The human capital implications of net zero on the energy sector

The National Skills Academy
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1. Abstract

This paper presents the findings of research carried out by the National Skills Academy for Power (NSAP) into the current and future workforce requirements of the UK's energy sector. It considers the impact of a wide range of factors on the sector's demand for people and skills and goes on to set out how the sector will work together to achieve the level of workforce resilience now required by Ofgem.

In December 2019, NSAP collected workforce data on more than 23,000 employees from 17 energy companies, including from all of the UK's transmission (TOs) and distribution (DNOs) network operators, five energy contractors, and seven smart metering companies. A strategic workforce planning model was then constructed with input from each company in order to quantify the supply and demand for people over the coming decade.

This statistical analysis was augmented by a more qualitative assessment of the challenges facing the sector in terms of its ability to attract and retain talent in the face of stiff competition from within the wider engineering/ infrastructure sector (which has been largely unaffected by the COVID-19 pandemic) and a skills supply pipeline that is already failing to meet current levels of demand (exacerbated by new post-Brexit immigration policies).

The study finds that there are a number of areas that need urgent and sustained attention if the UK is to achieve a sustainable and resilient net zero workforce. This has to be an essential element of the whole net zero debate, as without proper consideration of how the sector will meet its human capital challenges, the risks to delivery could be profound.

Working with all members of NSAP and the wider energy sector, we have developed a set of priority actions that will seek to address existing and potential skills challenges, including:

- Managing the transition from an aging technical and engineering workforce, including making the most of talent from under-represented sections of the population
- Developing resourcing strategies that are sustainable and deliver the talent needed in an efficient and cost-effective way, particularly down through the supply chain
- Developing new pathways that can make the most of the talent already in the sector when it comes to deploying new technologies (e.g. from smart metering to EV charging point installation)

Ultimately, the UK cannot have a resilient and sustainable energy sector without a skilled workforce. In the absence of any Government co-ordination in this area, it is itself developing a coherent strategy that will ensure access to the volume and quality of people needed to deliver the desired energy transition and maintain robust levels of consumer trust.

References: Future Energy Scenarios, National Grid ESO, July 2019; Building the net zero energy workforce, National Grid, January 2020; Open Networks, Workstream 3: Product 2: Functional and System Requirements, Energy Networks Association, 15th May 2018; UK Employer Skills Survey, UKCES, 2017; Engineering UK 2017: The state of engineering, EngineeringUK, 2017.

2. Overview

The UK is on a path to reach "net zero" carbon emissions by 2050. Over the next decade, the sector must increase low carbon electricity generation, install low carbon heating systems in nearly 3 million homes, develop carbon capture usage and storage (CCUS) technology, develop hydrogen networks and install around 60,000 charging points to power 11 million electric vehicles.

To deliver this, National Grid estimates that the UK's energy sector will need to fill 400,000 roles – including 260,000 new roles and 140,000 replacements for leavers.[i]

This will require the power sector to both develop a more robust talent pipeline of young people (especially those from under-represented groups and disadvantaged communities) and mitigate the loss of existing talent due to the baby boomer retirement crunch. At the same time, it continues to promote the career opportunities available in the sector, utilising the "green" and "net zero" principles that many young people align themselves with.

Clearly this is a massive challenge for a sector that has traditionally struggled to attract a diverse workforce, particularly in the networks aspect of the sector.

As a result of these challenges, the National Skills Academy for Power (NSAP) conducted a number of research projects during 2020 and 2021 which sought to identify the nature and extent of these challenges and their impact upon the power workforce.

This paper and presentation draws together the findings of these investigations and sets out the priority actions for the power sector and its various stakeholders and influencers.

3. Methodology

This paper draws together the findings of two major research projects carried out by Energy & Utility Skills on behalf of the National Skills Academy for Power (NSAP):

1. A detailed quantitative assessment of the power sector's skills and labour requirements over the course of the next ten years (2020-2029), covering transmission and distribution networks and their strategic supply chain partners
2. A "skills deep dive" covering a range of technologies related to big data, artificial intelligence, automation, smart networks, and the transition of DNOs to DSOs

The *quantitative assessment* of labour demand was based on workforce data provided by all of Great Britain's Transmission Operators (TOs) and Distribution Network Operators (DNOs), with a set of assumptions applied relating to likely future retirement and staff turnover rates. An industry-level resourcing strategy was then developed following discussions with the individual participating companies about their likely resourcing plans.

