

Horizon Europe Work Programme



D7.6 – AMBHER DISSEMINATION ACTIVITIES M18 (INCLUDING TRAINING, VISIT DEMO, ETC)

LEAD CONTRACTOR: TUE

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PU = Public

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Executive summary

In the context of the AMBHER project, the important role of dissemination and communication activities cannot be overstated. These activities are pivotal in disseminating scientific knowledge and technological developments to a broad audience. This comprehensive set of initiatives is designed not only to enhance the visibility of the project and its partners but also to ensure optimal recognition and future exploitation. These efforts will be directed towards key European forums and platforms relevant to the project's theme, maximizing its impact on the targeted audience.

The objective of this deliverable is to outline the diverse dissemination and communication activities conducted within the framework of the AMBHER project by Month 18. These activities adhere to the Dissemination and Communication Plan outlined in Deliverables D7.3 and D7.5. In accordance with this plan, the focus during the first and second years of the project is on:

1. Implementing the external and internal dissemination strategy and communication tools, including the development of public and private websites, and project communication materials.
2. Conducting internal and external dissemination activities with a specific emphasis on engaging the external audience. This involves i) facilitating internal dissemination between the Work Packages (WPs), ii) establishing an effective network among all participants, and iii) ensuring regular updates to the project website.
3. Showcasing public deliverables and presenting at international events, as well as participating in scientific workshops including webinars and schools.



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1 Introduction

The objective of this deliverable is to outline the diverse dissemination and communication activities conducted within the framework of the AMBHER project by Month 18. These activities adhere to the Dissemination and Communication Plan outlined in Deliverables D7.3 and D7.5. In accordance with this plan, the focus during the first and second years of the project is on:

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3. Showcasing public deliverables and presenting at international events, as well as participating in scientific workshops including webinars and schools.

The deliverable is divided in sections highlighting the tools used for internal and external communication and dissemination.



2 Dissemination and communication tools

Efforts have been actively underway to generate awareness surrounding the AMBHER project, elucidating its objectives and anticipated outcomes. These initiatives have been consistently implemented and will continue throughout the entirety of the project's duration. The principal activities during this period are elaborated upon in the following sections.

2.1 Project logo & public document templates

A project logo has been created as visual identity of the project (Figure 1).



Figure 1. Logo of AMBHER project.

In addition, templates for the general presentations of the project in poster and oral presentations have been drafted.

2.2 Websites

For safety reasons it was decided to keep the public website and the private platform separated. From the public website there is no link to the private platform.

2.2.1 Private webspace

The AMBHER internal project platform has been operational since the first month of the project, leveraging the large availability of TEAMS. TEAMS is now largely used by all partners and efficiently manages all enterprise content, providing essential services and controls for content management. Initially configured to oversee internal consortium activities related to AMBHER (including directories and subfolders for different Work Packages, and documents such as deliverables, Periodic Reports, meeting agendas, minutes, and presentations), the software has been tailored to meet the specific needs of the project. Further modifications will be incorporated upon partner requests or to enhance platform usability.

Upon logging into TEAMS with the Tecnia account, users can seamlessly navigate between projects they have access rights to. Within the AMBHER project site, users can easily identify fellow members and view the latest additions to the system. The platform allows users to communicate with each other, navigate website content, and add/modify elements within the site.

2.2.2 Public website

The AMBHER project website has been developed according to schedule. The project website is accessible at <https://www.ambherproject.eu/>

