

## D6.4 – Networking activities

### Project information

|                                  |                                                                                                                         |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
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## Dissemination Level

|                      |                                                                                                                        |          |
|----------------------|------------------------------------------------------------------------------------------------------------------------|----------|
| PU                   | Public, fully open, e.g. web (Deliverables flagged as public will be automatically published in CORDIS project's page) | <b>x</b> |
| SEN                  | Sensitive, limited under the conditions of the Grant Agreement                                                         |          |
| Classified R-UE/EU-R | EU RESTRICTED under the Commission Decision No2015/444                                                                 |          |
| Classified C-UE/EU-C | EU CONFIDENTIAL under the Commission Decision No2015/444                                                               |          |
| Classified S-UE/EU-S | UE/EU-S – EU SECRET under the Commission Decision No2015/444                                                           |          |

## Document Log

| Version | Date       | Description of Change                 |
|---------|------------|---------------------------------------|
| V1.0    | 12/02/2025 | First draft                           |
| V2.0    | 09/04/2025 | Added contributions from LANC and UVa |
| V3.0    | 29/04/2025 | Final draft                           |



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## 1 Executive Summary

Stakeholder engagement is key to assure a successful uptake of HYDRA results. The goal of the HYDRA networking and clustering strategy is to involve and consult individuals and organizations external to the consortium research group, fostering broad participation from researchers, industry professionals, and policymakers. This deliverable reports on the main activities implemented by HYDRA partners up to M18 regarding the engagement of stakeholders and networking. The deliverable is structured in three chapters:

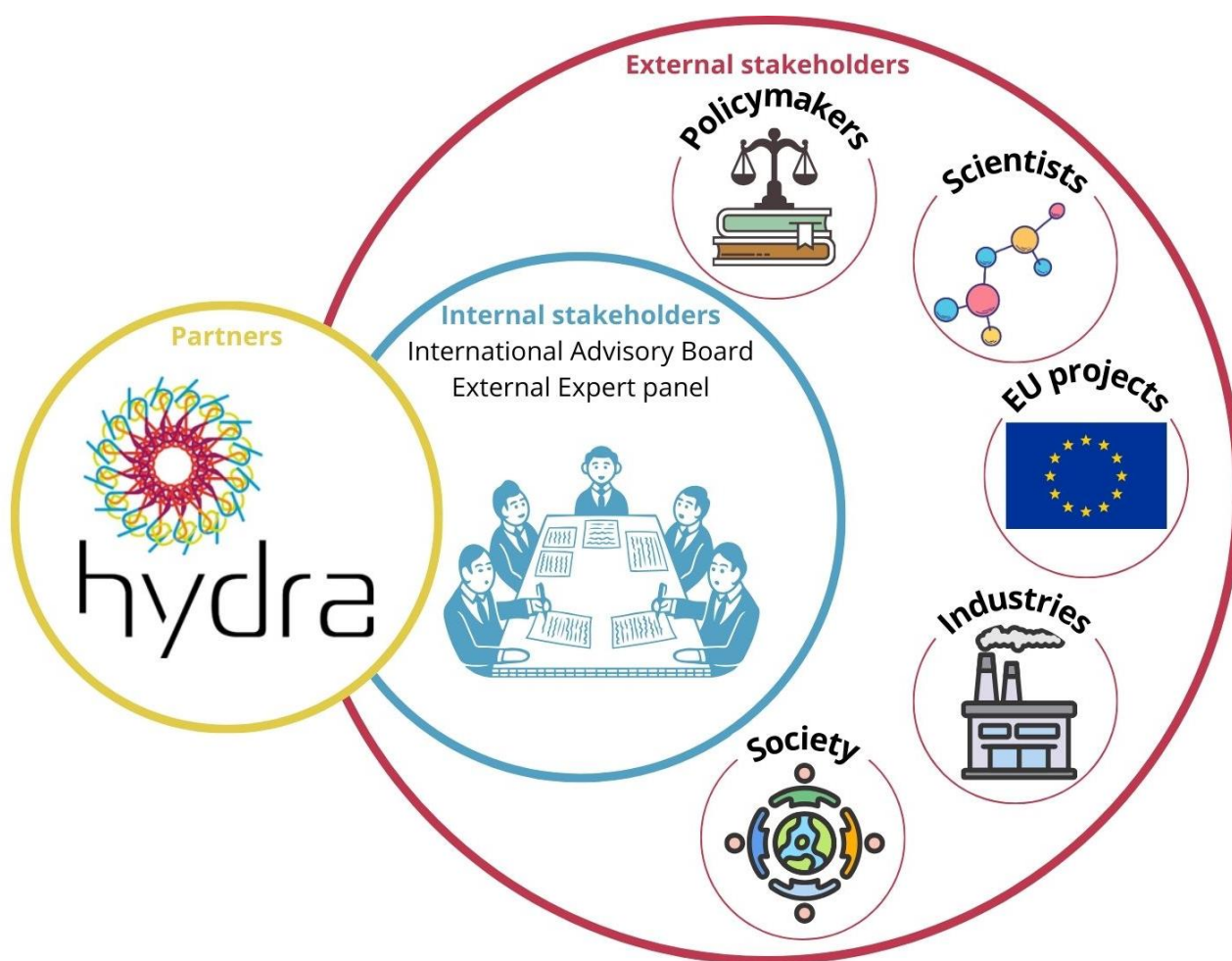
- **Chapter 2** gives an overview of the different engagement channels, based on the different stakeholder target groups;
- **Chapter 3** lists the activities performed by the consortium up to M18;
- **Chapter 4** draws the conclusions and plans the work ahead.



