
Interreg



Co-funded by
the European Union

Alpine Space



Poslovno podporni center Kranj
Regionalna razvojna agencija Gorenjske

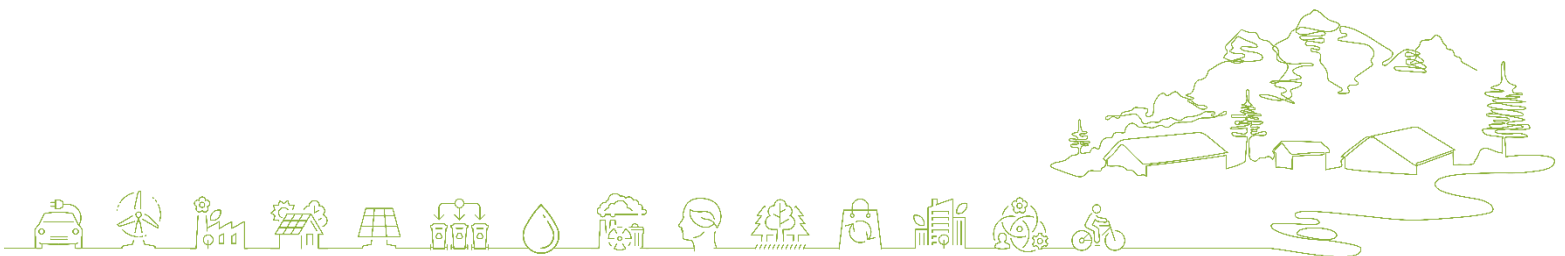
H2MA

Deliverable D.2.1.1

Pilot-testing action plan with guidelines on how to establish and manage Local Working Groups

Activity 2.1

February 2024



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 (HYDROGEN) 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 HYDROGEN routes.

Document details

Full document's title	Pilot-testing action plan with guidelines on how to establish and manage Local Working Groups
Version	V1
Author/s	XY
Organization/s responsible	PP2 BSC, Business Support Centre, Ltd, Kranj (BSC Kranj)
Delivery period	3, 13-18

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)
- PP9 Lombardy Region (IT)
- PP10 Codognotto Austria (AT)
- PP11 Italian German Chamber of Commerce Munich-Stuttgart (DE)

Responsible Partner/s for the compilation of this document

- PP2 BSC, Business Support Centre, Ltd, Kranj (SI)

CONTENTS

EXECUTIVE SUMMARY	4
A. INTRODUCTION.....	5
I. Outline of the Activity 2.1	5
II. Description of the Pilot Action	6
III. Current policy developments relevant to green H2 mobility.....	6
B. PROCEDURES FOR SETTING UP LOCAL WORKING GROUPS.....	10
I. Characteristics of the LWGs	10
II. Stakeholder identification & characteristics	11
i. Basic features of stakeholder analysis	11
ii. Criteria for selecting participants for the LWGs.....	12
iii. Concrete steps for selecting LWG participants	14
III. Contacting potential participants: steps of a communication approach.....	15
IV. Organisation of the LWG meetings	17
i. Advantages & disadvantages of online & in-person meetings	17
ii. Other practical arrangements regarding LWG preparation	18
V. Possible challenges & constraints	19
C. OPERATIONAL GUIDELINES FOR THE IMPLEMENTATION OF THE PILOT ACTION.....	21
I. The H2MA planning tool	21
i. Tool data parameters	21
ii. Calculation steps for the design & optimisation of routes	22
iii. Preliminary assessment of the tool	23
II. Specification of tasks & responsibilities for the implementation of the LWGs.....	24
III. Implementation steps & indicative agenda of the LWGs.....	25
IV. Challenges and recommendations.....	29
REFERENCE LIST	32
ANNEX I. Invitation letter template.....	35
ANNEX II. Facilitation techniques and tools.....	36

EXECUTIVE SUMMARY

In the context of Activity 2.1 titled “Development of pilot-testing resources guiding partners to set up Local Working Groups (LWGs) and streamline pilot action implementation” the present document contains Guidelines on how to set up and support the operations the LWGs.

In particular, section A serves as an introduction. It presents the H2MA pilot actions that will be implemented in six Alpine territories; LWGs will be set up within the framework of the pilot actions and they will test the H2MA planning tool, with the goal to design green hydrogen routes. Moreover, section A briefly situates Activity 2.1 within the H2MA project as well as within current policy developments related to the use of green hydrogen as a fuel.

Section B discusses and specifies relevant procedures for setting up LWGs. It outlines core characteristics of the LWGs, determines criteria and steps on how to select LWG participants from a broader pool of stakeholders and how to communicate with them and presents advantages and disadvantages of online and in-person meetings (suggesting the adoption of a mixed format); finally, it identifies challenges that H2MA partners might face in setting-up the LWGs and specifies ways to address them.

Section C shifts the focus from preparing, to conducting LWGs. Firstly, it briefly presents the planning tool that will be employed during the LWGs in order to design the green H2 routes. Subsequently, it identifies tasks and roles for LWG participants (H2MA partners and stakeholders alike) and describes their relevant responsibilities. Furthermore, it outlines an indicative agenda and describes concrete procedures and implementation steps of the of the LWG meetings, before concluding with a set of recommendations on how to cope with possible issues that might emerge during the implementation of the pilot actions.

A. INTRODUCTION

I. Outline of the Activity 2.1

H2MA Working Package (WP) 2 consists of the preparation and implementation of a pilot action, in six project territories. “Local Working Groups” (LWGs) will constitute the means to conduct the pilot action; members of the LWGs will originate from a broad range of stakeholders related to the objective of the project, such as public administration bodies, energy agencies, hydrogen refuelling stations (HRS) operators and heavy-duty vehicles (HDV) companies. LWG participants will collectively examine parameters of local green hydrogen supply and distribution networks and will employ the H2MA planning tool in order to design green hydrogen routes. These territorial routes will lead to the formulation of a common transalpine green H2 masterplan.

Towards this broader WP 2 objective, Activity 2.1 has a planning and preparative function. It contains materials/actions that aim to supply H2MA partners with adequate resources for the successful implementation of the pilot actions. In particular, these actions correspond to the two components (deliverables) of Activity 2.1.1: first, the preparation of guidelines on how to set up the LWGs and prepare the implementation of the pilot actions (i.e. the present document); second, the development of a training package that will assist local stakeholders in familiarizing themselves with critical aspects of H2 mobility planning, in view of their participation in the LWGs. These two deliverables are expected to be finalised (independently of each other) at the end of January / early February 2024, i.e. they must have been concluded before the conduct of the pilot action. Regarding the role of H2MA partners, BSC Kranj has assumed the responsibility for preparing the guidelines.

Activity 2.1 is linked to a number of other project activities: first, it will employ and test the “H2MA planning tool” foreseen by Activity 1.5; this tool is expected to contribute importantly in fulfilling H2MA’s goal of promoting hydrogen mobility solutions in the Alpine region. Furthermore, Activity 2.1 is closely related to the other two Activities that jointly comprise WP2; Activity 2.2 is directly dependent on 2.1, as it entails the very conduct of the LWGs and the design of the territorial routes; Activity 2.3 is indirectly though substantially related to 2.1, as it contains the design of a common, transalpine masterplan for green H2 mobility, which will build upon the territorial routes.

II. Description of the Pilot Action

The pilot action refers to testing the H2MA planning tool in order to design territorial green H2 routes; the planning tool will be employed by a LWG that will be set up in each pilot territory (Slovenia, Austria, Lombardy, Upper Rhine Valley, Strasbourg Metropolitan Area and Torino).

Within this project framework, the present Guidelines will assist responsible H2MA partners to organise, prepare and conduct the pilot action in a uniform way. Guidelines specify the procedures for setting up LWGs and outline the way that these will fulfil their role.

Green H2 "routes", which constitute the outcome of the pilot action, essentially refer to *a supply and distribution territorial network* that will form the backbone for the roll-out of green hydrogen in the Alpine area. This green H2 infrastructure network will primarily serve heavy-duty vehicles (HDVs) used in freight and public transport, i.e. primarily trucks and buses and secondarily trains. This transport sector has been identified as a priority for the uptake of hydrogen and this is reflected in the H2MA project.

III. Current policy developments relevant to green H2 mobility

Summing-up some basic facts and recent policy developments related to the HDVs in Europe, this sector is responsible for more than 25% of greenhouse gas (GHG) emissions from road transport in the EU and for over 6% of total EU GHG emissions¹. Moreover, "overall truck mileage is expected to increase by more than 50% by 2050"². Such data – interpreted withing the framework of the EU goals to reduce GHG emissions by 55% by 2030 and reach climate neutrality by 2050 and taking into account that the HDV sector is among those more difficult to decarbonise – have pushed the EU to design policies that factor in the particular features and requirements of the HDV sector. Indicatively, the EU hydrogen strategy³ specifies the HDV sector among those that are more conducive for the rollout of hydrogen. In a more targeted fashion, the European Parliament recently approved a Commission proposal for a new Regulation regarding the CO₂ emission performance standards for new HDVs; under this (forthcoming) EU

¹ European Commission, 14 February 2023, *Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2019/1242 as regards strengthening the CO₂ emission performance standards for new heavy-duty vehicles and integrating reporting obligations, and repealing Regulation (EU) 2018/956*, https://climate.ec.europa.eu/system/files/2023-02/policy_transport_hdv_20230214_proposal_en_0.pdf

² R. Raeesi et al., 2023, "Hydrogen supply chain and refuelling network design: assessment of alternative scenarios for the long-haul road freight in the UK", *International Journal of Hydrogen Energy*, <https://www.sciencedirect.com/science/article/pii/S0360319923018074>.