An impression of the project is reported in the Figure 2 below

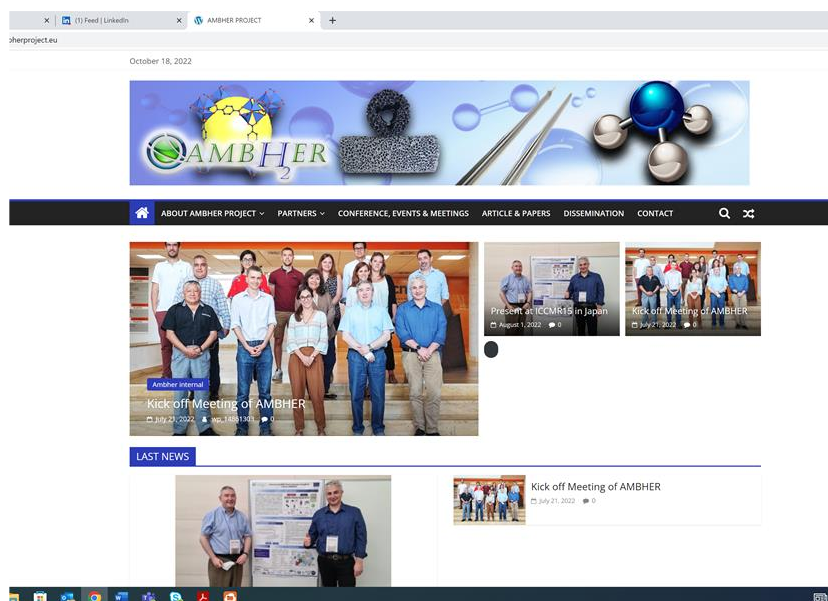


Figure 2. AMBHER project website, home page.

The website has been designed in order to present the project aims as well as the main activities and results to all interested stakeholders.

The role of the website in the communications strategy is to provide a place for people interested in the project to get more in-depth information about the project activities and results. The dedicated website will produce an extensive record of all publications and communications originated on the course of the project.

The main website sections and their sub-pages available to each user are listed below:

- Home
- About AMBHER project: Introduction – Objectives – Expected results and Long term impact
- Partners
- Conferences, Events & Meetings
- Articles and papers
- Dissemination
- Contacts

The Homepage also reports all news, and the website is designed in such a way that the latest news is always visible in each page of the website.

2.3 Social Media

A project social media approach is being implemented, focusing on strengthening the AMBHER presence on scientific, industrial and general public internet space.

To optimize the efforts, the main social media of AMBHER will be LinkedIn where the main news will be published, while these will further be linked in other social media as Facebook.



The account of AMBHER project for LinkedIn is reported in the Figure 3 below. It follows the same project identity used in different dissemination channels. It can be reached at <https://www.linkedin.com/company/ambher-project/>

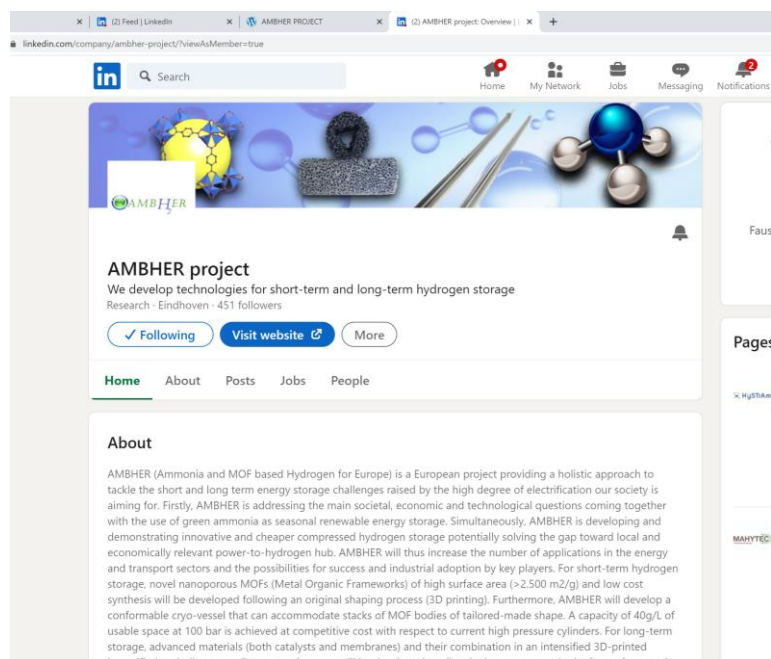


Figure 3. AMBHER project LinkedIn account.