## 2 Target groups and engagement channels

HYDRA target stakeholders can be grouped in three main categories (Figure 1):

- **Partners:** Bewarrant (BEWH), Warrant Hub (WH), Fundación CARTIF (CARTIF), AUTOMA (AUT), The Italian National Research Council (CNR), Politecnico di Torino (POLITO), VERTH, Lancaster University (LANC), the University of Valladolid (UVA);
- **Internal stakeholders:** members of the International Advisory Board and of the External Expert Panel;
- **External stakeholders:** policymakers; scientists; technology platforms, clusters, and EU projects; industries; general public (society).



**Figure 1 HYDRA stakeholder target groups**

Group of stakeholders relevant to the HYDRA project have been identified in the Plan for exploitation and dissemination of results (D6.2 – PDEC) and are listed in Table 1, highlighting their main needs and the project related message. For the channels used to reach them, refer to D6.2.

**Table 1 HYDRA target stakeholders' groups (TSG), their interests and HYDRA main messages**

| Stakeholder group                                             | Needs                                                                                                                                                                                                                                                                                                                                                                                                     | HYDRA main message                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Policy makers (PM)</b>                                     | <p>Setting clear guidelines to support the development and integration of hydrogen into the energy system.</p> <p>Assessing the effectiveness and impact of these policies, such as increased H<sub>2</sub> availability, reduced emissions, and economic and social benefits.</p>                                                                                                                        | <p>HYDRA will assess the integrated (climatic, environmental, economic, and social) impacts of a future H<sub>2</sub> economy. Based on the obtained results, HYDRA will suggest and model mitigation actions, producing guidelines and policy briefs for a sustainable development of the hydrogen economy.</p>                                                                                                               |
| <b>Scientific Community (SC)</b>                              | <p>Understanding H<sub>2</sub> interactions with atmospheric gases, including its reactions with hydroxyl radicals, methane, and ozone.</p> <p>Assessing the potential climate effects of hydrogen leakages, as they may influence methane concentrations and extend its atmospheric lifetime.</p> <p>Evaluating the contribution to the greenhouse effect of water vapor produced from hydrogen use.</p> | <p>HYDRA will investigate the potential impact of the hydrogen economy on the atmospheric composition, modelling the interaction of hydrogen with other atmospheric gases, taking into consideration the soil sink and evaluating the impact of hydrogen use on water vapour concentrations and on the stratospheric ozone layer. HYDRA will then use the results of these simulations to assess climate change scenarios.</p> |
| <b>Technology platforms, Clusters, and EU projects (PROJ)</b> | <p>Promoting innovation, data sharing, and collaboration</p>                                                                                                                                                                                                                                                                                                                                              | <p>HYDRA will generate and share data and knowledge on the possible impacts of the hydrogen economy and will seek synergies with relevant projects and clusters to foster collaboration.</p>                                                                                                                                                                                                                                   |
