discuss the various topics in greater depth, which proved to be very interesting and led to some very fruitful discussions.

Participants and we learned that in spite of the challenges and the slowing down of the hydrogen sector's development, the relevance for the deployment of H_2 mobility routes remains unchanged (Decarbonisation, EU energy sovereignty).

8. How could the training tools and activities be improved to better meet the needs of businesses, stakeholders, and policymakers in the future?

As the economic, technological and political situation evolve quickly, it would be interesting to have updated versions for H2MA deliverables in the future.

Furthermore, transforming the H2MA planification tool into an online and easier-to-use tool would be relevant for all organisations that wish to use it.

9. In your stakeholders point of view, what actions or initiatives should follow the training to ensure that the lessons learned are applied effectively in the real world?

Our stakeholders sometimes felt that the results needed to be communicated on, on a European level to implement the hydrogen sector's cohesion across borders and wished that there were enhanced accessibility/visibility to/on all European H_2 project's results, for them to be used more. Additionally, stakeholders acknowledged the existence of multiple cross-border networks (such as Trion-Climate or 3H2) and the existence of regional networks (DINAMHySE, Club H2 BFC) and the following opportunity to have another level of cooperation that could connect the information and actions from all networks into one central European platform.

7.5 Lombardy-RL and FLA

→ **Methodology:**

A workshop was organised with stakeholders, during which the regional strategy for the deployment of hydrogen (developed within the framework of the H2MA project) was presented, along with the H2MA masterplan for the dissemination of green hydrogen in the Alpine area. The regional strategy had been shared with participants a few days prior to the workshop, with the announcement that comments and observations could be made during the event. During previous project activities, the H2MA Roadmap (deliverable D.3.2.1.) had been distributed, and feedback from stakeholders was actively solicited and collected. The event was quite successful, attracting participation from academia, major industry associations, and key players in the hydrogen sector. Part of the workshop was dedicated to gathering feedback from stakeholders. The June 11 event was preceded by another awareness-raising event on hydrogen, organised in collaboration with Fedarene and H2IT (the industrial association for the promotion of hydrogen use) on May 5. The regional strategy for hydrogen deployment was also presented during that event, which received media coverage and was attended by three regional ministers.

→ **Effectiveness of Training Tools:**

1. How effective are the H2MA resources (tools and masterplan developed during the project) in addressing the specific needs of stakeholders related to green hydrogen mobility?

Stakeholders showed strong interest in the planning of a hydrogen development strategy in the Alpine area, as evidenced by the relevance of the stakeholders who attended the workshop organised within the H2MA project (some of the most prominent companies currently planning hydrogen development initiatives in Lombardy were present).

However, it was challenging to establish an interactive dialogue to better understand their interest in the development pathway. The impression was that stakeholders were more interested in the existence of a planned hydrogen development strategy, one that could provide a reference ecosystem for their corporate development projects, rather than in the use and discussion of the tool developed within the H2MA framework.

2. Were the training materials and tools user-friendly and accessible to all participants, including those with limited prior knowledge of green hydrogen technologies?

No negative feedback was received; in any case, most of the participants in the H2MA working groups and workshops were already involved in projects related to hydrogen development.

→ **Relevance to Stakeholders and Policymakers:**

3. Did the training activities help the stakeholders to better understand the regulatory and policy frameworks required to support green H_2 mobility adoption?

The documents developed will undoubtedly serve as a reference point for stakeholders and have represented a crucial starting point for thoroughly analysing the current state and understanding the regulatory and political context.

4. Did the tool and resources developed during the H2MA project assist stakeholders in identifying opportunities for advancing green hydrogen mobility? Or if not directly applied, how do stakeholders rate the potential of the H2MA resources for that?

As already mentioned, stakeholders appeared to be more interested in the existence of a planned strategy rather than in the use of the tool. Moreover, the stakeholders involved mostly belong to major companies that develop their own industrial development strategies internally.

→ **Practical Application and capacity building:**

5. Did the stakeholders provide specific examples on how the training tools could be applied in their current work or policy development?

No

6. What specific skills or knowledge did attendees gain through the training that will enable them to make a greater impact in the green H_2 mobility sector?

The greatest added value lies in the creation of an ecosystem and reference frameworks within which projects related to the use of green hydrogen in transport can be developed.

→ **Lessons Learned and Recommendations:**

7. What are the key lessons learned from participating in this joint training program that could be useful for future capacity-building efforts in green hydrogen mobility?

