



Humber HEY
Skills Partnership

Skills, Innovation and Sustainability

Green Jobs and Skills Analysis Report

Version 3



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Executive summary

Across the green industries there are a range of industry-specific and generic skills that are growing in demand and will be crucial to achieving the transition to a net zero economy.

However, it is clear from the interviews undertaken as part of this research and the data relating to the take-up of available provision, that demand for skills (from both the individual and the employer) is increasing only on a moderately upward trajectory. There is little sign of any significant uptick in demand for skills in the short-term.

However, all the green industries are very sensitive to the introduction of government policies and incentives (which often come about in very short timescales) – meaning that employers, education and skills providers and local stakeholders such as HEY LEP need to work together to ensure that appropriate provision is available when and where it will be needed.

Specific workforce and skills have been identified in relation to each industry:

- Offshore renewable energy
 - High level electrical skills, including Senior Authorised Persons
 - Consenting skills, particularly amongst SNCBs and regulators but increasingly within the industry
 - Electrical technical and engineering skills (particularly substations, HV and cables). These will be exacerbated by the upgrading of the power network and the introduction of battery storage sites
 - Project Management and the ability to manage significant sized projects and multiple contractors
 - High level digital specialisms including data analytics, artificial intelligence, robotics, digital engineering/science, machine learning, SCADA related skills, software development
 - On and offshore logistics; marine and port orientated skills
 - Construction resource for floating wind projects, which are anticipated to require high numbers of people in fabrication and welding
- Onshore renewable energy
 - Biomass/energy from waste
 - Biomass Engineers
 - Biomass Plant Managers
 - Biomass Plant Technicians
 - Heat networks
 - Commercial / Operations Manager
 - Control System Specialist
 - Design Engineer
 - Energy Master Planner
 - Financial Specialist
 - Heat Network Development Manager
 - Legal Specialist
 - Operations & Maintenance Technician/ Inspector
 - Project Delivery Manager

- Anaerobic digestion
 - Biogas Plant Operatives
 - Bioresource Advisors
 - Operators
 - Systems Process Engineers
 - Technicians
- Biogas/ Biomethane production
 - Biogas Technicians
 - Biochemists, Industrial and Life Scientists
 - Bioresource Advisors
 - Bioresource Planners
 - Logistics Managers
 - Quality Control Managers
 - Biochemical Engineers
- Carbon capture, utilisation and storage
 - Civil Engineers
 - Geologists
 - Geophysics
 - Geothermal Technicians
 - Machine Installers
 - Pipe Fitters
 - Technicians and Welders
 - Underground construction and tunnelling
 - Welders
- Hydrogen and alternative fuels
 - Engineers
 - Chemical engineer
 - Civil engineer
 - Commissioning engineer
 - Electrical engineer
 - Electronics engineer
 - Technicians and tradesperson
 - Control room officer
 - Electrical fitter
 - Electrical Instrumentation Technician
 - Electrician
 - Fitter and Turner
 - Gas Fitter (industrial)
 - Process Control Technician

- Business/commercial skills
 - Big data
 - Project management
- Electric vehicles
 - EV vehicle repair and maintenance
 - Hydrogen fuel cell professionals
- Off-site/Modular construction
 - Digital design
 - Manufacturing experience
 - Construction skills
 - Quality assurance:
 - Logistics
 - Project management
 - Problem-solving skills
- Retrofit, plumbing and electrical services
 - Retrofit advisers/co-ordinators
 - Loft/wall insulation installers
 - Installers heat pumps and solar PV systems
- Agri-tech and low carbon farming
 - Agricultural meteorology
 - AI and robotics
 - Business and commercial management
 - Data science
 - Digital skills
 - Engineering disciplines (electrical, mechanical and others)
 - Environmental economists
 - Environmental restoration planning
 - Food scientists/technologists
 - Fuel efficient driving
 - Scientists of varying specialisms
 - Software development/engineering
 - Soil and water conservation
 - Water resource management

- Digital skills
 - Analytics Specialist
 - Artificial Intelligence Specialist
 - Big Data Developer
 - Data Analyst, Engineer and Scientist
 - Insights Analyst
 - Software Engineers
 - IT Support Engineers

Geoscientific skills are essential for the energy transition as it is within geological formations that energy such as geothermal is found, and where the critical minerals essential for the development and construction of green energy technologies are extracted.

Geological formations are also the foundations for wind turbines, both onshore and offshore, and it is within these formations that geological storage can be used, including for gases such as air, carbon dioxide and hydrogen.

In addition to these industry-specific skills, a range of generic skills will also be increasing in demand and will be critical to the success of the green industries moving forward. For example:

- Project management
- Business and commercial
- Customer and stakeholder engagement
- Risk management
- Data analysis (e.g. operatives up to engineers are increasingly reliant on utilising data to perform job roles)
- Digital skills are increasingly affecting almost every job role, including those in the field workforce, so whether it's new hardware or software, a range of generic/off-the-shelf provision as well as technology-specific courses will be required

Multi-skilling is also an emerging trend and one that will be necessary to meet the future demands of the green economy. For example, if multiple technologies are being installed in one property (e.g. heat pumps, solar PV/thermal and electric vehicle charging points), it makes sense to multi-skill the installer workforce across the range of technologies (and accreditation systems will need to facilitate this in an efficient manner).

Across all of these skill areas, effective pathways to competency are needed at all levels of the workforce – from entry level (level 2) through to higher skills levels; while the largest volume of skills demands will be at level 3-4.

Throughout this research, a number of themes have repeatedly been raised in relation to education and skill provision:

- **Entry-level opportunities:** Programmes such as Skills Bootcamps offer a wide range entry level routes into selected industries and occupations and are crucial to ensuring that people of all capabilities and circumstances have the opportunity to enter meaningful employment.

The reach of these programmes needs to be widened through targeted promotion (and, potentially, incentivised – such as subsidised course/travel costs, guaranteed placements and/or interviews, etc.) to ensure that the intended market is being reached.

- **Apprenticeships:** Apprenticeships are very well regarded by industry, and there are few signs of any obvious gaps in the available standards. However, a significant proportion of relevant apprenticeship standards are not available within the HEY area or its surrounding LADs.

This is presumably due to lack of demand. A common theme from interviews with colleges and training providers for this research suggests that green industry demand for skills has not “taken off” as yet, but that the training market is ready to respond when it does.

- **Further education:** The further education colleges in the HEY and neighbouring LADs area are well regarded by employers in the green industries, but there is a view that current provision has a bias towards introductory/awareness courses rather than delivering a technically competent workforce.
- **Institute of Technology:** While agriculture and engineering are well covered by the IoT Partners, there is little provision on offer in the HEY area in terms of digital/data or areas relating to low carbon technologies, either large scale (e.g. wind) or domestic (e.g. EV repair, retrofit, etc.).
- **Higher education:** The universities in the Yorkshire and Humber region deliver a range of courses that fit well with the green industries. However, the concern that graduates lack industry experience is often cited and more needs to be done to facilitate this during their studies (e.g. work placements, internships, employability support, etc.).

The number of graduates entering employment in the green industries needs to increase substantially. Of the 2,300 STEM graduates in the region in 2019/20, just 105 did so within the industries covered by this research. Whether this is due to graduates choosing other industries or due to a lack of demand from employers needs further investigation.

The vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF4 (i.e. higher than an A level). However, only 19% of working age people in Hull and 33% of working age people in East Riding hold a qualification at this level.

The content of education and skills provision at all levels and ages (across secondary, further and higher education, including apprenticeships and T Levels) should be regularly reviewed in the context of the green industries to ensure that they actually engender an interest in current and future careers in these industries. As those due to enter the workforce in 2030 are already in Year 7, this work cannot start soon enough. The focus of this activity should be on promoting career pathways, and not on specific jobs/occupations. Furthermore, this provision “future-proof” in terms of content relating to technology, data and digital advancements and sustainability/circular economy principles.

While many employers, particularly the larger employers, do have good working relationships with education and skills providers, there is always room for more – whether it’s through activities such as providing guest lecturers, work experience placements or practice interviews.

In very few areas of the green economy is a skills revolution expected – it is more generally a case of evolution. Therefore, while new provision may be needed in some of the learning/training pathways, the upskilling of the current workforce will be a major exercise that will not, generally, require new qualifications.

Therefore, the possibilities for “micro-credentials” and skills accreditation/passporting that recognise upskilling achievements and facilitate the transfer of these skills around the green (and wider energy) industries should be investigated (in conjunction with industry skills bodies).

Facilitating the movement of skills around the green industries should be a priority. For example, multi-skilling the installer workforce across domestic low carbon technologies, including heat pumps, solar PV and EV charging points.

Careers education advice, information and guidance (CEAIG) needs to be reviewed in the context of better articulating up-to-date learning and career pathways to those in schools, colleges, universities – and be generally available to all adults. The ultimate aim of this should be to ensure that all sections of the community, no matter what their academic abilities, are aware of and have access to meaningful employment in the green industries.

Therefore, targeted promotion of training and employment opportunities should put in place for:

- Females
- Long-term unemployed
- Those from specific disadvantaged and deprived communities
- Those who are retired
- Those with caring responsibilities
- With physical or learning disabilities
- Youth unemployed

Finally, employers and stakeholders should consider how more can be done to create social value as a means of raising awareness of the various green industries and the role that they play in a sustainable, vibrant economy.

1 Introduction to this report

1.1 Background

Energy & Utility Skills was commissioned by the Hull and East Yorkshire SDF2 Project Board to produce a Green Jobs and Skills Analysis report for the Hull & East Yorkshire LEP and LSIP area. This report will provide a context for sustainability of investment through the SDF2 project within the Low Carbon and Digital themes.

It is hoped that this report will be of use to a variety of stakeholders to inform strategic skills planning in the Hull & East Yorkshire area, including:

- SDF partners
- LEP stakeholders
- The development of the HEY Local Skills Improvement Plan

The report will also be used to inform the work of other stakeholders working in the employment and skills system. For example, HEY LEP's Careers Hub, which supports the region's young people through the provision of high quality, impartial advice and support when making informed choices of career pathways.

1.2 Geographical coverage

Throughout this report, three geographic areas are utilised.

- HEY area: This consists of the local authority districts (LADs) of East Riding of Yorkshire and Kingston upon Hull.
- HEY and neighbouring LADs: This consists of the HEY area plus the four surrounding LADs of North East Lincolnshire, North Lincolnshire, Selby and York. The rationale for using this geography is that it recognises and takes into account the travel to work/learn patterns of the population in and around the HEY area.
- Yorkshire and Humber region: This is the government-defined region which consists of 21 LADs. This area is used only where it has not been possible to gain data relating to the HEY and neighbouring LADs area.

1.3 Industry coverage

The report covers eight green industries that are critical to decarbonising the HEY area and to providing a just transition for its population moving forward:

- Offshore renewable energy
- Onshore renewable energy
- Decarbonising energy intensive industries
- Hydrogen
- Electric Vehicles
- Construction
- Plumbing and electrical services
- Agri-tech and low carbon farming

It also considers the cross-cutting theme of digital skills, which are crucial to enabling the industries listed above.

2 Renewable energy in the Yorkshire and Humber region

In 2021, there was 6,314MW of renewable energy installed capacity in the Yorkshire and Humber region – an increase of 59% in just five years. Only the East of England (+61%) and North East regions (+71%) saw higher growth rates.

Figure 1: Renewable electricity installed capacity (MW), 2021 – UK, Yorkshire and Humber and HEY and neighbouring LADs

Generation type	UK installed capacity	Yorkshire and Humber region		HEY and neighbouring LADs installed capacity
		Installed capacity	% growth since 2016	
Onshore Wind	14,492	700	7%	483
Offshore Wind	11,255	1,647	284%	1,647
Wave and tidal	22	0.1	--	0.1
Solar Photovoltaic	13,965	638	24%	245
Hydro	1,891	6	32%	0.3
Landfill gas	1,056	90	-3%	33
Sewage gas	257	17	1%	6
Anaerobic Digestion	610	46	58%	26
Biomass and waste	6,153	3,171	43%	2,799
Grand Total	49,702	6,314	59%	5,240

Source: Data taken from Energy Trends produced by the Department for Business, Energy and Industrial Strategy.

As the table above shows, the HEY and neighbouring LADs area hosts the majority of the Yorkshire and Humber region's installed capacity across a number of generation types:

- Onshore wind (483MW of the region's 700MW)
 - East Riding of Yorkshire (326MW)
 - North Lincolnshire (128MW)
- Offshore wind (all of the region's 1,647MW)
 - North East Lincolnshire (1,437MW)
- Anaerobic Digestion (26MW of the region's 46MW)
 - East Riding of Yorkshire (17MW)
- Biomass and waste (2,799MW of the region's 3,171MW)
 - Selby (2,663MW)

3 Employment and labour market conditions

3.1 National labour market conditions

Across the UK economy as a whole, the most recent data¹ shows that the labour market continues to tighten following the effects of the Coronavirus pandemic:

- The number of payrolled employees increased by 0.1% over the past month to 30.0million (up 1.6% over the year)
- The employment rate increased by 0.2% over the quarter to 76.0% (up 0.3% over the year) – this is a record high
- The unemployment rate increased by 0.1% over the quarter to 3.8% (unchanged over the year)
- The economic inactivity rate fell by 0.4% over the quarter to 21.0% (down 0.3% over the year)
- There were 93,000 redundancies during the quarter; 2,000 fewer than in the previous quarter (but 37,000 more than a year ago)
- The number of vacancies fell by 7.0% over the quarter to 1,051,000 (down 19.2% over the year)
 - In the Electricity & Gas industry, the number of vacancies increased by 11.3% over the quarter (up 9.3% over the year) to c6,000
 - In the Water supply, sewerage, waste & remediation activities industry, the number of vacancies increased by 1.4% over the quarter (down by 16.7% over the year) to c7,000
- Total hours worked increased by 15.8million hours over the quarter to 1.059billion hours (up 13.9million hours over the year) – this is a record high (and now above pre- pandemic levels)
- Earnings growth in average total pay (including bonuses) was +6.5% and regular pay (excluding bonuses) was +7.2%
 - Average regular pay growth for the private sector was +7.0%
 - Growth in total and regular pay fell in real terms (adjusted for inflation) over the year by -2.0% for total pay and -1.3% for regular pay

Figure 2: Headline population characteristics

Indicator	Quarterly change	Annual change
Payrolled employees	↑	↑
Employment	↑	↑
Unemployment	↑	→
Economic inactivity	↓	↓
Redundancies	↓	↑
Vacancies	↓	↓
Hours worked	↑	↑
Earnings (Total real pay)	↑	↑

Source: Labour market overview, UK: June 2023.

¹ More information can be found on the ONS' [labour market overview website](#) (external link opens a new window).

3.2 Local labour market conditions

3.2.1 Population characteristics

Figure 3: Headline population characteristics

Local Authority District	% of working age population from an ethnic minority	% of 16-19-year-olds from an ethnic minority	% of working age population that are non-UK nationals	% of working age population with a disability	Forecast population Growth - All ages (2023-2040)	Forecast population Growth - 16-24-year-olds (2023-2040)
East Riding of Yorkshire	1.4%	N/A	2.5%	23.2%	3.5%	2.1%
Kingston upon Hull, City of	6.2%	N/A	4.4%	33.2%	0.3%	5.5%
North East Lincolnshire	3.5%	N/A	4.2%	31.6%	-0.8%	0.7%
North Lincolnshire	7.2%	N/A	6.6%	24.2%	1.8%	0.1%
Selby	N/A	N/A	N/A	17.4%	10.4%	11.1%
York	7.4%	10.8%	10.3%	20.2%	2.0%	4.8%
UK	14.9%	19.3%	11.5%	23.2%	3.8%	3.8%

Source: Annual Population Survey, ONS, 2021.

The ethnic diversity of the local populations varies considerably – from a low of 1.4% in East Riding of Yorkshire to a high of 7.4% in York. All local areas are substantially below the UK average of 14.9%.

Although local data relating to ethnic diversity in young people is only available for York, the available data does suggest that the younger population is more ethnically diverse than the whole of the working age population.

The proportion of the resident that are non-UK nationals is generally much lower than the UK average (York being just slightly below the UK average).

With the exception of Selby and York, the proportion of the resident population of the HEY and neighbouring LADs that has some form of physical or learning difficulty is higher than the UK average.

Selby is the only LAD in the HEY and neighbouring LADs area that is expected to see higher population growth than the UK average by 2040. North East Lincolnshire is expected to see a slight reduction in its total population.

In terms of the growth of 16-24-year-olds in the population, all areas in the HEY and neighbouring LADs are expected to see positive growth, particularly in Selby.

3.2.2 Economic activity

Each of the six LADs areas in the HEY and neighbouring LADs area have been ranked from “worst” (ranking=1) to “best” (ranking=6) based on their relative performance against five measures of economic status:

- Employment rate
- Job density
- Unemployment rates
- Long-term unemployment
- Economic inactivity

Figure 4: Average ranking of all economic status measures (out of 370 LADs in Great Britain)

Local Authority District	Average rank
Kingston upon Hull, City of	83.7
North Lincolnshire	129.8
North East Lincolnshire	135.4
Selby	142.5
East Riding of Yorkshire	181.2
York	271.2

Based on the average ranking of these five measures, Kingston upon Hull has the lowest ranking (83.7 out of 370 LADs across Great Britain). York has the highest ranking (271.2 out of 370).

3.2.3 Educational attainment and progression

Each of the six LADs areas in the HEY and neighbouring LADs area have been ranked from “worst” (ranking=1) to “best” (ranking=6) based on their relative performance against four measures of educational attainment and progression:

- 18-24-year-olds in full-time education
- Working age population with no qualifications
- Working age population with at least a Degree qualification
- Working age people receiving job related training in the last 13 weeks

Figure 5: Average ranking of all educational attainment and progression measures (out of 370 LADs in Great Britain)

Local Authority District	Average rank
North Lincolnshire	65.6
North East Lincolnshire	78.0
Kingston upon Hull, City of	118.3
East Riding of Yorkshire	149.6
Selby	186.2
York	253.8

Based on the average ranking of these four measures, North Lincolnshire has the lowest ranking (65.6 out of 370 LADs across Great Britain). York has the highest ranking (253.8 out of 370).

Higher education starts and outcomes

In 2020/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries.

Due to the nature and content of these subject areas, it is not possible to assign a subject area to a green industry.

Figure 6: Number of starts and their gender, ethnicity and disability status in higher education in the Yorkshire and Humber region (2020/21)

Subject area	Number of starts	% Female	% ethnic minority	% with a physical or learning disability
Biosciences = 680				
(CAH03-01-01) Biosciences (non-specific)	215	68%	51%	11%
(CAH03-01-02) Biology (non-specific)	360	65%	15%	10%
(CAH03-01-03) Ecology and environmental biology	100	55%	4%	7%
(CAH03-01-05) Plant sciences	5	71%	0%	14%
Agricultural sciences = 5				
(CAH06-01-01) Animal science	5	75%	0%	38%
Physical sciences = 1,005				
(CAH07-01-01) Physics	470	23%	15%	10%
(CAH07-02-01) Chemistry	535	52%	18%	10%
Environmental sciences = 260				
(CAH07-04-04) Natural sciences (non-specific)	110	55%	10%	10%
(CAH26-01-04) Environmental sciences	150	54%	9%	10%
Mathematical sciences = 770				
(CAH09-01-01) Mathematics	735	39%	19%	17%
(CAH09-01-03) Statistics	35	36%	33%	39%
Engineering = 2,690				
(CAH10-01-01) Engineering (non-specific)	150	23%	37%	16%
(CAH10-01-02) Mechanical engineering	780	12%	32%	25%
(CAH10-01-07) Civil engineering	575	26%	30%	25%
(CAH10-01-08) Electrical and electronic engineering	755	12%	26%	57%
(CAH10-01-09) Chemical, process and energy engineering	430	22%	46%	37%
Computer sciences = 2,110				
(CAH11-01-01) Computer science	1,430	14%	33%	28%
(CAH11-01-02) Information technology	50	18%	33%	12%
(CAH11-01-03) Information systems	80	19%	38%	4%
(CAH11-01-04) Software engineering	460	12%	34%	10%
(CAH11-01-05) Artificial intelligence	70	22%	30%	61%
(CAH11-01-07) Business computing	20	13%	43%	4%

Subject area	Number of starts	% Female	% ethnic minority	% with a physical or learning disability
Construction and built environment = 960				
(CAH13-01-01) Architecture	475	47%	33%	23%
(CAH13-01-02) Building	360	14%	18%	1%
(CAH13-01-04) Planning (urban, rural and regional)	125	39%	16%	46%
All Green subject area	8,500	28%	27%	23%
All subjects	51,700	53%	25%	16%

Source: Annual Population Survey, ONS, 2021.

Of the 19,800 graduates with at least a pass from a First Degree course from an HE institution within the Yorkshire and Humber region, 2,300 studied STEM subjects as listed above. Of these, 99% entered employment, self-employment or voluntary/unpaid work for an employer. The most common industries that STEM graduates entered were:

- Engineering activities and related technical consultancy 165
- Computer programming activities 160
- Computer consultancy activities 95
- General secondary education 90
- Architectural activities 75
- Accounting, bookkeeping and auditing activities; tax consultancy 65
- Construction of other civil engineering projects² 45
- Other professional, scientific and technical activities³ 45
- Construction of residential and non-residential buildings 40
- Other monetary intermediation (within the finance industry) 40

In total, just 105 (5% of the 2,300 STEM graduates) entered the industries covered by this research (see Figure 9 below for a list of the “best-fit” Standard Industrial Classification codes).

3.2.4 Levels of multiple deprivation

The Indices of Deprivation provide a set of relative measures of deprivation across England, Scotland Wales separately. They are based on seven domains of deprivation:

- Barriers to Housing and Services
- Crime
- Education, Skills and Training Deprivation
- Employment Deprivation
- Health Deprivation and Disability
- Income Deprivation
- Living Environment Deprivation

² This industry includes activities related to construction of industrial facilities (except buildings) such as refineries and chemical plants, construction work (other than buildings) such as outdoor sports facilities, and land improvement (e.g. adding of roads, utility infrastructure etc.).

³ This industry includes a variety of service activities generally delivered to commercial clients. It includes those activities for which more advanced professional, scientific and technical skill levels are required.

Although not every person in a highly deprived area will themselves be experiencing high levels of deprivation, in general terms it is likely that the availability of skills in the more deprived areas will be less than in the less deprived areas.

The table below shows each LGD’s overall ranking.

Figure 7: National ranking of multiple deprivation (out of 317 LADs in Great Britain)

Local Authority District	Average rank
Kingston upon Hull, City of	4.0
North East Lincolnshire	29.0
North Lincolnshire	115.0
East Riding of Yorkshire	202.0
Selby	246.0
York	267.0

Source: English Indices of Multiple Deprivation, 2019.

Kingston upon Hull is the most deprived LAD in the HEY and neighbouring LADs area – being the fourth most deprived LAD out of the 317 in England. York is the least deprived LAD.

3.2.5 Summary of labour market measures

The table below provides a summary of the rankings across the measures for economic status, educational attainment and progression and multiple deprivation as detailed above.

Figure 8: Summary of rankings

Local Authority District	Overall rank	Economic status	Educational attainment & progression	Multiple deprivation
North Lincolnshire	97.7	129.8	65.6	115
Kingston upon Hull, City of	101.0	83.7	118.3	4
North East Lincolnshire	106.7	135.4	78.0	29
Selby	164.4	142.5	186.2	246
East Riding of Yorkshire	165.4	181.2	149.6	202
York	262.5	271.2	253.8	267

Across all the measures considered in this analysis, North Lincolnshire has the lowest overall ranking (97.7). In theory, it is more likely that attracting and retaining the right skills could prove to be a challenge in this local area.

York has the highest overall ranking (262.5). Making it more likely that attracting and retaining the right skills could be easier.

3.3 Employment by industry

Accurate and reliable estimates of employment within each of the green industries in the HEY and neighbouring LADs are not available.

However, by using a combination of difficult data sources, we estimate that employment across the green industries within the Yorkshire and Humber region to be around 167,000.

Figure 9: Workforce estimates by industry in the Yorkshire and Humber region

Industry	Industry notes	People in employment
Offshore renewable energy	Offshore wind ⁴	4,300

⁴ Offshore Wind Skills Intelligence Report, Offshore Wind Industry Council, June 2023.

Industry	Industry notes	People in employment
Onshore renewable energy	Onshore wind	600 ⁵
	Hydro	600 ¹⁶
Decarbonising energy intensive industries	2011: Manufacture of industrial gases	400
	CCUS	0 ¹⁶
	Bioenergy	1,000 ¹⁶
	Alternative Fuels	200 ¹⁶
Hydrogen	35.21 Manufacture of gas	<50
Electric vehicles	29.10: Manufacture of motor vehicles	2,500
	45.20: Maintenance and repair of motor vehicles	22,000
	Low emission vehicles and infrastructure	200 ¹⁶
Construction	4110: Development of building projects	600
	4120: Construction of residential and non-residential buildings	34,000
	4329: Other construction installation	4,000
	4331: Plastering	900
	4332: Joinery installation	5,000
	4333: Floor and wall covering	1,250
	4334: Painting and glazing	2,500
	4339: Other building completion and finishing	2,250
	4391: Roofing activities	3,000
4399: Other specialised construction activities n.e.c.	10,000	
Plumbing and electrical services	4321: Electrical installation	17,000
	4322: Plumbing, heat and air-conditioning installation	13,000
	Photovoltaic	300 ¹⁶
	Energy efficient lighting	1,700 ¹⁶
	Other energy efficient products	5,700 ¹⁶
	Energy monitoring, saving or control systems	1,000 ¹⁶
Agriculture	Low carbon financial and advisory services	200 ¹⁶
	Farmers, partners, directors and spouses full time	11,600 ⁶
	Farmers, partners, directors and spouses part time	9,600 ¹⁷
	Salaried managers	1,100 ¹⁷
	Regular workers fulltime	4,400 ¹⁷
	Regular workers part time	2,500 ¹⁷
	Casual workers	2,600 ¹⁷
20.20: Manufacture of pesticides and other agrochemical products	900	
Total employment		166,900

Source: Business Register and Employment Survey, 2021 unless otherwise stated.

3.4 Employment by occupation

Looking at the region's workforce through the lens of occupation rather than industry provides a sense of the number of people undertaking similar roles in other industries and that may have a skillset which could transfer into the green industries (if they are not already in those industries).

Almost 768,000 people are currently employed in occupations which might align to the green industries (irrespective of which industry they actually work in). This is around 4.5 times higher than the current workforce estimate in the green industries and represents a significant pool of labour from which skills could transfer into the green industries with relative ease.

⁵ Experimental low carbon and renewable energy economy estimates, UK, constituent countries and English regions: 2020 (Experimental LCREE survey and IDBR-based estimate), ONS.

⁶ Structure of the agricultural industry in England and the UK at June 2022, Office for National Statistics.