The *qualitative investigation* into the impact of new technologies on the power sector's workforce was based on a literature review and 25 interviews with industry experts from employers, technology developers, universities and other industry stakeholders.

As both of these research reports were commissioned for the sole benefit of NSAP members, they are not in the public domain. Therefore, any questions relating to either project should be directed to Rob Murphy (rob.murphy@euskills.co.uk).

4. Results

The current power sector workforce in the UK stands at around 97,000[ii].

4.1 Diversity and inclusion

Within the power transmission and distribution sectors, including its primary contractors, the workforce falls short of national averages when it comes to employing young people, females, ethnic minorities and people with a physical or learning difficulty.

Figure 1: Age profile and personal characteristics of the electricity transmission and distribution "technical" workforce, 2020 (TOs & DNOs, Contractors, and all UK sectors)[iii]

Personal characteristic	Electricity sector	UK – All sectors
% aged 16-24	8%	12%
% aged 60+	12%	10%
% Female	23%	47%
% Ethnic minority	2%	11%
% Physical/learning disabilities	11%	15%

A key aspect in addressing this issue is increasing the opportunities available to people in/from disadvantaged communities, where ethnic diversity tends to be greater and, often, educational attainment lower.

However, it is not a simple problem to solve as there are a range of factors at play, some of which are outside of the control of a single employer (e.g. cultural and generational attitudes towards post-compulsory education routes as well as the energy sector and engineering more generally).

Low ethnic minority representation continues to be evident across the range of relevant technical Apprenticeship Frameworks and Standards. In 2018/19, just 4% of starts on Apprenticeships relevant to the sector were female and just 6% were from an ethnic minority background.

It is a different picture within Higher Education, where the proportion of first Degree starts on relevant STEM courses in 2018/19 that were female was 28% and 28% were from an ethnic minority background[iv].

With 26% of all live births across the UK in 2019 being from an ethnic group other than white[v], it is very likely the trend towards a more ethnically diverse population will continue.

4.2 Estimated demand for new recruits

Based on our analysis, an estimated 22,000 vacancies will be created over the next decade within the electricity transmission and distribution "technical" workforce – equivalent to 77% of the current workforce[vi].

Figure 2: Predicted number of vacancies in the electricity transmission and distribution "technical" workforce, 2020 (including TOs, DNOs and Contractors)

Cause of vacancies	Number of vacancies	% of current workforce
Retirements	10,000	36%
Voluntary staff turnover	12,000	41%
Total vacancies	**22,000**	**77%**

Because of their higher rates of staff turnover, the Contractor workforce is expected to lose the equivalent of 115% of its current workforce – compared to 46% of the TO workforce and 56% of the DNO workforce.

The planned resourcing strategies vary substantially between network operators and contractors.

Figure 3: Overall sector resourcing strategy (Network Operators and Contractors)

Skill Level	Company Type	Apprentice	Graduate Programme	Internal move	External
1	Network Operators				100%
	Contractors				100%
2	Network Operators	61%		18%	21%
	Contractors	15%		33%	52%
3	Network Operators	41%		44%	15%
	Contractors	20%		34%	46%
4	Network Operators	20%	19%	43%	18%
	Contractors			42%	58%
5	Network Operators		18%	73%	9%
	Contractors			20%	80%
6 to 8	Network Operators			90%	10%
	Contractors			50%	50%
Total	**Network Operators**	**33%**	**7%**	**40%**	**20%**
	Contractors	**7%**		**25%**	**68%**

While the network operators tend to invest heavily in Apprentices, Graduates and internal progression, contractors rely much more on the external labour market to supply the skills they need.

This is confirmed by data collected by Energy & Utility Skills through its *Procurement Skills Accord* initiative which shows that supply chain companies recruit far fewer Apprentices than asset owners. In 2020, 5.4% of asset owner technical workforces were Apprentices, compared to 3.0% in Tier 1 suppliers and just 1.4% in Tier 2 suppliers.

4.3 The impact of new technologies on the workforce

The power sector is facing several fundamental structural and technological developments:

- Increased demand for domestic low carbon energy and heating systems
- The need for a larger network of public electric vehicle charging points, in addition to increasing demand for domestic/private installations
- Decentralized energy production
- The development and deployment of "smart" grids
- Long-duration battery storage technologies
- Automation and controlling, telecommunication, Internet of Things (IoT) and big data analytics

Increasingly, consumers are becoming less passive recipients of power and are becoming active players in the energy market in their own right.