- There is a very fertile ecosystem at the regional level, actively engaged in the development of hydrogen-related projects. - The presence of an overarching strategy for hydrogen deployment serves as a guiding and supporting element for project development. - Challenges to the widespread adoption of hydrogen remain, not so much from a technical standpoint, but rather from an economic perspective. - Private stakeholders expect the Public Administration to maintain continuity and give concrete form to its commitment on the issue, including the allocation of greater financial resources.

8. How could the training tools and activities be improved to better meet the needs of businesses, stakeholders, and policymakers in the future?

Practical support could also be provided to help define and guide the implementation process of the interventions (e.g., through the development of a regulatory guide). Moreover, the masterplan should be expanded to include all regions of the Alpine region.

9. In your stakeholders point of view, what actions or initiatives should follow the training to ensure that the lessons learned are applied effectively in the real world?

Stakeholders are calling for concrete commitment, including financial support, to promote the development of hydrogen in the Alpine area. This support is essential to bring planned and future initiatives to fruition within their industrial development plans.

7.6 Slovenia-KSEENA

→ **Methodology:**

On the 6th of June, LP01 – KSSENA organised a 2nd edition of a double event (combined joint training and matching workshops) along with the participants of KLEAS (Consortium of Local Energy Agencies of the Republic of Slovenia), and a few stakeholders. The event was focused on presenting the H2MA approach, its tool, resources, and the replicability of the methods and mechanisms used in the last 3 years since the project's inception.

The event was hosted and moderated by KSSENA as the coordinator of the H2MA project, and was organized in Solkan, Nova Gorica district, on Friday, the 6th of June 2025. In addition to general presentations of the H2MA project and its most important deliverables, D.1.5.3. "H2MA planning tool" and D.2.3.2 - Green H_2 route masterplan for the alpine space, the event also explored the current problems preventing the establishment of H_2 infrastructure in the Republic of Slovenia and the opportunities offered by the current initiative and pilot projects in progress.

In addition, two workshops were held within the framework of the project - Joint training workshop and matchmaking workshop within Actions 3.3 & 3.4, in which the project developers demonstrated the "H2MA" approach and the most important findings of the project to the visiting colleagues, shared deliverables, tool and results with the participants, presented a plan for the continuation of H2MA activities after the end of the project in the autumn and initiated an interesting debate on the possibilities of synergy of the Slovenian H_2 value chain with other partner areas in the Alpine space.

The event followed the methodology and findings of the event, organised mutually by LP01 – KSSENA & PP02 BSC Kranj, on the 28th of May in Kranj (Slovenia), which served as the 1st edition of the joint training matchmaking workshops of the H2MA project. The participants, presenting all the public and local energy agencies of the Republic of Slovenia, have a wide web of trusted stakeholder relationships, with a focus on the municipalities they work with, granting them access to unlock the potential idle and untested capacity of decision makers at the local and regional levels for setting up green H_2 infrastructure at the local level, and setting up H_2 projects and initiatives as the #1 priority in their local energy conditions and when preparing new municipal investments plans.

→ **Effectiveness of Training Tools:**

1. How effective are the H2MA resources (tools and masterplan developed during the project) in addressing the specific needs of stakeholders related to green hydrogen mobility?

Slovenia is currently lagging behind other EU member states in both hydrogen production and demand, not only within the industrial sector but also in the field of mobility. Unlike many of its European counterparts, Slovenia stands out as the only country with just a handful of small pilot projects in this domain.

The H2MA resources have played a crucial role in enabling engagement with the topic of hydrogen, facilitating the connection of national stakeholders and various consortia focused on H_2 infrastructure and mobility. These resources have also helped initiate potential future collaborations. By reviewing and comparing the policies of our partners with our own, targeted recommendations have been provided to national policymakers.

Sharing knowledge gained from this and other related projects, as well as best practices, has proven valuable. Stakeholders are becoming increasingly aware that much of the current progress remains at a theoretical level. When moving towards practical implementation, existing tools often fall short, as they do not address the real-world challenges encountered. A common issue is that The tool's frequently calculates the cost of hydrogen based on production expenses rather than actual market prices, even though the market price is ultimately what matters.

Hands-on learning through real-world implementation and in-depth sharing of experiences and data from completed investments is essential for empowering stakeholders and investors. At the national level, policymakers are still in the process of learning about hydrogen technologies and markets. The information and insights provided through H2MA activities have been particularly beneficial in supporting this learning process and guiding future actions.