Figure 10: Number of people employed in selected occupations in the Yorkshire and Humber region

Standard Occupational Classification	People in employment
121 Managers and Proprietors in Agriculture Related Services	3,232
124 Managers in Logistics, Warehousing and Transport	18,279
211 Natural and Social Science Professionals	20,484
212 Engineering Professionals	36,000
213 Information Technology Professionals	98,946
214 Web and Multimedia Design Professionals	8,589
215 Conservation and Environment Professionals	4,775
216 Research and Development (R&D) and Other Research Profession	10,187
245 Architects, Town Planners and Surveyors	18,919
248 Quality and Regulatory Professionals	17,646
311 Science, Engineering and Production Technicians	19,494
312 CAD and Drawing Technicians	2,258
313 Information Technology Technicians	29,407
351 Transport Associate Professionals	3,191
352 Legal Associate Professionals	7,169
358 Regulatory Associate Professionals	6,070
511 Agricultural and Related Trades	28,511
521 Metal Forming, Welding and Related Trades	11,178
522 Metal Machining, Fitting and Instrument Making Trades	17,634
523 Vehicle Trades	33,544
524 Electrical and Electronic Trades	46,916
525 Skilled Metal, Electrical and Electronic Trades Supervisors	2,185
531 Construction and Building Trades	63,953
532 Building Finishing Trades	18,543
533 Construction and Building Trades Supervisors	6,264
612 Animal Care and Control Services	10,057
811 Process Operatives	37,726
812 Metal Working Machine Operatives	1,798
813 Plant and Machine Operatives	9,268
814 Assemblers and Routine Operatives	14,343
815 Construction Operatives	7,648
821 Road Transport Drivers	85,074
822 Mobile Machine Drivers and Operatives	14,390
823 Other Drivers and Transport Operatives	3,626
911 Elementary Agricultural Occupations	4,128
912 Elementary Construction Occupations	13,547
913 Elementary Process Plant Occupations	32,726
Total employment	767,705

Source: Annual Population Survey, ONS, 2021.

3.5 Diversity in the workforce

The tables below show how the proportion of females, ethnic minorities and those with disabilities vary by selected, green-relevant/adjacent, industries across the Yorkshire and Humber region.

Figure 11: Gender, ethnicity and disability status of the Yorkshire and Humber region workforce – Selected industries

SIC Description	% Female	% ethnic minority	% EA disabled ⁷
Agriculture, forestry and fishing	27%	2%	20%
Mining and quarrying	9%	0%	36%
Manufacturing	24%	7%	13%
Electricity, gas, air conditioning supply	30%	0%	9%
Water supply, sewerage, waste	13%	3%	14%
Construction	14%	9%	17%
Wholesale, retail, repair of vehicles	46%	11%	16%
Transport and storage	21%	14%	14%
Information and communication	29%	14%	13%
Prof, scientific, technical activities	46%	5%	14%
All green-relevant/adjacent industries	31%	9%	15%
All industries	48%	11%	18%

Source: Annual Population Survey, ONS, 2021.

Across all of the selected industries combined, levels of gender, ethnic and disability diversity are lower than across all industries of the economy.

This suggests that the transference of skills from adjacent industries will do little to help achieve equity of female, ethnic and disability representation in the green industries.

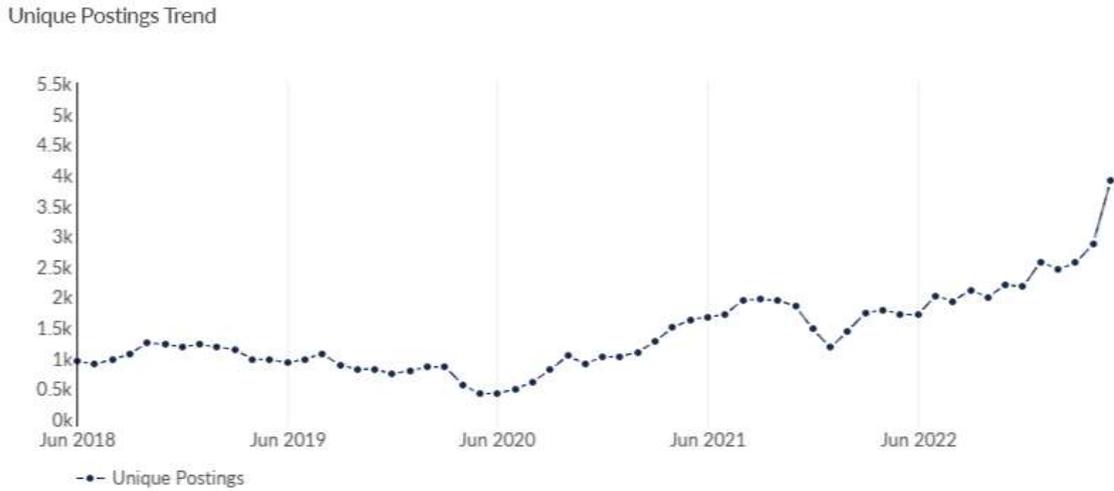
3.6 Recent recruitment activity

In the year ending 31st May 2023, there were 218,000 unique online job postings in the Yorkshire and Humber region. Of these, around 12,000 (5.5%) were in green or adjacent industries.

The number of job postings per month have been steadily increasing since May 2020, and reached a record high in May 2023 of more than 3,900.

⁷ Defined, under the Equality Act 2010, as a person who has a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on your ability to do normal daily activities.

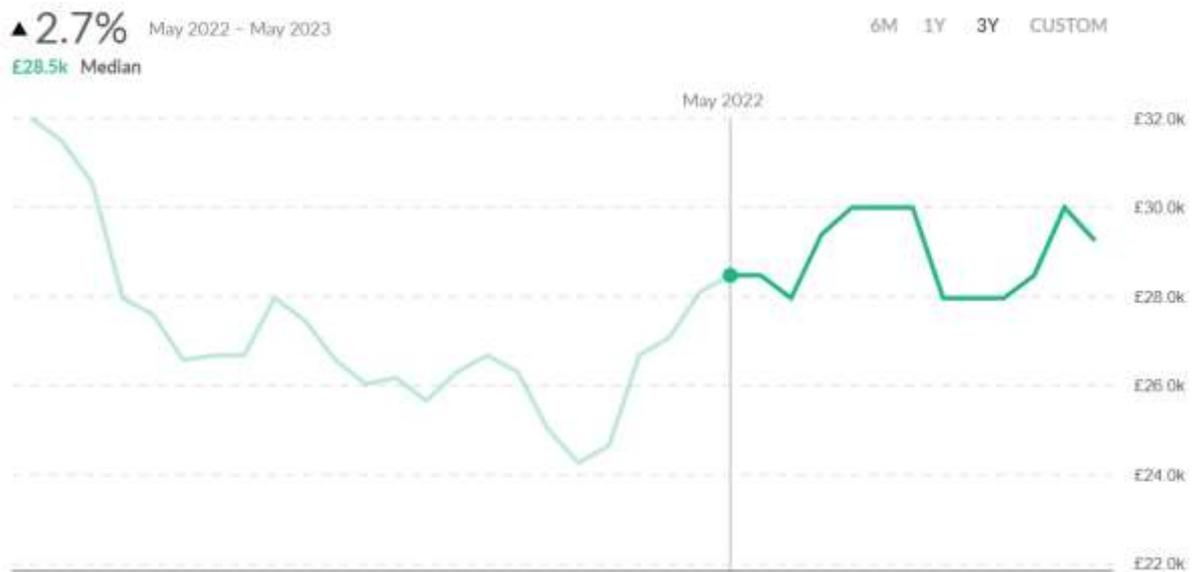
Figure 12: Number of online job postings per month in the Yorkshire and Humber region in green and adjacent industries



Source: Lightcast™, 2023.

However, this increasing demand for labour is not yet being reflected fully in increasing salary demands, which are only 2.7% higher than in May 2022 and haven't yet recovered to pre-pandemic levels.

Figure 13: Median advertised salary of online job postings in the HEY and neighbouring LADs area in the green and adjacent industries



Source: Lightcast™, 2023.

The top occupations being sought by green and adjacent industries were:

• Sales Related Occupations n.e.c.	496
• Other Administrative Occupations n.e.c.	336
• Customer Service Occupations n.e.c.	327
• Engineering Technicians	317
• Vehicle Technicians, Mechanics and Electricians	290
• Programmers and Software Development Professionals	264
• Sales and Retail Assistants	263
• Managers and Proprietors in Other Services n.e.c.	255
• Engineering Professionals n.e.c.	215
• IT Business Analysts, Architects and Systems Designers	191
• Science, Engineering and Production Technicians n.e.c.	171
• Van Drivers	161

Within these occupations, the most sought-after skills were:

• Project Management	815
• Key Performance Indicators (KPIs)	654
• Risk Analysis	571
• Procurement	509
• Environment Health and Safety	428
• Construction	378
• Agile Methodology	372
• Process Improvement	355
• Supply Chain	337
• Data Analysis	304

3.7 Projections of future employment

It is important to note that the following regional employment projections are based on national-level data and, as such, should be treated with a degree of caution as they do not take into account regional, local and industrial strategies at these lower levels.

At the macro level, total employment in the Yorkshire and Humber region is forecast to grow by 108,000 – from 2,741,000 in 2020 to 2,849,000 in 2035 (an annual growth rate of 0.3%).

Most green and adjacent industries are predicted to increase their workforce between 2020 and 2035⁸.

The predicted decline falls in the Coal, oil & gas; Mining & related and Coke and petroleum; Chemicals, etc. workforces represent an opportunity to transfer these skills into green industries such as offshore wind, CCUS and hydrogen production.

⁸ Although the estimates of jobs growth from this source are relatively modest, the Humber Industrial Cluster Plan: Skills analysis & engineering construction opportunities (April 2023) report estimates that 22,800 new industrial jobs could be created across the Humber by 2040.

Figure 14: Employment projections for green industries, 2020 to 2035 (000s)

Industry	2020	2025	2035	Average annual growth
Agriculture, etc	19	20	20	+0.4%
Coal, oil & gas; Mining & related	2	1	1	-3.4%
Coke and petroleum; Chemicals, etc	16	15	14	-0.9%
Motor vehicles, etc	13	12	11	-1.0%
Electricity, gas, etc	8	8	8	-0.3%
Construction	59	59	60	+0.1%
Civil engineering	23	23	24	+0.1%
Specialised construction	114	113	115	+0.1%
Motor vehicle trade	50	52	55	+0.7%
Telecommunications	18	19	20	+0.8%
Computing services	42	45	48	+0.8%
Information services	3	3	4	+0.8%
Architectural and related	49	48	50	+0.2%
Scientific research and development	5	6	7	+2.2%
All industries	2,741	2,772	2,849	+0.3%

Source: The Skills Imperative 2035: Occupational Outlook – Long-run employment prospects for the UK, NFER/ Warwick Institute for Employment Research/Cambridge Econometrics, 2023.

In addition to the 108,000 new jobs, there will also be a requirement to replace some 1,359,000 leavers from the existing workforce – meaning a total net requirement of 1,467,000.

Figure 15: Employment change by occupation group, 2020 to 2035 (000s)

Occupation	Net change in jobs	Replacement demand	Total requirement
Managers, directors and senior officials	3	144	147
Professional occupations	96	290	386
Associate professional occupations	49	173	221
Administrative and secretarial occupations	-6	169	163
Skilled trades occupations	-27	103	76
Caring, leisure and other service occupations	16	152	169
Sales and customer service occupations	-1	106	104
Process, plant and machine operatives	-13	88	75
Elementary occupations	-9	134	125
All industries	108	1,359	1,467

Source: The Skills Imperative 2035: Occupational Outlook – Long-run employment prospects for the UK, NFER/ Warwick Institute for Employment Research/Cambridge Econometrics, 2023.

Professional occupations are projected to see the largest growth in jobs (96,000 jobs), while Skilled trades occupations are projected to lose the most jobs (-27,000).

The vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher). However, only 41% of Yorkshire and Humber's working age population hold a qualification at this level.

All occupational groups will see a decline in jobs that require GCSEs at grades A*-C or lower.

However, this research highlights to continuing importance technicians, operators and maintenance staff who are typically trained to Level 3 or 4 equivalent, particularly in relation to the installation and maintenance of domestic low carbon technologies.

Figure 16: Occupational group and qualification requirements of net jobs growth, 2020 to 2035 (000s)

Occupation	All qualifications	RQF8 Doctorate	RQF7 Other higher degree	RQF6 First degree	RQF5 Foundation degree	RQF4 HE below degree level	RQF3 A level & equivalent	RQF2 GCSE (A-C) & equivalent	RQF1 GCSE (below grade C) & equivalent	No qualification
Managers, directors and senior officials	3	3	21	16	2	2	-7	-19	-13	-2
Professional occupations	96	19	95	17	-11	5	1	-17	-11	-2
Associate professional occupations	49	4	37	30	3	4	3	-17	-13	-2
Administrative and secretarial occupations	-6	2	23	34	9	6	-7	-38	-30	-4
Skilled trades occupations	-27	0	5	9	4	6	-11	-18	-10	-11
Caring, leisure and other service occupations	16	0	12	13	2	3	26	-28	-9	-3
Sales and customer service occupations	-1	1	9	16	4	3	8	-18	-18	-6
Process, plant and machine operatives	-13	1	4	8	3	4	7	-8	-18	-14
Elementary occupations	-9	0	6	12	7	6	9	-16	-17	-16
All industries	108	30	212	154	22	40	29	-179	-139	-60
% of 16-64-year-olds with these qualification levels	100%		41%			1%	13%	29%	3%	13%

Source: Annual Population Survey, 2022.

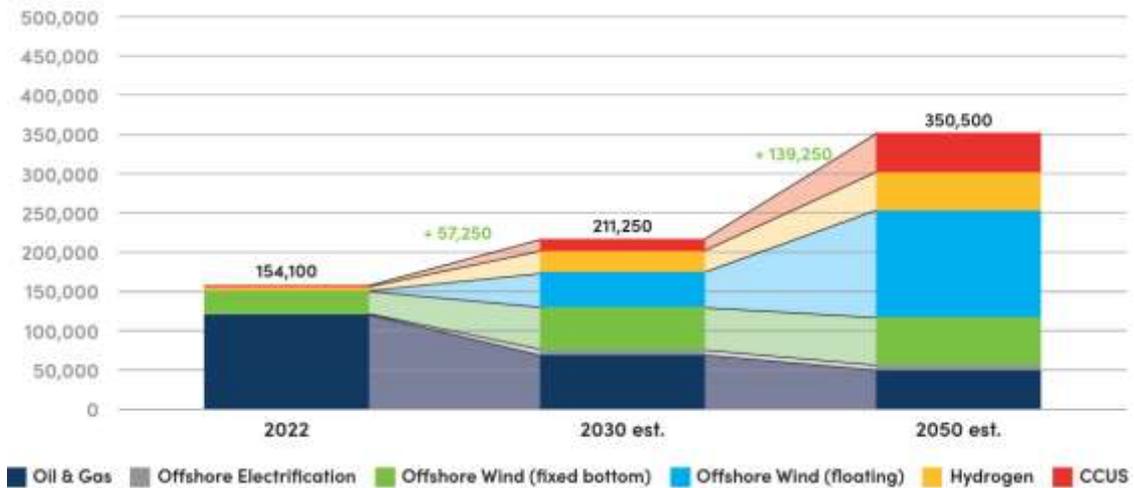
4 Offshore Renewable Energy

4.1 Current and future skills needs

At a national level, OPITO forecasts that the offshore energy sectors could support up to 350,000 jobs by 2050, an increase of around 196,400 on today, although meaningful growth is not expected until 2025⁹.

These include skills required across all business areas, from engineering and fabrication to procurement and people management, to leadership and new digital skills (e.g. in automation), and include all workforce roles, both offshore and onshore at terminals and fabrication facilities, and onshore professional, engineering, and support roles.

Figure 17: Offshore energy sectors 2022 to 2050 jobs estimates by sector – Direct and indirect employment



Source: North Sea Transition Deal Integrated People and Skills Strategy, May 2022.

Offshore wind

RenewableUK’s wind energy database reports that there is currently just over 13.7GW of operational offshore wind capacity across the UK, with the Yorkshire and Humber region providing 3GW (22%).

In addition, there is 2.7GW under construction, although none of this is located off the Yorkshire and Humber region.

Of the 16.6GW of consented projects across the UK, 2.9GW (17%) is in the Yorkshire and Humber region.

Figure 18: The current UK offshore wind pipeline – generating capacity

Geography	Operational	Under construction	Consented	Total
UK	13,660 MW	2,723 MW	16,618 MW	33,001 MW
Yorkshire and Humber region	3,033 MW	0 MW	2,852 MW	5,885 MW
Share of UK	22%	0%	17%	18%

Source: RenewableUK Wind Energy Database

⁹ North Sea Transition Deal Integrated People and Skills Strategy, May 2022.

The latest research by OWIC¹⁰ reports that the total UK offshore wind workforce is estimated to be 32,257 – up 4% from 2021/22. Yorkshire and Humber region accounting for around 16% (c4,300) of jobs. This is the largest regional workforce outside of Scotland.

They also report:

- 21% of the UK offshore wind workforce is female
 - The Yorkshire and Humber cluster has just 14% women in the workforce, which is the lowest of all regions in the UK
- 7% of the UK offshore wind workforce are from an ethnic minority background (up from 3% in 2021/22)

Looking forward to 2030, OWIC forecast that the industry will employ 104,401 people – 56,296 of those being direct, with 48,105 indirect roles.

There is a rapid increase in jobs through to 2026 at 88,509 jobs, before slowing down to 2030, reaching 104,401 at the end of 2029. The reason for this is likely because of the nature of project phases – there is substantial activity expected in 2023, with further subsequent growth as the planning phase moves into construction.

The Offshore Wind Sector Deal has been updated to reflect the Net Zero Strategy published in 2021 and subsequently the Energy Security Strategy published in 2022, which raised the target to 40GW and then subsequently 50GW of offshore wind projects by 2030.

Increasing the target to 60GW by 2030 which, if possible, with the constraints of volumes of raw materials, network connections, and marine capability, would likely require a workforce nearing 120,000.

Roles will be required at all stages of the project lifecycle, in design, manufacturing, construction, installation, operations and maintenance. Employment demand will be strongest for consenting skills, mechanical and electrical disciplines, and for engineers both onshore and offshore¹¹.

Skills shortages are anticipated in areas such as:

- High level electrical skills, including Senior Authorised Persons
- Consenting skills, particularly amongst SNCBs and regulators but increasingly within the industry
- Electrical technical and engineering skills (particularly substations, HV and cables). These will be exacerbated by the upgrading of the power network and the introduction of battery storage sites
- Project Management and the ability to manage significant sized projects and multiple contractors
- High level digital specialisms including data analytics, artificial intelligence, robotics, digital engineering/science, machine learning, SCADA related skills, software development
- On and offshore logistics; marine and port orientated skills
- Construction resource for floating wind projects, which are anticipated to require high numbers of people in fabrication and welding

¹⁰ Offshore Wind Skills Intelligence Report, Offshore Wind Industry Council, June 2023.

¹¹ North Sea Transition Deal Integrated People and Skills Strategy, May 2022.

In addition, a number of skills shortages are also identified in relation to floating offshore wind (FLOW)¹²:

- **Consenting skills:** Caused by an increasing pipeline of major projects around the UK and calls on both developer consenting teams and the statutory consultee bodies
- **Electrical skills:** At both technician & engineer level, caused by increasing electrification across multiple industries increasing demand for these skills
- **High voltage electrical skills:** At a Senior Authorised Person (SAP) and technician level in respect of switchgear commissioning, cable jointers and cable terminators
- **Digital skills:** Focussed on analytics, science and engineering, caused by increasing demand for data systems and data reporting across multiple industries
- **Fabrication:** The large numbers of welders that will be required is a real challenge, particularly if several projects occur at the same time in close proximity

The people and skills requirements of FLOW will increase the pressure on (but also offer an opportunity to) the following job roles¹³:

Blue collar trades such as:	
Onshore Construction Managers	Forklift Drivers
Onshore Construction Supervisors	Crane Drivers
Onshore Construction Shift Managers	Scaffolders
Onshore Site Foreman	Riggers
Onshore Site Chargehands	Painters
Skilled Welders	Site Labourers
Skilled Platters	Quayside Operatives
Skilled Electricians	

Marine crews such as:	
Captains	Crane Operators
Skippers	Mates
Towing Masters	Deckhands
Mooring Masters	Able Seafarers
Marine Engineers	1 st Officers
SSLs (Section Stability Leaders)	

Subsea expertise such as:	
ROV Pilots	Party Chiefs
ROV Technicians	Surveyors

The types of skills demanded across the project lifecycle of an offshore wind farm can vary considerably. The table below summarises sub-industries that make up the offshore wind industry and the skills and qualifications generally required by each.

¹² Floating Offshore Wind: Risks to project development – People, Skills and Vocations, Opergy/Offshore Renewable Energy Catapult, June 2022.

¹³ Floating Offshore Wind: Risks to project development – People, Skills and Vocations, Opergy/Offshore Renewable Energy Catapult, June 2022.

Figure 19: Skill requirements by project stage for offshore wind

Skill area	Specific details
Development and project management	<p>Generally, degree-level qualifications in relevant disciplines such as environmental sciences, economics, engineering and project management.</p> <p>Port studies: Degrees in environmental sciences, economics, engineering, project management.</p> <p>Geotechnical and geophysical surveys: Degrees in environmental sciences, geology; master's degree in oceanography, hydrography, geophysics, engineering geology and geotechnical engineering.</p> <p>Wildlife surveys: Degree or HND in biology, marine biology or environmental monitoring.</p>
Turbine design and manufacture	<p>Degrees in mechanical engineering and physics.</p> <p>Technical skills in welding, platers, electricians, fitters, etc. (via apprenticeships).</p> <p>Technical qualification in electrical and design engineering – welders, platers, pipe fitters, electricians, mechanical fitter and riggers.</p> <p>Research and development: degrees in physics, electrical/ mechanical engineering and maths.</p>
Balance of plant	<p>Qualifications in naval architecture, marine engineering, mechanical engineering, high voltage design engineering and technicians, geophysics and environmental sciences.</p> <p>Geotechnical and geophysical surveys: Degrees in environmental sciences, geology; master's degree in oceanography, hydrography, geophysics, engineering geology and geotechnical engineering.</p> <p>Turbine tower supply: Welding, plating, fabrication and blasting (via Apprenticeships).</p> <p>Foundation supply: Degree in civil, design, mechanical or fabrication engineering.</p> <p>Cable supply: Electrical engineering and product design engineering (high voltage design and technicians).</p> <p>Substation supply: Degree in product design engineering and electrical engineering.</p>
Installation and commissioning	<p>Turbine and foundation installation: Naval architecture and marine engineering.</p> <p>Cable installation: Degree in engineering or mechanical engineering.</p> <p>Installation support: Valid dive ticket. Degree in geophysics and environmental science.</p> <p>Vessel (master, mate, deckhand) certifications.</p>
Operations, maintenance and service	<p>Turbine maintenance: Technology-specific training; high-voltage equipment handling, certification to undertake lifting, climbing and rope access training. Strong electrical/control and instrumentation skillset.</p> <p>Maintenance of the offshore substation: High-voltage technicians; electrical or mechanical engineering.</p> <p>Supervisory control and data acquisition (SCADA) monitoring</p>
Cross-cutting skills	<p>Vessel operations and maintenance: Marine, electrical and mechanical engineering/operations (via apprenticeships and subsequent upskilling).</p> <p>Vessel mate, deckhand and master: Various mandatory certifications.</p>

Source: Skills and Labour Requirements of the UK Offshore Wind Industry: 2018 to 2032, Aura/Energy & Utility Skills, October 2018.

A recent report by RenewableNI and BVG Associates highlights the opportunities where a local area could provide local content to the offshore wind supply chain (although the report specifically relates to Northern Ireland, many of the aspects could equally relate to the Humber region):

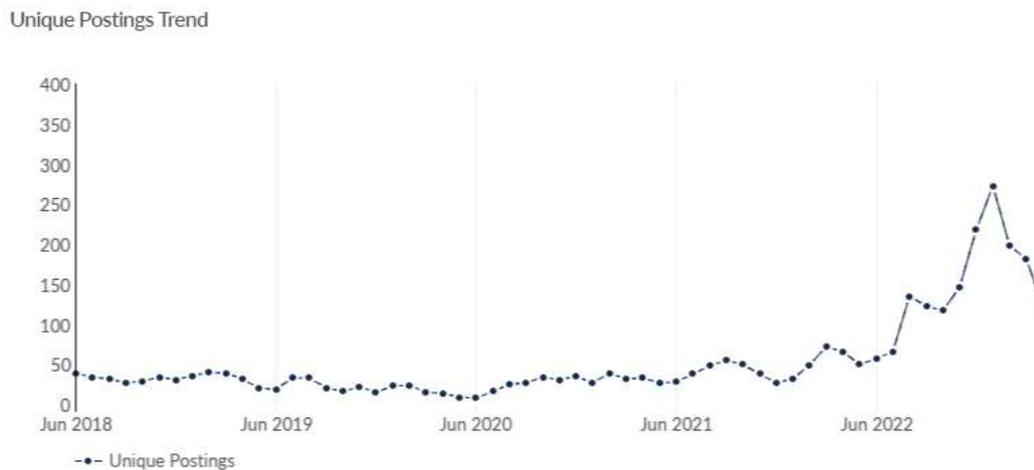
Figure 20: Primary contributions of the offshore wind supply chain

Development	Manufacturing
Development work requiring interaction with local stakeholders and the regulatory environment	Supply of foundations and offshore substation structures from Harland and Wolff
Site investigations and above water surveys	Supplying secondary steel for these components
Engineering design and consultancy	Construction of operation bases
Legal and financing expertise	
Installation	Operations, maintenance and services
Installation of onshore civils and electrical assets	Onshore logistics (a significant crossover with onshore wind)
Port side activities of turbine and foundation installation	Offshore logistics a mixture of local and imported supply
Some involvement in offshore cable installation such as onshore connection and cable protection	General maintenance of turbines and balance of plant

Source: The Clean Revolution: Building Northern Ireland’s Offshore Wind Industry, RenewableNI/BVG Associates, August 2022.

In the year ending 31st May 2023, there were 13,000 online job postings relating to offshore wind across the UK¹⁴ – 830 of which were located within the Yorkshire and Humber region. The number of job postings in this industry have seen a dramatic increase since July 2022.

Figure 21: Number of online job postings relating to offshore wind (Yorkshire and Humber region)



Source: LightcastTM, 2023.

¹⁴ These vacancies were identified using the keywords “offshore wind”.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 22: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Offshore Managers	Project Management
Contracts Managers	Procurement
Offshore Project Managers	Environment Health and Safety
Geotechnical Engineers	Electrical Engineering
HSE Advisors	Subcontracting
Lawyers	Contract Management
Client Service Representatives	Construction
Principal Consultants	High Voltage
Wind Turbine Technicians	Civil Engineering
Authors	Business Development

Source: LightcastTM, 2023.

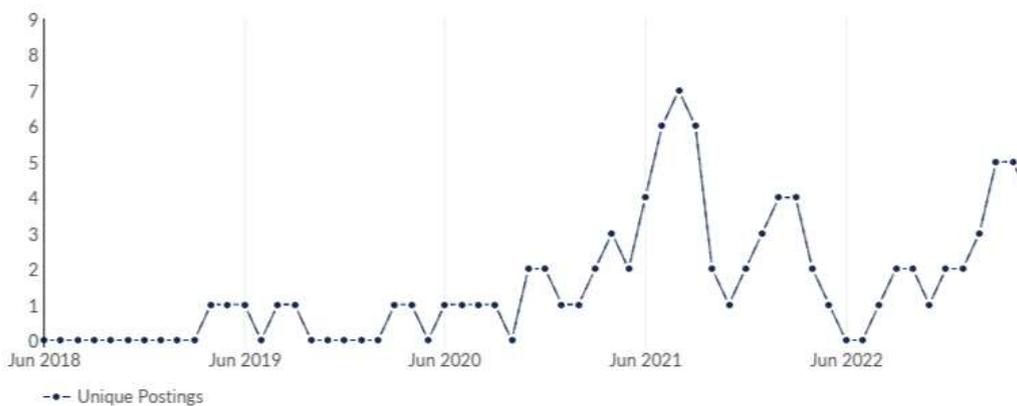
Marine, wave and tidal

Given that there is currently very little commercial activity in this industry in and around the HEY and neighbouring LADs at the moment, it is not surprising that demand for the associated skills is extremely low – and hence the training market is not making any moves to develop new provision. This situation is reflected across the UK.

In the year ending 31st May 2023, there were 200 online job postings relating to marine, wave and tidal across the UK¹⁵ – 9 of which were located within the Yorkshire and Humber region.

