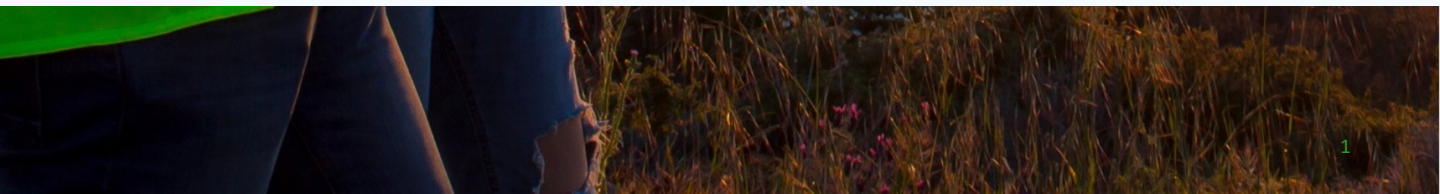
ENGINEERING SKILLS NEEDS – NOW AND INTO THE FUTURE

Discussion paper



Headline findings at a glance

The number of engineering jobs will grow in all UK regions between now and 2030

25% of all job postings in the UK are in engineering and technology

In the past 5 years postings for **'green' engineering jobs** have increased by 55% and postings requiring 'green skills' by 48%

Projections suggest net growth in engineering roles of 2.8% compared to 2.3% in all occupations. Growth at that level would lead to 173,000 new engineering and technology jobs by 2030

The highest number of engineering and technology jobs are in London and the South East, however, the proportional share of jobs in these regions has declined since 2016/17

The occupational composition of engineering varies across UK regions

- London and the South East have a high concentration of jobs in ICT and civil engineering
- Jobs in the Midlands and the South have a mechanical and electrical engineering focus
- Skilled trades, industrial and general operative roles are more concentrated in the North of England, Wales and Northern Ireland
- Scotland has a very high degree of specialisation in environment, energy and earth occupations

Introduction

Given recent rapid labour market developments and changing workforce needs, EngineeringUK commissioned labour market analysts Lightcast in autumn 2022 to explore engineering and technology skills needs, and how these have changed across the engineering sector in recent years.[1] The resulting report provides detailed insights into the engineering and technology sector.

Using Labour Force Survey data Lightcast's report explores the current numbers of engineers and presents projections for the future engineering and technology workforce. This provides a useful overview of the scale of the engineering and technology workforce needed if current trends continue over the coming years. As the projections do not take account of the likelihood of increased investment into the net zero economy over the period, we see these as a low-end estimate of the future requirements.[2]

Lightcast used job postings data to look at trends in employer recruitment activity over the period October 2021 to September 2022, providing near real-time insights on hiring trends. This provides a detailed overview of the latest roles and skills requirements for engineering and technology jobs, current salaries offered and how engineering and technology compares to other occupations.

A deep dive into the job postings data shows that the engineering and technology sector requires more specialised skills on average than other professions. However, the data also shows that within the engineering footprint there are unique skills requirements by job type, making engineering diverse and complex in its make-up. Furthermore, the skills needs in the engineering sector have been getting more diverse over the last few years, with employers requiring a broader spectrum of skills for their roles. Retraining and upskilling the current workforce will therefore need to be a consideration for engineering employers in the coming years.

[1] The research defines 'engineering' by using the 'engineering footprint' definition developed by EngineeringUK, the Royal Academy of Engineering and the Engineering Council (See from p32 in the state of engineering report 2018: https://www.engineeringuk.com/media/156187/state-of-engineering-report-2018.pdf). [2] Note that figures presented by Lightcast outline projected growth in engineering occupations, and are not equivalent to the shortfall figures previously produced by EngineeringUK.

Jobs and skills identified by Lightcast's taxonomy as **'green'** are becoming more prevalent due to the drive towards a low carbon economy, and engineering and technology roles are leading the way in this development. The report looks at how the demand for green skills has changed over the last 5 years, highlighting areas of rapid growth and how the shape of green skills is evolving. 'Green' roles appear across a wide range of industries, showing that the application of these skills is far-reaching and important to the economy at large.