³ European Commission, 8 July 2020, *A hydrogen strategy for a climate-neutral Europe*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0301>.

legislation, the average CO₂ emissions of the EU fleet of *new* heavy-duty motor vehicles will be reduced by 15% in 2025, 45% in 2030, 70% in 2035 and 90% by 2040; regarding urban buses in particular, new motor vehicles must be exclusively zero-emissions by 2030⁴. In terms of number of hydrogen-powered HDVs, an indicative estimation of the European Automobile Manufacturers' Association (ACEA) refers to 60,000 such trucks by 2030 in Europe⁵.

According to the recently legislated Regulation (EU) 2023/1804 on the deployment of alternative fuels infrastructure ("revised AFID"), only a few countries have deployed hydrogen refuelling points and these are "largely unsuitable for heavy-duty vehicles"⁶. According to online data from the European Hydrogen Refuelling Stations (HRS) Availability System⁷, a total of 183 stations are there across the EU, only 58 appear suitable for HDVs (i.e. at 350 bar). In the Alpine Space area 8 such HRS exist (six of them in Switzerland, one in Italy and one in France)⁸, whereas 4 additional HRS of unknown availability operate there. By way of contradistinction, ACEA estimates that in order to comply with the various EU environmental goals, the EU countries need to reach a target of about 300 truck-suitable HRS by 2025 and at least 1,000 by 2030⁹.

The alternative fuels infrastructure Regulation stipulates that along the TEN-T core network of each member state, a HRS (equipped with at a 700-bar dispenser and with a minimum 1 tonne/day cumulative capacity) should be in place every 200km (at most) by the end of 2030; each "urban node" should also have one HRS. EU countries should accelerate efforts to expanding their HRS network, as the Regulation necessitates the submission of national progress reports regarding this target¹⁰.

⁴ See *Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2019/1242 as regards strengthening the CO₂ emission performance standards for new heavy-duty vehicles and integrating reporting obligations, and repealing Regulation (EU) 2018/956*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2023:88:FIN>; European Parliament proceedings, 21 November 2023, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2023:88:FIN>; Result of votes https://www.europarl.europa.eu/doceo/document/PV-9-2023-11-21-VOT_EN.pdf.

⁵ ACEA, 2021, Heavy-duty vehicles: Charging and refuelling infrastructure requirements, Position Paper, <https://www.acea.auto/publication/position-paper-heavy-duty-vehicles-charging-and-refuelling-infrastructure-requirements/>, p.6.

⁶ Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L.2023.234.01.0001.01.ENG&toc=OJ%3AL%3A2023%3A234%3ATOC>.

⁷ *European HRS Availability System website*, interactive map, <https://h2-map.eu/>, accessed at 5 January 2024.

⁸ Four additional HRS of unknown availability operate at the Alpine space region.

⁹ ACEA, 20 May 2021, "Interactive map – Truck hydrogen refuelling stations needed in Europe by 2025 and 2030, per country", <https://www.acea.auto/figure/interactive-map-truck-hydrogen-refuelling-stations-needed-in-europe-by-2025-and-2030-per-country/>.

¹⁰ Regulation (EU) 2023/1804; see articles 6.1, 15 and Annex. Another relevant provision made in the Regulation (article 24.1) is that by the end of 2024 the Commission shall submit a "technology and market readiness report

Regarding other noteworthy developments at the policy sphere, the Zero-Emission Medium- and Heavy-Duty Vehicles (“Drive to Zero”) campaign was launched in October 2021; today, the accompanying Memorandum of Understanding is signed by 33 national governments (Austria and Switzerland from the Alpine area), a number of subnational governments and tens of representatives from the MHDV sector. Its core targets are 30% new MHDVs being zero emissions by 2030, and 100% by 2040, as to facilitate net-zero carbon emissions by 2050¹¹.

In relation to the Alpine region, a recent detailed study carried out within the framework of the Energy Action Group of the EUSALP, contains interesting findings. Indicatively, according to the views of EUSALP expert stakeholders¹², heavy transportation was mentioned as the “most promising utilization pathway for hydrogen in the Alpine region”¹³. Regarding expected benefits of hydrogen, along with decarbonization, “improvement of air quality was especially mentioned in relation to areas with high transit of heavy-duty vehicles”¹⁴. Road infrastructure” was identified as the core area of action for hydrogen policy; relatedly to this priority, “lack of infrastructure” was rated as the third most important *barrier* for the implementation of hydrogen strategies in the Alpine region, whereas lack of regional coordination in infrastructural planning, especially regarding hydrogen refuelling stations in key transportation routes was among the key policy needs that have to be addressed¹⁵. Such barriers, it should be noted, create certain risks or constraints in relation to the uptake of hydrogen in the Alpine region; after taking into consideration the stakeholder views and assessing various parameters (e.g. total cost per km, energy consumption and capital investment of refuelling stations) the study concludes that the use of H₂ in HDVs emerges as a secondary option, the first being electricity, “due to the worse performance it is expected to deliver in terms of cost-effectiveness and due to the supply chain risks it bears, especially when produced from natural gas”¹⁶.

Thus, the H₂MA project takes place at a juncture that, on the one hand, the necessity of adopting policies and concrete measures related to the use of (clean) hydrogen as a fuel is widely recognised and, on the other hand, hydrogen infrastructure is at a nascent stage (in the

dedicated to heavy-duty vehicles”; *inter alia* this report is expected to specify targets for *liquid* hydrogen refueling infrastructure, which is considered a new technology, suitable for HDVs.

¹¹ *Drive to Zero* website, <https://globaldrivetozero.org/>.

¹² Out of a total of ten stakeholders, most of them are employed in regional energy agencies from ten Alpine regions, previously involved in European projects on hydrogen (UNIBZ, 2022a, *Green Hydrogen for the Alps: A meta-study on renewable hydrogen uses, production, and policy priorities*, <https://www.alpine-region.eu/action-group-9>, p.42).

¹³ UNIBZ, 2022b, “Perspectives for Green Hydrogen in the Alpine region. Results from an Alpine wide study”. https://alpine-region.eu/sites/default/files/uploads/event/2524/attachments/menin_green_hydrogen_perspectives_study.pdf, p.12/

¹⁴ UNIBZ, 2022a, p.46

¹⁵ UNIBZ, 2022a, p.46-8; 2022b, p.10

¹⁶ UNIBZ, 2022a, p.69.

Alpine region and beyond), whereas as a number of questions regarding how hydrogen will become effective at the market level remains open.

In this sense, the pilot action foreseen in H2MA WP2 represents an opportunity to showcase how green hydrogen can be used in heavy-duty transport and how transnational coordination in infrastructural planning can be achieved.

B. PROCEDURES FOR SETTING UP LOCAL WORKING GROUPS

I. Characteristics of the LWGs

Each LWG will be composed of the responsible H2MA partner and local stakeholders. LWGs will have a hybrid character, as they will combine elements of a “working group”, which typically have “problem-solving” character, and “stakeholder meetings”, which primarily aim to engagement and consensus-building. In particular:

- **“Mission”:** the purpose of setting up the LWGs is to design territorial green H2 routes by employing the planning tool. Hence, H2MA LWGs have primarily a task-specific character that resembles the one of a “typical” working group. At the same time, the development of a shared understanding (around H2 mobility, in this case), which is a feature of stakeholder meetings, should be seen as a prerequisite in producing this concrete output. It is suggested that in developing the routes, LWG conduct their meetings in a way that is based upon consultation and sharing of information through a collaborative framework, usually features of stakeholder meetings.
- **Composition:** LWGs will integrate participants from categories that are typically represented in stakeholder meetings and working groups. In particular they will include groups that have an economic/policy/political interest in the development of green H2 transportation routes (i.e. “stakeholders”, as specified below) *and* experts, professionals and practitioners from the broader hydrogen mobility field (i.e. categories that usually staff working groups).
- **Schedule & mode of conduct:** Again, LWGs combine the “project-specific” logic of the working groups with the collaborative character of the stakeholder meetings. In addition to the kick-off, transnational meeting, it is suggested that LWGs may conclude their task within a total of three (3) meetings; depending on the engagement, expertise and economic/policy influence of the stakeholders in a partner’s country, one (1) meeting might be sufficient. In any case, it is expected that LWGs will be able to complete their task within a two-month timeframe. At the same time, their testing character adds some flexibility in their exact duration and mode of conduct; it is suggested that in developing the routes LWGs conduct their meeting(s) in a way that is based upon consultation and sharing of information.