Figure 23: Number of online job postings relating to marine, wave and tidal (Yorkshire and Humber region)

Unique Postings Trend



Source: LightcastTM, 2023.

¹⁵ These vacancies were identified using the keywords “wave energy”, “tidal energy” and “tidal power”.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 24: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Renewable Energy Managers	Project Management
SCOM Engineers	Business Development
Coastal Engineers	Procurement
Principal Engineers	Engineering Design Process
Project Principals	Mechanical Engineering
Energy Resource Partners	Data Analysis
Ocean Export Specialists	MATLAB
Project Engineers	Erosions
Research Fellows	Marketing
Wind Energy Engineers	Electrical Engineering

Source: LightcastTM, 2023.

4.2 Obtaining the required skills

It is likely that the main entry routes into the offshore renewable energy industry will continue to be:

- Apprenticeships and graduates
- From other, technically-related, industries (including those from other aspects of the wider energy industry – both onshore and offshore)
- Those with cross-industry skills (e.g. business/ commercial, IT and data analytics, drone/ ROV operators, etc.)

In relation to the second and third points above, having appropriate conversion programmes, as well as recognition of prior learning/experience, will be a crucial route to competency for the industry.

Recent research estimates that over 90% of the UK’s oil and gas workforce have medium to high skills transferability to offshore wind activities¹⁶, particularly around construction and installation jobs¹⁷.

While soft skills, business skills and other non-technical skills are generally highly transferable, transition training and upskilling will be required on technical skills associated with offshore wind.

¹⁶ UK Offshore Energy Workforce Transferability Review, Robert Gordon University, June 2021.

¹⁷ Richard Hanna, Phil Heptonstall & Rob Gross, UK Energy Research Centre (April 2022), [Green job creation, quality and skills: A review of the evidence on low carbon energy](#)

The volume of skills required, and normally within a relatively condensed timeframe, suggests that the challenge of attracting and retaining offshore skills could be considerable. Especially given:

- Demand for the required core skills (e.g. craft, mechanical/electrical engineering, etc.) is likely to be increasing across all of the green industries (both in the Hull area and more substantially across Great Britain)
- The lead time to competency of new entrants into the industry through programmes such as apprenticeships could be as long as six years – meaning that a heavy reliance on recruiting experienced workers during the early project development stages is highly likely

With the UK Government increasing the target from 1GW to 5GW by 2030, floating offshore wind (FLOW) offers another potential pathway for workers in the oil and gas industry, for example, in fabrication, subsea and in the design and operation of floating platforms, moorings and cable solutions¹⁸.

The Strategic Development Fund has enabled Hull College to invest in a range of new technologies and provision to ensure their provision is fit to deliver the skills needed to support the offshore renewable energy industry. Including the installation of new wave technology equipment for use by students and employers.

Hull College are also developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Materials and the environment, Future energy systems and sustainability and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules in Wind and Hydro Engineering, The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Grimsby Institute has also developed CO₂ welding modules along with 3D immersive training.

Apprenticeships

Developing the next generation of talent, in particular supporting apprenticeships, is a key target of the Offshore Wind Sector Deal, which set an industry target of 2.5% of the workforce to be recruited through apprenticeship programmes (2022 survey results show 2.6% of the workforce are apprentices – an increase of 0.6% on last year)¹⁹.

Yorkshire and Humber cluster have the highest number of apprentices in the industry, with 76 apprentices in that cluster alone.

In 2021/22 there were 1,271 starts on Engineering and Manufacturing Technologies apprenticeships in the HEY area – down slightly from 1,379 in the previous year.

Starts on Construction, Planning and the Built Environment apprenticeship standards increase by more than a 100 in 2021/22, but given the likely future demand for these skills, many more are likely to be needed to meet future demand.

¹⁸ North Sea Transition Deal Integrated People and Skills Strategy, May 2022.

¹⁹ Offshore Wind Skills Intelligence Report, Offshore Wind Industry Council, June 2023.

Figure 25: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Construction, Planning and the Built Environment	387	370	477
Engineering and Manufacturing Technologies	694	1,379	1,271
Information and Communication Technology	141	120	198
Science and Mathematics	3	1	2

Source: Data provided by HEY LEP.

The number of starts on ICT apprenticeships increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce. This also applies to Science and Mathematics apprenticeship standards.

The availability of local apprenticeship training on relevant standards can vary²⁰:

Those standards with a training provider within 40 miles of Hull include:

- Engineering design and draughtsperson (level 3)
- Engineering Fitter (Level 3)
- Maintenance and operations engineering technician (Level 3)
- Engineering Technician (Level 3)
- Project controls technician (L3)
- Plate Welder (Level 3)
- Pipe Welder (Level 3)
- Geotechnical engineer (integrated degree) (Level 7)

Those standards with no training provider within 40 miles of Hull but do offer training at the apprentices' workplace include:

- Electrical power networks engineer (Level 4)
- Electrical or electronic technical support engineer (degree) (level 6)

Those standards with no training provider within 40 miles of Hull include:

- Marine Electrician (Level 3)
- Electrical power protection and plant commissioning engineer (Level 4)
- Control technical support engineer (level 6)
- Project controls professional (Level 6)
- Marine Surveyor (degree) (Level 6)

Furthermore, standards that are currently in development include:

- Power Support Operative (Level 2)
- Multi-skilled mechatronics maintenance technician (Level 3)
- Power industry cable jointer - distribution (Level 3)
- Power industry overhead linesperson (Level 3)
- Power industry substation fitter (Level 3)

²⁰ This is based on searching for apprenticeship training providers on [the gov.uk website](https://www.gov.uk) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

T Levels

There are three T Levels currently available that are relevant to this industry²¹:

- Design and Development for Engineering and Manufacturing
 - The specialisms available in the Design and Development for Engineering and Manufacturing T Level are:
 - Mechanical engineering
 - Electrical and electronic engineering
 - Control and instrumentation engineering
 - Structural engineering
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC and Wilberforce College
- Maintenance, Installation and Repair for Engineering and Manufacturing
 - The specialisms available in the T Level in Maintenance, installation and repair for engineering and manufacturing are:
 - Maintenance engineering technologies: mechanical
 - Maintenance engineering technologies: mechatronic
 - Maintenance engineering technologies: electrical & electronic
 - Maintenance engineering technologies: control & instrumentation
 - In the HEY area, this qualification is being delivered by TEC Partnership
- Engineering, Manufacturing, Processing and Control
 - In addition to the core content, each student will also complete at least one module of occupation-specific content:
 - Fitting and assembly technologies
 - Machining and toolmaking technologies
 - Composites manufacturing technologies
 - Fabrication and welding technologies
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

²¹ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There are no IoT courses relevant to the offshore renewable energy industry being delivered within the HEY area, but there are a number of engineering courses which could be relevant to employers in the industry, including:

Figure 26: Institute of Technology courses delivered within the HEY area

Course	IoT Partner
Level 3 Diploma in Engineering and Technology	East Riding College
Level 4 HNC in General Engineering	East Riding College
Level 5 HND in Mechanical Engineering	East Riding College
Level 5 HND in Electrical and Electronic Engineering	East Riding College
Advanced Apprenticeship Engineering Technician	East Riding College
Advanced Apprenticeship in Engineering Manufacture - Fabrication and Welding	East Riding College
Advanced Apprenticeship Maintenance Operations Engineering Technician	East Riding College

Source: <https://yhiot.ac.uk/courses/>, accessed on 21st July 2023.

Higher education

As discussed in section 3.2.3 above, in 2020/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

In terms of near 2,300 STEM graduating entering employment on 2019/20, just 13 of them entered the electricity production industry (SIC 35.11) – although some may have entered the supply chain, which would be covered by other industrial codes).

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF4 (i.e. higher than an A level), it is imperative that the region's supply of degree-educated workers is improved, especially in areas such as:

- Environmental sciences
- Mathematical sciences
- Engineering
- Computer sciences

Skills Bootcamps

The only Skills Bootcamp on offer in Yorkshire and Humber that is relevant to offshore renewable energy is Welder Fabricator.

There are, however, a range of relevant Skills Bootcamps on offer in other regions of the country²²:

- Functional Skills for the Green Wind Industry
- GWO (Basic Safety Training) with VT L2 to ISO 9712
- Net Zero & Smart Energy Transition
- Offshore renewables
- Wind Technician Blade Repair
- Wind Technician Electrical
- Wind Technician Entry Level
- Wind Technician Painter
- Wind Technician Team Leader
- Wind Turbine Technician Blade Repair
- Wind Turbine Technician Electrical
- Wind Turbine Technician Entry Level
- Wind Turbine Technician Painter
- Wind Turbine Technician Team Leader

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

²² Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

5 Onshore renewable energy

5.1 Current and future skills needs

Biomass/Energy from waste

Whilst biomass is often presented in a binary “good” or “bad” light for the planet, the Association for Renewable Energy & Clean Technology (REA) are of the view that reality is one of more gradation, and with the right conditions it can contribute to the climate solution, even at large scale. Leading climate authorities around the world, such as the UK’s climate Change Committee, the International Energy Agency (IEA) and the UN Intergovernmental Panel on Climate Change (IPCC) are clear that bioenergy has a role to play in the net-zero future.²³

Using sustainable biomass as a source of energy can reduce the cost of meeting carbon reduction targets and can provide energy for a mixture of low carbon heat, power, gas and liquid transport fuels²⁴.

The Renewable Energy Planning Database²⁵ shows that in April 2023 there was 3GW of biomass installed capacity operational in the Yorkshire and Humber region. The planning pipeline contains a further 450MW of installed capacity.

Across the UK, biomass has created new jobs and investment in ports and freight infrastructure, an example being the Immingham Renewable Fuel Terminal (IRFT) in Humber which is the world’s largest biomass terminal.

Critical job roles within biomass include:

- **Biomass Plant Technicians:** Operating biomass fuel burning boilers or biomass fuel gasification system equipment, inspecting biomass power plant or processing equipment, recording or reporting damage and mechanical problems, recording or reporting operational data, measuring and monitoring raw biomass feedstock, including wood, waste or refuse materials
- **Biomass Engineers:** Responsible for installing, repairing and maintaining pipes, fixtures, plant and other plumbing used for heating, water distribution and waste water disposal in residential, commercial and industrial buildings. The skills and qualifications for a Biomass Engineer are a proven level of ability usually attained through 3 years’ experience working as a qualified and competent plumbing and heating engineer
- **Biomass Plant Managers:** Require a strong background in science and mathematics, physics, biology, chemistry, with a strong background in mechanical, engineering, production and processing, design and chemistry

In the year ending 31st May 2023, there were 13,800 online job postings relating to biomass/energy from waste across the UK²⁶ – 1,000 of which were located within the Yorkshire and Humber region.

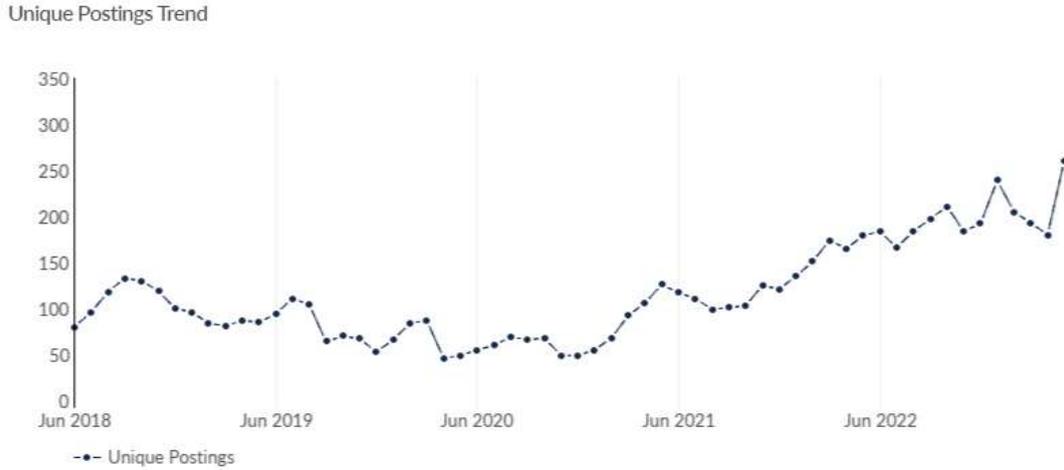
²³ More information can be found on [The Association for Renewable Energy & Clean Technology’s website](#) (external link opens a new window).

²⁴ The Bioenergy: Enabling UK biomass, Energy Technologies Institute, 2015.

²⁵ The Renewable Energy Planning database can be found on [the Department for Energy Security and Net Zero’s website](#) (external link opens a new window).

²⁶ These vacancies were identified using the keywords “biomass”, “waste to energy” and “energy from waste”.

Figure 27: Number of online job postings relating to biomass/energy from waste (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 28: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Pipefitters	Boilers
Mechanical Fitters	Technical Recruitment
Service Engineers	Water Treatment
Maintenance Engineers	Maintenance Engineering
Power Technicians	Machinery
Field Service Engineers	Mechanical Engineering
Renewable Energy Engineers	Environment Health and Safety
Electrical Maintenance Engineers	Procurement
Mechanical Maintenance Engineers	Wastewater
Mechanical Engineers	Risk Analysis

Source: LightcastTM, 2023.

Heat networks

Heat networks, otherwise known as district heating, produces and transmits heat from a central point to a number of users, using a network of underground hot water pipes. They tend to lend themselves well to distinct scenarios, for example, urban hubs, industrial complexes and self-contained rural communities (e.g. a village).

Currently, the heat network market is embryonic, with only around 10MW of installed capacity in the region, with a further 177MW in the planning pipeline.

Figure 29: Heat network project pipeline (MW installed capacity) by development stage (Yorkshire and Humber region)

Technology type	Operational	Under Construction	Planning Permission Granted	Planning Application Submitted	Pre-Planning	Grand Total
Air Source Heat Pumps			0.5	0.15		0.65
Biofuel CHP						
Biomass (dedicated)					45	45
EfW Incineration			20	95		115
Gas Fired CHP		9.2	13.5		1.5	24.2
Ground Source Heat Pumps	0.15		0.45			0.6
Water Source Heat Pumps			1.5			1.5
Grand Total	0.15	9.2	35.95	95.15	46.5	186.95

Source: Heat Networks Planning Database, Department for Energy Security & Net Zero/Barbour ABI, April 2023.

To design and develop an effective heat network requires:

- A suitable source of renewable low carbon energy
- Identification of an appropriate technology solution
- Sophisticated modelling of supply and demand
- Negotiation of access
- Commercial agreements and tariffs
- Installation and operation

Connection to building heating systems in a new-build scenario can be relatively straightforward, but integrating heat networks with existing building systems in retrofit context can be challenging.

A variety of possible technologies can provide the input into a heat network including different types and sizes of power stations, energy from waste (EfW) facilities, industrial processes, biomass and biogas fuelled boilers and Combined Heat and Power (CHP) plants, gas-fired CHP units, fuel cells, heat pumps, geothermal sources, electric boilers and solar thermal arrays²⁷. The skills needed for these technologies are considered throughout this report.

From the network perspective, existing workforce capacity and capabilities are insufficient to support the expected growth of the heat network industry²⁸.

²⁷ What is a heat network?, Department for Business, Energy and Industrial Strategy.

²⁸ Heat Network Skills Review (June 2020), Department for Business, Energy & Industrial Strategy, p.11-14

The main skills gaps appear to revolve around:

- Control systems / PLC specialists
- Design engineers
- Engineers and developers
- Facilities and estate managers
- Geoscientists
- General installers
- Legal and finance
- Project managers
- Strategic-level project planners
- Surveyors
- Welders

Furthermore, town and country planners need to understand how to integrate heat network infrastructure into planning proposals and to do energy and transport assessments of early designs.

Typically, people in these roles do not currently have the breadth of skills and experience of heat network projects required to be considered proficient due to the embryonic nature of the heat network industry at the moment²⁹.

The specifics of the additional learning required to supplement existing skill sets were identified in a research project managed by Energy Saving Trust on behalf of the Scottish Government, under the auspices of the Heat Network Skills Initiative³⁰. These included:

- Digitalised networks
- Heat network design principles
- Installation, operation and control of low temperature heat networks (including ambient loops)
- Smart technologies
- Specific project management approaches to heat network development

This table identifies the skills lacking across a number of crucial occupations³¹.

Figure 30: Summary of skills lacking by occupation within heat networks

Occupation	Skills lacking	Severity of skills gap
Control System Specialist	New recruits lacking the full range of skills required, in particular lack direct experience	High
Energy Master Planner	Intricate knowledge of heat networks can be lacking among those transferring from other industries - also a lack of commercial and legal understanding	High
Heat Network Development Manager	Commonly possessing strong project management or engineering skills, but rarely both	High

²⁹ Heat Network Skills Review: BEIS research report no. 2020/020.

³⁰ Heat Network Skills Initiative (March 2021), Energy Saving Trust, p.8.

³¹ Heat Network Skills Review: BEIS research report no. 2020/020.

Occupation	Skills lacking	Severity of skills gap
Project Delivery Manager	Lacking experience and understanding of the heat network landscape, as well as commercial skills and of procuring large scale projects	High
Commercial / Operations Manager	Business acumen skills	Medium
Design Engineer	There is a limited theoretical or practical knowledge and understanding of heat networks	Medium
Financial Specialist	There is some relevant knowledge at more junior levels; those at more senior levels typically have limited experience of the heat network industry	Medium
Legal Specialist	While there is some relevant knowledge at more junior levels, those at more senior levels typically have limited experience of the heat network industry	Medium
Operations & Maintenance Technician/ Inspector	Lack of people who are able to inspect a system and understand it sufficiently to be able to resolve problems	Medium
Installer	It is relatively easy for installers to work across different industries. No particular skills are lacking in this occupation	Low
Pipe Layer (including welding)	It is relatively easy for welders to work across different industries, so knowledge of heat network systems is often lacking (although these can be learnt with relative ease)	Low

A specialist skill that may be required within the heat networks – if heat is being obtained through geothermal means – are those associated with geoscience skills.

This requires skills associated with engineering geologists, hydrogeologists, geophysicists, geophysicist, geoscientist, geologist and geochemist.

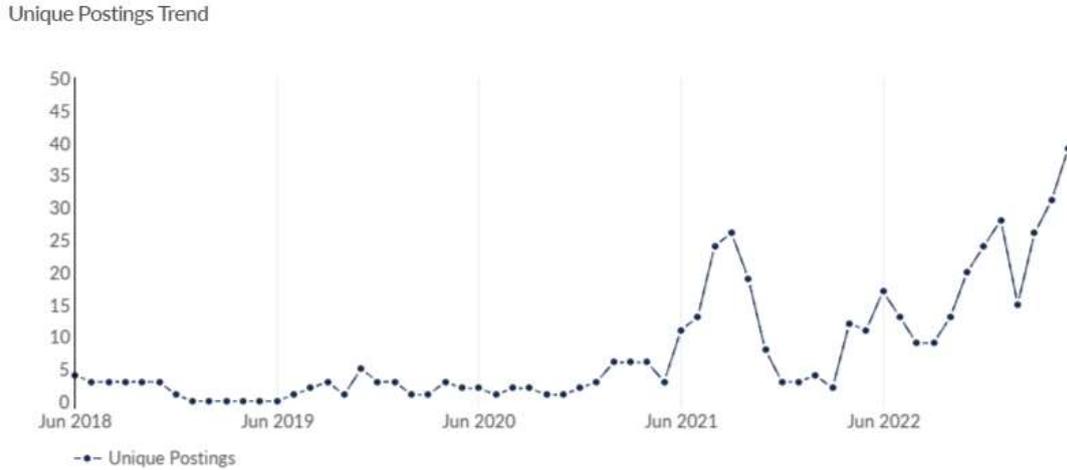
In relation to 100% hydrogen networks, only once they scale up in size and complexity, and industry/regulator-approved technical standards have been set, will educational institutions and private training providers enter the market.

In the meantime, any technical upskilling will largely be met by either the OEM/supplier and/or the “trial” network operators themselves on a “modular” basis as the technology is rolled out as business as usual, while awareness-type training is already well established, not least via the Skill up programme, further education colleges and the Hydrogen Training Academy.

In the year ending 31st May 2023, there were 2,000 online job postings relating to heat networks across the UK³² – 100 of which were located within the Yorkshire and Humber region.

³² These vacancies were identified using the keywords “heat networks”.

Figure 31: Number of online job postings relating to heat networks (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 32: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Project Managers	Business Development
Design Engineers	HVAC
Environmental Technologists	Building Automation
Building Engineers	Heat Recovery Ventilation
Carbon Analysts	Regional Sales
Engineers	Heat Exchanger
Mechanical Contractors	HVAC Split Systems
Project Delivery Managers	Refrigerant
Schedulers	Water Cooling
Sustainability Consultants	Net Zero

Source: LightcastTM, 2023.

Anaerobic digestion

Anaerobic Digestion (AD) can be used to produce biogas from food waste, sewage sludge, silage and animal manures. The resulting biogas can be upgraded via scrubbing technologies into biomethane and subsequently injected into the gas network³³.

³³ Advice report: The path to a Net Zero Northern Ireland, Climate Change Committee, March 2023.

The five relevant industry developments identified by the Anaerobic Digestion and Bioresources Association (ADBA) are³⁴:

- Renewable heat
- Renewable transport fuels
- Food waste
- Agriculture
- Wastewater

The Renewable Energy Planning Database³⁵ shows that AD is still in its infancy in the Yorkshire and Humber region. In April 2023 there was 45MW of AD installed capacity operational in the region. However, there is currently no planned activity in the pipeline.

The expansion of AD capacity will require a greater number of skilled Systems Process Engineers who will be needed in mostly remote rural areas where these sites will be located, supported by Operators, Technicians and Biogas Plant Operatives³⁶.

Large-scale biodigestion will call for an increasing number of Process Operatives and Technicians, as well as roles in Sales and innovation needed to grow the market for AD products.

The more skilled AD supply chain will need to include farmers who have detailed knowledge in the management of land and feedstocks, as well as specialist Grid Connection Engineers who ensure grid connections are safe, and that the biomethane fed into the grid is of suitable quality and calorific value as per the grid operators' requirements.

In considering the lack of skilled engineers in the industry and the importance to limit the environmental impact of biogas production there is significant employment potential for engineers to work both in industrial plants and in the increasing number of merchant AD sites that take commercial and household food waste.

There is the potential to translate opportunities into new career destinations for graduates in view of the current shortage of technicians and bioengineers with adequate experience in areas such as laboratory working, quality control and commercial business.

There is the need to match the locations of skill supply with the rural locations which will demand these skills; making such geographic areas attractive and inclusive.

Transferable skills will become increasingly important as technologies advance, industries shift and new markets open up. Flexibility needs to be encouraged in the workforce to enable skills that are developed now can be applied to different directions as the industry grows.

In agriculture, Farm Directors will need to develop a greater awareness of the value of by-products for producing energy through onsite AD facilities along with the benefits of co-digestion, supported by specialist bioresource advisors.

Farms will need to be supported in utilising digestates for agronomic benefits such as soil health. The recovery of high-value nutrients from digestates is currently an unexplored area which provides employment opportunities for biologists and ecologists in finding alternative uses for digestates.

³⁴ More information can be found on [the Anaerobic Digestion and Bioresources Association website](#) (external link opens a new window).

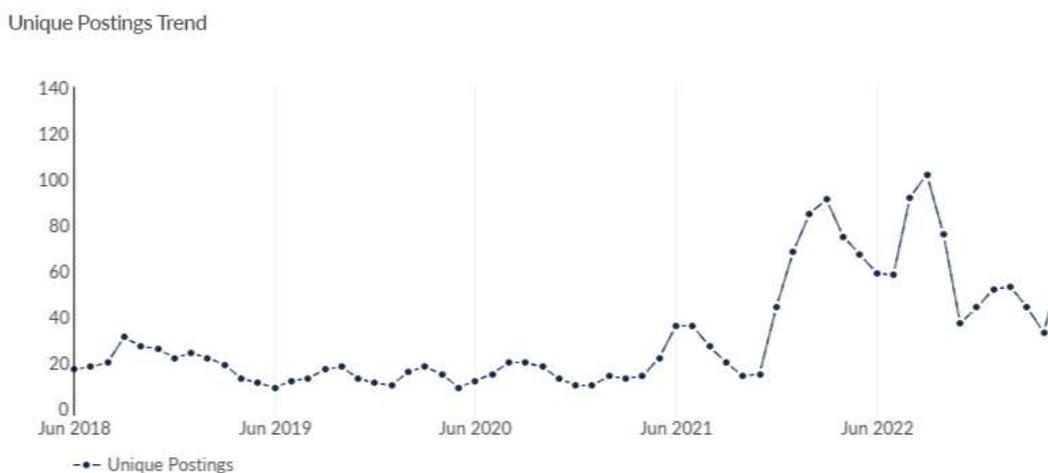
³⁵ The Renewable Energy Planning database can be found on [the Department for Energy Security and Net Zero's website](#) (external link opens a new window).

³⁶ The Future of Work: Baseline Employment Analysis and Skills Pathways for the Circular Economy in Scotland, Leonore te Bokkel, Fiona Craig and Sarah Wotton, Zero Waste Scotland and Esther Goodwin Brown and Joke Dufourmont, Circle Economy, 2023.

Bioresource Advisors, specialised in working with the agricultural industry, will be needed to support on-farm staff with a better understanding of the AD process; providing advice and training on equipment that can be used to make the process more efficient in-house. Knowledge transfer of AD and biorefining can be delivered by early adopters, agri-tech innovation centres and fully functioning demonstrator farms.

In the year ending 31st May 2023, there were 2,600 online job postings relating to anaerobic digestion across the UK³⁷ – 300 of which were located within the Yorkshire and Humber region.

Figure 33: Number of online job postings relating to anaerobic digestion (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 34: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Field Service Engineers	Digestive System
Mechanical Maintenance Engineers	Maintenance Engineering
Maintenance Engineers	Wastewater
Electrical Maintenance Engineers	Water Treatment
Renewable Energy Engineers	Engineering Drawings
Gas Engineers	Production Process
Instrumentation Engineers	Risk Analysis
Maintenance Fitters	Electronic Engineering
Multi-Skilled Operators	Gas Chromatography
Industrial Maintenance Electricians	Gasification

Source: LightcastTM, 2023.

³⁷ These vacancies were identified using the keywords “anaerobic digestion”.

Biogas/ Biomethane production

The bioeconomy expansion has the potential to produce value from by-products from agriculture, forestry, fishing and the wider food and drink industry. Expansion of the bioeconomy will require the development of roles and competences across agri-food industries as well as biotechnology.

Growth in the biorefining industry will support significant employment opportunities relating to new technology introduction and the larger range of products produced from the process.

However, in the short term, there are no real concerns regarding skills needs for biomethane – rather it is the shortage of people (as opposed to skills) which is the main issue facing the industry (as it is on many of the other green industries).

As the biorefining industry grows, so will the range of job opportunities due to the myriad of potential destinations for bioresources.

Skills that will be critical to the industry moving forward include:

- **Biogas Technicians:** Requires knowledge in natural gas liquids recovery processes, the various facets of natural gas, qualities, hazards & applications of fuel gas, biomass conversion and the theoretical & practical applications of mechanics
- **Biochemists, Industrial and Life Scientists:** Practical laboratory experience, with a degree in Life Sciences, Environmental, Material Science, Ecological Sciences or Chemical Engineering
- **Bioresource Advisors:** Requiring degrees in Material Science, Ecological Sciences or Environmental Sciences
- **Bioresource Planners:** Requiring a degree in Biology, Material Sciences or Life Sciences
- **Logistics Managers:** Requiring a degree or advanced qualification in Supply Chain Management or Business Administration

Alongside this, Quality Control Managers and Biochemical Engineers will be vital for ensuring controlled and high-quality processes within plants, utilising their practical experience of working in laboratories and quality control expertise.

