Skills Development Scotland

Hydrogen Skills Baseline

A report for the Scottish Hydrogen Skills Group

October 2025

Contents

Executive summary

Background

This hydrogen skills baseline has been led by Skills Development Scotland (SDS) on behalf of the Scottish Hydrogen Skills Group. It involved a desk-based review of existing evidence along with a small number of consultations to supplement this and add depth. The focus was largely on understanding **hydrogen workforce demand in terms of the volume of jobs and the skills implications arising from this**. However, the report also considered some existing supply-side skills challenges identified in the evidence review.

Policy landscape

Hydrogen is expected to play a key role in supporting Scotland's transition to net zero. National targets set out the ambition for hydrogen to provide **5 gigawatts (GW) of renewable and low carbon hydrogen production capacity by 2030 and 25 GW by 2045.**

Scotland has an advantage in producing hydrogen and is well placed to capitalise on opportunities from a growing hydrogen economy. This is driven by access to natural capital, including wind, wave and tidal resources, as well as existing industrial infrastructure such as port facilities.

The skills and expertise of the existing energy workforce is another significant asset, built from decades of experience in offshore engineering and oil and gas. If hydrogen is expected to take a more significant role in Scotland's energy mix in the future, then it will require people with the skills and experience to work with hydrogen at every stage of the hydrogen value chain. There appears to be a consensus that the skillsets required for the hydrogen workforce will not differ significantly from the existing energy workforce and that many of the roles in hydrogen will be similar to those found in sectors including oil and gas, petrochemicals, subsea, aerospace and onshore and offshore renewables.[1,2,3,4]

Factors which may limit Scotland's hydrogen potential

There are several factors which could limit the realisation of Scotland's hydrogen ambitions and therefore the need for jobs and skills in the sector. This includes factors such as grid connections, international competition, the relatively high cost of production of low carbon and renewable electricity, securing hydrogen offtakers and policy, regulation, and environmental and planning challenges. This uncertainty creates challenges for skills planning as there are many unknowns including likelihood of projects progressing, anticipated job volumes and timescales for these job requirements.

1 Scottish Government (2022), Hydrogen action plan
2 UK Government (2021), Green Jobs Taskforce Report
3 Scottish Government (2025), Grangemouth Industrial Just Transition Plan
4 Scottish Government (2020), Scottish Hydrogen Assessment

Hydrogen in Scotland's regions

The ability of Scotland's regions to benefit from hydrogen economy opportunities will depend on several factors including proximity to natural resources and industrial infrastructure. Significant investments are being made in some regions through the Hydrogen Allocation Round (HAR).

HAR1 confirmed revenue support funding over a 15-year period for 11 projects, two of which are in Scotland – Whitelee Green Hydrogen Project and Cromarty Hydrogen Project. HAR2 shortlisted projects were announced in April 2025.[5] In Scotland a total of eight projects were invited to the next stage of the process. This includes: Binn Ecopark Hydrogen Facility; Creca Hydrogen Facility; Grangemouth Green Hydrogen; Irvine Green Hydrogen Project; Selms Muir Hydrogen; Shetland Hydrogen Project 1 Strathallan Hydrogen Facility and Whitelee Green Hydrogen Phase 2.

Investment in hydrogen projects in Scotland's regions may create a need for hydrogen workforce skills at a regional level, requiring either a supply of skilled people locally or use of a mobile workforce which is seen elsewhere in the energy sector. However, the review of evidence uncovered limited information about specific detailed workforce demand at a regional level. Insight from RGU's recent report indicates that "a new offshore energy workforce model is emerging, featuring a more transient and flexible workforce. There will be a greater focus on capital activities and vocational work, and people will typically move from project to project across the country."[6]

Demand for a hydrogen workforce

The evidence identified **several sources of forecast hydrogen workforce demand, varying significantly**. The following caveats provide insight into some of the limitations of the data:

- **Methodology** – the data sources use different methods to develop forecasts. ECITB's labour forecasting tool, for example, is based on data gathered from the workforce census[7] and captures only engineering construction jobs. Others, such as Scottish Enterprise and the Scottish Hydrogen Assessment use scenario-based projections which are based on a range of scenarios. Scottish Enterprise's report on Economic Impact Scenarios for Scotand's energy transition report, for example, include both a strong ambition scenario and a business-as-usual scenario.[8]

- **Timescales** – the data gives a range of short, medium and long-term forecast demand for a hydrogen workforce. ECITB's Labour Forecasting Tool can be accessed through Power BI, allowing for analysis of a specified time series.[9] Other sources provide forecast demand up to a single point in time, i.e. 2030, 2045, 2050.

- **Geography** – this report has information on forecast demand at Scottish and UK levels. Although the Scotland-specific information is more relevant for this piece of work, it is useful to include UK estimates too.

5 https://www.gov.uk/government/publications/hydrogen-allocation-round-2-har2-projects/hydrogen-allocation-round-2-har2-shortlisted-projects

6 RGU Energy Transition Institute (2025), Striking the balance: Building a sustainable UK offshore energy workforce

7 ECITB, Workforce Census

8 Scottish Enterprise (2024), Economic Impact Scenarios for Scotland's Energy Transition

9 ECITB, Labour Forecasting Tool

- **Up-to-date evidence** – timeliness of information is key, particularly given the pace of change in the renewable energy sector. However, many of the sources included in this report are dated. The Scottish Hydrogen Assessment, published in December 2020, for example, will not account for more recent policy or investment developments which may influence demand for skills.[10] While information contained in this report will have been based on the best available data at the time, it should be used with caution, recognising limitations, and caveated appropriately.

- **Sector maturity** – insight suggested that because the sector is still developing there are some unknowns about jobs, with skills often being a consideration later in project development..

The data is wide-ranging in the scale of forecast demand, but in general **points to the creation of potentially significant job opportunities in Scotland's hydrogen economy if ambitions are realised (but recognising there are several factors which could impact on projects progressing)**. Looking just at Scotland-specific data, forecasts range from 236 full-time equivalent (FTE) jobs by 2030 using SE's business as usual scenario[11] to as many as 310,000 total jobs by 2045[12], although the highest forecast figure of 310,000 is a significant outlier. Table 1 provides a high-level summary of forecast demand, showing the range of different forecasts identified through the desk review.

10 Scottish Government (2020), **Scottish Hydrogen Assessment**

11 Scottish Enterprise (2024), **Economic Impact Scenarios for Scotland's Energy Transition**

12 Scottish Enterprise (2020), **Scottish Hydrogen Assessment**

Table 1 – Summary of forecast demand for a hydrogen workforce

Region	Source Title	Author	Timeframe	Measure	Demand Forecast
Scotland	Mapping the current and forecasted hydrogen skills landscape (2023)	ClimateXChange	2025-2030	Average direct annual employment (FTEs)	6,614 direct FTE jobs per year
	ECITB Labour Forecasting Tool (2024)	ECITB	2025-2030	FTE jobs (cumulative demand over the period)	6,927 - 7,346 FTE jobs
	Economic opportunities in Scotland's net zero and climate adaptation economy (2024)	ClimateXChange	2030	FTE jobs	5,191 FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2030	Direct FTE jobs (business as usual scenario)	236 direct FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2030	Direct FTE jobs (strong ambition scenario)	5,407 direct FTE jobs
	Mapping the current and forecasted hydrogen skills landscape (2023)	ClimateXChange	2030-2035	Average direct annual employment (FTEs)	18,535 direct FTE jobs per year
	Scottish Hydrogen Assessment (2020)	Scottish Government	2045	Total jobs	70,000 – 310,000 jobs
	Economic opportunities in Scotland's net zero and climate adaptation economy (2024)	ClimateXChange	2050	FTE jobs	3,793 FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2050	Direct FTE jobs (business as usual scenario)	714 direct FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2050	Direct FTE jobs (strong ambition scenario)	6,909 direct FTE jobs
UK-wide	UK Hydrogen Strategy (2021)	UK Government	2030	Total direct jobs	9,000 direct jobs
	Hydrogen Task and Finish Group: Findings and Recommendations (2024)	Hydrogen Skills Alliance	2030	Total jobs	29,000 direct jobs, 64,500 indirect jobs
	UK Hydrogen Strategy (2021)	UK Government	2050	Total direct jobs	Up to 100,000 direct jobs

Real-time job posting data reveals an upward trend in job postings which mention hydrogen in recent years and these roles typically pay above average salaries. However, consultation insight suggests this falls below the average for oil and gas roles.

Given the variance across the different sources in terms of methodology, source data, assumptions etc., it is not possible to directly compare figures. However, based on analysis and interpretation of the employment forecast data in this report, and reflecting the scale of uncertainty, the report makes the following recommendations for the Scottish Hydrogen Skills Group:

- A **focus on Scotland-specific data** – there are numerous forecasts relating to the potential for hydrogen jobs in the future. Although the UK forecasts will likely incorporate some demand in Scotland, the detail of this is not always clear. **Therefore, it will be more useful for the group to focus on forecasts which are specific to Scotland**.

- **Exclude outliers** – the figure of 310,000 from the Scottish Hydrogen Assessment is a significant outlier when set against the other forecasts included in this report – this figure is based on the most optimistic of the three scenarios set out in the assessment which is that Scotland will become an exporter of green hydrogen to European markets by 2045. Feedback from the group suggested that a conservative approach is taken to forecasting future hydrogen jobs, **therefore, it is recommended that the group focusses on the lower range of short-term forecasts when describing anticipated future demand for hydrogen jobs**.

- **Use a range of forecasts to describe potential future demand** – the evidence identifies significant uncertainty, driven by several factors which could limit the realisation of Scotland's future hydrogen production capacity. Given this uncertainty, it is recommended that rather than focusing on just one set of forecasts, **the group should use a range of data to describe the potential scale of future demand in the hydrogen economy and that this is caveated to highlight potential limiting factors**.

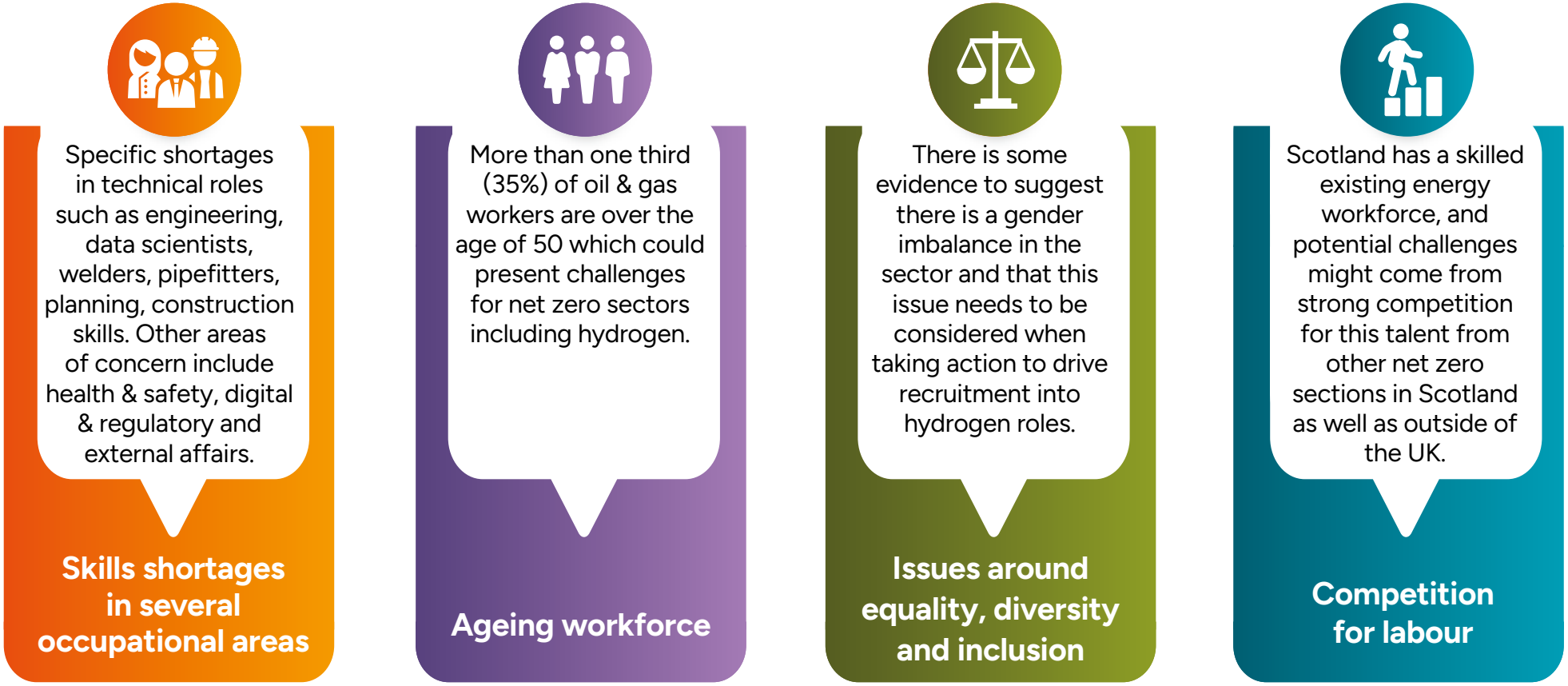
- **Describe potential demand over two time periods: short-term (to 2030) and longer term (to 2050)** – in light of the significant uncertainties, limiting factors and pace of change in terms of hydrogen announcements such as HAR2 and projects reaching Final Investment Decision (FID), the group should consider describing forecasts across two timescales. In the shorter-term, up to 2030 **the available evidence suggests that there could be between 236 and 7,346 jobs in the hydrogen economy. The longer-range forecasts will be subject to greater uncertainty driven by some of the limiting factors mentioned earlier in the report**.