All social media accounts refer to the project website and vice versa and show the EU-funding statement.

2.4 Flyer/Banners/Posters

Different flyers, posters and banners will be created by 1CUBE in coordination with the partners to advertise AMBHER in different events. The material will be custom made per event, while some general materials will be also created and printed that can be used in every dissemination event. A first poster has been created to advertise the start of AMBHER at the international conference on membrane reactor held in Japan in August 2022 (see Figure 4 below)

Summary and Concept

The AMBHER project aims at providing a quantum leap in the development of hydrogen storage technologies. For that purpose, it develops its main activities around **ammonia synthesis for the long-term storage** and around **novel nanoporous Metal Organic Frameworks (MOFs) for the short-time storage** (Figure 1). For long-term storage, **advanced catalysts and membranes** and their combination in an intensified **3D-printed periodic open cell structured reactor** will be developed to allow hydrogen storage in the form of ammonia in a cost-efficient and resource effective process at lower temperatures and pressures compared to conventional systems. For short-term hydrogen storage, **novel nanoporous MOFs** of high surface area and low-cost synthesis will be developed following an original shaping process (3D printing). **Conformable cryo-vessel** to accommodate stacks of MOF bodies of tailored-made shape will be also developed.

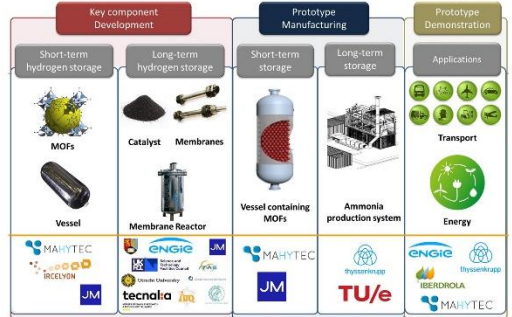
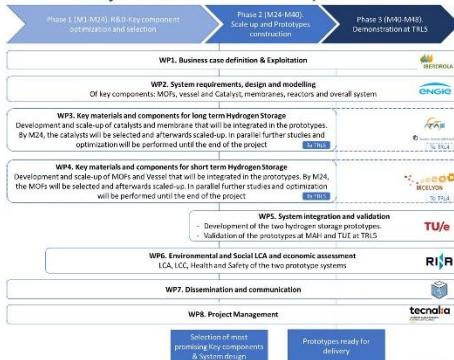


Figure 1. AMBHER project value chain

Project Objectives

Project structure and work plan



AMBHER project is validating both short term and long-term solutions at TRL 5. The main technical objectives on material and system level are the following:

- To design and develop a MOF container for a storage hydrogen capacity of 40 g/L at 100 bar whilst at competitive cost (600-1.000 euros/kg_{H₂}).
- To develop innovative conformable cryo-vessel operating up to 100 bars to be used in Hydrogen Refuel Station for Heavy Duty Vehicles.
- To develop Haber-Bosch process operating at pressures below 20 bar and temperatures below 250 °C with NH₃ production rates 4 times higher than conventional reactors operated at the same conditions.
- To develop innovative membranes for selective separation of ammonia during the gas phase production process with selectivities of NH₃/N₂ > 50 and NH₃/H₂ > 10.
- To design and manufacture highly **conductive Periodic Open Cellular Structures** with optimized heat and mass transfer and thin struts.
- To develop a full LCA, LCC and Health and Safety Analysis (HSE) of AMBHER.
- To pave the way for future exploitation of AMBHER Key Exploitable results.