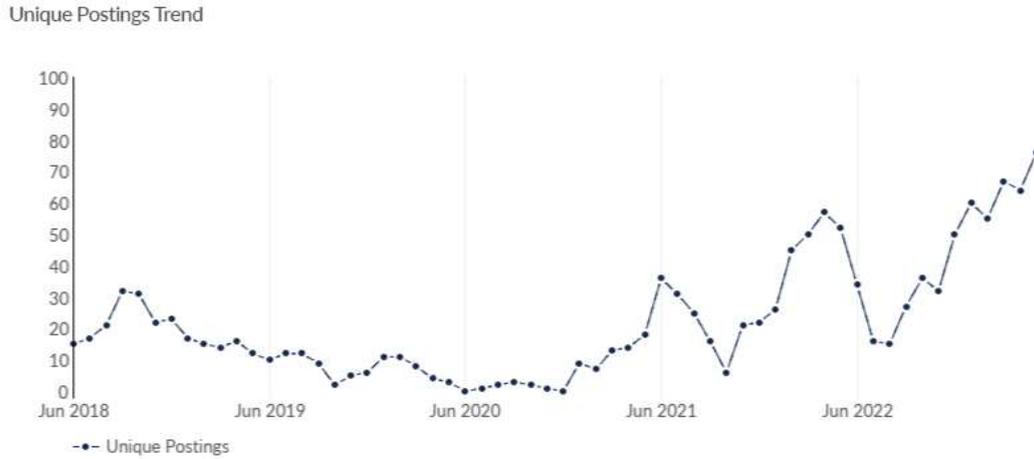
Growth in biorefining capacity will increase the complexity of logistics systems, calling for Harvest Operatives, Logistics Managers and Supply Chain Analysts to ensure that feedstock is consistent and not contaminated or does not have to travel extensive distances.

Legal and related skills may be required to deal with regulatory changes and policies introduced as a result of biomethane production, distribution and storage.

In the year ending 31st May 2023, there were 2,000 online job postings relating to biogas/biomethane production across the UK³⁸ – 230 of which were located within the Yorkshire and Humber region.

³⁸ These vacancies were identified using the keywords “biogas” and “biomethane”.

Figure 35: Number of online job postings relating to biogas/biomethane production (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 36: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Field Service Engineers	Mechanical Engineering
Project Engineers	Project Management
Renewable Energy Engineers	Digestive System
Service Engineers	Environment Health And Safety
Electrical and Instrumentation Technicians	Electrical Engineering
Process Engineers	Commissioning
Maintenance Engineers	Business Development
Mechanical Engineers	Project Engineering
Environmental Planners	Chemical Engineering
Gas Engineers	Wastewater

Source: LightcastTM, 2023.

5.2 Obtaining the required skills

The Strategic Development Fund has enabled Grimsby Institute to develop a CO₂ welding modules along with 3D immersive training.

Hull College are also developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Materials and the environment, Future energy systems and sustainability and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules in Wind and Hydro Engineering, The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Apprenticeships

In 2021/22 there were 1,271 starts on Engineering and Manufacturing Technologies apprenticeships in the HEY area – down slightly from 1,379 in the previous year.

Starts on Construction, Planning and the Built Environment apprenticeship standards increase by more than a 100 in 2021/22, but given the likely future demand for these skills (especially relating to domestic energy efficiency), many more are likely to be needed to meet future demand.

Figure 37: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Construction, Planning and the Built Environment	387	370	477
Engineering and Manufacturing Technologies	694	1,379	1,271
Information and Communication Technology	141	120	198
Science and Mathematics	3	1	2

Source: Data provided by HEY LEP.

The number of starts on ICT apprenticeships increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce. This also applies to Science and Mathematics apprenticeship standards.

The availability of local apprenticeship training on relevant standards can vary³⁹:

Those standards with a training provider within 40 miles of Hull include:

- Engineering design and draughtsperson (level 3)
- Engineering Fitter (Level 3)
- Maintenance and operations engineering technician (Level 3)
- Engineering Technician (Level 3)
- Project controls technician (L3)
- Plate Welder (Level 3)
- Pipe Welder (Level 3)
- Geotechnical engineer (integrated degree) (Level 7)

³⁹ This is based on searching for apprenticeship training providers on [the gov.uk website](#) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

Those standards with no training provider within 40 miles of Hull but do offer training at the apprentices' workplace include:

- Electrical power networks engineer (Level 4)
- Electrical or electronic technical support engineer (degree) (level 6)

Those standards with no training provider within 40 miles of Hull include:

- Electrical power protection and plant commissioning engineer (Level 4)
- Control technical support engineer (level 6)
- Project controls professional (Level 6)

T Levels

There are three T Levels currently available relating to this industry⁴⁰:

- Design and Development for Engineering and Manufacturing
 - The specialisms available in the Design and Development for Engineering and Manufacturing T Level are:
 - Mechanical engineering
 - Electrical and electronic engineering
 - Control and instrumentation engineering
 - Structural engineering
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC and Wilberforce College
- Maintenance, Installation and Repair for Engineering and Manufacturing
 - The specialisms available in the T Level in Maintenance, installation and repair for engineering and manufacturing are:
 - Maintenance engineering technologies: mechanical
 - Maintenance engineering technologies: mechatronic
 - Maintenance engineering technologies: electrical & electronic
 - Maintenance engineering technologies: control & instrumentation
 - In the HEY area, this qualification is being delivered by TEC Partnership
- Engineering, Manufacturing, Processing and Control
 - In addition to the core content, each student will also complete at least one module of occupation-specific content:
 - Fitting and assembly technologies
 - Machining and toolmaking technologies
 - Composites manufacturing technologies
 - Fabrication and welding technologies
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC

⁴⁰ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There are no IoT courses relevant to the onshore renewable energy industry being delivered within the HEY area, but there are a number of engineering courses which could be relevant to employers in the industry, including:

Figure 38: Institute of Technology courses delivered within the HEY area

Course	IoT Partner
Level 3 Diploma in Engineering and Technology	East Riding College
Level 4 HNC in General Engineering	East Riding College
Level 5 HND in Mechanical Engineering	East Riding College
Level 5 HND in Electrical and Electronic Engineering	East Riding College
Higher Apprenticeship Engineering Manufacturing Technician	East Riding College
Advanced Apprenticeship Engineering Technician	East Riding College
Advanced Apprenticeship in Engineering Manufacture - Fabrication and Welding	East Riding College
Advanced Apprenticeship Maintenance Operations Engineering Technician	East Riding College

Source: <https://yhiot.ac.uk/courses/>, accessed on 21st July 2023.

Higher education

As discussed in section 3.2.3 above, in 20120/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

In terms of near 2,300 STEM graduating entering employment on 2019/20, just 13 of them entered the electricity production industry (SIC 35.11) – although some may have entered the supply chain, which would be covered by other industrial codes).

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher), it is imperative that (i) the region's supply of degree-educated workers is improved (just 41% of the working age population hold at least a degree-level qualification) and (ii) that more are encouraged and enabled into the green industries, especially in areas such as:

- Environmental sciences
- Mathematical sciences
- Engineering
- Computer sciences

Skills Bootcamps

The only Skills Bootcamp on offer in the Yorkshire and Humber region that is relevant to onshore renewable energy is Welder Fabricator.

There are, however, a range of relevant Skills Bootcamps on offer in other regions of the country⁴¹:

- Environmental Technologies
- Functional Skills for the Green Wind Industry
- Net Zero & Smart Energy Transition
- Wind Technician Blade Repair
- Wind Technician Electrical
- Wind Technician Entry Level
- Wind Technician Painter
- Wind Technician Team Leader
- Wind Turbine Technician Blade Repair
- Wind Turbine Technician Electrical
- Wind Turbine Technician Entry Level
- Wind Turbine Technician Painter
- Wind Turbine Technician Team Leader

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

⁴¹ Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

Other provision

The Chartered Institution of Building Services Engineers has developed a “Heat Networks Code of Practice (CP1) course”⁴² to ensure that the skills necessary to implement the code of practice are available across the building services industry. The Code has been written to cover all stages of the development cycle of a project from feasibility through design, construction, commissioning, and operation.

⁴² More information can be found on [the Chartered Institution of Building Services Engineers' website](#) (external link opens a new window).

6 Carbon capture, utilisation and storage

6.1 Current and future skills needs

CCUS involves the capture of CO₂ emissions from industrial processes, such as steel and cement production, the generation of hydrogen through steam reforming, or from the burning of biomass or fossil fuels in power generation. It may also be used in combination with emerging direct air capture technologies.

The carbon dioxide (CO₂) can then be transported, including via repurposed gas pipelines, and stored, for example in underground locations⁴³ or repurposed for a wide range of manufacturing purposes (e.g. used directly as CO₂ or by transforming it into other valuable chemicals), thereby replacing an equivalent amount of fossil fuels in the manufacturing and energy supply chains⁴⁴.

If the CO₂ is stored, it will typically be stored at depths greater than 800 metres, where it no longer behaves as a gas, but instead as a supercritical fluid. The same geological formations that are well understood in the UK from many decades of oil and gas production.

If the CO₂ is utilised, it can be used to create fuels, plastics and polymers, and even soda ash (an ingredient found in household products) and, as such, transforms industrial waste into a valuable new resource.

Whilst the UK lacks operational large-scale CCUS plants, there are operational demonstration projects (Drax bioenergy carbon capture pilot plant), test facilities (UK Carbon Capture and Storage Research Centre Pilot-scale Advanced Capture Technology) and active research programmes (such as at Imperial College London and the University of Edinburgh) to support development⁴⁵.

Although still in its early stages of development (employing fewer than 500 people in total⁴⁶), CCUS is seen as an essential element in achieving the decarbonisation of heavy industry. As a result, most of the current jobs in the sector are in research and development (R&D), along with most of the jobs that may be created in the near future⁴⁷.

The UK has one of the largest CO₂ storage capacities in Europe⁴⁸ and has an ambition to create four CCUS clusters by 2030 – one of which will be located in the Humber (as well as the North East, North West and Scotland)⁴⁹. These cluster will capture and permanently store 20-30MtCO₂ per year in the UK subsurface offshore, including 9MtCO₂/a of industrial capture, and 5MtCO₂/a of engineered greenhouse gas removals (GGRs).

Cluster decarbonisation using CCUS provides current CO₂ emitters with a range of pathways to net zero⁵⁰:

- Decarbonising industrial CO₂ sources (such as iron and steel, fertilisers)
- enabling low-carbon power generation
- facilitating low-carbon hydrogen production
- Carbon capture with bioenergy sources (BECCS) or capturing CO₂ directly from the atmosphere (DAC)

⁴³ <https://www.nstauthority.co.uk/news-publications/news/2023/huge-net-zero-boost-as-20-carbon-storage-licences-offered-for-award/>

⁴⁴ The Circular Carbon Economy: How Carbon Clean Is Transforming the Future of Industry, Carbon Clean, 2023.

⁴⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845655/energy-innovation-needs-assessment-ccus.pdf

⁴⁶ ONS, [Low Carbon and Renewable Energy Economy statistics](#)

⁴⁷ Department for Business, Energy & Industrial Strategy (August 2022), [UK's industrial heartlands boosted by next stage of carbon capture clusters](#)

⁴⁸ Department for International Trade (2022), [Carbon Capture, Usage and Storage](#)

⁴⁹ BEIS, 2022, [CCUS Investor Roadmap](#)

⁵⁰ North Sea Transition Deal Integrated People and Skills Strategy, May 2022.

CCUS is also available for both the upgrading of biogas to biomethane and the subsequent use of biomethane in gas power stations or hydrogen production plants. Although it is likely to be the mid-2030s before we see it deployed at scale.

The introduction of CCUS will necessarily introduce new responsibilities into business operations, with 11% stating that 'significant change' to existing team structures will be required and a further 52% anticipating 'some' change. Only 8% of responses from industry foresaw no changes to roles across their business at all.

As CCUS solutions evolve, there's the possibility that many of the skills and processes needed to run the equipment could be outsourced – only 9% of companies want to take 100% responsibility post-installation⁵¹.

With the industry still in the early stages of development and deployment, it is very difficult to assess the skills – types and volume – required for an established CCUS industry.

Recent research by Cogent Skills⁵² highlights that the jobs related to carbon capture are moderately specialised, typically requiring skill levels of 7 and above. Various types of engineers are needed with backgrounds in automation, mechanical engineering, and petroleum technology. There are also a small number of jobs within operations & maintenance which require level 3 skills and above, such as control room operators, lab technicians, maintenance trades, and plant operators.

The jobs required in CO₂ pipeline transmission are relatively specialised, requiring skills ranging from engineering (hydraulics engineer, pipeline engineer, process safety engineer and electrical engineer) to chemistry (compression specialist and corrosion specialist). These engineering-based roles require level 6 skills and above, and the operations & maintenance (control centre operators, pipeline scheduler, and station operators) require level 5 skills and above.

While many jobs in underground storage do not require high levels of skill, specialised training is still necessary. Field operators, who are essential for this stage, need training in drilling, heavy duty mechanics, and servicing rigs. These professionals will require technical training but not necessarily degrees. On the other hand, engineering jobs such as drilling and completion engineer, reservoir engineer, and geoscience professionals such as geologists and geophysicists require skills at level 6 and above.

The skills likely to be in increasing demand include^{53,54}:

- Civil Engineers
- Geologists
- Geophysics
- Geothermal Technicians
- Machine Installers
- Pipe Fitters
- Technicians and Welders
- Underground construction and tunnelling
- Welders

Geoscience skills are essential to the development of CCUS, as geological formations are where carbon dioxide can be stored. This requires skills associated with engineering geologists, hydrogeologists, geophysicists, geophysicist, geoscientist, geologist and geochemist.

⁵¹ Scaling up CCUS – Market Insights, Decarb Connect, 2021.

⁵² A Greenprint on Skills for the Low Carbon Industries, Cogent Skills/Genserv, July 2023.

⁵³ Hull and East Yorkshire LEP, Green Jobs and Skills Analysis, December 2021, EU Skills.

⁵⁴ Capturing Carbon at Drax: Delivering Jobs, Clean growth and Levelling up the Humber, Vivid Economics, March 2021.

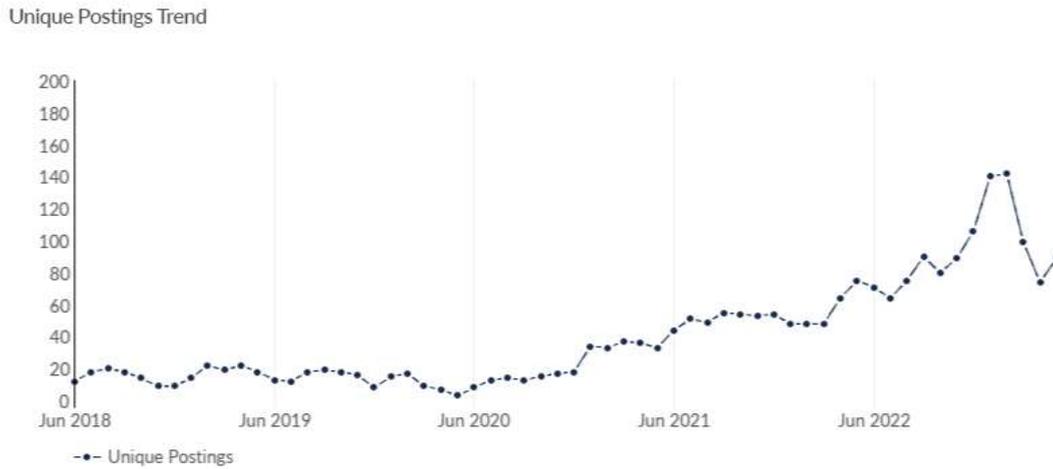
Many of the roles associated with CCUS could help to retain existing direct and indirect jobs in steel, cement, refining, chemicals, ceramics and glass manufacture.

Overall, CCUS deployment in these clusters could support 50,000 jobs by the end of the decade, with around 31,000 new jobs created, primarily in construction^{55,56}.

The Viking CCS Cluster project, with a final investment decision planned for 2024, has the potential to create 10,000 highly skilled jobs, while safeguarding 20,000 jobs in industry⁵⁷.

In the year ending 31st May 2023, there were 8,300 online job postings relating to CCUS across the UK⁵⁸ – 480 of which were located within the Yorkshire and Humber region.

Figure 39: Number of online job postings relating to CCUS (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 40: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Process Engineers	Project Management
Environmental Consultants	Engineering Design Process
Principal Consultants	Business Development
Electrical Engineers	Procurement
Principal Engineers	Environmental Impact Assessments
Project Managers	Chemical Engineering
Energy Market Analysts	Process Engineering
Civil Engineers	Chemistry
Commercial Managers	Proposal Development
Controls Engineers	Risk Analysis

Source: LightcastTM, 2023.

⁵⁵ BEIS, 2022, CCUS Investor Roadmap

⁵⁶ LSE, 2021, [Are green jobs good jobs?](#)

⁵⁷ Viking CCS: Transforming the Humber into a net zero SuperPlace, Viking CCS/Harbour Energy, 2023.

⁵⁸ These vacancies were identified using the keywords “carbon capture”, “CCS” and “CCUS”.

Across different aspects of the hydrogen industry there will need to be some retraining to ensure awareness of the different properties of hydrogen, but this is likely to be relatively modular upgrades to knowledge, although a roll-out of such training across large numbers if required over a relatively short period could be a challenge.

6.2 Obtaining the required skills

Published research suggests that^{59,60,61}:

- The onshore carbon capture elements are most closely aligned to skills existing within the chemicals industries
- The transport and storage elements of CCUS are well-suited to the specialist technical expertise and skills of the UK oil and gas workforce

In research carried out by the Energy Institute⁶² of UK energy professionals, CCUS was among the most cited destinations for those expecting to move to another field within the energy industry as a result of net-zero. However, half of respondents cited barriers to their personal development, including a lack of appropriate training courses being available.

HETA (through the SDF2 project) has developed a Introduction to Carbon Capture course.

Hull College are also developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Materials and the environment, Future energy systems and sustainability, Understanding decarbonisation and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Apprenticeships

There are a wide range of engineering and power-specific apprenticeships standards available.

In 2021/22 there were 1,271 starts on Engineering and Manufacturing Technologies apprenticeships in the HEY area – down slightly from 1,379 in the previous year.

Starts on Construction, Planning and the Built Environment apprenticeship standards increase by more than a 100 in 2021/22, but given the likely future demand for these skills (especially relating to domestic energy efficiency), many more are likely to be needed to meet future demand.

⁵⁹ <https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/consultancy/deloitte-uk-a-blueprint-for-green-workforce-transformation.pdf>

⁶⁰ CCSA Workforce & Skills Position Paper, July 2023.

⁶¹ The role of hydrogen in a net zero energy system, National Engineering Policy Centre/Royal Academy of Engineering, September 2022.

⁶² <https://www.energyinst.org/barometer/2021/biggestChallenges>

Figure 41: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Construction, Planning and the Built Environment	387	370	477
Engineering and Manufacturing Technologies	694	1,379	1,271
Information and Communication Technology	141	120	198
Science and Mathematics	3	1	2

Source: Data provided by HEY LEP.

The number of starts on ICT apprenticeships increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce. This also applies to Science and Mathematics apprenticeship standards.

The availability of local apprenticeship training on relevant standards can vary⁶³:

Those standards with a training provider within 40 miles of Hull include:

- Science Manufacturing Process Operative (Level 2)
- Maintenance and Operations Engineering Technician (Level 3)
- Science Industry Maintenance Technician (Level 3)
- Engineering Technician (Level 3)
- Project controls technician (L3)
- Plate Welder (Level 3)
- Pipe Welder (Level 3)
- Geotechnical Engineer (integrated degree) (Level 7)

Those standards with no training provider within 40 miles of Hull include:

- Electrical Power Protection and Plant Commissioning Engineer (Level 4)
- Science Industry Process and Plant Engineer (degree) (Level 7)
- Process Automation Engineer (degree) (Level 7)

⁶³ This is based on searching for apprenticeship training providers on [the gov.uk website](#) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

T Levels

There are three T Levels currently available relating to this industry⁶⁴:

- Design and Development for Engineering and Manufacturing
 - The specialisms available in the Design and Development for Engineering and Manufacturing T Level are:
 - Mechanical engineering
 - Electrical and electronic engineering
 - Control and instrumentation engineering
 - Structural engineering
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC and Wilberforce College
- Maintenance, Installation and Repair for Engineering and Manufacturing
 - The specialisms available in the T Level in Maintenance, installation and repair for engineering and manufacturing are:
 - Maintenance engineering technologies: mechanical
 - Maintenance engineering technologies: mechatronic
 - Maintenance engineering technologies: electrical & electronic
 - Maintenance engineering technologies: control & instrumentation
 - In the HEY area, this qualification is being delivered by TEC Partnership
- Engineering, Manufacturing, Processing and Control
 - This qualification includes specialism in Fabrication and welding technologies
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC

Further education

Drax and Selby College have developed an “Introduction to Carbon Capture and Storage” programme⁶⁵, which is equivalent to a Level 4 programme, that aims to equip a range of employees, supply chain workers and college students with a basic knowledge of how Bioenergy with carbon capture and storage (BECCS) works and the theory and practice behind the technology.

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

⁶⁴ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

⁶⁵ https://www.drax.com/uk/press_release/selby-college-and-drax-secure-funding-to-support-the-green-workforce-of-the-future/

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There are no specific CCUS courses being delivered through the IoT within the HEY area, but a number of generic engineering courses could be relevant, including:

Figure 42: Institute of Technology courses delivered within the HEY area

Course	IoT Partner
Level 3 Diploma in Engineering and Technology	East Riding College
Level 4 HNC in General Engineering	East Riding College
Level 5 HND in Mechanical Engineering	East Riding College
Level 5 HND in Electrical and Electronic Engineering	East Riding College
Higher Apprenticeship Engineering Manufacturing Technician	East Riding College
Advanced Apprenticeship Engineering Technician	East Riding College
Advanced Apprenticeship in Engineering Manufacture - Fabrication and Welding	East Riding College
Advanced Apprenticeship Maintenance Operations Engineering Technician	East Riding College

Source: <https://yhiot.ac.uk/courses/>, accessed on 21st July 2023.

Higher education

As discussed in section 3.2.3 above, in 20120/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

It is not possible to estimate what proportion of the near 2,300 STEM graduating entering employment on 2019/20 entered jobs related to CCUS – but we do know that just 105 of them entered employment in the green industries as a whole.

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher), it is imperative that (i) the region's supply of degree-educated workers is improved (just 41% of the working age population hold at least a degree-level qualification) and (ii) that more are encouraged and enabled into the green industries, especially in areas such as⁶⁶:

- Aerospace Engineering
- Automation, Instrumentation & Controls
- Biology, Environmental Engineering
- Business and Commerce
- Chemical Engineering
- Corrosion Engineering
- Electrical Engineering
- Geology
- Geophysics
- Instrumentation Technician
- Laboratory Technician
- Materials, Metallurgical Engineering
- Mechanical Engineering
- Oilfield Safety
- Petrochemical engineering
- Power Engineering
- Process Engineering

Skills Bootcamps

The only Skills Bootcamp on offer in the Yorkshire and Humber region that is relevant to CCUS is “Principles of Carbon Capture and Storage” offered by Selby College. This course is the first-of-its-kind and is designed to provide learners with the higher-technical skills and knowledge to operate this climate-saving technology.⁶⁷

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

⁶⁶ A Greenprint on Skills for the Low Carbon Industries, Cogent Skills/Genserv, July 2023.

⁶⁷ <https://www.selby.ac.uk/courses/skills-bootcamp-carbon-capture-and-storage--level-3>

7 Hydrogen and alternative fuels

7.1 Current and future skills needs

Hydrogen

The UK has virtually no low-carbon hydrogen in its system today – but technology is making this a near-term reality with vast potential applications, and the UK is well-placed to exploit all forms of low carbon hydrogen production.

Hydrogen can be produced in many different ways, the principal low carbon methods being:

- ‘Green’ hydrogen: using electrolysis, passing electricity through water to separate out the hydrogen and oxygen
- ‘Blue’ hydrogen: splitting natural gas into hydrogen and carbon dioxide, with the carbon captured and stored
- ‘Pink’ hydrogen: also using electrolysis, but with energy from a nuclear power plant

The Government’s ambition is that at least half of its 10GW of low carbon hydrogen production capacity by 2030 target will be green hydrogen, with the remainder consisting of blue hydrogen⁶⁸.

The potential roles for hydrogen in a net zero energy system include⁶⁹:

- Industry
 - Chemical feedstock for industrial processes
 - Primary steelmaking
 - Industrial heating
- Power
 - Medium- to long-term energy storage
 - Dispatchable low carbon electricity generation
- Transport
 - Aviation
 - Shipping
 - Heavy goods vehicles (HGVs) and public service vehicles (PSVs)
 - Rail
 - Off-road vehicles
- Heat and buildings
 - Domestic and commercial heating

⁶⁸ <https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy#hydrogen>

⁶⁹ The role of hydrogen in a net zero energy system, National Engineering Policy Centre/Royal Academy of Engineering, September 2022.

An estimated timeline for the development of the hydrogen economy is thought to be:

- Early 2020s
 - Some transport (buses, early HGV, rail & aviation trials)
 - Industry demonstration
 - Neighbourhood heat trial
- Mid 2020s
 - Industry applications
 - Transport (HGV, rail & shipping trials) village heat trial
 - Blending (tbc)
- Late 2020s
 - Wide use in industry power generation & flexibility; transport (HGVs, shipping)
 - Heat pilot town (tbc)
- Mid-2030s onwards
 - Full range of end users including steel; power system; greater shipping & aviation
 - Potential gas grid conversion

Based on several different scenarios, Hydrogen UK forecasts up to 29,700 direct and indirect jobs under a low scenario (7GW); 58,500 under a central scenario (14GW); and 96,800 jobs under a high scenario (22GW).

However, for both blue and green hydrogen production, further research is required to understand the skills gaps (both technical and safety) and address them by sufficiently upskilling the workforce for these emerging sectors^{70,71}. On this front, Hydrogen UK⁷² will soon be undertaking new strategic research into the hydrogen economy and the types of skills required to enable the UK to become a global leader.

Whilst many of the future jobs are still to be defined, as the hydrogen value chain touches numerous different types of technologies and manufacturing industries, many of these jobs will be underpinned by skills that already in the industry^{73,74} or can be readily transferred in from adjacent industries, most notably offshore oil and gas.

Job roles critical to hydrogen production include:

- Engineers
 - Chemical engineer
 - Civil engineer
 - Commissioning engineer
 - Electrical engineer
 - Electronics engineer

⁷⁰ The role of hydrogen in a net zero energy system, National Engineering Policy Centre/Royal Academy of Engineering, September 2022.

⁷¹ North Sea Transition Deal Integrated People and Skills Strategy, May 2022.

⁷² <https://hydrogen-uk.org/careers-in-hydrogen/>

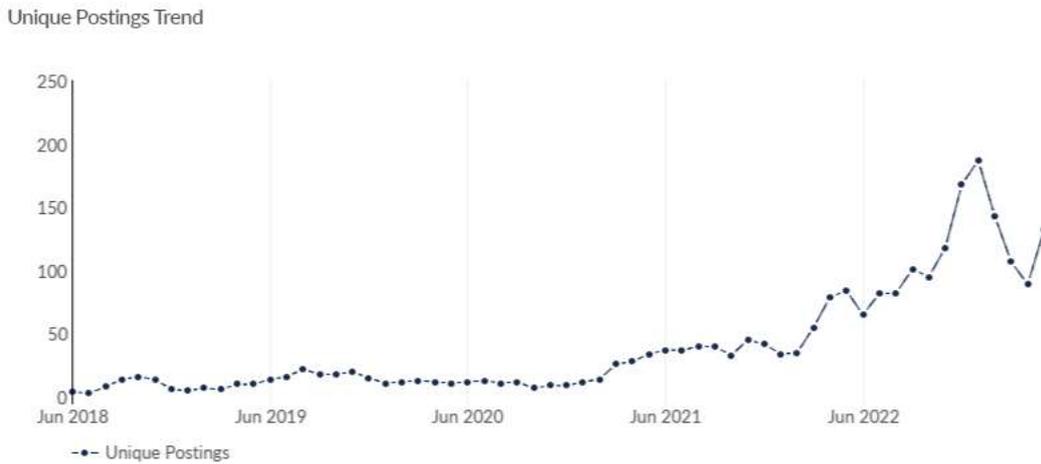
⁷³ <https://hydrogen-uk.org/careers-in-hydrogen/>

⁷⁴ Hydrogen Forecast to 2050, Energy Transition Outlook 2022, DNV.