Forecast future skills development priorities are likely to be[vii]:

- **Technicians, installation and maintenance occupations** – Multi-taskers with capabilities across several technologies
- **Engineering occupations** – Needing digital skills associated with big data analytics, the ability to collect and analyse data from the grid and metering systems, and automation and control skills
- **ICT Specialists** (Data Analyst, cyber security, ICT Technician) – Cross-sectoral occupations with knowledge on data security and analysis
- **Network Operators and Dispatchers** – Requiring advanced digital and technology skills to control and detect evidence of operating problems
- **Project Managers and Business Developers** – Office-based work is expected to require more soft skills as well as skills associated with the digitalisation of the electricity system
- **Commerce and Trading, Asset Engineer, and back-office occupations** – Expected to require more soft skills such as creativity, entrepreneurial thinking and innovation capacity, but also customer orientation skills due to changes in business models

Digitalisation in relation to control systems, sensors and tools will move from descriptive analytics (looking at historical data) to predictive analytics (linked to root cause analysis) and to prescriptive analytics (that looks at future assessment, optimisation and decision making).

Domestic low carbon technologies (LCTs)

The range of technologies considered in this investigation included:

- 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

LCTs are very sensitive to government policies and incentives. For example, incentives have driven uptake for solar PV, but not on a steady path, with spikes largely reflecting policy interventions.[viii] However, heat technologies have grown at a much slower rate, with the number of ASHPs installations being more than the number of G/WSHP, Biomass and Solar Thermal installations combined. It seems the technologies that offer greener energy at lower cost per kW generated trail behind those that are cheaper to install upfront.

Between 2012 and 2020 there was a steady decrease in the number of job postings relevant to LCTs[1,ix] – falling from 30,000 in 2012 to 14,000 in 2019. However, in the year to May 2021, there were 21,500 job postings, signalling a potential revival in the market and a strong bounce-back from the impact of the Coronavirus pandemic (the 2,500 job postings recorded in April 2021 is the highest monthly number since March 2015).

The workforce that is responsible for the designing, installing, maintaining and servicing LCTs is already considerable – with around 130,000 Gas Safe registered gas installers, 42,000 registered electricians and 1,920 installers listed as *MCS certified*.[2]

Research published by CITB[x] reports several occupations where significant recruitment will be required in the early 2020s, including:

- ***Construction Project Managers*** – peak of 20,000 additional workers per year
- ***Plumbing and HVAC Trades*** – peak of 15,000 additional workers per year
- ***Labourers*** – almost 12,000 additional workers will be required
- ***Building Envelope Specialists*** – nearly 8,500 additional workers will be required

[1] Job postings containing one or more of the following keywords: "Heat pump", "Solar", "District Heating", "Community Heating", "CHP" or "Cogeneration", "Biomass".

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

However, by around 2028/29, workforce levels will reduce as the number of new installations declines and the industry moves into a long-term maintenance and repair phase. Workforce levels will then become broadly stable at around 250,000 more than the 2019 baseline.

While training capacity in the current market seems sufficient to meet expected demands, there remain issues around the quality of such training and the messaging/promotion of training as an entry route into the workforce – for example, completing a relatively short training course with a provider does not result in a "competent person", which might take a full Apprenticeship and the AM2/S industry standard end-point assessment.[xi]

Electric vehicle charging points installation

While no robust estimates exist of the required number of EV charging point installers at a particular point in the future, we do know that there are currently more than 4,400 authorised installers (businesses, not individuals) registered for OZEV's *Electric Vehicle Homecharge Scheme*. In addition, there are likely to be a number of installers in the market that are not registered on the OZEV scheme, but this figure is unknown.

Due to the likely growth in demand for domestic EV chargers and transferability of skills into other domestic technology installations, the EV installer workforce could develop in a number of ways:

- A dedicated EV charging point installer workforce
- A multi-skilled "Electrician+" workforce which is capable of routine domestic electrical work as well as the installation of EV charging points
- A multi-skilled "Low Carbon" installer workforce capable of installing EV charging points as well as one or more domestic low carbon technology (e.g. PV)

There are also a range of support functions that need to be developed in addition to the installer workforce, including:

- **Technical customer service staff** – the first point of contact with the customer and able to assess whether installations are "standard" or may require remedial work prior to the installation taking place
- An **Installation Auditor** will also be needed to quality check installations
- In terms of **fault findings and repairs**, it is unlikely that this will require a qualified/ certified installer

Recruitment activity in this has increased substantially over the past couple of years[vii,3].