All points made above are further discussed in various subsections below.

II. Stakeholder identification & characteristics

i. Basic features of stakeholder analysis

“Stakeholder analysis” probably constitutes the most appropriate generic label to describe the systematic attempt in examining the character, the motives and the potential impact of stakeholders in various projects, policies or processes. A classic, broad definition of “stakeholders” understands them as groups or individuals that “can affect or be affected by the achievement of an organisation’s objective”¹⁷ or, even more broadly, by the effects of any process or development (e.g. climate change). Similarly, stakeholders can be understood as all “interested parties”¹⁸.

Various criteria have been employed in order to identify diverse stakeholders and involve them in a project. Indicatively, stakeholders may be categorised according to the distinct *function* they perform in relation to the objective, process or project at hand; in cases of projects that cover a large and/or geographically heterogeneous area, the criterion used to identify diverse stakeholders might be *geographical*; expert or technical *knowledge* can be a further criterion for identifying stakeholders, as well as the position they have within a given organisational *hierarchy*¹⁹.

Quite often, a combination of criteria is employed in order to obtain a more complex mapping of stakeholders. An often-used simple typology of stakeholders is based on the combination of two dimensions, “power” and “interest”. The intersection of high and low values of these dimensions leads to a fourfold typology of stakeholders (e.g. “high power / high interest”, “low power / high interest” and so on). An alternative simple typology is based on “interest” and “attitude”, the latter dimension referring to whether a stakeholder supports or opposes a given objective (project, policy, etc)²⁰.

The above brief presentation suggests that emphasis may be given to one stakeholder dimension over the other(s), depending on the features of a project or objective; relatedly, the

¹⁷ R. K. Mitchell et al., 1997, “Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts”, *The Academy of Management Review*, 22(4): 856-858, <https://www.jstor.org/stable/259247>; L. C. Ballejos & J. M. Montagna, 2006, “Stakeholders Selection for Interorganizational Systems: A systematic Approach”, in IFIP International Federation for Information Processing, Volume 214, *The Past and Future of Information Systems: 1976-2006 and Beyond*, Avison, D., Elliot, S., Krogstie, J. & Pries-Heje, J. (Eds), Boston: Springer, p. 39, https://link.springer.com/chapter/10.1007/978-0-387-34732-5_4.

¹⁸ K. Schmeer, 2000, *Stakeholder Analysis Guidelines*, Policy Toolkit for Strengthening Health Sector Reform, https://www.researchgate.net/publication/265021546_Stakeholder_Analysis_Guidelines.

¹⁹ Ballejos & Montagna, 2006, p.42-43.

²⁰ R. Murray-Webster & P. Simon, November 2006, “Making Sese of Stakeholder Mapping”, *PM World Today*, VIII:11, https://www.researchgate.net/publication/265653139_Making_Sense_of_Stakeholder_Mapping.

characteristics of the particular sector that a project falls within (e.g. RES, heavy-duty transport) might render certain stakeholder dimensions more relevant than others.

ii. Criteria for selecting participants for the LWGs

Based on the above overview, it becomes evident that the objectives of the present H2MA pilot action and the “hybrid” character of the LWGs will guide the identification of the stakeholders that will participate in the LWGs. To start with, candidate participants should *prima facie* satisfy the broad definition of a “stakeholder” as presented above; they should be easily identified as “interested parties”, i.e. as actors that “can affect or be affected” by the development of green H2 mobility routes.

Among the various dimensions discussed above, *function* appears to be the most relevant criterion. Firstly, green hydrogen is a novel technology/application and, as such, its development necessitates the synergy of various sectors. Secondly, the features of green hydrogen (e.g. its direct relation to RES) and the specific parameters of the H2MA pilot action (e.g. its emphasis on heavy-duty transport) create the need to include stakeholders from different sectors. On this premise and despite the fact that territorial particularities might influence the makeup of each LWG, the inclusion of representatives from the following seven sectors is advisable:

- a) *Regional administration* (officials from the transport, energy and environment units/agencies of the regional/local government); as the design of green H2 routes has a territorial character, the inclusion of local administration bodies which have regulatory authority in the specified sectors is necessary. Their inclusion, furthermore, is meant to offer some guarantee for the protection of the broader public interest in the design of the green H2 routes.
- b) *National administration* (at least one representative from the relevant ministry/ministries and/or the relevant national authority that will review the territorial green H2 designs); given the prominence of national governments in the regulation of the energy sector at large, as well as the consensus that national strategies and policies constitute a key driver for accelerating the roll out of green hydrogen²¹, it is suggested that representatives from the relevant national authorities are invited to participate.
- c) *Representative of the national transmission system operator* (if not included in the previous group).

²¹ This view is also shared by H2MA partners, as showcased in their replies to the questionnaire relevant to Activity 1.4 (see the relevant discussion in section A of D 1.4.2).

- d) *Representatives of public and private energy suppliers*; this sector is/will be largely responsible for the storage, transportation and distribution of green H₂, and perhaps the operation of hydrogen refuelling stations (HRS), thus their role will be crucial for the development of the supply and distribution network that will support the routes.
- e) *Representatives of the heavy-duty vehicles sector* (e.g. automotive industry, transport companies, logistics companies); the need to secure their contribution for the commercial uptake of green H₂ as a fuel as well as their insights on logistical aspects of the operation of a HDV fleet render essential their inclusion in the LWGs.
- f) *Representatives of RES producers*; green H₂ needs to be produced by renewable sources (primarily wind and solar power) and this constitutes the entry node of the supply and distribution network.
- g) *Representatives from universities and/or research institutes* (active in the field of hydrogen, RES and transport); given the rapid developments related to green H₂ technologies, the “highly” technical character (of at least certain aspects) of hydrogen supply chains and the very “pilot” character of designing territorial green H₂ routes in Alpine regions, their capacity to transfer insights and make suggestions from the scientific knowledge currently produced constitutes their inclusion highly demanded.

Subsequently, as the primary objective of the pilot action is to design green H₂ routes, a level of technical/expert *knowledge* related to green hydrogen, RES and/or heavy-duty transportation is in principle considered a relevant criterion to guide stakeholder identification. The fact that green hydrogen only now starts to enter the relevant market and that hydrogen infrastructure is at a nascent stage reinforces the innovative character of the H₂MA pilot action and further justifies the prioritisation of this criterion. Although *direct* expertise on green hydrogen is generally limited, groups or individuals that lack a basic background, in terms of knowledge or experience that will enable them to *easily develop an understanding* of green H₂ mobility and supply chain, would not seem suitable candidates for members of the LWGs.

Regarding other dimensions or criteria for stakeholder identification mentioned above, “power” (or “influence” or “hierarchy”) seems of most relevance. Numerous studies have shown that certain stakeholders (e.g. commercial interests, especially large companies) tend to be over-represented in multi-stakeholder initiatives²². Based on this insight, certain stakeholders appear more able to exert influence on the design of territorial green H₂ routes, primarily due to their mere size and/or the scope of their business activities. However, the very nascent character of green hydrogen and the relatively small area covered by each pilot territory can be considered as factors that will mitigate the development of power differentials

²² M. Eikelenboom & T. B. Long, 2023, “Breaking the Cycle of Marginalization: How to Involve Local Communities in Multi-stakeholder Initiatives?”, *Journal of Business Ethics*, 186: 32, 34, <https://link.springer.com/article/10.1007/s10551-022-05252-5>.

among stakeholders. In any case, H2MA partners that will organize LWGs are advised to consider this dimension when identifying stakeholders.

iii. Concrete steps for selecting LWG participants

Key points from the above discussion can be converted to a concise set of steps that may be used by H2MA partners in order to identify participants as follows:

- 1) First, H2MA partners may use the aforementioned list of seven stakeholder groups to draw upon. Thus, the criterion of function will be used as a starting point. **For each group, H2MA partners are advised to develop a list of priority stakeholders**²³. Given the local character of the pilot working groups and the concrete character of the stakeholder groups, it is expected that no severe problems in identifying particular stakeholders will be encountered; however, subsection (V) below identifies possible difficulties in identifying relevant stakeholders and suggests ways to overcome them.
- 2) The criterion of “knowledge” will be applied as a first filter. This should not be applied in a strict sense, as discussed above. As a way to streamline this process, potential **participants should be classified by H2MA partners in a simple three-grade scale**, i.e. low, medium and high levels of knowledge²⁴. Those classified as having a “high” level should be prioritized, those having a “low” level should be omitted from the list and those with a “medium” level should be contacted only in case stakeholders from the “high” level category are unwilling/unavailable to participate at the LWGs.
- 3) A second filter to be applied refers to the criterion of “power”. H2MA partners should classify potential participants according to the level of power or influence they are considered to “hold”; this can be done firstly within each sector, where applicable (e.g. classification of stakeholders from the energy suppliers’ sector). Similarly with the previous filtering process, a simple scale of three levels of power (low, medium, high) can be employed by H2MA partners. In contrast with the knowledge criterion, however, no particular grouping should be prioritized. Instead, attention should be given **to ensure as far as possible a balanced LWG “roster”** and avoid ending up with a LWG composition where one or more participants are possible to have excessive levels of influence, due to their size or because they retain hierarchical or dependency relations with other participants.