- **Supplement forecasts with the use of real-time information** – members of the Scottish Hydrogen Skills Group have access to information which can help to enhance understanding about jobs and skills in the hydrogen sector. Scottish Enterprise collects information through their project database and Skills Development Scotland can provide insight about relevant job postings from Lightcast. **The group should use this information where possible to get a more detailed understanding about current demand for jobs and skills in the hydrogen sector.**

Existing skills issues

The hydrogen economy will need people who can work in roles across all stages of the life cycle from planning and construction through to production, distribution, transport and storage. However, evidence revealed some existing skills issues could have implications for the future hydrogen workforce. Figure 1 provides a summary of these skills challenges. This is covered in more detail in Chapter 5.

Figure 1 – Potential skills issues which might impact the hydrogen sector



Future research, evidence and insight

The consultations revealed some pieces of research which are underway or have been completed as well as some that is planned for 2025/26 and which might help to improve our understanding of the potential demand for a hydrogen workforce. These research pieces, led by Scottish Enterprise, could help improve understanding of the potential demand for hydrogen skills.

- Hydrogen technology component factsheets
- End-to-end supply chain mapping for green/electrolytic hydrogen production projects
- H2 scenario planning (title TBC)

Conclusions

Hydrogen represents a significant opportunity and forecast demand data, though varied in scale, reveals that **significant employment opportunities are expected in Scotland's hydrogen sector if ambitions can be realised although it should be recognised that there are a number of limiting factors which could impact this**. The extent to which Scotland can capitalise on this depends on several factors, including skills. **The existing energy workforce has many of the skills required for hydrogen roles** but there is competition from other sectors, and internationally. **Retaining these skills will be key.**

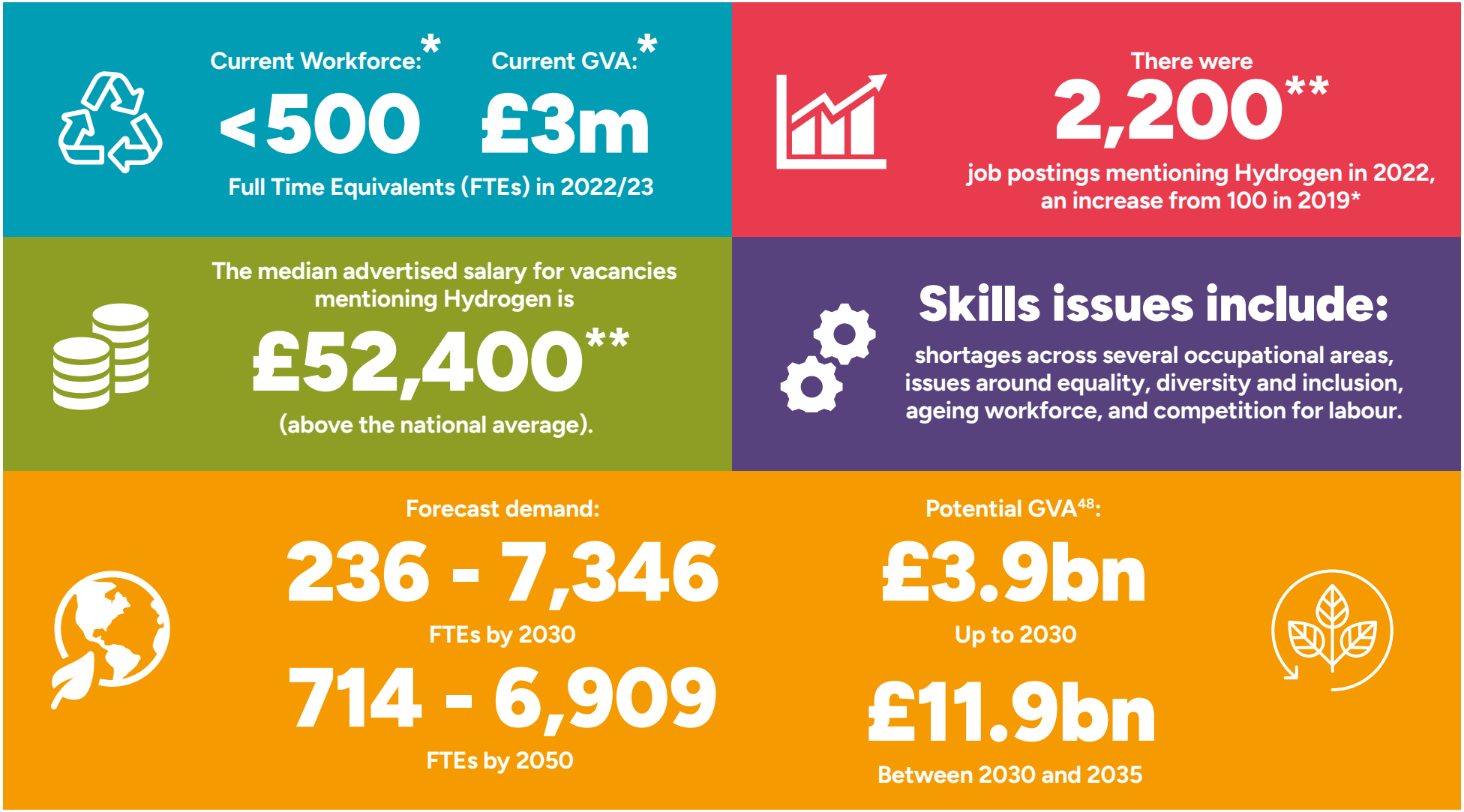
While there is consensus that hydrogen skills will be similar to the existing energy workforce, the review of existing evidence uncovered **limited information on where differences do exist (and what they look like).**

While the existing energy workforce is an asset for the net zero transition, there are some **existing issues that could be barriers to realising the opportunities** in hydrogen, including **an ageing workforce, lack of equality, diversity and inclusion in the workforce, competition for labour and existing skills shortages** in areas such as engineering, construction and planning.

Recent and planned research for 2025/26 – along with the recent insight from the ECITB workforce census in January 2025 – will help deepen knowledge of hydrogen workforce demand. Additional insight gained from sources such as Lightcast will also be particularly helpful as it reflects employers' current and emerging needs.

Figure 2: Summary of Scotland's hydrogen sector

An overview of Hydrogen in Scotland, including economic output from the sector, current employment and the range of forecast demand in the future.



*Source: ClimateXChange (2024), **Economic opportunities in Scotland's net zero and climate adaptation economy**

**Source: Lightcast (2024)

48 ClimateXChage (2023), Mapping the current and forecasted hydrogen skills landscape50 The Trading Nation report

1. Introduction, aims and approach

1.1 Background

The Scottish Hydrogen Skills Group was established in 2023 to act as an aligned and coherent skills voice for Scotland's hydrogen sector.

The group aims to ensure the prioritisation of the hydrogen skills agenda through an understanding of demand-led current and future skills needs alongside education/training developments and provision. The group has representation from several organisations including: Skills Development Scotland (SDS); OPITO; Energy Transition Zone Ltd (ETZ); OEUK; National Manufacturing Institute Scotland (NMIS); Engineering Construction Industry Training Board (ECITB); Cogent Skills/Hydrogen Skills Alliance; Enginuity; Inverness and Cromarty Firth Green Freeport; Scottish Funding Council (SFC); Energy Skills Partnership (ESP); Hydrasun and the Scottish Government.

During discussions at previous meetings, members noted the existence of multiple sources of data, insight and intelligence relating to hydrogen workforce demand, but the lack of an agreed, single evidence base for the group to work from in terms of communicating the future needs of the sector.

1.2 Purpose

The overall aim of this work is to collate the many pieces of existing evidence into one document to provide a comprehensive overview of what is currently known about demand for jobs and skills in the hydrogen sector. The final report will help the group to:

- get a detailed **overview of multiple different sources of demand data,** all brought together within one report
- understand the **skills implications** for a growing hydrogen economy
- identify potential **gaps in the evidence base**
- provide a **suggested focus for any future engagement with employers** (either through survey, industry workshops or future research commissions) around their hydrogen skills needs
- identify areas for discussion to help the group move forward in terms of **how they communicate hydrogen skills needs and fill identified gaps in the data**.

1.3 Types of hydrogen

Hydrogen has significant potential as a zero-carbon resource and a source of clean energy, as countries around the world look to phase out their reliance on fossil fuels.

There is a spectrum, or rainbow of colours which describe the wide range of different pathways which are used to produce hydrogen.

In terms of these different production methods, the main focus for this report is low carbon and renewable hydrogen. Hydrogen, which is produced via renewable and low carbon means, is the focus for policy support in Scotland. Scottish Government

targets around net zero set out ambitions for hydrogen to play a significant role in the country's energy transition.

Both blue and green hydrogen are referenced at various points throughout this report.[14]

- **green (renewable) hydrogen** – produced by splitting water using renewable energy sources such as wind, solar or hydropower, and is produced using zero-carbon

- **blue (low carbon) hydrogen** – produced via reforming natural gas or biogas in conjunction with carbon capture and storage and is a low-carbon production method.

1.4 Approach

Given the wide range of existing information relating to hydrogen workforce and skills demand, the decision was taken to adopt a multi-faceted approach which focussed largely on a desk-based review of available information.

This approach was supplemented with a handful of one-to-one conversations with relevant stakeholders. These conversations aimed to test the approach, ensure key pieces of insight were included and supplement and add detail to the insight gathered from the evidence review.

The end product aims to add value by drawing all of this evidence and insight together in one place, providing a comprehensive overview for members of the Scottish Hydrogen Skills Group:

- **Collation, analysis and synthesis of existing data, insight and intelligence relating to hydrogen workforce and skills demand.** This included a range of different policy documents as well as key sources of demand information such as the ECITB Labour Forecasting Tool[15], the ClimateXChange report on economic opportunities in Scotland's net zero economy[16], the Scottish Enterprise report on Economic Impact Scenarios for Scotland's Energy Transition and the Scottish Hydrogen Assessment.[17] A full list of the sources included can be found in the Bibliography in Appendix A.

- **Bespoke analysis of Lightcast data** to identify insight on relevant job postings. Lightcast provides job postings data which is collected by scraping information on recruitment from thousands of websites. This is collated to provide an analysis of job postings which can then be broken down by skills and qualification required, remuneration, location of job etc. This is real-time data which provides information about what employers are currently looking for in their workforce. For the purpose of this work, a bespoke analysis was created to identify and explore job postings which mention hydrogen.

- **One-to-one conversations with relevant partners** to gather insight on existing or planned data of relevance to this work. A topic guide was developed to ensure a consistent approach and steer conversations to focus on topics which would add most value to the work.

14 Scottish Hydrogen Assessment. The report also mentions grey hydrogen, which is created by reforming natural gas.

15 ECITB, Labour forecasting tool (LFT)

16 ClimateXChange (2024). Economic opportunities in Scotland's net zero and climate adaptation economy.

17 Scottish Government (2020), Scottish Hydrogen Assessment.

2. Policy context and regional considerations

2.1 The national context

Understanding the national context, as set out in key policy documents, strategies and action plans, gives an insight to the scale of the ambition and opportunity for Scotland's hydrogen sector. In turn, this is important in understanding what implications this might have for the workforce in terms of job opportunities and skill requirements.

