

# HYDROGEN TRAININGS

best practices

## European Chemical Regions Network (ECRN)



## SUMMARY

1. Hydrogen Transmission Training Course by DNV, Groningen, The Netherlands.....	3
2. Interuniversity Master of Permanent Training in Hydrogen Technologies, Catalonia, Spain.....	5
3. Hydrogen: a crucial puzzle piece in the energy transition by UGain, Flanders, Belgium..	7
4. H2HUB in Saxony-Anhalt, Germany.....	9
5. Executive Programme Hydrogen by New Energy Business School, Groningen, The Netherlands.....	11

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# 1

## HYDROGEN TRANSMISSION TRAINING COURSE BY DNV

DNV is an international accredited registrar and classification society headquartered in Norway. It provides services for several industries, including maritime, oil and gas, renewable energy, electrification, and healthcare. It organizes the 'Hydrogen Transmission Training Course' at the DNV's Technology Centre Groningen.



### Scope

The training provides a comprehensive overview of hydrogen transmission and blending with natural gas within the context of natural gas service. Participants will delve into topics such as hydrogen production, transmission, and utilization, along with key considerations for retrofitting or repurposing existing infrastructure for hydrogen use. Safety and operational challenges in future operations are also addressed. Additionally, the three-day program includes a tour of DNV's Technology Centre Groningen, featuring demonstrations of various hydrogen applications to offer practical insights into the training concepts.



DNV unveiled its new Technology Centre in april 2023 at Groningen's Zernike campus, a dynamic hub of educational, commercial, and research endeavors. This state-of-the-art facility, designed with sustainability in mind, is outfitted with cutting-edge testing apparatus to bolster DNV's investigations into the decarbonization of energy infrastructures.

Source : <https://www.dnv.com/news/dnv-grows-energy-testing-capability-in-groningen-with-new-technology-centre-to-accelerate-energy-transition-242452/>

## Competences

Upon completion of the course, attendees will acquire comprehensive competences in several crucial areas:

- Technical understanding of retrofitting natural gas infrastructure for hydrogen transportation.
- Familiarity with regulatory frameworks and policies governing pipeline conversion.
- Assessment of economic feasibility for pipeline conversion projects.
- Proficiency in safety considerations associated with hydrogen pipeline conversion.
- Knowledge of hydrogen properties and their impact on infrastructure and end-use equipment.
- Expertise in blending hydrogen with natural gas and transitioning to pure hydrogen across various sectors such as built environment, industries, and transportation.
- Understanding of network management and energy capacity implications when transitioning to hydrogen.

## Target audience

The training course caters to a diverse audience, including:

- Pipeline operators seeking to transform energy systems for hydrogen.
- Government decision-makers and regulators involved in energy transition policies.
- Engineers and asset managers responsible for evaluating and implementing repurposing initiatives.
- Professionals from industries reliant on natural gas, aiming to understand the implications of transitioning to hydrogen.
- Stakeholders involved in the built environment, industrial sectors, and transportation, preparing for the integration of hydrogen into their operations.

Sources: <https://www.dnv.com/training/hydrogen-transmission-training-course-244912/#:~:text=The%20three%2Dday%20training%20will,concepts%20covered%20during%20the%20training.>



The Interuniversity Master in Hydrogen Technologies is organized by several training centres and universities in Catalonia. Petronor-Repsol promotes this master's degree, designed and endorsed by 5 universities: Mondragon Unibertsitatea, the Universitat Politècnica de Catalunya, the Universitat Rovira i Virgili, the University of the Basque Country/ Euskal Herriko Unibertsitatea and the University of Zaragoza, along with 6 other training centers and research: the Somorrostro Integrated Vocational Training Center, the Comte de Rius Vocational Training Center, the Institut Escola del Treball, the Piràmide Integrated Public Vocational Training Center, the Hydrogen Foundation in Aragon and the School of Industrial Organization.



### Scope

The Master's objective is to equip professionals with expertise across the entire hydrogen value chain, encompassing generation, storage, transportation, distribution, transformation, and applications. The training methodology includes theoretical classes covering the various processes and transformations involved in each stage of the value chain. Practical application of concepts is ensured through hands-on laboratory sessions, simulations using specialized software, and technical visits to companies employing hydrogen in their production processes.

## Competences

It provides comprehensive skills in hydrogen technologies. The Master's covers hydrogen production, combustion systems, fuel cells, and their operation and maintenance. It also includes the economic and environmental impacts of these technologies. The course addresses hydrogen storage, transportation, and distribution systems, and prepares individuals to apply these technologies at an industrial level, mobility, and urban/residential use. Lastly, it covers risk and safety management in compliance with current regulations. Overall, it prepares individuals for various roles in this emerging field.

## Target audience

The Master is aimed at professionals interested in training in hydrogen technologies and their applications, a specialty aligned with European decarbonization strategies and the promotion of the industrial hydrogen sector:

- Project managers and technicians from companies that are introducing or plan to introduce Hydrogen technologies in their products or services in the future.
- Professionals from the industrial or technological sector interested in the potential of this new emerging technology to open new professional opportunities.
- Supplier companies in the energy sector that in the future intend to offer their products and services to the hydrogen sector and that need to begin preparing their technicians.



