

Hydrogen Skills Alliance

Driving Development of Hydrogen Skills in the UK





Executive Summary

The UK government recognises hydrogen as a critical element in achieving its net-zero emissions goal by 2050. To support this transition, a skilled workforce is essential. Our recent workforce assessment estimated approximately 29,000 direct jobs will be needed across the hydrogen economy by 2030, a significant increase from the current 1,600 jobs¹.

To capitalise on future technologies, the UK must develop a skilled workforce ready to embed and adopt a hydrogen energy model. Failure to do so risks losing productivity gains and market leadership. This nascent, complex, and cross-sector industry needs a different approach to skills. If we wait for the market to establish it will be too late, too slow, and too inefficient. To overcome this market failure, a systematic and collaborative approach is essential to ensure the right skills, in the right place at the right time.

The Hydrogen Skills Alliance (HSA), founded by Cogent Skills and the National Composites Centre in 2023, brings together over 50 organisations from across the four nations of the UK, including industry, academia, government, and skills bodies, to address the skills gaps and promote innovation.

¹ [Hydrogen-Workforce-Assessment-Executive-Summaryfinal.pdf](#) (cogentskills.com)

This report celebrates our initial 12 months of progress and outlines the work that lies ahead.

In our first 12 months, we have driven change by:

- 1. Identifying future skills requirements:** Assessing and projecting future workforce needs through initiatives like Workforce Foresighting.
- 2. Developing a Hydrogen Skills Framework:** Creating a guide to the knowledge, skills, and behaviours required by roles across the hydrogen economy, ensuring clarity and direction for training programmes.
- 3. Providing a Knowledge Repository:** Collecting and disseminating information and data on hydrogen skills from research and skills communities to support stakeholders.
- 4. Supporting Skills Solutions:** Enabling the creation of training programmes and frameworks across the Skills Value Chain, from basic awareness to specialised roles.
- 5. Influencing Policy:** Acting as a single voice into government to shape skills policy and address skills challenges to support the growth of the hydrogen economy.

Over the next 12 to 24 months our ambition is to:

- 1. Deliver a UK Hydrogen Skills Strategy:** Develop a comprehensive strategy to address workforce needs and skills development for the hydrogen economy.
- 2. Increase Industrial Engagement:** Encourage collaboration between industry stakeholders to enhance the provision of hydrogen-related skills.
- 3. Conduct further Workforce Foresighting Cycles:** Continuously assess and project future workforce requirements by analysing the necessary knowledge, skills, and behaviours.
- 4. Create a Dynamic Workforce Demand Model:** Develop a model to understand workforce demand dynamics in the evolving hydrogen sector.
- 5. Analyse Remaining Key Occupational Competencies:** Identify the “hydrogen delta” – the additional knowledge, skills, and behaviours required for roles operating in hydrogen-fuelled environments.
- 6. Pilot a Hydrogen Skills Academy:** Provide coordination for skills development and delivery across the hydrogen value chain.

By implementing these recommendations, our aim is to equip the UK with the skills to lead in the global hydrogen economy.

The first 12 months...

Our Approach

We have elected to follow a Skills Value Chain² approach in our work to connect workforce development with the wider innovation ecosystem to build a hydrogen skills base fit for the future.

The Skills Value Chain consists of three key steps; Convene, Curate, and Catalyse:

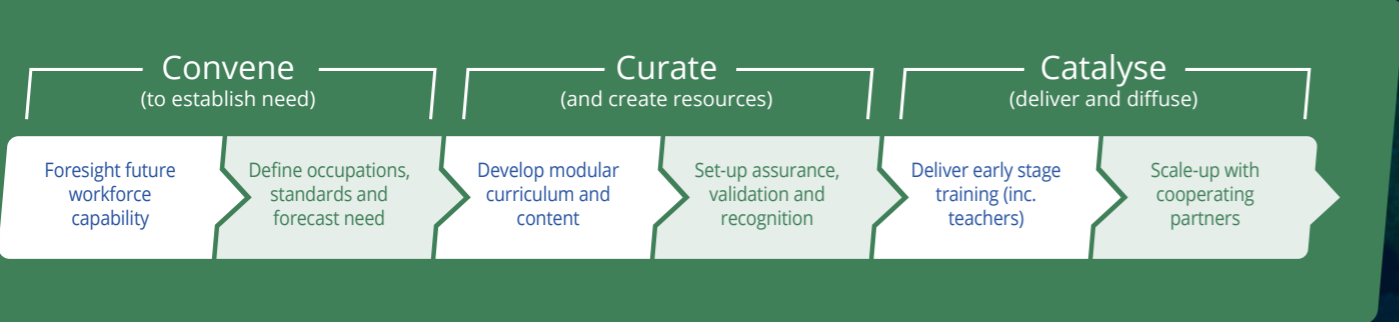


Figure 1: Skills Value Chain

The focus of our activity is at the early stages of the Skills Value Chain (Convene), bridging the gap between skills required for new technologies, and the current workforce. These early-stage activities included a **workforce assessment**, **skills foresighting**, and the creation of a **hydrogen skills framework**.

