



UK Government

Network Relevant Students Research

Executive Summary

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Executive Summary

Overview

A sufficient pipeline of skilled workers in network roles and the associated supply chain will be critical to meeting the UK's Clean Power 2030 and Net Zero commitments^{1 2}. However the current workforce faces a number of challenges. This includes a need to grow and reskill the sector in the face of stiff competition across industry, and to attract a more diverse workforce (particularly women).

A critical route to maintaining and growing the workforce is through recruiting early career students with the relevant pre-requisite qualifications to working in the electricity networks sector – a group referred to throughout this report as 'Network Relevant Students' (NRS).

Accordingly, this research has been commissioned to grow the evidence base around current barriers and motivations (perceived or actual) amongst NRS to working in network roles, how these manifest across different groups of NRS (e.g. according to gender or other demographic factors), and how NRS could be effectively encouraged to join the future workforce.

The research consisted of a two-phased iterative approach, as follows:

- Phase 1: Desk research and NRS profile building - drawing on publicly available data and interviews with 20 sector stakeholders to: profile the nature and prevalence of different NRS; understand views and experiences of training, recruiting and retaining NRS currently; and, capture existing interventions.
- Phase 2: Primary research – 8 x 90-minute online focus groups with current NRS and 20 x individual 45-minute online interviews with recent NRS, followed by a c.15-minute open online survey with 303 current and recent NRS, to: understand motivations and barriers in qualification and career decision-making; assess NRS' awareness and understanding of the networks sector; and, understand their appetite for working in the sector. 'Key Drivers' and segmentation analysis was then conducted to help identify the most important factors to encouraging NRS to consider a role in the network. Implications of the research findings were then discussed at a workshop with stakeholders from industry, academia, policy, education and Government, with a particular focus on opportunities for possible messaging and awareness raising interventions that could be implemented going forward.

¹ UK Government (2021). [Net Zero Strategy: Build Back Greener](#); Department for Energy Security & Net Zero (DESNZ) (2024). [Clean Power 2030 Action Plan: A new era of clean electricity – assessment of the clean energy skills challenge – evidence annex](#).

² The UK's electricity network includes all stages of electricity generation, transmission, and distribution, connecting power stations and generators such as windfarms to domestic and industrial users. This includes the nationwide system of pylons and cabling connecting everything together. Job roles in the sector include engineering, construction, planning and logistics roles, among others.

This report presents findings from these two phases of research, together with recommendations for how NRS could be effectively encouraged to take up roles in the networks sector going forward.

Understanding the wider context

Current workforce

In 2022, the ONS recorded approximately 54,900 people working in electricity transmission and distribution in Great Britain³ ⁴. Of these, 3,800 worked in transmission and 51,100 in distribution⁵. However, it is unclear how much of this is ‘permanent’ workforce (e.g. those working full-time for an electricity network owner or operator) and to what extent, if at all, it captures the ‘project by project’ workforce – e.g. those working for contractors on an electricity network project on the day used for estimates⁶.

In terms of understanding the demographic make-up of those currently working in electricity network roles, there are no definitive answers, since there is no data available for just the electricity networks workforce. However, multiple sources indicate a male-dominated workforce. Summary statistics for various high-level groupings suggest a workforce that is c. 75% male. The research has not been able to identify a source of data on ethnicity, either by sector or by role.

Addressing workforce challenges

Meeting future workforce needs - The National Energy System Operator states that more than twice as much new transmission network infrastructure will need to be built by 2030 as has been built in the past decade, along with accompanying enabling works, connections and distribution network strengthening⁷. Yet, the current parts of the workforce are ageing; data shows 38% of the engineering construction workforce is aged over 50⁸. Whilst there is no definitive published figure on the number of skilled workers that will be required for the sector

³ Draws on SIC-2007 codes pre-agreed with DESNZ. Relevant SIC-2007 codes included: Electricity, gas, steam and air condition supply (2-digit or Division code 35), Electrical power generation; transmission and distribution (3-digit or Group code 351), Production of electricity (5-digit or single code 35,110), Transmission of electricity (35120), Distribution of electricity (35130). It is unclear in this data what proportion of workers are directly employed in electricity transmission, or are contractors, or are part of the wider supply chain.

⁴ These figures are based on the latest available data on the number of people working in GB electricity transmission and distribution at the time of writing.

