Hull and East Yorkshire Local Enterprise Partnership

Green Jobs and Skills Analysis

December 2021

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1 Introduction

The Hull & East Yorkshire region is facing dynamic development within the decarbonisation and Net Zero agenda. The Government is prioritising and investing heavily in Zero Carbon, Net Zero and the 'Green Recovery' and investment across many sectors will further transform the area and create significant new jobs, for example, the Humber's offshore wind workforce is expected to grow from the current levels of 2,000 people to c10,000 by 2026.

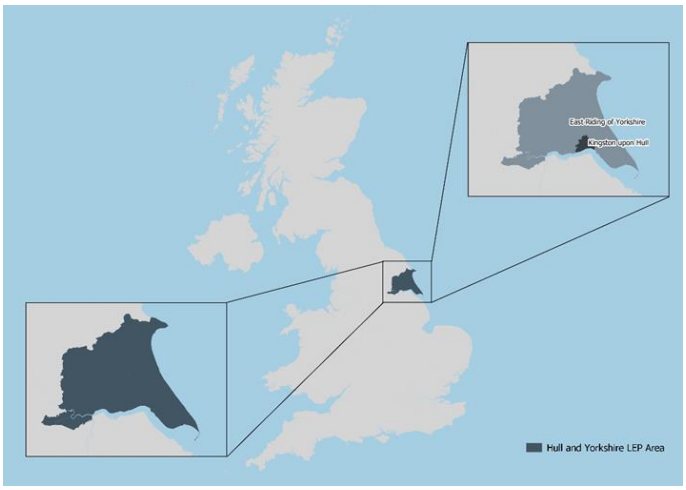
The Hull and East Yorkshire Local Enterprise Partnership (HEY LEP) commissioned Energy & Utility Skills to produce this analysis of the "green" jobs and skills requirements likely to emerge across the Hull and East Yorkshire (HEY) LEP region and the surrounding area over the coming years.

In order to produce this analysis, a wide range of existing literature and published data was reviewed to establish the skills needed to enable the region to reach its ambitious Net Zero targets.

In addition to drawing on existing resources, we engaged with stakeholders and employers to gauge their views and to influence the development of the conclusions and recommendations which will be used to inform the refresh of the HEY LEP's Local Skills Report (which will be published in January 2022) and the new Employment and Skills Strategy (which will be developed from January 2022).

This report will also be used by the HEY LEP's Careers Hub to support the region's young people to receive high quality, impartial advice and support when making informed choices of career pathways, as well as being made available to employers, wider stakeholders and providers to support curriculum planning.

The HEY LEP region covers the local authority districts (LADs) of Kingston upon Hull and East Riding of Yorkshire.



However, for the purposes of this report, and ensuring a more complete picture of the available labour market, much of the following analysis refers to HEY region and surrounding area, which also includes the LADs of:

- North Lincolnshire
- North East Lincolnshire
- York
- Selby

2 Executive summary

- This report, commission by the Hull and East Yorkshire LEP (HEY LEP) and carried out by Energy & Utility Skills is an analysis of the "green" jobs and skills requirements likely to emerge across the HEY LEP region and surrounding area over the coming years. It is based on a review of a wide range of existing literature and published data as well as a small number of stakeholder interviews and a stakeholder workshop.

The supply of skills in the HEY LEP region and surrounding area

- Green jobs and skills are defined as:
    - new or current roles that directly contribute to a low carbon economy, or directly support environmental goals, such as mitigation against climate change risks, for example Wind Turbine Technician, Nuclear Engineer, Flood Management, or Energy from Waste recovery operations
    - existing roles that require additional skills to repurpose them, such as Smart Meter Installer extended to Low Carbon Domestic Technologies Installer
- Furthermore, a range of indirect green jobs and skills are also considered where they are thought to be essential to the development of the green industry moving forward.
- The priorities of the HEY LEP over the coming year will focus principally on developing and supporting direct green jobs and skills allowing the HEY LEP to target their finite resources on 'mission critical' issues.
    - In total, across HEY and surrounding area, 7,375 people are employed in the core industries (i.e. those industries that are central to the green economy), and a further 22,140 are employed in adjacent/supporting industries.

The size of the challenge

- Within the UK's National Construction and Infrastructure Pipeline, there are projects worth more than £11.8billion planned for the Yorkshire & Humber region (this excludes any national investments which may be delivered in the region)
    - Two-thirds of which (c£8billion) will be in the green economy
    - In terms of investment per capita across the nine English regions[1], the Yorkshire & Humber region receives the highest, at £712

[1] Excluding the HS2 and Hinkley Point C "mega projects", which skew the regional data significantly.

- The CITB estimates that the Yorkshire and Humber construction industry needs to increase current recruitment by 3,800 new workers each year to deliver the expected work between the end periods of 2020 and 2025

- Compared to the predicted qualification demands of employers across the Yorkshire & Humber region in 2027, the HEY LEP resident population currently has a very high proportion of people with no qualifications, and a low proportion of people with a Degree.

Green skills, competencies and jobs

- Agriculture/Agri-tech
  - Activities in the industry are increasingly becoming driven by automation, robotics and data
  - Provides an opportunity to attract more young people into the industry, as it engages those with technology and data skills in a way it has not traditionally done
- Domestic low carbon technologies
  - Covering a range of domestic heat technologies
  - Demand is very sensitive to policy drivers, which could lead to surges in demand very quickly
  - Strong demand expected for specific technology installers, as well as building trades, electricians, plumbers, project managers and advisers
  - Strong upskilling requirement, as well as the need for new entrants
  - The availability of relevant Apprenticeship and T Level training providers in HEY and the surrounding area could be a barrier
- Electric vehicles
  - Demand for charging point installers and EV mechanics is increasing
  - To commission a charging point installation, it has to be signed off by a Competent Person, which can take 3 years to achieve. Should policy interventions produce a surge in demand, shortages and delays are likely to occur
  - There is a lack of Apprenticeship, T Level and accredited training for EV mechanics in HEY and the surrounding area

- Carbon capture, utilisation and storage
    - Significant activity taking place in and around the Humber area to decarbonise industry
    - Demand is increasing for Machine Installers, Pipe Fitters, Technicians and Welders, as well as for Geothermal Technicians, Geologists, Civil Engineers, Geophysics, Underground construction and tunnelling
    - High potential for transitioning skills from declining oil and gas and manufacturing industries although the current inability to accredit prior learning and experience could be a barrier
- Hydrogen
    - Ensuring the portability of skills from other sectors and the mutual recognition of professional qualifications to enable people to transition to new sectors such as hydrogen without re-certification will be a crucial element for success
    - Across the different aspects of the hydrogen industry, some retraining to ensure awareness of the different properties of hydrogen will be necessary, but these are likely to be relatively modular upgrades to knowledge, rather than the type of retraining associated with an entire career change
    - By September 2023, work should be completed on the requirements for hydrogen gas installation standards, competence frameworks and training specifications
- Offshore wind and nuclear
    - Looking at the current pipeline of projects, the region's percentage of UK offshore wind capacity is set to increase from 15% to 21%
    - By 2026, the total UK workforce is predicted to rise to nearly 70,000, with Yorkshire & Humber's workforce rising to 10,500 (+8,800)
    - However, just 9% of the workforce are female and 3% from an ethnic minority background
    - Goole, in the East Riding, has emerged as one of five sites shortlisted to host the UK's first nuclear fusion power station
    - There is the possibility of skills shortages in areas like: Chemists/Physicists, Civil Engineering Operatives, Commissioning Engineers, Concreters, Control and Instrumentation, Electrical Engineers, Emergency Planners, Project Planning and Control, Quality Assurance staff, Reactor Operation, Safety Case Preparation, Scaffolders, Site Inspectors and Steel Fixers

- Smart and resilient utilities networks
    - Strengthening and maintaining grid resilience will be essential is a world of significant distributed energy generation
    - There is likely to be increased demand for roles such as: Protection Engineers, Automation Engineers and Technicians, System and Network Planners, Data Network Engineers, Engineering and Connections Design, EHV Network Design Engineers, Senior Authorised Person and Cable-jointers
    - Degree and HNC/HND qualifications will remain particularly important in the traditional technical and engineering aspects of the sector
- Waste management, recycling and the circular economy
    - The three key value chains are:
        - Construction: digital technologies in building and materials management and closed-loop cycling of building materials
        - Repurposing and reuse: remanufacturing and refurbishment including decommissioning oil rigs and wind turbines
        - Biorefining and anaerobic digestion
    - Common skills and training requirements include: strengthening transferable and digital skills, developing holistic thinking across the workforce, promoting the circular economy as a career destination, integrating circularity into the existing skills landscape, introducing innovative forms of learning and knowledge exchange and harnessing skills for energy transition
- Information technology, artificial intelligence and data science
    - A constant theme throughout the areas discussed above is the need for greater levels of skill and competency in the areas of IT, artificial intelligence and data science
    - Although there is a clear need to upskill the existing workforce, the key focus will need to be on creating a more flexible, multiskilled and technologically-aware workforce
    - There is a need for education institutions and training providers to ensure courses and programmes are on offer covering the internet of things, machine learning, big data and augmented and virtual reality
    - Artificial intelligence is growing fast, as increased computational power and powerful algorithms are allowing patterns to be found in an increasing range and amounts of data
    - Data analytics skills must also be cultivated throughout the company, not just in the specialist areas, but across the business where data is utilised

- Of the nine relevant Apprenticeship Standards, only two (Level 3 Data Technician and Level 4 Data Analyst) had training provision within HEY and the surrounding area

- Core/Meta skills
  - In addition to "technical" skills, a wide range of "soft skills" are becoming increasingly sought after focusing on self-management, social intelligence and innovation
  - It is likely that people will stand out more for their creativity than their productivity
  - By emphasising the creative aspect of STEM careers (adding "Arts" to create STEAM?), it might entice those who might not otherwise consider a STEM career

Skills in short supply

- A wide range of job roles are proving difficult to fill, across all skill levels:

Job roles		
Scientists	Artificial Intelligence Specialist	Construction supervisors
Steel-fixers	Cyber Security engineers and architects	Scaffolders, stagers and riggers
Site managers	Data analysts, scientists and engineers	Engineering technicians
Pipe Fitters	Digital right across the craft-level workforce	Construction project managers and related
Offshore project managers	EV charging point installers – Domestic and public/contractors	Steel erectors
Middle managers with trade backgrounds	EV mechanics	Quantity surveyors
Ecologists	Ground Source Heat Pumps installers	Chartered architectural technologists
Welders	Ground Source Heat Pumps installers	

The supply of skills in the HEY LEP Region and surrounding area

- The most recent data show the labour market continuing to recover from the effects of the COVID-19 pandemic with rising employment and vacancies and falling unemployment
  - Although the headline economic indicators are positive, they do mean that the labour market is returning to the recent trend of being very "tight", an issue exacerbated by Brexit and the COVID-19 pandemic

- It is likely that sourcing a ready-skilled workforce in Kingston upon Hull and North East Lincolnshire is likely to be more difficult than average
    - Therefore, employers should think carefully about their resourcing strategy and the extent to which they seek ready-skilled workers or develop entry routes which can support people from within these communities to make the most of the opportunities in green industries
    - In East Riding of Yorkshire and York sourcing a ready-skilled workforce could be easier than average
- Similar to the whole of the UK economy (with the possible exception of London), the HEY LEP economy has bounced back strongly from the impact of the COVID-19 pandemic, with online vacancies in August 2021 reaching a record high of 9,600 (since the data was first collected in 2012)
    - The top occupations being sought were Plumber, HVAC Mechanic / Installer, Maintenance Technician, Electrical Engineer and Mechanical Engineer
- 9% of the Yorkshire and Humber region's 16+ population are from an ethnic minority background
    - Within HEY and the surrounding area, the population is less ethnically diverse, ranging from a high of 9% in York, down to just 1% in the East Riding of Yorkshire
    - However, the younger age groups of the population are more ethnically diverse than the older age groups

Pathways into the green economy

- The labour market entrants of 2030 are in Year 5 now, highlighting the need to engage with young people well before post-16 options are being considered
- Apprenticeships
    - There are more than 80 different Apprenticeship Standards that are currently available and relevant, to varying degrees, to the green industries
    - Around half of these are not currently delivered within HEY and the surrounding area
    - Only around a dozen Standards have more than two training providers operating locally (although there a number of nationwide providers who deliver at the apprentice's workplace)
    - The concept of "Shared Apprenticeships" should be developed and promoted
    - Employers in the green industries should aim for at least 5% of their workforce to be on an Apprenticeship programme each year

- T Levels
  - Although it was originally planned, there is no discrete T Level programme for the energy and utilities sector (although the Institute for Apprenticeships and Technical Education is keen to work with the sector on developing qualifications and progression routes that will meet the sector's needs)
  - The closest provider of the Maintenance, Installation and Repair for Engineering and Manufacturing T Level is currently listed as Wakefield College
- Traineeships
  - Based on the success of CITB's activities in this area, Traineeships represent a useful entry point for lower skilled people to begin their green careers
- Skills Bootcamps
  - The speed of deployment, and the marked lack of bureaucracy (which could present a risk to quality) could help to meet surges in demand for green skills such as electrical vehicle installation skills, heat pump installation skills, and possibly hydrogen technology skills
  - At the moment there are Skills Bootcamps available across England for construction, digital, engineering and manufacturing and green skills. However, very few of these courses are currently running within the analysis area (something that the Department for Education (DfE) will seek to address in the third wave of procurement) – the exception being five Digital Bootcamps that are due to start in January 2022
- Higher Education
  - In 2019/20, there were 18,874 first year degree starts in higher education institutions located in the Yorkshire and Humber region
    - 35% of these were female and 24% were from an ethnic minority
  - Of the 4,920 graduates from 2018/19 with a pass in a STEM-relevant, first Degree course from a higher education institution in the Yorkshire and Humber region, 3,315 (67%) entered employment or self-employment
    - Just 65 of these did so in the core SIC codes of green industries, and 425 entered employment across the core and adjacent SIC codes
- Transitioning skills from other industries
  - Throughout this report, there is reference to the potential for transitioning people into, and out of, industries that rely on the same similar core set of skills
  - It is estimated that over 90% of the UK's oil and gas workforce have medium-to-high skills transferability and are well positioned to work in adjacent energy sectors

- However, the lack of cross-sector training recognition means many offshore oil and gas workers would be expected to duplicate existing training to access roles in, for example, wind
- This represents a significant barrier to workers moving between industries (94% of respondents to their survey said they would support an offshore passport, which licenses accredited workers to work offshore in any sector through a cross-industry minimum training requirement)

Recommendations

- Focus on critical skills
- Continued drive towards equity, diversity and inclusion
- Promote the need to invest in the future talent pipeline
- Develop and promote clear career pathways
- Ensure the availability of Apprenticeship and T Level training in the HEY LEP region and surrounding area
- Promote supply chain collaboration
- Clearly articulate demand from industry to education and training providers

3 Defining "green" jobs and skills

Green jobs are defined by the International Labour Organization as 'decent jobs in any economic sector e.g. agriculture, industry, services, administration) which contribute to preserving, restoring and enhancing environmental quality[2]'. The ILO state that Green jobs reduce the environmental impact of enterprises and economic sectors by:

- Improving the efficiency of energy, raw materials and water
- De-carbonising the economy and bringing down greenhouse gas emissions
- Minimising or avoiding all forms of waste and pollution
- Protecting and restoring ecosystems and biodiversity
- Supporting adaptation to the effects of climate change

Recent policies from the UK Government and from the devolved administrations have increasingly focussed on meeting the needs of the 2050 net zero carbon target.

3.1 The HEY LEP's working definition

Energy & Utility Skills has developed a two-tier definition of green jobs:

- **Direct "Green Jobs" are**
    - new or current roles that directly contribute to a low carbon economy, or directly support environmental goals, such as mitigation against climate change risks, for example Wind Turbine Technician, Nuclear Engineer, Flood Management, or Energy from Waste recovery operations
    - existing roles that require additional skills to repurpose them, such as Smart Meter Installer extended to Low Carbon Domestic Technologies Installer

[2] Accessed from https://committees.parliament.uk/call-for-evidence/314/.

- **Indirect "Green Jobs' are**
    - existing jobs that contribute to the greening of economic activity but do not involve any new specific green skills or tasks
    - these could also include cross-sector/generic jobs/skills which "enable" the green economy directly through their work in the energy and utilities sector, for example:
        - a goods vehicle driver delivering the components to a wind farm
        - a data scientist analysing energy/customer data

The priorities of the HEY LEP over the coming year should focus principally on supporting jobs and skills that directly contribute to the development of the green economy. This approach will allow HEY LEP to direct their finite resource on 'mission critical' issues.

It should be noted that this working definition adopted by HEY LEP is narrower than other definitions used/proposed by many other organisations – principally on the basis of focussing only on direct jobs.

3.2 Relevant Standard Industrial Classifications (SIC codes)

In order to aid the measurement of performance across various aspects of the green economy across HEY and the surrounding area, we have identified a number of industrial and occupational classifications that are used by various providers of national and local statistics that apply to the definitions set out above.

In terms of industrial classifications that could be considered core to the green economy (i.e. those industries that are central to the green economy), 16 have been identified.

Figure 1: SIC 2007 codes that are considered to be CORE to the green economy

SIC code	SIC Description	Workforce in the HEY LEP region and surrounding area
35.11	Production of electricity	2,405
35.12	Transmission of electricity	20
35.13	Distribution of electricity	280
35.22	Distribution of gaseous fuels through mains	210
36.00	Water collection, treatment and supply	250
37.00	Sewerage	260
38.11	Collection of non-hazardous waste	1,785
38.12	Collection of hazardous waste	10

SIC code	SIC Description	Workforce in the HEY LEP region and surrounding area
38.21	Treatment and disposal of non-hazardous waste	1,110
38.22	Treatment and disposal of hazardous waste	60
38.31	Dismantling of wrecks	10
38.32	Recovery of sorted materials	595
39.00	Remediation activities and other waste management services	160
42.21	Construction of utility projects for fluids	80
42.91	Construction of water projects	40
49.50	Transport via pipeline	100

In total, across the HEY LEP region and surrounding area, 7,375 people are employed in these industries.

Furthermore, there are an additional 17 industrial classifications that are immediately adjacent to the green economy, employing an estimated 22,140 people.

Figure 2: SIC 2007 codes that are considered to be ADJACENT to the green economy

SIC code	SIC Description	Workforce in the HEY LEP region and surrounding area
16.29	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	140
19.20	Manufacture of refined petroleum products	1,050
28.11	Manufacture of engines and turbines, except aircraft, vehicle and cycle engines	820
33.14	Repair of electrical equipment	195
35.14	Trade of electricity	40
35.21	Manufacture of gas	0
35.23	Trade of gas through mains	0
35.30	Steam and air conditioning supply	10
42.22	Construction of utility projects for electricity and telecommunications	90
42.99	Construction of other civil engineering projects n.e.c	1,980
43.21	Electrical installation	3,600

SIC code	SIC Description	Workforce in the HEY LEP region and surrounding area
43.22	Plumbing, heat and air-conditioning installation	2,650
52.22	Service activities incidental to water transportation	2,435
71.12	Engineering activities and related technical consultancy	6,400
71.20	Technical testing and analysis	510
72.19	Other research and experimental development on natural sciences and engineering	345
84.13	Regulation of and contribution to more efficient operation of businesses	1,875

3.3 Relevant Standard Occupational Classifications (SOC codes)

Looking at occupational classifications that are relevant to the green economy, 26 such classifications that are central to the success of the green economy over the coming years have been identified.

Figure 3: SOC 2010 codes that are considered to be CORE to the green economy

SOC code	SOC Description
1122	Production managers and directors in construction
1123	Production Managers and Directors in Mining and Energy
1255	Waste disposal and environmental services managers
2111	Chemical Scientists
2112	Biological scientists and biochemists
2113	Physical Scientists
2121	Civil Engineers
2122	Mechanical Engineers
2123	Electrical Engineers
2124	Electronics Engineers
2126	Design and Development Engineers
2127	Production and Process Engineers
2129	Engineering Professional N.E.C.
2141	Conservation Professionals

SOC code	SOC Description
2142	Environment Professionals
3111	Laboratory Technicians
3112	Electrical and electronics technicians
3113	Engineering technicians
3114	Building and civil engineering technicians
3116	Planning, process and production technicians
3550	Conservation and Environmental Associate Professionals
5241	Electricians and Electrical Fitters
5250	Skilled metal, electrical and electronic trades supervisors
5314	Plumbers and heating and ventilating engineers
8114	Chemical and Related Process Operatives
8124	Energy Plant Operatives
8126	Water and Sewerage Plant Operatives

Furthermore, there are a number of occupations which are crucial enablers of the green economy, particularly:

SOC code	SOC Description
2433	Quantity Surveyors
3541	Estimators, valuers and assessors
5311	Steel erectors
8211	Large goods vehicle drivers
8221	Crane drivers

4 The size of the challenge

4.1 The National Construction and Infrastructure Pipeline

The 2021 National Infrastructure and Construction Pipeline sets out nearly £650bn of public and private investment over the next 10 years. It is produced with the aim of building market confidence and promoting innovation and capability[3].

Within this pipeline, there are details of some £11.8billion of investments planned for the Yorkshire & Humber region, excluding any national investments which may be delivered in the region.