| <b>Industry and Energy operators (IND)</b>                    | <p>Comprehending regulatory frameworks supporting the large-scale deployment of hydrogen technologies</p> <p>Understanding the H<sub>2</sub> economy development.</p> <p>Solving safety concerns due to hydrogen low ignition energy and wide flammability range.</p>                                                                                                                                     | <p>HYDRA will analyse the different policies, regulations, and incentives about hydrogen at national, EU, and global level. HYDRA will analyse the potential diffusion of hydrogen technologies in the mid-to-long term.</p> <p>HYDRA will develop a tool to monitor the leakages of hydrogen and ensure safety.</p>                                                                                                           |
| <b>General audience (PUB)</b>                                 | <p>Gaining awareness and knowledge regarding H<sub>2</sub>.</p>                                                                                                                                                                                                                                                                                                                                           | <p>HYDRA will disseminate and communicate its finding to different stakeholders, including citizens.</p>                                                                                                                                                                                                                                                                                                                       |

### 3 Networking activities: work done up to M18

In the following paragraphs, the main activities carried out by partners to promote and disseminate the project through networking, stakeholder engagement, and clustering are summarized.

#### 3.1 Networking and Clustering with European funded projects (TSG: PROJ)

Regarding the PROJ target group, HYDRA has established robust networking connections with various European projects to foster collaboration and knowledge exchange. In particular, networking activities carried out up to M18 involved the following projects:

- NHYRA (GA: 101137770), funded under HORIZON-JTI-CLEANH2-2023-05-03;
- HYWAY (GA: 101137582), funded under HORIZON-CL5-2023-D1-01-03;
- NEVERMORE (GA: 101056858), funded under HORIZON-CL5-2021-D1-01-05;
- AdvancedH2Valley (GA: 101137808), funded under HORIZON-JTI-CLEANH2-2023-06-02;
- REAL (GA: 101071647 ), funded under ERC-2022-SYG;
- LIFE OCEAN (LIFE21-ENV-DE-LIFE-OCEAN/101074503), funded under LIFE ENVIROMENT 2021.

#### NHYRA: pre-Normative Research on Hydrogen Releases Assessment



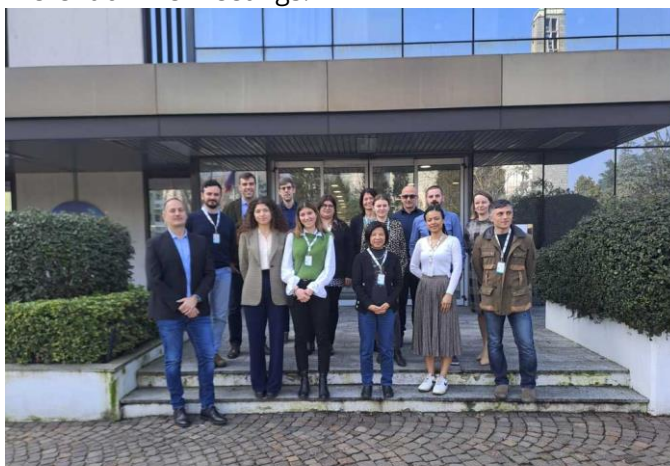
NHYRA addresses the knowledge gap in the quantification of hydrogen emissions along the value chain, aiming to develop a comprehensive "H<sub>2</sub> releases" inventory. The project will validate methodologies for laboratory and in-field leakage measurements, planning experimental tests on key elements of the H<sub>2</sub> value chain. Additionally, NHYRA aims to provide a detailed overview of potential H<sub>2</sub> release scenarios for 2030 and 2050, enabling decision-makers to identify and prioritize effective mitigation strategies.

