February 2025 briefing to the Migration Advisory Committee

About EngineeringUK

EngineeringUK is a non-profit organisation that works with over 400 organisations across engineering and technology-related sectors to inspire and enable young people from all backgrounds to progress into engineering and technology careers. We directly reach over 120,000 young people each year with activities such as the Big Bang Programme, Climate Schools Programme, and Tomorrow's Engineers Week, which are designed to interest them in the variety of opportunities presented by a career in modern engineering and technology.

As an organisation, we pride ourselves on providing in-depth research and evidence-based recommendations on a range of themes, from STEM education in schools to apprenticeships and technical qualifications. For example, we have recently published reports on the Net Zero workforce, STEM careers provision in schools and colleges, T-Levels, and apprenticeships via our Fit for the Future Inquiry, co-chaired by Lord Willetts and Lord Knight.

About this briefing

This briefing follows the Home Secretary's 6th August 2024 letter to Professor Brian Bell, Professor Bell's response, and subsequent meetings between the Migration Advisory Committee and stakeholders, including EngineeringUK, on 9th September 2024 and on 29th January 2025.

We give an overview of the issues affecting engineering workforce numbers in the UK, and of the issues that the government can address to avoid future acute shortages. We have focused on the types of role in shortage (or growing rapidly), and challenges in the skills system, given EngineeringUK's remit focusing on expanding routes into the engineering and technology sector for young people.

An overview of the engineering and technology workforce and routes in

The engineering sector is large, broad and with a variety of routes to professional and skilled occupations.

We note that the MAC's area of focus is "professionals" as defined by the SOC codes that Stuart Bell shared in the MAC's update meeting on 29th January.

EngineeringUK generally defines engineering occupations more broadly, using an "engineering footprint" derived from the most recent SOC codes and agreed on by EngineeringUK, the Engineering Council and the Royal Academy of Engineering[1]. According to this, 6.3 million people in the UK work in engineering jobs (19% of all jobs). The Engineering Council reported in 2020 that 64% of the engineering footprint is in a "professional or skilled" occupation, and that a further 11% of people in the engineering workforce have roles as managers, directors or senior officials.[1]

While we appreciate that the MAC has been looking at the education profile of people in engineering professions, and has found a majority are graduates, we ask you to note that not only academic but also vocational and work-based qualification pathways can lead to a professional engineering job at degree level or equivalent – as illustrated in Figure 1, below. A small minority of engineering jobs are in professions regulated by law, such as certain roles in aviation, registered gas engineers, and people who work with fluorinated gas[2]. In 2024, 217,000 engineers and technicians were members of Professional Engineering Institutions and registered with the Engineering Council[3], which sets and maintains standards of professional competence and ethics – but this is a minority of the engineering workforce.

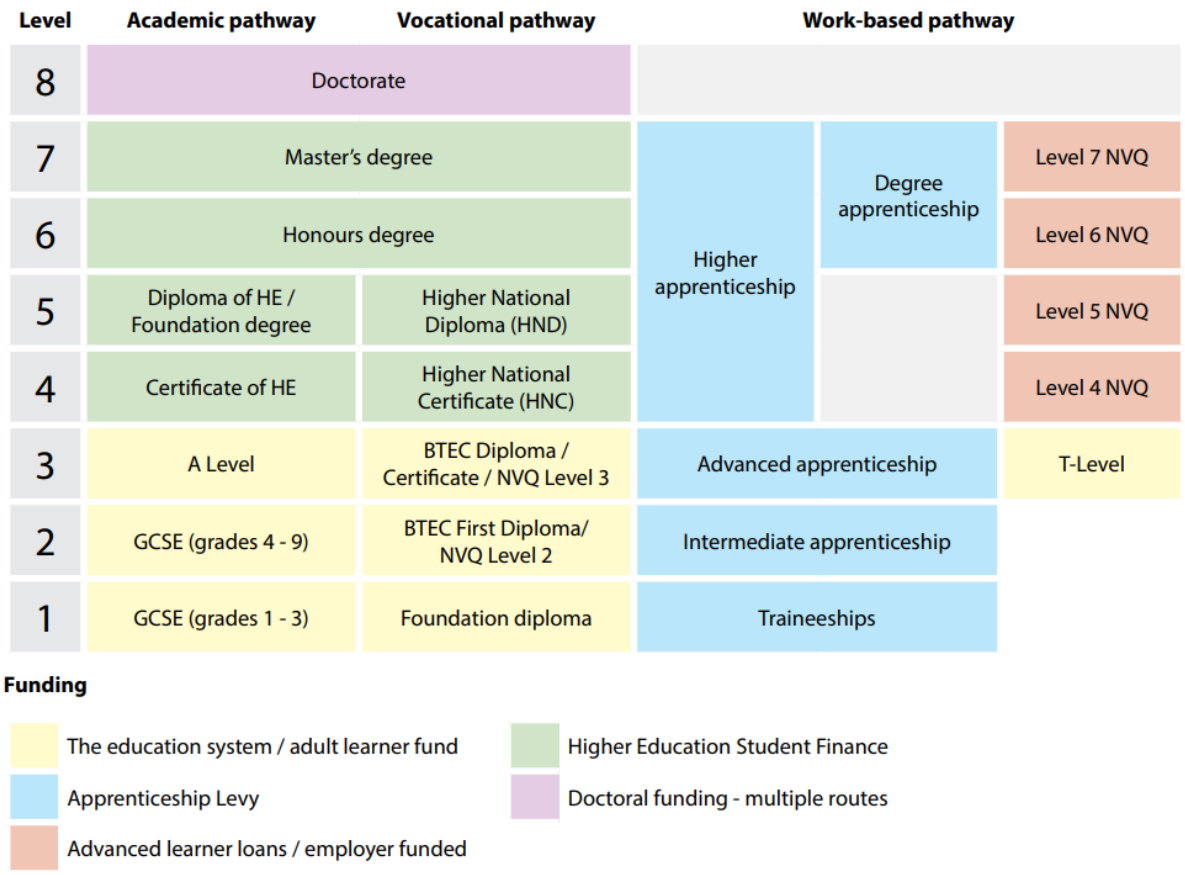
The Labour Force Survey suggests that 18.8% of those in the engineering footprint workforce were born outside the UK, slightly lower than the proportion for other occupations (20.5%).[4]