This £11.8billion of investment in the region is split across the following sectors:

- £5.7 billion in energy generation, principally on the Hornsea Project 2 and Dogger Bank A & B offshore wind farms
- £3.2billion on transport improvements
- £1.8billion on water and sewerage network improvements
- £465million on Full Sutton prison
- £315million on electricity network improvements
- £135million in education
- £109million on flood defences

Therefore, two-thirds of the region's infrastructure investments (an estimated £7.9billion) could be in the green economy, specifically electricity generation and networks, water and sewerage, and flood defences.

Where investments have been assigned to a specific English region or devolved area, this level of investment in the Yorkshire & Humber region is the third highest with only the South West (£20.2billion – mainly in the form of Hinkley Point C) and Scotland (£11.4billion) have a higher share of the total national investments.

Furthermore, in terms of investment per capita across the nine English regions[4], the Yorkshire & Humber region receives the highest, at £712.

However, an additional £29.1billion of investments are planned for the offshore oil and gas industry, much of which will align itself with the regions of Yorkshire & Humber, the North East and Scotland.

[3] Accessed from https://www.gov.uk/government/publications/national-infrastructure-and-construction-pipeline-2021.

[4] Excluding the HS2 and Hinkley Point C "mega projects", which skew the regional data significantly.

Unfortunately, no estimates of workforce demand sit alongside these planned financial investments. However, it is highly likely that such investments will attract a high level of demand for labour, much of which will overlap with the same base skills as those required across the wider green industries.

One of main challenges of meeting these skills demand is the short-term nature of much of these investments; meaning that programmes such as Apprenticeships can only do so much in terms of meeting the immediate/short-term demand for labour (this supports the data shown below in relation to the current demand for green skills with at least 3-5 years' experience).

4.2 Total demand for labour across the region

Working Futures 2017-2027 is the latest in a series of quantitative assessments of the employment prospects in the UK labour market produced by the Warwick Institute for Employment Research (Warwick IER) and Cambridge Econometrics on behalf of the Department for Education.

Their research suggests that total employment levels across the Yorkshire & Humber region will increase by around 1.7% (+46,000) in the decade between 2017 and 2027.

Within the industry groups principally allied to the green economy, employment is expected to increase by a slightly more modest 1.3% (+3,000) over the same period, mainly in construction-related activities (as opposed to operation and maintenance of assets).

Figure 4: Change in the total number of jobs by sector within the Yorkshire & Humber region

Sector	2017	2027	Change
All sectors	**2,681,000**	**2,727,000**	**+46,000**
Agriculture	20,000	18,000	-2,000
Electricity & Gas	8,000	8,000	0
Water	4,000	4,000	0
Sewerage	1,000	1,000	0
Waste Management	12,000	12,000	0
Construction	52,000	54,000	+2,000
Civil Engineering	31,000	32,000	+1,000
Specialised Construction	96,000	98,000	+2,000

Source: Working Futures 2017-2027, Warwick IER & Cambridge Econometrics, February 2020.

This data is supported by research published by CITB[5] which states that the Yorkshire and Humber region is above the UK on the level of annual average recruitment requirement based on 2020 workforce levels, at 1.8% per year. This means the Yorkshire and Humber construction industry will have to increase current recruitment by 3,800 new workers each year to deliver the expected work between the end periods of 2020 and 2025.

The following occupations have some of the strongest recruitment requirement levels:

- Other construction professionals and technical staff (1,000 per year)
- Non-construction professional, technical, IT, and other office-based staff (450 per year)
- Senior, executive, and business process managers (400 per year)

However, there will also be some pressure on plasterers, bricklayers, civil engineering operatives, steel erectors/structural fabrication, surveyors and construction project managers where demand is high compared to their workforce level.

The general trend throughout this period is a move to a more highly skilled workforce. Employment levels in the more highly skilled occupational groups within industries allied to the green economy is set to increase by 9,000, however, this is offset by decreases of 6,000 in administrative/secretarial, skilled trades and elementary occupations.

This is reflected in the number of people in employment who will require a higher level of education. Between 2017 and 2027, this number is expected to increase by 231,000, while the number of people in employment holding only GCSE qualifications or lower (including those with no qualifications) is set to fall by 204,000.

The table below shows the proportion of the resident population that holds different levels of academic qualifications (or equivalences) compared to the projected demand for those qualifications in 2027.

[5] Construction Skills Network: Labour Market Intelligence Report, Yorkshire & Humber, CITB/Experian, 2021.

Figure 5: Qualification levels in the working age (16-64) resident population compared to projected demand from employers in 2027 in selected industries

Sector	No Quals	GCSE other	GCSE A*-C	GCE A Level	HE below degree	Foundation Degree or equivalent	Degree or equivalent
HEY LEP Resident Population	**8%**	**8%**	**25%**	**24%**	**8%**	**N/A**	**27%**
Yorkshire & Humber Resident Population	**7%**	**8%**	**23%**	**24%**	**8%**	**N/A**	**30%**
All industries	**3%**	**11%**	**19%**	**21%**	**6%**	**6%**	**34%**
Primary sector and utilities	9%	12%	20%	20%	10%	4%	26%
Manufacturing	4%	14%	22%	24%	9%	4%	23%
Construction	3%	15%	28%	28%	7%	3%	16%
Trade, accomod. and transport	5%	15%	25%	24%	5%	5%	20%
Business and other services	4%	12%	16%	14%	6%	5%	43%

Source: Annual Population Survey, ONS, 2020 and Working Futures 2017-2027, Warwick IER & Cambridge Econometrics, February 2020.

Compared to the predicted qualification demands of employers across the Yorkshire & Humber region in 2027, the HEY LEP resident population currently has a very high proportion of people with no qualifications, and a low proportion of people with a Degree.

However, compared to the predicted qualification demands of employers in the primary and utilities sector consisting of agriculture, mining, oil & gas, electricity, gas, water and waste management, the qualification profile of the current HEY LEP resident population appears to be a close match.

4.3 Green jobs in the Yorkshire and Humber region

PwC's *Green Jobs Barometer*[6] currently ranks the Yorkshire and the Humber region 10th out of the 12 regions of the UK. The region attains lower than average relative performance across all five Pillars of the Barometer, with the exception of 'Sunset Jobs' i.e. those jobs that will become redundant following the transition to a green econmy, where it performs slightly better than the regional average.

These results are driven by the region's greater dependency on high carbon industries. The regional average for employee concentration of CO_2 (10.2 tonnes) is almost double the best performing region, London (5.3 tonnes). This serves as a stark reminder of how much the region's decarbonisation needs to advance in comparison to other regions.

The most striking demonstration of the region's performance relative to the rest of the UK comes out in the analysis of how environmentally friendly employees perceive their job to be currently and over the next 1-2 years. As the UK's lowest performing region, respondents from Yorkshire and the Humber were far from sanguine about the effects a green transition is having or could have. The region ranked lowest in the perceived environmental friendliness of their jobs, a finding which is consistent with the high regional composition of hard-to-abate industries.

Notwithstanding the challenges this region faces in a decarbonising economy, the energy sector has shown signs of recent improvement in their capacity building for a greener future – this sector has a higher demand for green jobs than the UK regional average. Given the regional dependency on this sector, its efforts to decarbonise should not only be welcomed but encouraged through targeted policy.

Furthermore, one green job in the electricity and gas sector (in FTE terms) yields six additional jobs in the UK economy as a whole. This is as a result of a combination of well-paid, skilled jobs in the sector, and an extensive supply chain. It is therefore vital to ensure that key enablers such infrastructure, skills and governance are in place to capitalise on these opportunities.

[6] Accessed from https://www.pwc.co.uk/who-we-are/our-purpose/building-trust-in-the-climate-transition/supporting-a-fair-transition/green-jobs-barometer.html.

5 Green skills, competencies and jobs

The transition towards a 'green economy' is going to require a range of different skills that goes well beyond those "green skills" detailed above.

As well as technical skills, which will continue to evolve as technologies and strategies develop, a successful transition will require more people with broader skills that match the demands across the wider economy, such as science, data, digital, management, and people skills.

The World Economic Forum notes six key skill categories that can help you build a successful career in the green economy:[7]

- **Science skills**: Key roles will include environmental scientists, biologists, hydrologists and biochemists
- **Architectural and planning skills**: Buildings will become more energy efficient, with fewer resources used to construct, operate and maintain them (meeting the increasing demands of environmental regulations and client demands)
- **Green engineering and tech skills:** The development of tomorrow's new technologies lies in the hands of today's young people
- **Agriculture skills:** Supporting the development of areas such as organic farming, urban farming and precision agriculture
- **Environmental justice skills:** Legal, social and historical knowledge to ensure humanity does not repeat the mistakes of the past which led to racial and social injustice and poor environmental and social health
- **Systems skills**: The green economy will need workers who can design, operate and monitor a wide range of systems, including macroeconomics to build sustainability into long-term infrastructure projects

The following section delves deeper into the specific job and skills requirements of a range of "green" industries.

[7] https://www.weforum.org/agenda/2021/08/these-are-the-skills-young-people-will-need-for-the-green-jobs-of-the-future/

5.1 Agriculture/Agri-tech

Society is facing major challenges from a growing population and climate change, so 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.

This has driven a move towards automation and data technologies. For example:

- With precision agriculture, and the use of data, we have the opportunity to inform the way we grow both crops and livestock. Employing these technologies can result in less waste of the inputs and more accuracy in outputs
- Crop science is now so precise that crop quality can be replicated time and again

Having access to the necessary skilled labour is proving to be another challenge, particularly in the area of automation, robotics and data.

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 has effectively levelled the playing field by allowing smaller farmers to increase yields more effectively and compete with the resources of larger farms.

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.

Younger people and new entrants are driving many of the agri-tech developments happening in the industry which are seeking to improve productivity, efficiency and environmental protection (e.g. crop treatments, livestock monitoring and tracking systems, new and better robots, more efficient autonomous tractors and software to manage the huge amounts of data). This provides an opportunity for younger people and new entrants to enter the industry decision makers and business managers, in addition to having the practical understanding of traditional farming.

So, while education and skills providers need to continue to commit to providing those core rural skills, they do have to integrate those new, developing skillsets alongside them. There isn't a revolution away from traditional skills to new technologies, they need to join forces and complement each other.

Growing areas of skills demand in the agricultural industry include:

- 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

These skills, together with raising awareness of greenhouse gas emissions, are vitally important to ensure the industry contributions to a net-zero future.

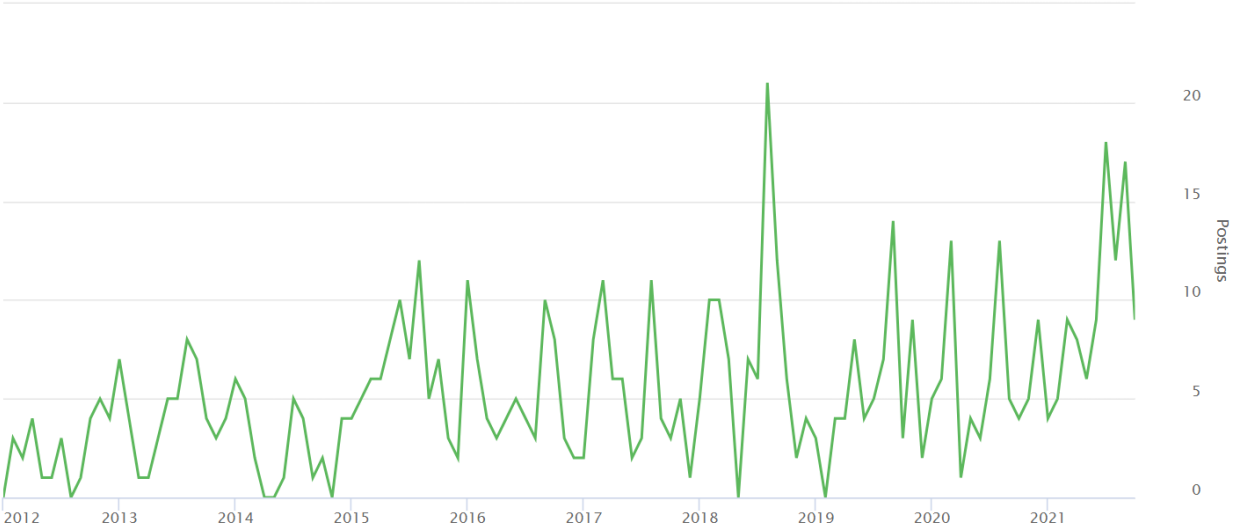
Continued professional development in all these areas will be crucial to continued success.

Furthermore, in terms of developing the future workforce, there also needs to be a stronger focus on core/meta skills (see section 5.10 below). Those entering the workforce over the coming years need to be resilient when dealing with challenges and be well-prepared for the world of work.

The need to attract younger people, new entrants and new skills – in addition to having to replace an aging workforce – heightens the need to refresh careers information and careers pathways into the industry which reflect both future technical requirements and the scope for the industry to contribute significantly towards addressing climate change. This is particularly important in the context of an industry with fewer formal qualification pathways and upskilling opportunities.[8]

Recruitment activity over the past 12 months has shown a significant increase since the depths of the coronavirus pandemic in April 2021 and is currently sitting higher than the long-term average. There will be a number of causes sitting behind this increase, not least (i) a strong bounce-back from the low levels of recruitment activity during the coronavirus pandemic and (ii) Brexit forcing many food producers to seek workers from within the UK labour force rather than using EU agency staff.

Figure 6: Number of online job postings per month in the agriculture, forestry and fishing sector in the year ending 31 October 2021 (HEY LEP region and surrounding area)



Source: Burning Glass Technologies.

[8] Climate Emergency Skills Action Plan 2020-2025, Skills Development Scotland, 2020.

The job titles most sought-after were:

- Warehouse Operative
- Production Operative
- Counterbalance Forklift Driver
- Pig Stockperson

5.2 Domestic low carbon technologies

Decarbonising domestic and commercial heat and power is a crucial element of the UK achieving net zero by 2050. As such, the UK government has announced the ambition of making homes, schools and hospitals greener, warmer and more energy efficient.

To achieve net zero by 2050, almost all of the UK's 29 million homes will need some sort of improvement/upgrade made to them[9].

The following technologies make up the majority of domestic/commercial technologies in the UK:

- Ground Source Heat Pumps (GSHP)
- Air Source Heat Pumps (ASHP)
- Micro Combined Heat and Power (CHP) or "Cogeneration"
- Community/District Heating
- Solar Thermal/Water Heating
- Solar Photovoltaic (PV)
- Biomass Boilers

  (note that hydrogen domestic heating boilers are considered in section 5.5 below)

This sector is very sensitive to government policies and incentives. Over recent years, incentives have driven uptake for solar PV, but not on a steady path, with spikes in demand largely reflecting policy interventions (e.g. following the introduction of the FiT and ahead of the announcement or introduction of major cuts, and to a lesser extent before FiTs ended)[10].

Heat technologies have grown at a much slower rate, although the number of air-source heat pumps that have been installed is more than the number of ground-source heat pump, biomass and solar thermal installations combined. Highlighting that it is those technologies that offer greener energy at lower cost per kW trail behind those that are cheaper to install upfront.

[9] https://news.ukconstructionweek.com/en/article/90567?utm_source=Mailjet-ukconstructionweek&utm_medium=newsletter&utm_campaign=ukconstructionweek-2555-s-en-290920

[10] Ibid.

Many of the new jobs to be created will be for installers and engineers, specialising in fitting renewable heating systems such as heat pumps, contributing to the target of installing 600,000 heat pumps a year by 2028. Currently the industry installs around 30,000 heat pumps per year, which provides an idea of the level of growth required from companies which manufacture, supply and install heat pumps[11]. This, in turn, contributes to a larger aim of delivering 19 million heat pumps by 2050. The adoption of heat pumps will be encouraged by the ban on installation of gas boilers in new build properties in 2025.

Occupations where significant recruitment will be required through the early 2020s, include[12,13,14]:

- Builders and insulation specialists
- Civils and reinstatement work
- Energy Assessors – as the use of Energy Performance Certificates increases
- Heat pump installers (50,000 required nationally by 2030)
- Insulation Installers
- Plumbers
- Project Managers (86,500 required nationally by 2028)
- Retrofit Co-ordinators (50,000 required nationally by 2030)
- Roofers, Carpenters and Electricians
- Surveyors and Advisers

With Ideal Heating being located in Hull, this is potentially a big opportunity for the HEY LEP region to be seen as a centre of excellence for training Heat Pump Engineers / Fitters. Transferring skills from the boiler manufacturing workforce to making heat pumps could be critical both for safeguarding employment and harnessing existing skills[15]. Whilst the technology is different, many of the engineering and component assembly processes are similar. The exceptions are pipe brazing and the handling of refrigerant, which are specific processes associated with heat pumps, but not boilers. Individuals with these skills could come from other sectors like air conditioning manufacture in the case of refrigerants, and the automotive industry for shaping and brazing .

[11] https://www.thermalearth.co.uk/blog/600000-heat-pumps-a-year

[12] Building Skills for Net Zero: Report prepared by Eunomia for CITB, March 2021.

[13] https://environmentjournal.online/articles/decarbonising-homes-could-create-1-2m-green-jobs/

[14] Net Zero and Construction: Perspectives and Pathways, CITB, 2021.

[15] Heat Network Skills Review: BEIS research report no. 2020/020, BEIS, June 2020.

Demand for these skills will ultimately be led by the consumer 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.

The fundamentals of heating and hot water do not change, and many in the current installer base already have many of the essential skills required for low carbon heating installation. There are currently around 130,000 Gas Safe registered gas installers, 42,000 registered electricians around the UK and 1,920 installers listed as MCS certified.[16]

As more traditional methods of heating are phased out and demand for low carbon solutions increases, installers will increasingly look to take advantage of these new markets[17].

In relation to heat networks, there are noticeable skills gaps in project management and project delivery/development roles, in key technical roles and across legal and financial roles. Typically, people in these roles do not have the breadth of skills and experience of heat network projects required to be considered proficient. The table below identifies the skills lacking across each occupation.[18]

Figure 7: Summary of skills lacking by occupation

Occupation	Skills lacking	Severity of skills gap
Project Delivery Manager	Challenge finding new recruits with the relevant experience and understanding of the heat network landscape specifically as well as individuals with the commercial skills and experience of procuring large scale projects.	High
Heat Network Development Manager	Typically lack the breadth of roles required in this position, commonly possessing strong project management or engineering skills but rarely both.	High
Energy Master Planner	Acceptance that no-one comes to the role fully proficient Intricate knowledge of heat networks can be lacking among those transferring from other sectors, although most accept that this can be developed. There is also a lack of commercial and legal understanding	High
Control System Specialist	New recruits often do not come equipped with the full range of skills required, and in particular lack direct experience working in the heat network sector.	High

[16] https://mcscertified.com/find-an-installer/, accessed on 27th May 2020.

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

[18] Heat Network Skills Review: BEIS research report no. 2020/020.

Occupation	Skills lacking	Severity of skills gap
Design Engineer	There is a limited theoretical or practical knowledge and understanding of heat networks, which new recruits will need to learn early on, on the job.	Medium
Commercial / Operations Manager	Suitable business acumen is often the key skill lacking among organisations that struggle to find commercial managers with necessary proficiency.	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 sector.	Medium
Financial Specialist	Similar to legal specialists, there is some relevant knowledge at more junior levels; those at more senior levels typically have limited experience of the heat network sector.	Medium
Operations and Maintenance Technician/ Inspector	There is a lack of good problem solvers, i.e. individuals who are able to inspect a system and understand it sufficiently to be able to resolve problems themselves.	Medium
Pipe Layer (including welding)	It is relatively easy for welders to work across different sectors, which means that knowledge of heat network systems themselves is often lacking (although these can be learnt with relative ease).	Low
Installer	It is relatively easy for installers to work across different sectors. The research did not unpick any particular skills lacking in this occupation.	Low

Currently the industry is relatively well equipped, from a capacity perspective, to meet demand in the sector for heat network development. However, the sector does appear to be ill-equipped to respond to any surge in demand for skills that will be required to meet expected growth of the sector.

In the short-term, there is expected to be a growing need for surveyors, meter providers and installers, as companies respond to the Government's proposed amendments to the heat network (Metering and Billing) Regulations 2014. Longer term there will likely be an increased demand for energy consultants, facilities and estates managers and those in customer service roles as maintenance and upgrades of heat network developments become more common.

But across all occupations, demand is likely to increase considerably due to the amount of development anticipated. There is particular concern in construction and technician roles, where the literature suggests generic skills across the economy are in short supply, a trend that is worsening. Furthermore, the industry's demand for graduate level engineers may suffer from a general UK shortage in science, technology, engineering and mathematics (STEM) graduates.

In the year ending 31 October 2021, data from Burning Glass Technologies suggests that there were very few online job postings relating to this sector across the analysis area. Where there were job postings, the majority of related to sales and account development, rather than any technical role.

To meet the anticipated capacity requirements, evidence suggests that the sector needs to better facilitate the transfer of skills from outside into the industry, including from energy, engineering and construction. Most engineers that possess thermodynamic and hydraulic skills are expected to be able to transfer with relative ease. However, such transfers are suitable at junior levels e.g. welders, installers and operations and maintenance technicians, but it can be more difficult to transfer at senior levels where experience of heat networks is expected.[19]

Apprentices in the electrotechnical sector are seen as vital for its future. Employers see them as a way to overcome the ageing workforce and to create succession plans where needed.[20]

However, there are challenges to be over-come in this area if demand from employers is to increase:

- Of the seven Apprenticeship Standards identified in Annex 2 as being relevant to this industry, only three of them had more than two providers delivering training in HEY and surrounding area. Three of them had no providers in the area at all.
- 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 slightly higher salary (but not invest in the actual training programme) means that, for many, it is a risk not worth taking.
- The transactional nature of contracting means that visibility of future work is low; this results in a lack of investment in long-term training programmes such as Apprenticeships.