- Technicians and tradesperson
 - Control room officer
 - Electrical fitter
 - Electrical Instrumentation Technician
 - Electrician
 - Fitter and Turner
 - Gas Fitter (industrial)
 - Process Control Technician
- Business/commercial skills
 - Big data
 - Project management

In the year ending 31st May 2023, there were 11,400 online job postings relating to the production of hydrogen across the UK⁷⁵ – 580 of which were located within the Yorkshire and Humber region.

Figure 43: Number of online job postings relating to the production of hydrogen (Yorkshire and Humber region)



Source: LightcastTM, 2023.

⁷⁵ These vacancies were identified using the keywords “hydrogen” and “hydrogen production”.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 44: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Hydrogen Technology Engineers	Project Management
Process Engineers	Business Development
Gas Operations Supervisors	Engineering Design Process
Engineering Apprentices	Oil And Gas
Storage Consultants	Chemical Engineering
Technical Project Managers	Chemistry
Principal Consultants	Process Engineering
HGV Drivers	Environment Health and Safety
Environmental Consultants	Procurement
Project Engineers	Environmental Impact Assessments

Source: LightcastTM, 2023.

Production of alternative fuels

The refining industry is currently engaged in a low-carbon transition through investment in research and development projects and its early deployment of new technologies – all of which can take some time to complete⁷⁶.

Innovation in the industry is in both the process and its application through increasingly using combinations of new feedstocks, such as biomass and vegetable oils, and cutting greenhouse gas (GHG) emissions along with developments in its applications in transport and heating.

The industry also has the opportunity to expand its onsite use of electricity and hydrogen and further exploit synergies with other industries⁷⁷.

The Future Ready Fuel campaign is testing logistics for a potential transition to renewable liquid fuels for the estimated 1.7 million UK properties that use oil for heating, with the industry currently developing innovative ‘drop-in’ biofuels⁷⁸.

Although the overall demand for liquid hydrocarbons is expected to reduce over the coming decades, this industry will continue to play a central role in fuelling both transport and industry.

As we move toward a Net-Zero future, companies will increasingly need to find innovative ways to improve process efficiency and introduce new technologies that can help them to decarbonise.

Reducing carbon emissions will require careful management to avoid disruption to our daily lives, minimise rising costs, and mitigate wider economic impacts. Therefore, it is paramount that employers have access to the skills they need to maintain resilience while they continue to advance their strategies for long-term sustainability.

However, less than half of employers in the industry believe their current workforce has the right skillset to support their organisation’s transition to net zero with sustainable technologies. A further 23% were unsure⁷⁹.

⁷⁶ <https://www.innovationnewsnetwork.com/low-carbon-liquid-fuels/548/>

⁷⁷ <https://www.innovationnewsnetwork.com/low-carbon-liquid-fuels/548/>

⁷⁸ <https://ukifda.org/industry-associates/>

⁷⁹ Future skills for the downstream sector, UKPIA/Cogent Skills, 2022.

62% of employers expect demand for engineering skills, of various disciplines, to increase over the next ten years, and 46% expected demand for operations and maintenance technicians and operatives to increase.

Engineering is also the area where most current skills shortages are being felt. The proportion of employers saying that current skills shortages were either moderate or severe by occupation was:

- Engineering professionals (69% of employers)
- Operations and maintenance technicians and operatives (53%)
- The most commonly experienced challenges regarding recruitment were:
- Low numbers of applicants with job-specific knowledge and/or industry experience (77% of employers)
- Low numbers of applicants with the required level of skills and/or qualifications (77%)
- Competition from other employers/ industries (69%)
- Not enough interest in the role (31%)

Furthermore, employers are more pessimistic about being able to retain their workforce in the workforce compared to now – with competition from within the industry, and from other industries, expected to become more intense.

Looking forward, the knowledge, skills and behaviours that will become more important over the next 10 years are:

- Digital skills (69% of employers)
- Innovation (62%)
- Digital security (62%)
- Managing change (54%)
- Managing risk (54%)
- Technology identification and application (54%)
- Compliance (38%)
- Creative thinking (46%)
- Designing, implementing, controlling & optimising new processes (46%)
- Health & Safety (38%)

7.2 Obtaining the required skills

Some studies have suggested that the UK's offshore oil and gas workforce have medium transferability to blue hydrogen. For green hydrogen production, skill sets are similar to the chemical industry, and only minor upskilling will be needed. With regards to electrolysis, the skills involved in the electricity generation industry, and in particular renewables and nuclear components, can readily transfer across. As such, the expansion of employment in the hydrogen industry is largely expected to draw on existing skills, and as such, should not present any major challenge in terms of a skills gap⁸⁰.

Ensuring the portability of skills and the mutual recognition of professional qualifications to enable transition without re-certification will be crucial⁸¹, thereby avoiding unnecessary retraining.

As the hydrogen industry develops, engineering job roles are anticipated to face relatively low levels of augmentation, as the fundamental tasks and responsibilities they undertake will largely remain consistent with current job roles.

⁸⁰ The economic impact of hydrogen and fuel cells in the UK, H2FCSupergen, March 2017.

⁸¹ North Sea Transition Deal, BEIS/OGUK, March 2021.

They will face minimal upskilling and capability development requirements and will have high transferability between various hydrogen projects. These engineers will most likely be familiar with hydrogen’s basic characteristics, handling properties, and safety principles, and will be equipped with the problem-solving skills to address the fundamental parameters of any project.

Although the majority of skills development will be centred around upgrading of existing skills, it is expected that specific upskilling will be required for the relating to the installation, commissioning, servicing and operation of electrolyzers.

Areas of significant skills gaps are most likely to occur in engineering, manufacturing technologies, science and mathematics.

Moreover, the workforce will need to be aware of the environmental and social impacts of hydrogen production and use, such as water consumption, carbon footprint, and public perception⁸².

The concept of industrial clustering could support the development of the liquid fuels industry. This could help support the development of attractive career pathways, including offering a more comprehensive early learning pathway (e.g. shared apprenticeships) as well as clearer career progression across the value chain.

Hull College (using SDF2 funds) are developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Materials and the environment, Introduction to hydrogen and fuel cells, Future energy systems and sustainability, Understanding decarbonisation and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Introduction to hydrogen and fuel cells, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Apprenticeships

In 2021/22 there were 1,271 starts on Engineering and Manufacturing Technologies apprenticeships in the HEY area – down slightly from 1,379 in the previous year.

Starts on Construction, Planning and the Built Environment apprenticeship standards increase by more than a 100 in 2021/22, but given the likely future demand for these skills (especially relating to domestic energy efficiency), many more are likely to be needed to meet future demand.

Figure 45: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Construction, Planning and the Built Environment	387	370	477
Engineering and Manufacturing Technologies	694	1,379	1,271
Information and Communication Technology	141	120	198
Science and Mathematics	3	1	2

Source: Data provided by HEY LEP.

The number of starts on ICT apprenticeships increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce. This also applies to Science and Mathematics apprenticeship standards.

⁸² <https://www.linkedin.com/advice/0/what-skills-competencies-needed-hydrogen-combustion>

The availability of local apprenticeship training on relevant standards can vary⁸³:

Those standards with a training provider within 40 miles of Hull include:

- Science manufacturing process operative (Level 2)
- Engineering Technician (Level 3)
- Project controls technician (L3)
- Plate Welder (Level 3)
- Pipe Welder (Level 3)
- Science industry maintenance technician (Level 3)

Those standards with no training provider within 40 miles of Hull include:

- Process automation engineer (degree) (Level 7)
- Science industry process and plant engineer (degree) (Level 7)

T Levels

There are three T Levels currently available that are relevant to this industry⁸⁴:

- Design and Development for Engineering and Manufacturing
 - The specialisms available in the Design and Development for Engineering and Manufacturing T Level are:
 - Control and instrumentation engineering
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC and Wilberforce College
- Maintenance, Installation and Repair for Engineering and Manufacturing
 - The specialisms available in the T Level in Maintenance, installation and repair for engineering and manufacturing are:
 - Maintenance engineering technologies: control & instrumentation
 - In the HEY area, this qualification is being delivered by TEC Partnership
- Engineering, Manufacturing, Processing and Control
 - In addition to the core content, each student will also complete at least one module of occupation-specific content:
 - Fitting and assembly technologies
 - Machining and toolmaking technologies
 - Composites manufacturing technologies
 - Fabrication and welding technologies
 - In the HEY area, this qualification is being delivered by Ron Dearing UTC

⁸³ This is based on searching for apprenticeship training providers on [the.gov.uk website](#) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

⁸⁴ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There are no IoT courses relevant to the hydrogen and alternative fuels industry being delivered within the HEY area, but there are a number of engineering courses which could be relevant to employers in the industry, including:

Figure 46: Institute of Technology courses delivered within the HEY area

Course	IoT Partner
Level 3 Diploma in Engineering and Technology	East Riding College
Level 4 HNC in General Engineering	East Riding College
Level 5 HND in Mechanical Engineering	East Riding College
Level 5 HND in Electrical and Electronic Engineering	East Riding College
Higher Apprenticeship Engineering Manufacturing Technician	East Riding College
Advanced Apprenticeship Engineering Technician	East Riding College
Advanced Apprenticeship in Engineering Manufacture - Fabrication and Welding	East Riding College
Advanced Apprenticeship Maintenance Operations Engineering Technician	East Riding College

Source: <https://yhiot.ac.uk/courses/>, accessed on 21st July 2023.

Higher education

As discussed in section 3.2.3 above, in 20120/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

It is not possible to estimate what proportion of the near 2,300 STEM graduating entering employment on 2019/20 entered jobs related to the production of hydrogen and alternative fuels – but we do know that just 105 of them entered employment in the green industries as a whole.

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher), it is imperative that (i) the region's supply of degree-educated workers is improved (just 41% of the working age population hold at least a degree-level qualification) and (ii) that more are encouraged and enabled into the hydrogen industry, especially in areas such as⁸⁵:

- Aerospace Engineering
- Automation, Instrumentation, Controls,
- Chemical, Mechanical, Petroleum
- Chemical, Process, Mechanical Engineering
- Electrical Engineering
- Electrochemistry
- Engineering
- Geological Engineering
- Geology
- Geophysics
- Industry mechanic
- Instrumentation & Controls
- Power Engineer
- Process or Mechanical Engineering

Skills Bootcamps

There are no Skills Bootcamp on offer in Yorkshire and Humber that are directly relevant to the production of hydrogen.

There is, however, a Hydrogen Awareness and Safety Skills Bootcamps on offer in other regions of the country⁸⁶.

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

⁸⁵ A Greenprint on Skills for the Low Carbon Industries, Cogent Skills/Genserv, July 2023.

⁸⁶ Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

National Occupational Standards

The UK's 'first' National Occupational Standard (NOS) for hydrogen production, storage, and transportation is set to be developed to help shape the skills required for hydrogen-based jobs. Cogent Skills revealed in August 2022 it will develop the standard following a successful contract bid, in a crucial step towards establishing a highly skilled and competent workforce, underpinning the UK's ambitions of boosting the development and deployment hydrogen technologies.⁸⁷

The new occupational standards will set out the standards of performance which individuals must achieve, together with the knowledge and skills required to work safely and effectively in the hydrogen production, storage and transportation industry⁸⁸.

⁸⁷ <https://www.h2-view.com/story/first-uk-occupational-standard-for-hydrogen-set-to-be-developed/>

⁸⁸ <https://cogentskills.com/news/first-national-occupational-standards-for-hydrogen-set-to-shape-skills-required-for-green-jobs/>

8 Electric vehicles

8.1 Current and future skills needs

This industry includes the following activities:

- Installation of EV charging points
- EV vehicle repair & maintenance (the installation of charging points is covered in section 6 - Domestic low carbon technologies and energy efficiency)
- Hydrogen fuel cells

EV charging points

As installing an EV charging point counts as notifiable work under Part P of the Building Regulations, an installer must be a registered electrician with a Competent Person Scheme in order to sign the installation legally.

The only other requirement is to undergo an appropriate EV charging point installation course – either by an appropriate training provider or by a charging point manufacturer.

One of the biggest skills challenges the industry could face is gaining the required workforce in a short timeframe should customer demand ramp up significantly as, to become a registered electrician can take up to four years.

Furthermore, as we have seen in relation to other domestic low carbon technologies such as heat pumps and solar PV, demand for electricians is expected to increase as these technologies establish themselves in the market and become cheaper to buy – perhaps driven by government incentives. Should the increase in demand for skills occur quickly, then it is likely that supply will fall short of demand due to the long lead-time to competency under current arrangements.

EV vehicle repair and maintenance

Demand for EV vehicle repair and maintenance skills will obviously reflect their market share of vehicles on the road. Across the whole of the UK in 2021, 19% of new vehicles registered had a plug⁸⁹. This underlines the scale of the challenge ahead if the 2030 ban on the sale of new petrol and diesel cars and vans is to be achieved.

The Institute of the Motor Industry (IMI) estimate that around 16% of the UK's qualified technicians are able to safely work on electric vehicles⁹⁰.

They also report that, contrary to popular belief, research shows that electric vehicles may not be less complicated to maintain than conventional petrol or diesel vehicles. So, the notion that one technician can service more EVs than non-EVs is no longer valid, and that garages and workshops should not presume they will require fewer technicians to service EVs.

The IMI predicts that by 2030, the UK will need 103,000 TechSafe qualified technicians to work with electric vehicles, increasing to 124,000 by 2032. However, current forecasts of qualified technicians suggest that there will be a shortfall of 16,000 technicians by 2032.

This risk could compromise vehicle safety and erode consumer confidence in the ability of garages to service, maintain, and repair electric vehicles – which, coupled with “range anxiety” and the relatively low volume of charging points – will do little to help meet the already challenging 2030 zero emission vehicle target.

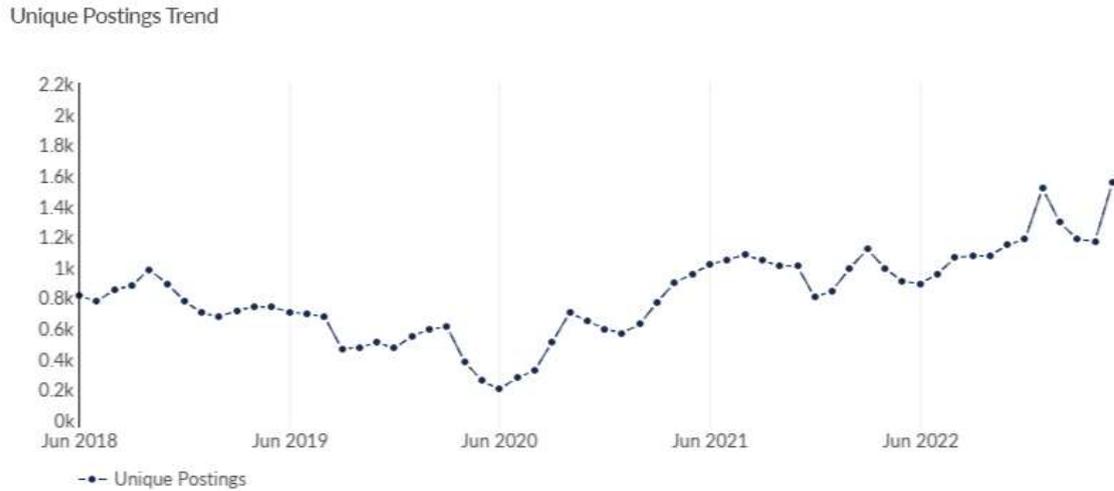
In the year ending 31st May 2023, there were 84,000 online job postings relating to vehicle technicians across the UK⁹¹ – 5,700 of which were located within the Yorkshire and Humber region.

⁸⁹ <https://www.zap-map.com/ev-market-statistics/>

⁹⁰ EV TechSafe Technician Forecasts, Institute of the Motor Industry, March 2023.

⁹¹ These vacancies were identified using the keywords “electric vehicle”, “EV charging” and “EV repair”.

Figure 47: Number of online job postings relating to vehicle technicians (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 48: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Vehicle Technicians	Vehicle Maintenance
HGV Mechanics	Vehicle Inspection
Testers	Mechanics
Motor Vehicle Technicians	Brakes
Vehicle Mechanics	Hydraulics
Global Vehicle Technicians	Suspension (Vehicle)
Automotive Technicians	Automotive Industry
Repair Technicians	Mechanical Engineering
Master Technicians	Engine Repair
Mobile Technicians	Electrical Diagnostics and Repairs

Source: LightcastTM, 2023.

Hydrogen fuel cells

Hydrogen fuel cells are similar to electric batteries in that they produce electricity without combustion or emissions, but unlike electric batteries, fuel cells do not run down or need to recharge—as long as there’s a constant source of fuel and oxygen which, when the infrastructure is in place, would be like refuelling a petrol or diesel vehicle.

For heavy vehicles, long distances, unpredictable routes, high uptime requirements, and the importance of high payloads make this industry particularly difficult to decarbonize⁹².

⁹² <https://www.mckinsey.com/capabilities/operations/our-insights/global-infrastructure-initiative/voices/unlocking-hydrogens-power-for-long-haul-freight-transport>

Therefore, it is likely that there will be a significant increase in hydrogen-powered vehicles both on the road and on infrastructure construction sites⁹³.

This assumes that the market is confident enough that there is sufficient hydrogen being produced (which may not be the case at the moment). Translink currently pay three-four times more for their hydrogen fuel than their diesel.

Hydrogen fuel cell professionals need to have a solid foundation in engineering principles and practices, such as⁹⁴:

- Thermodynamics
- Fluid mechanics
- Combustion
- Heat transfer
- Mechanical design

They need to be able to apply these principles to design, model, test, and optimize fuel cell systems and components, such as pistons, valves, injectors, spark plugs, and exhaust systems.

Additionally, they need to be able to use various tools and software, such as computer-aided design (CAD), computational fluid dynamics (CFD), and engine simulation software, to perform engineering tasks and analysis.

They also need to have a deep understanding of hydrogen as a fuel – its properties, characteristics, and behaviour – and how it is produced, stored, transported, and distributed. They also need to know how hydrogen interacts with different materials, such as metals, plastics, and composites, and how to prevent or mitigate hydrogen embrittlement, corrosion, leakage, and explosion.

The level of augmentation expected of technician and tradesperson job roles will vary greatly depending on the specific role. The most significant job role change will be faced by automotive mechanical and electrical technicians. These job roles will need to adapt to the unfamiliarity and complexity of hydrogen fuel cell vehicles and their associated systems⁹⁵.

In addition, first responders will also need awareness and some specific training in how to deal with basic depowering and reinitialising procedures to ensure safe work practices around dangerous high voltage systems.

The scale of augmentation for existing job roles are likely to be moderate for:

- Truck driver
- Heavy vehicle operator
- Plant machinery operator

However, the level of augmentation will be high for:

- Heavy duty fitter
- Automotive electrician
- Light vehicle technician
- Heavy vehicle technician
- Vehicle body repair technician

They will need a basic understanding of the operations and functions of proton exchange membrane fuel cells and when replacement is necessary (e.g. due to the cell's degradation over time).

They will need to work with high voltage systems, including learning how to depower them so that repair or maintenance work can be undertaken.

⁹³ <https://www.theconstructionindex.co.uk/news/view/balfour-beatty-swings-behind-hydrogen-for-heavy-plant>

⁹⁴ <https://www.linkedin.com/advice/0/what-skills-competencies-needed-hydrogen-combustion>

⁹⁵ Developing Australia's Hydrogen Workforce, Final Report, October 2022, PwC Consulting.

In the fishing fleet industry, marine engineers⁹⁶ will require an understanding of fuel cell technology, how it functions, and what components in the propulsion system may be safely handled for repair. They will also need an understanding of high pressure hydrogen storage systems and how they function.

8.2 Obtaining the required skills

Obtaining the skills required for EV charging point installation and the repair and maintenance of EVs should be relatively straightforward given the competitive nature of the training market in these areas.

However, current demand for such skills from the market, and the largely unknown timing of future demand, are limiting factors.

In relation to EV charging point installation, the industry requirement to be a qualified electrician to sign off on one's own installations is an issue that is currently being discussed. With demand for electricians expected to increase sharply as a result technologies such as heat pumps, EV chargers and other domestic and commercial low carbon/energy efficiency technologies, the requirement to be a fully qualified electrician severely limits the timeframe in which new recruits can enter the workforce. Should government incentives be introduced that increase demand for these technologies, the existing electrician workforce will not be able to grow quickly enough to meet market demands.

The Strategic Development Fund has enabled Hull College to invest in a range of new technologies and provision to ensure their provision is fit to deliver the skills needed to support the roll-out of electric vehicles. Including:

- Developing a Centre for Electric Vehicle Maintenance and Charging at the Cannon Street Campus
- Purchasing of four electric and hybrid vehicles and specialised workshop tools and equipment for use on learning programmes
- Six new courses have been developed

Grimsby Institute (through the SDF2 project) has also developing 3D immersive learning for electric and hybrid vehicles in high risk areas of training within a virtual environment, in order to provide students with a safe environment to complete safe disconnection techniques of high voltage electric vehicle systems. They are also developing teaching materials and 3D immersive learning relating to vehicle charging installation across a range of installation options and environments.

Hull College (using SDF2 funds) are developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Materials and the environment, Renewable Transport, Future energy systems and sustainability, Understanding decarbonisation and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Apprenticeships

In 2021/22 there were 1,271 starts on Engineering and Manufacturing Technologies apprenticeships in the HEY area – down slightly from 1,379 in the previous year.

Starts on Construction, Planning and the Built Environment apprenticeship standards increase by more than a 100 in 2021/22, but given the likely future demand for these skills (especially relating to domestic energy efficiency), many more are likely to be needed to meet future demand. However, these numbers likely reflect a degree of employer uncertainty around when demand for these skills will begin to increase.

⁹⁶ Developing Australia's Hydrogen Workforce, Final Report, October 2022, PwC Consulting.

Figure 49: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Construction, Planning and the Built Environment	387	370	477
Engineering and Manufacturing Technologies	694	1,379	1,271
Information and Communication Technology	141	120	198

Source: Data provided by HEY LEP.

The number of starts on ICT apprenticeships increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce.

The availability of local apprenticeship training on relevant standards can vary⁹⁷:

Those standards with a training provider within 40 miles of Hull include:

- Autocare technician (Level 2)
- Vehicle damage mechanical, electrical and trim (MET) technician (Level 3)
- Heavy vehicle service and maintenance technician (Level 3)

Those standards with no training provider within 40 miles of Hull but do offer training at the apprentices' workplace include:

- Vehicle damage assessor (Level 4)
- Bus and coach engineering technician (Level 3)
- Motor vehicle service and maintenance technician (light vehicle) (Level 3)

Those standards with no training provider within 40 miles of Hull include:

- Accident repair technician (Level 3)

However, it does not appear that any of these standards contain any content relating specifically to electric vehicles.

Furthermore, standards that are currently in development include:

- Battery manufacturing technician (Level 3)

T Levels

There is a T Level available in Maintenance, Installation and Repair for Engineering and Manufacturing, which includes an option to specialise in the Maintenance, installation, and repair of light and electric vehicles.

In the HEY area, this qualification is being delivered by TEC Partnership.

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

⁹⁷ This is based on searching for apprenticeship training providers on [the gov.uk website](https://www.gov.uk) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There are no IoT courses relevant to the electric vehicle industry being delivered within the HEY area.

Skills Bootcamps

The Skills Bootcamp on offer in Yorkshire and Humber that are relevant to electric vehicles include:

- Electric Vehicles Academy
- EV Charging Installer
- Electric Vehicle Maintenance
- Tech Safe Green Standard
- Professional Diagnostic Development

There are, however, a range of relevant Skills Bootcamps on offer in other regions of the country⁹⁸:

- Electric Vehicle (EV) & Hybrid
- Electric vehicle charging
- Electric Vehicle Maintenance
- Electric Vehicles Academy
- Electrification, EV and Hybrid Maintenance and Repair
- EV Charging Installer
- EV Maintenance, Repair and Diagnostics of heavy vehicles
- EV Superfast (Large Scale) Installations
- Electronics – Power electronics, machines and drives (PEMD)

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

⁹⁸ Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

9 Off-site/modular construction

Offsite construction is the manufacture and pre-assembly of construction elements or components in a factory environment prior to installation onsite at their intended, final location. Offsite construction currently accounts for less than 10% of total construction output, but is on an upward trajectory. Strong drivers for growth are underpinned by the need for significantly more housing, the availability of new technologies and an impetus for extending the benefits of offsite construction⁹⁹. The greatest potential for growth in offsite is in the housing and commercial sectors. However, there are also opportunities to upscale adoption in large-scale infrastructure projects.

9.1 Current and future skills needs

As a rapidly growing field, there is an increasing demand for skilled workers, including:

- **Digital design:** Building Information Modelling (BIM) is a key tool in modular construction, so experience in this field is highly desirable. BIM allows for the design and modelling of modular buildings at the testing phase, which can help to improve accuracy and efficiency.
- **Manufacturing experience:** Modular construction relies on the use of standardised components that are manufactured in a factory setting. This means that workers need to have experience with production lines, manufacturing systems, assembly, safety, and quality control.
- **Construction skills:** While not all modular construction workers need to have traditional construction experience, it is helpful to have some basic knowledge of construction principles and techniques. This will help workers to understand the role of modular construction in the overall construction process.
- **Quality assurance:** Modular construction requires a high degree of quality assurance, so the ability to identify and correct defects is essential. This includes the ability to perform quality checks on both the manufacturing and assembly processes.
- **Logistics:** Modular construction requires a strong understanding of logistics. This includes the ability to plan and coordinate the transportation of components from the factory to the construction site, as well as the assembly of the modules on-site.
- **Project management:** Modular construction projects can be complex, so it is important for workers to have strong project management skills. This includes the ability to plan and track the progress of the project, as well as to manage the budget and resources.
- **Problem-solving skills:** Modular construction projects can be challenging, so it is important for workers to be able to think critically and solve problems. This includes the ability to identify and troubleshoot potential issues, as well as to adapt to changes in the project plan.

In the main, modular construction works to higher tolerances onsite and requires better communication through the supply chain from design to delivery, management, logistics, and a better knowledge of systems by site-based workers.

In a 2017 report published by CITB, construction industry employers said that 26% of their current work is constructed offsite¹⁰⁰, and nearly half of these expect this proportion to increase over the next five years (just 4% anticipated a decrease in offsite construction).

Just over a quarter of respondents said that more than 25% of their directly employed workforce would need training in offsite over the next 3-5 years. However, 43% said less than 10% will need this.

⁹⁹ Faster, Smarter, More Efficient: Building Skills for Offsite Construction, Pye Tait/CITB, April 2017.

¹⁰⁰ Faster, Smarter, More Efficient: Building Skills for Offsite Construction, Pye Tait/CITB, April 2017.