Project details

Project details

Start Date: 1 June 2022
 Duration: 4 years
 UE Funding: 4,915,870 Euro

Coordinator's contact:

Dr. José Luis Viviente
 TECNALIA
 Jose.luis.viviente@tecnalia.com

More information at: <https://ambherproject.eu>

Consortium

The AMBHER consortium gathers 16 organizations from 6 countries. The consortium has been set-up to gather the complete value chains for the two hydrogen storage technologies. In AMBHER, the total industrial participation is around 44% of the consortium, while innovative SMEs represent 13% of the participants.

- | | |
|--------------------------|-------------------------|
| 1 TECNALIA, Spain | 9 CNRS, France |
| 2 TU/e, Netherlands | 10 TK, Germany |
| 3 CNR, Italy | 11 IBER, Spain |
| 4 UU, The Netherlands | 12 MAH, France |
| 5 CSIC, Spain | 13 ENGIE, France |
| 6 MPI, Germany | 14 UoB, United Kingdom |
| 7 1Cube, The Netherlands | 15 UKRI, United Kingdom |
| 8 RINA-C, Italy | 16 JM, United Kingdom |



Acknowledgement:

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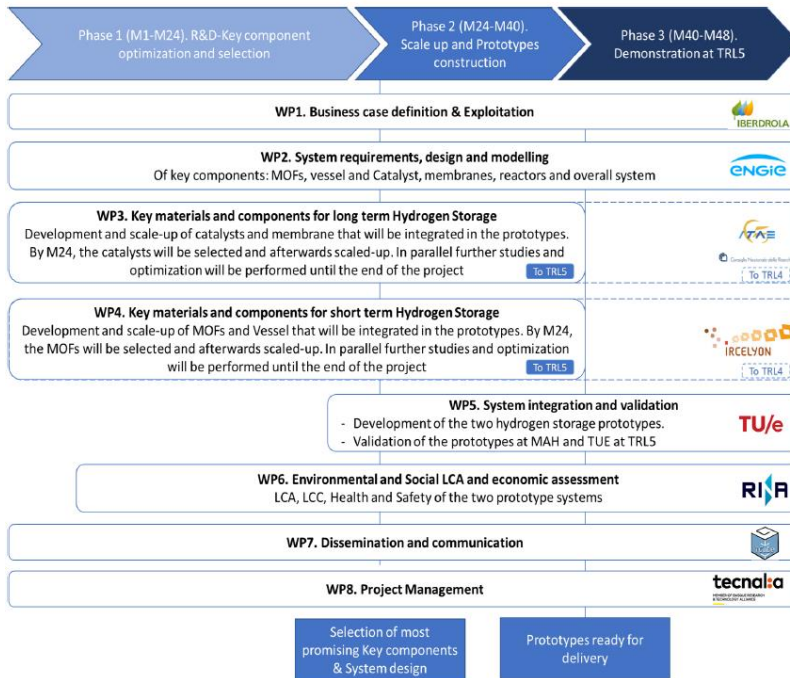
ICCMR15: August 1st – 4th 2022, Tokyo, Japan

Figure 4. First poster presented in Japan.

The first flyer has been produced and printed by 1Cube and sent to the partners for dissemination in events. An impression of the flyer in in the Figure 5 below



AMBHER Approach and methodology



Ammonia and MOF Based Hydrogen storage for euROpe

www.ambherproject.eu



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The AMBHER project aims at providing a quantum leap in the development of hydrogen storage technologies, both for long-term in the form of ammonia, as for short-term in the form of ultra-porous materials, setting the basis for future commercialization of greener technological pathways all along the value chain.