[3] Annual job postings across the UK. Job postings containing the keywords "EV" and ("Chargepoint" or "Charge point" or "Charging point"). This data may not reflect all recruitment activity relating to EV charging point installations.

Discussions are continuing on the development of a transition programme for smart meter installers to become an effective and timely source of skills for the EV charging point installer market. This will need the full support of the Competent Person Scheme Owners, the Electrotechnical Assessment Specification Management Committee and the collective support and a co-signed agreement from our Members.

Digital and data literacy

One of the most critical skill areas in demand in 2021 is 'technology skills and digital fluency'.[xii] All of the various technologies explored in our research, backed-up by all the interviewees, will require almost all employees in the power sector to possess increasing levels of:

- **Digital literacy** – the ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills
- **Data literacy** - the ability to read, write and communicate data in context, including an understanding of data sources, analytical methods and techniques applied — and the ability to describe the use, application and resulting value
- **Cyber security awareness** – the ability of end-users to understand and identify cyber security threats, the risks they introduce and utilising best practices to guide their behaviour

In 2019, digital skills were required in at least 82% of UK online advertised job openings[xiii] – an amount that is likely to grow over the coming years.

The energy sector will have to be strategic in their search for emerging skills, establishing short- and long-term solutions that showcase the attractiveness of the industry, highlighting their development opportunities, their contribution to net zero, and their adoption of exciting new technologies.

Artificial Intelligence and data science

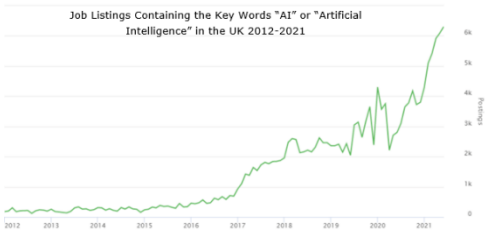
Artificial Intelligence (AI) is growing fast, as increased computational power and powerful algorithms are allowing patterns to be found in an increasing range and amounts of data. Such technologies include robotics, autonomous vehicles, natural language, computer vision, virtual agents, and machine learning.

Energy companies are employing AI to optimise, schedule, and automate their operations without disrupting energy performance, for example in load forecasting, predictive maintenance and demand management.[xiv]

The necessary skills and capability to harvest, analyse and make actionable insights based on data collected from both the assets and customers requires both core data analytics/ mathematics as well as technology/ energy sector context. Gaining an understanding of business skills is vital for AI specialists and data scientists, as data must be used and analysed in the right context. This will require additional learning and could warrant new modules being developed and tacked onto existing provision.

Furthermore, the power sector will value people who have experience of using real-life, imperfect data – which contrasts with 'clean' data sets that university students may tend to encounter. This is both a technical and a cognitive capability.

As demand for data scientists and data engineers has risen by over 231% in the past five years[xv], attracting experienced hires into the energy sector could prove challenging.



Investing in new talent as well as the existing workforce will be an essential part of the sector's resourcing strategy.

Automation

Robotic Process Automation (RPA) refers to the automation of repetitive and rule-based processes, for example in energy trading, finance and accounting and procurement. It can also refer to robots and drones that can be used in:

- Maintenance, inspection, and repair of dangerous, time-consuming, or hard to reach assets
- Installation and setup of technologies (e.g., offshore wind and solar panels)
- Wearables and sensors can be worn by workers that allow for digital tracking to predict accidents (e.g., pulse rate monitoring to establish accident risk profiles)[4]
- IT automation can improve price forecasting, custom reporting, secure file transfers, file archiving, provisioning, onboarding, and auditing[5].

Automation could occur in three waves:

- Wave 1 (to early 2020s): algorithmic
- Wave 2 (to late 2020s): augmentation
- Wave 3 (to mid-2030s): autonomy

During the first wave, there will be low displacement of existing jobs, perhaps only around 3% by the early 2020s[6]. Job displacement could increase in later waves as technologies mature and are rolled out in an increasingly autonomous form.

During the first and second waves, women could be at greater risk of automation due to their higher representation in clerical and other administrative functions.