²³ Schmeer, 2020.

²⁴ Schmeer, 2020.

III. Contacting potential participants: steps of a communication approach

After finalising the list with potential participants, H2MA partners will need to begin communication with potential participants early in advance and have in place a specified communication approach (set of actions) for *contacting potential participants and achieving their involvement* in the action.

Typically, stakeholders may be contacted through face-to-face meetings, official letters, emails and phone calls. Each of these methods has pros and cons²⁵. Selecting a method or a combination of methods generally depends on a number of variables, such as the availability of time, the sufficiency of personnel (in the responsible organisation) or the specific characteristics of potential stakeholders. In any case, it is advised that H2MA partners **appoint a “communications coordinator”**, i.e. employee that will be responsible for making the initial and follow up communications with potential participants.

Regarding the organisation of the H2MA pilot action, two features seem to influence more the selection of communication methods: first, the need to prepare and implement the LWGs in a relatively short timeframe (2-3 months); second, the local/territorial character of the action, which implies the existence of communication channels, something that facilitates participation.

Considering these contradictory features, a combination of methods based on the **formula “call, write, call”**²⁶ is recommended to H2MA partners. As a general outline, the sequence and content of relevant steps (i.e. the “communication approach”) could be the following:

- 1) Phone calls should be made to prioritised stakeholders. to inform them on basic features of the H2MA project (e.g. focus on green H2 in the Alpine area, EU funding) and the pilot action itself; they should also be informed (or their consent should be sought) on the intention to send them a formal invitation letter through email that will provide with more detailed information. In case certain stakeholders outright reject their participation, phone calls should be made to those next in the priority list. If feasible, those potential participants whose participation is deemed more essential could be contacted via face-to-face meetings.
- 2) An email will then be sent to those stakeholders that have expressed an interest in participating at the LWGs. An invitation letter will be attached to the email. The invitation letter should include a one-paragraph outline of the H2MA project, situating it within the rising significance of green hydrogen as a transport fuel. Another paragraph

²⁵ For example see *Community Tool Box*, “Section 3. Methods of Contacting Potential Participants”, <https://ctb.ku.edu/en/table-of-contents/participation/encouraging-involvement/contact-participants/main>.

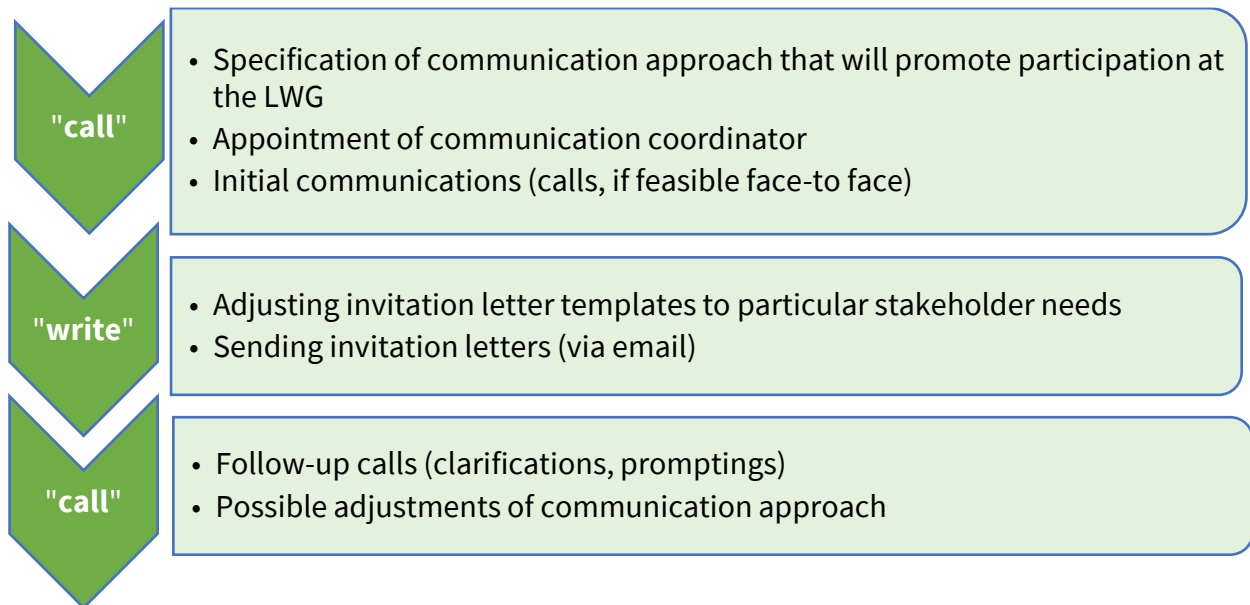
²⁶ *Community Tool Box*.

should describe the pilot action, e.g. regarding the H2MA planning tool and the collaborative process to be employed in the LWGs. This succinct invitation letter should primarily seek to attain its goals, i.e. to persuade stakeholders to participate in the LWGs. To this end, the letter should try to answer the questions “what can stakeholders contribute to the LWGs?” and “how can they benefit from their participation?”. Such arguments are suggested below in subsection B.V; these arguments are also included in **an invitation letter template to be found in the Annex.**

- 3) After sending the invitation letter, H2MA partners could make “reminder” phone calls to the stakeholders, e.g. to verify they have correctly received the invitation letter; more importantly, calls should be made a few days after sending the invitation letter (e.g. one week after), in case a reply has not been received. This phone call will be an opportunity to offer clarifications and make promptings to stakeholders that remain ambivalent.

The above-discussed suggestions regarding communication with identified stakeholders, in order to shape the composition of the LWGs, is summarized in the following figure.

Figure 1. Proposed communication approach.



IV. Organisation of the LWG meetings

Whereas responsible H2MA partners should begin the organisation of the LWGs from early on, it is advised that certain issues, such as the ones discussed in this subsection, are discussed with potential participants, at least with those that will have confirmed their participation; having such feedback will facilitate decisions and will enhance the successful implementation of the LWGs.

i. Advantages & disadvantages of online & in-person meetings

Most issues related to “practical” aspects of LWG organisation depend on whether the meetings will be held *in-person, online or will have a hybrid / mixed character*. The present subsection briefly presents advantages and disadvantages of the former two modes; it is suggested that LWG organisers make their choice by taking into account this discussion and adjusting it to their own needs, capacities, territorial particularities and preferences.

Regarding online meetings, the H2MA partnership has decided that the first LWG meeting, where the tool will be presented to all LWG participants, will be transnational and online in character. Among the advantages of online meetings is their flexible character; this might be appealing to stakeholders and therefore can promote participation at the LWGs. The cost-effective (lack of venue, transport, accommodation, catering, equipment, etc costs) and time-efficient character of online meetings is, moreover, an important advantage.

Nevertheless, certain issues need to be addressed if an exclusively online format is decided. Indicatively: it will have to be guaranteed that LWG participants have high-speed internet; a brief and clear set of technical instructions might have to be prepared and sent to the participants; a member from the H2MA partner team should be standby before and during the meetings, ready to resolve technical issues and address possible queries related to the tool and otherwise assist at a technical and user level the conduct of the online meetings.

Regarding face-to-face meetings, they offer a more conducive environment for enhancing interpersonal communication and interaction. This strengthens synergies and facilitates the implementation of collaborative processes such as consultation and brainstorming (which are expected to take place in the LWGs). Moreover, networking opportunities and the development of long-standing professional ties are expected to be easier in a face-to-face rather than online environment²⁷. More specifically regarding the H2MA pilot action, its local character mitigates the cost- and time-related drawbacks mentioned above. Moreover, given that a core feature of

²⁷ *Eric.ai*, 16 February 2023, “In-person Vs Virtual Meetings - 4 Things To Consider”, <https://www.eric.ai/blog/in-person-vs-virtual-meetings>.

the pilot action is to test the planning tool, i.e. a new program, and possible clarifications on its functions will be requested by LWG participants, conducting face-to-face meetings will expedite this process.

In case that H2MA partners decide to conduct the LWG meetings through a face-to-face format, a number of related issues will have to be addressed. Most of them refer to the selection of venue, which will have to fulfil various requirements. Indicatively, the venue should: be easily accessible to LWG participants; be able to accommodate the foreseen number of attendees; be equipped with high-speed internet, audio-visual and digital conferencing equipment (necessary at least for the first “transnational” meeting. Limited availability of adequate venues might arise for the period under consideration; thus, booking arrangements should be made as early as possible, Moreover, transport and accommodation arrangements might have to be made for those participants who will travel a long distance.