The Scottish Government has committed to decarbonisation, setting a target to achieve net zero by 2045. The ambition extends beyond target setting; aiming to ensure a Just Transition for Scotland's people, places and businesses.[18]

> "Our vision is that by 2045 Scotland will have a flourishing, climate friendly energy system that delivers affordable, resilient and clean energy supplies for Scotland's households, communities and business. This will deliver maximum benefit for Scotland, enabling us to achieve our wider climate and environmental ambitions, drive the development of a wellbeing economy and deliver a just transition for our workers, businesses, communities and regions."
>
> **Scottish Government (2023), Draft Energy Strategy and Just Transition Plan**

The review of the policy and strategy landscape relating to Scotland's ambitions around decarbonisation revealed no shortage of relevant documents highlighting the potential role for hydrogen as a key enabler in Scotland's energy transition.

The Draft Energy Strategy and Just Transition Plan for example notes the need to transform the way that Scotland generates, transports and uses energy.[19] Hydrogen is expected to play a key role in this transformation, with specific targets set for the sector. The Hydrogen Action Plan sets out actions which aim to "drive Scotland's hydrogen production capability to meet an ambition of 5 gigawatts (GW) of renewable and low-carbon hydrogen by 2030 and 25 GW by 2045".[20]

Scaling up hydrogen production to a point where these targets can be achieved will create opportunities for Scotland's businesses, people and places and the evidence suggests that as a nation, Scotland is well placed to seize this opportunity.

The evidence highlighted Scotland's natural advantage, not only in potential to produce hydrogen for domestic use but also as an exporter of hydrogen to international markets. A number of factors are at play in positioning Scotland to take advantage of the opportunity to produce hydrogen at scale:

- **Infrastructure** – the Hydrogen Action Plan notes that "Scotland's port facilities and existing energy infrastructure along our extensive coastlines and on our islands, offer the

18 Scottish Government (2023), Draft Energy Strategy and Just Transition Plan

19 Scottish Government (2023), Draft energy strategy and Just Transition Plan

20 Scottish Government (2022), Hydrogen action plan

potential to develop multiple large-scale hydrogen hubs, with export routes through ports, terminals and pipeline."[21]

- **Scotland's abundant natural capital** – Scotland has vast renewable energy potential including wind, wave and tidal resources. The Green Industrial Strategy notes that offshore and onshore wind resources provide the potential to support the large-scale production of renewable hydrogen via electrolysis.[22]

- **Skilled workforce** – Scotland has a workforce with significant expertise in oil and gas and onshore and offshore energy sectors. Robert Gordon University's (RGU's) Striking the Balance report suggests that nearly 1 in 30 of Scotland's working age population is currently employed in (or supports) the offshore energy industry and that this figure is closer to one in six in the north east of the country.[23]

The Hydrogen Action Plan provides insight to the potential scale of the opportunity noting that "the combination of natural resources, infrastructure and skilled energy workforce" could pave the way for Scotland becoming a low-cost producer of hydrogen for both domestic and international markets.[24]

This is further confirmed in 'A Trading Nation – Realising Scotland's Hydrogen Potential – A Plan for Exports' which notes that "Scotland is well placed to respond to others' import demand through its capacity to produce significant quantities of renewable and low-carbon hydrogen and hydrogen products, as well as by utilising its skills, experience and knowledge..."[25]

Although Scottish hydrogen projects do not necessarily guarantee Scottish hydrogen jobs, if Scotland can establish international trade opportunities, then there is scope for an increase in hydrogen jobs in Scotland supporting the sector globally.

The Green Industrial Strategy, published in September 2024, identifies several key areas where Scotland is well placed to develop internationally competitive clusters, one of which is **growing the hydrogen sector**.[26] It points out the opportunities that will be created right across the supply chain from "manufacturing, production, end use, transportation and storage infrastructure to regulatory innovation, standard setting, and exports."

While the documents make clear the potential opportunities for Scotland, the key questions from a jobs and skills perspective are; how likely are the projects to progress (therefore creating a demand for people and skills); what volume and types of jobs will be created; where might they be located; and what types of skills will be required to fill these roles? The remainder of this section looks at what information is contained in these documents regarding expected jobs and skills in hydrogen and what is known about the geographical distribution of future activity.

21 Scottish Government (2022), Hydrogen action plan

22 Scottish Government (2024). Green Industrial Strategy

23 RGU Energy Transition Institute (2025), Striking the balance: Building a sustainable UK offshore energy workforce

24 Scottish Government (2022), Hydrogen action plan

25 Scottish Government (2024), A Trading Nation - Realising Scotland's potential: plan for exports

26 Scottish Government (2024), Green Industrial Strategy

2.2 A focus on skills

The role for skilled people in the hydrogen sector is set out in the Hydrogen Policy Statement which notes that "if it is to play a larger role in our future energy mix, we will need the skills of people and companies that know how to produce, manage, compress, transport, store and reconstitute gas."[27]

The Hydrogen Action Plan refers to workforce skills throughout, highlighting both the existing skills and expertise within the energy sector and setting out the further actions required to support workforce development.[28]

In terms of existing skills and expertise, the Hydrogen Action Plan makes the following points:

- Many of the **skills** that will be required for roles in hydrogen **can already be found in a wide range of sectors** including oil and gas, subsea, maritime, onshore and offshore renewables, chemicals and petrochemicals and aerospace.
- Scotland has **unrivalled expertise** in developing energy infrastructure which has been gained through decades of work in offshore engineering and oil and gas. The areas of expertise highlighted include:
    - gas storage and distribution
    - safety planning, regulation, and enforcement for hazardous gases
    - handling of high-pressure gases
    - offshore and subsea engineering
    - design and production engineering
    - manufacture of storage vessels, compressors, balance of plant
    - plant maintenance.

2.3 Regional considerations

Within the context of this work, it is useful to consider the geographical distribution of planned hydrogen activity as this may drive demand for people and skills. This could result in a requirement for a supply of labour with relevant skills at a regional level. However, it may be that in some cases workforce demand can be satisfied by a mobile workforce at a national (or even multi-national) level who can be brought in as and when to support at different stages of hydrogen projects.

2.3.1 Examples of regional activity

The ability of Scotland's regions to access the opportunities – and realise the benefits – from a growing hydrogen economy will be dependent on several factors. As mentioned earlier, this includes proximity to natural resources and access to the right mix of skills. Recognising this, the Hydrogen Action Plan notes how the Scottish Government intends to take a "regional approach to their support for the hydrogen economy.[29]

27 Scottish Government (2020), Scottish Hydrogen Policy Statement

28 Scottish Government (2022), Hydrogen action plan

29 Scottish Government (2022), Hydrogen action plan

While hydrogen is often described as a nascent industry, there are many examples of where Scotland's regions are already active in the hydrogen economy. INEOS have a skilled workforce who help to produce grey hydrogen, with ambitions to create renewable and low-carbon hydrogen in the future at Grangemouth.[30] In Aberdeen, the city is home to two hydrogen fuelling stations – with a third under development – as well as a large fleet of hydrogen vehicles. In Fife, the H100 project plans to bring renewable hydrogen into homes in late 2025.[31] The European Marine Energy Centre (EMEC) in Orkney is involved in activity across the hydrogen value chain including hydrogen production, storage and end-use.[32] These are just examples of some of the activity already underway in the hydrogen sector across Scotland's regions.

It was outwith the scope of this work to carry out a review of investment and projects within the hydrogen economy, however there are some noteworthy regional developments which could represent an opportunity to learn more about the skills needs required at different stages of the hydrogen life cycle.

The Hydrogen Allocation Rounds (HARs) are a government funding programme which aims to support low carbon production across the UK by helping to bridge the cost differential between low carbon hydrogen and traditional, more carbon-intensive alternatives. A total of 11 projects were successful in securing a total of £2bn funding through HAR1, two of which were in Scotland – Whitelee Green Hydrogen and Cromarty Hydrogen. HAR2 shortlisted projects were announced in April 2025.[33] In Scotland a total of eight projects were invited to the next stage of the process. This includes: Binn Ecopark Hydrogen Facility; Creca Hydrogen Facility; Grangemouth Green Hydrogen; Irvine Green Hydrogen Project; Selms Muir Hydrogen; Shetland Hydrogen Project 1, Strathallan Hydrogen Facility and Whitelee Green Hydrogen Phase 2. The majority of these projects are within close proximity to the central belt, with Creca and Shetland being significant outliers.

Insight from RGU's UK Offshore Energy Workforce Transferability Review notes that "with the increased energy system localisation and the emergence of integrated regional energy clusters, it is projected that the offshore energy workforce and skills requirements will become increasingly regionalised."[34]

In terms of implications for skills, project and investment activity at a regional level will drive demand for skills. The ClimateXChange report notes that "a skilled and experienced technical workforce will be required in different areas of Scotland, including rural and remote areas such as the islands."[35] The same report notes the importance of ensuring that "regions are adequately supplied with technical talent because these sites provide crucial learning experiences for the rest of the future hydrogen economy."

Finally, this report also notes that experience from the oil and gas sector suggests that the physical location of skilled people may not be as much of a concern because of workforce mobility.

30 https://uk.rwe.com/press-and-news/2024-05-14-rwe-announces-large-scale-green-hydrogen-plant-in-grangemouth/

31 Scottish Development International (2022), Think Hydrogen, Think Scotland

32 The European Marine Energy Sector (EMEC)

33 https://www.gov.uk/government/publications/hydrogen-allocation-round-2-har2-projects/hydrogen-allocation-round-2-har2-shortlisted-projects

34 Robert Gordon University (2021), UK Offshore Energy Workforce Transferability Review

35 Climate xchange report, Mapping the current and forecasted hydrogen skills landscape

A recent report from the RGU Energy Transition Institute suggests that the announcement of six industrial clusters across the UK may result in some of Scotland's energy workforce (in the North East) relocating or "working remotely from Scotland to support these clusters, necessitating a more flexible, transient and capital project- oriented workforce.[36]

CASE STUDY

2.3.2 Grangemouth

The Grangemouth Industrial Just Transition Plan was launched in June 2025, setting out the strategic importance of the site in supporting Scotland's transition to net zero and providing some focussed insight around the role of skills in achieving this ambition[37].

Grangemouth has a highly skilled workforce, employed across various job roles. This includes engineers, technicians and planners, engineering and manufacturing support functions, mariners, clerical and administrative staff and health and safety operators, just to list a few.[38]

The plan suggests that the skills required for future jobs might be similar to the skills held in existing roles. This is explained further with an example of how it might play out in practice: "safe and sustainable operations of sites in the future, for example at a hydrogen manufacturing facility or bio refinery will likely require similar skillsets to those that exist today... Rather than requiring complete transformation, the same skills will likely be applied with tailoring to specific low carbon processes."[39] Similar views were identified in other sources included in the review of existing evidence, highlighting the transferability of skills from existing oil and gas roles into new clean growth sectors. This is discussed later in more detail, in chapter 5.

The plan highlights some challenges which might have an impact at the site. This includes skills shortages across several areas such as engineers, welders, pipefitters, data scientists and IT specialists[40]. Competition for labour and a gender imbalance within the existing workforce are also identified within the document. Some of this is explored in more detail in chapter 5, alongside insight from other sources.

Finally, the Grangemouth Industrial Just Transition Plan sets out an action to "establish a Grangemouth Industrial Cluster skills pilot that will support the industrial transition."[41] This is just one example of regional activity being taken forward in response to identified skills needs.

In September 2024 it was announced that Petroineos planned to cease crude oil processing activities at the site and that the Grangemouth refinery would be converted into a fuel import terminal. Project Willow, a joint funded feasibility study between the Scottish and UK Governments which explores options for the long-term industrial future at Grangemouth, was also established.[42]

36 RGU Energy Transition Institute (2025), Striking the balance: Building a sustainable UK offshore energy workforce

37 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

38 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

39 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

40 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

41 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

42 https://www.gov.uk/government/news/uk-and-scottish-governments-announce-joint-plan-to-secure-industrial-future-of-grangemouth

The findings from the Project Willow feasibility study were published in March 2025 following an assessment of over 300 technologies which could be successfully deployed at Grangemouth, helping to secure Grangemouth's future as a low carbon energy hub.[43] The report sets out nine technologies which are likely to attract private investment at the site, four of which involve the use of low carbon hydrogen.