⁵ Drawn from ONS ‘GB and UK level employment (thousands) by 2, 3 and 5 digit SIC 2007 (full-time/part-time and public/private sector split)’. Transmission includes “operation of transmission systems that convey the electricity from the generation facility to the distribution system” and distribution includes “operation of distribution systems (i.e. consisting of lines, poles, meters, and wiring) that convey electric power received from the generation facility or the transmission system to the final consumer”.

⁶ SIC data (which is what has been used to calculate overall numbers) broken down by gender is not available, or where gender data is available it is not industry specific.

⁷ National Energy System Operator (NESO). (2024). [Clean Power 2030](#). National Energy System Operator.

⁸ von Blumenthal, F. and Fantini, A. (2021). [ECITB Workforce Census 2021: Overview of the Engineering Construction Industry](#).

to meet Net Zero targets⁹, evidence drawn from desk research suggests there will need to be significant increases. For example, according to the Electricity Networks Strategic Framework, reinforcing Great Britain's onshore electricity networks to meet Net Zero could directly support an additional 50,000-130,000 FTE jobs by 2050^{10 11}. This represents a significant increase on current workforce numbers (though we are unable to draw direct comparisons between current vs. projected numbers).

A gender imbalance remains - The sector still has a significant gender imbalance, with women being underrepresented in a range of roles, such as Engineering. For example, according to EngineeringUK, the proportion of women working in Engineering and Technology roles has declined in the past year (to 2024), from 16.5% to 15.7%. In contrast, women make up more than half of the rest of the UK workforce (56.1%)¹². Wider research has shown that a lack of diversity can deter underrepresented groups from pursuing careers in this sector¹³. While efforts are being made by academic institutions and employers to promote initiatives supporting more diversity in STEM, a lack of authentic role models for young women has been shown to still serve as a barrier to entry among stakeholders and female NRS engaged through this research.

Findings from the desk research, and engagement with stakeholders, highlights a number of further challenges facing the sector in meeting workforce challenges. These include:

Major competition within and across sectors – The sector is competing for the same narrow pool of people with relevant STEM skills within and across other sectors (both domestically and globally). This was seen to be leading to a shortage of available talent and increased 'poaching' of trained employees between sectors. This was felt to be compounded by industry regulation, which was seen as a barrier for employers looking to incentivise roles and compete on salary with other high-paying sectors and international projects (including in the Middle East).

An outdated view of the roles needed – Qualifications which currently define whether someone would qualify to work in the electricity networks sector were felt to be too narrow and outdated. Stakeholders emphasised a need to update the way we think about and define network 'roles'; broadening it beyond simply maintaining and operating the grid, to the emerging job needs of the 'new world' (e.g. digital technology, automation, analytical and AI capabilities) and future large-scale infrastructure needs.

Skills challenges remain – Stakeholder feedback points to a gap between the skills taught in educational institutions and the needs of the industry, which can have a knock-on effect for employers. For example, university courses often failing to provide practical and applicable

⁹ Some of this is hard to precisely quantify, since figures do not necessarily relate specifically to the electricity networks sector.

¹⁰ Department for Business, Energy, & Industrial Strategy (BEIS) (2022). [Electricity networks strategic framework: enabling a secure, net zero energy system](#).

¹¹ These figures are based on the latest available estimates for the number of jobs supported at the time of writing.

¹² EngineeringUK (2024). [Spike in women aged 35 to 44 leaving engineering](#). Press Release.

¹³ National Grid (2020a). [Building the Net Zero Energy Workforce](#). National Grid Group; Crowhurst, M. and Taylor, A. (2023). [Generation Green Jobs? Exploring young people's readiness for the Net Zero skills revolution](#).

skills required by the sector. Or challenges in terms of the consistency of skillsets among early career NRS when they start a job – this can be regardless of their qualification route, and can relate to completers of apparently identical qualifications. It was also recognised that meeting workforce challenges is not just about expanding the number of new entrants into the sector; it will also mean reskilling and upskilling the existing workforce (e.g. on connecting to smart technologies, and identifying crossover competencies that can be transferred from, for example, offshore oil to offshore wind).

Main findings

Building a profile of NRS

NRS study numbers and changes over time ¹⁴

The research points to a range of qualification routes, which provide the prerequisites to joining the sector. These include routes via higher education institutions and apprenticeship/vocational qualifications. Figures for enrolments provide helpful context for thinking about meeting the future skills needs set out above¹⁵.