Adopting a mixed/hybrid character mode of conduct represents a way to combine the positive features of the two methods and balance out their drawbacks. It could be a viable option if the event is integrating lectures and discussion. However, in the case of H2MA LWGs that involve coordination of material that may exist in both digital and written form could be challenging; besides, technical issues might disturb communication flow. Thus, it is recommended that LWG organisers avoid the hybrid option and select between in-person or online mode, as aforementioned.

ii. Other practical arrangements regarding LWG preparation

Other issues that have to be addressed at this initial preparatory stage refer to scheduling and communication arrangements. H2MA partners should write down an indicative schedule of the meetings and circulate it to certified LWG participants for feedback. A concrete meeting agenda might be difficult to define at this point, however an indicative number of meetings and possible dates should be part of this preliminary schedule. **An average of, indicatively, three (3) LWG meetings**, excluding the first one that will be held at a transnational basis, are adequate for concluding the design of the green H2 territorial within a period of about two months. Furthermore, following the finalisation of the list of LWG participants, H2MA partners should make sure to update them regularly and promptly on all relevant issues, in order to keep them engaged and informed.

V. Possible challenges & constraints

This subsection discusses challenges that H2MA partners may face during the preparation of the pilot action; potential problems and obstacles are described and then possible ways to address them are briefly presented and discussed. Issues that might emerge *during* the conduct of the LWG meetings and refer to their content and processes are separately discussed at the following section (subsection C.IV).

Table 1. Possible challenges in preparing LWGs & ways to address them

Possible challenges	Discussion & suggestions
Identifying stakeholders	<p>In case that certain difficulties in or in case prioritised stakeholders decline up front their participation:</p> <ul style="list-style-type: none"> - H2MA could apply the “snowball technique” logic, i.e. contacted stakeholders could be asked to provide the name of at least another potential participant (i.e. another hydrogen user or RES producer). - If graver difficulties emerge, H2MA partners could contact established experts in any given sector that will help them identify potential participants.
Lack of interest	<p>Despite their relevance to issues of hydrogen mobility, stakeholders might question if it is worth participating in a project that, even if perceived as worthy, is expected to bear results not in the short term; stakeholders with some knowledge of current scenarios on hydrogen use, which project a commercial uptake after 2030, might consider nonconsequential or premature their participation. Stakeholders that are primarily concerned about the concrete benefit of their organisation, might express their reservations in terms of this premature character of the pilot action.</p> <p>H2MA partners will need to muster arguments from their participation in the project (and its various documents) to address this kind of reservations. They could highlight, for example, that:</p> <ul style="list-style-type: none"> –precisely in order for clean hydrogen to be widely used as a fuel, the existence of the relevant infrastructure (such as this related to the territorial routes) is an absolute prerequisite and that, in

	<p>general, pilot and testing activities are necessary early stages for every successful technology;</p> <ul style="list-style-type: none"> – activities such as the H2MA pilot action will pave the way for (or form synergies) larger-scale initiatives, such as Hydrogen Valleys; – participating in this pilot action will enable them to gain a better understanding of the prospects of hydrogen in their region, which will help them acquire valuable information for designing their future actions or will even enable them to see their particular needs/interests integrated in this attempt that will possibly set the regional scene for hydrogen; – they will have the chance to familiarise with an innovative tool, which they will be able to use outside H2MA (for their own ends); – they will have the opportunity to build new connections or strengthen existing ones.
<p>Limited time availability</p>	<p>A common concern among potential participants at working groups/stakeholder meetings is their (anticipated) time-consuming character. To an extent, stakeholders make this assessment in relation to the expected utility or the urgency of the issue to be examined, in the sense that involvement in objectives of high interest to them is less likely to be characterised as “unproductive”; hence, the aforementioned ways to address possible stakeholder concerns about the importance, urgency and/or utility of the LWGs apply to this aspect as well.</p> <ul style="list-style-type: none"> - Focusing on more “practical” concerns about time availability, which could be related to a heavy schedule, limited personnel, etc, the conduct of the meetings exclusively online is an apparent way to respond to such concerns (as discussed). - Furthermore, a detailed meeting’s agenda and its communication to the participants early on, as well as the setting of a “tight” meeting schedule (e.g. not exceeding 3 hours per meeting) constitute standard ways to meet such stakeholder concerns. - A more flexible schedule format could be an alternative approach; in this case the meetings schedule would not be set in advance but decided by the LWG participants on a step-by-step basis according to their time availability. It is suggested that this option is pursued with extreme caution, however, as the pilot action might be excessively prolonged, thus potentially disrupting the H2MA workplan.

C. OPERATIONAL GUIDELINES FOR THE IMPLEMENTATION OF THE PILOT ACTION

I. The H2MA planning tool

As aforementioned, the H2MA pilot action aims at designing territorial green H2 routes through the employment of the planning tool. The H2MA tool is computer program that will rely on data to visualise and calculate green hydrogen infrastructure and possible routes at a (primarily) territorial level, i.e. for each H2MA region. A transnational online meeting is scheduled to take place with the objective to present the tool and the way to use it to all H2MA partners and the LWG participants. However, since the present subsection covers aspects such as the conduct of the LWGs, their steps and indicative agenda, a brief outline of the tool's core components and logic is necessary. This outline is based on information that is available to H2MA partners through relevant project documents (such as D 1.5.1) and the recently issued initial ("alpha") version of the tool and the accompanying Guidelines document.

i. Tool data parameters

The tool relies on the data that each partner has collected and sent to the developer of the tool. Data parameters that H2MA partners collect in relation to their territory *include*:

- maps of their region and its subregions (sub-areas)
- population statistics and GDP per capita of the region
- road networks, including TEN-T networks
- (natural gas) pipeline networks
- HRS (subregion, geographic coordinates, dispensing capacity [kg per day], dispensing pressure [350 or 700 bar], expected vehicle types that will be served [passenger cars, trucks or both], possible connection with a H2 production plant, status [existing or planned], distance from TEN-T network)
- Hydrogen production facilities (subregion, geographic coordinates, production capacity [e.g. kg/day], production type [e.g. *green* hydrogen], installed electrolysis capacity, electrolysis type [AEL/PEM], connection with RES plant, connection with HRS, operation status [existing or planned], operator)
- RES profile
- Vehicle stock (passenger cars, light duty trucks, medium duty trucks, HDVs, trailers, buses)

- Average mileage per vehicle, by vehicle category (passenger cars, HDVs, etc).

H2MA partners were expected to supply information on such data parameters in shapefile or excel format. These files constitute the “input” that the tool is based on in order to visualise the current situation and calculate the optimal green H2 routes (*see below*). Hence, the availability, richness and accuracy of the data supplied by the partners constitutes an essential factor for the “performance” and the helpfulness of the tool.

ii. Calculation steps for the design & optimisation of routes

Regarding the functions and components of the tool, it initially depicts essential information of the “current situation” of *an individual H2MA region*, namely the location of existing *and* planned HRS and hydrogen production facilities. The existing TEN-T network and the broader road network of the region are moreover included in this geographic visualisation.

The first step of the tool is to *define the scenario(s)*, i.e. to determine these data parameters and their values that will be used to design green H2 routes. The values of a first set of data parameters are prefilled based on the information uploaded by the partners, e.g. the vehicle stock in the region (number of HDVs, buses, etc). The values of a second set of data parameters are prefilled based on the current state of affairs; for example, the value of *hydrogen consumption* per vehicle category (kg/100km) or the *capital and operational cost* of green hydrogen production components are given by the tool. However, the values of these two sets of data parameters may be manually altered or updated by the users of the tool. The values of a third set of data parameters relies solely on the specification or the selection made by the users of the tool themselves; these include the hydrogen delivery modality (pipelines or trucks) and the share of hydrogen-power vehicles (FCEVs) in each vehicle category (e.g. 5% of HDVs are hydrogen-powered, 2% of buses, etc).

The second step of the tool refers to the *computation of hydrogen routes*; this involves various layers (or “sub-steps”). A first one contains a calculation of the hydrogen demand for the entire region; taking into account that certain subareas are expected to have greater demand for hydrogen than others (e.g. because of a TEN-T corridor), these differentiated demand projections are also visualised on a subarea basis²⁸. The next sub-step is to initialise the scenario-building; based on the previous specification of data parameters multiple scenarios

²⁸ The division of a territory to smaller areas is considered a standard technique in the design of hydrogen supply chain networks; it is highly conducive to the spatial character of such designs and facilitates the goal of optimisation, most importantly the identification of candidate site for establishing hydrogen production, storage and refuelling facilities (L. Li *et al.*, 2019, “Hydrogen supply chain network design: An optimization-oriented Review”, *Renewable and Sustainable Energy Reviews*, 103, <https://hal.science/hal-02300029>, p.36; Raeesi *et al.*, 2023, p. 5).

will be generated. The following sub-step is to start the optimisation of the network; by selecting the relevant command, the tool calculates the optimal scenario²⁹. In particular, it identifies and visualises *optimum locations* for the establishment of green H2 production sites and HRS; based on these two crucial components of the hydrogen network it moreover visualises a (proposed) *hydrogen delivery route*.

iii. Preliminary assessment of the tool

It is expected that the “experimentation” with alternative parameter *values will be at the core of the activities of the LWGs*; by changing the values of the input parameters (e.g. delivery mode, share of hydrogen-powered vehicles, etc), alternative scenarios and routes will be produced.