In summary, while Slovenia is making strides in connecting stakeholders and sharing knowledge, significant progress is still needed to move from theory to practice, especially given its current position relative to other EU countries in the hydrogen sector.

2. Were the training materials and tools user-friendly and accessible to all participants, including those with limited prior knowledge of green hydrogen technologies?

The training materials and tools have proved accessible and user-friendly for our participants, as the majority of them are entities with a wider knowledge span when it comes to H_2 technology.

The tools, their location, and their use were also presented at the event, but there were indeed some stakeholders without any specific knowledge on H_2, which has expressed some difficulties in understanding the usefulness and some minor user-interface related setbacks encountered from their side.

→ **Relevance to Stakeholders and Policymakers:**

3. Did the training activities help the stakeholders to better understand the regulatory and policy frameworks required to support green H_2 mobility adoption?

The training activities conducted as part of the H2MA project's joint training and matchmaking workshops significantly contributed to enhancing stakeholders' understanding of the regulatory and policy frameworks necessary for the adoption of green hydrogen (H_2) mobility in Slovenia.

Participants, including representatives from all public and local energy agencies across Slovenia, were exposed to comprehensive presentations on the H2MA approach, its tool, and key deliverables such as the H2MA planning tool and the Green H_2 route masterplan for the Alpine space. These resources provided practical insights into the current regulatory landscape, highlighted existing barriers, and outlined actionable recommendations for policy development.

Through interactive sessions and discussions, stakeholders gained:

- A clearer overview of the current regulatory and policy challenges hindering the establishment of H_2 infrastructure, especially at the local and regional levels.
- Exposure to best practices and replicable mechanisms from other Alpine partner regions, which offered comparative perspectives on policy instruments and regulatory support.
- Practical guidance on integrating green H_2 priorities into local energy strategies and municipal investment plans, empowering decision-makers to advocate for supportive policy measures.
- Opportunities to engage directly with project developers and peers, fostering knowledge exchange on regulatory requirements and the steps needed to advance green H_2 mobility.

The workshops also initiated debates on how to leverage existing stakeholder networks and municipal relationships to unlock policy action and address untested regulatory capacities. By sharing both theoretical frameworks and hands-on experiences from pilot projects, the training activities bridged the gap between policy theory and practical application, equipping stakeholders with the knowledge and tools needed to navigate and influence the evolving regulatory environment for green hydrogen mobility in Slovenia.

4. Did the tool and resources developed during the H2MA project assist stakeholders in identifying opportunities for advancing green hydrogen mobility? Or if not directly applied, how do stakeholders rate the potential of the H2MA resources for that?

The tools and resources developed during the H2MA project, such as the H2MA planning tool and the Green H_2 route masterplan, were designed to help stakeholders across the Alpine region, including Slovenia, identify opportunities for advancing green hydrogen mobility. These resources provided scenario modelling, infrastructure mapping, and strategic guidance, and were presented to Slovenian stakeholders through local working groups and workshops.

However, for Slovenian stakeholders, the practical usefulness of these tools and resources was notably limited. Slovenia continues to lag behind other EU member states in several key areas:

There is a lack of significant hydrogen demand and production, both in industry and mobility.

Slovenia has only a few small pilot projects, with no large-scale or firm initiatives underway.

The country does not yet have a dedicated national hydrogen strategy; only a draft action plan is being prepared, with completion expected no earlier than 2026.

The realisation of key performance indicators (KPIs) set in strategic documents has been poor, with limited progress on infrastructure and market development.

As a result, while the H2MA tool and resources offered valuable theoretical frameworks and facilitated knowledge exchange, stakeholders in Slovenia found them difficult to apply directly to their context. The absence of a robust hydrogen ecosystem, concrete projects, and clear policy direction meant that the tool could not be leveraged to their full potential. Stakeholders recognised the potential of the H2MA resources for future planning and capacity building, but their immediate impact on identifying actionable opportunities for green hydrogen mobility was minimal.

In summary, although the H2MA project provided advanced tools and methodologies, their effectiveness for Slovenian stakeholders was constrained by the country's current lack of hydrogen demand, production, strategy, and project implementation. The tool is seen as having potential value once Slovenia addresses these foundational gaps, but for now, it have not significantly assisted in advancing green hydrogen mobility.

→ **Practical Application and capacity building:**

5. Did the stakeholders provide specific examples on how the training tools could be applied in their current work or policy development?

This question is not particularly relevant for Slovenia, as the country currently lacks significant hydrogen demand, production, concrete pilot projects, and a dedicated hydrogen strategy.