In terms of skills development at Grangemouth, the Forth Valley Regional Skills Action Plan sets out an action to establish a Grangemouth industrial skills offer through activities such as developing and promoting a programme of flexible and digitally enabled skills delivery and coordinating existing STEM outreach programmes to highlight career opportunities and pathways into STEM.[44]

CASE STUDY

2.3.3 Aberdeen Hydrogen Hub

Construction is underway on the Aberdeen Hydrogen Hub (AHH) which is a joint venture between BP and Aberdeen City Council. The hub will be a scalable green hydrogen production, storage and distribution facility which will be powered by renewable energy.

The concept for the AHH was born out of a joint commission between Aberdeen City Council, One North East (ONE) and Scottish Enterprise which set out to explore the case for a renewable hydrogen hub in the region.

The hub will be developed in three phases. The first phase will be focussed on production of hydrogen for consumption by the public sector and this will involve the construction of a hydrogen re-fuelling station for a range of different motor vehicles including buses, cars, vans and trucks.

Future phases (2 and 3) will see a scale-up of production to connect to larger volume hydrogen use including road, rail, freight and marine use as well as the production of hydrogen for heat and export.

A Final Investment Decision (FID) was reached on the project in July 2024. Contracts have been awarded to Scottish businesses Robertson Civil Engineering, FES Group and Hydrasun to work on the project, and within Hydrasun it is expected to create 40 green engineering and construction jobs. This is an example of where an industry employer can provide valuable insight to the Scottish Hydrogen Skills Group about the types (and phasing) of jobs required to support live hydrogen projects, as well as the competencies required by the people who fill these roles.

2.4 Summary

This section has summarised the policy context for Scotland's hydrogen economy, particularly focusing on skills and regional considerations through some examples of regional developments. The key points to note are:

43 Scottish Government (2025), https://www.gov.scot/news/plan-for-future-of-grangemouth/

44 Skills Development Scotland (2025), Forth Valley Regional Skills Action Plan

- The Scottish Government's ambition is that by 2030 there will be at least **5 GW of renewable and low carbon hydrogen production capacity and 25 GW by 2045**.

- Scotland's **infrastructure, natural capital and skilled workforce** are key assets for maximising opportunities from a growing hydrogen economy.

- Many of the **skills required for roles in hydrogen can already be found** in a wide range of sectors in Scotland.

- Scotland has particularly strong expertise in **developing energy infrastructure**.

- The **geographical distribution** of planned hydrogen activity may have **implications for people and skills** at a regional level which could be addressed by accessing skills at a local level or utilising a mobile workforce.

- **Understanding more about current live hydrogen projects** – particularly those where jobs are anticipated to be created in the near future – can provide greater insight into job volumes, types and skills needs. Sharing of learning and best practice by these early adopters represents an opportunity for the Scottish Hydrogen Skills Group to deepen their understanding about demand for jobs and skills in a hydrogen economy.

3. The hydrogen sector in Scotland

There are several sources of information about the size of the hydrogen sector in Scotland, its contribution to the economy and how many people are currently employed. This section provides an overview of this information before going on to explore the scale of the opportunity for Scotland and the factors that will play a role in unlocking its potential.

3.1 Scotland's current hydrogen sector

Research from ClimateXChange suggests that, in 2022/23, there were less than **500 full-time equivalents (FTEs) employed in hydrogen.** The same report estimates the business count to be around **100 and GVA in the region of £3million.**[45]

The Green Industrial Strategy confirms there are over 150 companies already active in Scotland's hydrogen sector but that there are in the region of another "1,000 companies with relevant skills and capabilities delivering products, solutions and services across the supply chain, many of which are making plans to enter the sector imminently."[46] At the time of writing, it was thought that there were over 200 companies active in the sector based on information Scottish Enterprise have gained from conversations with developers.

Insight from Scottish Enterprise's project database indicates that there are a total of **120 planned green H2 production projects** across different stages of development. This figure is based on conversations with project developers as of July 2025; every effort is made to ensure the information is accurate, but it cannot be guaranteed. The information collected on these projects shows the range of different stages of which the projects are.

Figure 3 - Number of green H2 projects by planned timescale

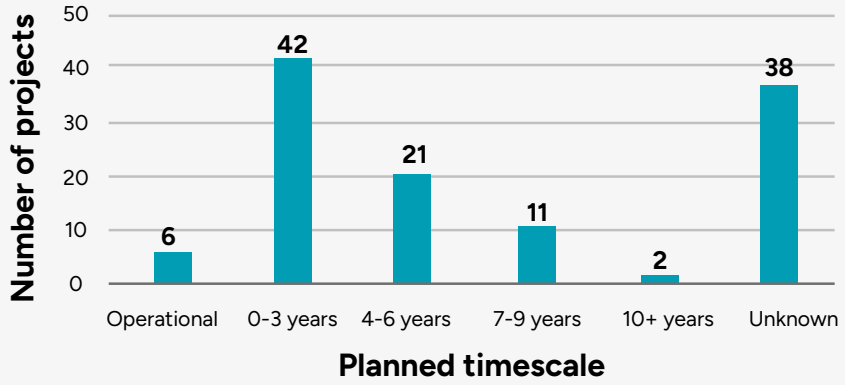


Figure 3 shows that just a small number of the projects are already operational (5%) although a significant volume (35%) are expected to become operational in the next 0-three years, with the numbers decreasing the further into the future you look. For a significant proportion of projects – around one in three – the timescales are unknown. It is important to note that whilst 35% of the total number of projects are set to come online in the next few years, they are relatively small projects and so this does not represent 35% of the total installed capacity. Larger projects, with larger job numbers and skills requirements, will come online later.

45 ClimateXChange (2024), Economic opportunities in Scotland's net zero and climate adaptation economy

46 Scottish Government (2024), Green Industrial Strategy

While this confirms some of the uncertainty around timescales and the fact that only a handful of projects are currently up and running, it does suggest that a significant proportion of projects are expecting to become operational in the short-term (0-3 years). Ongoing learning from these hydrogen projects will be important in helping to get a better understanding of skills implications and job requirements at the different stages of the project lifecycle.

3.2 Realising the potential

While research from ClimateXChange notes that demand is currently low for hydrogen, it indicates that international demand is growing and that there is **potential for Scotland to supply 10% of Europe's future hydrogen demand if the right actions are taken to seize this opportunity.**[47]

This is further explored in a separate ClimateXChange report which notes that if the hydrogen production capacity ambitions are to be realised, the sector could contribute £3.9bn to GVA (up to 2030) and £11.9bn between 2030 and 2035.[48]

However, while there are many examples of existing hydrogen activity in Scotland, the sector as a whole is still at a relatively early stage in its development and it is expected to take some time for hydrogen production to grow and reach a fully commercial scale.[49]

There are several factors which could potentially limit the future growth of the hydrogen economy in Scotland. These are not unique to Scotland and the global hydrogen sector is grappling with similar issues. This could introduce a degree of uncertainty in terms of what skills employers might need, and when:

- **Lack of certainty around hydrogen offtake** – 'A Trading Nation' notes that while there are currently many more project announcements than there are those which have reached Final Investment Decision (FID) stage, without offtake demand (and operational support) to justify expenditure, many of these projects may not progress.[50] Insight from the ECITB workforce census sectoral report notes that "the sector's ability to grow and develop the necessary skills will depend on the country's capacity to sustain sufficient levels of hydrogen demand."[51] Qualitative insight also confirmed that this is a significant challenge.

- **Investment** – a recent report from RGU's Energy Transition Institute notes that making the transition to a decarbonised economy will require a "shift from operational to capital intensive activities, primarily involving the development of wind farms, hydrogen infrastructure and CCUS facilities."[52] The need for investment to support large-scale projects and infrastructure for transport and storage is also set out in other documents including the Green Industrial Strategy and A Trading Nation: Realising Scotland's Hydrogen Potential.[53] [54]

  Insight from steering group members noted that it is difficult to get companies to invest in the sector at this point due to the risk involved, although it's important to make sure that companies have the right skills to win contracts in 2-3 years otherwise there might be a loss of experience to international companies.

47 ClimateXChange (March 2024), Economic opportunities in Scotland's net zero and climate adaptation economy

48 ClimateXChange (2023), Mapping the current and forecasted hydrogen skills landscape

49 Scottish Development International (2022), Hydrogen: Unlocking Scotland's clean energy potential and healing the planet

50 The Trading Nation report

51 ECITB (2025) ECITB 2024 Workforce Census Sectoral Report

52 RGU Energy Transition Institute (2025), Striking the balance: Building a sustainable UK offshore energy workforce

53 Scottish Government (2024), Green Industrial Strategy

54 Scottish Government (2024), A Trading Nation - Realising Scotland's Hydrogen Potential: plan for exports

There is also some insight from ECITB's workforce census which indicates that delays in final investment decisions (FID) have slowed the uptake in the sector, with analysis carried out as part of this work revealing that the "average announced FID date for hydrogen projects was delayed by nine months."[55]

- **Cost** – if Scotland is to compete in hydrogen markets internationally, then hydrogen production must be cost-competitive to ensure Scotland is in the best position not just to supply domestic markets but as an exporter.[56] Electricity costs are the major contributor to hydrogen production costs, which may be partially addressed by current reforms to the electricity markets in the UK.[57]

- **Limited grid capacity** – ClimateXChange notes that limited grid capacity might act as a barrier to hydrogen production.[58] However, the latest updates to the grid connection process could help to speed things up.[59]

- **Access to skills** – the Hydrogen Skills Alliance Plan highlights the need for workers to construct new hydrogen infrastructure, noting that "the availability of construction and engineering workers is likely to affect the timeline for new projects with competition for a limited pool of skills."[60]

While Scotland's significant energy skills and expertise are considered a strength, there are concerns over the retention of oil and gas workers during the transition to renewable energy. RGU's Striking the Balance report notes the importance of Scotland securing a significant share of future renewables activity in order to provide opportunities for, and retain, the offshore energy workforce.[61]

- **International competition** – the ClimateXChange report notes that "while Scotland is well placed to supply hydrogen molecules through high pressure pipelines, it may be outcompeted in the European market by lower cost, low carbon hydrogen from renewable rich countries particularly in the form of ammonia, methanol and other hydrogen derivatives."[62]

- **Planning and environmental** – SEPA act as consultees for hydrogen production planning applications, taking into account water scarcity, environmental risks and noise.[63] Both the planning and environmental processes can cause unexpected delays.

These variables all introduce a degree of uncertainty in terms of the likelihood of projects progressing as well in relation to the timescales for expected jobs to come online, i.e. if projects do materialise, how long will it be until they will require people to fill jobs?

55 ECITB (2025), **ECITB 2024 Workforce Census Sectoral Report**

56 Scottish Government (2024), **A Trading Nation - Realising Scotland's Hydrogen Potential: plan for exports**

57 UK Government, Department for Energy Security and Net Zero (2025), **Review of electricity market arrangements (REMA): Summer update, 2025**

58 ClimateXChange (2024), **Economic opportunities in Scotland's net zero and climate adaptation economy**

59 UK Government, Department for Energy Security and Net Zero (2024), **Clean Power 2030 Action Plan**

60 Hydrogen Skills Alliance (2025), **Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy**

61 RGU Energy Transition Institute (2025), **Striking the balance: Building a sustainable UK offshore energy workforce**

62 Climate Xchange (2024), **Review of demand for hydrogen derivatives and products**

63 SEPA, **https://www.sepa.org.uk/environment/energy/hydrogen/**

The uncertainty introduced by these variables is an important consideration when it comes to the provision that may be required to ensure that those entering roles in a hydrogen context have the right blend of qualifications and skills. The same is true about the careers information advice and guidance (CIAG) given to young people who are considering a career in the renewable energy sector – people who are interested in jobs in hydrogen will want to know when jobs are likely to be available.

3.3 Summary

This section has provided information about Scotland's current hydrogen economy and considered some of the factors which could limit the sector's ability to realise its potential and subsequently drive demand for jobs and skills. The evidence indicates:

- Scotland's **hydrogen sector is still in its early stages**, however it is showing **signs of growth** and there are already projects in development that are set to boost Scotland's hydrogen production.
- Of the projects contained in SE's project database, **only a small handful are already operational**. However, it is expected that a **significant proportion of these projects will be operational in the next 0-3 years**.
- There are **over 200 companies active** in Scotland's hydrogen sector, with around **1,000 companies having the relevant skills and capabilities** to enter the sector.
- It will take time to fully develop hydrogen production in Scotland, however the opportunities that it offers as a decarbonised industry could play an important part in **Scotland achieving net zero goals**.
- As it will take time to develop the hydrogen sector in Scotland, **it will also take time to fully understand the demand for jobs and skills in the sector**.
- **Several variables could limit the sector's ability to reach its potential**, including investment, grid capacity, planning and environmental factors, cost-competitiveness and access to skills. In turn, this could have implications for the jobs and skills required in the hydrogen sector.