This will significantly facilitate H2MA partners and stakeholders to contemplate future hydrogen mobility scenarios; for example, if the share of FCEVs in HDVs reaches 10% in 2030 and 20% in 2035, and/or electrolysis cost declines by 10%, how this will be reflected in hydrogen demand in their region and what number of HRS and production sites will this necessitate?

By way of preliminary assessment, it can be argued that the H2MA integrates various components of hydrogen supply chain networks (HSCN) designs. Indicatively, one of its primary objectives is *to align hydrogen infrastructure with demand*. Moreover, it combines elements of what have been defined as “strategic” and “tactical” planning, as it takes into consideration alternative options regarding the location and capacity of hydrogen facilities and the delivery means, as well as the market share of FCEVs (which is considered a major uncertainty regarding the design of HSCNs) in order to determine “the most efficient approach to fulfil demand forecasts”³⁰. Furthermore, by focusing on the optimisation of hydrogen routes, the tool puts at its core the “location/routing problem” of HSCN designs, which has been identified as *a key issue to be addressed in planning hydrogen mobility*³¹.

Finally, the above discussion is based (as mentioned) on the alpha version of the tool; certain upgrades and improvements are planned to be made, therefore the tool is expected to assist green H2 mobility planning in an even more elaborate and efficient way.

²⁹ Ideally, one optimal scenario will be produced; however, when one parameter is slightly changed another version of the scenario is generated.

³⁰ Li et al., 2019, p.20-21, 29.

³¹ Li et al., 2019, p.41.

II. Specification of tasks & responsibilities for the implementation of the LWGs

After having concluded all (or most) preparatory and planning steps presented in section B and being informed on the basic features of the H2MA planning tool, H2MA partners will need to consider various aspects and make arrangements regarding the very implementation of the pilot action. Specifying and allocating tasks and responsibilities that will be assumed by the H2MA partners, as well as possible roles and ways of engagement for LWG participants, constitute core components of these arrangements. The following table includes a basic set of such issues that need to be addressed – or at least be explicitly identified ahead of the start of LWG meetings – by the H2MA partners.

Table 2. Tasks & responsibilities for LWG organisers & participants

Task/role	Related responsibilities
Coordination	One or more employees/associate of each local pilot action organiser will need to assume the role of coordinator of the LWGs. The coordinator(s) will be responsible for: organising and moderating the meetings, defining and communicating clear objectives from the outset of the pilot action, compiling and communicating to the participants a short list with keys points/issues addressed at each meeting. Importantly, the coordinator(s) will be responsible for compiling a summary report of each meeting, which will also facilitate implementation of H2MA Activity 2.2.
Scheduling and specification of the agenda	Having a preliminary schedule of the LWG meetings before the first meeting is important; some flexibility to accommodate participants' needs should be granted, provided that the requirements regarding the pilot action duration are respected. This “scheduling” task falls upon the H2MA partners, again. Concrete details of scheduling depend on the meetings format that will have been decided (in-person, online or hybrid; <i>see also subsection B. IV</i>). A set of steps that will lead to the design of the green H2 route and an indicative agenda are also components of this task, which are detailed below in subsection C.III .

<p>Background/technical information</p>	<p>Sufficient information on H2 mobility planning in general, as well as guidelines on the use of the tool should be made available to the LWG participants. <i>This task primarily corresponds to Deliverable 2.1.2 (i.e. the “training package”) of the present Activity.</i> Within the scope of this task also lies the provision of feedback regarding the use of the tool; thus, an employee/associate of the H2MA partner, possibly one that will have been involved in the preparation of the training package, should assume this role (as mentioned in subsection B.IV).</p>
<p>Stakeholders’ roles</p>	<p>The meaningful implementation of the LWGs necessitates the active involvement of the stakeholders. To this end stakeholders should assume particular responsibilities.</p> <ul style="list-style-type: none"> – Each participant will be asked to share basic information from his/her knowledge background or experience on this area and make a number of suggestions regarding the green H2 routes, which will be then discussed with other LWG members. – This “brainstorming” process may be take place in subgroups; in this case, participants in each one of them should assume the roles of “coordinator” and “rappporteur” (at the plenary meetings).

III. Implementation steps & indicative agenda of the LWGs

This subsection includes a delineation of steps that will enable the LWGs to design the territorial green H2 routes. This **essentially amounts to an outline of the (indicative) agenda**. Regarding their mode of conduct, meetings should be **interactive and collaborative** and should facilitate discussions to gather insights, ideas, and concerns from stakeholders.

“Transnational” meeting: As aforementioned, the conduct of a transnational meeting has been agreed by the H2MA partners, to be held before the implementation of the pilot action in the six territories.

- Hence, main topics of this meeting is a presentation of the tool and its components, a demonstration of the scenario-building and optimisation processes and a “Q&A” session in order to provide with clarifications.

1st LWG meeting: The first meeting will have an introductory character. LWG members are encouraged to discuss their ideas on optimal ways to enhance the collaborative character of the meetings. Possible topics related to the implementation of the LWGs that will be addressed and discussed include the following:

- *A short overview of the H2MA pilot action and the LWG main objective (design of territorial green H2 routes with an eye to their integration to a common, transalpine mobility H2 masterplan).*
- *An overview of the territorial data uploaded to the tool. Possible questions regarding the accuracy, availability and sufficiency of the various data parameters should be discussed.*
- *Provision of simple guidelines to LWG participants on how to present their insights on their field of expertise/experience (including suggestions on how to address data availability/accuracy) at the next meeting.*
- *Mode of preparation and elaboration of the scenarios. The first option refers to the up-front preparation of 1 or 2 scenarios by the H2MA partners; parameters may be discussed and modification made by the LWG participants. The second option refers to the joint preparation of the scenarios, initiating the dialogue from the beginning within the LWGs.*
- *Creation and characteristics of LWG subgroups. A further decision can be made by the LWGs on whether their work can be organised in **subgroups**. These subgroups could have a “*thematic*” character (i.e. comprised of members with similar areas of expertise), something that will lead them to focus on particular dimension(s) of the H2 route; alternatively, they could have a “*cross-functional*” character (i.e. comprised of members with diverse expertise), in which case they may test in less depth, but in full scope alternative green H2 routes. Of course, a combination of both alternative modes of work may be decided. Moreover, possible adjustments of “practical” aspects may be discussed; depending on the selected format (in-person or online), such issues might include time availability and technical issues.*

2nd LWG meeting: The second meeting should focus on the first testing of the tool that will lead to the specification of at least one “candidate” green H2 route (suggested timeframe: 2030).

- A first round of “runs” of the tool may be performed with data parameters corresponding both to present conditions and presumed 2030 conditions; their results may then be discussed in the “plenary” of the LWG.
- Subsequently, elaboration and testing of different assumptions regarding input parameters may continue in the plenary or in the subgroups.

- Having discussed alternative and parameter values, a second round of scenarios can be run in the plenary, where each subgroup “rapporteur” will present 2-3 key insights/suggestions. If the majority opinion among LWG participants is that the “optimised” route is unsatisfactory, a new round of discussion/testing may be repeated that will lead to a new run of scenario definition and optimisation. The end result should be one or, alternatively, a small number (2-3) of optimised territorial green H2 routes for 2030.

A variable that is critical for calculating hydrogen demand and the location of HRS and green hydrogen production facilities, is the projected share (penetration level) of FCEVs. LWGs should experiment with alternative assumptions regarding FCEV share, especially regarding heavy-duty trucks, buses and medium-duty trucks³². Besides their own knowledge and access to local data, LWG members may be assisted by the various forecasts regarding the projected hydrogen share in HDVs in various timeframes (most usually 2030, 2040, 2050); *a set of forecasts are presented in H2MA D.1.4.2* (“Scenarios forecasting the maturity of green HYDROGEN production and distribution in the Alpine space”, pp. 56-57). Based on such projections, LWGs may run different scenarios based on an “optimistic”, a “conservative” and a “moderate” value of hydrogen share. A similar approach can be applied in relation to green H2 production cost values (electrolysis, RES production cost).