NHYRA is a three-year initiative coordinated by SNAM S.P.A (IT). The project foresees the participation of 14 other partners in and extra EU: the University of Bologna (IT); the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (IT); Baker Hugues (IT); ENGIE Lab CRIGEN (FR); Enagás (ES); the INSTYTUT NAFTY I GAZU (PL); the German Aerospace Center (DE); the European Gas Research Group (BE); Fondazione Bruno Kessler (IT); the National Physical Laboratory (UK); the Fire and Explosion Modelling Group (FMEG) of the University of Surrey (UK); LINDE (DE); EQUINOR (NO); and the University of California (USA).

So far, networking activities between HYDRA and NHYRA involved the following:

- At the KoM of the NHYRA project, held on February 20, 2024, in Milan (Figure 2), HYDRA technical coordinator (Dr. Rossella Urgnani, WH) presented the project at the NHYRA consortium. The presentation highlighted HYDRA's objectives, methodology, and expected outcomes. Key aspects discussed included the possible collaboration between HYDRA and NHYRA.

- The coordination teams of HYDRA and NHYRA continued the discussion about the possible collaboration among the two projects in different online meetings.
- Some partners of the NHYRA consortium attended remotely the M12 HYDRA General Assembly (Turin, 27-28 November, 2024), as members of the HYDRA External Expert Panel.
- On March 28<sup>th</sup>, 2025, HYDRA organized its first webinar, titled “Towards the hydrogen economy: policy framework and leakage scenarios along the whole value chain”. In the webinar, Vittoria Troisi (SNAM) held a presentation titled “H2 leakage inventory: the NHYRA project”.



**Figure 2 – NHYRA and HYDRA partners at the NHYRA KoM**

### HYWAY: Climate impacts of a HYdrogen Economy – the pathWAY to knowledge



HYWAY is HYDRA’s sister project and, therefore, shares similar objectives and end-goal. In particular, HYWAY aims to quantify the atmospheric hydrogen budget, model the climate and environmental impacts of hydrogen emissions, measure the hydrogen leakages and soil uptake fluxes, create emissions inventories, and develop a range of scenarios of a future hydrogen economy.

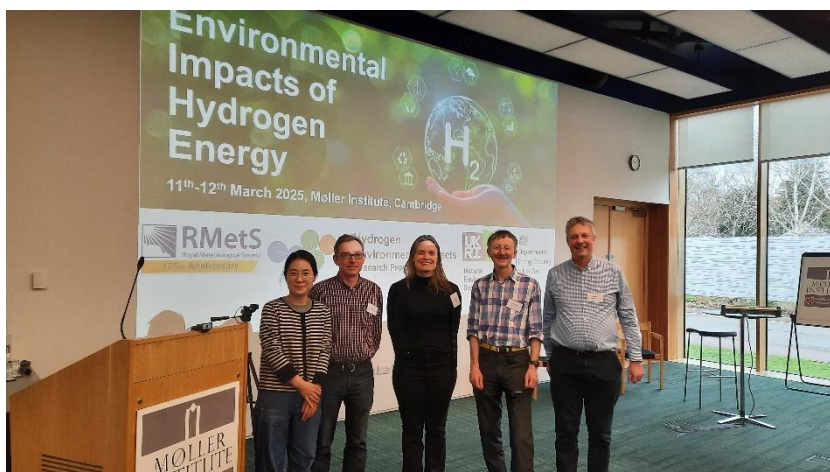
This 4-year project is coordinated by the CICERO Center for International Climate Research (NO), and brings together a consortium of 11 additional partners: the National Centre for Scientific Research (FR); the French Alternative Energies and Atomic Energy Commission (FR); the University of Lund (SE); the International Institute for Applied Systems Analysis (AU); the Royal Netherlands Meteorological Institute (NL); the University of Edinburgh (UK); The German Aerospace Center (DE); The Norwegian Meteorological Institute (NO); the University of Reading (UK); the University of Leeds (UK); and the Cyprus Institute (CY).