Employees' perception of the impact of automation on skills and their job is not always consistent with the reality, suggesting that companies must be more informed and explicit about reskilling needs and take their workforce on the automation journey with them. Employers should prepare for this future by:

- **Plan for reskilling –** Companies must take into consideration the impact on the workforce, with a budget set out for reskilling/ redeployment
- **Encourage employees to reskill –** Guide employees to understand the importance of reskilling, outlining emerging skills

[4] https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/unlocking-the-value-of-digital-operations-in-electric-power-generation
[5] https://www.altenergymag.com/article/2017/03/automation-in-the-energy-industry-/25798
[6] https://www.pwc.co.uk/services/economics/insights/the-impact-of-automation-on-jobs.html

- **Develop the 'right' skills –** Including a strategy for building a talent pipeline, such as apprenticeships and working closely with universities to access young talent (and provide them work experience) while still in education

Augmented Reality and Virtual Reality

Augmented Reality (AR) and Virtual Reality (VR) are types of immersive technology that fit under the umbrella term of Extended Reality (XR).

- **AR technology** merges aspects of the real and virtual world together by producing 3D models or overlaying digital information on to the real world
- **VR technology** allows a user to be immersed and to interact with a simulated 3D environment, normally by wearing a VR headset

Use of AR and VR technologies in the power sector can be categorized into three main purposes:

- **Training -** Use of immersive technologies can simulate realistic and dangerous situations to produce a more hands-on training experience
- **Operational Processes and Asset Maintenance –** VR can be used to troubleshoot in the event of a problem, as the cause of failure can be identified more efficiently and safely using the virtual version of the plant
- **Knowledge transfer –** Using AR to pass on data to a subject matter expert, guiding on-site technicians through remote consulting

While energy companies will likely out-source the initial development of AR/VR technology to specialist developer companies, they will need to facilitate the development:

- Communicating the company's needs (be an intelligent client)
- Possessing sufficient background knowledge to be instructed by the provider on how to be a trainer ('train-the-trainer')
- Analysing quantitative or qualitative feedback and communicating findings and their implications

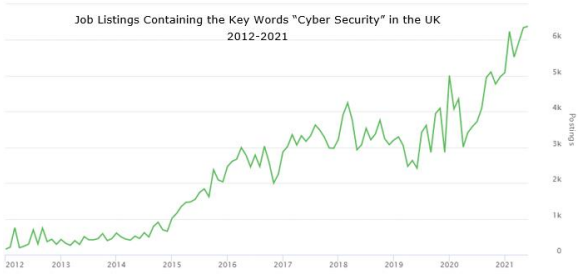
Cyber security and specialist IT skills

Wherever digital communications exist, there also exists the potential for security breaches – with technology comes vulnerability.

Cyber security roles in the energy sector will benefit from a dual skillset, meaning they need to be proficient in both IT (information technology) and OT (operational technology) - understanding communications technology and engineering equipment, as well as their interactions, is a niche skillset that not many individuals possess in the wider labour market and will be a key aspect of training and development of these people within the sector[xvi].

The cyber security roles in greatest demand include engineers, analysts, architects, managers, and consultants – people who need to be able to communicate risks and good practice in an engaging way to non-cyber staff, while working collaboratively across the business to develop a holistic cyber security strategy.

Cyber security specialists are highly skilled, with academic achievements to match. Around 90% of such job postings required a degree qualification or higher.[xvii]



Around three-quarters of job postings also required more than 3 years' industry experience. Meaning that demand/ competition for experienced, qualified experts in this field is intense.

As a result of this apprenticeships in this field can be a strategic way for the energy sector to attract and develop its cyber security workforce, providing them with the required technical skills and also the necessary business knowledge/context.

Smart networks

To enable smarter grid operation and planning, several innovations are required around the use, collection, and analysis of grid data, including innovations around data collection and storage, analysis and use in decision-making[xviii] - as discussed above.

For grid operators, smart networks also mean structural changes to reinforce or upgrade the network assets, implement decentralised energy data processes, change processes and business models, establish more flexible energy markets, and modernize system operations.

A larger array of operational technologies deployed at various points on the assets will require a broader set of skills and knowledge amongst a substantial proportion of the craft, technical and engineering workforce, particularly:

- Power Systems Engineering
- Software and Systems Engineering
- Digital and data skills
- Managing multi-stakeholders
- Developing, trialling, and roll-out of new Business Models
- Handling energy data

There is likely to be increased demand for roles such as **protection engineers** to work on LV cable replacement and **automation engineers and technicians** to support the network. The industry will continue to need **system and network planners**, and we anticipate needing **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. EHV network design engineers and SAPs will be required in greater numbers and that the complexity of their skillset will increase.

