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H2MA

*Deliverable D.1.2.3*

# **Lessons learnt on planning specifications and requirements for long-distance H2 infrastructure**

Activity 1.2

April, 2023



## DOCUMENT CONTROL SHEET

### Project reference

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<b>Lead partner</b>	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

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## **IMPRINT**

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## CONTENT

Introduction.....	4
1.1 Organisations Visited.....	4
1.2 Q&A.....	8
1.3 Visuals.....	9
2. EVALUATION FROM PARTICIPANTS.....	10
2.1 Feedback Received:.....	10
<b>2.1.1 Overall Organization:</b> .....	10
<b>2.1.2 Thematic Areas:</b> .....	10
<b>2.1.3 Suggestions for Future Study Visits:</b> .....	10
<b>2.1.4 Time Allocation:</b> .....	10
<b>2.1.5 Quantity and Quality of Information Received:</b> .....	10
<b>2.1.6 Relevance to Organizations:</b> .....	10
<b>2.1.7 Facilitating Policy Recommendations and Improvements:</b> .....	11
<b>2.1.8 Appropriateness and Productivity of the Study Visit:</b> .....	11
3. Conclusion: .....	11

<b>H2MA Activity 1.2 – “Study Visit on planning specifications and requirements for setting up green H2 mobility routs for long-distance transport, to improve partners and stakeholders’ coordination and implementation capacities”</b>	
<b>Name of the person filling the questionnaire</b>	Angeles Casulli
<b>Affiliation:</b>	Project Manager <i>Italian German Chamber of Commerce Munich-Stuttgart</i>
<b>Name of the Location</b>	Augsburg, Germany
<b>Date of Visit:</b>	17 <sup>th</sup> -18 <sup>th</sup> of April
<b>Purpose of the Visit:</b>	To learn about the specifications and planning requirements for the creation of commercial and urban H2 green mobility routes for long-distance transport.

## INTRODUCTION

On April 17th and 18th, a study visit was organized to learn about the specifications and planning requirements for the creation of commercial and urban H2 green mobility routes for long-distance transport.

The visit included several important organizations in Bavaria, including the Hydrogen Center Bavaria, Quantron AG, Green Hydrogen Technology GmbH, and the University of Augsburg.

The aim was to understand the current state of green hydrogen in Bavaria and how it can be used to facilitate the transition to a more sustainable form of transportation.

### 1.1 Organisations Visited

- I. The [Hydrogen Center Bavaria](#) (H2.B) is the strategy and coordination center for hydrogen in Bavaria, initiated and financed by the Free State of Bavaria.



The Center acts at the interface between industry, science and politics in a national and international context. The numerous activities of the Center are intended, among information and consulting, to strengthen the networking of Bavarian hydrogen stakeholders with each other (in the Hydrogen Alliance Bavaria), as well as with other national and international players. In addition, the H2.B coordinates the [Hydrogen Alliance Bavaria](#).

In 2020, the H2.B and its partners in the Hydrogen Alliance Bavaria developed a [Position Paper](#) about the Bavarian Hydrogen Economy as a first step towards the [Bavarian Hydrogen Strategy](#). In April 2022, the H2.B published the [Hydrogen Roadmap Bavaria](#).

The **Position Paper**, the **Bavarian Hydrogen Strategy** and the **Roadmap Bavaria** provide an overview of the goals and objectives of the Hydrogen Alliance Bavaria and of the state of Bavaria, Germany. They focus on leveraging the potential of hydrogen as a key energy carrier for achieving the goals of the energy transition towards a low-carbon economy.

The key points highlighted in the documents include:

- **Establishing a hydrogen infrastructure:** The papers call for the establishment of a hydrogen infrastructure that supports the production, storage, transport, and distribution of hydrogen. This includes the construction of hydrogen production facilities, the expansion of hydrogen refueling stations, and the development of hydrogen pipelines.

- **Promoting research and innovation:** They highlight the importance of promoting research and innovation in the field of hydrogen technologies, particularly in the areas of hydrogen production, storage, and utilization. This includes the funding of research projects and the establishment of partnerships between research institutions and industry.
- **Implementing policy measures:** They emphasize the need for policy measures to support the market uptake of hydrogen, including financial incentives for the purchase of hydrogen-powered vehicles, the promotion of green hydrogen in public procurement, and the establishment of regulations for the safe and sustainable use of hydrogen.
- **Developing hydrogen value chains:** The papers call for the development of hydrogen value chains that connect hydrogen production with demand sectors, including transportation, industry, and heating. This includes the development of hydrogen-powered vehicles, the integration of hydrogen in industrial processes, and the use of hydrogen for heating and power generation.
- **Fostering international cooperation:** They highlight the importance of international cooperation and collaboration to promote the development of a global hydrogen economy. This includes the establishment of partnerships with other regions and countries, the sharing of knowledge and best practices, and the promotion of joint research and development projects.