Due to these foundational limitations, Slovenian stakeholders were unable to provide specific examples of applying the training tools in their current work or policy development. The tools remain largely theoretical and are not directly applicable in the present Slovenian context.

6. What specific skills or knowledge did attendees gain through the training that will enable them to make a greater impact in the green H_2 mobility sector?

At the event held on June 6, 2025, in Solkan, attendees gained a clearer understanding of how green hydrogen mobility is being developed in other Alpine and EU regions, especially regarding policy frameworks and infrastructure planning. They became familiar with the H2MA planning tool and the Green H_2 route masterplan, which helped them grasp strategic approaches and scenario analysis for future hydrogen mobility projects.

The training also increased their awareness of regulatory and policy challenges, giving them a better sense of what is needed to support green H_2 initiatives in Slovenia. Importantly, the event allowed participants to strengthen their professional networks and exchange experiences with colleagues from local energy agencies and municipalities.

While the skills and knowledge acquired are still mostly theoretical due to Slovenia's current lack of concrete hydrogen projects, they provide a solid foundation for future action as the national context develops.

→ **Lessons Learned and Recommendations:**

7. What are the key lessons learned from participating in this joint training program that could be useful for future capacity-building efforts in green hydrogen mobility?

Key lessons from the joint training program in Solkan showed that capacity-building efforts in green hydrogen mobility must be closely aligned with the local context and stage of development.

For Slovenia, where hydrogen production, demand, and strategy are still in their infancy, purely theoretical tools have limited immediate impact. However, the training was valuable for building networks, raising awareness of policy and regulatory challenges, and exposing stakeholders to best practices from more advanced regions.

The experience also highlighted the need for clearer regulatory pathways and more practical, hands-on projects to bridge the gap between theory and real-world application. Overall, future capacity-building should be flexible, practical, and tailored to the specific needs and readiness of the local ecosystem.

8. How could the training tools and activities be improved to better meet the needs of businesses, stakeholders, and policymakers in the future?

To better meet the needs of businesses, stakeholders, and policymakers in the future, training tools and activities should be made more practical, context-specific, and action-oriented. This means that, rather than relying on theoretical models and generalised frameworks, the focus should shift toward real-world case studies and demonstrations that offer hands-on learning and directly address the current stage of hydrogen ecosystem development in each region. Interactive workshops that encourage problem-solving and the direct application of tools to local challenges would make the training more relevant and impactful.

Ongoing dialogue and feedback between participants and trainers are essential for ensuring that the content remains useful and adapts to evolving needs. Clearer guidance on regulatory pathways and practical steps for project development would also help bridge the gap between theory and implementation. However, as already described above, this question is not so relevant for Slovenia, given the current lack of hydrogen demand, production, concrete pilot projects, and a dedicated hydrogen strategy. In the Slovenian context, the tools and activities remain largely theoretical and are not directly applicable at present, but they could become more valuable as the national hydrogen ecosystem matures.

9. In your stakeholders point of view, what actions or initiatives should follow the training to ensure that the lessons learned are applied effectively in the real world?

To ensure that the lessons learned from the training are effectively applied in the real world, stakeholders believe that follow-up actions and initiatives must go beyond theoretical knowledge and address the actual barriers to green hydrogen (H_2) mobility in Slovenia.

The most critical step for Slovenia is to persuade national decision-makers to adopt a comprehensive, stand-alone H_2 strategy. Without such a strategy, the country lacks clear direction, coordinated policy measures, and the necessary framework to support further development in the sector. Establishing this strategy would provide a foundation for aligning stakeholders, setting priorities, and guiding future investments.

Equally important is unlocking dedicated financing for H_2 pilot projects. Access to funding would enable the move from theory to practice, allowing stakeholders to implement real-world demonstrations, gather practical experience, and showcase the viability of hydrogen technologies. These pilots would not only validate the tools and concepts introduced during training but also help build confidence among investors, policymakers, and the broader public.

In addition to these priorities, ongoing engagement between stakeholders, through working groups, feedback sessions, and collaborative planning, will help maintain momentum and ensure that knowledge gained from training is translated into actionable steps. Continuous advocacy for regulatory clarity, streamlined approval processes, and support for capacity building will further facilitate the effective application of lessons learned.

For Slovenia, the path forward hinges on high-level policy commitment and tangible financial support, which together can transform training outcomes into meaningful progress in the green hydrogen mobility sector.