Employers often fund training for the current and future workforce, either by paying directly for training or through the apprenticeships levy. For all sectors, the Employer Skills Survey has found that SMEs are, on average, less likely than large employers to offer training – although, for those they train, they are more likely to offer training leading to nationally recognised qualifications[5] – and they may also find it more challenging to pay for visa sponsorship[6]. Large firms employ more than half of the engineering workforce, but small and

[1] EngineeringUK uses an "engineering footprint" to define the engineering workforce – a list of SOC codes which encompass all aspects of engineering jobs, including engineering jobs in organisations which do not specialise in engineering. https://www.engineeringuk.com/research-and-insights/our-research-reports/the-engineering-footprint

medium enterprises (SMEs) are also significant. EngineeringUK reported in 2018[7] that 99.6% of engineering companies in the UK are classed as SMEs, with 43% of the country's engineers working in them.

Figure 1: Qualification pathways and funding in England



Source: Higher Education Policy Institute[8]

The engineering workforce does not yet reflect the broader population, which implies that there are under-used talent pools

Women are under-represented in engineering (15.7% of those working in engineering roles are women, which compares to 56% of those in other occupations being female)[9]. People from UK minority ethnic groups (12% of the engineering workforce compared with 16% in other occupations[10]), those from lower socio-economic backgrounds (24% of the engineering workforce compared with 26% in other occupations[11]) and disabled people (14% of the engineering workforce compared with 18% in other occupations[12]) also under-represented.

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INSPIRING FUTURES TOGETHER

Labour shortages in engineering and the link to skills

Shortage in the overall supply of engineers is a longstanding, challenging issue.

In 2023, research carried out by Lightcast for EngineeringUK found that 19% of jobs are in engineering, but 25% of job postings relate to engineering occupations[13]. Jobs in the engineering sector were projected to grow at a faster rate of growth than for all occupations nationally.[14]

This comes in addition to already long-standing workforce shortages in the sector. The Institution of Engineering and Technology (IET) reported in 2022, "There is currently a shortfall of over 173,000 workers in the Science, Technology, Engineering and Maths (STEM) sectors: an average of 10 unfilled roles per business in the UK. Our latest skills survey identifies that half (49%) of engineering and technology businesses are experiencing difficulties in the skills available to them when trying to recruit."[15] This is a longstanding issue. The IET report states that it has tracked this challenge "for the last 15 years – longer than the time it takes for a primary aged child to complete their education".

Growth in jobs occurs rapidly in cutting-edge sub-sectors.

You highlighted at the MAC's stakeholder meeting on 29th January that you would like to know more about specific shortage occupations.