The analysis estimates that there could be around 428,000 NRS currently studying or training in the UK across higher education and apprenticeship routes, but that the total figure is likely to be notably higher if all vocational qualification routes could be taken into account.

Of these, around 418,000 students were enrolled on relevant higher education routes in the academic year 2022/23 (UK wide). These figures include students studying full-time and part-time at both an undergraduate and postgraduate level, at any level of their studies (i.e. not only new enrolments, but also returning students).

Apprenticeship data shows around an additional 10,000 students achieving a relevant apprenticeship in the year 2022/23 as a minimum (England only¹⁶), noting data was not available for all eligible apprenticeship courses. Data on vocational qualifications recently awarded is only available at a higher level, preventing complete estimates of this group.

There is data to suggest these numbers may be in decline in some subject areas¹⁷. For example, apprenticeship data shows a decline in Engineering and Manufacturing apprenticeships from more than 7,000 in 2016/17, to fewer than 5,000 in 2022/23. Uptake of

¹⁴ Draws on latest available data at the time of analysis that supports profiling and estimates required

¹⁵ For both higher education (HE) and apprenticeship routes, lists of specific courses were agreed in consultation with DESNZ and stakeholders. HE student data is taken from HESA. Apprenticeship data is taken from GOV.UK - Apprenticeships, Academic year 2023/24. Numbers between HE and apprenticeship routes may also differ markedly as HE numbers include everyone in the UK studying a course, such as Maths or Physics, compared to more highly specialised apprenticeship routes

¹⁶ Apprenticeships data available on GOV.UK is for England only.

¹⁷ As context, it is worth noting that apprenticeships across all subjects dropped over this period, which may in part be because of COVID-19, and in part because of the switch from frameworks to standards (essentially making apprenticeships more rigorously assessed, which may have led to slightly lower uptake).

some key higher education routes is also declining, for example, Electrical engineering has been in steady decline since the early 2000s¹⁸.

NRS demographic profile ¹⁹

Most NRS subjects and routes are male-dominated. For higher education routes, engineering courses tend to be the most male-dominated (Mechanical engineering was 12% female in 2021/22; Electrical and electronic engineering 17% female), although there have been slight increases in female student numbers in recent years. Only a handful of the relevant NRS courses identified are female-dominated - these tended to be smaller (in terms of student numbers) and less directly relevant to network roles (e.g. Environmental Sciences). ²⁰

Data for apprenticeships is more limited, but a similar pattern is still observable - data for 2023/24 shows very limited numbers of female students in Construction, Planning and Built Environment (10%) and Engineering & Manufacturing Technologies (10%), but better representation in Science and Mathematics (59%), and a general upwards trend since 2017/18²¹. Again, data is limited for other vocational qualifications²².

In terms of ethnicity, relevant data is available for higher education courses only at the higher subject-grouping level²³. Higher education subject areas which are relevant to taking up network roles are, on balance, more ethnically diverse compared to the average across all subject areas. For example, the student population for Computing was 65% White in 2022/23, Engineering & Technology was 68% and Mathematical Sciences 72%, compared to an average of 72% across all subject areas²⁴. There is an observable trend towards greater ethnic diversity over the last decade²⁵.

Apprenticeship data shows less ethnic diversity: enrolments in 2023/24 were 91% White for courses in Construction, Planning and Built Environment, 86% White in Engineering & Manufacturing Technologies, and 76% White in Science and Mathematics. There is a slight trend towards increasing diversity since 2017/18, however, as the proportion of people identifying as 'White' enrolled in each subject area has decreased slightly across the board²⁶.

¹⁸ Royal Academy of Engineering (2024). CSA Next Steps Paper: Coordinating skills challenges across government. Royal Academy of Engineering News.

¹⁹ Draws on latest available data at the time of analysis that supports profiling and estimates required.

²⁰ HESA (2024a). Chart 11 - HE students by CAH level 1 and sex Academic years 2014/15 to 2021/22. HESA. [Available online.](#)

²¹ GOV.UK (n.d.a). Apprenticeships, Academic year 2023/24. [Available online.](#)

²² Awards data from Awarding Organisations for vocational qualifications in England regulated by Ofqual is available, but it has not been possible to disaggregate qualification level by subject area as of the time of analysis, so detailed estimates on vocational routes have not been included (see: [Vocational and other qualifications quarterly: July to September 2024 - GOV.UK](#)).

²³ We are not able to drill down into more specific network relevant qualification subjects.