3rd (final) LWG meeting: The final meeting could include the following sessions:

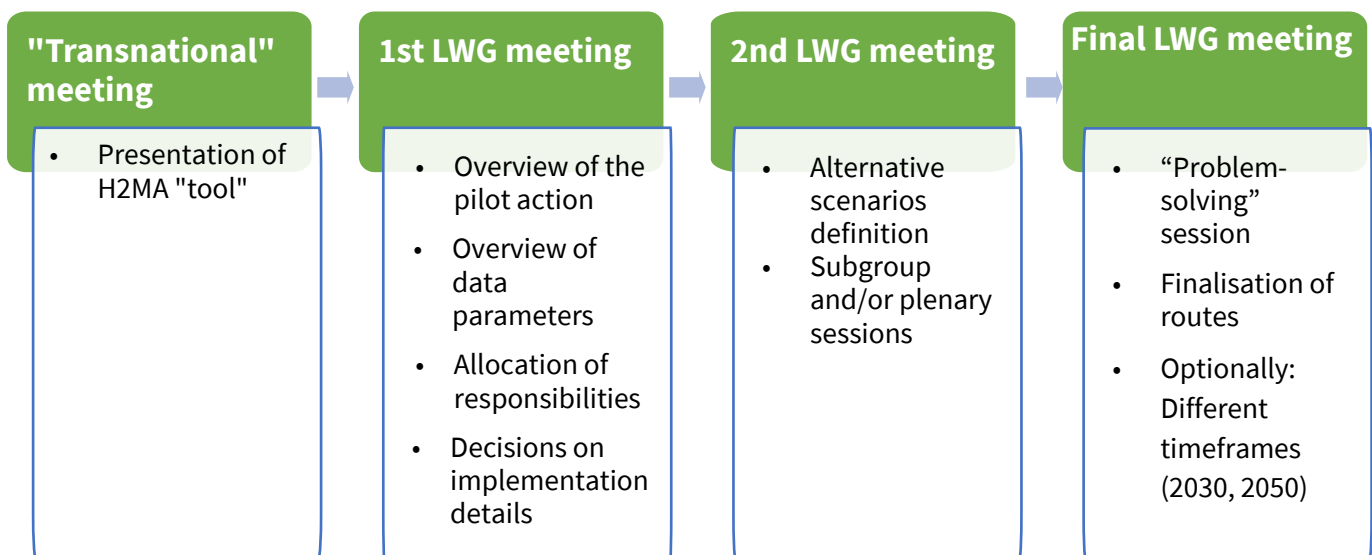
- A joint “*problem-solving*” session may precede the final specification of routes, where LWG members will discuss potential challenges, problems or broader issues regarding the design of the routes and will attempt to find solutions. Certainly, a number of inadequacies and flaws might persist (e.g. due to non-availability of data), despite efforts to solve problems and identify the optimal route; however, LWG should *explicitly identify* these shortcomings or areas in need of further improvement.
- A *final round* of scenario optimisation should be performed, based on the best available specification of the various data parameters. Moreover, although the formulation of a common, transalpine green H2 masterplan is the objective of a different H2MA activity (2.3), it may be advisable that each LWG includes in the assessment of alternative routes the aspect of hydrogen connectivity with other (Alpine) regions.
- Additionally, LWG participants may experiment with scenarios regarding alternative timeframes, e.g. 2050, based on the available data regarding the current situation and taking into account various forecasting scenarios. This may be done *on an*

³² During the subsequent Activity 2.3 alternative assumptions can come up during the peer reviews, i.e. through the comparison of localisation, distribution and production plans in neighboring countries.

optional basis either through the conduct of additional LWG meetings or individually by LWG participants themselves.

To ensure the successful implementation of the LWG meetings, it is important for organising partners to employ appropriate facilitation techniques and tools to maximise participation, manage conflicts that may arise, and foster active collaboration. **Organising partners can refer to ANNEX II for an indicative selection of facilitation tools and techniques** they can use during the LWG meetings.

Figure 2. Steps & main thematic topics of LWGs



IV. Challenges and recommendations

This final subsection of the present Guidelines discusses challenges that LWG participants, including the H2MA partners, will potentially encounter during the design of the territorial green H2 routes and recommendations to address them.

Table 3. LWG implementation challenges & how to address them

Possible challenges	Discussion and suggestions
<i>Difficulties in employing the H2MA planning tool</i>	The tool appears to be simple and straightforward in its use. However, certain LWG participants may still face difficulties when using it. The conduct of the transnational online meeting represents a way to forestall or mitigate the emergence of such issues. In case this problems permit, technical questions and issues will be addressed by an employee/associate of the relevant H2MA partner, i.e. a person who has advanced familiarisation with the tool (possibly an IT specialist), who will have been assigned this task (as discussed above).
<i>Lack of data</i>	Lack of data is an issue of much greater importance; the more data parameters this affects, the graver the problem is. Its severity refers to the fact that non-availability or insufficiency of data cannot be easily compensated for (assuming that all attempts to make this data available have been exhausted). The most reasonable way to address this issue is to rely on theoretical knowledge or familiarity with other regions ; the scientific and/or professional background will be significant in this regard. For example, missing data related to the dispensing capacity (kg per day) of a hydrogen refuelling station may be tentatively filled by knowing the average dispensing capacity in this country or more broadly in Europe of HRS ³³ .
<i>Participants' fatigue and lack of engagement</i>	Lack of interest or involvement of LWG participants in the design of the routes is, also, an important possible barrier. A crucial first step to address such problems lies in the identification of the exact source(s) of this lack of engagement:

³³ It should be noted that lack of data is also related to inadequate parameters. For example, the tool is not (currently) able to incorporate energy production from hydro plants, nor consider the demand side for production or distribution related to green hydrogen in aviation and shipping.

	<p><i>Disengagement due to fatigue:</i> The collaborative character of LWGs, the suggestion to organise their work into subgroups, the provision of a small number of meetings and a relatively short meeting duration (3 hours maximum, with break sessions after each hour), the very employment of a computer program, are all measures that are meant to enhance the attractive, interactive and focused character of the LWGs. LWG organisers should actively monitor if such sense of fatigue is expressed by participants; in case this problem arises, strengthening even more the collaborative and interactive character of the meetings appears as the most promising option, e.g. by instigating more often discussions, by suggesting rotation in the roles of “coordinator” and “rapporteur” within the subgroups or by proposing a rotation in the very composition of the subgroups.</p> <p>➤ <i>Disengagement due to lack of inclusiveness:</i> Participants may not be actively involved in LWGs if they perceive that their very composition or way of conduct excludes the fair inclusion of their views and/or certain participants (deemed more powerful) disproportionately hold sway on the LWG. Issues related to “power imbalances” in the LWGs are discussed below.</p>
<p>Power imbalances among LWG participants</p>	<p>The issue of power differences was explicitly discussed in subsection B.II and the application of a power “filter” was suggested when selecting potential participants for the LWGs. H2MA partners are, however, advised to be conscious about the possibility that power differences have detrimental effects for the inclusive and collaborative conduct of the pilot action.</p> <p>If this appears the case, LWG organisers (which crucially hold the role of coordinator,) are encouraged to take measures towards “levelling the playing field”, most importantly through “increasing the voice of low power stakeholders”³⁴, e.g. by safeguarding that participants enjoy equal time to express their views or have equal access to the roles of “coordinator” and “rapporteur” and by encouraging the expression of diverse viewpoints.</p>

³⁴ Eikelenboom & Long, 2023, <https://link.springer.com/article/10.1007/s10551-022-05252-5>, p.35.

Conflicts among participants	<p>Tensions and conflicts among LWG participants may be related to the aforementioned issue of power differentials and lack of inclusiveness, but also due to other reasons (e.g. competing interests, contradictory objectives, status antagonisms, different cognitive frameworks and professional backgrounds, etc)³⁵. Being cautious for the possible emergence of unproductive conflicts and antagonisms, H2MA partners may apply if needed certain “conflict management” measures, such as (in addition to aforementioned actions regarding power imbalances):</p> <ul style="list-style-type: none">➤ clarify basic rules of collaborative conduct in the first LWG meeting;➤ intervene to enforce these rules in case they appear in risk of being violated;➤ safeguard transparent procedures in all LWG processes;➤ seek actively to combine and accommodate diverse views, identify common ground among them and prioritise commonalities rather than differences, etc.
-------------------------------------	---

REFERENCE LIST

- ACEA, 2021, *Heavy-duty vehicles: Charging and refuelling infrastructure requirements*, Position Paper, <https://www.acea.auto/publication/position-paper-heavy-duty-vehicles-charging-and-refuelling-infrastructure-requirements/>.
- ACEA, 20 May 2021, “Interactive map – Truck hydrogen refuelling stations needed in Europe by 2025 and 2030, per country”, <https://www.acea.auto/figure/interactive-map-truck-hydrogen-refuelling-stations-needed-in-europe-by-2025-and-2030-per-country/>.
- Ballejos, L. C. & Montagna, J. M. 2006, “Stakeholders Selection for Interorganizational Systems: A systematic Approach”, in IFIP International Federation for Information Processing, Volume 214, *The Past and Future of Information Systems: 1976-2006 and Beyond*, Avison, D., Elliot, S., Krogstie, J. & Pries-Heje, J. (Eds), Boston: Springer, https://link.springer.com/chapter/10.1007/978-0-387-34732-5_4.
- *Community Tool Box*, “Section 3. Methods of Contacting Potential Participants”, <https://ctb.ku.edu/en/table-of-contents/participation/encouraging-involvement/contact-participants/main>.
- *Drive to Zero* website, <https://globaldrivetozero.org/>.
- Eikelenboom, M. & Long, T. B., 2023, “Breaking the Cycle of Marginalization: How to Involve Local Communities in Multi-stakeholder Initiatives?”, *Journal of Business Ethics*, 186: 32, 34, <https://link.springer.com/article/10.1007/s10551-022-05252-5>.
- *Eric.ai*, 16 February 2023, “In-person Vs Virtual Meetings - 4 Things To Consider”, <https://www.eric.ai/blog/in-person-vs-virtual-meetings>.
- European Commission, 8 July 2020, A hydrogen strategy for a climate-neutral Europe, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0301>.
- European Commission, 14 February 2023, *Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) 2019/1242 as regards strengthening the CO₂ emission performance standards for new heavy-duty vehicles and integrating reporting obligations, and repealing Regulation (EU) 2018/956*, https://climate.ec.europa.eu/system/files/2023-02/policy_transport_hdv_20230214_proposal_en_0.pdf.
- *European HRS Availability System* website, interactive map, <https://h2-map.eu/>, accessed at 5 January 2024.