So far, networking activities between HYDRA and HYWAY involved the following:

- At the KoM of the HYWAY project, held on September 4-5, 2024, in Oslo, the technical coordinator of HYDRA (Dr. Rossella Ugnani, WH) presented the project at the HYWAY consortium.
- On November 27-28, 2024, some of the HYWAY partners participated remotely in the M12 General Assembly of the HYDRA project as members of the International Advisory Board. Moreover, Dr. Gunnar Mhyre (HYWAY Co-lead) presented HYWAY to the consortium partners.



- On March 11-12, 2025, members of both HYDRA and HYWAY attended a meeting in Cambridge on the Environmental Impacts of Hydrogen Energy organized by the Royal Meteorological Society's Atmospheric Chemistry Special Interest Group to mark the conclusion of the NERC/DesNZ Hydrogen Environmental Impacts Programme in the UK. On the sidelines of the meeting, partners from HYDRA and HYWAY had initial discussions on how to align the modelling components of the projects to ensure consistency and get the maximum benefit from both projects.



**Figure 3 – HYDRA and HYWAY partners at the final Event of the UK Hydrogen Environmental Impacts Programme**

### **NEVERMORE: New Enabling Visions and tools for End-users and stakeholders thanks to a common MOdeling fRamework towards a climatE neutral and resilient society**



NEVERMORE aims to develop integrated models and tools to assess the impacts and risks of climate change. The project aims to create interactive digital resources for both citizens and policymakers, facilitating learning about future scenarios and enhancing the effectiveness of mitigation and adaptation policies. NEVERMORE focuses on five case studies in climate change hotspots (Greece, Italy, Sweden, Spain and Romania). Through local and transnational stakeholder councils, the project ensures active participation of public and private actors in the co-design, co-creation, and co-assessment of activities, promoting the adoption of climate change decision support tools.

NEVERMORE spans 4 years, ending in 2026, and involves a partnership of 16 organizations: Fondazione Bruno Kessler (IT, coordinator), Fundación CARTIF (ES), National Centre for Scientific Research "Demokritos" (EL), RINA Consulting (IT), Software Imagination & Vision (IT), Association des Agences de la Democratie Locale (FR), Fondazione Centro Euro-Mediterraneo sui Cambiamenti Climatici (IT), Zentrum für Soziale Innovation (AU), IVL Svenska Miljöinstitutet (SE), University of Valladolid (ES), Potsdam Institut für Klimafolgenforschung (DE), Instituto de Fomento de la Región de Murcia (ES), Provincia Autonoma di Trento (IT), Municipality of Sitia (EL), Institutia Prefectului Judetului Tulcea (RO), Energikontor Norr AB (North Sweden Energy Agency, SE).



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Networking among HYDRA and NEVERMORE is facilitated by Fundación CARTIF and the University of Valladolid, which participate in both projects.

So far, networking activities between HYDRA and NEVERMORE involved the following:

- On November 27-28, 2024, some of the NEVERMORE partners participated remotely in the M12 General Assembly of the HYDRA project as members of the External Expert Panel. Moreover, Dr. Alessia Torre (NEVERMORE coordinator) presented NEVERMORE to the HYDRA consortium partners.



Figure 4 - Snapshot of the HYDRA M12 GA in Turin

### AdvancedH2Valley: Showcasing Advanced Hydrogen Valley in Western France



AdvancedH2Valley aims to scale-up local renewable hydrogen projects in a complete H<sub>2</sub> value chain, developing an interregional hydrogen valley. The

project will thus use the hydrogen produced in the Loire valley in different mobility and industrial applications. Beyond environmental impacts, the project intends to catalyze positive change by raising awareness, increasing students skills, fostering collaboration, and sharing knowledge among neighboring regions.