Jobs are expected to grow across the engineering footprint – with the greatest number of additional jobs in occupations related to information and communication technology (ICT) (32% of new jobs, 55,000), skilled construction trades (15% of new jobs) and civil engineering (10% of new jobs). While many of the roles are not considered specialist roles, a quarter of job postings related to the engineering footprint require at least one specialised engineering skill – for example, a knowledge of civil engineering or engineering analysis. [16]

The same research also found that some subsectors are growing particularly fast, with their numbers growing by more than a quarter over the last five years[17]:

- Chemical and biomedical engineering
- Robotics
- Simulation and simulation software.

While small in absolute numbers[18], these subsectors represent areas of technological progress and must remain competitive.

Lightcast also found that demand in other larger skill subcategories have also grown rapidly, such as electrical and computing engineering (15% growth between 2016/2017 and 2021/22) and drafting and engineering design (over 10% over the same five-year period), with the types of roles being in demand also changing. For example, demand for engineering

management skills has grown strongly. Lightcast found that the number of jobs referencing engineering management skills grew by more than 40% between 2016/17 and 2021/22, despite being relatively small in absolute numbers. [19]

The engineering and technology sector is subject to potential disruptions and changes in demand. Planning about how to supply skills to meet this changing demand does not yet exist in a way which allows for workforce planning.

In addition to the growth highlighted above, the engineering and technology sector is expected to change rapidly, influenced in part by government policies such as net zero ambitions and infrastructure commitments such as HS2 or house building commitments, as well as technological developments such as digitisation, automation and AI. The Climate Change Committee has quoted estimates that between 135,00 and 725,000 net new jobs could be created by 2030 in low-carbon sectors alone.[20] The CCC's literature review suggested that many of these jobs are likely to be in engineering industries such as construction and retrofit for energy-efficient buildings, renewable energy generation, and the manufacture of and infrastructure for electric vehicles. Energy and Utilities Skills has estimated that employers in the energy and utilities sector will have to attract and recruit 312,000 new people between 2024 and 2030, equating to nearly 50% of the current workforce; this includes 106,800 existing roles to replace workers who are set to retire over the period.[21]

The government could do more to 'back-cast' to identify the number of technical and engineering students needed.[22] There is no UK-level estimate of the number of engineers and technicians required to support the UK's net zero transition, and therefore no breakdown of the engineering specialisms needed, for example the number of electrical, chemical or mechanical engineering graduates and higher-level apprentices. Extrapolating backwards further, there is no UK-level assessment of the number of STEM students and apprentices in schools and colleges required each year to satisfy future engineering and technical needs.[23] It is vital that the government, as part of this, develops up-to-date skills taxonomies which can differentiate between 'expansion' and 'replacement' jobs, to track the demand for new talent as workers retire.

Skills England – and, currently, the Unit for Future Skills – will be looking to get a better understanding of the demand in the sector, and it is vital that this will feed into these discussions. We ask that sector skills plans are developed in partnership with the devolved administrations, bringing in bodies such as Skills Development Scotland, to ensure cohesion in skills approaches across the UK. We would also ask that government consider a 'skills impact' assessment to accompany new policy announcements.

In the long term, changes in the UK birth rate may increase shortages

Preliminary analysis of ONS data on birth rates suggests the number of 18-year-olds is currently on the rise. That 'bulge' in the population pyramid will continue to cause an increase in the number of 18-year-olds until 2030. However, from 2030 on, birthrates show that we will see a decline in the number of UK-born young people entering the workforce, and therefore available to fill gaps in the sector. 2023 had the lowest number of births since 1976 and 1977. At just over 591,000, the number of births in the UK in 2023 was 19% lower than the peak of nearly 730,000 in 2012 – this lower birth rate will begin to directly affect workforce starts around the time that this cohort turns 18 in 2041.[24]

What drives these shortages?

The education system is not providing students with the breadth of opportunities in engineering and technology to promote engineering skills and give opportunities to all children

A healthy UK-grown engineering and technology workforce depends on children and young people acquiring the skills and qualifications which give them the option to pursue a career in engineering and technology. As it stands, the education and skills system is not delivering this, meaning that not all young people in England (and across the devolved nations) are given the educational opportunities to move into engineering and technology jobs.

Our introduction set out that the engineering workforce has a higher proportion of men, people from higher socio-economic groups, and non-disabled people, compared to other occupations. If the proportion of women and other underrepresented demographics were present in engineering and technology at the same rates as the overall workforce, there would be over 2 million more workers available, many of whom would be available to fill vacancies in the clean energy industries.[25] Correcting this balance through the school system would of course take time. This is illustrated by the fact that challenges emerge at school age.

The skills pipeline already shows signs of working in a suboptimal way at school age and we believe these issues can be tackled by intervention.