Workforce Assessment

Understanding the current workforce and the impact of future demand for skills is essential for effective skills planning. Our initial assessment was carried out in collaboration with government and industry across production, storage and distribution of hydrogen and its usage in industry, for heating and as a source of power. The assessment also considered construction of facilities in these parts of the hydrogen chain.

The assessment estimates the 2030, 10GW hydrogen economy will create 28,675 direct and 64,500 indirect jobs.

	Production	Transmission	Transport & Distribution	Storage	Transport (Usage)	Industrial Processes	Heat	Power	Total
Direct	8,500	6,000	1,500	3,000	3,500	2,500	175	3,500	28,675
Indirect	24,000	13,500	3,000	6,000	7,500	3,500	300	6,000	64,500

Challenges identified by the assessment include:

- Skills and labour shortages
- Uncertainty around workforce demand
- Sector and technology awareness and attractiveness
- Lack of diversity within the industry
- Unknown usage supply chain skills requirements due to nascent technology
- Lack of clarity of hydrogen specific and related roles
- Lack of capacity in the provider network
- Lack of regulator capacity and expertise

The report's recommendations are informing the development of a UK Hydrogen Skills Strategy.



² The Skills Value Chain – HVMC (catapult.org.uk)

Foresight Future Skills Needs

Hydrogen technology is evolving quickly in response to global, national and sector challenges. A systemic approach is required to identify the organisational capabilities and competencies necessary for its adoption.

The Skills Foresighting process, the first step in the Skills Value Chain approach, is led by The Workforce Foresighting Hub – an initiative initiated and funded by Innovate UK and developed in collaboration with the Catapult Network. The Hub provides the processes and data that inform skills insights and recommendations that in turn inform the response of industry, policymakers, and educators.

The first cycle of skills foresighting, carried out this year, focused on pressurised hydrogen storage technology, critical in all aspects of bulk storage, distribution, and commercial use with application across many industrial sectors.

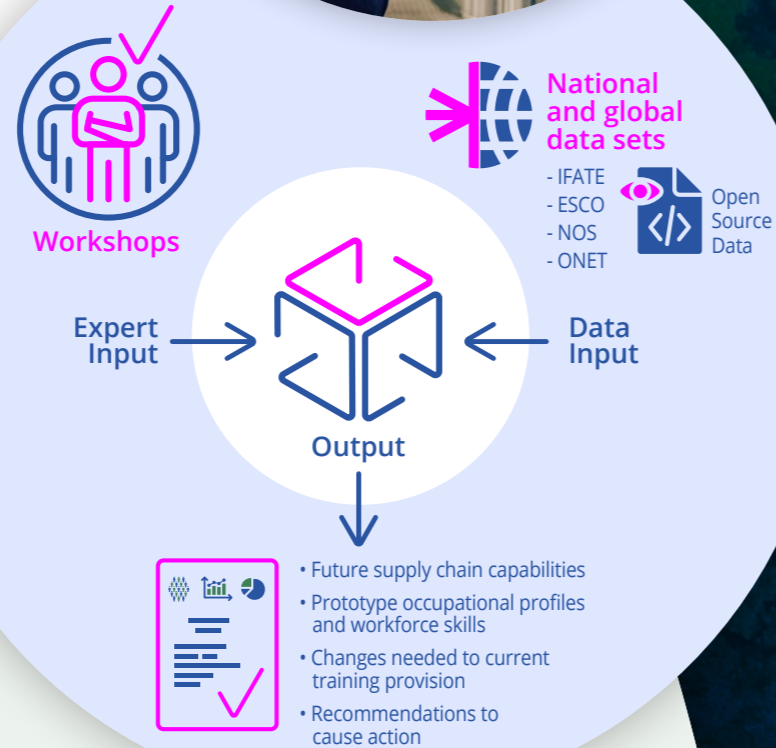
Through the foresighting process, a range of future occupational profiles were proposed for this technology and the required knowledge, skills, and behaviours mapped. Subsequently, these were compared to 750 Institute for Apprenticeships and Technical Education (IfATE) standards to identify where action might be necessary.