Finally, the report explores regional variation, highlighting different engineering and technology specialisms in different parts of the UK. While growth in the number of engineering and technology jobs up to 2030 is projected across all regions, the percentage share of engineering and technology roles advertised in London and the South East has been decreasing in recent years.

This confirms that opportunities in the engineering and technology sector are spreading across other parts of the UK, possibly as a result of the changing requirements of the engineering and technology industry and the location of specialist companies related to them, as well as broader moves to ensure areas across the UK are better supported.

This paper reviews some of Lightcast's key findings in more detail and discusses some of the actions required for the engineering and technology skills needs of the future to be met.

Growing demand for engineers

Based on current trends and investment, Lightcast's projection model suggests[3] that there will be 173,000 more, new jobs in engineering and technology by 2030.

This projection represents a need for more workers with the relevant skills to fill new/additional engineering and technology jobs on top of currently available jobs, and those likely to become available as a result of retirements or those leaving the workforce for other reasons. With more government and/or industry investment into engineering and technology likely over the coming years because of the need to move to a net zero economy, we believe this to be a conservative estimate, with the number of additional jobs likely to grow into the future. Latest research, for example, suggests that the UK's domestic retrofitting sector alone will need to train 45,000 technicians each year at its peak in 5 to 10 years' time, and the energy sector will need to fill 400,000 roles by 2050, 65% of which will be new roles (equating to roughly 10,000 each year)[4].

The demand for (new and replacement) engineering and technology roles is unlikely to be met unless the numbers currently studying engineering and technology via the main academic and vocational routes increase. There were only 38,615 first degree undergraduate entrants studying engineering and technology in 2020/21[5], and there was a 13% decrease to 97,940[6] in engineering-related apprenticeship starts between 2016/17 and 2021/22.

Not all of these students will complete their qualification, and not all those who do will go on to work in engineering occupations or in the sector. Therefore, the gap between available engineering roles and those available to fill them is likely to be larger than these numbers suggest on current trends.

Not only does the size of the engineering and technology workforce need to increase, so too does its diversity. However, progress has been relatively slow, with women making up only 16.5% of the workforce in 2021[7], for example. If women were present in the engineering workforce at the same level as they are in the overall workforce (47.7%), then there would be around 1.8 million more[8]. Increasing diversity further will be key to meeting future requirements, including more representation of people from different socioeconomic backgrounds, ethnic minority groups, disabled people, as well as more women.

In light of the growing demands for engineering and technology roles, it is imperative that the government is clear on the skills needed throughout the country and has a strategy to meet those needs. This is why the engineering sector has for some time been calling for a STEM skills strategy. Government should be working with businesses and other organisations to develop this strategy and achieve progress in training and attracting those groups underrepresented in engineering and technology.

[3] Calculated from a bottom-up level, on the basis of an average of 3, 5 and 8-year time trends (please see p12 of Lightcast report).
[4] Net zero workforce, EngineeringUK 2022, online (accessed April 2023)
[5] Engineering in higher education, EngineeringUK 2022, online (accessed April 2023). [6] Further education and apprenticeship pathways into engineering, EngineeringUK 2022, online (accessed April 2023). [7] Trends in the engineering workforce, EngineeringUK 2022, online (accessed April 2023).
[8] Women in engineering, EngineeringUK 2022, online (accessed April 2023).

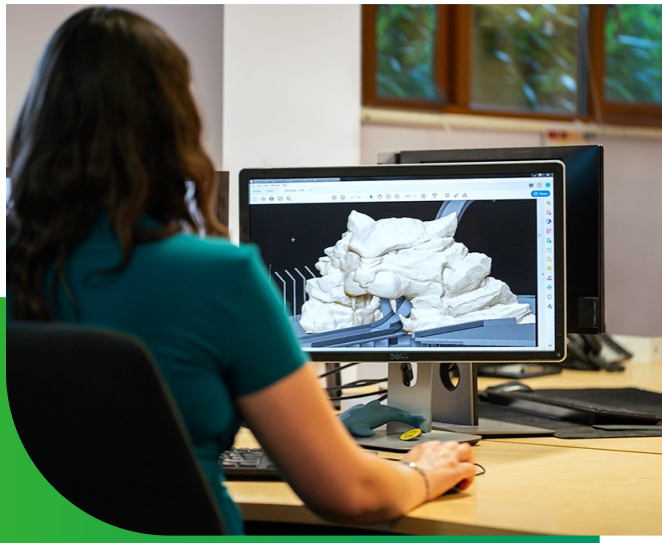
ICT in the engineering footprint

Over 4 in 10 of job postings (43%) in the engineering and technology sector are in information and communication technology (ICT) and software related occupations.