The activities of H2.B include:

- **Research and development:** promoting the development of new technologies and the optimization of existing ones for the production, storage, and use of hydrogen. This includes research into hydrogen production from renewable energy sources, the development of fuel cell systems, and the optimization of hydrogen storage and transport.
- **Demonstration projects:** supporting the development and implementation of demonstration projects to showcase the benefits of hydrogen technology in various sectors, including transport, energy, and industry. These projects help to build awareness and promote the adoption of hydrogen technology.
- **Knowledge exchange:** facilitating knowledge exchange and collaboration between its members, as well as with other stakeholders in the hydrogen sector. This includes organizing workshops, seminars, and other events to share information and best practices.
- **Policy advocacy:** advocating for policies and regulations that support the growth of hydrogen technology and its integration into the energy system. The center works closely with policymakers at the local, national, and European levels to promote the development of a supportive policy framework.

In conclusion, the Hydrogen Center Bavaria is playing a key role in promoting the adoption of hydrogen technology in various sectors and supporting the research and development of new technologies. Its activities are helping to drive the transition to a low-carbon energy system and a more sustainable future.

- II. [Quantron AG](#) is a German-based company that specializes in sustainable transportation solutions. With a focus on zero-emission mobility, Quantron AG has established itself as a leading provider of electrification technologies for commercial vehicles. In recent years, the company has made a strategic shift towards hydrogen mobility. They recognize the immense potential of hydrogen fuel cells in providing long-range, emission-free transportation for heavy-duty vehicles such as trucks and buses.



To this end, Quantron AG has developed a range of hydrogen fuel cell vehicles, including trucks, vans, and buses, which are powered by green hydrogen produced from renewable energy sources. These vehicles have demonstrated impressive performance in terms of range, durability, and reliability, making them a compelling option for fleet operators seeking to decarbonize their operations.

The company is also engaged in the development of a comprehensive hydrogen infrastructure, which includes the installation of hydrogen refueling stations across Europe. Their aim is to make hydrogen mobility accessible and affordable for businesses of all sizes, paving the way for a greener, more sustainable future.

Quantron AG's goals and plans for the future are centered around its vision of sustainable, zero-emission transportation. Specifically, the company aims to be a leading provider of hydrogen fuel cell vehicles and related infrastructure, and to help accelerate the transition to a decarbonized transport sector.

To achieve these goals, Quantron AG has outlined several key strategies. These include:

- **Innovation and technology development:** Quantron AG is committed to advancing the state-of-the-art in hydrogen fuel cell technology, and to developing new and innovative solutions to support the growth of the hydrogen mobility sector.
- **Strategic partnerships:** The company recognizes the importance of collaboration and partnership in achieving its goals and is actively seeking out partnerships with other leading companies in the hydrogen ecosystem, including hydrogen producers, infrastructure providers, and vehicle manufacturers.
- **Expansion into new markets:** They are focused on expanding its operations into new markets across Europe and beyond, with a particular emphasis on markets where there is high demand for sustainable, zero-emission transportation solutions.

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- **Customer focus:** Quantron AG is committed to meeting the needs of its customers and is continuously working to improve its products and services based on customer feedback and market demand.

Overall, Quantron AG's goals and plans for the future reflect a strong commitment to sustainable transportation, and a belief that hydrogen fuel cell technology will play a key role in achieving a more sustainable, low-carbon future.

- III. [Green Hydrogen Technology GmbH](#) is a German-based company that specializes in the production and distribution of green hydrogen. The company's mission is to provide a sustainable and cost-effective solution for the decarbonization of industries such as energy, transport, and industry.



Green Hydrogen Technology GmbH has developed a new, patented process that enables the production of green hydrogen on an industrial scale using sewage sludge, plastic, and wood waste as raw materials. This innovative process converts waste products into high-quality green hydrogen, reducing waste and providing a sustainable source of energy. By using waste materials as a feedstock for hydrogen production, Green Hydrogen Technology GmbH is helping to reduce waste volumes and minimize environmental impact while also creating a valuable new source of clean energy.

Green Hydrogen Technology GmbH is committed to driving innovation in the hydrogen sector and working in partnership with leading companies and organizations to advance the adoption of hydrogen technology. Its focus on sustainable, cost-effective solutions for the decarbonization of industries reflects a strong commitment to a greener, more sustainable future.

The company's goals for the future include expanding its production capacity for green hydrogen, as well as further developing its waste-to-hydrogen technology to create even more sustainable sources of green hydrogen.

- IV. The Research group of [H2.UniA](#) is an interdisciplinary network of chairs and working groups within the University of Augsburg. Their focus is to bundle expertise and exchange regarding research on relevant topics of hydrogen technology and to make a significant contribution to the implementation of the energy transition and the European, National, and Bavarian Hydrogen Strategy and Climate Alliance.