A **T Level** in *Building Services Engineering for Construction* is now available (https://www.instituteforapprenticeships.org/t-levels/t-level-information-hub/t-level-in-building-services-engineering-for-construction/) although the closest provider is currently 90 miles away from Hull at Oldham College.

[19] Heat Network Skills Review: BEIS research report no. 2020/020, BEIS, June 2020.

[20] Labour Market Intelligence Research, NET/ECA/The Electrotechnical JIB/TESP/Select/Unite, March 2019.

5.3 Electric vehicles

As of the first quarter of 2021, there were approximately 400 registered EVs in Hull and 1,100 in East Riding[21]. To support these, there is a reasonable spread of charging infrastructure in both East Riding and Hull, with 40 'rapid' chargers, 159 'fast' chargers and 8 'slow' chargers in operation at the time of writing. Clusters of charging points can be found in and around Hull City Centre, Bridlington, Beverley, and Goole.

Recent trends in online job postings have shown a significant increase in volume over the past year, primarily for EV charging point installers and electricians.

Figure 8: Number of online job postings per month in the electric vehicle sector in the year ending 31 October 2021 (HEY LEP region and surrounding area)

Source: Burning Glass Technologies.

Looking forward to 2030, approximately 37,000 EVs could be registered in East Riding and approximately 25,000 in Hull, with an increase in the growth rate of EV uptake in the second half of the 2020s.

By this time, the LGA estimates that around 2,000 people could be employed in the HEY LEP region and surrounding area in the low emission vehicles and infrastructure industry. By 2050 this could increase to more than 5,000.

[21] Evidence Base to Support EV Charge Point Strategy and Decision Making in Hull and East Riding of Yorkshire: Final Report, Hull and East Yorkshire Local Enterprise Partnership/Hull City Council/East Riding of Yorkshire Council, November 2021.

Figure 9: Estimated direct employment in low emission vehicles & infrastructure[22] by Local Authority

Sector	2030	2050	Change
Yorkshire & Humber region	6,472	13,340	+6,868
Kingston upon Hull	320	614	+294
East Riding	258	451	+193
North East Lincolnshire	254	446	+192
North Lincolnshire	276	525	+249
Selby	885	2,812	+1,927
York	129	235	+106

Source: Local green jobs - accelerating a sustainable economic recovery, LGA.

The Jacobs study referred to above contains a number of recommendations, some of which are pertinent to this study and will impact upon workforce and skills development:

1. Provide a base level of infrastructure to encourage uptake:

   Hull: 4 rapid chargers immediately; 26-75 rapid chargers by 2025

   East Riding: 4 - 11 rapid chargers immediately; 55 - 149 rapid chargers by 2025

2. Undertake further work to map current training and skills provision in the HEY area across the range of skills required in the EV sector to understand key content and geographical gaps
3. Continue engagement with Northern Power Grid to address key points of weakness in the power network

In terms of workforce and training of the required workforce, there appears to be a widespread lack of understanding of the scale and the specificity of job type across the supply and service chains. This includes the volume of new workers needed to enter the workforce and the type and number of current workers who may need reskilling/upskilling.

Acquiring the necessary people and skills – charging infrastructure

To install EV charging points in domestic settings, installers must:

- Be registered on an appropriate Competent Person Scheme
- Carry out the installation in accordance with Part P (Electrical safety – dwellings), and the IET Code of Practice for Electric Vehicle Charging Equipment Installation
- Meet the standards of the IET Wiring Regulations (BS 7671)
- Notify the DNO (Distribution Network Operator) when charge points are installed

[22] Defined as Electric vehicles, ICE --> EV transition, Chargepoints, HRS, EV battery, Fuel cell EVs, ICE --> FCEV transition, Stationary fuel cells and Energy storage.

To enter the EV charging point installer workforce, the following requirements are *normally* mandatory:

- City & Guilds 2365 – Electrotechnical Craft (Level 2)

  https://www.cityandguilds.com/qualifications-and-apprenticeships/building-services-industry/electrical-installation/2365-electrotechnical-craft#

- City & Guilds 2382 – Requirements for Electrical Installations (18th edition of IET Wiring Regulations; BS 7671)

  https://www.cityandguilds.com/qualifications-and-apprenticeships/building-services-industry/electrical-installation/2382-requirements-for-electrical-installations#

- City & Guilds 2919 – Electric Vehicle Installations

  https://www.cityandguilds.com/qualifications-and-apprenticeships/building-services-industry/electrical-installation/2919-electric-vehicle-charging#&acc=level3

The requirement for installers to be fully qualified electricians and registered with a Competent Person Scheme owner e.g. NAPIT or NICEIC, could prove a significant barrier to entry should demand for installations ramp up quickly. This requirement is set out in The Electrotechnical Assessment Specification[23].

In order to become a recognised competent person via a Competent Person Scheme, experience in the field must be gained alongside C&G 2397 Installing, Testing and Ensuring Compliance of Electrical Installation Work in Dwellings.

New entrants may complete an apprenticeship programme as the foundation of a career in electrical installation: Level 3 - Installation Electrician and Maintenance Electrician (https://www.instituteforapprenticeships.org/apprenticeship-standards/installation-electrician-and-maintenance-electrician-v1-0). As reported in Annex 2, there are at least seven training providers within 40 miles of Hull that deliver this Standard.

Acquiring the necessary people and skills – Repair and maintenance of EVs

As of December 2020, 6.5% of UK automotive workforce are qualified to work on electric vehicles - based on a total technician workforce of 237,939 of which 15,428 are registered on the IMI TechSafe Register (accredited to work on electric vehicles)[24].

It is estimated that the electric vehicle population will accelerate from c380,000 to 10.6m in the next decade and in order to safely maintain that number of vehicles the UK will need around 75,000 technicians with the skills to work on EVs.

[23] https://electrical.theiet.org/bs-7671/building-regulations/electrotechnical-assessment-specification/

[24] https://tide.theimi.org.uk/industry-latest/news/road-decarbonisation-ps15m-skills-funding-boost-critical-get-75000-more

The **IMI Accreditation Electric Vehicle** route[25] is intended for technicians whose job role involves the inspection maintenance and repair of light vehicles, as well as those involved in accident repair body shops.

Technician must be able to work unsupervised and, ideally, they should be in full time employment with at least 2 years' experience to ensure they are familiar with the skills, knowledge and techniques required to service, maintain and repair vehicles fitted with high voltage batteries / components such as 'hybrid' or pure electric vehicles. However, it would appear that the closest training provider is nearly 70 miles away at Nottingham College.

The **C&G Automotive Maintenance and Repair** (7290) qualification[26], at levels 1 through to 4, are for anyone interested in starting or developing a career in the maintaining and repairing of different types of vehicles, including hybrid, electric and hydrogen vehicles. However, there appears to be no centres currently offering this course.

However, in 2022, it is expected that the *Maintenance, Installation and Repair for Engineering and Manufacturing* **T Level** qualification will include a TQ specialism relating to *Maintenance, installation, and repair: Light and Electric Vehicles*. However, as T Levels are still in development, it is unclear at this time whether this qualification will be available within the immediate HEY LEP region and surrounding area. At the moment it seems that the closest provider of this qualification may be over 40 miles away at Wakefield College.

The current **Apprenticeship Standard** ST0033 *Motor vehicle service and maintenance technician (light vehicle)* does not contain any content relating to EVs.

5.4 Carbon capture, utilisation and storage

CO_2 is well known for its contribution to global warming and is usually considered a pollutant. However, CO_2 can also be used in a variety of industrial processes, including production of synthetic jet fuel and diesel, polymers and plastics, concrete and building aggregates, and for increasing crop yields[27].

[25] https://awarding.theimi.org.uk/Qualifications/Electric-Vehicle-Technician

[26] https://www.cityandguilds.com/qualifications-and-apprenticeships/transport-maintenance/automotive/7290-automotive-maintenance-and-repair#&acc=level3

[27] https://www.baringa.com/en/insights-news/blogs/january-2020/carbon-capture-and-use-making-co2-an-asset/

The Humber is home to two of the UK's six oil refineries, the second largest chemicals and process clusters, and one of only two integrated steelworks in the country. There are 55,000 jobs in the manufacturing sector in the region and 20% of the economy derives from energy intensive industry.

East Co_2ast Cluster

A collaboration between Zero Carbon Humber, Net Zero Teesside and Northern Endurance Partnership, the cluster has the potential to transport and securely store nearly 50% of all UK industrial cluster CO_2 emissions, up to 27 million tonnes of CO_2 emissions a year by 2030.

By deploying CCUS across the Humber and Teesside, the East Coast Cluster aims to create and support an average of 25,000 jobs per year between 2023 and 2050 with approximately 41,000 jobs at the project's peak in 2026. These skilled jobs will be industries such as[28]:

- Industrial carbon capture
- Low-carbon hydrogen production
- Negative emissions power
- Power with carbon capture

Zero Carbon Humber

Equinor-led Hydrogen to Humber (H2H) Saltend is Zero Carbon Humber's anchor project. It will establish the world's largest hydrogen production plant with carbon capture at px Group's Saltend Chemicals Park[29].

The H2H Saltend project will be the starting point for a CO_2 and hydrogen pipeline network developed by National Grid Ventures, connecting energy-intensive industrial sites throughout the region, offering businesses the options to directly capture their emissions or fuel-switch to hydrogen.

All captured CO_2 will be compressed at Centrica Storage's Easington site and stored under the southern North Sea using offshore infrastructure shared with the Teesside industrial cluster.

As this shared infrastructure is delivered, other Zero Carbon Humber partners will connect their infrastructure, currently in development, to the pipelines. For example:

- Bioenergy with carbon capture and storage (BECCS), at Drax Power Station near Selby, from 2027, scaled up to become the world's first carbon negative power station by 2030 (creating more than ten thousand jobs at the project's peak)
    - This could support an average of 10,500 direct, indirect and induced jobs per year during construction between 2024 to 2031, peaking at 16,800 jobs in 2028

[28] https://www.zerocarbonhumber.co.uk/news/east-coast-cluster-selected-as-one-of-the-uks-first-two-carbon-capture-and-storage-projects/

[29] https://www.zerocarbonhumber.co.uk/the-vision/

- Drax and Selby College have developed an "Introduction to Carbon Capture and Storage'" programme, 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 BECCS works and the theory and practice behind the technology
- The module will be piloted with 50 learners between 1st January until 31st March 2022 and then rolled out to a further 80 companies and 450 learners from 1st April 2022 and 31st March 2024, subject to future funding[30]

- SSE Thermal's Keadby 3 would be a 900MW power station fuelled by natural gas and fitted with carbon capture technology to remove the CO_2 from its emissions
  - The captured CO_2 would then be transported using shared pipelines before being securely stored under the Southern North Sea
  - It would have the potential to come online by 2027, in line with Government ambitions for 'Track 1' industrial cluster projects[31]
- At Uniper's Killingholme site in Immingham, clean hydrogen production, in line with the company's pledge to be carbon neutral in Europe by 2035

Although outside of the cluster area, work being undertaken by OPITO will provide standards and skills competency training support to the Scottish Cluster in advance of work getting underway in 2023. Workforce skills training and development plans implemented on the Scottish Cluster will be applicable across other UK-based CCS clusters.[32]

Humber Zero

Humber Zero[33] is a £1.2 billion project that will develop technology to capture and safely store carbon emitted by the Immingham industrial cluster, thereby radically reducing greenhouse gas emissions.

The project is expected to create 2,500 jobs during construction, 200 permanent jobs, and safeguards 20,000 direct and indirect jobs on the River Humber's South Bank. A further phase of the project aims to produce hydrogen at scale for immediate use and fuel switching from natural gas to hydrogen to decarbonise the Immingham industrial site. The project aims to start operations by 2027.

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

[31] https://www.zerocarbonhumber.co.uk/news/sse-thermal-and-equinor-join-forces-on-plans-for-first-of-a-kind-hydrogen-and-carbon-capture-projects-in-the-humber/

[32] https://theacornproject.uk/2021/11/17/partnership-formed-to-build-scotlands-low-carbon-workforce/

[33] https://www.humberzero.co.uk/

As many as 49,700 direct, indirect and induced jobs will be created as a result of deploying CCS and hydrogen technologies in the Humber region. These jobs could begin to be realised in as little as four years' time (2024), peaking at 49,700 jobs in 2027.[34]

These jobs include up to 25,200 high quality jobs in construction, such as:

- Machine installers
- Pipe fitters
- Technicians
- Welders

A further 24,500 supported across the supply chain and wider economy.

The development of geothermal projects to produce and store sustainable energy could create job opportunities for:

- Geothermal technicians
- Geologists
- Civil engineers
- Energy specialists
- Geophysics
- Underground construction and tunnelling

To ensure a well skilled local labour force able to support the delivery of CC US in the Humber by the start of construction in 2024, interventions will need to be made now, including demonstrating the value of vocational work at school and offering enhanced apprenticeships. The Humber industrial cluster is ideally placed to offer an enhanced model of apprenticeship.[35]

As there are real synergies between the oil and gas and CCUS industries, the geology, infrastructure, and regulatory requirements for both are similar. Areas that have a history of extracting carbon from the subsurface should be in a good place to develop a thriving industry putting it back underground. The carbon capture technologies use processes similar to those in the chemical industry and the transport and storage of the carbon resemble typical oil and gas installations.

The transitioning of such a workforce means that many well-paid employees in the oil and gas industry should be able take up jobs within CCUS via appropriate upskilled/reskilling interventions.

[34] Capturing Carbon at Drax: Delivering Jobs, Clean growth and Levelling up the Humber, Vivid Economics, November 2020.

[35] ibid

However, even where some skills might already be available in an area, the strategic planning to channel the required workforce into CCUS needs oversight and to commence quickly. In research carried out by the Energy Institute[36] of UK energy professionals, for whom 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, half the respondents cited barriers to their personal development, including a lack of appropriate training courses being available.

Oil and gas workers are the most likely to be unsure of which skills they need to develop; around three times as many respondents from this sector are concerned about this issue than those from other parts of the industry – which is worrying given that the emphasis on this workforce to be a key part of the transition into other low carbon industries, particularly CCUS.

The North Sea Transition Deal[37] contains actions that will both facilitate the reskilling of existing parts of the oil and gas workforce and will ensure that everyone employed in the sector, whatever their background, can fulfil their potential.

There are examples of transition programmes making a positive impact. ECITB's Accelerated Experience and Learning Programme (AELP)[38] is a retraining programme aimed at 'sector jumpers'. Many of the technical skills and behaviours required in the nuclear sector were identified as being comparable with those working in the coal station, including a similar safety and security culture as well as the turbines and control room. The AELP recognised and built on the existing skills of the workers from Cottam to provide a path to becoming a 'suitably, qualified and experienced person' in 12 rather than 18 months.

5.5 Hydrogen

A hydrogen economy is a key component of the transition towards net zero. Developing this emerging sector will require existing and important new skills to be available in the right place at the right time.

Creating a successful hydrogen sector could support 9,000 direct jobs across the UK by 2030, with up to 100,000 supported directly by 2050. These jobs, with additional indirect and induced employment benefits, will help drive local economic growth and support the delivery of government's commitment to level up the UK[39].

[36] https://www.energyinst.org/barometer/2021/biggestChallenges

[37] North Sea Transition Deal, BEIS/OGUK, March 2021.

[38] Skills Transferability in the Engineering Construction Industry, ECITB, 2020.

[39] UK Hydrogen Strategy, HM Government, August 2021.

"Green Hydrogen for Humberside" will be an important part of the decarbonisation vision for the Humber area by enabling both an early bulk scale supply of zero carbon fuel and the subsequent expansion of supply via a progression in electrolyser capacity out to 2040[40].

Immingham is the most carbon intensive and has access to renewable electricity from GW scale offshore windfarms which comes ashore in the region. Long-term, there is an opportunity to build several tens of GWs of wind power solely to generate green hydrogen offshore. This makes Immingham an attractive location for the production of low-cost renewable hydrogen for industrial decarbonisation as part of the wider Zero Carbon Humber roadmap.

Hydrogen provides an opportunity for those who have previously worked or are currently working in high carbon sectors to transition to support the green industrial revolution[41]. Oil & Gas UK has estimated that, between 2018 and 2030, the number of jobs directly and indirectly supported by the UK's offshore oil and gas industry could reduce from 147,000 to around 105,000 and that many of the skills in this industry will be transferable to clean growth industries, and hydrogen will provide significant opportunities, including:

- Project management
- Process engineering
- Repurposing of infrastructure
- Gas safety

The recent North Sea Transition Deal committed the government to continue to champion the role of the oil and gas sector and its workforce in the energy transition, supporting work on the sector's Integrated People and Skills Plan.

Ensuring the portability of skills and the mutual recognition of professional qualifications to enable people to transition to new sectors such as hydrogen without re-certification will be a crucial element for success.

The expansion of employment in the hydrogen industry would largely draw on existing skills, and as such, should not present any major challenge in terms of a skills gap[42].

With regards to electrolysis, the skills involved in the electricity generation sector, and in particular renewables and nuclear components, come to the fore.

[40] https://itm-power.com/news/green-hydrogen-for-humberside-project-deployment-study

[41] UK Hydrogen Strategy, HM Government, August 2021.

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

Hydrogen can cause embrittlement and failure of iron-derived piping. However, the UK gas network has been undertaking an Iron Mains Replacement Programme (IMRP) since 2002, which aims to upgrade the majority of the existing gas distribution pipes from iron to polyethylene. This dense polythene piping is also suitable for the transmission of hydrogen, which opens up the potential for the repurposing of existing network infrastructure. Crucially, this also means that the skills required for laying a hydrogen network already exist.

The transportation of gases and chemicals, including liquefied natural gas (LNG) in tankers and tube-trailers is also a well-established industrial system.

Across these different aspects of the hydrogen industry, some retraining to ensure awareness of the different properties of hydrogen will be necessary, but these are likely to be relatively modular upgrades to knowledge, rather than the type of retraining associated with an entire career change.

However, the overall roll-out of such training upgrades, if required to cover a large number of workers over a relatively short time period, could be a logistical challenge, or hold up the progress of such a scenario if not well-planned.

The historical example of the transition from town gas to natural gas offers evidence of how this can be achieved. Alternatively, the way in which regulation, training and accreditation has kept pace with electric vehicle deployment, gives an example of a slower, more gradual and responsive market-led transition.

In terms of domestic gas boilers, the Department for Business, Energy & Industrial Strategy (BEIS) has appointed a consortium led by Energy & Utility Skills and the Institution of Gas Engineers & Managers (IGEM) to develop domestic and non-domestic hydrogen gas installation standards, competence frameworks and training specifications. The work will be supported by Publicly Available Specification (PAS) standards being developed by the British Standards Institution (BSI) to codify guidance and specifications for ancillary hydrogen gas devices and components.

Energy & Utility Skills is partnering with IGEM to develop the installation standards and training specifications to safely enable the repurposing of existing natural gas systems for use with 100% hydrogen in domestic and non-domestic premises.

IGEM will assess hydrogen research and the scientific evidence base to update the IGEM/H/1 Hydrogen Reference Standard and create two new Hydrogen Enabling Standards covering domestic and non-domestic scenarios.

Energy & Utility Skills will finalise and implement the Hydrogen Competency Framework by developing an updated and expanded Training Specification, aligned to these new and updated standards developed by IGEM. The work is due to be completed by September 2023.

5.6 Offshore wind and nuclear fusion

Offshore wind

RenewableUK's wind energy database reports that there is currently just over 10GW of operational offshore wind capacity across the UK, with the Yorkshire & Humber region providing 1.6GW (15%).

In addition, there is 4.7GW under construction, with nearly one-third of this (1.4GW) being situated in the Yorkshire & Humber region. And of the 10.8GW that has been consented across the UK, 2.4GW is situated in this region.