The profile of these roles looks very different to all roles across engineering and technology, with an emphasis on software skills, therefore skewing some of the data.

For example, looking across all engineering and technology roles advertised, including ICT, 25% of jobs required specialised engineering skills. However, when ICT was excluded, demand for specialised engineering skills increased to 36%. Similarly, excluding ICT job postings from the analysis reduces the demand for information and technology skills within the footprint from half (51%) to a quarter (27%).

It is clear that digital knowhow and information and technology skills are, and will continue to be, important for future engineering roles. It also highlights that ICT jobs will play an important role in the UK economy in the future and that for the UK to remain competitive in this field, supply of suitably skilled and qualified people will need to be able to meet demand.



Green skills

We know that the activities and skills of engineering and technology employees will be crucial in achieving the UK's net zero carbon emissions targets.

This is why EngineeringUK continues to review evidence on the engineering skills needed to meet this challenge[9]. Despite this, and due to the sector evolving rapidly, it has been difficult to agree a definition of what is meant by 'green jobs' or 'green skills', making projections about demand difficult to pin down. To help advance understanding, Lightcast used their own taxonomy for this report to help provide an insight into how the shape of green skills in engineering and technology has changed in recent years. The taxonomy includes almost 230 'green skills' and 370 'green job titles' selected for their relevance to sustainability, environmental protection and decarbonisation activities.

Insights from this approach show that job postings within the engineering footprint requiring at least one green skill increased by 48% to 212,000 between 2016/17 and 2021/22. Over the same period, the number of 'green job titles' increased by 55% to over 23,000 job postings. The research also finds that in addition to job titles such as environmental engineers, renewable engineers and

[9] Net zero workforce, EngineeringUK 2022, online (accessed April 2023)

environmental consultants, many green jobs are analytical and/or advisory roles, indicative of businesses seeking to measure the environmental impact of their work. The fact that green skills are also cited in job postings from across the engineering footprint shows the breadth of their application.

It's clear the demand for green skills is here to stay. This means that the sector, the organisations designing relevant courses, employers and employees will need to evolve their understanding of what is required of them and be open to adapt their approaches and learning. To support this, employers and government alike must be willing to invest more in the training of both the future and current workforce. Only by doing so will the UK be able to achieve our own net zero ambitions, and compete economically with the rest of the world, ensuring the UK's prosperity into the future.

Automation

Automation will result in some jobs evolving in response to inevitable advancements in technology, with the skills required for some roles potentially changing significantly.

In their report, Lightcast set out to assess the extent of the impact of this evolution on engineering occupations and compare that with the impact on other occupations. To do this, Lightcast used their own UK automation index which looks at the proportion of working time spent in each occupation performing tasks which are deemed to be at 'high-risk' of change through automation and other technological change anticipated over the next 20 to 30 years.

The research finds that around a quarter (27%) of tasks in engineering and technology occupations were deemed to be automatable in the future, similar to the average across all occupations (28%). Occupations most likely to experience change due to automation are those with routine-based tasks such as process operatives, bricklayers, carpenters and joiners, electricians and electrical fitters, vehicle technicians and mechanics. However, the research also shows that not all occupations will be affected in the same way - the activities of some are more likely to be changed by new, more efficient machinery and robotics, while others will see the application of new methods and processes.

Technology is continuously advancing, and while this research provides us with an insight into what the future may hold, it is difficult to predict how and whether other occupations may also be affected in the future. To respond to this insight employers, employees, training providers and government will need to maintain an agile and flexible mindset and a willingness to pay for the continuous upskilling of the UK workforce through various training schemes, including apprenticeships and shorter-term courses.

Regional insights

Lightcast's research has shed light on the unique strengths and specialisms within engineering and technology occupations across the different regions of the UK.