One potential new area to investigate further is the development of a **Smart Network Craftsperson/ Technician/ Engineer** Apprenticeship standard/ framework at circa Level 4. An alternative is to develop an industry-recognised equivalent outside of a formal Apprenticeship.

The transition from DNO to DSO

The three roles of a Distribution System Operator are[xix]:

- **Planning and network development**
  - Plan efficiently in the context of uncertainty, taking account of whole system outcomes, and promote planning data availability
- **Network operation**
  - Promote operational network visibility and data availability
  - Facilitate efficient dispatch of distribution flexibility services
- **Market development**
  - Provide accurate, user-friendly, and comprehensive market information
  - Embed simple, fair, and transparent rules and processes for procuring distribution flexibility services

A number of capabilities where current DNO levels were well below the anticipated requirements for DSOs have been identified, primarily in areas such as:

- Commercial Relationships & Whole System Pricing
- Customer account management
- Despatch
- Forecasting
- Regulatory codes and frameworks
- Settlement
- Whole system co-ordination

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 DSO operations.

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. As such, this "skills deep dive" exercise should be refreshed on a regular basis – approximately every 3 years.

4.4 External challenges to workforce resilience

In addition to the specific challenges highlighted above, we must consider the wider context that the energy sector operates in:

- The most recent data shows that the labour market is continuing to recover from the Coronavirus pandemic
  - Employment is increasing and unemployment is decreasing
  - Redundancy rates have returned to pre-pandemic levels
  - Job vacancies have reached a record high

- Investment levels in the UK's essential infrastructure is planned to exceed £600bn over the coming five years, with the utilities sector accounting for one in every five pounds of investment, including 31 individual projects worth more than £1bn, many of which will run concurrently
- An estimated that 25% of vacancies in England were skills shortages.[xx]
    - 29% within "Primary Sector & Utilities" - only "Manufacturing" (36%) and "Construction" (34%) report a higher proportion of skills shortages
- Energy & Utility Skills has identified the following list of job roles as being in shortage in the UK's energy sector.[xxi]

Figure 4: Job titles evidenced to the Migration Advisory Committee as being in shortage in the UK energy and utilities sector

Job title	
Chemical Engineer	Overhead Linesworker
Civil Engineers	Planning/ Development Engineer
Class 1 & Class 2 HGV Drivers	Plant Operators
Commissioning Engineer	Power System Engineer
Contract and Sourcing Managers	Process Engineer
Control Engineer	Procurement Specialist
Cyber Security – IT Lead	Programme Manager
Data Scientist	Project Engineer
Design Engineer	Project Manager
Electrical Technicians	Proposals Engineer
Electronic Engineer	Protection Engineer
Enterprise Architect	Quality, Health, Safety and Environment (QHSE) Engineer
Environmental Advisors	Regulatory Manager - Econometrician
Estates Surveyors	Reporting Manager - Finance
Estimator	SAP System Architects
Health & Safety Advisors	Security Architect - IT
Instrumentation, Control & Automation Technicians	Senior/ Quantity Surveyor
IS Senior Buyer - IT	Site Managers
IT Developers	Software Engineer
Maintenance Engineer	Solutions Architect
Mechanic	Substation Electrical Engineer
Mechanical Technicians	Surveyor
Mechatronic Engineer	Technical Engineering Manager - Safety and Network Strategy

- Brexit appears to have had only an indirect impact the energy sector in that it has reduced the general supply of construction/engineering construction trades in the UK labour market, particularly at the lower-to-mid skill levels.

5. Conclusions

Based on the findings of this research, the following recommendations are made:

5.1 Skills priorities

Over the coming years, the following skills/job roles will be heavy demand and will require the sector to take both individual and collaborative action to ensure supply meets demand:

- For electric vehicle and domestic low carbon technologies – reskilling/multi-skilling to enable competencies across a wider range of installations (e.g. heat pumps and EV charging points)
- Engineering occupations – with data, digital and commercial skills
    - LV protection engineers
    - Automation engineers and technicians
    - System and network planners
    - Data network engineers
    - EHV network design engineers
    - Senior Authorised Persons
- ICT Specialists (Data Analyst, cyber security, ICT Technician) – with industry context knowledge
- Project Managers and Business Developers
- Commerce and Trading
- Development of a "Smart Network Craftsperson/ Technician/ Engineer" Level 4

5.2 Upskill the existing workforce

Digital literacy is increasingly becoming an essential skill of the workforce out in the field, where the two-way flow of information and data is done dynamically and in real-time.