4. Demand for a hydrogen workforce

4.1 Introduction

This section provides an overview of current and future demand for hydrogen skills in Scotland. It uses several data sources to present an overview of data relating to demand for a hydrogen workforce. The sources included for analysis in this section are:

- Lightcast job postings[64]
- Engineering Construction Industry Training Board (ECITB) Labour Forecasting Tool (LFT)[65]
- ClimateXChange – mapping the current and forecasted hydrogen skills landscape[66]
- Scottish Government – Scottish Hydrogen Assessment[67]
- Scottish Government – Hydrogen Action Plan[68]
- Scottish Enterprise – Economic Impact Scenarios for Scotland's energy transition[69]
- ClimateXChange – Economic opportunities in Scotland's net zero and climate adaptation economy[70]
- UK Government – UK Hydrogen Strategy[71]
- Hydrogen Task and Finish Group: Findings and Recommendations[72]

4.2 Data considerations

Before going on to provide an overview of existing data relating to hydrogen workforce demand, it is important to note some of the factors which could impact the reliability of forecasts. These issues are summarised below:

- **Hydrogen is a nascent industry** – insight from the Green Jobs Delivery Group – Hydrogen Task and Finish Group report highlights the challenges of trying to predict workforce requirements within a nascent industry such as hydrogen, where factors such as policy shifts, safety and regulation, investment and political dynamics impact progress.[73]
- **Uncertainties around timing** – the numerous conditions which require to be met for projects to progress, some of which were set out earlier in section 3.2, create uncertainty around exactly when job opportunities might materialise. Aside from creating

64 Lightcast (2024), bespoke analysis carried out by SDS
65 ECITB, Labour forecasting tool (LFT)
66 ClimateXChange (2023), Mapping the current and forecasted hydrogen skills landscape
67 Scottish Government (2020), Scottish Hydrogen Assessment
68 Scottish Government (2022), Hydrogen Action Plan
69 Scottish Government (2024), Economic Impact Scenarios for Scotland's Energy Transition
70 ClimateXChange (2024), Economic opportunities in Scotland's net zero and climate adaptation economy
71 UK Government (2021), UK Hydrogen Strategy
72 Hydrogen Skills Alliance (2024), Green Jobs Delivery Group – Hydrogen Task and Finish Group: Findings and Recommendations
73 Hydrogen Skills Alliance (2023), Green Jobs Delivery Group - Hydrogen Task and Finish Group

challenges in anticipating skills requirements, it could also be problematic for planning for skills provision and providing careers advice for people considering a career in renewable energy. Insight from partners suggests that timelines for projects have been drifting, taking longer to progress than first anticipated. The ClimateXChange report notes that "hydrogen projects typically require long lead times, due to infrastructure requirements as well as typical barriers to the implementation of innovative technology."[74] Insight also suggests that 2025 could be a pivotal year with new projects coming online, starting construction and reaching Final Investment Decision (FID).

RGU's Striking the Balance report suggests that "before 2027, there is likely to be limited capacity for the UK offshore renewables sector to host and accommodate the quantity of oil and gas workers becoming available on the job market due to the decline in the oil and gas industry".[75]

- **Data protection issues** – for those forecasts which are based on projects providing information about their workforce requirements, some projects may be excluded due to data protection issues.[76]

- **Use of different source data, assumptions and modelling** – the datasets rely on different methodologies and modelling which makes it difficult to compare and contrast the different figures presented.

4.3 Lightcast data

This section looks at current online job postings which mention hydrogen. Classifications are currently not sensitive enough to capture emerging sectors (such as hydrogen) therefore a 'best fit' approach has been taken to provide an indication of activity. A keyword search was applied to try to assess the skills demand in the Hydrogen sector.

The number of job postings mentioning 'hydrogen' increased from 100 postings in 2019 and 200 postings in 2020 to around 2,200 postings in 2021.[77] This significant jump between 2020 and 2021 and the sustained growth up to 2024 (around 1,500 job postings each year) suggests that demand for workers in the hydrogen sector is growing. This increase may be linked to the drive towards achieving net zero. All job postings data from this point onwards is for the period January 2024 to December 2024.

Job postings data is also available by region in Scotland. Estimates show that over 75% of postings including hydrogen were advertised in:

- Glasgow City (31%)
- Aberdeen City and Shire (23%)
- City of Edinburgh (22%).

The median advertised salary was £52,400 (above the national average of £30,500). Of the advertisements that specified an education level (49%), around 80% of those postings required a Bachelor's degree or above. The types of job roles in demand in the hydrogen sub-sector, identified through the key word search, were:

- Hydrogen Technology Engineers
- Electrical and Control Engineers

74 ClimateXChange (2024), **Review of demand for hydrogen derivatives and products**

75 RGU Energy Transition Institute (2025), **Striking the balance: Building a sustainable UK offshore energy workforce**

76 Hydrogen Skills Alliance (2023), **Green Jobs Task and Finish**

77 Lightcast (2024)

- Process Engineers
- Policy Advisors
- Renewable Energy Consultants.

As many of the job titles noted above cannot be identified by Standard Occupational Classification (SOC) codes, the key word search provides an understanding of the types of jobs that are required within the hydrogen sub-sector. The search has also highlighted a number of more general occupations under the SOC codes that feature in hydrogen job adverts. The types of occupations in demand were:

- Production and process engineers
- Project support officers
- Mechanical engineers
- Physical scientists
- Buyers and procurement officers.

Job postings data also offers an indication of the types of employers advertising within the hydrogen sector. Across Scotland, the greatest number of postings come from large energy distribution and energy production companies of 250 employees and over. The job postings data also indicates the types of specialised skills sought by employers:

- Project Management (23%)
- Renewable Energy (17%)
- Procurement (13%)
- Net Zero (10%)
- Business Development (10%)
- Engineering Design Process (10%)
- Energy System Transition (7%)

4.4 Future hydrogen workforce demand

This section highlights some of the key sources that forecast future hydrogen workforce demand across Scotland and the UK, providing an overview of each of these in turn. As noted earlier, hydrogen is an emerging sector which can make it difficult to quantify workforce demand. The sources included use different methodologies to attempt to forecast demand in the sector. There are caveats and limitations associated with each approach, which have been highlighted where known.

4.4.1 ECITB Labour Forecasting Tool (LFT)[78]

The Engineering Construction Industry Training Board (ECITB)'s Labour Forecasting Tool (LFT) is an interactive Power BI tool, enabling users to create bespoke analysis. It uses data gathered from the ECITB workforce census which was published in early 2025 and based on the most recent workforce census which was carried out between May and June 2024. This is the only source which enables bespoke analysis of data as others are contained within published reports.

78 ECITB (2024), Labour Forecasting Tool

This data estimates demand for engineering construction workers only. The in-scope engineering construction workforce (the focus of this tool) is estimated to represent roughly 50% of the wider engineering construction workforce. Companies within scope are those that primarily operate in engineering construction, while out-of-scope companies typically focus on other industries (e.g. defence, residential construction, rail) while sometimes working on engineering construction projects. The in-scope workforce is generally more trained and qualified to work on engineering construction sites. Out-of-scope workers may often require additional training before they are able to work on such sites.

ECITB provides background information on the LFT on their **website**, noting that this is based on the best available data and highlighting limitations. The data relies on assumptions to overcome data gaps which introduce variability in the forecasts. It also specifically notes that the data available for the hydrogen sector is limited and that it is assumed that the skills required in hydrogen are similar to those needed for other engineering and construction industry sectors. The ECITB indicates that "results for hydrogen and carbon capture will improve as new data becomes available."

ECITB notes that the projected demand is mainly driven by new build and decommissioning projects, and to a lesser extent by the demand resulting from operation and maintenance works.

The data contained within the LFT presents overall demand with a breakdown of occupational groups included as part of this. Analysis can be based on one of two scenarios:

- Scenario one assumes that the entire project pipeline is built, aligned with publicly stated deadlines and new similar projects continue to be developed.
- Scenario two assumes that 50% of future projects experience delays and/or reduced investment. Delay and investment reduction based on historical data.

Using scenario one, analysis of the data from the LFT reveals forecast demand to be in the region of around 7,346 FTEs in Scotland's hydrogen sector between 2025 and 2030. This is cumulative demand over the period. Scenario two indicates a slightly lower forecast of 6,927. In 2025, the estimated demand in Scotland for engineering construction workers in the hydrogen sector is 757. By 2030, this demand may rise to 1,359. Under Scenario two, demand in 2030 is projected to be 1,284. Scenario two shifts demand to later years and results in a different occupational mix: more delays mean relatively less site work and proportionally more office-based activity.

Looking at demand between 2025 and 2030, by occupational group, the greatest volume of demand is expected to be for engineers (c.1,520) followed by professionals (892) and managers (c. 770).[79]

Data is also available at a regional level – North Eastern Scotland, South Western Scotland, Highlands and Islands and Eastern Scotland. At a regional level, the LFT indicates that by far the greatest cumulative volume of demand between 2025-2030 is expected to be in North Eastern Scotland (5,646), followed by Eastern Scotland (760), Highlands & Islands (325), Scotland – not specified (334) and South Western (282).[80]

79 This occupational breakdown is based on the ECITB's Hydrogen Scenario 1

80 This geographical breakdown is based on the ECITB's Hydrogen Scenario 1

4.4.2 Mapping the Current and Forecasted Hydrogen Skills Landscape[81]

This paper from the ClimateXChange looks at the current and forecasted jobs and skills demand in Scotland's hydrogen economy. The focus for this study was on skills requirements at the upstream end of the supply chain and includes hydrogen production facility installation, commissioning and operations as well as storage, transportation and export.

The study revealed that "a large number of new jobs will be created as the hydrogen economy grows." Between 2025 and 2030, it is estimated that the hydrogen economy will require an average of 6,614 direct skilled jobs per year (full-time equivalent).

It notes that a significant proportion (40%) will be focussed on hydrogen production facility design, installation and commissioning whereas operation and transportation will each only account for around 1-2% of jobs. Another significant proportion of jobs (40%) is expected to be in hydrogen export and almost one-in-five (18%) will be in hydrogen storage.

Employment in the sector is then forecast to increase to an average of **18,535 direct jobs per year between 2030 and 2035**. The report notes that this includes an almost quadruple increase in export-related activities as well as an increase (by a factor of three) in hydrogen production operations.

The forecasts in this study were based on the Scottish Annual Business Statistics and modelled upon what would be required to meet the ambitions of 5 GW production capacity by 2030 and 25 GW by 2045. Therefore, the figures rely on these assumptions being realised. In order to meet the 5 GW production capacity ambition, **"stakeholders estimate that the talent pipeline will take approximately three to five years to fill."**

This report also includes a section on the geographical distribution of demand for a hydrogen workforce, noting sites such as the European Marine Energy Centre (EMEC), the Glenshaugh Farm project at the James Hutton Institute, Crofflickland Farm in Aberdeenshire and the Pure Energy Centre in Shetland.

It notes that "industry stakeholders expressed an opinion that the location is not a concern to their operations because, in their experience, the workforce is mobile." However, the report then goes on to note that "a lack of regional skills could have a detrimental effect on the early stages of the hydrogen economy that is predicted to kickstart at remote and decentralised off-grid sites." The report therefore indicates the potential value of a skilled regional workforce which would help to support the growth of the hydrogen sector.

4.4.3 Scottish Hydrogen Assessment[82]

The Scottish Government's Scottish Hydrogen Assessment, which was published in December 2020, aimed to inform the development of future Scottish Government decarbonisation policy. The paper sets out three scenarios for Hydrogen in Scotland and estimates the demand each scenario will create. The three scenarios are:

81 ClimateXChange (2023), **Mapping the current and forecasted hydrogen skills landscape.**

82 Scottish Government (2020), **Scottish Hydrogen Assessment**

- **Hydrogen economy** – hydrogen is one of the main ways in which Scotland's energy system is decarbonised. A balanced mix of blue and green hydrogen is extensively used across all sectors.