Figure 10: The current UK offshore wind pipeline – generating capacity

	Operational	Under construction	Consented	Total
UK	10.5GW	4.7GW	10.8GW	26GW
Yorkshire & Humber region	1.6GW	1.4GW	2.4GW	5.4GW
Share of UK	15%	30%	13%	21%

Source: RenewableUK Wind Energy Database

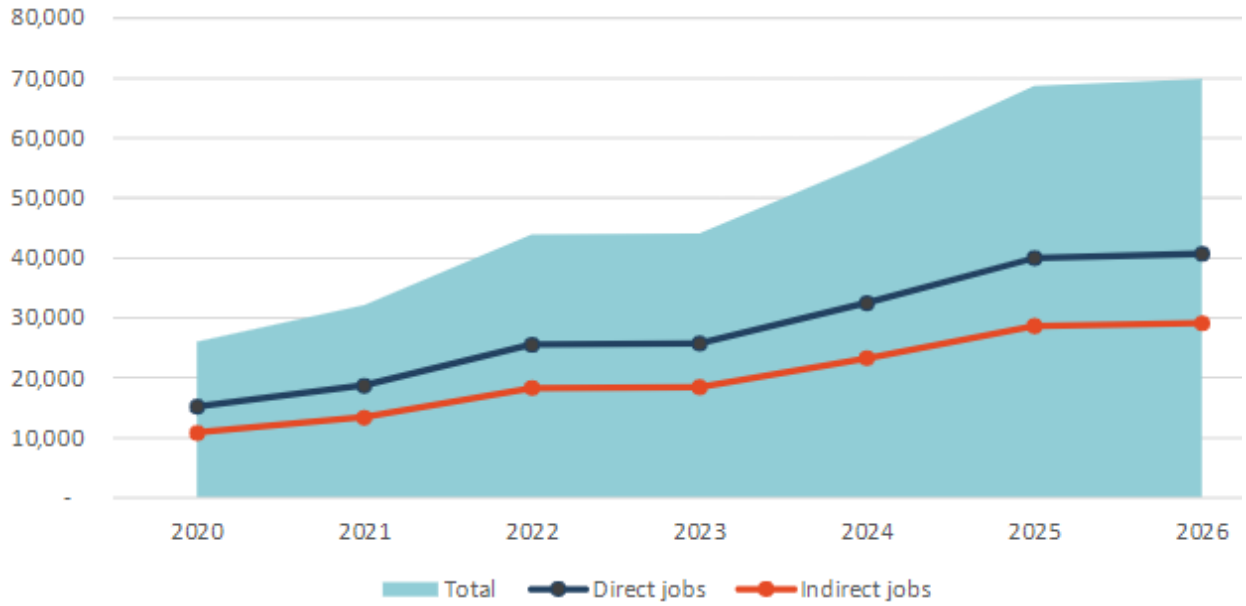
The latest research by OWIC[43] reports that the total UK offshore wind workforce is estimated to be 26,093, with the Yorkshire and Humber region accounting for around 15% (c1,700) of direct jobs. This is the largest regional workforce outside of Scotland. They also report:

- Just 9% of this workforce are female, compared to 18% across the total UK offshore wind workforce
- Just 3% of the total UK offshore wind workforce are from an ethnic minority background

By 2026, the total UK workforce is predicted to rise to nearly 70,000, with Yorkshire & Humber's workforce rising to 10,500 (+8,800).

[43] Offshore Wind Skills Intelligence Model Report, OWIC, February 2021.

Figure 11: UK offshore wind jobs forecast to 2026



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

Figure 12: Skill requirements by project stage for offshore wind

Skill area	Specific details
Development and project management	Generally, these roles require degree-level qualifications in relevant disciplines such as environmental sciences, economics, engineering and project management. **Port studies:** Degrees in environmental sciences, economics, engineering. Project management. **Geotechnical and geophysical surveys:** Degrees in environmental sciences. Master's degree in oceanography, hydrography and geophysics. **Wildlife surveys:** Degree or HND in biology, marine biology or environmental monitoring.
Turbine design and manufacture	Ranging from degrees in mechanical engineering and physics to mid-range technical skills in welding, platers, electricians, fitters, etc. Apprenticeships, Higher Apprenticeships and HNC / HND. Technical qualification in electrical and design engineering (achieved through an Apprenticeship of Higher Apprenticeship) – welders, platers, pipe fitters, electricians, mechanical fitter and riggers. HNC / HND in electrical engineering. Degree in mechanical engineering and physics. Research and development (R&D) and design requires degrees in subjects such as physics, electrical and mechanical engineering, and mathematics. Manufacturing and assembly requires craft persons and technicians.

Skill area	Specific details
Balance of plant	Qualifications in naval architecture, marine engineering, mechanical engineering, high voltage design engineering and technicians, geophysics and environmental sciences, vocational and HNC / HND programmes also deliver the necessary technician-level skills. Construction and vessel-related training and certificates are also required. **Turbine tower supply:** Technical skills such as welding, plating, fabrication, and blasting (achieved through a relevant Apprenticeship). Degree in textile technologies or manufacturing production engineering. CSCS and NEBOSH accreditation. **Foundation supply:** Degree in civil, design, mechanical or fabrication engineering. CSCS accreditation. Project management. **Cable supply:** HNC / HND in electrical engineering and degree in product design engineering (high voltage design and technicians). CPCS certification. **Substation supply:** Degree in product design engineering and electrical engineering. Project management. CIRSR certification.
Installation and commissioning	**Turbine and foundation installation:** Degree in engineering, naval architecture and marine engineering. Vocational qualification in yacht and boatbuilding. Project management. CPCS certification. **Cable installation:** Degree in engineering or mechanical engineering. HNC / HND in technical engineering. Appropriate vocational qualification / experience (e.g. Apprenticeship). Project management. **Installation support:** Valid dive ticket. GWO module certificates. Explosive ordnance disposal qualification (ISSEE). Degree in geophysics and environmental science. Vessel (master, mate, deckhand) certifications. Maritime and Coastguard Agency (MCA) certification.
Operations, maintenance and service	**Turbine maintenance:** IRATA Level 3 certification. Technology-specific training; high-voltage equipment handling, certification to undertake lifting, climbing and rope access training. Strong electrical / control and instrumentation skillset. **Maintenance of the offshore substation**: Technicians with high-voltage experience. HNC / HND in electrical or mechanical engineering. **Onshore substation maintenance**: Standard and specialist high voltage work. **Maintaining the turbine foundation**: Specialist equipment skills. Valid diver ticket. IOSH. GWO certificates for offshore survival. **Supervisory control and data acquisition (SCADA) monitoring**
Cross-cutting	**Warehouse manager and operative:** Degree in business, retail management or economics are desirable, as is Chartered Institute of Logistics and Transport Level 3 accreditation. **Vessel operations and maintenance:** Degrees in marine, electrical and mechanical engineering and/ or marine operations. Apprenticeships and subsequent upskilling can provide the broader technical know-how required to succeed.

Skill area	Specific details
	Vessel master: The master needs certifications in Standards of Training, Certification and Watch Keeping for Seafarers (STCW) to at least Master 200GT (STCW II/3), along with ENG 1 medical, STCW95 basic training and a radio communication certificate, for example Global Maritime Distress and Safety System (GMDSS) General Operators Certificate (GOC). The master must also complete a stability course, a Maritime and Coastguard Agency (MCA) Approved Engine Course (AEC) or Marine Engine Operator Licence (MEOL). **Vessel mate and deckhand:** The deckhand requires an ENG 1 medical and STCW95 basic training, alongside an MCA AEC or MEOL. Certification in STCW III/3 is desirable.

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

Moving forward, the focus of innovation and skills will be around[44]:

- **Training and technical standards** – Establishing a consistent, standardised training requirement for the range of roles required. Opportunities exist for providers to shape this process and benefit from the outcome. This is particularly for the case of re-skilling personnel who are changing sectors e.g. oil and gas, ex-forces
- **Vessels and logistics solutions** – Reducing direct costs, increasing access and mitigating H&S and environmental risks, enhanced marine co-ordination software, personnel tracking systems and next generation workboats
- **Subsea cables** – Constructed further afield and in more hostile environments and conditions.
- **Transmission** – Optimised / next generation transmission systems e.g. high-voltage direct current (HVDC) and improved, lower cost materials, cabling concepts, and installation techniques.
- **Foundations** – Novel foundation designs including both fixed and floating concepts for low-cost foundations, particularly for water depths of greater than 35m and to support larger turbines and development of serial manufacturing techniques for foundations
- **Turbine technology** – Development of innovative materials and components for the next generation of larger capacity (up to 15MW), higher reliability turbines (including the design, materials and fabrication of longer blades, larger bearings, generators and drivetrain components)
- **Artificial intelligence and robotics** – Remote surveillance and inspection of offshore assets – both above and below the surface. The development of artificial intelligence to optimise asset performance

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

- **Data analytics** – Harvesting asset performance data to optimise system performance, monitor and plan the replacement of failing equipment and improve the general management of assets

Nuclear

Goole, in the East Riding, has emerged as one of five sites shortlisted to host the UK's first nuclear fusion power station.

The UK is aiming to become the first country to commercialise the energy source, a move that could create thousands of jobs and play a crucial part in the nation's net zero ambition.

Goole sits close to a proposed hydrogen and carbon network, with a huge focus on decarbonisation already in the Humber region (Zero Carbon Humber) and could also serve as a magnet for other high-tech industries, furthering the development of science and technology capabilities in the area.

The successful site will be announced in late 2022.

The required skills will mostly be in science, technology, engineering and maths, although there will be opportunities across a wide range of roles and skills, including:

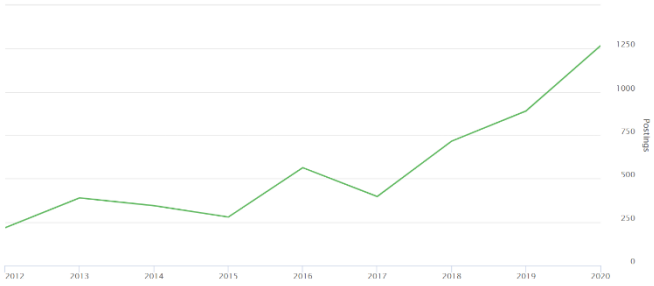
- Commissioning engineers
- Contract managers
- Cost Estimators
- Project Managers
- Radiation protection workers
- Schedulers
- Waste management skills
- Trades such as:
    - Cable pullers
    - Fitters
    - Pipe Fitters
    - Project controllers, with a greater emphasis on the professional skills attributed to managing large scale projects
    - Riggers
    - Welding (high integrity)

The Nuclear Skills Strategy Group[45] has identified a number of "fragile skills" where the supply might not meet demand going forward:

- Chemists/Physicists
- Civil Engineering Operatives
- Commissioning Engineers
- Concreters
- Control and Instrumentation
- Electrical Engineers
- Emergency Planners
- Project Planning and Control
- Quality Assurance staff
- Reactor Operation
- Safety Case Preparation
- Scaffolders
- Site Inspectors
- Steel Fixers

The number of online job postings that stated a requirement for "Nuclear fusion" skills has been increasing rapidly across the UK over the past three years, with most (82%) requiring at least a Degree-level qualification, mostly in the following subjects[46]:

- Chemical Engineering
- Chemistry
- Computer Science
- Electrical and Electronic Engineering Technologies/Technicians
- Engineering
- Materials Science
- Mathematics
- Mechanical Engineering
- Physics



[45] Nuclear Workforce Assessment 2019, Nuclear Skills Strategy Group.

[46] Burning Glass Technologies, 2021.

5.7 Smart and resilient utilities networks

With an ever-increasing array of operational technologies being developed and deployed at various points on the assets e.g. monitoring equipment and comms systems, it is essential that they are integrated into the system rather than seen as individual technologies operating in isolation.

This will likely require a broader set of skills and knowledge amongst a substantial proportion of the crafts, technical and engineering workforce, ensuring they understand the interdependencies between different technologies on different parts of the network.

The main areas where skills and training are considered to be particularly necessary are:

- **Power Systems Engineering** with new technology integration. Traditional Power Systems skills are still essential, but more understanding, knowledge and skills are required on integrating and utilising new technologies
- **Software and Systems Engineering** for the energy sector. Transitioning from a largely mechanical system to a software intensive socio-technical one

  Hardware deployment, with connectivity to data collection and networks, is necessary

  The software needs of the industry require reliable data analysis and service delivery platforms, applications for user engagement and information, along with algorithms for assets utilisation optimisation

  The training for all of these skills is currently delivered within the Networking and Computer Science/Informatics disciplines. The challenge is in attracting well-qualified individuals into the energy sector
- **Digital and data skills** To harness AI to maximise the reliability, responsiveness and accuracy of the UK's energy system, the sector will need to attract experts in machine learning

As discussed in section 5.9 below, digital literacy across the workforce, including those in the field, will be essential for operation and maintenance of a smart grid. Increasingly work allocation and reporting is moving from paper to screen, requiring a level of competence in handling such IT products as well as the specific software used

- **Managing multi-stakeholders** Large scale implementation projects require the participation of many stakeholders and tend to last for a long time. Managing such projects requires skills in integration, knowledge sharing, coordination, and the creation of a long-lasting project identity with shared goals, outlasting individuals/stakeholder participation
- Developing, trialling, and roll-out of new **Business Models.** Innovation in service delivery must constitute a core daily part of the energy business, necessitating training in formulating sound business models, trialling, and rolling successful cases out to the wider business
- **Telecommunications** The ability to install, repair, maintain and fault-find a range of new technologies that send and receive data in a secure manner
- **Control room** Staff are a big part of the transition towards a smart grid, with ever-increasing amounts of data coming in with more regularity, meaning that more and quicker decisions are needed to be made regarding network reconfiguration

There is likely to be increased demand for roles such as:

- **Protection Engineers** to work on LV cable replacement
- **Automation Engineers and Technicians** to support the network
- **System and Network Planners**
- **Data network Engineers** to support innovation programmes to replace copper connections with fibre connections
- **Engineering and Connections Design** roles could be a potential supply concern due to increased industry workload
- Extra high voltage (EHV) **Network Design Engineers** and **Senior Authorised Person** (SAPs) will be required in greater numbers and that the complexity of their skillset will increase
- **Cable Jointers**, partly due to transmitting power using DC rather than AC

The development and deployment of technologies that lead to a smart network are taking place now and will be crucial to establishing a resilient grid capable of supporting high levels of decentralised generation and the transition from Distribution Network Operator to Distribution System Operator.

While significant activity is taking place during ED2 (2023 to 2028), in reality the development and deployment of new technologies will be a never-ending process.

Acquiring the necessary people and skills

Many of the fundamentals of network operation and maintenance remain the same. However, the application of the knowledge could be different as new enabling technologies are introduced requiring a broader IT/digital skillset. Applied engineering skills will remain essential.

In terms of training on specific technologies, both hardware and software, the technology developer/provider will play a key role.

Higher level skills

Degree and HNC/HND qualifications will remain particularly important in the traditional technical and engineering aspects of the sector, as they provide much of the STEM-related skills base necessary for the planning, operation, maintenance and upgrading of network infrastructure.

Since 2014/15, the number of starts on relevant first degree Engineering courses in UK universities has increased slightly from 30,200 to 31,400 in 2018/19. Of the latest cohort, 17% were female and 32% were from an ethnic minority background[47].

However, this general trend of increasing interest in engineering subjects does not seem to have reached electronic & electrical engineering courses. In 2018/19 there were 6,000 starts in this subject (13% of whom were female and 35% from an ethnic minority), 500 fewer than in 2014/15.

Apprenticeships

There is evidence that many companies are seeking new ways of maximising their Apprenticeship Levy investments, including dedicated training programmes to create a pipeline of critical engineering roles, including the transfer of existing employees or part-qualified new entrants from sources like the armed forces or STEM Returners, or those with transferable skills from the oil and gas industry.

These "fast-track" engineering apprenticeships will aim to make best use of people's existing skills through tailored programmes which will bring them up to speed and allow them to be productive more quickly.

One potential new area being investigated is the development of a Smart Network Craftsperson/Technician/Engineer Apprenticeship Standard at Level 4.

[47] HESA Student Record 2018/19.

5.8 Waste management, recycling and the circular economy

The three key value chains and related circular strategies which were identified and analysed to assess potential new roles and the skills those jobs would require were[48]:

- Construction; digital technologies in building and materials management; closed-loop cycling of building materials
- Repurposing and reuse; remanufacturing and refurbishment including decommissioning oil rigs and wind turbines; products-as-a-service (to lease rather than to own)
- Biorefining and anaerobic digestion.

The common skills and training requirements include:

- **Strengthen transferable and digital skills**: Many circular economy strategies require a digitally-enabled workforce as industries shift and new markets open up through advances in material science and technologies
- **Develop holistic thinking across the workforce**: Integrate lifecycle and systems thinking across interdisciplinary, vocational, professional and higher education courses in order to promote understanding of the dynamics, roles, responsibilities and value associated with the circular economy
- **Promote the circular economy as a career destination**: Integrate understanding and skills for the circular economy into all curricula and sectors, so the circular economy becomes synonymous with our economy and there are clearer pathways into roles and sectors that contribute to it
- **Integrate circularity into the existing skills landscape**: Manage the urban-rural divide to ensure inclusive opportunities for skills development across all communities
- **Introduce innovative forms of learning and knowledge exchange**: Encourage closer collaboration between industry and education through innovation centres and demonstrator sites that can be visited by students, educators, employers and workers
- **Harness skills for the energy transition**: Develop and implement skills pipelines to ensure the employment, environmental and economic opportunities associated with the energy transition can be fully exploited - particularly the largely untapped potential associated with reuse and remanufacture of infrastructure from the energy sector

[48] The Future of Work: Baseline Employment Analysis and Skills Pathways for the Circular Economy in Scotland, Zero Waste Scotland/Circle Economy, 2020.

Construction-related

An increasing aspect of the over-lap between construction and waste management and recycling is Closed-loop Cycling of Building Materials and Components, which means building materials are no longer sent to landfill, but downcycled for use in other sectors.

The use of secondary materials in construction presents opportunities for creating jobs across the value chain in the sourcing, sorting, testing and supply of high-quality secondary materials. Because the ability to capture, reuse and recycle building materials and components is strongly linked with the way buildings are deconstructed, **Site Analysts** and **Deconstruction Auditors** will need to use different approaches to locate and reduce damage to reusable components or recoverable materials from buildings. They will ensure site harvest management plans are in place, replacing site waste management plans in order to reflect the value that can be harvested from buildings.

Demolition Labourers, **Supervisors** and **Technical Managers** will also need to understand the value of secondary products, components and materials and the processes required to prevent material contamination, facilitate efficient recycling and minimise damage to recovered elements.

There will also be opportunities for new roles such as **Low Carbon Specialists** and **Sustainability Advisors** to work with companies developing these products to ensure factors like their weight or method of transportation do not outweigh the carbon savings of giving materials a second life.

Sales and marketing professionals will also be vital in growing the market and encouraging **procurement staff** to switch from primary to secondary materials.

Architects will need to work in new ways to promote the reuse of materials and disassembly of buildings through their designs, while **Material Scouts** will be concerned with finding secondary materials and products in the region that could be used for new construction projects.

This will be crucial to changing practice and preventing contractors, both public and private, from reverting to primary materials, particularly due to the time sensitive nature of the construction contracts which typically limit the level of collaboration and planning required in a circular economy.

Repurposing energy assets

Establishing high-value industries around the reuse of energy assets will require highly skilled **Industrial Designers**, **Material Innovation Specialists** and **Product Developers** to experiment and innovate around the reapplication of assets.

Alongside designing new products, **Reuse Specialists** will be needed to test markets and conduct feasibility studies to ensure a route to market for new products, be that in renewable energy, agriculture, construction or other industries. For example, opportunities associated with repurposing wind turbine assets, such as the fibreglass blades, are largely underexplored as only a few wind turbines have been taken out of service to date.

The oil and gas industry holds a wealth of expertise in skilled processes, such as fabrication. Workers in roles like **Fabrication Engineering** will be well suited to applying their skills in the wind industry or the repurposing of capital equipment from the oil and gas industry for use in other industries. Similarly, the safe dismantling, transportation and handling of large components required to bring these assets onshore, will require skilled labour largely already present in the industry in roles like heavy lifting engineers.

Biorefining

There are significant employment opportunities associated with the growth of biorefining, both in relation to the introduction of new technologies and the larger range of products produced from the process. As the biorefining industry grows, so will the range of job opportunities due to the myriad of potential destinations for bioresources.

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.

Highly skilled **Biologists**, **Industrial Scientists** and **Biochemists** are needed to determine applications for outputs of biorefining processes into diverse new products. 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.

Anaerobic Digestion

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 Operatives**.

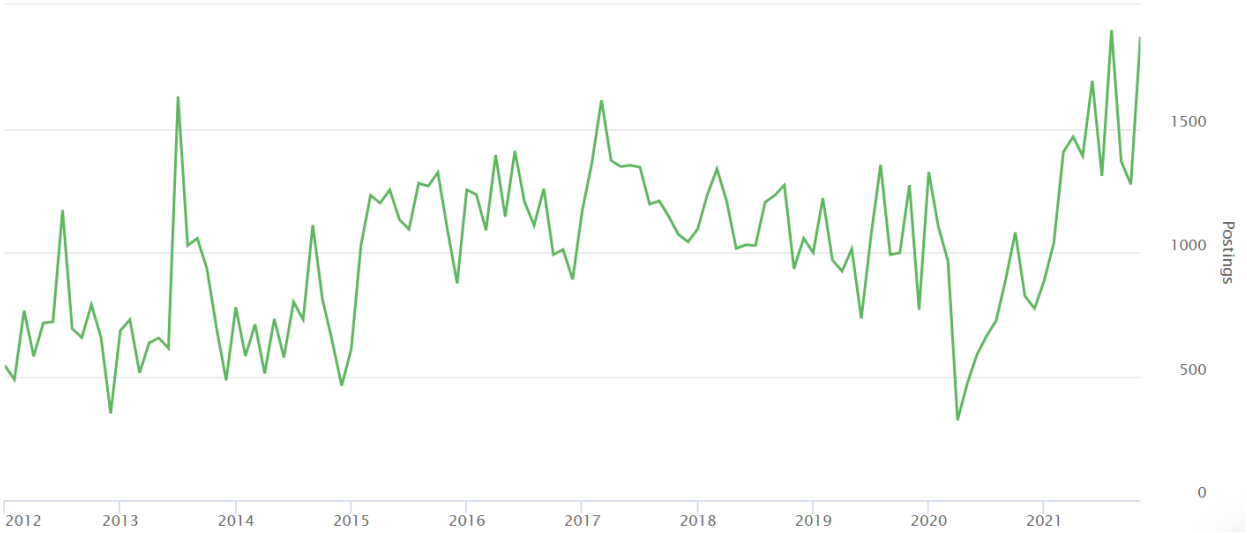
Large-scale biodigestion will call for an increasing number of **Process Operatives** and **Technicians**, as well as roles in **Sales** and innovation needed to grow the market for AD products.