Nearly two-fifths (38%) of businesses expecting to use offsite construction over the next 3-5 years think they will need new or significantly improved offsite construction skills, particularly in:

- Handling and assembly skills
- Operation of powered equipment
- Site health and safety and welfare
- Site preparation
- Disposal of waste
- Quality control

In order to capitalise on the opportunities afforded by offsite construction, the construction workforce needs to have sufficient capability and capacity. The CITB research identified six key functions for offsite construction:

- Digital design
- Estimating/commercial
- Offsite manufacturing
- Logistics
- Site management and integration
- Onsite placement and assembly

Digital design

The critical difference between design for traditional construction and design for offsite, is that the latter needs to design specifically for manufacture and subsequent assembly, using appropriate technology and digital skills.

Technical skills include:

- BIM-enabled design
- Creating 3D models
- Developing a value proposition (cost, durability, low carbon, aesthetic)
- Digital design software use e.g. AutoCAD, Revit
- Digital skills (e.g. scheduling and specific IT)
- Generating 2D fabrication drawings and site drawings
- Obtaining prices and dealing with variations
- Producing product/service specifications
- Reading technical drawings
- Risk assessment

Estimating/commercial

Estimating is a crucial element of delivering the fundamental cost savings of offsite (compared with traditional) construction, but is subject to substantial skills shortages.

Technical skills include:

- Analysis of tender documents/contract terms and conditions
- BIM-enabled design
- Costing/developing whole life cycle costs
- Developing sub-contract terms and conditions
- Developing a value proposition (cost, durability, low carbon, aesthetic)
- Developing tenders
- Obtaining prices and dealing with variations
- Planning
- Producing product/service specifications
- Reading technical drawings
- Risk assessment

Offsite manufacturing

Offsite manufacture refers to the creation of components, modules or entire buildings that are subsequently taken to, and assembled/installed onsite.

Technical skills include:

- BIM-enabled design
- Health & safety
- Relevant trade skills (joinery, plastering, operating site machinery, welding)
- Lifting and handling
- Machine plant operation
- Multiskilling (e.g. combination of various technical skills)
- Process management
- Project management
- Quality control
- Reading technical drawings
- Risk assessment
- Supply chain management (“re-engineering the supply chain”)
- Time management
- Working at heights

Logistics

Logistics in this context spans the product: planning, transportation, scheduling, goods in/goods out etc., and also supply chain management. This function spans offsite and onsite.

Technical skills include:

- Budget and financial management
- Control and management of inventory
- Digital skills (e.g. scheduling and specific IT)
- Health & safety
- Lifting and handling
- Planning
- Process management
- Project management
- Quality control
- Reading technical drawings
- Risk assessment
- Supply chain management (“re-engineering the supply chain”)
- Time management
- Working at heights

Site management and integration

Offsite construction site management hinges on being able to integrate the offsite and onsite functions, which requires a comprehensive understanding of both aspects.

Technical skills include:

- Budget and financial management
- Digital skills (e.g. scheduling and specific IT)
- Health & safety
- Information management (project delivery and design management)
- Measuring to precise specifications
- Multiskilling (e.g. combination of various technical skills)
- Process management
- Project management
- Quality control
- Reading technical drawings
- Risk assessment
- Supply chain management (“re-engineering the supply chain”)
- Time management

Onsite placement and assembly

Onsite construction requires precise, accurate placement of components, modules and buildings prior to full assembly. This level of precision is the nucleus of a successful project.

Technical skills include:

- Health & safety
- Relevant trade skills (joinery, plastering, operating site machinery, welding)
- Laying groundworks
- Lifting and handling
- Machine plant operation
- Measuring to precise specifications
- Multiskilling (e.g. combination of various technical skills)
- Process management
- Project management
- Quality control
- Reading technical drawings
- Risk assessment
- Time management
- Use of hand tools
- Working at heights

In slightly more recent research by WLC/CITB¹⁰¹, the following skills challenges are reported:

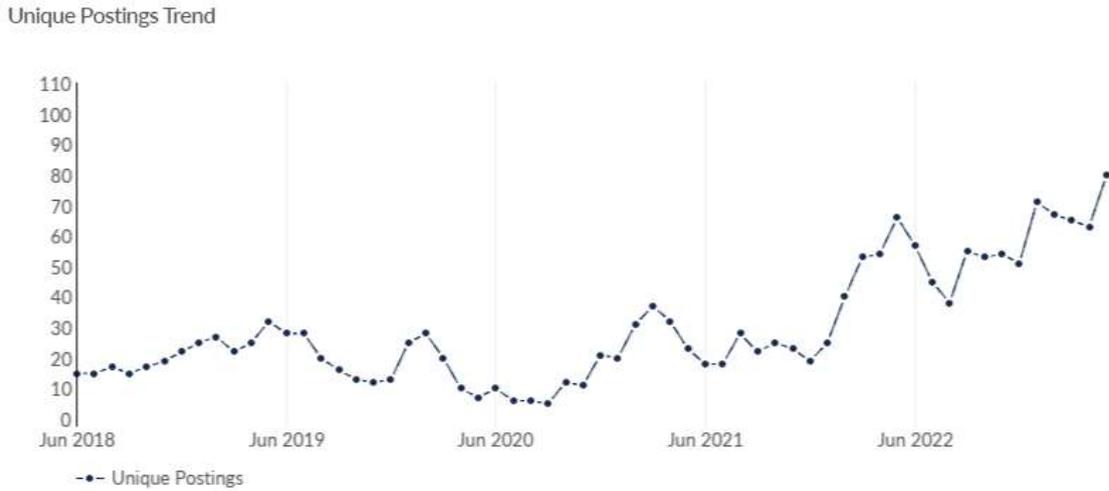
- In the short term it will need to grow and develop skilled trades and manual workers to support an increase in the number of homes built using the current construction methods,
- In the medium to longer term it will be necessary to maintain the onsite skilled trades and manual workers at the same time as developing the offsite workforce to deliver MMC builds.
- There is also the need to up-skill existing workers to cover the site management, integration, onsite placement and assembly that will be increasingly required for MMC, and to.
- Ensure that the professional, management, technical and non-manual workforce develops the digital skills that will be an increasing part of construction work in the future.

In the year ending 31st May 2023, there were 1,600 online job postings relating to modular construction across the UK¹⁰² – 300 of which were located within the Yorkshire and Humber region.

¹⁰¹ The Impact of Modern Methods of Construction on Skills Requirements for Housing: A report on the skills implications for both panelised and volumetric housing construction, Whole Life Consulting/CITB, April 2019.

¹⁰² These vacancies were identified using the keywords “modular construction”.

Figure 50: Number of online job postings relating to modular construction (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 51: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Estimators/Designers	Modular Design
Architectural Technologists	Autodesk Revit
CAD Design Technicians	AutoCAD
Modular Project Managers	Construction
Quantity Surveyors	Modular Building
Project Managers	Supply Chain
Site Engineers	Computer-Aided Design
CAD Technicians	Building Information Modelling
Design Engineers	Project Management
Architectural Technicians	Architectural Drawing

Source: LightcastTM, 2023.

9.2 Obtaining the required skills

CITB report¹⁰³ finds a number of issues with training and qualifications that are acting as barriers to delivering the skills needed, notably:

- Limited training and qualifications that are specific to offsite construction, rather than traditional construction
- Training that is available does not typically include coverage of relevant 'softer skills', including behaviours and attitudes for offsite, even though these are very important for the holistic nature of offsite work
- Where relevant training and qualifications are available, most employers are not aware of them, or are unable to access them because few providers offer the courses or because they are not able to release employees to attend training
- The tutor/assessor shortage is one reason for the limited training provision on offer. However, this is also because of a tendency among employers to assume relevant training does not exist and to train in-house instead. As a result this suggests to training providers there is limited demand.

Hull College (using SDF2 funds) are developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Materials and the environment, Understanding Smart Home Heating Systems, Solar biomass and storage engineering, Building Fabric and Energy Conservation, Future energy systems and sustainability, Understanding decarbonisation and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Apprenticeships

In 2021/22 there were 1,271 starts on Engineering and Manufacturing Technologies apprenticeships in the HEY area – down slightly from 1,379 in the previous year.

The number of starts on ICT apprenticeships increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce.

Figure 52: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Construction, Planning and the Built Environment	387	370	477
Information and Communication Technology	141	120	198

Source: Data provided by HEY LEP.

¹⁰³ Faster, Smarter, More Efficient: Building Skills for Offsite Construction, Pye Tait/CITB, April 2017.

The availability of local apprenticeship training on relevant standards can vary¹⁰⁴:

Those standards with a training provider within 40 miles of Hull include:

- Scaffolder (Level 2)
- Roofer (Level 2)
- Building services engineering craftsperson (Level 3)
- Building services engineering service and maintenance engineer (Level 3)
- Plumbing and domestic heating technician (Level 3)
- Electrical, electronic product service and installation engineer (Level 3)
- Installation electrician and maintenance electrician (Level 3)
- Refrigeration air conditioning and heat pump engineering technician (Level 3)
- Domestic electrician (Level 3)
- Building services engineering senior technician (level 4)
- Construction design and build technician (level 4)
- Building services design engineer (degree) (level 6)
- Building services engineering site management (degree) (level 6)
- Architect (integrated degree) (level 7)

Those standards with no training provider within 40 miles of Hull but do offer training at the apprentices' workplace include:

- Junior energy manager (Level 3)
- Smart home technician (level 3)
- BEMS (building energy management systems) controls engineer (level 4)
- Building control surveyor (integrated degree) (level 6)

Those standards with no training provider within 40 miles of Hull include:

- Architectural assistant (integrated degree) (level 6)
- Design and construction management (degree) (level 6)

Furthermore, standards that are currently in development include:

- Low carbon heating technician (level 3) (in development)

¹⁰⁴ This is based on searching for apprenticeship training providers on [the gov.uk website](#) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

T Levels

There are three T Levels currently available relating to the construction industry¹⁰⁵:

- Building Services Engineering for Construction
 - Options to specialise in this qualification include:
 - Electrical and electronic equipment engineering
 - Electrotechnical engineering
 - Protection systems engineering
 - There are no providers of this qualification in the HEY area.
- Design, Surveying and Planning for Construction
 - Options to specialise in this qualification include:
 - Surveying and design for construction and the built environment
 - Civil engineering
 - Building services design
 - Hazardous materials analysis and surveying
 - There are no providers of this qualification in the HEY area.
- Onsite Construction
 - Options to specialise in this qualification include:
 - Bricklaying
 - Carpentry and joinery
 - Plastering
 - Painting and decorating
 - TEC Partnership is the only institution delivering this qualification in the HEY area.

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

¹⁰⁵ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There are no IoT courses relevant to the off-site/modular construction industry being delivered within the HEY area.

Higher education

As discussed in section 3.2.3 above, in 20120/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

It is not possible to estimate what proportion of the near 2,300 STEM graduating entering employment on 2019/20 entered jobs related to offsite/modular construction – but we do know that 57 of them entered employment in the construction industry as a whole.

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher), it is imperative that (i) the region's supply of degree-educated workers is improved (just 41% of the working age population hold at least a degree-level qualification) and (ii) that more are encouraged and enabled into the green industries, especially in areas such as:

- Environmental sciences
- Mathematical sciences
- Engineering
- Construction and built environment

Skills Bootcamps

The only Skills Bootcamp on offer in the HEY area that is relevant to the off-site/modular construction industry is Construction Management.

There are, however, a small number of construction Skills Bootcamps on offer in other regions of the country that may be relevant to varying degrees¹⁰⁶, for example CAD for Construction.

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

¹⁰⁶ Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

10 Retrofit, plumbing and electrical services

10.1 Current and future skills needs

This industry includes the following activities:

- Home insulation
- Heat pumps
- Solar photovoltaic and thermal
- Hydrogen-ready boilers

Buildings are the second largest source of emissions in the UK, which currently has the least energy efficient housing stock in Europe. While there have been gradual improvements in efficiency over the last decade, change has not come quickly enough.

To meet its current climate targets, the UK government aims to retrofit all homes to the 'EPC Band C' standard by 2035. However, only 29% of current homes meet this standard.¹⁰⁷

Research by Onward highlights the massive challenges the UK faces in decarbonising housing stock, including the need to retrofit 15 million houses with energy-efficiency measures in the next 13 years¹⁰⁸. In addition, the Government's ambitions for low-carbon heating will require the installation of 600,000 heat pumps per year by 2028.¹⁰⁹

This will entail a significant increase in the number of workers performing retrofit related tasks such as domestic energy assessment, retrofit advice, retrofit coordination, as well as the installation of energy efficiency measures in existing dwellings such as insulation and windows, in addition to renewable energy sources such as heat pumps and solar photovoltaic systems.

Meeting these ambitions will create significant numbers of jobs both in the installation of energy-efficiency measures and low-carbon heating systems, in addition to the related supply chains. For example, the CITB predicts nearly 300,000 jobs will be created in these sectors by the end of the decade.¹¹⁰

However, the markets for these various low carbon technologies are very sensitive to government policies and incentives. Many of the interviews conducted for this research mentioned the lack of (i) policy certainty (particularly in relationship to which technologies/ solutions should be "first out of the blocks") and (ii) incentives¹¹¹ to improve consumer demand as being factors behind the low take-up of these technologies.

Once policy certainty and incentives are delivered (including quality measures such as Trustmark and MCS), consumer demand should follow, leading to businesses having the confidence to invest in skills¹¹².

The skills associated with the installation of domestic low carbon technologies fall into two broad categories:

- There are roles relating to assessment, advisors, co-ordinators, consultants and planners – these generally require higher level qualifications and specialist training
- There are roles relating to the actual installation and maintenance of the technologies – these are generally "skilled trades" and acquire their skills through programmes such as apprenticeships, manufacturer-specific short courses and on-the-job experience

¹⁰⁷ Retrofit: The workforce we need: Who should lead the green revolution?, Autonomy, March 2023.

¹⁰⁸ Onward, 2022, Going Green.

¹⁰⁹ Department for Business, Energy & Industrial Strategy & Lord Callanan (September 2022), [Boost for innovative heat pump projects to drive cleaner heating](#)

¹¹⁰ Construction Industry Training Board [CITB] (2021), [Building skills for net zero](#)

¹¹¹ Consumers tend to respond more favourably to incentives that offer cheaper installation costs, rather than offer longer-term cost reduction benefits.

¹¹² Delivering Net Zero: A Roadmap for the role of heat pumps, Heat Pump Association, 2019.

In the case of retrofit advisers/co-ordinators/etc., significant expertise is required to develop a retrofit programme for a building. Each project requires the skills of a surveyor to assess current condition and any requirements for repair, an energy specialist to model current performance and design an upgrade solution, a project manager to supervise the retrofit programme, and various different trades people are required to implement all the recommendations¹¹³.

Therefore, the role of the Retrofit Co-ordinator is an essential one as they identify, analyse and manage the technical and procedural risks that are frequent in household retrofit projects. They ensure that energy efficiency measures are designed, specified, monitored, and evaluated after installation in line with PAS 2035.

The challenge to the industry and its stakeholders will be to ensure that there is an appropriately sized and skilled Retrofit Co-ordinator workforce that can build and maintain trust in the whole home decarbonisation market. At the moment, this is not the case¹¹⁴.

In relation to the existing installer workforce, the fundamentals of home heating and hot water will not change, and many already have many of the essential skills required for low carbon heating installation and will, with access to the right provision at the right time at the right cost, be able to upskill on these new technologies relatively easily.

All installations must be undertaken by suitably qualified trades. Crucial to this happening at the required scale moving forward will be having sufficient supply of qualified electricians and plumbers – which form the basis of most installer skillsets. This means that it can take up to four years to become fully qualified, which is a significant factor when to incorporate into any industry skills strategy.

Finally, there is a critical skills gap in repair skills for traditional buildings, but this is more a volume issue as these are not skills that are typically included in any formal training, they are normally picked up through on-the-job training.

In the commercial buildings industry, bringing experience of these technologies to architects, building designers, engineers and facilities managers will enable efficient, all-electric building design¹¹⁵.

Ultimately, demand for these technologies – and therefore a skilled workforce – will be led by consumer demand, meaning that training provision will need to respond very quickly to upturns in demand from the market, both in terms of upskilling the existing workforce and in enabling new entrants to join the workforce in as efficient and cost-effective way as possible.

In the following sections, we take a look at the skills requirements for each technology. Note, however, that we do not review the accreditation and regulation of skills and/or installation (e.g. MCS or Trustmark). These are outside of the remit of this research.

Home insulation

Insulation technicians perform important roles in this work by installing cladding and upgrading insulation, performing structural and other repair work, ensuring good airflow and proper ventilation and moisture-proofing.

They must also undertake cosmetic repair and finishing tasks such as plastering, sealing and painting to restore function and aesthetics.

Of the types of insulation available (loft, cavity wall, solid wall and floor), cavity wall insulation is the least intrusive, as it is applied externally, without significantly altering the appearance of the building. Loft insulation can be relatively nondisruptive, although this depends on the condition and accessibility of the loft space.

Although, loft insulation can usually be installed by low-skilled workers, each installation requires a survey to ensure that there are no issues requiring attention, such as frayed wiring, leaks or damp.

¹¹³ Building skill for net zero, Report prepared by Eunomia for CITB, March 2021.

¹¹⁴ Building skill for net zero, Report prepared by Eunomia for CITB, March 2021.

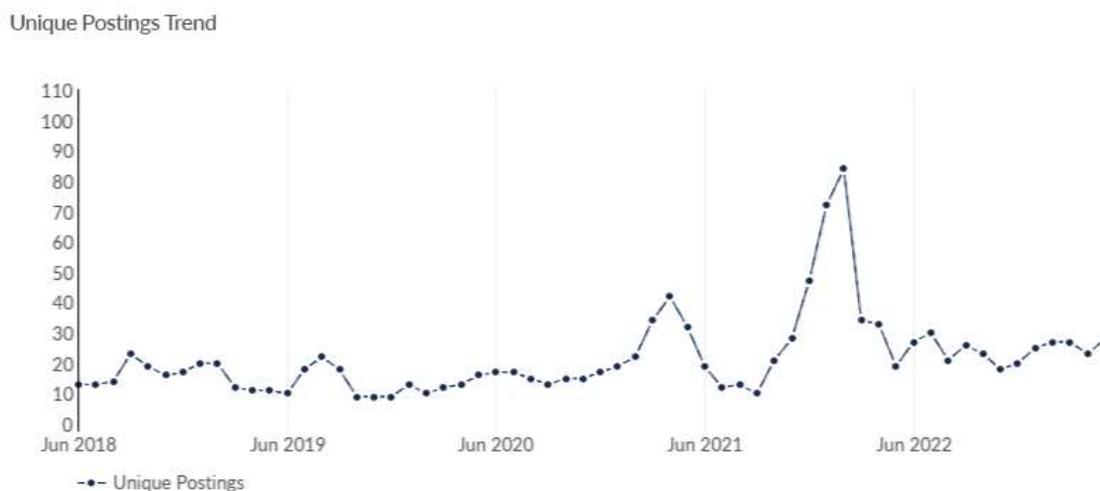
¹¹⁵ Harnessing heat pumps for net zero: The role of heat pumps in saving energy and cutting emissions, Australian Alliance for Energy Productivity (A2EP) and Energy Efficiency Council (EEC), February 2023.

Solid wall insulation can be applied internally or externally, but there are significant differences between installing at street level, compared to high-rise, with the latter requiring significant additional skills such as scaffolding and working at heights.

While many of the installation tasks can be delivered with lower levels of training¹¹⁶, tasks such as surveying and designing each project, require deep knowledge of building systems, considerable experience and specialised training¹¹⁷.

In the year ending 31st May 2023, there were 2,100 online job postings relating to home insulation across the UK¹¹⁸ – 130 of which were located within the Yorkshire and Humber region.

Figure 53: Number of online job postings relating to home insulation (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 54: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Insulation Installers	Construction
Client Liaison Officers	Cladding
Site Managers	Roofing
Insulation Technicians	Subcontracting
Drywall Installers	Sales Management
Labourers	Building Envelope
Production Operatives	Mortars
Site Supervisors	Plastering
Building Surveyors	Procurement
Project Managers	AutoCAD

Source: LightcastTM, 2023.

¹¹⁶ Cavity wall insulation also requires a survey and must be installed by qualified operatives (Level 2 NVQ Certificate in Insulation and Building Treatments – Cavity Wall Insulation).

¹¹⁷ Building skill for net zero, Report prepared by Eumonia for CITB, March 2021.

¹¹⁸ These vacancies were identified using the keywords “home insulation”, “wall insulation” and “loft insulation”.

Heat pumps

Typically, replacing a gas boiler with a heat pump requires consideration of a number of factors – such as appropriate system capacity, integration with other systems, sound, ventilation and electrical requirements. These skills are not necessary when replacing a gas boiler like-for-like.

Electrical installation, maintenance and repairs will remain the key technical skills of the industry. In the future these will need to be upgraded continually to meet technical changes¹¹⁹.

Heat pumps also tend to require 32-amp electrical supplies, and therefore an installation will require someone on site that is Part P (of the Building Regs) qualified to be able to connect the power supply.

The high demand for plumbers and heating and ventilating engineers and similar tradespeople has been exacerbated by Brexit.

HVAC mechanics and those with equivalent qualifications can seek specialised training and become qualified heat pump installers – occupations that are in high demand in both the retrofit and new build industries.

The skills required to install heat pumps can be broken down into three categories¹²⁰:

- Assessment and system design
- System installation
- Electrical work

Assessment and system design: The first stage is typically the assessment of the property and the design of the heat pump system, taking into account a property's heating needs and the preferences of the customer. The process usually involves:

- Discussion with the customer to understand what they are looking for and surveying the property
- Performing heat loss calculations for the property to determine the heat pump size required
- Sizing heat emitters (e.g. radiators)
- Sizing pipework and materials
- Setting control options such as space heating controls and hot water controls

Heat loss calculations and heating system design are taught in gas and oil training courses, but they are rarely employed in practice during boiler installations. However, given that heat pumps run efficiently at lower flow temperatures than gas boilers, poor heat loss calculations and design can lead to the heat pump system not running at its most efficient¹²¹. Therefore, high-quality assessment and design is essential to any domestic heat pump installation.

System installation: The physical installation of the system involves fitting the heat pump and any auxiliary equipment into the property and making it operational by connecting it to the heating emitters and pipework.

The skills required to complete the installation are very similar to those required to install a gas boiler – generally speaking laying pipework, installing heating emitters and fitting in equipment.

As the design and assessment process requires a different skill set from the process of installing a heat pump, the MCS has reflected this by splitting the Heat Pump Standard into two separate standards: one for Heat Pump Design and one for Heat Pump Installation. This allows engineers to specialise on either process.

¹¹⁹ The Electrotechnical Skills Partnership Labour Market Intelligence Research, Pye Tait Consulting, March 2019.

¹²⁰ How to scale a highly skilled heat pump industry, Nesta, July 2022.

¹²¹ Retrofitting homes for net zero heating: Regulatory change, Heat Pump Association, November 2020.

However, limitations on the ability of plumbers to offer a ‘single-stop’ service to replace a gas hot water system with a heat pump (due to the need for electrical trades licencing) has consistently been identified as a barrier to deployment. This is particularly important because gas boilers are generally replaced when they fail – requiring a replacement system to be implemented quickly. Development of training packages to allow a single trade to fully install heat pumps could materially accelerate deployment.

Electrical work: The electrical work requires a qualified electrician with knowledge of configuring the heat pump and the wiring and assessing the electrical network capacity. However, there is a shortage of qualified electricians on the market and it can take up four years to achieve this status.

Furthermore, as we have seen in relation to other domestic low carbon technologies such as heat pumps and solar PV, demand for electricians is expected to increase as these technologies establish themselves in the market and become cheaper to buy – perhaps driven by government incentives. Should the increase in demand for skills occur quickly, then it is likely that supply will fall short of demand due to the long lead-time to competency under current arrangements.

Widespread heat pump deployment will require both upskilling of the current workforce and the training of the next generation.

The first of these is fairly straightforward utilising existing training provision across the further education colleges. The latter requires (i) high quality and engaging careers education advice, information and guidance in order to attract young people and adults into these careers and then (ii) high quality entry level provision – while the latter exists (with the possible exceptions listed below), it is more questionable that for former does.

There are a number of skill areas that are perhaps not currently included within existing training provision:

- Higher level technical skills in order to integrate electronic and digital equipment in a “smart” setting
- Building physics, for example “U” values, moisture effects, characteristics of heating and ventilation systems
- Installing pipe networks with pumps, sensors and logic controls
- Building Information Management (BIM) to be able to track components from “cradle to grave” to save on materials, operational and maintenance costs

Also, in the future, it may be that more carbon efficient systems will be bigger with more complex electro-mechanical systems, incorporating a mix of technologies, which will require a more sophisticated skillset.

There are currently 746 MCS registered installers of air source heat pumps in the Yorkshire and Humber region and 321 registered installers of ground source heat pumps¹²².

Solar PV

Solar PV installers in the UK typically have an electrical/electrician background, while solar thermal requires more plumbing-based skills. both roles are supplemented with roofing skills such as scaffolding and working at heights.

¹²² <https://mcs-certified.com/find-an-installer/> accessed on 15th April 2023.

The essential skills and competences for a solar installer are:

- Mount panels securely using a specified mounting system and on the defined position and inclination
- Test procedures in electricity transmission: Perform tests on powerlines, cables and pipework
- Inspect electrical supplies
- Comply with legal regulations, follow health and safety procedures.
- Install electrical and electronic equipment and circuit breakers

Jobs roles needed during the installation phase include:

- Electrician with Solar Expertise
- HVAC Technician with Solar Expertise
- Plumber with Solar Expertise
- Roofer with Solar Expertise
- Solar Assembler / Basic Installer
- Solar Crew Chief
- Solar Project Manager
- Solar PV Installer
- Solar PV Technician (commercial/utility)
- Solar Service Technician (residential)

The electrical work requires a qualified electrician with knowledge of configuring the solar equipment. However, there is a shortage of qualified electricians on the market and it can take up to four years to achieve this status.

Furthermore, as we have seen in relation to other domestic low carbon technologies such as heat pumps and EV charging point installation, demand for electricians is expected to increase as these technologies establish themselves in the market and become cheaper to buy – perhaps driven by government incentives. Should the increase in demand for skills occur quickly, then it is likely that supply will fall short of demand due to the long lead-time to competency under current arrangements.

In order to increase the number of solar installers and other roles required by the industry, high quality and engaging careers education advice, information and guidance will be required in order to attract young people and adults into these careers.

There are currently 1,468 MCS registered installers of solar PV in the Yorkshire and Humber region, and 152 installers of solar thermal¹²³.

Hydrogen-ready boilers

Several manufacturers have already developed hydrogen-ready domestic heating boilers. These can run on natural gas until hydrogen arrives, then they are converted in a matter of hours.

Unsurprisingly, as this is a developing technology, hydrogen boiler installation is one area where the current installer workforce say they lack the required skills and knowledge. This, however, does not necessarily represent an insurmountable challenge¹²⁴.

All gas installers in the UK are already highly trained and registered with Gas Safe, and the additional training required to work with hydrogen is expected to take only about one day for these to complete.

¹²³ <https://mcs-certified.com/find-an-installer/> accessed on 15th April 2023.

¹²⁴ Building skill for net zero, Report prepared by Eunomia for CITB, March 2021.

The size of the workforce needed for the conversion is highly dependent upon the required speed of the conversion programme implemented by the gas distribution networks (and customer demand – if the conversion is voluntary).

Careful consideration will have to be given as to how the conversion programme is rolled out. If all networks go at the same time, this could overwhelm training providers.

Working closely with Government and IGEM, Energy & Utility Skills has produced the Hydrogen Competency Framework¹²⁵ to ensure that new hydrogen appliances are installed to the highest safety standards.

