

The white paper you have in front of you is based on the findings of the research report, 'Hy2Market: Training Guidelines'. Its goal is to provide a comprehensive overview of the hydrogen workforce and training landscape by assessing market demand and existing training offerings, identifying gaps between demand and supply, and proposing improvements to better align training provision with actual workforce needs.

## Empowering the Hydrogen Workforce: Aligning Skills with Market Needs

Europe is in full swing to transform towards a European hydrogen economy. In order to become a global leader in hydrogen, Europe needs to enable its strong innovative SME's and to stimulate Investments. To give the European hydrogen market a boost, the Hy2Market project was established. Alongside its technical and infrastructural work, the project also addresses regulatory barriers and supports capacity building.

Within this framework, training and knowledge exchange play an important role in equipping Europe's workforce and stakeholders with the skills needed for a safe and effective hydrogen transition.





Building the right knowledge base is essential to enable a smooth and effective hydrogen transition. To achieve this, it is important to create an overview of existing training material and to check if this matches the

demand by the market. Our goal is to generate market insights by comparing the available training material with the practical experiences of partners active in the hydrogen field.

Within this project, we collected extensive information on desired training needs through a survey conducted among its 38 partners at the time of the research, complemented by an overview of existing programs and expert assessments gathered during several consortium meetings. This allows us to conclude:

1. How to best structure and deliver training programmes;
2. Where key gaps in current education and training provision exist;
3. How hydrogen-related education and training can be improved.

## Research scope

-  **Combination of quantitative & qualitative research**
-  **Desk research:** Netherlands, Austria, Greece
-  **Survey of 38 partners:** 14 hydrogen-related roles analyzed
-  **Goals:** identify training gaps, assess current offerings, suggest improvements

# Hydrogen Skills and Workforce Insights in Europe

Bridging education and industry needs for the European hydrogen transition



Co-funded by  
the European Union

## About

# Hy<sub>2</sub>Market

[Hy2Market](#) is a European Union-funded project (2023–2027) established under the Interregional Innovation Investments (I3) instrument. Its mission is to accelerate the development of a European hydrogen economy by strengthening collaboration between regions, industries and innovation ecosystems across Europe.

The project connects regions with strong hydrogen production potential to those with growing demand, aiming to advance the entire hydrogen value chain, from production and transport to industrial and mobility applications.

The Hy2Market consortium brings together 42 partners from across Europe.

[Get to know our partners.](#)

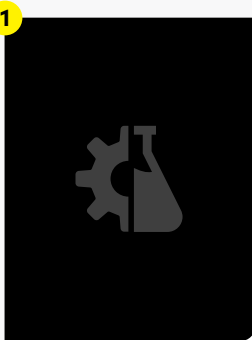


# Roles and Knowledge Requirements for Scaling the Hydrogen Economy

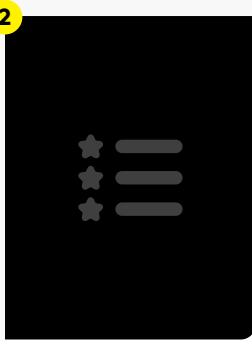
Scaling the hydrogen value chain requires building knowledge across diverse roles within companies, each with distinct focus areas. This is critical now, as the industry transitions from pilot projects to large-scale deployment. Without the right knowledge in place, companies risk delays, safety incidents, and inefficient operations.

The following knowledge domains were considered: Operational, Material, Engineering, Chemical, Safety, Energy Conversion, System Integration, Economic/Market, R&D, Legal.

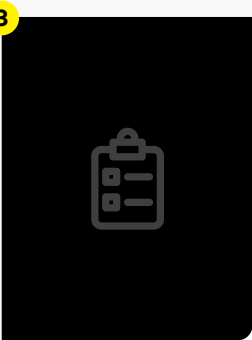
## 4 Key Insights



**Mechanical and Chemical Engineering positions** require the deepest knowledge across all domains, reflecting their central role in design, integration, and process optimization.



**Engineering & Technical roles** (Mechanical, Chemical, Electrical, Quality & HSE) demand strong expertise in engineering, safety, and operational aspects to ensure robust and safe system performance.



**Managerial and business-oriented roles** (Finance, HR, Purchasing, Top-Level Management) prioritize economic, market, and legal knowledge, essential for strategic decision-making and compliance.



**Cross-functional roles** (R&D, Mid-Level Management, Logistics) require a balanced mix of technical and strategic knowledge, enabling coordination across disciplines.

## Three Common Learning Needs Across Roles

### 1. Safety

Non-negotiable for all technical roles and relevant for commercial functions due to compliance and risk management.

### 2. Basic technical understanding

Non-technical roles require a basic understanding of materials, processes, and system interfaces to make informed decisions and evaluate projects and contracts.