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.

The number of online job postings that stated a requirement for "waste management" or "recycling" skills has been increasing rapidly across the UK since the depth of the coronavirus pandemic in April 2020 – to a level higher than the long-term average.[49]

[49] Burning Glass Technologies, 2021.

Figure 13: Number of online job postings per month in the waste management and recycling sector in the year ending 31 October 2021 (HEY LEP region and surrounding area)



Source: Burning Glass Technologies.

The job titles most sought-after were:

- 360 Excavator Driver
- LGV Class 2 Driver
- Business Development Manager
- Operations Manager
- Maintenance Engineer
- Recycling Operative
- Administrator
- Transport Manager
- Site Operative
- Site Chemist

41% of these job postings required at least a degree-level qualification and a further 35% required good GCSEs – highlighting the changes undergoing in the sector as it diversifies away from landfill and the increasing overlaps with other industries.

5.9 Information Technology, artificial intelligence and data science

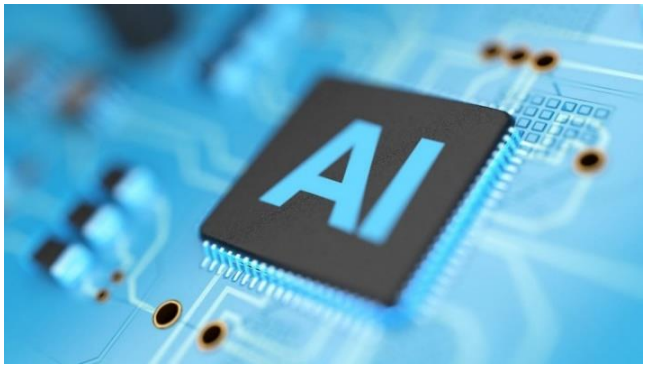
A constant theme throughout the areas discussed above is the need for greater levels of skill and competency in the areas of IT, artificial intelligence and data science. Although there is a clear need to upskill the existing workforce, the key focus will need to be on creating a more flexible, multiskilled and technologically aware workforce[50].

There is a need for education institutions and training providers to ensure courses and programmes are on offer which develop skills in the areas outlined below:

- Internet of things
    - IoT System Anthropologists
    - IoT Data Actuaries
    - IoT Security Repair Consultant
- Machine learning
    - AI Business Developer Manager
    - AI and Machine Learning Specialist
    - Quantum Machine Learning Analyst
- Additive manufacturing
    - 3D Material Scientists
    - 3D Printer Ink Developers
    - Manufacturing Process Consultants
- Big data analytics
    - Data Trust Officer
    - Data Engineer / Analyst / Architect
    - Data Ethicists
    - Data Broker
    - Business Intelligence Developer
    - Information Research Scientist
    - Work Gamifier

[50] UKCS Workforce Dynamics: The Skills Landscape 2019-2025, OPITO/Robert Gordon University, 2019.

- Augmented and virtual reality
  - AR/VR journey builder / content writers
  - UI (user interface) and UX (user experience) Designer
  - Avatar Relationship Managers
  - Reality Connector



Artificial intelligence is growing fast, as increased computational power and powerful algorithms are allowing patterns to be found in an increasing range and amounts of data. A growing amount of available data sets will allow companies to inform their decision-making. For example, energy companies are increasingly using field apps in their work, re cognising the importance of collecting data and providing analytical insights to field staff with the goal of improving business operation [51].

McKinsey[52] report the most common current AI capabilities of global electric power and natural gas industries are computer vision, machine learning, robotic process automation, virtual agents or conversational interfaces, and physical robots (which come in a variety of sizes and configurations providing different applications).

However, as these skills are in demand right across the UK economy, significant skills shortages exist in utilities companies, particularly in[53]:

- Technical roles
  - Only 2% of companies have people with skills to develop new algorithms (develop new AI software)
  - 14% have people with skills to implement AI (adapt existing software)
  - 16% have data scientists to prepare data sets for AI tools (train existing software)
- Strategic roles
  - Only 33% of companies have appropriate people to define the AI strategy
  - 51% have the right people to identify use cases

[51] Digitalisation Strategy Harnessing the power of digital technologies to create the network of the future, Western Power Distribution, 2020. (https://www.westernpower.co.uk/downloads-view-reciteme/171166)

[52] https://www.mckinsey.com/featured-insights/artificial-intelligence/global-ai-survey-ai-proves-its-worth-but-few-scale-impact

[53] Think:Act Artificial Intelligence in Utilities: a smart move, Roland Berger, 2018.

The top emerging roles and skills in this area are:

Top 10 Emerging Roles within Data & AI[54]	Top 15 Skills Requested for AI and Data Science Roles[55]	Top 15 Technical Skills Requested for AI and Data Science Roles[56]
■ Artificial Intelligence Specialist ■ Data Scientist ■ Data Engineer ■ Big Data Developer* ■ Data Analyst ■ Analytics Specialist ■ Data Consultant* ■ Insights Analyst* ■ Business Intelligence Developer* ■ Analytics Consultant (* refers to a niche as opposed to mass scale of opportunity)	■ Software Development Principles ■ Scripting Languages ■ Machine Learning ■ SQL Databases and Programming ■ Data Science ■ Project Management ■ Java ■ Data Analysis ■ Javascript and JQuery ■ Database Administration ■ Artificial Intelligence ■ System Design and Implementation ■ Microsoft Development Tools ■ Big Data	■ Python ■ SQL ■ Software Engineering ■ Software Development ■ Java ■ Javascript ■ C++ ■ Microsoft C# ■ LINUX ■ Microsoft Excel ■ Git ■ Scrum ■ Microsoft Azure ■ Docker Software ■ .Net

It will be crucial to provide new entrants into the sector with both these technical skills and also the required sector expertise/ industry context. This will require additional learning and could warrant new modules being developed and tacked onto existing provision.

Data Analytics skills must also be cultivated throughout the company, not just in the specialist areas, but across the business where data is utilised.

Two recent studies by Deloitte found that:

- Companies where all employees are trained on data analytics, 88% exceeded business goals, compared to 61% of companies in which only select employees have been trained[57]
- The impact of digital disruption on various groups of the UK utilities workforce will be[58]:
    - **Field Force**
        - Field force employees will need to be proficient at making fast-paced decisions by understanding the implications of data, turning them into solutions

[54] The Future of Jobs Report, World Economic Forum, 2020. (http://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf)

[55] Understanding the UK AI Labour Market: 2020, Ipsos MORI, 2021.

[56] Understanding the UK AI Labour Market: 2020, Ipsos MORI, 2021.

[57] https://www2.deloitte.com/us/en/insights/topics/analytics/insight-driven-organization.html

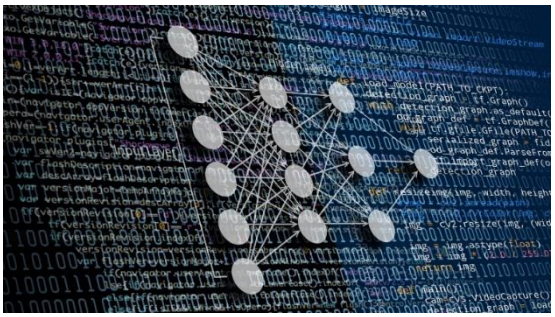
[58] The Connected Employee: the utility's most important asset, Deloitte, 2017 (https://www2.deloitte.com/content/dam/Deloitte/es/Documents/energia/Deloitte-ES-Energia-el-empleado-concectado.pdf)

        - The automation of manual processes will reduce time spent on routine work, so field force roles will have greater involvement in strategic decisions, requiring internal and external connectedness within the company
        - Effective communication skills will be necessary with increased interactions with members of other parts of the company
    - **Back Office** (finance, procurement, supply chain, IT)
        - Transitioning away from routine tasks to strategy and problem-solving
        - This will also involve creativity and critical thinking in understanding how to work alongside automated processes
    - **Customer engagement centres**
        - Customer contact employees will work alongside digital technology, requiring interpersonal skills, empathy, creative thinking, and listening skills
    - **Leadership**
        - The digital disruption of automation and new technologies will present challenges and opportunities
        - Leaders will need to embrace skills such as adaptability, decisiveness, social flexibility, resilience, and agility

Supporting the IT infrastructure needed to implement the above will involve a greater role for **IT Technicians**. Employers in the green industries will face stiff competition from other sectors when trying to attract the most talented IT Technicians.[59]

Acquiring the necessary skills

By utilising existing education and qualification provision, obtaining the necessary core skills should be relatively straightforwardly – however, as these skills are also demanded across much of the economy, supply of such skills may be lacking. For example, demand for data scientists and data engineers has risen by over 231% in the past five years[60].



The importance of work placements or practical experiences that demonstrate the intersection between data knowledge, business, and the power sector cannot be understated.

[59] Skillfile #313 Information Technology Technicians, Suffolk Growth Partnership, accessed from https://www.suffolkgrowth.co.uk/technical-skills-legacy.

[60] Dynamics of Data Science Skills: How can all sectors benefit from data science talent? The Royal Society, 2019. (https://royalsociety.org/-/media/policy/projects/dynamics-of-data-science/dynamics-of-data-science-skills-report.pdf?la=en-GB&hash=212DAE7D599B0A48687B372C90DC3FEA)

Promoting Apprenticeships in this field can boost AI technical skills along with knowledge and experience of working in energy and utilities, which is key for successful employees. Likewise, gaining an understanding of business skills is vital for AI specialists and data scientists, as data must be used and analysed in conjunction with a business problem or business context.

Of the nine Apprenticeship Standards identified in Annex 2 as relating to cyber security and data, only two of them (Level 3 Data Technician and Level 4 Data Analyst) had training provision within HEY and surrounding area.

To meet more short-term AI and data skill needs, companies need to make the most of the people and skills they already have. A study by Burning Glass Technologies[61] suggests that around 200 new technology occupations[62] have "adjacent roles" which have the potential to be reskilled or upskilled at a lower cost. Employees with comparable skillsets can thus be strategically upskilled to integrate new skills within the organization.

Finally, The Royal Society reports[63] that there is value in companies allowing their data scientists to donate their time to applying their skills to societal challenges. For example, through pro bono project work along the lines of DataKind UK[64], the Royal Statistical Society's Statisticians for Society programme[65], and hackathon events.

[61] Skills of Mass Disruption: Pinpointing the 10 Most Disruptive Skills in Tech, Burning Glass Technologies, 2020. (https://www.burning-glass.com/wp-content/uploads/2020/12/Skills-of-Mass-Disruption-Report.pdf)

[62] Within the areas of AI and machine learning, cloud technologies, IT automation, natural language processing, proactive security and software development.

[63] Dynamics of data science skills, The Royal Society, May 2019.

[64] https://datakind.org.uk/

[65] https://rss.org.uk/membership/volunteering-and-promoting/statisticians-for-society-initiative/

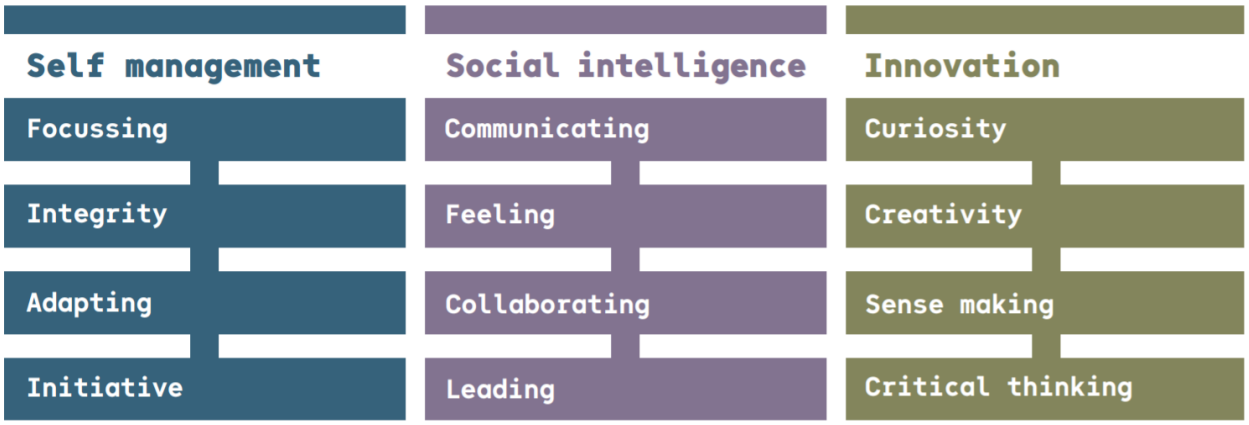
5.10 Core/Meta skills

In addition to the "technical" skills discussed above, a wide range of "soft skills" are becoming increasingly sought after.

These skills are not just to help us cope in this environment of ongoing change. They are timeless, higher order skills that create adaptive learners and promote success in whatever context the future brings[66].

These skills and capabilities themselves are not new, but we do need to increase the value that society, and employers in particular, places on them so that they are held by more people and in greater depth.

The skills have been classified under three headings:



There are many interrelationships and dependencies between these skills. For example, the capacity to focus on a challenge to allow for creativity and innovation in coming up with solutions will need initiative to make these ideas become a reality. Concepts such as emotional intelligence, entrepreneurialism and confidence are made up of components that are represented across the model.

Research by McKinsey[67] identified the 56 foundational skills that foster a productive workforce in the age of AI and automation, encompassing cognitive, interpersonal, self-leadership, and digital skills.

[66] Skills 4.0: A skills model to drive Scotland's future, Skills Development Scotland/Centre for Work-based Learning in Scotland, 2018.

[67] https://www.mckinsey.com/industries/public-and-social-sector/our-insights/defining-the-skills-citizens-will-need-in-the-future-world-of-work

Figure 14: Foundational skills that foster a productive workforce

It is likely that people will stand out more for their creativity than their productivity[68]. By emphasising the creative aspect of STEM careers (adding "Arts" to create STEAM?), it might entice those who might not otherwise consider a STEM career.

[68] Creativity will be key to competing against AI in the future workforce - here's how (https://www.weforum.org/agenda/2020/11/ai-automation-creativity-workforce-skill-fute-of-work/?utm_source=sfmc&utm_medium=email&utm_campaign=2735990_Agenda_weekly-13November2020&utm_term=&emailType=Newsletter)

6 Skills in short supply

Many employers in the green industries report difficulties in recruiting a wide range of skilled trades, including[69]:

- Ecologists
- Middle managers with trade backgrounds
- Offshore Project Managers who can manage finance, tax, personnel and cross-border issues
- Pipe Fitters
- Scientists
- Site Managers
- Steel Fixers
- Welders

Furthermore, research conducted for the National Skills Academy for Power by Energy & Utility Skills (2021, unpublished) found that the most urgent need for a sustainable pipeline of new talent lay in:

- Ground Source Heat Pumps installers
- EV Mechanics
- EV Charging Point Installers – Domestic and public/contractors
- Digital right across the craft-level workforce
- Artificial Intelligence Specialist
- Data Analysts, Scientists and Engineers
- Cyber Security Engineers and Architects

[69] The Technical Skills Legacy for Norfolk and Suffolk: ANNEX 2 – Evidence, Pye Tait Consulting, January 2020.

Looking forward over the next five years, hard-to-recruit skills are expected in:

- Traditional construction crafts and trades:
    - Labourers
    - Carpenters/Joiners
    - Bricklayers/Masons
- More highly skilled roles:
    - Designers
    - Welders
    - Qualified Electricians

In recent research, more than two-thirds of businesses that employed the following roles expected their workforce in these roles to increase over the next five years[70]:

- Chartered Architectural Technologists
- Quantity Surveyors
- Steel Erectors
- Construction Project Managers and related
- Construction Supervisors
- Engineering Technicians
- Scaffolders, Stagers and Riggers

The UK's current Shortage Occupations list contains many of the job roles detailed above and throughout this report. While the purpose of this list is the help employers recruit skilled workers from outside of the UK more quickly and easily that would otherwise be the case under the Skilled Worker route[71], there is an onus on UK industry to work towards self-sufficiency in these areas.

[70] The Technical Skills Legacy for Norfolk and Suffolk: ANNEX 2 – Evidence, Pye Tait Consulting, January 2020.

[71] https://www.gov.uk/government/publications/uk-points-based-immigration-system-employer-information/the-uks-points-based-immigration-system-an-introduction-for-employers#skilled-worker-route.

Figure 15: Relevant occupations to the green industries that are currently on the UK's Shortage Occupation List

Job title		
Biological Scientists and Biochemists – all jobs	Physical scientists – only the following jobs in the oil and gas industry: • Geophysicist • Geoscientist • Geologist • Geochemist Technical Services Manager in the decommissioning and waste areas of the nuclear industry Senior Resource Geologist and staff geologist in the mining sector	Civil Engineers – all jobs
Mechanical Engineers – all jobs	Electrical Engineers – all jobs	Electronics Engineers – all jobs
Design and Development Engineers – all jobs	Production and Process Engineers – all jobs	Engineering professionals not elsewhere classified – all jobs
IT Business Analysts, Architects and Systems Designers – all jobs	Information Technology and Communications professionals not elsewhere classified – only Cyber Security Specialists	Quality Control and Planning Engineers – all jobs
Laboratory Technicians – all jobs	Welding trades – only high integrity pipe welders, where the job requires 3 or more years' related on-the-job experience	

Source: Skilled Worker visa: shortage occupations, Updated 6 October 2021, accessed from https://www.gov.uk/government/publications/skilled-worker-visa-shortage-occupations/skilled-worker-visa-shortage-occupations.

Skills shortages in the green industries appear to be driven largely by:

1. A lack of people wanting to join the industry (particularly young people), caused a lack of knowledge about the potential opportunities on offer
2. A general shortage of job applicants given the number and scale of major national infrastructure projects (see section 4.1 above)
3. Competitors offering better salaries and benefits
4. Insufficiently skilled, qualified and experienced applicants
5. The specialist and complex nature of certain roles
6. Being unable to find training that directly aligns to industry needs

7 The supply of skills in the HEY LEP region and surrounding area

7.1 General labour market conditions

Across the UK economy as a whole, the most recent data[72] show the labour market continuing to recover from the effects of the Coronavirus pandemic:

- Payrolled employees increased by 207,000 people (0.7%) over the past month (up 1,008,000 people (3.6%) over the past year)
- The employment rate increased by 0.5% over the quarter to 75.3%
- The unemployment rate decreased by 0.4% over the quarter to 4.5%
- The economic inactivity rate decreased by 0.2% over the quarter to 21.1%
- Redundancies fell by 5,000 over the quarter to 99,000 (130,000 fewer than a year ago)
- Vacancies reached another record high of 1,102,000 during the quarter
- Total hours worked increased by 39.9million over the quarter to 1.02billion hours

Figure 16: Quarterly and annual change in the principal labour market indicators (August 2021)

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

Source: Labour market overview, UK: October 2021, ONS.

Although the headline economic indicators are positive, they do mean that the labour market is returning to recent trend of being very "tight", an issue exacerbated by Brexit and COVID-19 pandemic.

[72] Labour market overview, UK: October 2021, ONS.

Although there is little evidence that Brexit has had any real impact specifically on the energy sector, the impact of the COVID-19 pandemic did hit the recruitment of Apprentices during the September 2020 in-take. However, this does appear to have been a short-term impact.

The impact of Brexit more widely on the broader construction and infrastructure sector has been much more significant.

Recent research by CITB[73] estimates that the number of migrant workers in the UK construction industry fell by 8.3% (-25,000) in 2020 compared to the year before. They also report that the proportion of migrant construction workers aged under 25 fell by six percentage points from 9% in 2019 to just 3% in 2020 and in London, where half of the construction workforce are migrant workers, the number of migrants fell by 15% from 145,000 in 2019 to 125,000 in 2020.

In terms of the impact of this on wage inflation, ONS data shows year-on-year wage rises, including bonuses and arrears, peaked at +15% nationwide in May 2021 and continued to record an above average +6% in September 2021 against a whole economy reading of +4%, supporting anecdotal evidence that labour shortages are driving up prices.

These increasing wage pressures and the rising cost of raw materials are hampering employers' ability to recruit and train a skilled workforce, just as the construction industry is being asked to be the catalyst for a post-COVID resurgence in productivity. This means that the pressures associated with the end of EU freedom of movement are coinciding with others on skills and materials that will lead to higher costs and potential project delays in the immediate future.

7.2 Local labour market condition

The table below highlights the variations that exist around the country, the Yorkshire & Humber region and the constituent local authorities of the HEY LEP region and surrounding area across 15 different labour market measures. Each local authority has been rated red or green depending upon their performance against the Yorkshire & Humber region average for each measure.

On average, each local authority is rated "worse" than the regional average on 10 of the 15 measures. An explanation of each measure, and how they have been interpreted, is provided in Annex 1.

However, as labour markets are extremely complicated concepts and rarely conform to a statistical summary based on a wide range of factors, this analysis should be treated with a degree of caution.