The Hydrogen Competency Framework details how hydrogen is different to natural gas and what the implications are for natural gas engineers. The associated skills matrix identified a number of areas where a practical demonstration of skills will be required:

- Risk assessment
- Acceptable materials
- Tightness testing
- Purging practice
- Commissioning
- Combustion analysis
- Leakage detection
- Handover and future Maintenance
- Dealing with PRE

There are also areas where a “comprehensive” understanding will be required by the workforce:

- Properties of hydrogen
- Behaviour of hydrogen
- Appliance design changes
- Installation procedures
- Ventilation
- Metering

Furthermore, “active awareness” will be required in areas such as:

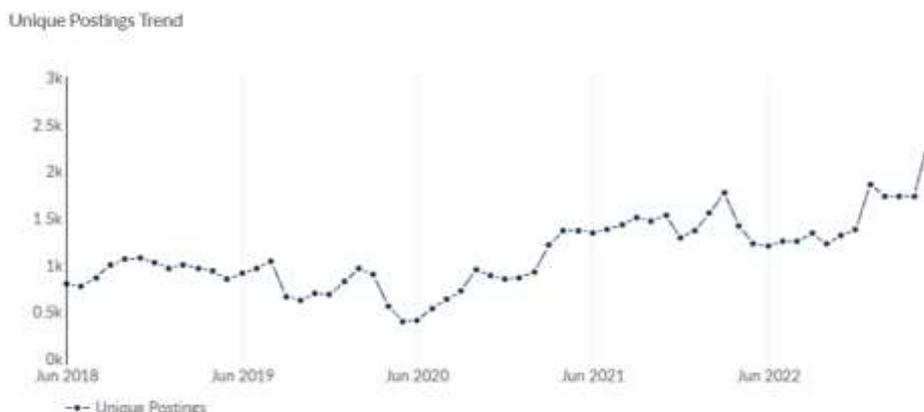
- Legislation and applicable regulations
- Products of Combustion
- Unsafe situations

In the year ending 31st May 2023, there were 109,000 online job postings relating to plumbing and electrical services across the UK¹²⁶ – 7,700 of which were located within the Yorkshire and Humber region.

¹²⁵ <https://www.euskills.co.uk/download/hydrogen-competency-framework-report/>

¹²⁶ These vacancies were identified using the keywords “home insulation”, “wall insulation” and “loft insulation”.

Figure 55: Number of online job postings relating to plumbing and electrical services (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 56: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Electricians	Maintenance Engineering
Electrical Maintenance Engineers	Electrical Wiring
Maintenance Electricians	Plumbing
Plumbers	Machinery
Gas Engineers	Electrical Engineering
Pipefitters	Boilers
Industrial Electricians	Electrical Systems
Domestic Engineers	HVAC
Mechanical Fitters	Three-Phase
Solar Electricians	Building Services Engineering

Source: LightcastTM, 2023.

10.2 Obtaining the required skills

Training in this industry is commercial and very competitive, with the consensus being that training providers will develop their facilities and provision to meet demand as and when it occurs.

However, one of the largest barriers to upskilling the existing workforce is the need to take time away from the job in order to attend training – especially as demand for traditional building services skills remains high. This, in turn, dissuades training providers from investing in local, suitable training provision for these new, low carbon technologies¹²⁷.

Transferring skills from the boiler manufacturing workforce to making heat pumps could be critical both for safeguarding employment and harnessing existing skills¹²⁸. Whilst the technology is different, many of the engineering and component assembly processes are similar.

¹²⁷ Green skills as an enabler of UK retrofit: Deep dive research report – Green Jobs Barometer, PwC, November 2022.

¹²⁸ Heat Network Skills Review: BEIS research report no. 2020/020, BEIS, June 2020.

However, from a forward planning perspective, one of the main challenges the industry in terms of developing its workforce in a timely manner is that, to become a fully trained heat pump engineer, a new trainee must typically first qualify as a plumber or gas and oil heating engineer before attending a heat pump specific training course. As this prerequisite can take up to four years, it makes it particularly difficult for the heat pump industry to attract newcomers with no previous experience¹²⁹.

Retraining existing gas and oil heating engineers or plumbers is a more straightforward process, particularly given the overlap in skills needed to install a heat pump and those needed to install a gas or oil boiler. This means that for boiler engineers and plumbers, a three to five-day heat pump training course is usually sufficient to gain the necessary installation and, more importantly, assessment and design knowledge needed to get started as a heat pump engineer.

Wilberforce Sixth Form College (through the SDF2 project) has introduced micro generation into their provision in the form of a hydrogen and heat pump teaching units.

Hull College are also developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Materials and the environment, Understanding Smart Home Heating Systems, Solar biomass and storage engineering, Building Fabric and Energy Conservation, Future energy systems and sustainability, Understanding decarbonisation and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Apprenticeships

In 2021/22 there were 1,271 starts on Engineering and Manufacturing Technologies apprenticeships in the Yorkshire and Humber region – down slightly from 1,379 in the previous year.

Starts on Construction, Planning and the Built Environment apprenticeship standards increase by more than a 100 in 2021/22, but given the likely future demand for these skills (especially relating to domestic energy efficiency), many more are likely to be needed to meet future demand. However, these numbers likely reflect a degree of employer uncertainty around when demand for these skills will begin to increase.

Figure 57: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Construction, Planning and the Built Environment	387	370	477

Source: Data provided by HEY LEP.

The availability of local apprenticeship training on relevant standards can vary¹³⁰:

Those standards with a training provider within 40 miles of Hull include:

- Scaffolder (Level 2)
- Roofer (Level 2)
- Building services engineering craftsperson (Level 3)
- Building services engineering service and maintenance engineer (Level 3)
- Plumbing and domestic heating technician (Level 3)
- Electrical, electronic product service and installation engineer (Level 3)

¹²⁹ How to scale a highly skilled heat pump industry, Nesta, July 2022.

¹³⁰ This is based on searching for apprenticeship training providers on [the gov.uk website](https://www.gov.uk) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

- Installation electrician and maintenance electrician (Level 3)
- Refrigeration air conditioning and heat pump engineering technician (Level 3)
- Domestic electrician (Level 3)
- Building services engineering senior technician (level 4)
- Construction design and build technician (level 4)
- Building services design engineer (degree) (level 6)
- Building services engineering site management (degree) (level 6)
- Architect (integrated degree) (level 7)

Those standards with no training provider within 40 miles of Hull but do offer training at the apprentices' workplace include:

- Dual fuel smart meter installer (level 2)
- Junior energy manager (Level 3)
- Smart home technician (level 3)
- BEMS (building energy management systems) controls engineer (level 4)
- Building control surveyor (integrated degree) (level 6)

Those standards with no training provider within 40 miles of Hull include:

- Architectural assistant (integrated degree) (level 6)
- Design and construction management (degree) (level 6)

Furthermore, standards that are currently in development include:

- Low carbon heating technician (level 3) (in development)

T Levels

There are three T Levels currently available relating to the plumbing and electrical industry¹³¹:

- Building Services Engineering for Construction
 - Options to specialise in this qualification include:
 - Plumbing and heating engineering
 - Heating engineering and ventilation
 - Refrigeration engineering and air conditioning engineering
 - There are no institutions delivering this qualification within the HEY area.
- Design, Surveying and Planning for Construction
 - Options to specialise in this qualification include:
 - Surveying and design for construction and the built environment
 - Civil engineering
 - Building services design
 - Hazardous materials analysis and surveying
 - There are no institutions delivering this qualification within the HEY area.

¹³¹ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

- Onsite Construction
 - Options to specialise in this qualification include:
 - Bricklaying
 - Carpentry and joinery
 - Plastering
 - Painting and decorating
 - TEC Partnership is the only institution that delivers this qualification in the HEY area.

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There are no IoT courses relevant to the retrofit, plumbing and electrical industry being delivered within the HEY area.

Higher education

As discussed in section 3.2.3 above, in 20120/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

It is not possible to estimate what proportion of the near 2,300 STEM graduating entering employment on 2019/20 entered jobs related to retrofit, electrical and plumbing services – but we do know that 69 of them entered employment in the construction industry and associated trades.

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher), it is imperative that (i) the region's supply of degree-educated workers is improved (just 41% of the working age population hold at least a degree-level qualification) and (ii) that more are encouraged and enabled into the green industries, especially in areas such as:

- Environmental sciences
- Mathematical sciences
- Engineering
- Construction and built environment

Skills Bootcamps

Skills Bootcamps on offer in the HEY area that are relevant to retrofit, plumbing and electrical services include:

- Domestic Electrical Installer
- Heat Pumps – F Gas/Monobloc

There are, however, a wide range of relevant Skills Bootcamps on offer in other regions of the country¹³²:

- Award in Domestic Retrofit Assessment - Level 4
- Award in Understanding Domestic Retrofit - Level 3
- CAD for Construction
- Diploma in Retrofit Coordination and Risk Management - Level 5
- Domestic Retrofit Advice
- Domestic Retrofit Installation
- Electrical Installation
- Energy efficiency in Traditional Buildings
- Environmental Technologies
- Future Homes
- Future of Construction
- Green construction and buildings
- Heat Pump Installation
- Hydrogen Awareness and Safety
- Solar Photovoltaic Systems
- Solar PV for Roofers
- Retrofit Assessor
- Retrofit Coordinator
- Retrofit heat pump installation & maintenance
- Route to Retrofit
- Scaffolding
- Solid Wall Insulation
- Spray Foam Insulation

¹³² Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

- Understanding Domestic Retrofit
- Understanding domestic retrofit ventilation
- Upskilling Gas Engineers from Level 2 to Level 3
- Upskilling Smart Metering Engineers and Gas Engineers
- Upskilling Smart Metering Engineers to Level 3 Gas Engineers
- Using CAD for Estimates
- Zero Carbon Buildings

The Social Housing Retrofit Accelerator is also running a series of “bootcamps”, based on their CPD-accredited *Retrofit Essentials Course*¹³³. However, none of the summer and autumn 2023 courses are planned to take place within, or near, the HEY area.

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

¹³³ See <https://socialhousingretrofit.org.uk/resources/retrofit-essentials#a0> for more information.

11 Agri-tech and low carbon farming

11.1 Current and future skills needs

With society facing major challenges from a growing population and climate change, the imperative to grow more food locally has never been greater.

Innovation and technological development is key to tackling these challenges. Through innovation in seeds, crop protection, digital tools, and agriculture practices, the agri-tech industry is advancing sustainability and efficiency across the entire agriculture value chain.

Furthermore, the industry also has significant potential in the area of energy production, particularly in bioenergy (biomass, biofuels, biogas), wind power and solar photovoltaics. It is estimated that farmers own or host over half of the UK's solar power and anaerobic digestion capacity, as well as the majority of wind power¹³⁴.

In terms of developing the skills of the workforce, there are two areas of focus:

- The knowledge, skills and behaviours needed to make informed environmental and climate related decisions
- The technical skills needed to implement the required actions

The ascent of environmental farming and circular agriculture practices will lead to an increased demand for specialist advisors, including agronomists and animal nutritionists: independent advisors on soil health and animal feed quality, respectively, and ways to monitor, manage and maintain it.

Technical ecological knowledge of soils, nutrients and proteins is necessary, combined with interpersonal skills and empathy for different farms and farmers' situations and needs.

Initiatives to restore and improve woodland, rewet bog and peatlands and cultivate biodiversity through hedgerow management can also generate job opportunities for those in rural communities¹³⁵.

Increased use of automation and data-based technologies is driving a skills change in the industry. For example:

- The use of data within precision agriculture is changing the way crops and livestock are grown and managed – resulting in less waste of the inputs and more accuracy in outputs
- Crop science is increasing quality and consistency

For example, data can now be collected using drones or handheld sensors which, when combined with maps, allow farmers to identify and rectify problems such as poor irrigation, plant density, and disease which can directly affect crop yields and profitability. This data ability allows smaller farmers to increase yields more effectively and compete with the resources of larger farms.

Younger people and new entrants will be the driving force behind many of the agri-tech developments happening in the industry over the coming years and improving productivity, efficiency and environmental protection.

¹³⁴ <https://www.nfuonline.com/archive?treeid=69296>

¹³⁵ The Circularity Gap report: Northern Ireland, Circle Economy, 2022.

In terms of developing the workforce of the future, increasing levels and quantities of skills are likely to be required in areas such as¹³⁶:

- Agricultural meteorology
- AI and robotics
- Business and commercial management
- Data science
- Digital skills
- Engineering disciplines (electrical, mechanical and others)
- Environmental economists
- Environmental restoration planning
- Food scientists/technologists
- Fuel efficient driving
- Scientists of varying specialisms
- Software development/engineering
- Soil and water conservation
- Water resource management

Other areas of innovation that may impact upon the skills of the wider agriculture and land-based industries include:

- Soil sequestration, where atmospheric carbon is stored in soil and vegetation
- Reducing beef herd methane emissions through changes in genetics, diet or grazing management¹³⁷
- Increasing water efficiency, it will be critical that farmers and land managers ensure sustainable abstraction for irrigation
- Organic farming techniques
- Crop diversification

These skills are being added to and/or adapted by existing occupations and will require more technical knowledge be spread across both mid-level skills and higher-level skills.

These skills, together with raising awareness of greenhouse gas emissions, are vitally important to ensure the industry contributes to a net-zero future.

This provides an opportunity to attract more young people into the agricultural industry as it engages those with technology and data skills in an industry that has not traditionally done so. It also provides an opportunity to attract experienced people with these skills from other industries as decision-makers and business managers.

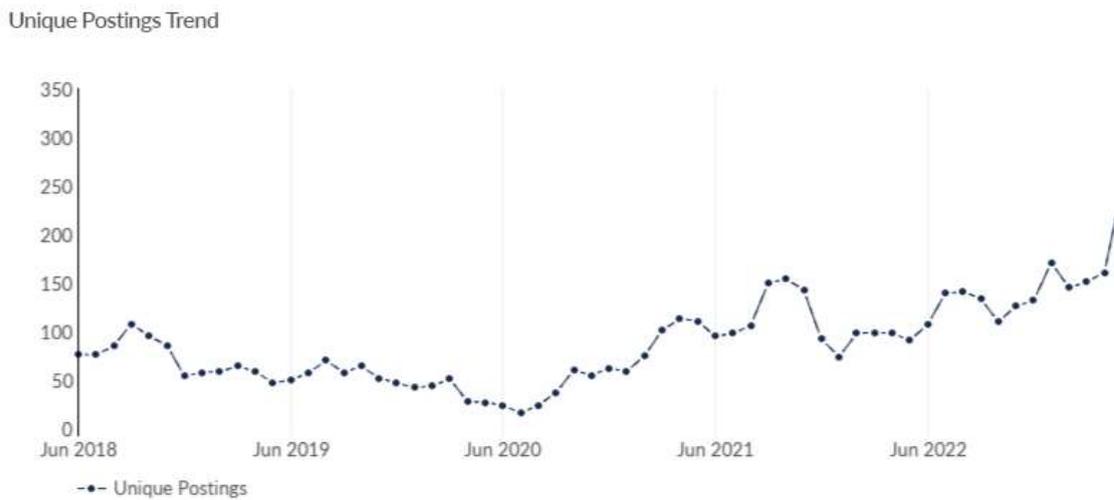
In the year ending 31st May 2023, there were 12,600 online job postings relating to agriculture across the UK¹³⁸ – 740 of which were located within the Yorkshire and Humber region.

¹³⁶ Skills for a greener future: A global view, International Labour Organisation, 2019.

¹³⁷ Gjerek M, Morgan A, Gorennor and Liz Hutton at the Department during the work. Brown N, Womersley G (2021). Diesel Use in NSW Agriculture and Opportunities to Support Net Zero Emissions. Sydney: Australian Alliance for Energy Productivity for NSW Department of Primary Industries.

¹³⁸ These vacancies were identified using the keywords “home insulation”, “wall insulation” and “loft insulation”.

Figure 58: Number of online job postings relating to agriculture (Yorkshire and Humber region)



Source: LightcastTM, 2023.

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 59: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
3.5 Tonne Drivers	Warehousing
Farm Workers	Machinery
Warehouse Operatives	Finance
Staff Employees	Agriculture
7.5 Tonne Drivers	Operations Management
HGV Class 1 Drivers	Data Analysis
Customer Service Advisors	Poultry
Herdsmen	Invoicing
Sales Assistants	Project Management
Harvest Managers	Animal Husbandry

Source: LightcastTM, 2023.

11.2 Obtaining the required skills

The challenge for learning and skills providers will be to integrate new learning content into core agricultural provision, such as:

- AI and robotics
- Data science
- Digital skills
- Engineering disciplines (electrical, mechanical and others)
- Scientists of varying specialisms
- Software development/engineering
- Business and commercial management
- Food scientists/technologists

The Strategic Development Fund has enabled Bishop Burton College to invest in a range of new technologies and provision to ensure their provision is fit to deliver the skills needed in modern agriculture.

Including robotic mowers and pitch line markers, electric farm vehicles, anaerobic digestion units.

Furthermore, all new learners are being offered a Level 3 online Green Energy courses alongside their existing studies, which covers green energy solutions, micro and mini AD systems and electrics and battery power selection. Short courses have also been developed covering digital, electric vehicles and electricity principles.

Hull College (using SDF2 funds) are developing:

- Foundation Degree in Sustainable Development, including modules in Policy, Governance and Sustainability, Understanding decarbonisation and Climate change, science and symptoms
- Foundation Degree in Renewable Energy and Technology, including modules The fundamentals of energy, Understanding decarbonisation, Policy, Governance and Sustainability, Empowering Communities, Health and safety in the energy sector, Energy Project Management and Personal development and The economics of renewable energy

Apprenticeships

In 2021/22 there were just 39 starts on Agriculture, Horticulture and Animal Care apprenticeships in the HEY area.

Figure 60: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Agriculture, Horticulture and Animal Care	37	44	39
Information and Communication Technology	141	120	198

Source: Data provided by HEY LEP.

The number of starts on ICT apprenticeships increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce.

The availability of local apprenticeship training on relevant standards can vary¹³⁹:

Those standards with a training provider within 40 miles of Hull include:

- Arborist (level 2)
- Countryside worker (level 2)
- General farm worker (level 2)
- Crop technician (level 3)
- Forest craftsperson (level 3)
- Livestock unit technician (level 3)
- Countryside ranger (level 4)

Those standards with no training provider within 40 miles of Hull but do offer training at the apprentices' workplace include:

- Poultry worker (level 2)

Those standards with no training provider within 40 miles of Hull include:

- Poultry technician (level 3)
- Agriculture or horticulture professional adviser (level 6)
- Professional forester (integrated degree) (level 6)

Furthermore, an Assistant farm manager (level 4) standard is currently in development.

T Levels

The one T Level that is currently available relating to this industry is the Agriculture, Land Management and Production¹⁴⁰. However, there are no institutions within the HEY area that deliver this qualification.

Relevant specialisms available in this T Level include:

- Crop and plant production
- Land-based engineering
- Livestock production
- Tree and woodland management and maintenance

From September 2024, a T Level in Animal Care and Management will also be available.

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

¹³⁹ This is based on searching for apprenticeship training providers on [the gov.uk website](#) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

¹⁴⁰ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

Courses relevant to the agri-tech and low carbon farming industry that are delivered within the HEY area include:

Figure 61: Institute of Technology courses delivered within the HEY area

Course	IoT Partner
HNC Agriculture (Crop Production)	Bishop Burton College
HNC Agriculture (Livestock Production)	Bishop Burton College
HNC Agriculture (General)	Bishop Burton College
FdSc Agriculture	Bishop Burton College
FdSc Agriculture (Precision Crop Technology)	Bishop Burton College
BSc (Hons) Precision Agriculture	Bishop Burton College
FdSc Animal Management and Behaviour	Bishop Burton College
BSc (Hons) Animal Behaviour and Welfare (Top Up)	Bishop Burton College
HNC Animal Management (Behaviour and Welfare)	Bishop Burton College
FdSc Applied Canine Behaviour and Training	Bishop Burton College
BSc (Hons) Canine Behaviour Management (Top Up)	Bishop Burton College
Level 4 Countryside Ranger Apprenticeship	Bishop Burton College
FdSc Wildlife and Conservation Management	Bishop Burton College
BSc (Hons) Wildlife and Conservation Management (Top Up)	Bishop Burton College
FdSc Ecology and Environmental Management	Bishop Burton College
BSc (Hons) Ecology and Environmental Management (Top Up)	Bishop Burton College

Course	IoT Partner
FdSc Applied Equine Management (Coaching)	Bishop Burton College
FdSc Applied Equine Management (Therapy)	Bishop Burton College
BSc (Hons) Equine Business Management	Bishop Burton College
BSc (Hons) Equine Health and Nutrition	Bishop Burton College
BSc (Hons) Equine Science	Bishop Burton College
BSc (Hons) Equine Sports Science and Coaching	Bishop Burton College
BSc (Hons) Equine Therapy and Rehabilitation	Bishop Burton College
Level 3 in Agriculture	Bishop Burton College

Source: <https://yhiot.ac.uk/courses/>, accessed on 21st July 2023.

Higher education

As discussed in section 3.2.3 above, in 20120/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

It is not possible to estimate what proportion of the near 2,300 STEM graduating entering employment on 2019/20 entered jobs related agri-tech and low carbon farming – but we do know that 7 of them entered employment in agriculture as a whole.

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher), it is imperative that (i) the region's supply of degree-educated workers is improved (just 41% of the working age population hold at least a degree-level qualification) and (ii) that more are encouraged and enabled into the green industries, especially in areas such as:

- Biosciences
- Agricultural sciences
- Physical sciences
- Environmental sciences

Skills Bootcamps

There are no Skills Bootcamps on offer in the Yorkshire and Humber region that are relevant to agriculture.

There are, however, a wide range of relevant Skills Bootcamps on offer in other regions of the country¹⁴¹:

- Arboriculture
- Fast Track to Farming: Level 2 Certificate in Agriculture
- Fast Track to Industry: Level 2 Certificate in Arboriculture
- Land Management and Arboriculture

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

¹⁴¹ Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

12 Digital skills

12.1 Current and future skills needs

A constant theme throughout the industries discussed in this report is the need for greater levels of skill and competency in the areas of data, digital and specialist IT skills. Although there is a clear need to upskill the existing workforce, a key focus for education and skills providers should be on creating a more flexible, multi-skilled and technologically-aware workforce¹⁴².

Across the green industries and circular economy, employers are looking to improve communication links across the field workforce – making it simpler, safer, and smarter through the adoption of digital technologies.

Mobile Workforce Management (MWM) solutions give the field workforce real-time information about customers, assets, outages, hazards, and more, will enable them to make the best decisions. It also enables improved scheduling.

There are likely to be two aspects to the upskilling requirement of MWM:

- Base IT skills – the ability to use mobile devices, email, IM, etc.
- Solution-specific skills – likely to be provided by the solution provider

While action on the first of these, base IT skills for the craft workforce, is beginning to take place, it is piecemeal and could potentially benefit from some consistency in terms of learning content within technical training provision. Action on the latter will largely depend on timing and the specifics of the technology/ solution being implemented.

There are a number of IT, software and cyber security occupations currently listed on the UK's Shortage Occupation List that the green industries could potentially benefit from if recruiting from overseas¹⁴³:

- IT business analysts, architects and systems designers – all jobs
- Programmers and software development professionals – all jobs
- Web design and development professionals – all jobs
- Information technology and communications professionals not elsewhere classified – only cyber security specialist

Cyber security roles in the energy industry will benefit from a dual cyber security skillset, meaning they need to be proficient in both IT and operational technology (OT). Understanding communications technology and engineering equipment, as well as their interactions, is a niche skillset that not many individuals possess in the wider labour market and will be a key aspect of training and development of these people within the power industry.

Related to this is DevOps, a form of agile software development that requires close collaboration between programmers, analysts and operations engineers. Instead of large OT projects where IT developers work in relative isolation, DevOps introduces a daily rhythm of small iterative changes to constantly upgrade, improve and fix applications – IT and OT work hand-in-hand.

This dual cyber security skillset will be increasingly vital in the energy industry as IT and OT continue to merge, suggesting that the future IT workforce will need to be trained in explicitly energy-related skills.

Similarly, IT professionals are increasingly being asked to interact with Supervisory Control And Data Acquisition (SCADA) systems as digitisation and cloud connectivity are disrupting how SCADA systems interact and relate with critical IT infrastructure¹⁴⁴.

¹⁴² UKCS Workforce Dynamics: The Skills Landscape 2019-2025, OPITIO/Robert Gordon University, 2019.

¹⁴³ Taken from <https://www.gov.uk/government/publications/skilled-worker-visa-shortage-occupations/skilled-worker-visa-shortage-occupations>

¹⁴⁴ Taken from <https://www.skillslab.edu.au/educational-blog/who-will-need-scada-training-in-the-future?>

According to the World Economic Forum, the top emerging job roles in the energy and utilities industry are AI Specialist, Data Scientist and Data Engineer¹⁴⁵.

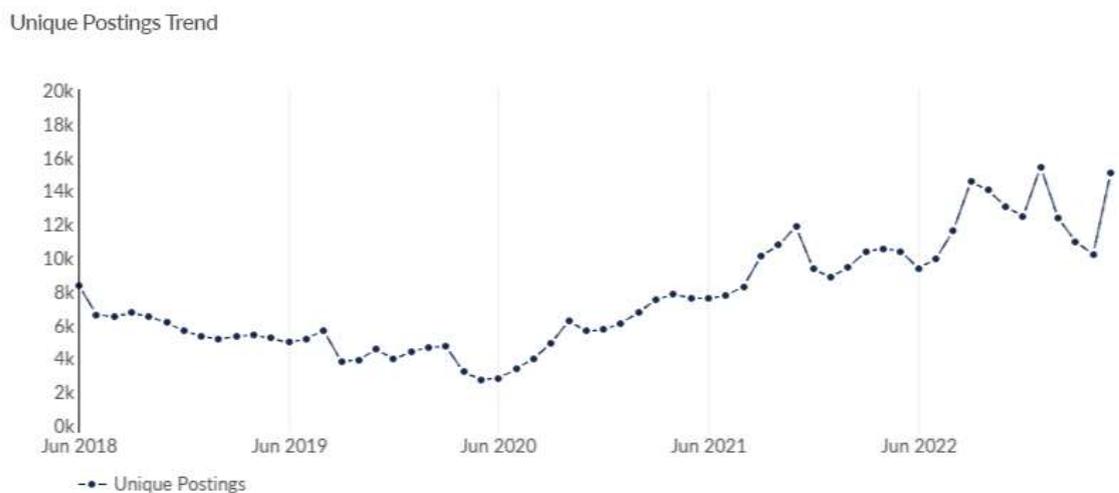
Figure 62: Top 10 emerging roles and skills in data and AI

Top 10 emerging roles within data & AI	Top 10 skills requested for data & AI roles ¹⁴⁶
Artificial Intelligence Specialist	Software Development Principles
Data Scientist	Scripting Languages
Data Engineer	Machine Learning
Big Data Developer	SQL Databases and Programming
Data Analyst	Data Science
Analytics Specialist	Project Management
Data Consultant	Java
Insights Analyst	Data Analysis
Business Intelligence Developer	Javascript and JQuery
Analytics Consultant	Database Administration

Demand for data scientists and data engineers has risen by over 231% across the UK in the past five years¹⁴⁷.

In the year ending 31st May 2023, there were 1.08million online job postings relating to data and digital occupations across the UK¹⁴⁸ – 66,500 of which were located within the Yorkshire and Humber region.

Figure 63: Number of online job postings relating to data and digital occupations (Yorkshire and Humber region)



Source: LightcastTM, 2023.

¹⁴⁵ The Future of Jobs Report, World Economic Forum, 2020. (http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf)

¹⁴⁶ Understanding the UK AI Labour Market: 2020, Ipsos MORI, 2021.

¹⁴⁷ Dynamics of Data Science Skills: How can all sectors benefit from data science talent? The Royal Society, 2019.

¹⁴⁸ These vacancies were identified using the Standard Occupation Classification code of IT Specialist Managers (2133), IT Project and Programme Managers (2134), IT Business Analysts, Architects and Systems Designers (2135), Programmers and Software Development Professionals (2136), IT Operations Technicians (3131), IT User Support Technicians (3132) and IT Engineers (5245).