Sources: [https://www.mondragon.edu/cursos/es/master-interuniversitario-tecnologias-hidrogeno?utm\\_source=5498\\_NdP\\_Ind\\_TOT\\_22-23&utm\\_medium=POST&utm\\_campaign=22205900\\_MITH](https://www.mondragon.edu/cursos/es/master-interuniversitario-tecnologias-hidrogeno?utm_source=5498_NdP_Ind_TOT_22-23&utm_medium=POST&utm_campaign=22205900_MITH)

## HYDROGEN: A CRUCIAL PUZZLE PIECE IN THE ENERGY TRANSITION BY UGAIN

UGain, UGent Academy for Engineers, organizes intensive training courses that reflect the current state of technology and science, it bridges the gap in knowledge with young graduates and offers employees with years of experience the opportunity to orient their careers in a new direction. 'Hydrogen: a crucial puzzle piece in the energy transition' training contributes to the professionalized training offering on hydrogen, tailored to the companies.

### Scope

This post-academic training program focuses on hydrogen, highlighting its pivotal role in the energy transition towards a sustainable and climate-resilient society and economy.

It covers various aspects of hydrogen technology, including production, conversion, storage, transport, usage, safety, and business cases. The program aims to equip participants with the necessary competencies to navigate the entire hydrogen value chain.



Sources: <https://www.ugain.ugent.be>

## Competences

Participants will develop competencies across the entire hydrogen value chain, including but not limited to production, conversion, storage, transport, and utilization in diverse sectors. The program emphasizes theoretical knowledge combined with practical insights gained through industry visits. Safety considerations and certification for hydrogen-related processes and applications are also addressed.



## Target audience

This program primarily targets individuals working in companies seeking to transition to hydrogen, such as those in the steel or chemical sectors, or those involved in developing, designing, or implementing hydrogen technology for specific applications like transportation or industry. It is specifically tailored for technical professionals seeking to enhance their expertise in hydrogen technology. A minimum prerequisite for participation is at least a technical bachelor's degree level of prior knowledge.

Sources: <https://www.ugain.ugent.be/waterstof2024.html>



Since February 2023, collaborative efforts with the Merseburg University of Applied Sciences, the Otto von Guericke University Magdeburg, and the Anhalt University of Applied Sciences have been ongoing to establish a central H2HUB for training and further education.

### Scope

The objective is to delineate the intersections between company requirements and the prescribed curriculum of training and further education, while also pinpointing synergies and harnessing their potential. Future specialists will need both specialized expertise and a comprehensive understanding of the hydrogen economy.

Previously conducted separately, the training and further education formats of network partners will now be consolidated and enhanced with complementary options. The coordination of tasks and competencies in developing knowledge transfer formats will be synchronized among network partners and transformed into collaborative project offerings.



## Competences

Objectives of the learning environment:

- Learn how to set up a hydrogen system and understand how the individual components work in a playful way;
- Visualization of the specialists in a hydrogen plant and their tasks;
- Expandable content through module system, "quests" and scenarios;
- Visualization and virtual application of current R&D in the field of hydrogen.

Goal of the learning environment:

- VR serious game for students;
- Modelling parameters of energy transfers between different infrastructures;
- Development of a generic prototype in the style of an economic simulation;
- Parameter modelling taking into account permanent and discontinuous resources and different consumption values.

Development of further training on selected topics of the hydrogen value chain for a wide range of target groups, e.g. for plant manufacturers and operators, planners and project developers, decision-makers in companies or municipalities, etc.

## Target audience

Students, specialists, and executives will be trained for the knowledge areas of the hydrogen economy in accordance with their needs (bachelor or master level, part-time further education).



New Energy Business School, established in 2002 by Gasunie, Gazprom, and the University of Groningen, later joined by Shell and Enagás, evolved over time. In 2017, it merged with Energy Valley and Energy Academy Europe to form New Energy Coalition.



This coalition aims to bring together researchers, entrepreneurs, and policymakers to boost innovation, achieve breakthroughs in technology and knowledge, and drive changes in mindset and behavior regarding the energy transition. The business school is responsible for the organization of 'Executive Programme Hydrogen' course.

### Scope

The school's 'Executive Programme Hydrogen' focuses on key topics driving the hydrogen revolution, including geopolitical considerations, financing models, infrastructure development, and safety protocols. This program equips participants with strategic foresight, technical expertise, and leadership judgment needed to drive meaningful change in the hydrogen sector.



## Competences

The program comprises three modules. The initial module, spanning two days, is held at Rotterdam School of Management in the Netherlands. This segment concentrates on hydrogen value chains, market developments, and leadership.

Following this, the second module, also spanning two days, will be hosted at Nyenrode Business University in Breukelen, the Netherlands. This module explores the role of harbors, hydrogen import strategies, and incorporates a workshop on design thinking. This methodology aids in implementing innovation and fosters early engagement with stakeholders' perspectives.

The third module, situated in Norway, shifts the focus towards hydrogen production and implementation. During the interim period, participants will be tasked with crafting a New Energy Essay, to be presented during the second module.



### Target audience

This masterclass is designed for high-profile individuals within the hydrogen sector who are motivated to shape the future of energy. It caters to leaders, innovators, and visionaries committed to driving transformative change through the strategic integration and advancement of hydrogen technologies. It is a program designed for those with knowledge and experience in the energy sector.

Sources: <https://www.nebs.nl/programme/executive-programme-hydrogen/?instance=208>