- Designing and setting up a broad and complete network of value chains.
- Developing a set of cost-effective and environmentally friendly flexible technologies that can be easily tailored for the storage of H₂ in different forms and for different applications (Energy & Transport among others).
- Laying the foundations for new business opportunities,

AMBHER concept and partners

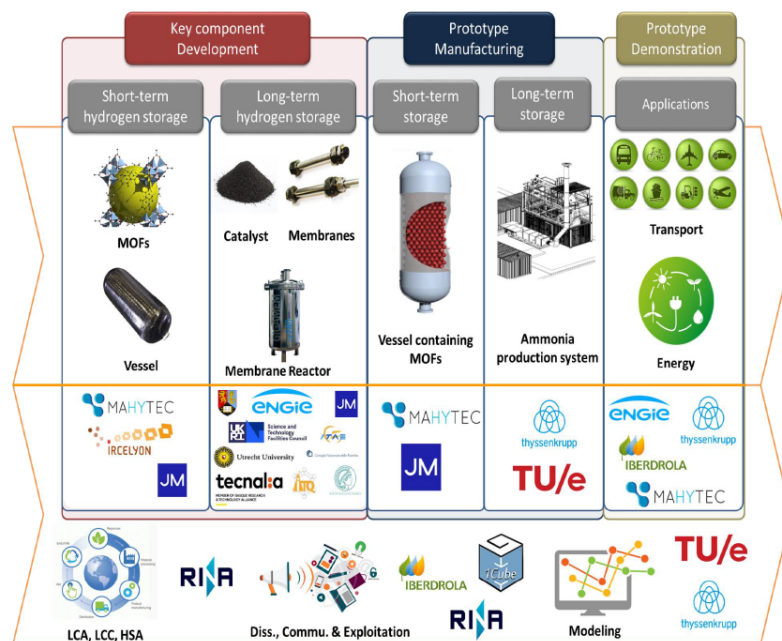


Figure 5. First flyer printed by 1Cube.



2.5 Newsletters

Two newsletters have been released along the period. They can be downloaded from the public website <https://www.ambherproject.eu/dissemination/>. The newsletters were also disseminated via LinkedIn and via email.

2.6 Videos

The AMBHER project has planned to deliver 2 videos. The first short video will be produced within the first six months of the project and will show the project concept, ideas and expected benefits from its implementation.

The video has been published on Youtube and disseminated via website, LinkedIn and email.

The video is visible at <https://www.youtube.com/watch?v=GzldWW3MuOg>

A second video will be produced in month 45, where the project's achievements will be covered. The creation of the videos is a perfect way of disseminating the AMBHER project.