- European Parliament proceedings, 21 November 2023, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2023:88:FIN; Result of votes https://www.europarl.europa.eu/doceo/document/PV-9-2023-11-21-VOT_EN.pdf.
- Larkins, K., “Best Group Facilitation Techniques & Methods, *KSL Training*, <https://www.ksl-training.co.uk/free-resources/facilitation-techniques/group-facilitation-techniques-and-methods/>.
- Li, L. *et al.*, 2019, “Hydrogen supply chain network design: An optimization-oriented Review”, *Renewable and Sustainable Energy Reviews*, 103: 342-360, <https://hal.science/hal-02300029>.
- Mitchell, R. K. *et al.*, 1997, “Toward a Theory of Stakeholder Identification and Salience: Defining the Principle of Who and What Really Counts”, *The Academy of Management Review*, 22(4): 856-858, <https://www.jstor.org/stable/259247>.
- Murray-Webster, R. & Simon, P., November 2006, “Making Sense of Stakeholder Mapping”, *PM World Today*, VIII:11, https://www.researchgate.net/publication/265653139_Making_Sense_of_Stakeholder_Mapping.
- Raeesi, R. *et al.*, 2023, “Hydrogen supply chain and refuelling network design: assessment of alternative scenarios for the long-haul road freight in the UK”, *International Journal of Hydrogen Energy*, <https://www.sciencedirect.com/science/article/pii/S0360319923018074>.
- Regulation 2023/1804. *Regulation (EU) 2023/1804 of the European Parliament and of the Council of 13 September 2023 on the deployment of alternative fuels infrastructure, and repealing Directive 2014/94/EU*, <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L.2023.234.01.0001.01.ENG&toc=OJ%3AL%3A2023%3A234%3ATOC>.
- Schmeer, K. 2000, *Stakeholder Analysis Guidelines, Policy Toolkit for Strengthening Health Sector Reform*, https://www.researchgate.net/publication/265021546_Stakeholder_Analysis_Guidelines.
- *The Commons: Social Change Library*, 2023, “Facilitation tools and techniques”, <https://commonslibrary.org/facilitation-tools-and-techniques/>.
- UNIBZ, 2022a, *Green Hydrogen for the Alps: A meta-study on renewable hydrogen uses, production, and policy priorities*, <https://www.alpine-region.eu/action-group-9>.
- UNIBZ, 2022b, “Perspectives for Green Hydrogen in the Alpine region. Results from an Alpine wide study”, <https://alpine->

region.eu/sites/default/files/uploads/event/2524/attachments/menin_green_hydrogen_perspectives_study.pdf.

- URBACT, “World Café”, <https://urbact.eu/toolbox-home/analysing-problems/world-cafe>.

ANNEX I. Invitation letter template



(date)

Dear XXX,

We are delighted to extend our invitation for you to participate in the Local Working Group (LWG) organised by (H2MA partner's name) that will lead to the design of a green hydrogen supply and distribution network in (*region's name*). This promising initiative is part of the Interreg Alpine Space project 'Green Hydrogen Mobility for Alpine Region Transportation' (H2MA).

The H2MA project aims to accelerate the roll-out of green hydrogen (H2) infrastructure for transport and mobility in the Alpine region. To this end, it brings together 11 partners from all 5 Interreg Alpine Space EU countries. Green H2 technologies have been identified among the key solutions to decarbonise the transport sector and the need to expedite their use has gained policy momentum at the EU and international level. H2MA will increase the capacities of territorial public authorities and stakeholders to overcome barriers and collaboratively plan transalpine zero-emission H2 routes. H2MA's solutions will especially focus on the deployment of transnational infrastructure for freight and passenger transport (heavy duty trucks and railway in the short-term, maritime and aviation in the long-term), in tandem with urban mobility planning (buses).

The LWG that you are kindly invited to participate in is an integral part of the H2MA "pilot actions", to be concurrently implemented in six Alpine territories. LWGs aspire to bring together participants from the wider H2 landscape (infrastructure providers, refueling stations operators, RES producers), the transport sector, the research community and relevant public authorities. The primary goal of LWGs will be to pilot test the joint design of territorial green H2 supply and distribution networks, *inter alia* through the employment of a novel computer application that was developed within H2MA's framework. At a subsequent stage, the territorial routes that you, along with other stakeholders, will collaboratively design will inform a common, transalpine green H2 mobility masterplan.

Your participation in the LWG will enable your voice to be heard in an initiative that will potentially pave the way for the rollout of green H2 in (*region's name*). Moreover, it constitutes a valuable opportunity to strengthen your understanding on green H2 production and supply parameters, to familiarise yourself with helpful H2 design methods, to build new connections and develop synergies for the uptake of green H2, and to formulate your future hydrogen strategies or integrate pilot action results in your current projects.

Thank you for considering our invitation, we eagerly anticipate your participation.

Sincerely,

(Name, title, organisation, logo)

Attached is the poster of the H2MA project.

ANNEX II. Facilitation techniques and tools

Organising partners of LWG meetings are advised to include a consult the facilitation techniques and tools described below and select the most appropriate combination aiming to enhance the participation and productivity of the meetings.

Go-Round

Particularly during the 1st LWG Meeting, where the LWG will be coming together for the first time, it will be beneficial to include activities that break the ice and get participants interacting. Such an activity is “Go-round”, where the meeting facilitator goes round the circle of participants, giving each person an opportunity to introduce themselves. It is important that the introductions are short (e.g., 1 minute each) and focused on aspects most relevant to the meetings’ thematic.

Ground Rules

Prior to delving into each LWG meeting’s core activities, it is recommended that the meeting facilitator or leader establishes some “ground rules” or a “team code” for group working. Such “rules” or “code” should be specific enough to be practical, without restraining the group’s creativity. This could effectively be done employing some visuals (e.g. Powerpoint slides) with key words that represent the meeting’s “ground rules”.

Energiser

Participants often experience fatigue, a sense of being (mentally) stuck, or feeling overwhelmed during group meetings., especially after lunch. Energisers are ideal to re-vitalise the group and should be employed strategically throughout the day. Ideally, energisers should be short in duration (e.g. 5 minutes) and involve some brisk physical movement combined with mentally stimulating activities. Meeting facilitators should however be mindful of any potential health limitations of participants and select appropriate energisers that everyone in the group can participate in.

Reverse Brainstorming

If a group encounters a blockage during a discussion, reverse brainstorming can facilitate overcoming it by considering the reverse of the problem or question they are faced with. By shifting the perspective, this facilitation technique has the potential to yield some valuable ideas for tackling issues.

Small Group Discussions

Dividing the larger group into smaller groups can enhance individual participation and provide ample time for all participants to share their ideas and engage in discussions. Moreover, alternating small group discussions with whole group discussions, can promote a smooth flow of conversation across different levels, facilitating better integration of participants' ideas.

Debriefing

In a meeting where many small group discussions or activities take place in parallel, a debrief led by the meeting's facilitator or leader can help summarise what has been achieved, areas of improvement, and finally contextualise the outcomes of the discussions or activities within the overarching goals of the meeting.

Flip Chart Presentations

In small group discussions, it is advisable to document key conclusions, arguments, and actionable steps in a flipchart. Designating a spokesperson from each group to present the flip chart's contents to the whole promotes cohesion and ensures that the discussion's main points are effectively communicated.

World Café Method

Lastly, employing the World Café method³⁶ during the final (3rd) LWG meeting is expected to provide the ideal platform for conducting the “joint problem-solving session”. The World Café method is a simple and flexible, yet effective, format for fostering collaborative dialogue, promoting active listening, and reinforcing brainstorming among participants. The approach involves creating a café-like atmosphere where participants engage in small-group discussions

³⁶ URBACT, “World Café”, <https://urbact.eu/toolbox-home/analysing-problems/world-cafe>.

around tables circularly arranged, rotating between tables at intervals to share insights and build upon each other's ideas.

In the framework of the LWG meetings, it is recommended that the organising partner prepares in advance a set of 4-5 questions for participants to discuss during the World Café session. Each question will be written on a paper and placed on one of the tables. A moderator will be assigned to each table for the whole duration of the session to facilitate the discussion and provide clarifications. Participants will be equally divided per table, asked to stay for a fixed time (suggested 15-20 minutes), and make their contributions per each question. Every 15-20 minutes participants will move clockwise and join the next table to meet another host and discuss the next question, providing once again their input. When participants will have gone through all tables, the session will conclude, and the host of each table will present the results to the plenary and encourage further input.