7.7 Slovenia-BSC

→ **Methodology:**

On the 28th of May 2025, BSC Kranj organised a double event, activity 3.3 and 3.4. PP2 acquired some of the information that seemed relevant to the stakeholders before the event, e. g. national financial incentives and opportunities for investments in H_2 technology.

The 3.3 activity incorporated presentations of several projects AMETHyST, program Interreg Europe, HyEfRe, program Interreg Central Europe, NACHIIP, program I3 and H2MA, Interreg Alpine Space, the main results including the tool.

However, the thematic is complex and the invited parties relevant for investing in H_2 economic ecosystem are all experts in their own areas of work. Therefore, each of them contributed the knowledge and "trained" others also in the matchmaking 3.4 part of the day.

→ **Effectiveness of Training Tools:**

1. How effective are the H2MA resources (tools and masterplan developed during the project) in addressing the specific needs of stakeholders related to green hydrogen mobility?

The H2MA resources enabled us to tap into the topic, start connecting national stakeholders and different consortiums addressing the H_2 infrastructure and mobility and initiate possible future cooperations through the process of overview of partners policies, we could compare them to ours and give recommendations to the national policy makers.

Sharing the knowledge gained from the project and other projects and good practices is beneficial. The stakeholders are realising that this is on a theoretical level. When they want to start doing something in this area, the actual implementation, these tools are not very helpful, and they are other issues that need to be tackled.

Too many times, tools calculate the price of H_2 according to the costs not the market price, but at the end the market price matters. The hands-on learning through implementation or in-depth experience and data sharing from already implemented investments is the next step to empower the stakeholders, investors. Since in our case also the national level policy makers are still learning, the information we could provide by H2MA activities have been beneficial.

2. Were the training materials and tools user-friendly and accessible to all participants, including those with limited prior knowledge of green hydrogen technologies?

The training materials and tool are accessible. They are and will be accessible on the official project website to all interested parties. Are they user friendly? No, not really.

The vast majority of the stakeholders do not have time to read all the documents we provided. They like the events we've organised to inform and matchmake, because they save them time, give them condensed information and if they want to know more on a certain topic, these events give them the opportunity to connect them to the other experts.

However, they are some deliverables that are too ahead of themselves to matter ATM, like interoperability that could be a topic for discussion and analyses on its own.

→ **Relevance to Stakeholders and Policymakers:**

3. Did the training activities help the stakeholders to better understand the regulatory and policy frameworks required to support green H_2 mobility adoption?

Policy makers create the regulatory and policy framework; therefore, they are familiar with it. In terms of EU regulatory framework and even the policy framework of some partner countries the policy makers are also familiar with them.

The stakeholders who are in the gas industry know the regulations that apply to gas business, which means they apply to hydrogen as well. There are stakeholders interested to tap into the H_2 technologies that see business opportunities, or they see H_2 as a possible solution to a problem they have.

Those stakeholders are trying to get specific information as well as general information. H2MA provides more or less general information and information about policies, challenges, good practices but the specific information for investors are lacking here as well as also on the national level.

4. Did the tool and resources developed during the H2MA project assist stakeholders in identifying opportunities for advancing green hydrogen mobility? Or if not directly applied, how do stakeholders rate the potential of the H2MA resources for that?

The tools and resources provided by H2MA project gave a broader understanding and, in some cases, also specific challenges stakeholders are going to face entering or trying to be a part of, building the H_2 economic ecosystem.

They also got the information when, where and why it is sensible to use H_2, also in terms of mobility. When it comes to political decisions, they are more or less straight forward.

When it comes to application, economics, environmental risks then it is not straight forward any more. H2MA resources are a good platform to start a discussion among stakeholders and identify interest among certain groups.

→ **Practical Application and capacity building:**

5. Did the stakeholders provide specific examples on how the training tools could be applied in their current work or policy development?

The A3 deliverables have not been distributed yet to the stakeholders, the A2 and A1 stakeholder deliverables were distributed, but the stakeholders, the vast majority of them, haven't had the time to read them or did not respond.

Most stakeholders receiving the deliverables have not responded favourably to our invitation for the training and matchmaking event (most of them did not have time), therefore, most of the stakeholders were new to the group/event.

For the policymaker, there were a lot of interesting information, and a lot of information were noted down by other stakeholders as well. However, there was a general response to our deliverables and (other) deliverables of the projects presented on the event being more theoretical. The response has been that there is a big difference between being theoretical and the implementation.

6. What specific skills or knowledge did attendees gain through the training that will enable them to make a greater impact in the green H_2 mobility sector?