- **Green export** – Scotland's vast renewable resources, particularly offshore wind, but also wave, tidal and onshore are used to produce green hydrogen. This serves a European export market.

- **Focused hydrogen** – hydrogen plays a supporting role in decarbonising the energy system in sectors that are hard to decarbonise by other means. Hydrogen is produced near to where it's used.

This paper finds that, in the most ambitious scenario, Scotland could be established as an **exporter of green energy to Europe and this could create demand for over 300,000 jobs by 2045**, contributing £25bn to GVA. The other two scenarios presented in the paper are based on Scotland supporting a **domestic hydrogen market, with this likely to create anywhere between 70,000 to 175,000 jobs**, contributing between £5-16bn to GVA.

The forecast demand figures in this paper are larger than most of the other figures presented, particularly in the most ambitious scenario of 310,000 which is an outlier when viewed alongside other forecasts presented in this paper. This is because of the wide definition of hydrogen employment used, which includes roles in hydrogen production, transmission and distribution, as well as heat, industry and power. Furthermore, this paper uses ambitious scenarios and considers the jobs that could be created across different stages of the hydrogen lifecycle in the period up to 2045.

The report acknowledges that there are "various views as to how hydrogen could and should be produced and used." The three scenarios which are included present three different ways in which Scotland's hydrogen sector could develop in the future. It also specifically notes that these scenarios are not intended to be "an accurate prediction of the future and suggests that the actual outcomes are likely to be somewhere between these scenarios." For each of the three scenarios, the report assumes that the net zero target is achieved, and it is only the extent of the use of hydrogen that varies in each.

4.4.4 Hydrogen Action Plan[83]

The Scottish Government's Hydrogen Action Plan summarises the actions that will be taken over the next five years to support the development of a hydrogen economy in Scotland.

The paper references the figures from the previously mentioned Scottish Hydrogen Assessment, noting that the potential for the hydrogen economy in Scotland to support the protection or creation of between 70,000 and 310,000.

It notes that there are **currently over 65,000 people working in Scotland's energy sector** and that there is "a large talent pool with expertise in: gas storage and distribution; safety planning, regulation, and enforcement for hazardous gases; handling of high-pressure gases; offshore and subsea engineering; design and production engineering; manufacture of storage vessels, compressors, balance of plant; and plant maintenance."

83 Scottish Government (2022), Hydrogen Action Plan

4.4.5 Economic Impact Scenarios for Scotland's Energy Transition[84]

This paper sets out the potential economic opportunities which could arise from the transition to net zero, looking across 18 low carbon technologies including Hydrogen production and Hydrogen refuelling. The forecasts are based on Scottish and Southern Energy Networks (SSEN) and Scottish Power Energy Networks (SPEN) input to the National Grid's "Future Energy Scenarios" together with complementary scenarios for industrial decarbonisation from the Scottish Net Zero Roadmap (SNZR).

It uses the following two potential scenarios to develop the forecasts for future demand:

- **Strong ambition** – the 'strong ambition' scenario assumes high levels of renewable deployment driven by societal change and strong policy support, thus meeting the Scottish Government's net zero emissions target by 2045 and that employment in low carbon technologies will increase significantly.

- **Business as usual** – this scenario assumes a slower rate of growth driven by lower demand from consumers and as a result the net zero target is not achieved.

The 'strong ambition' scenario forecasts that the hydrogen sector is expected to **employ 5,407 people by 2030, increasing to 6,909 by 2050**. This includes hydrogen production and hydrogen refueller roles. Employment in hydrogen production is expected to decrease from 5,191 in 2030 to 3,793 by 2050, whilst hydrogen refueler employment is expected to increase from 216 in 2030 to 3,116 by 2050.

Looking at the 'business as usual' scenario, **the hydrogen sector is expected to employ 236 people by 2030 and 714 people by 2050, across hydrogen production and hydrogen refueller roles.**

4.4.6 Economic opportunities in Scotland's net zero and climate adaptation economy[85]

The aim of this research was to "identify and understand the potential economic opportunities Scotland could realise from the shift towards a Net Zero and Climate Adaptation economy." It provides a detailed analysis of 12 sectors, of which hydrogen was one.

The forecasts included in this report indicate that by 2030 there could be a 5,191 FTE headcount in Scotland's hydrogen economy, with the sector forecast to account for £286m of GVA. This is predicted to reduce slightly to a 3,793 headcount and £209m GVA by 2050. These forecasts are based on the Scottish Enterprise economic impact scenarios in section 4.4.5, using the estimates for hydrogen production.[86]

4.4.7 UK Hydrogen Strategy[87]

The UK Government's first Hydrogen Strategy (2021) sets out the key steps needed to develop a low carbon hydrogen sector in the UK.

According to this paper, creating a successful hydrogen sector could support over 9,000 direct jobs across the UK by 2030 and up to 100,000 by 2050.

84 Scottish Enterprise (2024), Economic Impact Scenarios for Scotland's Energy Transition.

85 ClimateXChange (2024), Economic opportunities in Scotland's net zero and climate adaptation economy

86 Scottish Enterprise (2024), Economic Impact Scenarios for Scotland's Energy Transition.

87 UK Government (2021), UK Hydrogen Strategy

The figures outlined in this paper use the Energy Innovation Needs Assessment methodology, using updated domestic and global scenarios to identify the direct jobs linked to hydrogen.[88]

The paper mentions that skills gaps may cause challenges, particularly at higher technical levels.

4.4.8 Hydrogen Task and Finish Group: Findings and Recommendations[89]

The Hydrogen Skills Workforce Assessment was completed in 2024 by the Hydrogen Skills Alliance, on behalf of the Green Jobs Delivery Group Task and Finish Group. It looks at the hydrogen sector across the UK, considering workforce data, key industry issues, and industry data collection.

According to this research, **across the UK by 2030 there could be 29,000 direct jobs in all areas of hydrogen, and 64,500 indirect jobs**. The highest number of jobs is expected in production (8,500 direct jobs by 2030 and 24,000 indirect jobs), followed by transmission (6,000 direct and 13,500 indirect).

The authors caveat the data by noting the challenges in accurately predicting workforce demand due to ambiguity in timing alignment, policy shifts, political dynamics and investment.

The research finds that there are skills gaps in the sector, with 84% of employers believing that the UK's workforce doesn't serve the sector's needs adequately. There are some specific shortages mentioned, including in construction and engineering trades.

87 UK Government (2021), **UK Hydrogen Strategy**

88 UK Government (2019), **Energy Innovation Needs Assessment**

89 Hydrogen Skills Alliance (2024), **Green Jobs Delivery Group – Hydrogen Task and Finish Group: Findings and Recommendations**

4.5 Recent and planned future insight, research and industry frameworks

The Hydrogen Skills Framework was published in April 2025 to help employers map out the workforce skills required for roles in the hydrogen economy.[90] Developed by industry stakeholders, the framework looks in detail at roles across different stages of the hydrogen lifecycle: production, transmission, transport & distribution, storage, maritime, aerospace, industrial decarbonisation and automotive. It provides a description of each of the skill themes within these roles and identifies the types of job roles aligned to the skills. It will also act as a recognised benchmark for skills development.

The consultations identified research planned for the 2025/26 financial year which should, amongst other things, help to provide up-to-date insights into demand for skills in Scotland's hydrogen economy. The following pieces were highlighted:

- **Hydrogen technology component factsheets** – Scottish Enterprise is developing a series of factsheets which will aim to show supply chain companies where their products, services and capabilities might fit by providing a component level breakdown of key elements of hydrogen infrastructure. Factsheets on electrolysers, low carbon (blue) hydrogen production plants, hydrogen compression, storage and distribution and hydrogen refuelling stations are already available.[91]
- **Hydrogen Economy Research: End-to-End Supply Chain Map** – published August 2025, and led by Scottish Enterprise, this work maps out the types of activities involved and supply chain requirements at each stage of the green hydrogen production project life cycle from concept, feasibility, construction and operation through to decommissioning. This work will help to identify particular areas of Scottish supply chain opportunity, as well as potential bottlenecks and gaps if all the projects under development come online.
- **H2 Scenario Planning (title TBC)** – this work will set out in greater detail exactly what a Scottish hydrogen economy could look like in terms of likely infrastructure deployment and timelines under several scenarios and will help companies to get a better idea of the scale and timing of the market opportunity they could be facing.

4.6 Summary and recommendations

This section has summarised some of the key pieces of research which aim to quantify and forecast workforce demand in hydrogen across Scotland and the UK.

Each source uses different methodologies and timeframes, meaning the figures identified in each are varied. It is clear from looking collectively at these pieces of research that:

- there is expected to be significant **job growth if Scotland can realise the opportunities** associated with hydrogen
- using only the forecasts which are specific to Scotland, and

90 Hydrogen Skills Alliance (2025), Hydrogen Skills Framework

91 Scottish Enterprise, Hydrogen Factsheet

looking at the shorter term, the data indicates that **there could be between 236 (in a business-as-usual scenario) and 7,346 jobs in hydrogen by 2030**

- job postings data suggest that **demand for hydrogen-related roles in Scotland has grown significantly** in recent years, in roles that typically **pay above the national average, although insight gathered from consultation highlighted that this can fall below the average for oil and gas jobs**

- the skills that employers are looking for in hydrogen job adverts in Scotland include **project management, renewable energy and procurement**, indicating the range of types of roles required in the sector

- **many of the skills associated with the hydrogen economy are considered to already exist** across Scotland's workforce

- it is **difficult to accurately predict workforce** figures for hydrogen due to the fact it is still an emerging sector with several variables which may impact the progress of hydrogen projects

- the **forecasts largely rely on scenario analysis** which may be impacted by policy and investment changes.

Given the variance across the various sources of forecast demand in terms of methodology, source data, assumptions etc it is not possible to directly compare figures set out in table 2.

However, based on analysis and interpretation of the employment forecast data in this report, and reflecting the scale of uncertainty, the report makes the following recommendations for the Hydrogen Skills Group to consider in terms of how communicate the scale of potential workforce demand in Scotland's hydrogen sector:

- **A focus on Scotland-specific data** – there are numerous forecasts relating to the potential for hydrogen jobs in the future. Although the UK forecasts will likely incorporate some demand in Scotland, the detail of this is not always clear. **Therefore, it will be more useful for the group to focus on forecasts which are specific to Scotland.**

- **Exclude outliers** – the figure of 310,000 from the Scottish Hydrogen Assessment is a significant outlier when set against the other forecasts included in this report – this figure is based on the most optimistic of the three scenarios set out in the assessment which is that Scotland will become an exporter of green hydrogen to European markets by 2045. Feedback from the group suggested that a conservative approach is taken to forecasting future hydrogen jobs, **therefore, it is recommended that the group focusses on the lower range of short-term forecasts when describing anticipated future demand for hydrogen jobs**.

- **Use a range of forecasts to describe potential future demand** – the evidence identifies significant uncertainty, driven by several factors which could limit the realisation of Scotland's future hydrogen production capacity. Given this uncertainty, it is recommended that rather than focusing on just one set of forecasts, **the group should use a range of data to describe the potential scale of future demand in the hydrogen economy and that this is caveated to highlight potential limiting factors**.