The table below shows the top ten most sought-after job titles and skills over the past year:

Figure 64: Top ten most sought-after (i) job titles and (ii) skills

Job title	Most sought-after skills
Software Engineers	Microsoft Azure
Software Developers	Agile Methodology
DevOps Engineers	SQL (Programming Language)
.NET Developers	JavaScript (Programming Language)
Data Engineers	Amazon Web Services
Solutions Architects	C# (Programming Language)
Java Developers	Software Engineering
Full Stack Developers	Python (Programming Language)
Data Analysts	DevOps
IT Support Engineers	Java (Programming Language)

Source: LightcastTM, 2023.

12.2 Obtaining the required skills

Education and training providers in Hull and East Yorkshire are actively embracing the transition to a digital future. They are innovating and leveraging digital assets to enhance skill development, ensuring that workers are equipped to meet the demands of the evolving digital landscape. This commitment is an important foundation for economic growth in the region¹⁴⁹.

By utilising existing education and qualification provision, obtaining the necessary core skills could be relatively straightforward – however, as these skills are also demanded across much of the economy, attracting and retaining them in the green industries and circular economy could prove to be challenging.

Apprenticeships

The number of starts on ICT apprenticeships in the HEY area increased significantly in 2021/22 to 198 (from 120 in the previous year). However, given the ubiquitous demand for these skills across the whole economy, an increase in starts on these standards will almost certainly be required to meet the demands of the future workforce.

Figure 65: Starts in the HEY area by selected Sector Subject Areas

Sector Subject Area	2019/20	2020/21	2021/22
Information and Communication Technology	141	120	198

Source: Data provided by HEY LEP.

¹⁴⁹ HEY Digital Skills Prospectus, HEY LEP/Humber Local Digital Skills Partnership, 2023.

The availability of local apprenticeship training on relevant standards can vary¹⁵⁰:

Those standards with a training provider within 40 miles of Hull include:

Cyber security technician (level 3)	Data Technician (level 3)
Digital support technician (level 3)	Software development technician (level 3)
Applications support lead (level 4)	Business analyst (level 4)
Cyber security technologist (level 4)	Data analyst (level 4)
DevOps engineer (level 4)	Software developer (level 4)
Data scientist (integrated degree) (level 6)	Digital and technology solutions professional (integrated degree) (level 6)
Digital user experience (UX) professional (integrated degree) (level 6)	Artificial intelligence (AI) data specialist (level 7)

Those standards with no training provider within 50 miles of Hull include:

- Cyber security technical professional (integrated degree) (level 6)
- Digital and technology solutions specialist (integrated degree) (level 7)

Furthermore, standards that are currently in development include:

- Digital Product Manager (level 4)
- Data engineer (level 5)
- Spatial data specialist (level 7)

T Levels

There are three T Levels currently available relating to the digital industry¹⁵¹:

- Digital Business Services
 - There are no institutions delivering this qualification within the HEY area
- Digital Production, Design and Development
 - There is one institution delivering this qualification within the HEY area
- Digital Support Services
 - There are two institutions delivering this qualification within the HEY area: Ron Dearing UTC and Wilberforce College

Yorkshire and Humber Institute of Technology

The Yorkshire & Humber Institute of Technology (one of twelve Institutes of Technology across England) is designed to increase access to higher level technical skills required by employers. The Institute is based on a collaborative partnership between a number of colleges, universities and employers.

¹⁵⁰ This is based on searching for apprenticeship training providers on [the gov.uk website](#) (link opens a new window) within a 40 mile radius of the HU1 1AA post code.

¹⁵¹ More information on this qualification can be found on [HM Government's T Level website](#) (external link opens in a new window).

The Yorkshire and Humber IoT delivers high quality, higher-level technical qualifications with a focus on STEM (science, technology, engineering and mathematics) in the following subject areas:

- Computing and Digital Technologies, Cyber Security, Software Development, Computer Games Development
- Construction and the Built Environment
- Engineering and Engineering Technologies
- Manufacturing Technician
- Precision Agriculture Technology, Agricultural Engineering

There are three college partners located in the HEY area – Bishop Burton College, TEC Partnership (East Riding) and University of Hull.

Other partners, outside of the HEY area, are:

- Askham Bryan College
- Craven College
- TEC Partnership (Scarborough)
- Selby College
- York College
- York St John University

There is only one course relevant to the digital and data industry that are delivered within the HEY area – Foundation Degree in Computing delivered by East Riding College.

Higher education

With 50% of data scientists in the energy industry having a master's level degree or higher, higher education provision is crucial to the development of data teams in the energy industry¹⁵².

As discussed in section 3.2.3 above, in 20120/21, there were 51,700 starts on first degree courses in the Yorkshire and Humber region. Of these, 8,500 studied subject areas that are relevant to the green industries – 2,690 of these were in engineering.

It is not possible to estimate what proportion of the near 2,300 STEM graduating entering employment on 2019/20 entered jobs related to digital/data roles in the green industries – but we do know that 303 of them entered employment in the computer programming and information services industries.

Given that the vast majority of net jobs growth by 2035 will require qualifications at, or higher than, RQF6 (i.e. first degree or higher), it is imperative that (i) the region's supply of degree-educated workers is improved (just 41% of the working age population hold at least a degree-level qualification) and (ii) that more are encouraged and enabled into the green industries, especially in areas such as computer sciences.

The University of Hull has developed a centre of excellence for Data Science, Artificial Intelligence, and Modelling (DAIM¹⁵³) which brings together practitioners from across traditional disciplinary boundaries. DAIM runs an extremely successful MSc conversion course that takes in students from any discipline and trains them up for the workforce in AI and data science. Their MSc has enrolled 864 students since September 2020 with graduate destinations ranging from the banking sector and to start-ups, to the high street and security.

¹⁵² Data Science Skills in the Energy Sector: Survey Results, Energy Systems Catapult, March 2023.

¹⁵³ www.hull.ac.uk/work-with-us/research/institutes/data-science--artificial-intelligence-and-modelling

Skills Bootcamps

There are more than 90 Skills Bootcamps on offer in the Yorkshire and Humber region that are relevant to digital and data skills, with most of them being run online. These include topics such as:

- Agile Project Management
- Artificial intelligence
- Business Analysis
- Cloud computing and data analytics
- Coding
- Cyber security
- Cyber Technician
- Data Analysis
- Data Engineering
- Data science
- Digital Design
- Digital Literacy
- Software development (with Microsoft certification)
- Software Engineering
- Web Development

There are, however, around 200 relevant Skills Bootcamps on offer in other regions of the country¹⁵⁴.

Stakeholders and training providers in the HEY area should review their Skills Bootcamp offer to ensure it is meeting the needs of the green industries in the area.

Other provision

The Office for National Statistics (ONS) is leading the way in developing a degree level apprenticeship in data science on behalf of the public and private industries. The course is one of a number of new offerings at the new Data Science Campus.¹⁵⁵

The National Cyber Security Centre (NCSC) provides certified training schemes¹⁵⁶, ensuring high quality content and delivery via a variety of study options (classroom, online, self-paced e-learning, in-house, online virtual classroom). They certify three levels of skills training:

- Awareness level — giving newcomers a thorough foundation in cyber security
- Application level — in-depth courses for professional development
- Courseware — to be used in conjunction with a certified trainer and quality management system

¹⁵⁴ Taken from <https://www.gov.uk/government/publications/skills-bootcamps-training-providers>

¹⁵⁵ Taken from <https://datasciencecampus.ons.gov.uk/>

¹⁵⁶ Taken from <https://www.ncsc.gov.uk/information/certified-training>

13 Recommendations

13.1 Engage with young people to make them aware of the available learning and career pathways

It is worth noting that the labour market entrants of 2030 will be starting in Year 7 (Key Stage 3) in September 2023.

Figure 66: Age of current school students and their likely entry into the labour market

School Year	Age in 2023/24 academic year	Year entering the workforce
Year 13	17-18	2024
Year 12	16-17	2025
Year 11	15-16	2026
Year 10	14-15	2027
Year 9	13-14	2028
Year 8	12-13	2029
Year 7	11-12	2030

Schools and colleges in the HEY area outperform national averages for careers advice and guidance, including related to vocational and technical education, having increased their achievement in these over the last three academic years¹⁵⁷. However, they need more support and appropriate materials to promote the opportunities in the green industries.

Recommendation 1 Clear learning and career pathways for critical roles within each of the green industries should be developed that articulate the learning, qualification and experience requirements from entry level through to level 8

These materials could support Key Stage 3 education provision and should articulate the potential careers, learning and earning journeys (not just list specific job roles).

Areas of good practice include *Future Jobs Wales* (<https://careerswales.gov.wales/future-jobs-wales>) and *My World of Work* (<https://careers.myworldofwork.co.uk/>).

Recommendation 2 Strengthen links between industry and school links through the activities such as:

- HEY Careers Hub and its Enterprise Adviser Network (<https://enterpriseadviser.careersandenterprise.co.uk/becoming-an-enterprise-adviser/>)
- Founders4Schools (<https://www.founders4schools.org.uk/>)
- STEM Ambassadors (<https://www.stem.org.uk/stem-ambassadors>)
- High quality, meaningful experiences of the workplace and employer encounters
- More project-based activities and “sector weeks” (along the lines of Apprenticeship week)
- Engage and support pupil support services
- Teacher workplace experiences and CPD events for Careers and Employability professionals
- Talks and presentations to current students by former students and apprentices
- Reach out and engage young people outside of the school/education system

¹⁵⁷ Apprenticeship and Technical Education Provision in Hull & East Yorkshire – increasing capacity and participation, Little Lion Research, June 2023.

13.2 Ensure opportunities for all by widening access to learning and careers opportunities

A common theme throughout this research has been the need for more people to undertake education and skills learning and, subsequently, to enter the green workforce – untapping the latent skills in the population and ensuring a just transition for all.

This is supported by the findings of recent research undertaken for HEY LEP¹⁵⁸ which found several issues needed to be addressed in relation to apprenticeships and T Levels:

- Boosting female participation rates
- Increasing knowledge of T Levels
- Supporting disadvantaged learners into technical education
- Raising qualification levels achieved by learners from Level 2/3 to Level 4+
- Addressing information gaps about technical education between employers, schools/colleges, training providers and learners/parents
- Considering what funding support may be available to help encourage learner take-up

Recommendation 3 Innovative and practical ways of improving the supply of people into the green industries via appropriate learning pathways needs to be developed, particularly in relation to:

- Disadvantaged and deprived communities: Consider what additional support may be required in order to open up opportunities for those in deprived areas and/or with low educational attainment (for example, pre-employment or pre-apprenticeship support programmes)
- Economically inactive and unemployed: Reducing the barriers to entry, particularly those:
 - With physical or learning disabilities
 - With caring responsibilities
 - Who are retired, but want to play an active role in bringing the next generation through
 - Females (particularly in technical, engineering and managerial roles)
 - Long-term unemployed
 - Youth unemployed
 - Refugees
 - Young people from socio-economically disadvantaged backgrounds

Recommendation 4 Options should be investigated as to how to incentivise/promote participation from these groups on provision at all levels (this applies to both individuals and employers) – and particularly at level 3

Starts on apprenticeships in the HEY area in 2021/22 were 25% lower than pre-pandemic levels (5,300, compared to 7,000 in 2018/19). This fall in starts is predominantly on intermediate level apprenticeships (although they still account for the largest number of starts), while starts on advanced level apprenticeships did increase compared to the previous year.

Starts on higher level apprenticeships seem to have been unaffected by the pandemic, continuing their steady increase since 2017/18 (this may be at least partly due to the increasing trend of employers using apprenticeships as an upskilling tool for their existing workforce, thus making more use of their Apprenticeship Levy funds).

¹⁵⁸ Apprenticeship and Technical Education Provision in Hull & East Yorkshire – increasing capacity and participation, Little Lion Research, June 2023.

Recommendation 5 Consideration should be given to how a more proactive approach could be taken to support the upskilling/reskilling of people who are at risk of losing their current job or any employed in declining industries/occupations

Recommendation 6 More work needs to be done to understand and address why so few STEM graduates enter employment in the green industries

In 2019/20, of the 2,300 graduates with a pass from a First Degree STEM course from an HE institution in Yorkshire and Humber, just 105 entered employment in the green industries covered by this research.

Recommendation 7 Employers and stakeholders should consider how they can do more to create social value as a means of raising awareness of the various green industries and the role that they play in a sustainable, vibrant economy.

13.3 Ensuring effective pathways to competency

One of the major challenges in developing new pathways to competency (for example, apprenticeships) is that it can take a number of years to (i) develop the qualification and (ii) for learners to become competent through it.

As the pace of technological change in the industry accelerates, it will be important to consider alternative routes to competence other than formal qualification structures, such as an Apprenticeship programme, in terms of meeting specific skills needs in the near-term. Therefore, innovative, more flexible pathways need to be investigated.

Recommendation 8 Existing education and skills provision at all levels and stages needs to be “future-proofed” in terms of content relating to technology, data and digital advancements and sustainability/circular economy principles.

Recommendation 9 Apprentices in the electrotechnical industry (e.g. electricians and plumbers) and construction trades are seen as a vital component of the current and future workforce – and more are needed to support the deployment of technologies such as heat pumps and EV charging points.

However, there are challenges to be over-come in this area if demand from employers is to increase. For example, retaining apprentices once they complete their learning programme can be a major issue for smaller companies and those lower down the supply chain. The risk of having their newly-completed apprentices “poached” by other organisations who are willing to pay a higher salary (but not invest in the actual training programme) means that, for many, it is a risk not worth taking.

Recommendation 10 Collaboration amongst employers within the green industries should be promoted and facilitated

This could provide (at least) three benefits:

1. The learners, while in training, could have the opportunity to broaden their experience and skillsets by undertaking placements/projects across the supply chain (such “shared apprenticeship” schemes can pool opportunities across multiple employers to offer apprentices a varied programme of learning and allows participation from SMEs that cannot offer an apprentice year-round work¹⁵⁹)
2. Facilitating cohorts of learners for specific under-represented groups. For example, female-only cohorts on technical frameworks, or cohorts specifically for certain BAME groups
3. Increasing demand for specific training where current provision is lacking within the HEY and neighbouring LADs (making low volume provision more economically viable for the provider)

¹⁵⁹ https://www.yprentis.co.uk/wp-content/uploads/2021/12/South-Wales-Argus-Advertorial-PE_Dec-2021.pdf

Recommendation 11 The utilisation of the full range of available apprenticeship standards and T Levels needs to be improved

Anecdotal evidence suggests that Apprenticeship Levy money is not being fully spent in the industries, and that demand for apprenticeships needs to be increased.

In addition to technical standards, the green industries could benefit from utilising existing standards in areas such as logistics, data and supply chain.

Recommendation 12 Promote T Level provision across the green industries

By September 2023, six more colleges and education providers in the HEY area will be offering T Levels across seven subjects in total. A further expansion of provision is planned for September 2024 which should see an increase in take-up and the ability to compare starts and completion data for the region¹⁶⁰.

Recommendation 13 Promote collaboration/sharing of resourcing between employers and education and skills providers

In order to improve the capacity and capabilities of the trainer/lecturer workforce, consider how closer engagement between employers and education and skills providers can be encouraged and supported (e.g. facilitate “guest lecturers” from industry). This was also highlighted in the Humber Industrial Cluster Plan¹⁶¹.

Recommendation 14 As demand for modular/short course provision increases to upskill the current workforce, the options for “micro-credentials” need to be explored

Micro-credentials are short, credit-bearing courses that support higher education. Micro-credentials would not normally constitute an award in their own right, but they have standalone value and could also contribute to a recognised qualification. They potentially widen access to learners who might not have considered a more academic route to achieving a qualification.

Recommendation 15 Education and skills providers should review how they provide their services to ensure that learning of all styles and types can benefit

Education and skills providers should be encouraged to review their current provision, and provide future provision, in ways that acknowledge and support different learning styles and methods, including innovations such as micro-learning, mobile learning, immersive technologies (e.g. virtual and augmented reality), and gamification.

Recommendation 16 Stakeholders and training providers should work with employers to ensure that their Skills Bootcamp offer is meeting the needs of the green industries in the HEY area and whether there are any gaps (currently and, potentially, in the future).

¹⁶⁰ Apprenticeship and Technical Education Provision in Hull & East Yorkshire – increasing capacity and participation, Little Lion Research, June 2023.

¹⁶¹ Humber Industrial Cluster Plan: Skills analysis & engineering construction opportunities, April 2023.

13.4 Industry-specific recommendations

In addition to the overall recommendations listed above, there are a small number of industry-specific actions that stakeholders and employers might consider implementing:

Offshore renewable energy

- With just 17% of the workforce being female (the lowest of all UK regions), more targeted work needs to be done to promote this industry to women and other under-represented groups.
- Employers and stakeholder need to work together to identify where local content can be maximised in each of the project stages – from development through to operation and maintenance.
- The relative lack of training providers in the HEY area that can deliver industry-specific training within the areas of apprenticeship standards, the Institute of Technology or Skills Bootcamps should be reviewed to see whether this is acting as a barrier to skilling the future workforce.

Onshore renewable energy

- In future iterations of this research, the workforce and skills requirements of commercial-scale battery storage technologies should also be included. This technology will become increasingly important to the energy system as a means of ironing out the peaks and troughs of intermittent renewable energy technologies.
- Employers and stakeholder need to work together to identify where local content can be maximised in each of the project stages – from development through to operation and maintenance.
- The relative lack of training providers in the HEY area that can deliver industry-specific training within the areas of apprenticeship standards, the Institute of Technology or Skills Bootcamps should be reviewed to see whether this is acting as a barrier to skilling the future workforce.

Carbon capture, utilisation and storage

- Lack of job opportunity awareness – The relative ‘newcomer’ status of the CCUS industry to the UK economy and public information space means there is a lack of awareness of the available job opportunities, from early education settings through to professional employment institutions.
- The relative lack of training providers in the HEY area that can deliver industry-specific training within the areas of apprenticeship standards, the Institute of Technology or Skills Bootcamps should be reviewed to see whether this is acting as a barrier to skilling the future workforce.

Hydrogen and alternative fuels

- Review, with industry, the extent to which conversion courses are needed to support the development of the hydrogen and alternative fuels industry.
- The relative lack of training providers in the HEY area that can deliver industry-specific training within the areas of apprenticeship standards, the Institute of Technology or Skills Bootcamps should be reviewed to see whether this is acting as a barrier to skilling the future workforce.

Electric vehicles

- The relative lack of training providers in the HEY area that can deliver industry-specific training within the areas of apprenticeship standards, the Institute of Technology or Skills Bootcamps should be reviewed to see whether this is acting as a barrier to skilling the future workforce.

Off-site/Modular construction

- The relative lack of training providers in the HEY area that can deliver industry-specific training within the areas of apprenticeship standards, the Institute of Technology or Skills Bootcamps should be reviewed to see whether this is acting as a barrier to skilling the future workforce.
- Ensure that industry-specific training provision includes appropriate “soft skills” elements.

Retrofit, plumbing and electrical services

- The relative lack of training providers in the HEY area that can deliver industry-specific training within the areas of apprenticeship standards, the Institute of Technology or Skills Bootcamps should be reviewed to see whether this is acting as a barrier to skilling the future workforce.
- Ensure sufficient provision is in place to train traditional electricians and plumbers in sufficient numbers.
- In future iterations of this research, the workforce and skills requirements of domestic battery storage technologies should also be included. This technology will increasingly be coupled with a range of domestic low carbon technologies as part of a whole-system approach to decarbonising home heating.

Agri-tech and low carbon farming

- With the exception of T Levels and Skills Bootcamps, there is good coverage of agricultural skills training across the HEY area, be it via apprenticeships, the Institute of Technology or Skills Bootcamps.
- Review all core agricultural learning provision to ensure that it is “future-proof” in terms of incorporating new skills/understanding such as utilising new technologies, analysing and using data, environmental science, environmental protection, etc.

Data skills

- With the exception of the Institute of Technology, there is good coverage of data and digital skills training across the HEY area, be it via apprenticeships, T Levels or Skills Bootcamps.
- Consider what can be done to promote the green industries and circular economy as attractive career options for those currently studying data, digital and IT skills at all levels of education.
- Investigate the potential demand for modular upskilling courses relating to:
 - Industry context for data, digital and IT specialists
 - Data, digital and IT upskilling for the existing workforce

Appendix 1 - Matrix of current provision and the green industries that they serve

Training provision	Offshore renewable energy	Onshore renewable energy	Carbon capture, utilisation & storage	Hydrogen & alternative fuels	Electric vehicles	Off-site/ Modular construction	Retrofit, electrical & plumbing services	Agri-tech & low carbon farming
Apprenticeships								
Engineering design and draughtsperson (level 3)	✓	✓						
Engineering Fitter (Level 3)	✓	✓						
Maintenance and operations engineering technician (Level 3)	✓	✓	✓					
Pipe Welder (Level 3)	✓	✓						
Geotechnical engineer (integrated degree) (Level 7)	✓	✓						
Electrical power networks engineer (Level 4)	✓	✓						
Electrical or electronic technical support engineer (degree) (level 6)	✓	✓						
Marine Electrician (Level 3)	✓							
Electrical power protection and plant commissioning engineer (Level 4)	✓	✓						
Control technical support engineer (level 6)	✓	✓						
Project controls professional (Level 6)	✓	✓						
Marine Surveyor (degree) (Level 6)	✓							
Power Support Operative (Level 2)	✓							
Multi-skilled mechatronics maintenance technician (Level 3)	✓							

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Training provision	Offshore renewable energy	Onshore renewable energy	Carbon capture, utilisation & storage	Hydrogen & alternative fuels	Electric vehicles	Off-site/ Modular construction	Retrofit, electrical & plumbing services	Agri-tech & low carbon farming
Power industry cable jointer - distribution (Level 3)	✓							
Power industry overhead linesperson (Level 3)	✓							
Power industry substation fitter (Level 3)	✓							
Engineering technician (L3)	✓	✓	✓	✓				
Pipe Welder (Level 3)	✓	✓	✓	✓				
Plate Welder (Level 3)	✓	✓	✓	✓				
Electrical power protection and plant commissioning engineer	✓	✓	✓					
Project controls technician (L3)	✓	✓	✓	✓				
Autocare technician (Level 2)					✓			
Vehicle damage mechanical, electrical and trim (MET) technician (Level 3)					✓			
Heavy vehicle service and maintenance technician (Level 3)					✓			
Bus and coach engineering technician (Level 3)					✓			
Motor vehicle service and maintenance technician (light vehicle) (Level 3)					✓			
Accident repair technician (Level 3)					✓			
Battery manufacturing technician (Level 3)					✓			
Vehicle damage assessor (Level 4)					✓			

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Training provision	Offshore renewable energy	Onshore renewable energy	Carbon capture, utilisation & storage	Hydrogen & alternative fuels	Electric vehicles	Off-site/ Modular construction	Retrofit, electrical & plumbing services	Agri-tech & low carbon farming
Scaffolder (Level 2)						✓	✓	
Roofer (Level 2)						✓	✓	
Building services engineering craftsperson (Level 3)						✓	✓	
Building services engineering service and maintenance engineer (Level 3)						✓	✓	
Plumbing and domestic heating technician (Level 3)						✓	✓	
Electrical, electronic product service and installation engineer (Level 3)						✓	✓	
Installation electrician and maintenance electrician (Level 3)						✓	✓	
Refrigeration air conditioning and heat pump engineering technician (Level 3)						✓	✓	
Domestic electrician (Level 3)						✓	✓	
Building services engineering senior technician (level 4)						✓	✓	
Construction design and build technician (level 4)						✓	✓	
Building services design engineer (degree) (level 6)						✓	✓	
Building services engineering site management (degree) (level 6)						✓	✓	
Architect (integrated degree) (level 7)						✓	✓	
Junior energy manager (Level 3)						✓	✓	
Smart home technician (level 3)						✓	✓	
BEMS (building energy management systems) controls engineer (level 4)						✓	✓	

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Training provision	Offshore renewable energy	Onshore renewable energy	Carbon capture, utilisation & storage	Hydrogen & alternative fuels	Electric vehicles	Off-site/ Modular construction	Retrofit, electrical & plumbing services	Agri-tech & low carbon farming
Building control surveyor (integrated degree) (level 6)						✓	✓	
Architectural assistant (integrated degree) (level 6)						✓	✓	
Design and construction management (degree) (level 6)						✓	✓	
Dual fuel smart meter installer (level 2)							✓	
Arborist (level 2)								✓
Countryside worker (level 2)								✓
General farm worker (level 2)								✓
Crop technician (level 3)								✓
Forest craftsperson (level 3)								✓
Livestock unit technician (level 3)								✓
Countryside ranger (level 4)								✓
Poultry worker (level 2)								✓
Poultry technician (level 3)								✓
Agriculture or horticulture professional adviser (level 6)								✓
Professional forester (integrated degree) (level 6)								✓

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Training provision	Offshore renewable energy	Onshore renewable energy	Carbon capture, utilisation & storage	Hydrogen & alternative fuels	Electric vehicles	Off-site/ Modular construction	Retrofit, electrical & plumbing services	Agri-tech & low carbon farming
T Levels								
Design and Development for Engineering and Manufacturing	✓	✓	✓	✓		✓		
Maintenance, Installation and Repair for Engineering and Manufacturing	✓	✓	✓	✓	✓	✓		
Engineering, Manufacturing, Processing and Control	✓	✓	✓	✓		✓		
Building Services Engineering for Construction						✓	✓	
Design, Surveying and Planning for Construction						✓	✓	
Onsite Construction						✓	✓	
Agriculture, Land Management and Production								✓
Digital Business Services	✓	✓	✓	✓		✓		✓
Digital Production, Design and Development	✓	✓	✓	✓		✓		✓
Digital Support Services	✓	✓	✓	✓		✓		✓

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Training provision	Offshore renewable energy	Onshore renewable energy	Carbon capture, utilisation & storage	Hydrogen & alternative fuels	Electric vehicles	Off-site/ Modular construction	Retrofit, electrical & plumbing services	Agri-tech & low carbon farming
Higher Education								
Biosciences								✓
Agricultural sciences								✓
Physical sciences			✓	✓				✓
Environmental sciences	✓	✓	✓	✓				✓
Mathematical sciences	✓	✓	✓	✓	✓	✓	✓	✓
Engineering	✓	✓	✓	✓		✓	✓	✓
Computer sciences	✓	✓	✓	✓		✓	✓	✓
Construction and built environment					✓	✓	✓	
Skills Bootcamps								
Functional Skills for the Green Wind Industry	✓	✓						
GWO (Basic Safety Training) with VT L2 to ISO 9712	✓							
Net Zero & Smart Energy Transition	✓	✓	✓	✓	✓	✓	✓	✓
Offshore renewables	✓							
Wind Technician Blade Repair	✓	✓						
Wind Technician Electrical	✓	✓						
Wind Technician Entry Level	✓	✓						
Wind Technician Painter	✓	✓						
Wind Technician Team Leader	✓	✓						

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Training provision	Offshore renewable energy	Onshore renewable energy	Carbon capture, utilisation & storage	Hydrogen & alternative fuels	Electric vehicles	Off-site/ Modular construction	Retrofit, electrical & plumbing services	Agri-tech & low carbon farming
Wind Turbine Technician Blade Repair	✓	✓						
Wind Turbine Technician Electrical	✓	✓						
Wind Turbine Technician Entry Level	✓	✓						
Wind Turbine Technician Painter	✓	✓						
Wind Turbine Technician Team Leader	✓	✓						
Principles of Carbon Capture and Storage			✓					
Electric Vehicles Academy					✓			
EV Charging Installer					✓			
Electric Vehicle Maintenance					✓			
Tech Safe Green Standard					✓			
Professional Diagnostic Development					✓			
Construction Management						✓		
Domestic Electrical Installer							✓	
Heat Pumps – F Gas/Monobloc							✓	



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