AdvancedH2Valley is coordinated by Lhyfe (FR) and foresees the participation of other 13 partners: EnR44 (FR), Teréga Solutions (FR), Hyliko (FR), Département de Loire-Atlantique (FR), SAS Terminal du Grand Ouest – TGO (FR), Fraikin France (FR), Zamenhof Exploitation (FR), Hype (FR), Fundación Tecnalia Research & Innovation (ES), Université d'Orléans (FR), Université Bretagne Sud (FR), Warrant Hub Spa (IT), Automobile Club de l'Ouest (FR).

HYDRA and AdvancedH2Valley have a partner in common, Warrant Hub, making networking easier.

So far, networking activities between HYDRA and AdvancedH2Valley involved the following:

- On March 28<sup>th</sup>, 2025, during the HYDRA first webinar (“Towards the hydrogen economy: policy framework and leakage scenarios along the whole value chain”). Olivier Job (Lhyfe, project coordinator) presented AdvancedH2Valley during the speech titled “Hydrogen end uses: examples from the LIFE OCEAN and AdvancedH2Valley projects”.

Hydrogen End Uses: Examples from the AdvancedH2Valleys Project



Figure 5 - AdvancedH2Valley presentation during the first HYDRA webinar



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## LIFE OCEAN: Fuel Cell and Methanol Reforming system for clean energy on board

LIFE OCEAN aims to replace superyacht diesel generators with a microbial fuel cell (mFC) system. This system uses a methanol reformer to produce hydrogen, which then feeds a PEM fuel cell. The project will establish an important milestone in decarbonizing the maritime industry, paving the way for the widespread adoption of this technology across other types of vessels. Expected outcomes include improved air quality, over 80% reduction in greenhouse gas emissions, increased green methanol production capacity, up to 25% increase in energy efficiency for superyachts, and elimination of on-board noise and harmful pollutants.

LIFE OCEAN is coordinated by SIEMENS ENERGY (DE) and foresees the participation of SANLORENZO (IT).

So far, networking activities between HYDRA and LIFE OCEAN involved the following:

- On March 28<sup>th</sup>, 2025, during the HYDRA first webinar ("Towards the hydrogen economy: policy framework and leakage scenarios along the whole value chain"). Dr. Markus Wagner (Siemens Energy, project coordinator) presented LIFE OCEAN during the speech titled "Hydrogen end uses: examples from the LIFE OCEAN and AdvancedH2Valley projects".

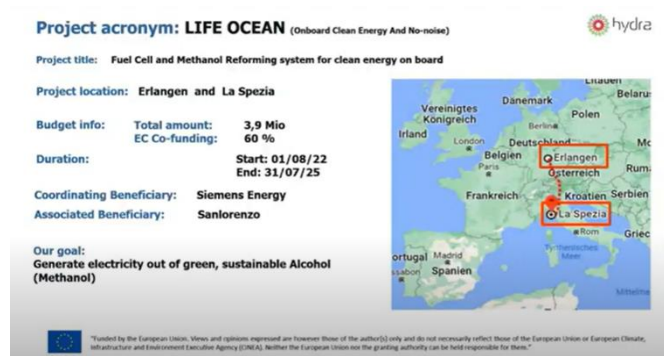


Figure 6 - LIFE OCEAN presentation during the first HYDRA webinar

## REAL: A Post Growth Deal



REAL "A Post-Growth Deal" is a six-year (2023-2029), €9.9 million research initiative funded by the European Research Council (ERC). Led by Professors Giorgos Kallis and Jason Hickel from the Autonomous University of Barcelona (UAB), and Professor Julia Steinberger from the University of Lausanne (UNIL), the project aims to explore pathways for societies to

achieve human well-being within planetary boundaries without relying on economic growth. REAL focuses on developing equitable North-South convergence scenarios, formulating post-growth policy packages, and investigating alternative provisioning systems. The project also examines political movements and alliances necessary for post-growth transitions and seeks to bridge the gap between post-growth theory and practice through community engagement.