We hadn't had any training in terms of how to prepare an application for the H_2 project or how to handle H_2, work with it, fill in the H_2 storage, repair the component in H_2 truck or anything similar, so attendees could not acquire any skills.

In terms of knowledge gained to make a greater impact in the green H_2 mobility sector, yes. Scania Slovenia provided expert information on H_2 trucks, different variations, H2FCE, H2ICE, H2crio different technologies behind, obstacles and the policy maker has been very interested to gain even more information, so they may adjust financing mechanisms accordingly to the market.

In terms of generation and distribution, the stakeholders agreed that if the contracts are signed with any of the states currently providing other energy vectors, there would not be a problem of getting the H_2, even if wanting green H_2. However, we also agreed that supporting and encouraging energy dependency of Europe on other countries outside EU, also for this energy vector is the wrong strategy.

It is repeating mistakes from the past not learning anything, doing business as usual just changing the energy vector and unfortunately increasing risk for potential environmental disasters. Choosing new energy vector is an opportunity to change provision structures and it enables building self-sufficient H_2 economic ecosystems and increasing self-resilience also in terms of economy.

We also had a debate if all the costs connected to the provision of H_2 cross oceans and seas to Europe would really long term assure low cost of H_2 or better margines and/or would shorter supply chains and investing in production of H_2 in Europe be better for the economy of the European Union? We agreed to the latest, but in terms of provision of green H_2, we also agreed that a combination of pink and green would-be best solution. We discussed also other fuel options like HVO and synthetic fuels.

→ **Lessons Learned and Recommendations:**

7. What are the key lessons learned from participating in this joint training program that could be useful for future capacity-building efforts in green hydrogen mobility?

Talking to the right stakeholders: manufacturers and distributers of H_2 vehicles, energy providers, logistic companies, investors in the H_2 systems and policy makers, potential users all together talking.

Identification and presentation of good practices, existing business and infrastructural capacities.

Pilot project financing, financing incentives – grants.

8. How could the training tools and activities be improved to better meet the needs of businesses, stakeholders, and policymakers in the future?

For investors to have a Guidebook with a check list of what permits investor needs to build the infrastructure and who is responsible to issue it, what are the expected waiting times, step by step and to whom they can turn for support. This Guidebook needs to be done according to the Slovenian institutions. If translated that might be useful also for foreign investors if interested.

9. In your stakeholders point of view, what actions or initiatives should follow the training to ensure that the lessons learned are applied effectively in the real world?

Combining the training and matchmaking event was a “very good move”, because stakeholders already agreed to new meetings according to their interest. Some “lessons” effecting policies can be applied only with labour costs, the application and creation of H_2 economic ecosystem needs business models, financing structures to cover CAPEX, OPEX and create positive ROI. Market driven investments create long term economic stability, while incentive driven investments may, if not applied very strategically, do the opposite. Stakeholders find this kind of events useful at least once per year.

7.8 Italy, CMTO

→ **Methodology:**

On 12 September 2025, the Metropolitan City of Torino (CMTO) hosted a training seminar aimed at building the capacities of local public officers involved in hydrogen mobility initiatives. The event took place at the CMTO premises in Turin and gathered key stakeholders from across the Piedmont region.

This training seminar was designed for public officers from local administrations within the Metropolitan City of Turin who, at various levels, are involved in the authorisation and evaluation of investments related to:

- The deployment of hydrogen infrastructure for mobility at both local and transalpine levels.
- The design and implementation of local plans for sustainable mobility and logistics (including PULS: Plans for Sustainable Logistics and PUMS: Plans for Sustainable Mobility).
- Local policies and regulations concerning hydrogen in mobility.

In addition to training on the use of the H2MA tool and the masterplan developed under the H2MA project, the seminar covered topics related to the use of hydrogen in mobility, such as technical solutions and market trends, as well as urban planning and environmental procedures involved in the permitting process for constructing hydrogen production facilities and roadside hydrogen refuelling stations (HRS).

These latter topics are crucial to accelerating the deployment of roadside HRS in line with AFIR EU plans, helping to avoid delays in the evaluation and authorisation stages caused by insufficient training of local officers, misunderstandings of technical and environmental regulations, or worse, unfounded fears about the safety of hydrogen fuel and installations based on misinformation.