- **Describe potential demand over two time periods: short-term (to 2030) and longer term (to 2050)** – in light of the significant uncertainties, limiting factors and pace of change in terms of hydrogen announcements such as HAR2 and projects reaching FID, the group should consider describing forecasts across two timescales. In the shorter-term, up to 2030 **the available evidence suggests that there could be between 236 and 7,346 jobs in the hydrogen economy. The longer-range forecasts will be subject to greater uncertainty driven by some of the limiting factors mentioned earlier in the report.**

- **Supplement forecasts with the use of real-time information** – members of the Scottish Hydrogen Skills Group have access to information which can help to enhance understanding about jobs and skills in the hydrogen sector. Scottish Enterprise collects information through their project database and Skills Development Scotland can provide insight about relevant job postings from Lightcast. **The group should use this information where possible to get a more detailed understanding about current demand for jobs and skills in the hydrogen sector.**

Table 2 summarises the key data from each of the papers highlighted in this section. It should be noted that some of the figures relate to the Scottish workforce only whilst others are UK-wide. The figures vary due to the different methodologies used with some highlighting yearly headcount figures whilst others forecast total job creation in the sector over a certain timeframe. This limits the extent to which these figures are directly comparable. However, looking at just Scotland-specific data, and based on the figures in the table, **the forecasts range from 236 FTE up to 2030[92] to as many as 310,000 total jobs by 2045.**

92 ECITB Labour Forecasting Tool

Table 2: Summary of workforce demand figures

Region	Source Title	Author	Timeframe	Measure	Demand Forecast
Scotland	Mapping the current and forecasted hydrogen skills landscape (2023)	ClimateXChange	2025-2030	Average direct annual employment (FTEs)	6,614 direct FTE jobs per year
	ECITB Labour Forecasting Tool (2024)	ECITB	2025-2030	FTE jobs (cumulative demand over the period)	6,927 - 7,346 FTE jobs
	Economic opportunities in Scotland's net zero and climate adaptation economy (2024)	ClimateXChange	2030	FTE jobs	5,191 FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2030	Direct FTE jobs (business as usual scenario)	236 direct FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2030	Direct FTE jobs (strong ambition scenario)	5,407 direct FTE jobs
	Mapping the current and forecasted hydrogen skills landscape (2023)	ClimateXChange	2025-2030	Average direct annual employment (FTEs)	18,535 direct FTE jobs per year
	Scottish Hydrogen Assessment (2020)	Scottish Government	2045	Total jobs	70,000 – 310,000 jobs
	Economic opportunities in Scotland's net zero and climate adaptation economy (2024)	ClimateXChange	2050	FTE jobs	3,793 FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2050	Direct FTE jobs (business as usual scenario)	714 direct FTE jobs
	Economic Impact Scenarios for Scotland's Energy Transition	Scottish Enterprise	2050	Direct FTE jobs (strong ambition scenario)	6,909 direct FTE jobs
UK-wide	UK Hydrogen Strategy (2021)	UK Government	2030	Total direct jobs	9,000 direct jobs
	Hydrogen Task and Finish Group: Findings and Recommendations (2024)	Hydrogen Skills Alliance	2030	Total jobs	29,000 direct jobs, 64,500 indirect jobs
	UK Hydrogen Strategy (2021)	UK Government	2050	Total direct jobs	Up to 100,000 direct jobs

5. Skills implications for a hydrogen workforce

5.1 Introduction

So far, this report has set out the range of existing forecast demand for jobs in the hydrogen sector. However, the evidence review also considered the skills required for hydrogen jobs as well as. existing skills issues which could impact the hydrogen sector's growth ambitions and job creation potential. Along with other factors such as capital investment, grid connections, planning permission etc., the evidence revealed a range of skills gaps, shortages and other factors such as an ageing workforce and competition for labour as potential barriers for the sector. The remainder of this section explores the implications for skills in more detail.

5.2 What skills will be in demand in the hydrogen economy?

The Hydrogen in Scotland – Skills and Qualifications Gap Analysis report notes that "building a successful hydrogen economy requires a skilled workforce with the knowledge and expertise to design, build, operate and maintain hydrogen related systems and facilities."[93]

The section considers evidence from the review which provides insight into skills demand within a hydrogen economy. Where possible, consideration was given to which stage of the hydrogen value chain these skills would be required. The planning and construction phase was also included here given the critical need for skills to plan for and build hydrogen sites and infrastructure.

5.2.1 Planning and construction

The Hydrogen in Scotland – Skills and Qualifications Gap Analysis report highlights several different skills expected to be required at the construction phase of infrastructure projects.[94] It lists project management, quantity surveying, scheduling and resource management, procurement and sourcing management as well as general construction skills. It also notes that **these are not skills that are specific to hydrogen but are general construction skills which will be in demand elsewhere in the economy.**

The Hydrogen Skills Alliance Plan notes that the "construction of hydrogen production facilities is a complex endeavor requiring provision and expertise."[95] It goes on to list the job types which will be required at this stage, including chemical engineers; civil engineers; architects and planners; electricians; plumbers; and HVAC technicians.

93 Hydrogen in Scotland – Skills and Qualifications Gap Analysis (no date provided), Hydrogen in Scotland - skills and qualifications gap analysis

94 Hydrogen in Scotland – Skills and Qualifications Gap Analysis (no date provided), Hydrogen in Scotland - skills and qualifications gap analysis

95 Hydrogen Skills Alliance (2025), Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy

The Green Industrial Strategy highlights the important role of planning skills in enabling the growth of the hydrogen sector and explicitly sets out the need to support "training and upskilling across our public sector resources and ensuring a pipeline of future planning and consenting professionals."[96]

5.2.2 Production

EMPOWERING THE FUTURE: A Strategic Skills Plan for the UK Hydrogen Economy includes a case study on RWE which details the need for people and skills across several different disciplines including commercial and regulatory skills, environmental and safety specialists, engineering and technical skills and operation and maintenance skills.[97]

The Hydrogen in Scotland – Skills and Qualifications Gap Analysis report notes that the skills required will not be specific to hydrogen but will require skills to be tailored to application in a hydrogen environment. The broad skills that were listed include project management, engineering and operations. Several more specific skills were also mentioned including: electrolyser integration/ servicing/ maintenance and inspection; controls and monitoring systems; safety and alarms interface; Hydrogen Process Safety and Consulting/Design work.[99]

5.2.3 Transmission, distribution and end use

The Hydrogen in Scotland: Skills and Qualifications Gap Analysis report also notes that some skills at this stage will be temporary and goes on to list examples such as vehicle retrofitting skills.

However, if hydrogen vehicles become more readily available (most likely heavy good vehicles), the focus will shift to vehicle technicians (integration, servicing, maintenance, and inspection), and health and safety awareness in the context of hydrogen gas. It also lists other examples of skills requirements at this stage including: marketing for hydrogen demand stimulation; fuel cell integration/servicing/maintenance and inspection; gas pipelines design and tube trailers; and hydrogen dispensing and distribution integration.[98]

EMPOWERING THE FUTURE: A Strategic Skills Plan for the UK Hydrogen Economy notes that "the growth and maintenance of the hydrogen distribution network relies on a diverse workforce equipped with varying levels of skills and expertise."[99] It goes on to list a need for skilled tradespeople at this stage of the hydrogen value chain, specifically mentioning welders and pipefitters. Other technical skills requirements at this stage will include engineers from across a range of engineering disciplines including chemical, mechanical and materials engineering. The report also points to the need for non-technical professional roles including "regulatory specialists and safety inspectors with backgrounds in law, environmental science, or engineering to ensure distribution practices meet strict safety and environmental standards."

96 Green Industrial Strategy (2024), **Green Industrial Strategy**

97 Hydrogen Skills Alliance (2025), **Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy**

98 Hydrogen in Scotland – Skills and Qualifications Gap Analysis (no date provided), **Hydrogen in Scotland - skills and qualifications gap analysis**

99 Hydrogen Skills Alliance (2025), **Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy**

5.3 Digital skills

Digital skills were raised as important cross-cutting skills within hydrogen roles. The Green Jobs Taskforce report highlights the role of digital skills in future renewables jobs, noting that "skills in digital and data analytics will be required for the net zero workforce across all areas."[100] It highlights examples of this in practice including in the management of smart grid infrastructure, electric vehicles and home heating systems. Specific to hydrogen, the report also mentions "the building of energy infrastructure, especially in new technologies involving hydrogen and CCUS, will create demand for improved digital skills in the workforce."

The Hydrogen in Scotland – skills and qualifications gap analysis outlines digital skills as one of several critical skills areas. Digital skills will be required in two capacities – digital professionals who can apply their expertise in a hydrogen context and digital capabilities across the broader workforce".[101]

5.4 How might skills needs for hydrogen differ from existing energy skillsets?

The evidence revealed a consensus that many of the skillsets that will be required can already be found within the existing energy workforce.

The Green Jobs Taskforce report makes reference to work from RGU which estimates that as much as **"90% of the UK's oil and gas workforce have medium to high skills transferability and are well positioned to work in other energy sectors."**[102] The report describes the high level of transferability from oil and gas to decommissioning and subsea network projects. However, the degree of transferability was considered to be less – described as medium – for some other activities including Carbon Capture Utilisation and Storage (CCUS) and blue hydrogen.

Research from ClimateXChange refers to the transferable workforce skills, "most notably engineering skills from oil and gas and chemicals sectors."

Hydrogen in Scotland – skills and qualification gaps analysis[103] also notes the research from RGU which refers to **"significant optimism around the potential to transfer talent from oil and gas into renewables, creating potential supply."**[104] Additionally, this work states that "approximately half of the jobs in offshore renewables in 2030 are projected to be filled by individuals transitioning from existing oil and gas roles to offshore renewables along with new graduates and external recruits."[105]

This was echoed in the Grangemouth Industrial Just Transition Plan which noted that "rather than requiring complete transformation, the same skills will likely be applied with tailoring to specific low-carbon processes."[106]

Insight from some of the consultations also added to the view that roles in hydrogen would look broadly similar to existing energy jobs and that skillsets will be largely transferable. In particular, it was noted that the technical skills will be very similar but candidates will need to be able to apply these in a

100 UK Government (2021), Green Jobs Taskforce

101 Hydrogen in Scotland – Skills and Qualifications Gap Analysis (no date provided) Hydrogen in Scotland - skills and qualifications gap analysis

102 UK Government (2021), Green Jobs Taskforce Report

103 Aberdeen Hydrogen Hub (no date provided), Hydrogen in Scotland - skills and qualifications gap analysis

104 Robert Gordon University (2021), UK Offshore Energy Workforce Transferability Review

105 Robert Gordon University (2021), UK Offshore Energy Workforce Transferability Review

106 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

hydrogen setting. In this case, it was suggested that the additional knowledge for this could be acquired through a bolt-on module to existing provision.

The Hydrogen in Scotland – skills and qualification gaps analysis builds on this, explaining that differences in technology might result in workers having to undertake "additional training to adapt to new practices and procedures."[107]

The same report then goes on to highlight several skills in existing jobs that will be a good fit in renewables (including hydrogen). Specifically, it mentions:

- **technical skills** like engineering, project management, and data analysis
- skills in **safety, risk management and regulatory** compliance
- soft skills such as **communication, leadership and problem solving.**

5.5 What existing skills issues might present challenges for a growing hydrogen economy?

The hydrogen economy will need people who can work in roles right across all stages of the life cycle from production, distribution, transport and storage. However, the evidence revealed some existing skills issues which might limit the potential of the sector. In some areas, these skills shortages are considered to be an immediate priority.

The Green Jobs Delivery Group – Hydrogen Task and Finish Group report highlights shortages of skilled workers, noting that "a significant 84% of employers surveyed believe that the UK's current workforce doesn't adequately serve the sector's needs", and that there are "specific shortages in many areas".[108]

Adding to this, insight from 'Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy' indicates that "employers across clean energy sectors are widely reporting significant shortages in construction, engineering, electrical, fabrication and planning."[109]

The skills issues identified across the evidence review are summarised below:

- **STEM and data science skills** – ClimateXChange research notes that "access to talent, particularly in STEM and data science fields is a threat to realising the hydrogen sector's potential."[110] The Grangemouth Industrial Transition Plan revealed recruitment challenges for engineers, data scientists, IT specialists and welders and pipefitters.[111]
- **Planning skills** – this was mentioned in research from ClimateXChange which highlighted shortages in this area as a potential hinderance to project delivery.[112]

107 Aberdeen Hydrogen Hub (no date provided), Hydrogen in Scotland - skills and qualifications gap analysis

108 Hydrogen Skills Alliance (2023), Green Jobs Delivery Group - Hydrogen Task and Finish Group

109 Hydrogen Skills Alliance (2025), Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy

110 ClimateXChange (2024). Economic opportunities in Scotland's net zero and climate adaptation economy

111 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

112 ClimateXChange (2024), Economic opportunities in Scotland's net zero and climate adaptation economy

- **Skills gaps** – ClimateXChange research also notes additional skills gaps in areas such as customer insights, proposition design, electrical engineering, digital expertise, regulatory and external affairs, advocacy, and health and safety.[113]

EMPOWERING THE FUTURE: A Strategic Skills Plan for the UK Hydrogen Economy includes a case study on SGN which notes that the main skills gap is in production and storage and that "while front-line skills are expected to remain similar over the next five to ten years, support skills (e.g. network analysts and planners) will evolve as hydrogen usage becomes more prevalent."[114]

- Some of the medium-concern areas which were highlighted in the Hydrogen in Scotland – skills and qualifications gap analysis report include **commercial and business development, value chain management, construction skills, control room operations, field operations, inspection and maintenance, social performance and community engagement, and environmental management and sustainability.**[115]

- **Ageing workforce** – the Draft Energy Strategy and Just Transition Plan highlights insight from ECITB which states that more than a third of UK oil and gas workers (35%) are over 50 years old.[116]

- **Competition from other sectors** – the transferrable skills which have been highlighted in this report present a significant opportunity for Scotland's evolving hydrogen sector but also pose a risk given the competition with other energy sectors. The Grangemouth Industrial Just Transition Plan highlights the potential challenges associated with having a highly skilled workforce, noting that "the world-class training of many of Grangemouth's staff means that opportunities are readily available across the UK and indeed further afield"[117] and the risk that this poses to retaining knowledge and expertise.