A good barometer of the issues affecting the engineering and technology pipeline is the take-up of STEM subjects at GCSE level. While many have increased in popularity, take-up of others has declined. In particular, participation in design and technology GCSE has fallen by 52% over the 9 years to 2024[26].

Furthermore, gender differences in participation in engineering and technology careers begin to show clearly at secondary school age. Our 2024 analysis found that, in England, Northern Ireland and Wales, girls made up half of those taking GCSE maths and physics[27], but the proportion drops at A level. Girls made up 37% of pupils taking A level maths and 23% of pupils taking A level physics.[28]

Young people's beliefs about what careers are suitable for them are strongly differentiated by gender. For example, 16% of girls aged 11 to 18 think engineering is suitable for them, compared with 44% of boys in the same age-group.[29] At least some of these attitudes are malleable. We know that the more young people know about engineering, the more likely they are to consider engineering careers. Research has shown that children who attend one or more STEM activities are more than three times as likely to consider a career in engineering compared to non-attenders.[30] In light of this, access to good careers provision is vital. Our survey of careers leaders and careers staff in secondary schools and colleges in England found that, while 90% of respondents said their students can take up personal careers guidance interviews, only 26% offered this before Key Stage 4, which we believe is not early enough[31]. The same research found that only 61% of respondents said that students of work experience age at their school took part in STEM work experience each year.[32] There are also challenges in securing high quality work experience. For example, a quarter of students surveyed for the Science Education Tracker 2023 said that they had wanted to secure STEM-related work experience but had been unable to.[33]

Underlying all of this, shortages of STEM teachers in schools are becoming acute, particularly in deprived areas.[34] 28% of secondary school teaching hours for physics were delivered by a teacher without a relevant post-A level qualification in the 2022/23 academic year, whilst for Design and Technology the figure was 21%[35]. DfE data shows that STEM teacher vacancies stood at 1,600 in November 2023, up from 1,300 the previous year and 360 in 2010/11.[36]

Challenges remain with ensuring T Levels are part of an equitable skills pipeline

Challenges remain for T Levels. Our 2022 report with MakeUK found that capacity, time and financial constraints could make it challenging for employers to provide industry placements – particularly given existing apprenticeship requirements. At the time, 9% of businesses responding to our survey were hosting a student on placement – with only 2% of SMEs hosting a student on T Level placement[37]. With the continuation of some BTECs, the pressure on T Levels has been taken off. However, more work needs to be done to ensure that they become a viable pathway into engineering. Joint research by EngineeringUK and MakeUK has shown that larger employers were more likely to be aware of them (83%) compared with SMEs (63%)[38]. Furthermore, take-up of engineering and technology-related T Levels by girls is

low: among students completing an engineering and technology-related T Level course in 2024, just 9 per cent were female.[39]

Apprenticeships have not grown as fast as hoped, and there has been a fall in the number of lower-level apprenticeships affecting the number of younger people being able to access the engineering workforce.

The government planned in 2015 for there to be 3 million apprenticeships by 2020, but the number of apprenticeship starts has declined since the apprenticeships levy was introduced in 2017[40].

Our analysis of DfE apprenticeship start data has found that, despite a small recovery between 2022/23 and 2023/24, the number of engineering and technology-related apprenticeship starts in 2023/24 was down 6.3% compared to 2018/19. The proportion of apprenticeships taken up by women and by people from an ethnic minority background has been increasing, but there is still a large gender differential. In 2023/14, 17% of engineering and technology apprenticeship starters were female, compared with 52% across all subject areas.[41]

However, lower-level apprenticeships have been declining rapidly. Starts in engineering and technology-related apprenticeships at Level 2 decreased by 52% between 2017/18 and 2023/24 – which is particularly likely to affect young people.[42] Our January 2024 Fit for the Future report found that many businesses, particularly smaller firms, found it challenging to find the resources to take on young apprentices. We are also concerned that not enough young people value – or indeed are aware of – apprenticeships open to them.[43]

Others such as the Association of Employment and Learning Providers (AELP) have also emphasised the work that government and others need to do to raise the perceived benefits from, and value of, apprenticeship study.[44]

Patterns established at school stage flow through to and beyond higher education.

Under-representation in engineering of some groups continues in higher education. EngineeringUK's analysis of HESA data for 2021/22 graduates shows that women, those from a lower socio-economic background and Black/Black British (Caribbean) young people are underrepresented in engineering and technology degrees compared to other subjects. Women are starkly under-represented among engineering and technology graduates, at 21.7%. By contrast, women made up 60.4% of graduates for all other subjects. 35.3% of engineering and technology graduates came from the most advantaged areas of the UK, compared to 32.0% of graduates for all other subjects.[45]

Workplace issues including retention – what more could employers do?