Some of the specific topics covered are:

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- **Hydrogen production:** This includes research on various methods of hydrogen production, such as electrolysis, reforming, and biomass gasification.
- **Hydrogen storage:** This involves developing technologies for safe and efficient storage of hydrogen, including high-pressure gas storage, liquid hydrogen storage, and solid-state hydrogen storage.
- **Fuel cells:** Fuel cells are devices that convert the chemical energy of hydrogen into electrical energy. They cover research on various types of fuel cells, including proton exchange membrane fuel cells, solid oxide fuel cells, and microbial fuel cells.
- **Applications of hydrogen:** They discuss various applications of hydrogen, including its use as a fuel for transportation, as a source of energy for buildings and industries, and as a means of energy storage.

Furthermore, The [H2Lab](#) conducts research in several areas, including hydrogen production, storage, and utilization. The laboratory has a range of state-of-the-art equipment and facilities for research and development, including a hydrogen production system, a fuel cell test bench, and a hydrogen storage and compression system.

The H2Lab also works closely with industry partners and other research institutions to promote the development and deployment of hydrogen technologies. The laboratory provides training and education programs to students and professionals and engages in outreach activities to promote public awareness and understanding of hydrogen and its potential as an energy carrier.

For example, within the H2Lab, the "[H2-ER](#)" research project is being conducted by the Hydrogen Research Center at the University of Augsburg, and it aims to develop a highly efficient and cost-effective system for the production of hydrogen through electrolysis. The system is designed to use renewable energy sources, such as solar or wind power, to generate electricity for the electrolysis process. The project involves interdisciplinary research that brings together expertise from chemistry, materials science, and electrical engineering.

The project also involves the development of novel materials and catalysts for the electrolysis process, as well as the optimization of the design and operation of the electrolysis system.

## 1.2 Q&A

- **From where is the Hydrogen in Bavaria being imported?** Mostly abroad, Chile e.g.
- **Type of Hydrogen being imported?** It doesn't matter, the most important is promoting hydrogen use.

- **Regulations of type of hydrogen for import and export?** There is a need to deal with it at an EU Level and National Level. Producing Green Hydrogen is correlated to using renewables energies.
- **Structure of Partnership?** Interface of Politics, Industry and Academic: Collecting opinions and finding a common ground between them. Transferring knowledge and connecting
- **Pipelines in Bavaria?** They will be built in the future. There are currently propositions on it. Longline pipelines are presented as the solution. Study going on to identify future regional needs and costumers.
- **Pipeline connecting Northern and Southern Germany?** Hopefully in the future.
- **Costs of lost in the pipelines?** Not calculated

### 1.3 Visuals



## 2. EVALUATION FROM PARTICIPANTS

### 2.1 Feedback Received:

#### 2.1.1 Overall Organization:

The majority of the participants rated the study visit's overall organization as excellent. They appreciated the warm welcome and the fantastic work done by the organizers. One participant expressed regret that they did not have the opportunity to visit an HRS for trucks as originally planned in the application form. However, all the other topics were addressed satisfactorily.

#### 2.1.2 Thematic Areas:

When asked if there were any issues related to the thematic areas of the study visit that have not been addressed, one participant mentioned circular economy of the actors involved. However, another participant mentioned that there are many issues in H2 mobility implementation, and it would be unrealistic to address them all in one study visit.

#### 2.1.3 Suggestions for Future Study Visits:

The participants had a few suggestions for the organization of future study visits. One participant suggested deepening the refueling part, perhaps even with a practical demonstration. Another participant suggested saving some time to visit the city. They also suggested that the consortium (lead partner) should prepare a presentation adapted to the companies engaged to give them a clear understanding of possible benefits they can have when engaging with the H2MA project. Finally, one participant mentioned that H2 should never be about its own promotion, but rather tackling all the obstacles and pros.

#### 2.1.4 Time Allocation:

When asked if the time allocated for each topic was sufficient, the majority of the participants agreed or strongly agreed.

#### 2.1.5 Quantity and Quality of Information Received:

Regarding the quantity of information received during the study visit on the current state of green hydrogen in Bavaria, most participants rated it as good or excellent. Similarly, when asked about the quality of information received, most participants rated it as good or excellent.

#### 2.1.6 Relevance to Organizations:

When asked how relevant the topics addressed were to their organization's operations, most participants rated it as good or excellent.

### 2.1.7 Facilitating Policy Recommendations and Improvements:

Regarding whether knowledge gained in the study visit can facilitate policy recommendations and improvements, most participants agreed or strongly agreed.

### 2.1.8 Appropriateness and Productivity of the Study Visit:

When asked if the study visit was appropriate and productive, the majority of the participants agreed or strongly agreed.

## 3. CONCLUSION:

The study visit on H2 green mobility routes in Bavaria was well-organized and informative. The participants learned about the work being done in Bavaria and the situation of hydrogen in different fields. The feedback received from the participants was overwhelmingly positive, with participants finding the study visit relevant to their organization's operations and agreeing that the knowledge gained could facilitate policy recommendations and improvements. Some participants suggested improvements for future study visits, such as addressing the circular economy of the actors involved and including practical demonstrations of refueling.