Equally, data literacy is fast becoming a key skillset – not just those directly involved in its collection, storage, and analysis, but also amongst decision-makers.

Cyber security sits in the same camp. Everyone handling potentially sensitive data should be aware of the risks and how they can help mitigate them.

The success or failure of a digital, data or cyber security strategy depends on the skills, knowledge, and actions of the entire workforce – and all should be included in relevant and appropriate training.

5.3 Promote the sector as an attractive career option to all sections of the community

Energy companies should consider the ways it reaches out to prospective employees to ensure that opportunities are available to all, no matter what their age, gender, ethnicity, disability status or where they live.

Resourcing strategies, including their entry requirements, may be exacerbating diversity and inclusion issues. For example, requiring a Degree or industry experience (where, in reality, they are not essential) could effectively rule out many from disadvantaged communities and certain ethnic minorities.

Attracting ethnic minorities into operational and technical roles is a long-standing issue (in 2018/19, just 7% of starts on industry-relevant Apprenticeship Standards were from an ethnic minority background). Opportunities to improve ethnic diversity may be easier at a higher skill level, as 28% of first Degree starts on relevant STEM courses in 2018/19 were from an ethnic minority.

The benefits of employing neurodiverse people in data areas is increasingly being recognised[xxii]. Including people with Autism, Dyslexia, Dyspraxia and Attention Deficit Hyperactivity Disorder (ADHD).

5.4 Measuring and reporting workforce resilience

The reporting of robust and transparent human capital metrics to both internal and external stakeholders can help employers demonstrate its commitment to its people.

To support this aim, the National Skills Academy for Power is currently working with DNOs to develop a framework which seeks to measure and benchmark workforce resilience from a skills and resourcing perspective. It is likely that metrics will be developed relating to the following aspects:

- **Attraction**
  - **Workforce characteristics**
    - % of workforce that are female, from an ethnic minority background, with a physical and/ or learning disability
    - % of the workforce aged 16-24 and 60+
  - **Resourcing**
    - Number of applicants per vacancy, and the average time fill a vacancy
    - % of vacancies filled via internal candidates vs external recruits
- **Skills development**
  - Employee participation in upskilling, multi-skilling and new skill training
- **Retention**
  - **Leavers**
    - Median retirement age and voluntary staff turnover rates
    - Reason for leaving and average length of service upon leaving
  - **Succession planning**
    - Succession effectiveness rate and succession readiness rate
  - **Absenteeism**

5.5 Engage with the sector's Workforce Renewal and Skills Strategy

The Energy & Utilities Skills Partnership's Workforce Renewal and Skills Strategy is the driving force behind skills development at a sector level. This new strategy seeks to ensure workforce resilience, and calls upon policy makers, regulators, unions, and supply chain partners to unite.[xxiii]

The strategy focusses on three main areas:

- **Sector attractiveness, recruitment and workforce diversity**
  1. Reflect the population that the sector workforce serves
  2. Inspire the next generation to a career within the energy and utilities sector
- **Maximising investment in skills**
  3. Deliver the competencies and skills we need
  4. Build public recognition of the sector
- **Targeted action – to address anticipated skills gaps and shortages**
  5. Support a successful UK economy and society outside the EU
  6. Contribute to a sustainable and resilient UK

5.6 Refresh and update the new technologies skills deep dive on a regular basis

As this is a fast-paced period of change fir the industry and new technologies will continue to be developed and deployed as long as there is an energy sector, it is recommended that this review of new technologies and their impact on the sector's workforce is refreshed on a regular basis – perhaps every 3-5 years.

It would also be a useful exercise to revisit the findings from this current exercise to see (i) if new technologies are coming along at the pace we anticipated in 2021 and (ii) whether their impact on the workforce was as predicted.

7. Paper category and keyword set

Electricity and Nuclear

Energy Security

Energy Distribution

Renewables

Smart energy

Human Capital

Strategic Workforce Planning

Skills

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