The training was delivered as a three-hour, in-person session, conducted in Italian by two hydrogen experts. The seminar was attended by 15 participants, including representatives from the Italian Association of Engineers for Traffic and Logistics (AIIT), the National Association of Local Authorities (ANCI), public officers from the Mobility and Energy Department of CMTO, and delegates from local municipalities in the Piedmont region.

At the conclusion of the presentations, participants were asked to complete a questionnaire to provide feedback on the content, lessons learned, and recommendations for future activities. The results of this feedback are summarised in the final sections of this report.

→ **Effectiveness of Training Tools:**

10. How effective are the H2MA resources (tools and masterplan developed during the project) in addressing the specific needs of stakeholders related to green hydrogen mobility?

The H2MA tool provided the participants with an overview of the current status of investments in hydrogen refuelling stations (HRS) across the Alpine region, as well as the potential development of cross-border Alpine road routes supported by these stations.

The masterplan further emphasised how ongoing investments will facilitate the creation of integrated, zero-emission hydrogen logistics networks between Alpine countries. It also underlined the need for additional investments at regional, national, and cross-border levels to comply with the European AFIR standards, which mandate one HRS every 200 km along the TEN-T road network, particularly relevant for the Piedmont region.

Moreover, the H2MA masterplan demonstrated that integrated cross-border investment planning, especially for projects located at borders between Alpine countries or along major transport corridors (such as the TEN-T4 Fréjus route between Italy and France), can generate economies of scale. This approach enhances the efficiency of trans-Alpine logistics nodes, including logistics platforms, inter-ports, and seaports, while supporting the achievement of environmental objectives and AFIR investment targets for the involved countries.

11. Were the training materials and tools user-friendly and accessible to all participants, including those with limited prior knowledge of green hydrogen technologies?

Yes, the tools and materials were made available to all participants. At the start of the training session, a dedicated intervention provided a shared technical and regulatory framework on hydrogen, ensuring that all participants began with a common level of understanding.

→ **Relevance to Stakeholders and Policymakers:**

12. Did the training activities help the stakeholders to better understand the regulatory and policy frameworks required to support green H_2 mobility adoption?

Yes, two specific presentations were delivered covering HRS planning, permitting procedures, and the safety of hydrogen infrastructures and vehicles. Additionally, a comparative analysis of the regulatory frameworks in force across neighbouring Alpine countries was provided, highlighting potential improvements that could be adopted in local legislation and procedures.

13. Did the tool and resources developed during the H2MA project assist stakeholders in identifying opportunities for advancing green hydrogen mobility? Or if not directly applied, how do stakeholders rate the potential of the H2MA resources for that?

The H2MA resources sparked significant interest among participants, particularly regarding the following potential outcomes:

- Planning new hydrogen refuelling stations (HRS) to meet AFIR regulatory standards in the region, while considering ongoing and planned investments in neighbouring Alpine areas.
- Providing valuable information to support environmental and mobility plans, especially those related to air quality.
- Accelerating permitting procedures for HRS investments and streamlining decision-making processes concerning hydrogen regulations and local planning.
- Supporting the development of zero-emission logistics for both long- and short-haul transport, enabled by a network of HRS connecting key logistics nodes and urban centres.
- Establishing dialogue with relevant industrial and logistics stakeholders to promote hydrogen as one of the viable solutions for transport decarbonisation.

→ **Practical Application and capacity building:**

14. Did the stakeholders provide specific examples on how the training tools could be applied in their current work or policy development?

Yes, and in particular:

The Italian Association of Engineers for Transport and Logistics (AIIT), acting as technical advisor to the Italian Ministry of Transport on the design of the transnational France–Italy logistics corridor plan, will benefit from the scenario developed for the Western Alps tunnels in shaping sustainability actions.

The Metropolitan City of Turin (CMTO) will utilise the data and scenarios produced by the tool to inform the design of its sustainable mobility and logistics plans.

The National Association of Local Municipalities (ANCI) will disseminate the content of the training to smaller municipalities to enhance their understanding of hydrogen in logistics, particularly regarding the role of local authorities in permitting procedures, safety issues, and public information campaigns.

15. What specific skills or knowledge did attendees gain through the training that will enable them to make a greater impact in the green H_2 mobility sector?

The attained skills and knowledge are the following:

1. A general overview of the hydrogen economy, including the prospects for development in the logistics sector, the advantages and disadvantages of using hydrogen as an energy vector, and the current state of investments in the Alpine region and across the EU.
2. An in-depth focus on the permitting, environmental, and safety procedures required for hydrogen refuelling stations.
3. A comprehensive policy overview at both EU and national levels, with particular emphasis on targets to be achieved in accordance with EU directives, notably the AFIR regulation.
4. Information on the progress of hydrogen refuelling infrastructure deployment in neighbouring regions, specifically Lombardy and Vallée d'Aoste in Italy, AURA in France, and Vaud and Valais in Switzerland.