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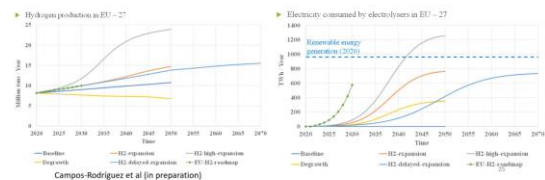
So far, networking activities between HYDRA and REAL involved the following:

- Presentation of Iñigo Capellán-Pérez (UVA) in internal REAL seminar about “Modelling energy transitions towards sustainability and degrowth” on 10/12/2024 (online). Overview of WILIAM and System Dynamics modelling and preliminary results of HYDRA results implementing hydrogen deployment in different storylines (green growth, postgrowth, etc.) at EU level.

### Example 3. ¿Hydrogen and degrowth/PG?

- ¿a priori incompatibility? E.g., not mentioned in Fitzpatrick et al. 2022 Degrowth policy collection.
- BUT, we will need green hydrogen if we want to have some clean chemical industry, primary steel, biofuel refining, etc. in a Degrowth/PG scenario.

- Exploratory results for hydrogen production in EU as non-energy use (WILIAM model):



**Figure 7 - Presentation of Iñigo Capellán-Pérez (UVA) into internal REAL seminar Project. The REAL project**

The collaboration between HYDRA and the aforementioned projects facilitates the sharing of best practices and research findings, addressing common challenges more effectively. By engaging in these networking activities, HYDRA aims to create a cohesive and synergistic approach to tackle unresolved gaps in the knowledge of environmental, climate, and atmospheric sciences.

### 3.2 Horizon Europe CL5-D1 clustering event (TSG: PM, PROJ)

In October 2024, HYDRA participated in the Clustering Event Horizon Europe Cluster 5 Destination1, organized by the European Climate, Infrastructure and Environment Executive Agency together with DG RTD. This event brought together different EU projects and aimed to discuss preliminary results with a political and societal relevance in view of the COP29 (Baku, Azerbaijan, 11 – 22 November, 2024). Different projects presented their activities and findings, such as:

- **PARIS** (GA: 101081430), coordinated by UNIVERSITEIT UTRECHT (NL). The project focuses on GHG emissions (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, F-gases, Inorganics in air and particle phase) with the aim to reconcile bottom-up emission estimations with top-down estimations based on atmospheric concentration data. PARIS will thus produce Annexes to National Inventory Reports (NIRs) for eight countries (UK, Ireland the Netherlands, Germany, Switzerland, Italy, Norway, and Hungary).
- **TipESM** (GA: 101137673), coordinated by DANMARKS METEOROLOGISKE INSTITUT (DK). The project studies critical climate tipping points—thresholds whose small changes can trigger irreversible and catastrophic shifts in the Earth system. By using advanced Earth System Models, the project aims to develop early warning indicators, safe emission pathways, and a risk register to better prepare society.
- **IAM COMPACT** (GA: 101056306), coordinated by ETHNICON METSOVION POLYTECHNION (EL). The project aims to address the gap between current climate policies and the emissions reductions needed to meet the Paris Agreement's goals by developing comprehensive policy measures through interdisciplinary modeling.
- **RESCUE** (GA: 101056939), coordinated by the BARCELONA SUPERCOMPUTING CENTER (ES). The project aims to assess the Earth system and climate responses to various CDR (carbon dioxide removal) deployment pathways.
- **NEVERMORE** (GA: 101056858), coordinated by FONDAZIONE BRUNO KESSLER (IT) and described above (paragraph 3.1).
- **ACHIEVE** (GA: 101137625) coordinated by STICHTING RADBOUD UNIVERSITEIT (NL). The project seeks to enhance the effort in voluntary climate actions by addressing their integrity, providing scientific insights into their effectiveness, and developing pathways to achieve climate neutrality.