Accepting this caveat, based on this analysis, it is likely that sourcing a ready-skilled workforce in Kingston upon Hull and North East Lincolnshire is likely to be more difficult than average. Therefore, employers in these areas should think carefully about their resourcing strategy and the extent to which they seek ready-skilled workers or develop entry routes which can support people from within these communities to make the most of the opportunities in green industries.

In East Riding of Yorkshire and York sourcing a ready-skilled workforce could be easier than average.

[73] Migration and UK Construction 2021, CITB, 2021.

Figure 17: Comparison between HEY LEP local authorities against regional and national performance on a range of economic indicators

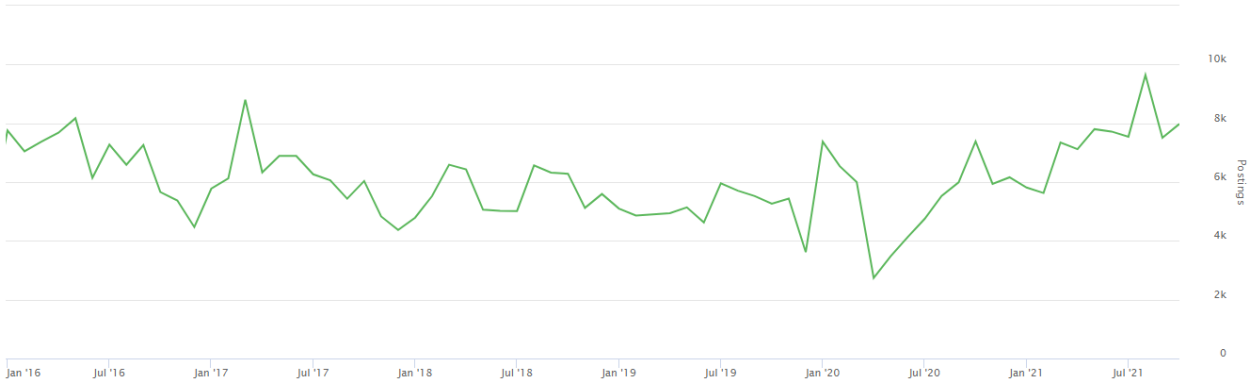
Nation/ Region	Resident Population				Economic Status			Annual salary growth (All sectors)
	Forecast Growth All people (2021-2040)	Forecast Growth 16-24-year-olds (2021-2040)	% of working age population from an ethnic minority	% of 16-19-year-olds from an ethnic minority	Employment rate	Unemployment rate	Economic inactivity rate	
Great Britain	**7.3%**	**7.8%**	**13.7%**	**20.8%**	**74.4%**	**5.0%**	**21.6%**	**0.3%**
Yorkshire & Humber region	**5.4%**	**6.7%**	**9.0%**	**15.9%**	**73.5%**	**5.0%**	**22.4%**	**1.3%**
Kingston upon Hull	0.2%	6.2%	3.8%	*	71.8%	5.8%	23.4%	5.1%
East Riding of Yorkshire	4.3%	1.7%	1.3%	*	78.4%	5.5%	21.6%	4.6%
North Lincolnshire	2.3%	1.5%	5.9%	*	73.2%	4.8%	23.7%	6.6%
North East Lincolnshire	-0.8%	1.7%	1.9%	*	69.5%	5.0%	26.2%	8.4%
York	2.2%	6.5%	8.5%	11.6%	77.2%	3.6%	20.6%	7.6%
Selby	12.5%	10.9%	*	*	77.9%	3.2%	20.0%	7.5%
Source & date	ONS Population Projections		Annual Population Survey, 2020		Labour Market Profile, ONS, June 2021			Full-time, annual gross pay, ASHE (Table 8), 2021

Nation/ Region	Education & Skills						Skills shortages All Sectors	Number of metrics rated "worse" than UK average (out of 15)
	16-24-year-olds not in education, employment or training	% with no quals	% with no quals (16-24)	% with A Level+	HE STEM Starts Female	HE STEM Starts Ethnic minority		
Great Britain	**6.8%**	**6.5%**	**8.1%**	**43.1%**	**27.6%**	**28.3%**	**24%**	**N/A**
Yorkshire & Humber region	**7.8%**	**7.2%**	**8.2%**	**37.0%**	**27.6%**	**24.2%**	**21%**	**N/A**
Kingston upon Hull	9.6%	11.5%	8.4%	23.7%	29.7%	18.0%	27%	12
East Riding of Yorkshire	5.9%	4.5%	7.4%	41.5%	33.6%	5.8%	24%	6
North Lincolnshire	6.7%	7.5%	11.4%	32.4%	25.8%	13.0%	9%	10
North East Lincolnshire	10.0%	12.1%	10.1%	25.5%	21.2%	12.7%	26%	12
York	6.3%	5.4%	7.9%	47.1%	25.4%	10.0%	16%	7
Selby	N/K	7.8%	*	29.3%	*	*	*	2 out of 8
Source & date	Young people not in education, employment or training (NEET), UK: August 2021	Annual Population Survey, 2020			HESA, 2018/19			Median - 8

7.3 Recent trends in online job postings

Similar to the whole of the UK economy (with the possible exception of London), the HEY LEP economy has bounced back strongly from the impact of the Coronavirus pandemic, with online vacancies in August 2021 reaching a record high of 9,600 (since the data was first collected in 2012).

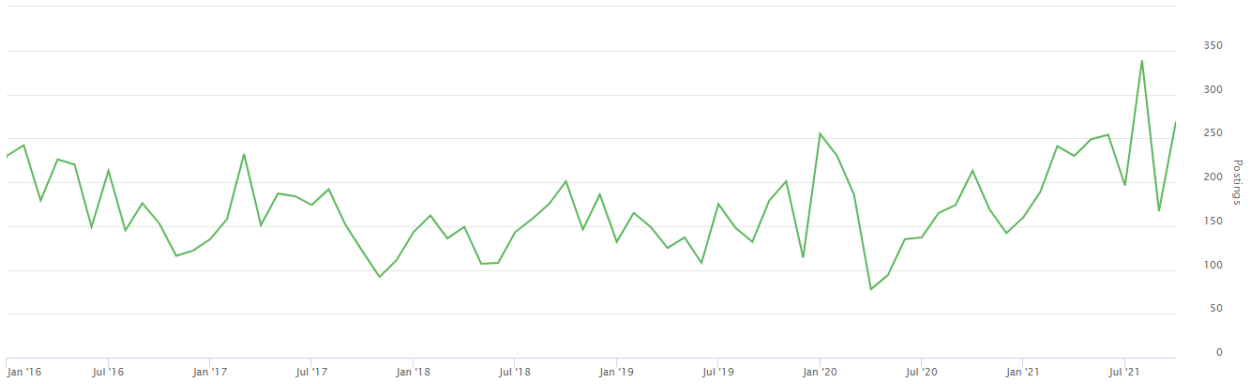
Figure 18: Number of online job postings per month in the HEY and surrounding area (all sectors)



Source: Burning Glass Technologies, 2021.

In terms of the demand for "green skills" across HEY and surrounding area, August saw a record high number of job postings of 339.

Figure 19: Number of online job postings per month in HEY and surrounding area (Green Skills)



Source: Burning Glass Technologies, 2021.

The top ten occupations requiring these skills were:

- Plumber
- HVAC Mechanic / Installer
- Maintenance Technician
- Electrical Engineer
- Mechanical Engineer

- Electrician
- Production Worker
- Construction Helper / Worker
- Project Manager
- Civil Engineer

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

- Plumbing
- Teamwork / Collaboration
- Customer Service
- Renewable Energy
- HVAC
- Project Management
- Budgeting
- Key Performance Indicators (KPIs)
- Boilers
- Sales

It is interesting to note that six of the top ten skills being sought were generic/non-technical i.e. teamwork, customer service, project management, budgeting, KPIs and sales.

It should also be noted that all of the skills areas that are "technical" in nature, all of them relate to those that are largely domestic/micro-generation (with the exception of Renewable Energy, which would include some larger generating technologies).

The median salary of job postings in HEY and surrounding area that required green skills was £32,200, which is significantly higher than the median of £26,100 on offer across all sectors of the economy. However, it is a lower than the £35,000 on offer for green skills across the whole of the UK.

Nearly two-thirds (59%) of job postings in HEY and surrounding area that required green skills required 3-5 years' experience, which is similar to the UK figure for the same skills (54%). However, it is significantly higher than the 33% of postings across the HEY LEP economy as a whole that require 3-5 years' experience. This could present a challenge to the green industry in HEY and surrounding area as it relies on the external labour market to deliver these skills, rather than employers investing in and developing their own talent pipelines. This competition for skilled people could drive up wage demands and staff turnover rates amongst these jobs and reinforcing the disincentive to invest in trainees for the fear of losing them once they complete their training.

Just 30% of job postings in HEY and surrounding area that required green skills required a degree or higher, compared to 49% of similar job postings across the UK green skills economy. and 38% of job postings across the HEY LEP economy as a whole. This reflects the dominance of domestic/micro-generation jobs in the green economy at the moment, which generally require craft-level skills.

7.4 Levels of diversity in the resident population and workforce

9% of the Yorkshire and Humber region's 16+ population are from an ethnic minority background. On the whole, the same population within HEY and surrounding area is less ethnically diverse, ranging from a high of 9% in York, down to just 1% in the East Riding of Yorkshire.

Figure 20: Proportion of the resident population that are from an ethnic minority

Local area	Total 16+ population	16-19-year-olds	50+ year-olds
Yorkshire and The Humber	9%	16%	4%
York	9%	12%	3%
North Lincolnshire	6%	*	4%
Kingston upon Hull, City of	4%	*	*
North East Lincolnshire	2%	*	1%
East Riding of Yorkshire	1%	*	1%
Selby	*	*	*

Source: Annual Population Survey, July to June 2021, ONS.

* Denotes data sample is too small to be reliable.

However, it is important to recognise that the younger age groups of the population are more ethnically diverse than the older age groups. Across the region, just 4% of people aged 50+ are from an ethnic minority.

32% of the Yorkshire and Humber region's 16+ population are EA or work-limiting disabled[74]. On the whole, a lower proportion of HEY and surrounding area's population are classified as such – ranging from a high of 30% in Hull, down to 18% in York.

Figure 21: Proportion of the resident population that are EA or work-limiting disabled

Local area	Total 16+ population
North East Lincolnshire	32%
Kingston upon Hull	30%
Yorkshire and The Humber	25%
East Riding of Yorkshire	21%
North Lincolnshire	21%
Selby	19%
York	18%

Source: Annual Population Survey, July to June 2021, ONS.

The tables below show how the proportion of females, ethnic minorities and those with disabilities vary by broad industrial and occupational groups across the Yorkshire and Humber region.

Figure 22: Gender, ethnicity and disability status of the Yorkshire and Humber region workforce – Selected industry sections

Industry Section	SIC Description	% Female	% ethnic minority	% EA disabled
A	Agriculture, forestry and fishing	23%	0%	20%
D	Electricity and gas	29%	0%	13%
E	Water supply, sewerage and waste	22%	3%	9%
F	Construction	13%	4%	13%
H	Transport and storage	21%	12%	16%
J	Information and communication	26%	8%	12%
M	Professional, scientific and technical activities	40%	8%	14%

Source: Annual Population Survey, July to June 2021, ONS.

Across all of the broad industry sections of the regional economy that are relevant to the green economy, levels of gender, ethnicity and disability diversity are below those seen across the resident working age population.

[74] The Equality Act 2010 (EA) core definition includes people of working age (16-64) who have a long-term physical or mental health condition that affects their day-to-day activities. Work-limiting disabled includes those who have a long-term disability which affects the kind or amount of work they might do.

8 Pathways into the green economy

As well as facilitating the transitioning of skills and people from other industries, preparing young people for the world of work is key to long-term productivity and competitiveness. As well as being critical for the area's economic future, recruiting and developing young people benefits organisations now, through improving workforce diversity, bringing in new ideas and skills, and helping to build talent pipelines.

The promotion of green careers to young people is essential if the workforce of the future is to be available with the right skills at the right time – and with the passion and understanding of how to access those careers. It is worth noting that the labour market entrants of 2030 are in Year 5 now – highlighting the need to engage with young people well before post-16 options are being considered.

Figure 23: Age of current school students and their likely entry into the labour market

School Year	Age in 2021/22 academic year	Year entering the workforce (aged 19)
Year 13	17-18	2022
Year 12	16-17	2023
Year 11	15-16	2024
Year 10	14-15	2025
Year 9	13-14	2026
Year 8	12-13	2027
Year 7	11-12	2028
Year 6	10-11	2029
Year 5	9-10	2030

Supporting young people to find jobs and fulfilling careers is a collective responsibility, requiring action from a range of organisations, including policy-makers, educators and businesses themselves

There are a range of programmes available to employers to support them in their engagement, recruitment and training of both the current and future workforce – each of them is considered below.

HEY LEP should work to promote all these services to its employers to ensure maximum take-up.

8.1 Apprenticeships

This study has found more than 80 different Apprenticeship Standards that are currently available and relevant, to varying degrees, to the green industries (full details of these can be found in Annex 2). However, the extent to which they are available within the vicinity of HEY and surrounding area varies considerably.

Of the 80+ different Standards, around half of them are not currently delivered within HEY and surrounding area (based on information provided by the Institute for Apprenticeships website).

Only around a dozen Standards have more than two training providers operating locally (although there a number of nationwide providers who deliver at the apprentice's workplace).

Given the characteristics of the Yorkshire and Humber resident population, the following benchmarks are appropriate for Apprenticeship starts:

- Gender = 50%
- Ethnicity = 16%
- Disability = 25% (although given the physical nature of many of the Apprenticeship Standards, this proportion of disabled starts may not be achievable or appropriate in all cases)

The table below shows the total number of starts by sector subject area, along with the proportion of starts that are female and from an ethnic minority.

Figure 24: Number of starts on relevant Apprenticeship sector subject areas, by gender and ethnicity within each HEY LEP local authority (2020/21)

Sector subject area	Yorkshire & Humber region	Kingston upon Hull	East Riding	North East Lincs	North Lincs	Selby	York
Agriculture, Horticulture and Animal Care	2,220 F = 43% EM = 0%	80 F = 50% EM =0%	200 F = 30% EM = 0%	100 F = 40% EM = 0%	100 F = 20% EM = 0%	80 F = 50% EM = 0%	80 F = 25% EM = 0%
Construction, Planning and the Built Environment	11,720 F = 6% EM = 4%	910 F = 9% EM =0%	1,170 F = 5% EM = 0%	430 F = 9% EM = 0%	560 F = 7% EM = 5%	190 F = 11% EM = 10%	390 F = 10% EM = 2%
Engineering and Manufacturing Technologies	20,030 F = 9% EM = 11%	1,870 F = 6% EM =9%	4,190 F = 12% EM = 13%	630 F = 13% EM =14%	1,000 F = 12% EM = 4%	300 F = 7% EM = 0%	510 F = 8% EM = 12%
Information and Communication Technology	5,960 F = 30% EM = 14%	270 F = 30% EM = 0%	320 F = 31% EM =0%	120 F = 33% EM = 0%	160 F = 38% EM =24%	80 F = 50% EM = 0%	160 F = 25% EM = 0%
Science and Mathematics	80 F = 50% EM = 0%	0	0	40 F = 0% EM = 0%	0	0	0

Source: Accessed from https://explore-education-statistics.service.gov.uk/data-catalogue/apprenticeships-and-traineeships/2020-21.

There are very few areas where the proportion of starts exceeds the regional figure for gender or ethnicity. The exceptions being

- Gender
  - Agriculture, Horticulture and Animal Care in Hull and Selby
  - Information and Communication Technology in Selby
- Ethnicity
  - Information and Communication Technology in North Lincolnshire

In all other areas, there is work to be done to make these Apprenticeships more attractive to females and those from an ethnic minority.

The proportion of starts which have a physical or learning disability within relevant sector subject areas is only available at the national level:

- Agriculture, Horticulture and Animal Care 20%
- Construction, Planning and the Built Environment 15%
- Engineering and Manufacturing Technologies 12%
- Information and Communication Technology 10%
- Science and Mathematics 9%

All of these sector subject areas fall short of the 25% of resident population with a learning or physical disability.

In addition to those Standards which are currently available, a small number of new Standards are currently being developed:

- Domestic Electrician at level 3 (ST1017)[75]
- Low Carbon Heating Technician at level 3 (ST1020)[76]
- All Energy Engineering Technician Apprentice being led by OPITO

The Government is currently consulting on the concept of a "flexible Apprenticeship", that would enable an apprentice to complete their programme with a number of different employers. Although initial aimed at construction, agriculture and, mostly, the creative industries, such a concept may be interest to energy companies and their supply chains.

Such "shared Apprenticeship" initiatives are already running in parts of England. Relevant examples include:

[75] https://www.instituteforapprenticeships.org/apprenticeship-standards/domestic-electrician

[76] https://www.instituteforapprenticeships.org/apprenticeship-standards/low-carbon-heating-technician

- **TrAC** (https://www.tracweb.co.uk/)
- **EN:Able Futures** (https://www.efficiencynorth.org/futures-(1)/shared-apprenticeship-service)
- **CITB** (https://www.citb.co.uk/courses-and-qualifications/citb-apprenticeships/take-on-an-apprentice/types-of-apprenticeships/shared-apprenticeship-scheme/what-is-the-shared-apprenticeship-scheme/)
- **Thames Water** (https://www.thameswater.co.uk/about-us/newsroom/latest-news/2021/oct/thames-water-to-launch-leading-shared-apprenticeships)

Finally, a reasonable benchmark figure to aim in this respect would be around 5%.

- In 2020, Apprentices accounted for 5.4% of Procurement Skills Accord[77] signatories' workforces
- Members of The 5% Club[78] aspire to achieve 5% of their workforce in "earn and learn" positions (including apprentices, sponsored students and graduates on formalised training schemes) within five years of joining

If the green industries in HEY and the surrounding area were to have an ambition of having at least 5% of its workforce being on an Apprenticeship programme, this would mean around 1,500 (of the current 29,500) being on-programme at any one time.

8.2 T Levels

T Level programmes are two-year, full-time study programmes, intended for 16-year-olds in England.

The policy aim is that 16-year-olds have a choice of A Levels, T Levels or Apprenticeships. The T Level programme is designed as converse to Apprenticeships. So, whereas an Apprenticeship is 80% workplace based and 20% off-the-job training, a T Level programme is 80% classroom-based study, with 20% on a high-quality Industry Placement, ideally intended to be taken *en bloc* with a single employer.

T Level programmes include new, large and rigorous Level 3 qualifications, most of which are either in development or yet to commence development.

Although it was originally planned, there is no discrete T Level programme for the energy and utilities sector, but the Institute for Apprenticeships and Technical Education is keen to work with the sector on developing qualifications and progression routes that will meet the sector's needs.

[77] https://www.euskills.co.uk/about/energy-utilities-skills-partnership/skills-accord/

[78] https://www.5percentclub.org.uk/about/

It is widely acknowledged that T Levels face substantial challenges: they are new, the programmes are hard, there is generally a shortage of employers who can provide the Industry Placements, staff that can teach the courses can be difficult to find, and how well prepared a T Level learner is for either employment or progression to other programmes is unclear, as are the progression routes themselves.

There has been a progressive softening of policy lines around T Levels, and the Education Secretary recently made a statement that other qualifications (that T Levels are intended to replace, principally BTECs) will still be around for the foreseeable future.

On the plus side, if a T Level approach doesn't suite the sectors' needs, the Institute have indicated that they are very willing to work with the sector to design something that both meets their criteria and meets the sectors' need. So, there is an opportunity and an infrastructure in place to develop new qualifications and standards that are better than what are currently in place.

It is planned that T Levels relevant to the green industries will be available on the following timeline:

- September 2020
    - design, surveying and planning for construction
    - digital production, design and development
- September 2021
    - building services engineering for construction
    - digital business services
    - digital support and services
    - onsite construction
    - science
- September 2022
    - design and development for engineering and manufacturing
    - engineering, manufacturing, processing and control
    - maintenance, installation and repair for engineering and manufacturing
- September 2023
    - animal care and management
    - agriculture, land management and production

The T Level qualification in *Maintenance, Installation and Repair for Engineering and Manufacturing*[79] will be particularly relevant to many of the green industries considered in this report as it will have the following specialisms:

- Maintenance engineering technologies: Mechanical
- Maintenance engineering technologies: Mechatronic
- Maintenance engineering technologies: Electrical & Electronic
- Maintenance engineering technologies: Control & Instrumentation
- Maintenance, installation, and repair: Light and Electric Vehicles

However, it should be noted that, at the moment, the closest provider of this qualification is 42 miles away from Hull at Wakefield College.

A list of the (currently 44) providers in the Yorkshire & Humber region that have been selected to deliver T Levels can be found here: https://www.gov.uk/government/publications/providers-selected-to-deliver-t-levels.

8.3 Traineeships

The CITB has worked with Further Education (FE) bodies and government to create occupational traineeships that provide learners with a combination of work experience and training that will prepare them for a job or Apprenticeship in construction.

Based on a bricklaying standard developed by CITB, a pilot programme with 20 students at Hartlepool College saw 64% of learners who completed the Occupational Traineeship move from FE into a job or Apprenticeship in construction, compared to 41% with existing construction-related FE courses.

Based on the success of the pilot, CITB is working with partners to develop further standards in Carpentry & Joinery, Plastering, and Painting & Decorating and to expand the existing one.

As well as directly raising the number of FE learners going into construction, Traineeships will create a platform for employers and FE to work together to create better ways to prepare leaners for work.