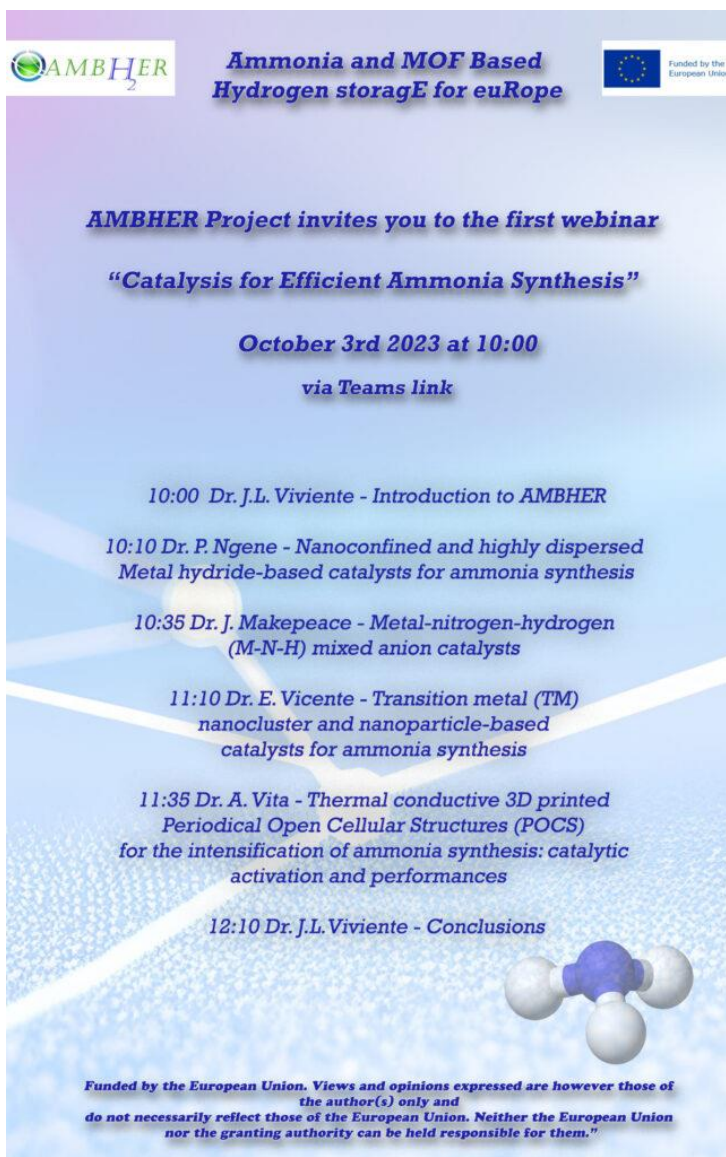
2.7 Webinars and schools

One of the channels used by the AMBHER project to reach the large audience and disseminate the results is through webinars and Schools.

In this first period the AMBHER project has organized a webinar on Catalysts for ammonia production.

The webinar flyer is attached in Figure 6.





Ammonia and MOF Based Hydrogen storage for euRope

AMBHER Project invites you to the first webinar

“Catalysis for Efficient Ammonia Synthesis”

October 3rd 2023 at 10:00

via Teams link

10:00 Dr. J.L. Viviente - Introduction to AMBHER

10:10 Dr. P. Ngene - Nanoconfined and highly dispersed Metal hydride-based catalysts for ammonia synthesis

10:35 Dr. J. Makepeace - Metal-nitrogen-hydrogen (M-N-H) mixed anion catalysts

11:10 Dr. E. Vicente - Transition metal (TM) nanocluster and nanoparticle-based catalysts for ammonia synthesis

11:35 Dr. A. Vita - Thermal conductive 3D printed Periodical Open Cellular Structures (POCS) for the intensification of ammonia synthesis: catalytic activation and performances

12:10 Dr. J.L. Viviente - Conclusions

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Figure 6. First webinar flyer

The recordings of the first webinar have been also published and are available at <https://www.youtube.com/watch?v=Vx05kwMSeXM>.

In the meantime, a second webinar has been created for the Membranes and will be held on December 5th 2023. The flyer is reported below in Figure 7.





**AMBHER and ARENHA Projects
invite you to the webinar
“Membranes and Reactors for Ammonia energy”**

December 5th 2023 at 10:00
via Teams link

10:00 Dr. J.L. Viviente - Introduction to AMBHER and ARENHA

10:10 Dr. A. Pacheco - Carbon molecular sieve membranes for gas separation and membrane reactors

10:35 Dr. A. Rahimalimamaghani - Tailor-made CMSMs for gas separation in membrane systems

11:00 EngD V. Cechetto - Hydrogen production via ammonia decomposition in membrane reactors: experimental, process design and techno-economics

11:25 MSc. V. Verde - Modelling tools for high-temperature electrolysis processes

11:50 Dr. G. van Zee - Process simulation modeling for absorption-assisted Haber-Bosch ammonia synthesis

12:10 Dr. J.L. Viviente - Conclusions



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Figure 7. Second webinar flyer.

In November 2023, AMBHER project has co-organized a webinar together with other 3 projects on hydrogen storage. The Coordinator Jose Luis Viviente has presented AMBHER in this webinar (Figure 8).