We see, for example, that London and the South East specialise in ICT and civil engineering roles, while in the South and the Midlands the focus is on mechanical and electrical engineering. Scotland has a very high degree of specialisation in environment, energy and earth occupations, whereas skilled trades, industrial and general operative roles are most specialised to the North of England, Wales and Northern Ireland.[10]

London and the South East continue to have the highest number of job postings, reflecting the labour market overall. However, the percentage share of engineering and technology roles advertised in these areas has decreased since 2016/17, with corresponding growth in the North of England. Accounting for the different specialisms across the UK, this shift in job postings could be indicative of an overall shift in skills needs in the engineering economy towards more environmental and skilled trade roles.

Additionally, data for Local Skill Improvement Plan areas (LSIPs) in England and NUTS2[11] regions for the devolved nations demonstrate differences within regions. Job postings data shows that urban locations have higher concentrations of engineering and technology vacancies than rural locations across the UK. However, there are also some areas of engineering specialism outside of major cities, showing that there is potential for growth in other areas.

Looking at this in the context of the government's 'levelling up' agenda[12], which acknowledges that "while talent is spread equally across our country, opportunity is not", it becomes clear that more needs to be done to better link up young people across our regions with the opportunities that are becoming available in their areas.

We know from EngineeringUK's survey of young people and their parents, that from an early age, knowledge of engineering careers and pathways into them varies by location[13]. Knowledge in London is generally stronger compared with other regions, but there is not a clear North-South divide. For example, 60% of young people in London knew what subjects they would need to take to become an engineer, compared to 47% in the North East and North West and only 25% in the South East.

With the levelling up agenda striving to enable more social mobility, there is undoubtedly a need for regional solutions to ensure growth in the engineering and technology sector, allowing for talent from a wider variety of backgrounds to join the workforce. Stronger links between businesses, education providers and LSIPs, which are central to the government's plan to tailor further education in a way that better reflects and responds to local skills needs, is a good starting point for facilitating this. However, at the same time, we must not lose sight of the need for young people training to become engineers, alongside skilled engineers, to be able to access opportunities outside their own area. Ensuring a certain level of workforce mobility across the UK will be vital to enable people to access opportunities as well as ensure that we have the workforce to serve nationally important industries and sectors.

[10] See the appendix of the research report for a full list of SOC codes in each thematic career group. [11] NUTS2 regions are geographical classifications used for statistical purposes. At the time of writing, these were moving to be called International Territorial Levels (ITLs) following the UK's exit from the EU. See: https://www.ons.gov.uk/methodology/geography/ukgeographies/eurostat [12] Levelling up the United Kingdom, gov.uk, 2022, online (accessed April 2023)
[13] Levelling up engineering skills: widening opportunities for young people, EngineeringUK 2021, online (accessed April 2023)

Conclusion

The job postings data used by Lightcast for their report confirms what the sector has been saying for some time - that there are acute skills and labour shortages in the engineering and technology sector.

Jobs in engineering and technology are continuing to grow and at a faster rate than the average for all other professions, with potential for even faster growth if further investment is made, as planned and anticipated, by government or industry towards net zero targets for carbon emissions.

This is set against a decline in the number of engineering and technology apprentices over the last 5 years, and numbers of students studying engineering and technology subjects in higher education that are not increasing at a fast enough rate to meet the future (new and replacement) needs of the sector. This, combined with rapidly emerging new roles related to green skills and technology advancements, highlights the need for sustained and growing investment in training, as well as reskilling and retraining those already in the labour market, especially those where automation is likely to change the shape of their job.

On top of this, it is essential to invest in the skills of a more diverse range of new entrants to the engineering labour market. Only by improving workforce diversity and reaching the full pool of talent can the sector fill its skills and labour gaps.

In addition to investing in training, reskilling, and retraining both the future and existing engineering and technology workforce, it is important that clear strategies are developed to address regional challenges and skills needs. Strengthening links between engineering companies, education providers, and local communities, for example through LSIPs, and developing more locally focused programmes of support for young people, is a good starting point. This will be essential for widening participation, and ultimately increasing the number and diversity of young people considering joining the future engineering and technology workforce.