²⁴ According to HESA, HE students of White ethnicity accounted for 72% of all students of known ethnicity in 2022/23. Available [online](#).

²⁵ Drawn from HESA (2024b). HE Student Data. HESA. [Available online.](#)

²⁶ GOV.UK (n.d.a). Apprenticeships, Academic year 2023/24. [Available online.](#)

Barriers and motivators for NRS

The research looked to understand the range of barriers and motivators for NRS when making choices about a future career. Survey results show that those on a university degree pathway (including current students) are most likely to be motivated to take up a career in the networks sector by **‘seeing people like themselves working in the chosen sector’**, followed by the **‘employer’s reputation’** and **‘pay and wider benefits’**. In contrast, among those on a vocational pathway, the biggest motivating factors are having the opportunity to work in a **‘green job’** and **‘doing something their family approves of’**, followed by the **‘employer’s reputation’** and **‘intellectual challenge’** of the job.

Below the most pertinent barriers and motivators coming out of the research (including among stakeholders and NRS) are explored further.

Seeing people like ‘me’ – Male dominance in a sector could be seen to serve both as a barrier and a motivator for female NRS when considering a future career. On the one hand, there were female NRS research participants who explained that they wanted to pursue relevant network qualifications to help bridge gender gaps in traditionally male-dominated fields, such as STEM (e.g. Maths and Physics). On the other, the lack of authentic role models for young women in STEM appeared to be serving as a barrier to entry. For female survey participants, ‘seeing people like me working in the sector’ was the joint top motivating factor for choosing a career among those who would consider a network role.

Opportunities to work in a green job – This is something which could be leveraged to change perceptions and drive consideration amongst NRS, but not at the expense of other career motivators the research uncovered as important to them. There was a perception among NRS participants that ‘green jobs’ are generally less well paid than other sectors (and pay matters to them). There was also confusion about the sector’s role in the energy transition to Net Zero; thus making it harder for NRS to immediately see the sector as ‘green’.

Employer and sector reputation – NRS are looking for prestigious and innovative opportunities, advancement, and alignment with their values. As it stands, the networks sector is seen as less ‘glamorous’ and not as exciting as competitor sectors. There was recognition among stakeholders of the need to elevate the sector’s reputation, and promote it as a dynamic career path.

Pay and wider benefits – This is a key motivator for NRS, but one which presents a challenge for the sector. There is a stubborn perception that the networks sector does not pay as well other sectors NRS would be qualified to work in (raised by both stakeholders, and also apparent from the research with NRS themselves). Meanwhile, as noted above, the sector faces a challenge in matching the salaries offered by other competitor industries. This pay differential may not necessarily reflect reality – for example, it’s noted in the evidence that clean energy jobs can offer well-paid careers, with relevant jobs tending to be advertised for salaries above the UK average²⁷. However, when compared specifically to other highly skilled

²⁷ Department for Energy Security & Net Zero (2024b). Clean Power 2030 Action Plan: A new era of clean electricity – assessment of the clean energy skills challenge – evidence annex. [Available online.](#)

sectors, they are often lower paid²⁸. Identifying other, more indirect, monetary benefits for taking up a role in the sector will ultimately be important here.

Family and community influences - Family appears to be a key factor in influencing qualification pathways. This was particularly evident in fields perceived as prestigious, such as Physics, among those 'first-generation' NRS pursuing higher education, and more evident among NRS participants from an ethnic minority background.

Location – Higher education graduates are seen as traditionally more mobile. The sector is mainly associated with jobs in more rural or isolated locations. Location has been shown to be an important career choice motivation among NRS, but it could be seen both positively (e.g. in terms of offering opportunities for travel) and negatively (e.g. long commutes and impact of relocation) by participants.

Job security – This was a top motivator when making choices about a future career among the NRS surveyed. Given the importance of the electricity networks sector to national infrastructure and meeting Net Zero targets, this seems a key way to 'hook' NRS.

Career progression and skills development – NRS are looking for long-term career progression and skills development. Employers and educational institutions are increasingly acknowledging the lack of visibility of development opportunities within the sector.

Poor sector awareness – NRS engaged through the research, whilst pursuing relevant qualification routes, were not clear on the opportunities presented by the electricity networks sector. However, they were open to knowing more. Just 45% of NRS surveyed were aware of job opportunities available in the sector, of which only 8% reported knowing a 'great deal'. As it stands, 2 in 5 (41%) survey participants have considered or would consider working in the electricity network. Raising awareness of the sector, and the range of opportunities on offer with different entry levels, will be critical to attracting NRS to network roles going forwards.