This programme represents a useful entry point for lower skilled people to begin their green careers.

8.4 Skills Bootcamps

Skills Bootcamps are a new form of flexible skills provision, designed to be short interventions, at Level 3 and up, that can equip both employed and unemployed people with new skills to allow them to take advantage of the opportunities presented by an economy that recovering from Covid, becoming more technological and working towards Net Zero.

[79] https://www.instituteforapprenticeships.org/t-levels/t-level-information-hub/t-level-in-maintenance-installation-and-repair-for-engineering-and-manufacturing/

Skills Bootcamps are a radical departure from usual DfE policy. They have recently been applied to help fix the shortage of HGV drivers. The speed of deployment, and the marked lack of bureaucracy (which could present a risk to quality) could help to meet surges in demand for green skills such as **electrical vehicle installation** skills, **heat pump installation** skills, and possibly **hydrogen** technology skills.

At the moment there are Skills Bootcamps available across England in construction, digital, engineering and manufacturing and green skills. However, very few of these courses are currently running within HEY and surrounding area (something that the DfE will seek to address in the third wave of procurement), the exception being five Digital Bootcamps that are due to start in January 2022.

8.5 Free Level 3 qualifications

Free Level 3 qualifications for those aged 19 or over and do not already have a Level 3 qualification can be obtained in a wide range of green-related subject areas[80]:

- Agriculture
- Building and construction
- Digital
- Engineering
- Environmental conservation
- Horticulture and forestry
- Mathematics and statistics
- Science
- Transportation operations and maintenance
- Warehousing and distribution

A full Level 3 qualification is equivalent to an advanced technical certificate or diploma, or 2 A levels.

There are around 30 providers of these in the Yorkshire and Humber region.

From April 2022, anyone earning below the National Living Wage or are unemployed will also be able to access these qualifications for free, regardless of any prior qualifications they may have.

[80] https://www.gov.uk/government/publications/find-a-free-level-3-qualification/list-of-free-level-3-qualifications-available-to-eligible-adults#transportation-operations-and-maintenance

8.6 Higher Education

In 2019/20, there were 18,874 first year degree starts in higher education institutions located in the Yorkshire and Humber region.

- Gender: 35% of these starts were female
- Ethnicity: 24% of these starts were from an ethnic minority

In the tables below, those subjects were the proportion of starts that are female is less than 50% and the proportion of starts that are from an ethnic minority is less than 16% are coloured red.

Figure 25: Number of starts in relevant HE subjects in institutions located in the Yorkshire and Humber region - % of these that were female and from an ethnic minority

Subject (CAH3 hierarchy)	First year starts	% Female	% ethnic minority
(CAH02-03-04) Environmental and public health	345	64%	39%
(CAH03-01-01) Biosciences (non-specific)	310	66%	46%
(CAH03-01-02) Biology (non-specific)	585	63%	16%
(CAH03-01-03) Ecology and environmental biology	155	56%	6%
(CAH03-01-04) Microbiology and cell science	120	62%	18%
(CAH03-01-05) Plant sciences	*	*	*
(CAH03-01-06) Zoology	130	64%	9%
(CAH06-01-01) Animal science	*	*	14%
(CAH06-01-02) Agricultural sciences	*	*	*
(CAH06-01-03) Agriculture	*	*	*
(CAH06-01-07) Food sciences	155	69%	28%
(CAH07-01-01) Physics	585	24%	13%
(CAH07-02-01) Chemistry	720	46%	18%
(CAH07-03-01) Physical sciences (non-specific)	*	*	*
(CAH07-03-02) Earth sciences	200	42%	6%
(CAH07-03-03) Materials science	85	26%	16%
(CAH07-03-04) Forensic and archaeological sciences	200	71%	12%
(CAH08-01-01) Sciences (non-specific)	195	55%	79%
(CAH08-01-02) Natural sciences (non-specific)	105	58%	12%
(CAH09-01-01) Mathematics	1,030	41%	17%
(CAH09-01-03) Statistics	265	56%	30%
(CAH10-01-01) Engineering (non-specific)	450	15%	32%
(CAH10-01-02) Mechanical engineering	1,045	10%	25%
(CAH10-01-03) Production and manufacturing engineering	410	15%	25%
(CAH10-01-07) Civil engineering	1,095	24%	27%
(CAH10-01-08) Electrical and electronic engineering	1,470	20%	27%

Subject (CAH3 hierarchy)	First year starts	% Female	% ethnic minority
(CAH10-01-09) Chemical, process and energy engineering	805	30%	40%
(CAH10-01-10) Others in engineering	50	19%	33%
(CAH11-01-01) Computer science	2,220	21%	30%
(CAH11-01-02) Information technology	115	25%	31%
(CAH11-01-03) Information systems	380	41%	33%
(CAH11-01-04) Software engineering	535	15%	38%
(CAH11-01-05) Artificial intelligence	135	28%	29%
(CAH11-01-06) Computer games and animation	390	19%	9%
(CAH11-01-07) Business computing	55	33%	36%
(CAH11-01-08) Others in computing	115	19%	33%
(CAH12-01-01) Geography (non-specific)	75	53%	5%
(CAH12-01-02) Physical geographical sciences	200	60%	5%
(CAH12-01-03) Human geography	660	61%	9%
(CAH12-01-04) Environmental sciences	205	57%	12%
(CAH12-01-05) Others in geographical studies	215	42%	6%
(CAH13-01-02) Building	715	21%	19%
(CAH13-01-03) Landscape design	285	70%	13%
(CAH13-01-04) Planning (urban, rural and regional)	575	52%	11%
(CAH15-02-01) Economics	1,460	39%	27%
Total	**18,875**	**35%**	**24%**

Source: HESA Student Record 2019/20.

** Denotes data is suppressed for confidentiality reasons*

The table below shows the number of these starts in each of the institutions located in the Yorkshire and Humber region.

Figure 26: Number of starts in relevant HE subjects in institutions located in the Yorkshire and Humber region - % of these that were female and from an ethnic minority

Institution	First year starts	% Female	% ethnic minority
The University of Leeds	4,555	41%	19%
The University of Sheffield	4,375	39%	18%
The University of York	2,965	40%	17%
Sheffield Hallam University	2,340	20%	21%
The University of Huddersfield	1,280	29%	49%
Leeds Beckett University	1,220	25%	26%

Institution	First year starts	% Female	% ethnic minority
The University of Hull	960	28%	11%
The University of Bradford	895	31%	74%
York St John University	255	33%	13%
Leeds Trinity University	25	4%	33%
Total	**18,875**	**35%**	**24%**

Source: HESA Student Record 2019/20.

In 2018/19, there were 4,920 graduates with a pass in a STEM-relevant, first Degree course from an HE institution in the Yorkshire and Humber region (that completed the Graduate Outcomes Survey). Of these, 3,315 (67%) entered employment or self-employment – and just 65 of these did so in the core SIC codes of green industries (see table 1 above), and 425 entered employment across the core and adjacent SIC codes (see tables 1 and 2 above).

Figure 27: Relevant outcomes of graduates from Y&H institutions from 2018/19 Graduate Outcomes Survey

2018/19	Number of graduates	%
Graduates from a STEM-relevant first degree courses with a pass	4,920	100%
... entered employment or self-employment	3,315	67%
... working in the core or adjacent SIC codes	425	13%
... working in the core SIC codes	65	2%

Source: HESA Student Record Graduate Outcomes Survey Results.

It is not clear from the available evidence whether this level of graduate employment in the green industries in the region was determined/ limited by (i) industry need or (ii) whether this was all that applied to join the industries (i.e. leaving additional industry demand unmet).

8.7 Transitioning skills from other industries

Throughout this report, much has been said about the potential for transitioning people into, and out of, industries that rely on the same similar core set of skills. It is estimated that over 90% of the UK's oil and gas workforce have medium-to-high skills transferability and are well positioned to work in adjacent energy sectors[81].

High-carbon sectors (such as oil and gas) that are likely to decline over the next few decades are likely to be good places to start, although it is important to acknowledge that all of the green industries discussed in this report will have to compete with other parallel and growing UK sectors for this finite pool of talent.

[81] UK Offshore Energy Workforce Transferability Review, Robert Gordon University, May 2021.

There is likely to be value in adopting a holistic approach across the green industries, to ensure they work collaboratively to identify and share out skills rather than competing with each other – particularly when it comes to addressing accrediting prior learning and skills[82].

The ECITB's *Accelerated Experience and Learning Programme* (AELP)[83] is a retraining programme aimed at 'sector jumpers'. Many of the technical skills and behaviours required in the nuclear sector were identified as being comparable with those working in the coal station, including a similar safety and security culture as well as the turbines and control room.

The lack of cross-sector training recognition means many offshore oil and gas workers are expected to duplicate existing training to access roles in wind. This represents a significant barrier to workers moving between industries (94% of respondents to their survey said they would support an offshore passport, which licenses accredited workers to work offshore in any sector through a cross-industry minimum training requirement)[84].

HEY LEP should monitor progress of OPITO's Energy Skills Alliance[85], which aims to deliver an all-energy career proposition, enabling workers to see a career path across the breath of the energy industry. This is part of the People and Skills Plan associated with the North Sea Transition Deal[86] and is part of the Energy Transition Zone steering group.

[82] Green Jobs Barometer: Monitoring the fair transition to a green economy, PwC, Q4 2021.

[83] Skills Transferability in the Engineering Construction Industry, ECITB, 2020.

[84] https://platformlondon.org/p-publications/offshore-training-passport-debate-briefing-for-msps/print/

[85] https://opito.com/energy-transition/energy-skills-alliance

[86] https://www.gov.uk/government/publications/north-sea-transition-deal

9 Recommendations

Based on the research detailed above, it is recommended that HEY LEP take action in the following areas:

9.1 Focus on critical skills

- The priorities of HEY LEP over the coming year should focus principally on supporting jobs and skills that directly contribute to the development of the green economy. This approach will allow HEY LEP to direct their finite resource on 'mission critical' issues.
- Specific details of the various critical skills needed across the green industries are contained in chapters 4 and 5 of this report and are wide-ranging in their level and scope, including:
  - Construction trades, particularly Electricians.
  - Craft roles - e.g. Welders, Steel Fixers, Cable Jointers, Fitters, Drivers, etc.
  - Engineers and specialist - e.g. Electrical, Mechanical and Civil Technicians/ Engineers, and Quantity Surveyors.
  - Technology-specific – e.g. hydrogen, EV Mechanics & Charging Point Installers, Heat Pump Installers, etc.
  - "New" technologies – e.g. data, cyber, artificial intelligence, etc. (these are cross-sector skills which may benefit from collaborations with organisations who sit outside of the green industries).

9.2 Continued drive towards equity, diversity and inclusion

- A crucial aspect of avoiding and alleviating possible skills shortages is to maximise the potential pool of labour available to the green economy. To achieve this, individual employers and the industry more generally will have to make itself more attractive to females, those from an ethnic minority background and to those with lower academic achievements, i.e. from all sections of the HEY LEP community.
- Increasing the supply of young people in the industry will be central to ambition.

- While the younger population are more ethnically diverse, there are still strong cultural drivers which may limit their likely move into the green industries:
  - High levels of diversity at higher education, particularly among those from Indian and Chinese families
  - Low levels of diversity within Apprenticeships, particularly from Black and Mixed backgrounds
- HEY LEP and its partners should consider how best to promote the opportunities in the green industries to all sections of the local resident population
  - This might include case studies, role models and promoting industry engagement with all stages of education – school, FE & HE

9.3 Promote the need to invest in the future talent pipeline

- Coupled with recommendation 9.2 above is the need to encourage industry to invest more in the future talent pipeline
  - Too many job postings have high entry requirements which rule out a substantial proportion of the population – whether they relate to academic qualifications or previous industry experience
  - Drax has recognised this issue, and are looking at the potential for leveraging other credentials such as teacher references or the submission of evidence demonstrating mechanical or electrical engineering aptitude
- The CITB report that, over the last 12 months, training providers have continued to report that their main concern for the immediate future was low demand from employers for training.[87]
- There is a very wide range of Apprenticeship Standards (c80) that could be relevant to employers in the green industries, which employers should take advantage of.
  - It also makes economic sense for those employers that pay the Apprenticeship Levy to maximise their returns
  - This also includes ensuring that the Apprenticeship Levy Transfer option is utilised where appropriate

[87] Migration and UK Construction 2021, CITB, 2021.

- Consider what additional support may be required in order to open up opportunities for those in disadvantaged communities and/or with low educational attainment (which is not necessarily a good proxy for "intelligence" or potential)
- Outside of apprenticeships, work should continue to promote the offering of work experience and other placements where possible
- Promote the Enterprise Advisers[88] initiative amongst local green employers – these are professionals who volunteer to work directly with a school or college to develop a strong careers programme and help create opportunities for young people

9.4 Develop and promote clear career pathways

- The CBI report a lack of awareness of the green economy amongst the general public, and the path to net-zero. Without a stronger "brand", individuals will be less likely to consider career opportunities in the green industries[89].
- Many people spoken to as part of this research report that more work needs to be done to develop and promote clear career pathways, linked to appropriate training and development.
- This requires clear articulation of the wide range of opportunities available across all of the green industries, and how individuals can progress their careers via a clear sight of both the academic and vocational pathways.
- These career pathways should cover all levels – from entry level up to graduates, career changers[90] and returners.
- These pathways can also be used to support careers advisors, teachers and other influencers.

9.5 Ensure the local availability of Apprenticeship and T Level training

- There are more than 80 different Apprenticeship Standards currently available and relevant, to varying degrees, to the green industries. However, the extent to which they are available within the vicinity of HEY and the surrounding area varies considerably.

[88] https://www.cipd.co.uk/learn/volunteer/supporting-young-people/become-enterprise-adviser

[89] https://www.cbi.org.uk/articles/skills-and-training-for-the-green-economy/

[90] The *Energy Skills Alliance* (https://opito.com/energy-transition/energy-skills-alliance) is championing this work through its Future Energy Skills Demand workstream, which seeks to map the energy sectors' current capabilities and future requirements. This work is set to be completed in 2021, after which it will be critical for businesses, academia and governments to carefully consider how they can work collaboratively to ensure that this demand is met.

- Of the 80+ different Standards, 41 of them are not currently delivered within the immediate vicinity of Hull (based on information provided by the Institute for Apprenticeships website).
- Only around a dozen of the Standards have more than two training providers operating locally to Hull (although there a number of nationwide providers who deliver at the apprentice's workplace).
- HEY LEP should seek to identify those Apprenticeship Standards that are critical to employers in the green industries and work to ensure they are available locally.
- This is particularly important due to providers reporting that travel-to-learn distances are getting shorter, caused mainly by the rising cost of transport). This is seen as being particularly acute at lower levels.[91]

9.6 Promote supply chain collaboration

- Encourage closer working on identifying and addressing common skills issues down through the supply chain
- Leverage the influence of the big players to support the supply chain

9.7 Clearly articulate demand from industry to education and training providers

- HEY LEP and its partners should consider how best to collect, aggregate and communicate employer demand for skills to the training provider community
- Timing is crucial – such activities would need to tie in with the planning cycles of all institutions
- This could bring about economies of scale in low-volume / high-cost training

[91] The Technical Skills Legacy for Norfolk and Suffolk: ANNEX 2 – Evidence, Pye Tait Consulting, January 2020.

Annex 1 – Definitions used to rank local authority conditions

The table below explains each of the ten measures and the logic behind the red/green rating.

Measure	Notes on interpretation/ranking
Forecast Growth All people (2020-2040)	■ Forecast % growth in the resident population ■ Population growth is considered a positive attribute ■ Areas with a higher than average % are coloured green
Forecast Growth 16-24-year-olds (2020-2040)	■ Forecast % growth of young people in the resident population ■ Population growth is considered a positive attribute ■ Areas with a higher than average % are coloured green
% of working age population from an ethnic minority	■ % of the working age resident population that are from an ethnic minority ■ Ethnic diversity is considered a positive attribute ■ Areas with a higher than average % are coloured green
% of 16-24-year-olds from an ethnic minority	■ % of young people in the resident population that are from an ethnic minority ■ Ethnic diversity is considered a positive attribute ■ Areas with a higher than average % are coloured green
Employment rate	■ % of working age population that are in employment ■ In this analysis, a high employment rate is considered a positive attribute ■ Areas with a lower than average % are coloured green
Unemployment rate	■ % of working age population that are unemployed ■ In this analysis, a low unemployment rate is considered a positive attribute ■ Areas with a higher than average % are coloured green

Measure	Notes on interpretation/ranking
Economic Inactivity rate	■ % of working age population that are not in the active labour market (e.g. retired, sick, students, etc.) ■ In this analysis, a low economic inactivity rate is considered a positive attribute ■ Areas with a lower than average % are coloured green
16-18 leavers not in sustainable destination	■ % of 16-18-year-olds not in sustainable employment, training or study (i.e. not in employment, education or training) ■ A lower than average % is considered a positive attribute ■ Areas with a lower than average % are coloured green
% of resident population with no qualifications	■ % of the resident population that does not hold any qualifications ■ A lower than average % is considered a positive attribute ■ Areas with a lower than average % are coloured green
% of resident population with at least an A Level or equivalent	■ % of the resident population that holds at least one A Level or equivalent ■ A higher than average % is considered a positive attribute ■ Areas with a higher than average % are coloured green
HE STEM Starts Female	■ % of starts in higher education STEM subjects that are female ■ A higher than average % is considered a positive attribute (up to 50%) ■ Areas with a higher than average % (up to 50%) are coloured green
HE STEM Starts Ethnic Minority	■ % of starts in higher education STEM subjects that are from an ethnic minority ■ A higher than average % is considered a positive attribute (up to 50%) ■ Areas with a higher than average % (up to 50%) are coloured green
% of vacancies reported as skills shortages All sectors	■ % of vacancies in the area that proved difficult to fill on the basis of a lack of applicants with the required skills, qualifications or experience ■ A lower than average % is considered a positive attribute ■ Areas with a lower than average % are coloured green

Measure	Notes on interpretation/ranking
% of vacancies reported as skills shortages Energy & Utilities	■ % of vacancies in the energy and utilities sector that proved difficult to fill on the basis of a lack of applicants with the required skills, qualifications or experience ■ A lower than average % is considered a positive attribute ■ Areas with a lower than average % are coloured green
Annual salary growth	■ % growth in average annual earnings over the previous year ■ A higher than average % is considered a positive attribute ■ Areas with a higher than average % are coloured green
Number of red flags (out of 15 measures)	■ The number of measures where the local area was ranked "worse" than the SHEPD area average ■ Areas which are ranked "worse" than average in fewer than 6 measures are coloured green

Annex 2 – Relevant Apprenticeship Standards

Core Green Apprenticeships

The following Apprenticeship Standards have been identified (using the Institute for Apprenticeships' website) as being central to achieving a future green economy.