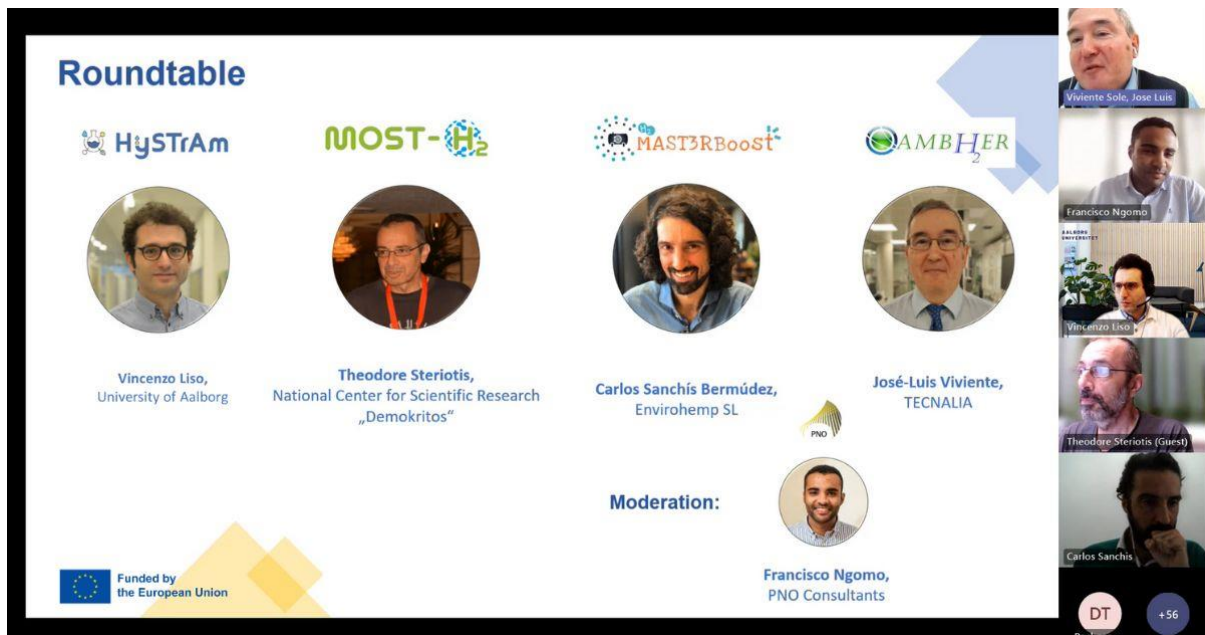


Figure 8. Webinar co-organized with 3 other projects.

In January 2024, AMBHER will organize a Winter School in Eindhoven on membrane reactors.

2.8 Public reports

Public reports as well as presentations and posters, papers etc. are freely available on the website of AMBHER at <https://www.ambherproject.eu/dissemination/>

Additionally, and to increase dissemination, a Community of the AMBHER project is available in ZENODO where public documents are published and obtain a DOI number so that they can be easily referenced to.

The community is available at

<https://zenodo.org/communities/ambher-project?q=&l=list&p=1&s=10&sort=newest>



Appendix I: Dissemination Follow Up

The tables below are intended to report and keep track of all the dissemination initiatives at the partners' level to be updated each six months.

Dissemination and communication activities:

Type of activities	Main leader	Title	Date	Place	Type of audience	Estimated Number of persons reached	Countries addressed
Participation in the ICCMR conference	Tecnalia, TUE	AMBHER project	1-4 August 2022	Tokyo, Japan	Scientific	100	Japan, Asia, EU
Participation to N3C conference	UU	Metal hydride nanocomposite materials as TM-free catalysts for ammonia synthesis	6-8 March, 2023	Noordwijkkerhout in Leiden	Scientific	>500	EU
LinkedIN	1CUBE, Tecnalia	https://www.linkedin.com/feed/update/urn:li:activity:6938834274737381377 AMBHER project started	04 June 2022	Spain	Scientific		
LinkedIN	1CUBE, Tecnalia	https://www.linkedin.com/feed/update/urn:li:activity:6953326095488192512 Kick-off-meting	14 July 2022	Spain	Scientific		
LinkedIN	1CUBE, Tecnalia	https://www.linkedin.com/feed/update/urn:li:activity:6959820133678620672 Jose Luis Viviente presented AMBHER project at ICCMR15	01 August 2022	Spain	Scientific		
LinkedIN	1CUBE, Tecnalia	https://www.linkedin.com/feed/update/urn:li:activity:6987700016802885632 Meet Margot Llosa as participant	17 October 2022	Spain	Scientific		
LinkedIN	1CUBE, Tecnalia	https://www.linkedin.com/feed/update/urn:li:activity:6987700229294673920 Meet Alfredo Pacheco as participant	17 October 2022	Spain	Scientific		
LinkedIN	1CUBE, Tecnalia	https://www.linkedin.com/feed/update/urn:li:activity:69	26 October 2022	Spain	Scientific		