Other barriers to entry – Of note here was that roles and routes to a career in the networks sector (e.g. Engineering) tend to be associated with academic qualifications, which reduces the talent pool and puts off some who could in theory access a network role via a different route. Knowledge around alternative technical and vocational options is also seen to be low among parents, who have been shown to play an important role in NRS career decisions.

Conclusions and recommendations

Key reflections

This research has aimed to provide an updated picture of the potential NRS 'pool', qualification routes and demographic profile (though it has not been possible to come up with fully definitive

²⁸ Sato, M., Cass, L., Saussay, A., Vona, F., Mercer, L. and O'Kane, L., (2023). Skills and wage gaps in the low-carbon transition: comparing job vacancy data. [Available online](#).

figures for NRS across the UK, primarily due to the nature of the data available in the public domain at the time of writing, and because NRS are not a perfectly defined cohort).

However, the analysis of existing data on NRS suggests there is a large potential pool of eligible workers that could be contributing to future workforce needs. Both the survey and qualitative research with NRS themselves certainly indicates potential appetite for a career in the electricity networks sector among this cohort.

The research has shown that key to attracting more (and better skilled) NRS to the sector will be a greater focus on awareness raising (about what the sector is, and the roles within it), and in elevating its image so it can more effectively compete in the wider jobs market.

It has also helped us to understand more about the career motivations and barriers of NRS, and how they navigate their career journeys. This is invaluable to understanding how the sector and others should focus efforts in order to encourage NRS into the workforce. This includes helping to ensure any messaging and communication is targeted appropriately.

There is already considerable work going on across the sector to help address some of the skills challenges set out in this report. This research was not intended to provide a root and branch mapping of all of this activity, but it has uncovered a number of initiatives and work streams that are relevant to note, and which can be built upon (for example, the Power Academy, various work experience and educational initiatives, and communications and advertising activities). The Office for Clean Energy Jobs has now also been established within DESNZ, working to ensure the UK has the skilled workforce needed for the Net Zero transition. Membership bodies, such as the Energy and Utility Skills Partnership, are also pooling resources and co-ordinating knowledge-sharing across industry employers.

Recommendations

Government has made commitments in the Clean Power 2030 Action Plan to exploring public awareness campaign options, working with industry to coordinate messaging which promotes the opportunities from clean energy jobs, such as those in the electricity networks sector²⁹. Based upon this research - which examines the factors that influence NRS in their career choices and draws on insights from relevant stakeholders - the findings point to a range of possible interventions that will help to support this endeavour. These include the following.

Reframe how people see the sector. Talk to the bigger picture of Net Zero and the scale of the change needed (though not at the expense of other career motivators). Speak to the design and innovation opportunities in the networks sector, and emerging roles in, for example, cyber security and tech.

Coalesce around a mission statement. The research demonstrates the diversity of NRS, which will mean discrete messaging is needed for different cohorts and at different points along their career journey. However, stakeholders did see value from a cohesive message or mission

²⁹ Department for Energy Security & Net Zero (2024a). Clean Power 2030 Action Plan: A new era of clean electricity. [Available online.](#)

statement for industry to coalesce around, as a way to promote the sector. This could draw on compelling narratives that resonate with broader societal goals, such as ‘powering the nation’, forming part of a broader campaign that ties together various activities and initiatives across the sector, coupled with a more discrete focus on individual cohorts of NRS.

Meet NRS where they’re at. For NRS on more academic routes, any targeting is likely to be more effective towards the end or immediately after their degree. Graduates, in particular, are potentially looking for more generalist roles, so highlighting the variety of careers in the networks sector (beyond traditional engineering and ‘craft’) will be important. It is also relevant to consider where opportunities are promoted. Certainly, feedback from NRS participants suggests there is a lack of advertising and promotion of the sector through routes like career fairs, which feels like a missed opportunity. Female NRS will be an important cohort to consider here as well. Among this group, by far the biggest motivator to taking up a career in the networks sector will be seeing more people like them working in the sector.

Finally, stakeholders reflected that a multi-actor approach will be needed to address challenges – including Government, industry and educators/trainers working together. There is also an opportunity to learn from what is working well in other sectors competing for NRS, such as nuclear and defence.

This publication is available from: www.gov.uk/government/publications/electricity-network-jobs-motivations-and-barriers-for-students

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