The right-hand column of each table contains a red, amber, green status based on the following definitions:

Availability RAG status	Key
	This signifies that there are no training providers listed in HEY and surrounding area (analysis area) on the IfA website
	This signifies that there one or two training providers listed in HEY and surrounding (analysis area) area on the IfA website
	This signifies that there are more than three training providers listed in HEY and surrounding area (analysis area) on the IfA website

Agriculture/Agri-tech

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0017	Stockperson (beef, pigs, sheep, dairy)	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/stockperson-beef-pigs-sheep-dairy-v1-0 There appears to be just two providers of this Standard operating in the analysis area	
ST0937	General farm worker	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/general-farm-worker-v1-0 There appears to be just two providers of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0223	Arborist	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/arborist-v1-0 There appears to be just one provider of this Standard operating in the analysis area	
ST0225	Horticulture or landscape operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/horticulture-or-landscape-operative-v1-0 There appears to be just two providers of this Standard operating in the analysis area (although there are a number of nationwide providers that operate at the apprentice's workplace)	
ST0242	Land-based service engineer	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/land-based-service-engineer-v1-0 There appears to be just two providers of this Standard operating in the analysis area	
ST0224	Forest operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/forest-operative-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	
ST0166	Equine groom	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/equine-groom-v1-0 There appears to be just one provider of this Standard operating in the analysis area (although there are a number of nationwide providers that operate at the apprentice's workplace)	
ST0397	Animal care and welfare assistant	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/animal-care-and-welfare-assistant-v1-1 There appears to be just one provider of this Standard operating in the analysis area (although there are a number of nationwide providers that operate at the apprentice's workplace)	
ST0018	Crop technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/crop-technician-v1-0 There appears to be just two providers of this Standard operating in the analysis area	
ST0938	Livestock unit technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/livestock-unit-technician-v1-0 There appears to be just one provider of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0741	Landscape technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/landscape-technician-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0226	Landscape or horticulture supervisor	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/landscape-or-horticulture-supervisor-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0243	Land-based service engineering technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/land-based-service-engineering-technician-v1-1 There appears to be just two providers of this Standard operating in the analysis area	
ST0167	Senior equine groom	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/senior-equine-groom-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0926	Countryside Ranger	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/countryside-ranger-v1-0 There appears to be just one provider of this Standard operating in the analysis area	
ST0761	Agriculture or horticulture professional adviser	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/agriculture-or-horticulture-professional-adviser-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	

Power generation and grid resilience

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0291	Nuclear Operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/nuclear-operative-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0290	Nuclear Health Physics Monitor	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/nuclear-health-physics-monitor-v1-0 There appears to be no provider of this Standard operating in the UK at the moment	
ST0154	Maintenance and Operations Engineering Technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/maintenance-and-operations-engineering-technician-v1-1 There appears to be reasonable provision within the analysis area, with at least seven providers of this Standard	
ST0156	Power network craftsperson	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/power-network-craftsperson-v1-1 There appears to be just one provider of this Standard operating in the analysis area	
ST0159	Utilities Engineering Technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/utilities-engineering-technician-v1-1 There appears to be just one provider of this Standard operating in the analysis area	
ST0475	Electrical power networks engineer	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/electrical-power-networks-engineer-v1-0 There appears to be just one provider of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0157	Electrical power protection and plant commissioning engineer	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/electrical-power-protection-and-plant-commissioning-engineer-v1-0 There appears to be just one provider of this Standard operating in the analysis area	
ST0662	Automation and controls engineering technician	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/automation-and-controls-engineering-technician-v1-0 There appears to be just one provider of this Standard operating in the analysis area	
ST0292	Nuclear Welding Inspection Technician	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/nuclear-welding-inspection-technician-v1-0 There appears to be no provider of this Standard operating in the UK at the moment	
ST0380	Nuclear Technician	5	https://www.instituteforapprenticeships.org/apprenticeship-standards/nuclear-technician-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0289	Nuclear scientist and nuclear engineer (integrated degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/nuclear-scientist-and-nuclear-engineer-integrated-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0024	Electrical or electronic technical support engineer (degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/electrical-or-electronic-technical-support-engineer-degree-v1-1 There appears to be just one provider of this Standard operating in the analysis area	
ST0784	Nuclear Reactor Desk Engineer	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/nuclear-reactor-desk-engineer-v1-0 There appears to be no provider of this Standard operating in the UK at the moment	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0153	Power Engineer (Integrated degree)	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/power-engineer-integrated-degree-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	
ST0107	Systems engineer (degree)	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/systems-engineer-degree-v1-1 There appears to be no provider of this Standard operating in the analysis area	

Domestic low carbon technologies

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0158	Dual fuel smart meter installer	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/dual-fuel-smart-meter-installer-v1-1 There appears to be just one provider of this Standard operating in the analysis area	
ST0322	Refrigeration air conditioning and heat pump engineering technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/refrigeration-air-conditioning-and-heat-pump-engineering-technician-v1-1 There appears to be reasonable provision within the analysis area, with at least four providers of this Standard	
ST0152	Installation electrician and maintenance electrician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/installation-electrician-and-maintenance-electrician-v1-0 There appears to be reasonable provision within the analysis area, with at least seven providers of this Standard	
ST0464	Smart home technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/smart-home-technician-v1-0 There appears to be no provider of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0303	Plumbing and domestic heating technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/plumbing-and-domestic-heating-technician-v1-0 There appears to be reasonable provision within the analysis area, with at least six providers of this Standard	
ST0155	Gas engineering operative	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/gas-engineering-operative-v1-1 There appears to be no provider of this Standard operating in the analysis area	
ST0629	BEMS (building energy management systems) controls engineer	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/bems-building-energy-management-systems-controls-engineer-v1-0 There appears to be no provider of this Standard operating in the analysis area	

Gas production and distribution, including hydrogen

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0204	Gas network operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/gas-network-operative-v1-1 There appears to be just one provider of this Standard operating in the analysis area	
ST0205	Gas network craftsperson	3	https://www.instit3uteforapprenticeships.org/apprenticeship-standards/gas-network-craftsperson-v1-2 There appears to be just one provider of this Standard operating in the analysis area	

Water treatment, supply and environmental services

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0876	Water process operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/water-process-operative-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0898	Water network operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/water-network-operative-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0453	Water treatment technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/water-treatment-technician-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0160	Water process technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/water-process-technician-v1-0 There appears to be just two providers of this Standard operating in the analysis area	

Environmental services

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0408	Countryside worker	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/countryside-worker-v1-0 There appears to be just two providers of this Standard operating in the analysis area	
ST0767	Water environment worker	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/water-environment-worker-v1-0 There appears to be no provider of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0778	Environmental practitioner (degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/environmental-practitioner-degree-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	
ST0577	Ecologist (degree)	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/ecologist-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0748	Sustainability business specialist (integrated degree)	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/sustainability-business-specialist-integrated-degree-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	

Waste management, recycling and the circular economy

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0545	Waste resource operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/waste-resource-operative-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0507	Metal recycling general operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/metal-recycling-general-operative-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0823	Metal recycling technical manager (MRTM)	5	https://www.instituteforapprenticeships.org/apprenticeship-standards/metal-recycling-technical-manager-mrtm-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	

Engineering

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0091	Civil Engineering Technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/civil-engineering-technician-v1-1 There appears to be just two providers of this Standard operating in the analysis area	
ST0457	Engineering Technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/engineering-technician-v1-1 There appears to be reasonable provision within the analysis area, with at least eight providers of this Standard	
ST0432	Engineering Fitter	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/engineering-fitter-v1-1 There appears to be reasonable provision within the analysis area, with at four eight providers of this Standard	
ST0847	Engineer surveyor	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/engineer-surveyor-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0023	Control / technical support engineer	5	https://www.instituteforapprenticeships.org/apprenticeship-standards/control-technical-support-engineer-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there are some nationwide providers that operate at the apprentice's workplace)	
ST0417	Civil Engineer (Degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/civil-engineer-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0042	Civil engineering site management (degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/civil-engineering-site-management-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0672	Electro-mechanical engineer	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/electro-mechanical-engineer-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0456	Postgraduate Engineer	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/post-graduate-engineer-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	

Construction and energy efficiency

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0065	Building services engineering installer	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/building-services-engineering-installer-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0271	Steel fixer	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/steel-fixer-v1-1 There appears to be no provider of this Standard operating in the analysis area	
ST0736	Construction Plant Operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/construction-plant-operative-v1-0 There appears to be one provider of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0162	Engineering Fitter	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/engineering-fitter-v1-1 There appears to be reasonable provision within the analysis area, with at least four providers of this Standard	
ST0161	Junior Energy Manager	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/junior-energy-manager-v1-0 There appears to be no provider of this Standard operating in the analysis area	
ST0091	Civil engineering technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/civil-engineering-technician-v1-1 There appears to be one provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0063	Building services design technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/building-services-design-technician-v1-0 There appears to be no provider of this Standard operating in analysis area	
ST0332	Surveying technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/surveying-technician-v1-0 There appears to be one provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0061	Building services engineering service and maintenance engineer	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/building-services-engineering-service-and-maintenance-engineer-v1-0 There appears to be one provider of this Standard operating in the analysis area (although there is one nationwide provider that operate at the apprentice's workplace)	
ST0062	Building services engineering craftsperson	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/building-services-engineering-craftsperson-v1-0 There appears to be no provider of this Standard operating in the analysis area	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0092	Community energy specialist	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/community-energy-specialist-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	
ST0049	Construction quantity surveying technician	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/construction-quantity-surveying-technician-v1-0 There appears to be two providers of this Standard operating in the analysis area	
ST0331	Chartered surveyor (degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/chartered-surveyor-degree-v1-2 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0045	Construction quantity surveyor (degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/construction-quantity-surveyor-degree-v1-0 There appears to be no providers of this Standard operating in the analysis area	
ST0372	Building services design engineer (degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/building-services-design-engineer-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	

Supporting Green Apprenticeships

The following Apprenticeship Standards have been identified as being important to the successful development and implementation of the green transition.

Other specialists

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0257	Large goods vehicle (LGV) driver C and E	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/large-goods-vehicle-lgv-driver-c-plus-e-v1-2 There appears to be one provider of this Standard operating in the analysis area (although there are nationwide providers that operates at the apprentice's workplace)	
ST0422	Science Manufacturing Process Operative	2	https://www.instituteforapprenticeships.org/apprenticeship-standards/science-manufacturing-process-operative-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0163	Project Controls Technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/project-controls-technician-v1-0 There appears to be one provider of this Standard operating in the analysis area (although there are nationwide providers that operates at the apprentice's workplace)	
ST0808	Marine Electrician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/marine-electrician-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0310	Associate project manager	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/associate-project-manager-v1-3 There appears to be three providers of this Standard operating in the analysis area (there are many nationwide providers that operates at the apprentice's workplace)	
ST0411	Project manager (integrated degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/project-manager-integrated-degree-v1-0 There appears to be one provider of this Standard operating in the analysis area (although there are nationwide providers that operates at the apprentice's workplace)	

Cyber security and Data

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0795	Data technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/data-technician-v1-0 There appears to be three providers of this Standard operating in the analysis area (there are many nationwide providers that operates at the apprentice's workplace)	
ST0865	Cyber Security Technician	3	https://www.instituteforapprenticeships.org/apprenticeship-standards/cyber-security-technician-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0118	Data Analyst	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/data-analyst-v1-1 There appears to be three providers of this Standard operating in the analysis area (there are many nationwide providers that operates at the apprentice's workplace)	

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST1021	Cyber Security Technologist	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/cyber-security-technologist-2021-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0585	Data Scientist (integrated degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/data-scientist-integrated-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0409	Cyber Security Technical Professional (Integrated Degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/cyber-security-technical-professional-integrated-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0119	Digital and Technology Solutions Professional (Integrated Degree)	6	https://www.instituteforapprenticeships.org/apprenticeship-standards/digital-and-technology-solutions-professional-integrated-degree-v1-1 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0763	Artificial Intelligence (AI) Data Specialist	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/artificial-intelligence-ai-data-specialist-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	
ST0482	Digital and Technology Solutions Specialist (Integrated Degree)	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/digital-and-technology-solutions-specialist-integrated-degree-v1-0 There appears to be no provider of this Standard operating in the analysis area (although there is one nationwide provider that operates at the apprentice's workplace)	

Automation

Reference	Apprenticeship Title	Level	Notes on availability in and around the analysis area	Availability RAG status
ST0662	Automation and Controls Engineering Technician	4	https://www.instituteforapprenticeships.org/apprenticeship-standards/automation-and-controls-engineering-technician-v1-0 There appears to be one provider of this Standard operating in the analysis area	
ST0407	Process Automation Engineer (degree)	7	https://www.instituteforapprenticeships.org/apprenticeship-standards/process-automation-engineer-degree-v1-0 There appears to be no provider of this Standard operating in the whole of the UK	

Annex 3 – Other relevant skills bodies

In and around the Humber Estuary

Name	Description	Coverage
Centre for the Assessment of Technical Competency (CATCH)	Working across the private and public sectors CATCH runs capital and business support programmes, network groups, skills programmes, conferences, events and publications aimed at encouraging best practice, knowledge exchange and business excellence. http://www.catchuk.org/	Located in Grimsby
Grimsby Renewables Partnership	The Grimsby Renewables Partnership is a local group which has formed to promote local companies to the rapidly increasing offshore wind activity in the area. Activities of the Grimsby Renewables Partnership include: Showcasing the North East Lincolnshire's local business offer to the industry Regular networking events Seminars and informative sessions on opportunities Notifications of key developments in the industry Work with top tier companies to understand their requirements and help promote member companies to satisfy that demand http://investnel.co.uk/grp	Grimsby
Team Humber Marine Alliance	With 200 members across the marine and offshore supply chain, including commercial shipping, marine engineering, support vessels, specialist health & safety, ports and logistics. They provide expert advice, bring companies together to collaborate on joint ventures and supply chain opportunities, lobby government and represent their members at key UK and European conference and exhibitions. They also host and organise numerous events throughout the year, including the Offshore Wind Connections conference. http://www.thma.co.uk/skills/	Humber

Name	Description	Coverage
Operations and Maintenance Centre of Excellence (OMCE)	OMCE is funded by a £2m collaboration between ORE Catapult and the University of Hull, building on the region's energy heritage, location and experience of servicing UK offshore wind farms. The five-year partnership will see a series of research and innovation projects developed to improve the way that offshore wind farms are operated and maintained. https://ore.catapult.org.uk/operation-performance/strategic-programmes/omce/	Located on the Humber National resource

Domestic low carbon technologies

- **BSE Skills** – A joint venture by SELECT, the Scottish & Northern Ireland Plumbing Employers' Federation (SNIPEF) and the Building Engineering Services Association (BESA). Following the closure of SummitSkills, they manage and develop NOS, qualifications and Apprenticeships for the building services engineering sector.
- **Construction Leadership Council: *People & Skills Network*** – Brings together partners from across the construction industry and built environment, including employers, training providers, trade federations, and skills bodies to tackle the industry's most pressing skills need challenges.
- **Electrical Contractors' Association** (ECA)**: *Skills Committee* –** Monitor and review all skills matters relevant to the Association and support the ECA in engaging with third parties such as Government, non-departmental public bodies, standard setting bodies, awarding organisations, training providers, assessment organisations and other trade bodies.
- **The Electrotechnical Skills Partnership** (TESP) – TESP is an industry partnership formed by the Electrical Contractors' Association (ECA), Joint Industry Board (JIB), National Electrotechnical Training (NET), SELECT and Unite the Union.
- **Instructus** – They certificate Apprenticeships in England, Wales and Scotland. They manage and maintain a range of Standards, including Building Services Engineering Technology & Project Management, Domestic Heating, Heating & Ventilation, Plumbing & Heating and Refrigeration & Air Conditioning

  They are also the *Standards Setting Body* for a range of business and administration related NOS.
- **The Joint Industry Board (JIB)** – Administers the Electrotechnical Certification Scheme (ECS) in England, Wales and Northern Ireland, accrediting the qualifications and skills of 160,000 individuals working in the industry.
- **MCS** - MCS is a standards organisation. They create and maintain standards that allow for the certification of products, installers and their installations.

- **National Electrotechnical Training (NET)** – An independent industry charity which develops and delivers assessments of occupational competence (end tests) on behalf of the electrical and engineering industries in the UK. As a registered charity, any surpluses generated by NET's operations are re-invested in supporting the development of vocational skills in the industries it serves, in line with its charitable objectives.
- **The Plumbing & Heating Skills Partnership (PHSP)** – Established by the Association of Plumbing and Heating Contractors (APHC), the Scottish and Northern Ireland Plumbing Employers' Federation (SNIPEF) and the British Plumbing Employers' Council (Training) Ltd (BPEC), their focus is supporting plumbing and domestic heating employers in developing and driving forward the industry's skills agenda by working with other key stakeholders to deliver and/or facilitate the plumbing and heating industry's skill needs.

Electric vehicles

- **EVA England** - The voice for current, new and prospective electric vehicle drivers and accelerating the transition to an electric England (https://www.evaengland.org.uk/)
- **Institute of the Motor Industry (IMI)** - IMI's purpose is to provide, and continuously evolve, the means by which people working in the automotive sector can attain relevant professional competence and appropriate recognition (https://tide.theimi.org.uk/)
- **Society of Motor Manufacturers and Traders** (SMMT) – The voice of the UK motor industry, supporting and promoting its members' interests (https://www.smmt.co.uk/)

Hydrogen

- **UK Hydrogen and Fuel Cell Association** – Supporting its members in understanding and enhancing the prospects for hydrogen and fuel cells in the UK (http://www.ukhfca.co.uk/)
- **The Hydrogen Hub** - Industry-led community of stakeholders from across the hydrogen and fuel cell supply chain, Government, local authorities, businesses and current and potential users (https://www.hydrogenhub.org/)

Low carbon electricity generation

- **RenewableUK** - professional body for marine and wind renewable energy industries in the UK (https://www.renewableuk.com/)
- **Association for Decentralised Energy** - We are the leading trade association for decentralised energy, representing more than 130 interested parties from across the industrial, commercial and public sectors (https://www.theade.co.uk)
- **Energy & Utility Alliance** - Trade association spanning the onshore gas industry in the UK (has three divisions: ICOM Energy Association, Heating & Hot Water Industry Council (HHIC) and SBGI Utility Networks) (https://eua.org.uk/)
- **Renewable Energy Association** - A coalition built to be the voice for renewable energy and clean technology in the UK (https://www.r-e-a.net/)

- **Energy UK** - The trade association for the energy industry (https://www.energy-uk.org.uk/)
- **Anaerobic Digestion and Biogas Association** (ADBA) – Representing the UK anaerobic digestion (AD) and bioresources industry (https://adbioresources.org/)

Hydrogen

- **UK Hydrogen and Fuel Cell Association** - dedicated to supporting stakeholders across the entire value chain of both the Hydrogen sector and the Fuel Cell industry (http://www.ukhfca.co.uk/)

Energy networks

- **Energy Networks Association** - Representing energy network operators in the UK and Ireland (https://www.energynetworks.org/)

Carbon capture and storage

- **UK CCS Research Centre** - By funding travel for development opportunities, and providing training, we ensure early career researchers have the skills and networks to keep the UK at the forefront of CCS development (https://ukccsrc.ac.uk/what-we-do/)
- **CCS Association** - Trade association promoting the commercial deployment of Carbon Capture, Utilisation and Storage (https://www.ccsassociation.org/)
- **CCUS Council** – The primary forum for engaging the CCUS sector on discussing and addressing key strategic issues to enable the government's ambition for CCUS to be achieved (https://www.gov.uk/government/groups/ccus-council)

Waste management, recycling and the circular economy

- **Organics Recycling Group** (ORG) - Set up by the Renewable Energy Association. It works on behalf of the biodegradable waste management industry (http://www.organics-recycling.org.uk/?lang=_e)
- **Chartered Institution of Wastes Management** (CIWM) - Works on behalf of waste and resource management professionals in the UK (https://www.ciwm.co.uk)
- **Environmental Services Association** (ESA) - Trade association for the UK resource and waste management industry (http://www.esauk.org)
- **WAMITAB** - Develops qualifications and certificates for those working in: waste management, recycling, cleaning and street cleansing (https://wamitab.org.uk/?lang=_e)

Nuclear

- **National Skills Academy for Nuclear** (NSAN) - Improving the performance of companies in the nuclear industry through collaboration and action on skills (https://www.nsan.co.uk/)

Agriculture/Agri-tech

- **Agriculture and Horticulture Development Board** (AHDB) - Statutory levy board. To make agriculture and horticulture industries more competitive and sustainable through factual, evidence-based advice, information and activity (https://ahdb.org.uk/)
- **Crop Protection Association** (CPA) - Trade body that represents the UK's plant science industry (https://www.croplife.uk/)
- **Lantra** – The Sector Skills Council that supports skills and training for people and businesses in the land-based and environmental sector (https://www.lantra.co.uk/?lang=_e)
- **Linking Environment and Farming** (LEAF) - Charity that promotes sustainable food and farming (https://leaf.eco/)
- **Soil Association** - Campaigns for healthy, humane and sustainable food, farming and land use (https://www.soilassociation.org/?lang=_e)
- **Sustain** - Alliance of public interest bodies advocating agriculture policies and practices that enhance the health and welfare of people and animals, improve the working and living environment, enrich society and culture and promote equity (https://www.sustainweb.org/)
- **Agricultural Industries Confederation** (AIC) - Agrisupply industry's leading trade association (https://www.agindustries.org.uk/)
- **Innovation for Agriculture** - Working with leading agricultural researchers, businesses, landowners, and farmers to develop the knowledge and technologies that will make farming more sustainable, resilient, and productive (https://www.innovationforagriculture.org.uk)
- **UK Urban Agritech** – Bringing together the UK's key players in modern agricultural technologies (https://www.ukuat.org/)

Water and Environmental Services

- **Construction Industry Research and Information Association** (CIRIA) - Publishes information on waste and sewage issues relevant to the construction industry (https://www.ciria.org)
- **Chartered Institution of Water and Environmental Management** (CIWEM) - Promotes education, training, study and research in water and environmental management (https://www.ciwem.org)
- **British Water** - Trade association for the water and wastewater industry in the UK and overseas (https://www.britishwater.co.uk)
- **Water UK** - (https://www.water.org.uk/)
- **Future Water Association** - Trade group that represents operators from across the UK's water supply chain (https://www.futurewaterassociation.com/)

- **The Society of British Water and Wastewater Industries** (SBWWI) - Represents the interests of contractors, manufacturers, distributors, consultants and others in the water industry(

Artificial Intelligence, coding and data science

- **Inspiring Women in Data Science** (https://www.meetup.com/IWDSuk/)
- **Women in ML** (https://wimlworkshop.org/)
- **Black in AI** (https://blackinai.github.io/#/)
- **Queer in AI** (https://sites.google.com/view/queer-in-ai/home)
- **LatinX in AI** (https://www.latinxinai.org/)
- **The AI Club for Gender Minorities** (https://www.meetup.com/ai-club/)
- **RLadies** (https://rladies.org/)
- **PyLadies** (https://pyladies.com/)
- **Code Institute** - https://codeinstitute.net/
- **Digital Catapult** - https://www.digicatapult.org.uk/about-digital-catapult
- **Energy Digitalisation Taskforce**
- **Energy Systems Catapult –** https://es.catapult.org.uk/
- **Offshore Renewable Energy Catapult –** https://ore.catapult.org.uk/about/
- **Open Data Institute** (https://theodi.org/)
- **Royal Statistical Society** - https://www.rss.org.uk/
- **The Alan Turing Institute** - https://www.turing.ac.uk/
- **The Office for AI** - https://www.gov.uk/government/organisations/office-for-artificial-intelligence
- **The UK Infrastructure Transitions Research Consortium** (ITRC) - https://www.itrc.org.uk/about/

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