		91000893798133760 First newsletter					
LinkedIN	1CUBE, Tecnalia	https://www.linkedin.com/feed/update/urn:li:activity:7009098027009245184 M6 project meeting	15 December 2022	Spain	Scientific		
LinkedIN	1CUBE	https://www.linkedin.com/company/85876755/admin/feed/posts/	periodically	NL	Scientific and non-scientific		
Participation at IUPAC CHAINS	UU	Metal hydride nanocomposite materials as TM-free catalysts for ammonia synthesis	20-23 Aug. 2023	The Hague, NL	Scientific	>500	EU
Participation at ECCE23 conference	CNR	Catalytic activation of 3D printed AISi10Mg Periodic Open Cellular Structures (POCSs) by combined dip/spin coating method for the intensification of ammonia synthesis	17-21 Sept. 2023	DE	Scientific	>500	EU + international
Participation at ICCMR16 Conference	TUE	A modeling study on the effect of membrane properties in a packed bed membrane reactor for ammonia synthesis	16-18 Oct. 2023	ES	Scientific	115	International
Participation at ICCMR16 Conference	CNR	Catalytic Activation of periodic open cellular structures (POCSS) for the integration with membranes to enhance ammonia synthesis in membrane reactors	16-18 Oct. 2023	ES	Scientific	115	International
Participation at ICCMR16 Conference	TEC-TUE	Recent developments at Tecnalia and TUE on carbon molecular sieve membranes (CMSM) for gas separation and membrane reactor	16-18 Oct. 2023	ES	Scientific	115	International
Participation at ICCMR16 Conference	TEC	Ammonia and MOF Based Hydrogen storage	16-18 Oct. 2023	ES	Scientific	115	International



		for Europe (AMBHER)					
Participation at AMBHER webinar	CSIC	Nanoparticle-based ammonia synthesis	3 October 2023	Online	General Public		International
Participation in Autumn School	CSIC	Transition metal nanoclusters and nanoparticle-based catalysts for ammonia synthesis	24-26 October 2023	ES	Scientific	150	International

Scientific publications (This field is only for peer reviewed articles)

Type of scientific publication	Title of the scientific publication	DOI	ISSN or eISSN	Authors	Title of the journal or equivalent	Number, date	Publisher	Place of publication	Year of publication	Relevant pages	Public & private participation	Peer-review	Is/Will open access provided to this publication
[Article in journal] [Publication in conference proceeding /workshop] [Books/Monographs] [Chapters in books] [Thesis/dissertation]	[insert title of the publication]	[insert DOI reference]	[insert ISSN or eISSN number]	[insert authors' name(s)]	[insert title of the journal]	[insert number of the journal] [insert month of the publication] [insert year of the publication]	[insert name of the publisher]	[insert place of publication]	[insert year of the publication]	[insert first page of the publication] - [insert the last page of the publication]	[YES] [NO]	[YES] [NO]	[Yes - Green OA [insert the length of embargo if any]] [Yes - Gold OA [insert the number of processing charges in EUR if any]] [NO]