### 3. Economic and Legal Knowledge

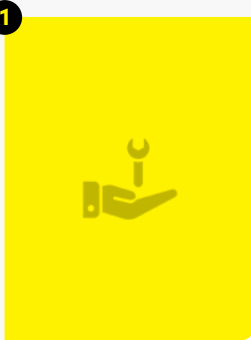
Universal for strategic decision-making and regulatory compliance.

The next section of this Whitepaper will explore training formats in more detail and outline how companies can structure effective learning strategies.

# Training Formats for Building Competence for the Hydrogen Workforce

Developing a skilled hydrogen workforce requires combining theory, practice, and collaboration across multiple learning pathways. Hy2Market findings highlight that effective training complements formal education with applied, company-driven training and on-site experience, addressing technical skills gaps, and ensuring that Europe's workforce is ready to drive the hydrogen economy.

## 4 Key Insights



**On-the-job Learning is crucial:** Practical, hands-on experience is crucial in sectors like hydrogen production, transport, and use. Companies can enhance skills through task rotations and mentorship programs.



**Heavy reliance on Previous Education:** Formal undergraduate and graduate education provide the foundation for hydrogen workforce preparation. However, real-world skills gaps remain.



**External Training and Workshops are important:** External programs are essential for keeping skills and knowledge up to date, especially in fast-evolving hydrogen technologies, renewable energy, and safety.



**Learning from Peers plays a crucial role:** Peer learning fosters knowledge exchange and innovation, enhancing performance through shared expertise in hydrogen production, transport, and use.

## Additional Insights

**Internal training programs** are highly beneficial because company-based initiatives can tailor learning to organization-specific technologies and skills, ensuring close alignment with operational and strategic needs. **Cross-functional collaboration** also adds significant value, as joint training across technical, economic, and policy domains fosters a holistic understanding of the hydrogen value chain. In addition, **company libraries and resource centers play an important role** by providing centralized access to technical manuals, case studies, and industry reports, thereby supporting continuous learning on hydrogen technologies. **Self-study is becoming increasingly relevant**, with independent learning through research papers and online courses enabling professionals to deepen expertise in targeted hydrogen-related topics. At the same time, **online learning platforms are growing in importance**, as digital courses and webinars

offer flexibility, broaden access to hydrogen education, and support rapid reskilling. Finally, **internal knowledge-sharing platforms are key drivers of innovation**, as dedicated physical or digital spaces allow employees to exchange best practices and collectively develop new hydrogen-related know-how.



# Recommendations

## Make concrete hydrogen workforce and reskilling plans

- List all hydrogen roles needed for each upcoming project phase (development, construction, operation) and estimate full-time equivalents (FTEs) for the initial years.
- Identify relevant source professions from existing country-specific labor pools. Then make decisions on buy or build strategies (recruiting externally or reskilling internally), resulting in a company-wide strategy paper.



## Definition of role-specific, task-based training paths

Start with design of short modular training paths for critical roles (O&M technician, project engineers).

Procedure:

- Listing of most critical tasks per role (leak checks etc.)
- Transferring tasks into small modules (theory + guided practice + short checks)
- Distribution of modules over 6-12 modules in form of a small internal curriculum



## Mentoring and on-the-job learning must be mandatory, not optional

Assign a mentor to every new employee for 6-12 months. Newcomers shadow experienced staff on shifts for the most important tasks they should learn.

Keeping a simple competence log (date, task, observed, assisted, independent, mentor signature) as a basis to sign off responsibility.



## Selective use of external training

External training should be selected for areas where external expertise and rapid innovation outpace internal capabilities.

- Prioritize it for specialist hydrogen topics (e.g., HAZOP) and cross-industry lessons learned that are not yet mature internally.
- Choose external courses to track fast-evolving regulations, standards, and frontier developments (e.g., new electrolyzer designs or safety concepts) ahead of in-house updates.
- Opt for joint sessions with partners to share costs and align on shared practices, then integrate insights via updated internal checklists for organization-wide impact.

## Regional collaboration to widen the talent pool

Close collaboration between neighboring companies, with vocational schools, technical colleges, Universities of Applied Sciences, Clusters, Federal location agencies, Departments of Education, labor market services, professional external educational institutions etc. via:

- Setup of regional hydrogen training pools
- Development of small sets of practical microcredentials (e.g. Hydrogen Safety Basic, H2-Plant operator Level 1 etc.)
- Systematically tap feeder sectors that may lose jobs in the transition phase



## Interested in the full report?

The findings and insights in this white paper are based on deliverable 6.3 from the Hy2Market project.

## Contact

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For any questions regarding the white paper or the full report.

## Stay up-to-date

Want to receive updates about Hy2Market research and deliverables in the future?