- **Workforce Equality, Diversity and Inclusion (EDI)** – insight from the Hydrogen Skills Alliance points to some challenges around a lack of equality, diversity and inclusion (EDI) in construction, manufacturing and production noting that "without a very different approach to other sectors, the gender and EDI disparity currently found within construction, manufacturing and production will be repeated during the development of the hydrogen economy."[118]

- Looking specifically at Grangemouth, insight has revealed that the workforce is predominantly male and that this "should be considered in any activity promoting the future activity and jobs at the industrial cluster in outreach to schools, colleges and universities."[119]

5.6 Gaps in data

The review of evidence also sought to identify any potential gaps in information relating to demand for hydrogen skills to enable the Scottish Hydrogen Skills Group to explore opportunities

113 ClimateXChange (2024), Economic opportunities in Scotland's net zero and climate adaptation economy

114 Hydrogen Skills Alliance (2025), Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy

115 Aberdeen Hydrogen Hub (no date provided), Hydrogen in Scotland - skills and qualifications gap analysis

116 ECITB (2022), Ageing oil & gas workforce presents net zero challenge

117 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

118 Hydrogen Skills Alliance (2024), Green Jobs Delivery Group – Hydrogen Task and Finish Group: Findings and Recommendations

119 Scottish Government (2025), Grangemouth Industrial Just Transition Plan

to address these gaps in any future work undertaken through research or consultation activity. The following gaps were identified:

- **Understanding of how skillsets will differ** – the evidence revealed a consensus that skills required for hydrogen roles (and indeed roles in other renewable energy sectors) will be broadly similar to current requirements in existing energy roles. However, **it is inferred that there will be some differences**, with one report referring to transferability of skills as medium for blue hydrogen and carbon capture, utilisation and storage (CCUS) (as opposed to high for some other net zero sectors).

- The evidence review did not uncover explicit detail on what these differences look like. This is an area which the Scottish Hydrogen Skills Group could potentially look to address in future, through additional research and consultation. This is in line with the recommendation in the Green Jobs Delivery Group – Hydrogen Task and Finish Group report which highlights the need to "articulate the hydrogen 'delta' that differentiates between roles in other industries to aid the identification of hydrogen specific training."[120]

- **Skills needs across the whole hydrogen life cycle** – there was some information identified in the evidence review regarding the hydrogen value chain skills requirements but there may be an opportunity to build on this to enable a better understanding of the more detailed occupational skill demands at different stages of the hydrogen value chain.

- **Understanding how demand might differ at a regional level** – there are limited sources of detailed information about anticipated demand at a sub-national level. Given that there are projects underway or in development right across the country, and the key role skills will play in enabling growth of the hydrogen economy, there could be a need to better understand what demand might look like, at a granular regional level, including the timing and staging of jobs and the role of local labour versus a mobile workforce for jobs at different stages of the hydrogen life cycle.

- **Employers can find it difficult to articulate what skills are required for hydrogen projects** – some insight from the consultations indicated that employers can find it challenging to articulate what skills they will need for their hydrogen projects, particularly as this may be a relatively new service offering for some of them. This is an important consideration for the Scottish Hydrogen Skills Group as it may be that additional consultations with employers' result in limited insight due to lack of knowledge about skills requirements. It also highlights the importance of maximising learning from early adopters and sharing this more widely to help employers understand more about what skills are required across the hydrogen value chain.

- **Skills may not be a priority consideration at early stages of a project** – allied to the point above, during the consultations, there was discussion about how skills can sometimes be a late consideration for a hydrogen project given other more pressing considerations such as investment, planning permission etc. which are necessary for projects to progress.

120s Hydrogen Skills Alliance (2024), Green Jobs Delivery Group – Hydrogen Task and Finish Group: Findings and Recommendations

5.7 Summary

This section has set out the implications for skills that might arise from the hydrogen economy to reveal that:

- The skills that already exist in Scotland's workforce, particularly in the energy sector, are considered to be **largely transferable** to hydrogen roles.
- However, **there is a knowledge gap here**. While the skills are **largely transferable**, the review did not uncover much in the way of specific **detail** about what the potential differences might look like.
- Much of the work associated with the hydrogen economy will require **adapting these existing skills** to work on hydrogen technologies or in a hydrogen setting.
- There are some **existing skills issues** which may pose challenges, for example shortages in areas including **engineering, data science, welding and construction**. In addition, there are also issues with an ageing workforce, competition for talent across sectors, and a lack of diversity in the workforce.
- It may be challenging to understand the detailed skills needs in the sector because employers can find it difficult to articulate this need and skills are not always a priority consideration at early stages of project development.

6 Conclusions

This section sets out the main findings from this piece of work.

6.1 Hydrogen is a significant opportunity for Scotland although this is dependent on a range of factors

Countries around the world are exploring how to decarbonise energy systems and Scotland is no exception. Scottish climate change legislation set a target for net zero emissions of all greenhouse gases by 2045 and it is anticipated that hydrogen will have a central role to play in achieving this ambition.

Scotland is well placed to make the most of opportunities from the hydrogen economy because of the existing energy infrastructure and abundance of natural resources. The existing energy workforce is also an asset for the renewable sector as a whole, bringing knowledge, experience and expertise from roles in oil and gas and offshore wind. **Retaining these skills** will be critical as the energy sector transitions to net zero.

However, there are also several factors which may limit Scotland's ability to capitalise on the ambitions for hydrogen and this includes securing hydrogen offtakers, investment, grid connections, international competition and planning and environmental considerations.

6.2 Growth of the hydrogen economy will be dependent on several variables, and this has implications for skills

Demand for hydrogen is currently low, although it is expected to increase in coming years. For hydrogen projects to progress they require investment but also access to the right skills at the right time, for example to support the construction of hydrogen infrastructure.

Skills is a derived demand and given the relative nascency of the sector, along with variables which can introduce uncertainty, it can be difficult to determine (a) whether projects will progress and (b) if they do, the project timeframes. This is important because it has implications for how and when workers will be required in hydrogen roles, how provision is put in place to support new workers into the sector and the provision of careers information advice and guidance (CIAG) for young people considering a career in the sector.

6.3 Several sources of data suggest that there could be significant job creation, although this is varied in scale and there are limitations to the data

There are several sources of data on demand for a hydrogen workforce which vary in terms of how they have been developed, the timescales over which they consider job forecasts and the geographical coverage they offer. In addition, some of the sources are now quite dated, particularly given the pace of change in the renewables sector. Finally, some of the forecasts largely rely on scenario analysis which may be impacted by policy and investment changes.

The demand data, although subject to the caveats and limitations above, suggests that Scotland's hydrogen economy could create significant future job opportunities if conditions can be met to support growth in the sector.

Job postings data indicates that there has been an increase in demand for hydrogen-related jobs in recent years. This data also suggests that levels of pay for these jobs is above average. However, insight gathered from consultation revealed that while pay rates may be above the national average, there is some concern that they fall below equivalent pay rates in oil and gas.

Supplementing forecast data with real-time information from other sources such as Lightcast and the Scottish Enterprise project database will help the Hydrogen Skills Group to maintain an up-to-date understanding of anticipated demand in the hydrogen sector.

6.4 Skills implications

There was consensus that many of the skills associated with the hydrogen economy already exist in the energy sector and that retaining the skills will be important, particularly in light of competition from other sectors as well as from other countries.

There are some existing skills issues facing the current energy workforce which may have an impact on the future hydrogen workforce. There are specific occupational skills issues in areas such as engineering, planning, data science etc., as well as wider labour market challenges such as an ageing workforce, lack of equality, diversity and inclusion and competition for labour.

The evidence review identified some potential gaps in evidence for consideration by the group:

- **Skills needs across the whole hydrogen life cycle** – there was some information available although there may be an opportunity to build this out in more detail and understand more about distinct skills needs at the different stages of the hydrogen value chain, including planning and construction.
- **Regional considerations** – there was limited information about forecast demand or skills needs at a regional level although the evidence points to significant developments including HAR funding as well as partner insight and evidence from sources such as SE's project database.
- **Differentiating hydrogen roles** – although there was a consensus that skills needs for hydrogen roles will be broadly similar to those in the existing energy sector, there was little detail on exactly what differs in a hydrogen role.

6.5 Recent and planned work underway which will provide more insight about demand for a hydrogen workforce

The consultations identified recent and planned research for 2025/26 which could help to provide up-to-date insights into demand for skills in Scotland's hydrogen economy, along with other activities. The pieces of work which were identified include:

- **hydrogen technology component factsheets**
- **Hydrogen Economy Research: End-to-End Supply Chain Map**
- **H2 scenario planning (title to be confirmed).**

Consultation insight identified that it is not always possible for employers to articulate their skills needs, particularly as many projects are at an early stage in development. This suggests there could be scope to support employers to better understand the skills that might be needed in the hydrogen sector. This highlights the importance of learning from existing hydrogen projects which can share their experiences with others and help to inform evidence relating to hydrogen skills needs (including Hydrasun's Hydrogen Skills Academy, H100 Fife and Creed Hydrogen Skills and Innovation Centre).

Appendix A – Bibliography

Aberdeen Hydrogen Hub (no date provided)
Hydrogen in Scotland - skills and qualifications gap analysis

ClimateXChange (2024)
Economic opportunities in Scotland's net zero and climate adaptation economy

ClimateXChange (2023)
Mapping the current and forecasted hydrogen skills landscape

ClimateXChange (2024)
Review of demand for hydrogen derivatives and products

ECITB (2025)
ECITB 2024 Workforce Census Sectoral Report

Engineering Construction Industry Training Board (ECITB) (2022)
Ageing oil & gas workforce presents net zero challenge

Engineering Construction Industry Training Board (ECITB)
Labour Forecasting Tool

Engineering Construction Industry Training Board (ECITB)
Workforce Census

European Marine Energy Sector (EMEC)

Hydrogen Skills Alliance (2025) Empowering the Future: A Strategic Skills Plan for the UK Hydrogen Economy

Hydrogen Skills Alliance (2024).
Green Jobs Delivery Group – Hydrogen Task and Finish Group: Findings and Recommendations

Lightcast (2024)

Robert Gordon University (2021)
UK Offshore Energy Workforce Transferability Review

RGU Energy Transition Institute (2025),
Striking the balance: Building a sustainable UK offshore energy workforce

Scottish Development International (SDI)
Scotland's Regional Hydrogen Hubs

Scottish Development International (2022)
Hydrogen: Unlocking Scotland's clean energy potential and healing the planet

Scottish Development International (2022)
Think Hydrogen, Think Scotland

Scottish Enterprise (2024)
Economic Impact Scenarios for Scotland's Energy Transition

Scottish Enterprise (2025) Hydrogen Factsheet

Scottish Government (2023)
Draft Energy Strategy and Just Transition Plan

Scottish Government (2024) A Trading Nation - Realising Scotland's Hydrogen Potential: plan for exports

Scottish Government (2025)
Grangemouth Industrial Just Transition Plan

Scottish Government (2024)
Green Industrial Strategy

Scottish Government (2022)
Hydrogen Action Plan

Scottish Government (2020)
Scottish Hydrogen Assessment

Scottish Government (2020)
Scottish Hydrogen Policy Statement

SEPA (SEPA webpage accessed 09/07/25)

Skills Development Scotland (2025)
Forth Valley Regional Skills Action Plan

UK Government (2019) Energy Innovation Needs Assessment

UK Government (2021) Green Jobs Taskforce Report

UK Government (2021) UK Hydrogen Strategy

UK Government, Department for Energy Security and Net Zero (2024)
Clean Power 2030 Action Plan

UK Government, Department for Energy Security and Net Zero (2025)
Review of electricity market arrangements (REMA): Summer update, 2025

Skills Development Scotland
1st Floor, Monteith House
11 George Square
Glasgow G2 1DY

www.sds.co.uk