Of the 23 proposed occupational profiles analysed:

- Only one has adequate coverage in existing IfATE standards.
- 19 have partial coverage, necessitating additional content.
- Three lack sufficient coverage, indicating the need for new standards or major revisions.

The analysis revealed current IfATE training standards require urgent attention to meet the needs of a pressurised hydrogen storage workforce and underscores the importance of updating and expanding standards and frameworks to meet the evolving demands of the hydrogen sector.

Recommendations captured in the final report are being taken forward by a 'Cause Action' working group led by the HSA.



Hydrogen Skills Framework

The HSA is developing a hydrogen skills framework to guide employers in identifying the competencies required for existing job roles following a transition to a hydrogen-fuelled environment. The resulting Hydrogen Skills Framework will provide a trusted single reference point for the development of new training programmes and provide evolving evidence to support the modification of existing training programmes, qualifications and university curricula.

In a demonstration of principle over 100 roles have been identified across the hydrogen economy of which 14 have been mapped against the framework to date.

Hydrogen Awareness Modules

In 2023, the High Value Manufacturing Catapult (HVM Catapult) developed a suite of six Hydrogen Awareness Modules³. They serve as an initial resource for building foundational knowledge about hydrogen, covering hydrogen fundamentals, production, storage & distribution, and use. They are freely accessible to all and, to date, have been utilised by over 1000 users.

- Overall Considerations
- Hydrogen Production
- Storage and Distribution
- Energy Use: H2 as Feedstock
- Energy Use: Industrial and Domestic
- Energy Use: Transport

Landscape Mapping

To enhance awareness and reduce duplication, the HSA has developed a dynamic landscape map of hydrogen-related activities across the UK. This resource encompasses initiatives, strategies, training courses, and qualifications and is regularly refreshed by HSA members.



3 <https://hydrogenaware.co.uk/login/index.php>

Recommended Next Steps

The recommended next steps for the HSA have been identified and include the following key activities:

1. Developing a UK Hydrogen Skills Strategy

The HSA has been commissioned by the Hydrogen Delivery Council to develop a UK Hydrogen Skills Strategy. Using the evidence base and recommendations developed in our workforce assessment, this strategy will set out an action plan for a robust workforce equipped to champion the integration and growth of the UK's hydrogen economy.

2. Growing industrial engagement and developing dialogue in hydrogen skills

The HSA proactively engages with stakeholders from diverse sectors through our quarterly meetings, consultations and projects. Its aim is to broaden this industrial engagement to achieve representation across the hydrogen economy.

Through links with wider organisations, such as HII (Hydrogen Innovation Initiative) and the HIA (Hydrogen in Aviation group), the HSA will provide clear alignment between technology and skills.

The HSA will continue to work with government through its membership of the Hydrogen Delivery Council and relationships with government departments such as the Department for Energy Security and Net Zero, the Department for Education, and Skills Development Scotland to support policy development and execution for hydrogen skills.

3. Continuing to foresight skills

Hydrogen technology is developing rapidly. The HSA will continue to map the competencies needed for its mainstream adoption. Foresighting cycles are planned for cryogenic storage, hydrogen gas turbines and fuel cells. The HSA will implement the recommendations from foresighting reports by collaborating with industry, technology, and academic stakeholders to drive action, while continuously assessing and forecasting future skill requirements.

4. Developing a dynamic modelling tool

The best skills require timely and robust data on forthcoming projects. The HSA want to enhance understanding of workforce demand by developing a dynamic 'linear optimisation' model to provide scenario-based workforce and skills forecasts that can support national and regional skills planning.

5. Mapping additional use cases in skills framework

Building on the 14 occupations mapped as a test of concept, the HSA will work with employers to map the remaining key occupations identified across the hydrogen economy. The HSA will also seek to design practical solutions from the results, such as developing and delivering training content.

6. Proposed Hydrogen Skills Academy pilot

Delivery of the UK Hydrogen Strategy requires a collaborative and systematic approach due to the unique characteristics of the UK's hydrogen economy. The HSA is working with the Hydrogen Delivery Council to develop a proposal for a Hydrogen Skills Academy. The Academy would serve as a network of excellence for aggregating and delivering hydrogen-related skills via regional hubs ensuring high-quality hydrogen skills can be delivered at a time and place needed by employers.

Looking ahead, the HSA's commitment to delivering a skilled hydrogen workforce remains in sharp focus. With continued collaboration shaping activity, the HSA is poised to play a pivotal role in equipping the UK with the expertise needed to capitalise on the opportunities presented by the hydrogen economy.

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