The meeting brought together a multidisciplinary group of experts from academia and policymaking to discuss the latest results in climate science. This event served as an important opportunity to connect HYDRA with broader initiatives aimed at minimizing future climate impacts.



### 3.3 Other Networking activities (TSG: PROJ, PM, SC, IND, PUB)

The HYDRA project has undertaken a wide range of dissemination activities, with a strong emphasis on networking and stakeholder engagement. Key activities include participation in international conferences and congresses such as:

- The 2024 EGU conference, where WH participated in the press conference “Climate compatible energy in an uncertain future” and presented HYDRA objectives and methodology in session AS3.26 (Composition-Climate Interactions: Hydrogen, Ozone and Aerosols). (TSG: SC).
- The 2024 International Conference on Socio-Environmental Footprints (ICSEF), where UVa presented preliminary results related to the integration of hydrogen in the WILIAM model. (TSG: SC).
- The 19th Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES), where UVa presented non-energy uses of hydrogen in Europe. (TSG: SC).
- The XIII AEC International Congress. Climate change and society, where UVa presented initial findings regarding the incorporation of H<sub>2</sub> uses (non-energy uses and synthetic fuels) and production (electrolysis and steam methane reforming) into the energy module of WILIAM: effects on electrification, primary energy use, and greenhouse gas emissions. (TSG: SC).

Additionally, WH presented HYDRA at two very important workshops:

- The Hydrogen Research: Virtual Seminars, part of the UK NERC Hydrogen Environmental Impacts Programme (TSG: SC, IND, PM).
- The Hydrogen Emissions and Environmental Impacts Workshop, organized by the Hydrogen and Fuel Cell Technologies Office (HFTO) of the U.S. Department of Energy's (DOE's), in collaboration with the European Commission (TSG: IND, PM).

With a focus on industrial stakeholders, AUT presented HYDRA at the Italian Hydrogen Expo and at the Smart Grid Days 2024, an event the company organizes for its customers which was dedicated to “Methane, hydrogen, air, water: examples of innovative applications of spectroscopic technologies”.

The project also engaged with the broader community (TSG: PU) through various press releases and newsletters, social media posts on platforms like LinkedIn, as well as a Tv Radio Campaign.

These efforts have been complemented by the organization of training events, such as the first HYDRA webinar (Towards the hydrogen economy: policy framework and leakage scenarios along the whole value chain), targeted at PM, SC, IND, and PROJ.

These activities have not only disseminated project results but also fostered collaboration and knowledge exchange among researchers, industry professionals, policymakers and other stakeholders, thereby strengthening the project's impact and outreach.

### 3.4 External Expert Panel and International Advisory Board (TSG: PM, SC, IND, PRJ)

An international Advisory Board (IAB) and an External Expert Panel (EEP) have been appointed as external bodies to officially provide feedback and advice on the HYDRA project development. Members of the IAB include researchers involved in the HYWAY project, while the EEP is formed by industrial representatives of the NEVERMORE and NHYRA project, as well as by members of the policymaking community.

HYDRA plans to periodically engage with the IAB and EEP, envisioning their participation to some project meetings or events. This entails their access to restricted information, shared under an NDA agreement. Up to now, the IAB and EEP attended the HYDRA M12 General Assembly in Turin (via Teams link).



## 4 Conclusions

The networking and clustering activities of the HYDRA project have been instrumental in advancing its objectives and fostering a collaborative environment for advancements in environmental and climate science, as well as in the hydrogen economy pathway. By actively engaging with European projects and clusters, organizing webinars, and participating in various networking activities, HYDRA has successfully built a robust network of stakeholders, including researchers, industry experts, and policymakers.

By fostering a cohesive and synergistic approach, HYDRA and its partners are well-positioned to make meaningful contributions to the European Union's sustainability goals and address the pressing issues of energy transition and independence.