These competencies will prove valuable for trainees when designing hydrogen investments in their own territories, especially in engaging with private investors and project promoters. They will also enhance understanding of, and focus on, the environmental and safety authorisation procedures in which they may be involved.

→ **Lessons Learned and Recommendations:**

16. What are the key lessons learned from participating in this joint training program that could be useful for future capacity-building efforts in green hydrogen mobility?

According to feedback collected from participants, the key lessons are the following:

- Hydrogen is one of several options to support the decarbonisation of mobility and should not be viewed as the sole solution.
- It is particularly well-suited to logistics and heavy-duty transport operations.
- At this early stage of market development, the planning of hydrogen refuelling stations (HRS) must be approached at a trans-regional level, due to high costs and specific operational constraints.
- There is an urgent need to deploy HRS along TEN-T corridors to meet the obligations set by the AFIR regulation.
- Like all fuels, hydrogen presents safety risks that require specific management measures; however, appropriate regulations have already been adopted at both EU and national levels to ensure these risks are properly addressed.

17. How could the training tools and activities be improved to better meet the needs of businesses, stakeholders, and policymakers in the future?

To make the tool available online through user-friendly applications, such as Google Maps or similar platforms, in order to improve accessibility and ease of use.

18. In your stakeholders point of view, what actions or initiatives should follow the training to ensure that the lessons learned are applied effectively in the real world?

To keep local authorities informed about the progress of hydrogen refuelling station (HRS) deployment in the Alpine regions by periodically updating the H2MA scenarios.

8. REFERENCES

AISBL, F. (2025). *European Federation of Agencies and Regions for Energy and Environment*. Retrieved from fedarene.org: https://fedarene.org/

Alternative Fuels Infrastructure. (2025). Retrieved from transport.ec.europa.eu: https://transport.ec.europa.eu/transport-themes/clean-transport/alternative-fuels-sustainable-mobility-europe/alternative-fuels-infrastructure_en

ASF. (2025). Retrieved from www.abfallwirtschaft-freiburg.de: https://www.abfallwirtschaft-freiburg.de/

Current Austrian developments and examples of sustainable energy technologies. (2025). Retrieved from www.energy-innovation-austria.at: https://www.energy-innovation-austria.at/article/renewable-gasfield/?lang=en

Euro Supply Chain. (n.d.). Retrieved from www.eurosupplychain.fr/en: https://www.eurosupplychain.fr/en

Europe, I. C. (2024). *HyEfRe*. Retrieved from www.interreg-central.eu: https://www.interreg-central.eu/projects/hyefre/

Fernando, J. (2025, July 18). *Capital Expenditure (CapEx): Definitions, Formulas, and Real-World Examples*. Retrieved from www.investopedia.com: https://www.investopedia.com/terms/c/capitalexpenditure.asp

H2CE. (2025). Retrieved from www.interreg-central.eu: https://www.interreg-central.eu/projects/h2ce/

Italian Hydrogen Association. (2021). Retrieved from www.h2it.it: https://www.h2it.it/

National Association of Italian Municipalities (ANCI). (2025). Retrieved from www.developmentaid.org: https://www.developmentaid.org/organizations/view/34971/national-association-of-italian-municipalities-anci

North Adriatic Clean Hydrogen Investment Platform (NACHIP) to strengthen the North Adriatic Hydrogen Ecosystem. (2023). Retrieved from www.nahv.eu/nachip/: https://www.nahv.eu/nachip/

Space, I. A. (2022). *AMETHyST*. Retrieved from www.alpine-space.eu: https://www.alpine-space.eu/project/amethyst/

The Slovenian Energy Agency. (2025). Retrieved from www.agen-rs.si/web/en: https://www.agen-rs.si/web/en

TIS ROMA 2024. (2024). Retrieved from tisroma.aiit.it: https://tisroma.aiit.it/

What is OPEX (Operational Expenditure)? Examples and Strategies. (2025). Retrieved from kaizen.com: https://kaizen.com/insights/opex-examples-strategies/

White, J. (2025, May 28). *What's a Good Return on Investment (ROI)?* Retrieved from smartasset.com: https://smartasset.com/investing/whats-a-good-return-on-investment-roi