EngineeringUK has found that there are some challenges in ensuring that skills are retained in the engineering industry after education has been completed. This is a complex area, and we have not completed enough analysis to provide recommendations. However, the following bullet points indicate that there is scope for employers (perhaps with the support of public sector organisations) to encourage skills development and retention of engineering and technology graduates within the sector, and we would welcome the MAC including any commentary on this. However, we have no evidence about how far, if at all, correcting these issues would reduce the need for recruitment from outside the UK.

- After university, retention of engineering and technology graduates within the sector is reasonably high, though more so for men than for women. EngineeringUK has found that, for those graduating in 2021/22[xxx], 29.2% of male engineering and technology graduates and 43.3% of their female counterparts were not working in an engineering occupation 15 months after graduating.
- EngineeringUK's analysis has revealed that a recent decline in the proportion of women working in engineering and technology roles, from 16.5% in 2022 to 15.7% in 2023, was driven by a spike in women aged 35 to 44 leaving the sector (this trend is not reflected across the wider economy). This is supported by the Institute for Employment Studies' finding that women leave the engineering sector at twice the rate of men within a decade (70% vs 35%)[xxxi], and the Engineering Council's registration data showing the average age of women leaving the engineering and technology sector is 17 years younger than men (43 vs 60)[xxxii].
- Interestingly, the migrant workforce contributes to a better gender balance – although it needs further work to explore why this is. For example, EngineeringUK's analysis of the Labour Force Survey (LFS) shows that around 298,000 women working in engineering and technology in the UK were born outside the UK. This represents around 30% of women working in the sector, and compares to around 19% of the total engineering and tech workforce being born outside the UK.

How has the engineering sector sought to respond and adapt to these shortages?

EngineeringUK is not best placed to give a detailed response on this question, but we would point to the work of skills taskforces in a variety of engineering sectors, some of which we contributed to. While these taskforces represent a partial view, together they illustrate some of the intentions to expand the domestic workforce. (To give one example – using regional

hubs in the nuclear sector to encourage retention and development of skills within the industry.)

- The nuclear strategic plan and skills charter.
- The manufacturing skills task force.
- A shipbuilding skills delivery group, set up to implement the recommendations of the shipbuilding skills task force, which included advice on how to leverage UK skills systems.
- The transport employment and skills taskforce closed in 2022 and the government has published a summary of responses to its call for evidence, although we are not aware of any specific actions planned as a result.

What policy levers within the immigration system could be used more effectively to incentivize sectors to focus on recruiting from the domestic workforce?

We are aware of employers that are successfully increasing the inclusiveness of their recruitment approaches and attracting many and more diverse entry level candidates including into apprenticeships. But too few apprenticeships are offered, and SMEs particularly struggle to both offer and successfully recruit to them. SME involvement in apprenticeships has dropped. Barriers to SMEs include complex systems around the apprenticeships levy, colleges not providing appropriate courses, and insufficient resources to recruit and support apprentices within the current system[46]. The system must work better for employers. Recruiting more from the domestic workforce is simply not possible if the pool of engineers with the more highly skilled or specialised skills do not exist and the immigration system must support employers in these areas. In particular, we have heard that there are some specific areas of very high demand internationally such as high voltage senior authorised persons (SAPs). An employer has also told us (in line with the MAC's findings) that obtaining international visas for those on graduate schemes is challenging – which is vital for many multinationals. Alongside this, it would be good to explore how employers can be supported to be more effective at training and retaining their current workforce.

EngineeringUK recommendations

To address the longstanding systemic issues in the engineering labour market and in the supply of young people coming into the engineering sector, EngineeringUK recommends the following to government[47]:

- A more strategic approach to workforce planning based on a robust understanding of workforce needs, led by the Cabinet Office or Treasury, to equip the UK with the

skilled workforce needed to meet the challenges of sustainability and technological advancement.

- A focus on enhancing diversity within the STEM workforce.
- This strategy supported and closely linked into a holistic STEM education and skills plan.

We would welcome the Migration Advisory Committee considering these recommendations for inclusion in the final report. It is vital that the final report considers not only recommendations to address current labour supply issues but also how to prevent any future shortfalls.

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[1] Engineering Council (2020), Mapping the UK's engineering workforce
[2] Department for Business & Trade (2024), UK regulated professions and their regulators - GOV.UK
[3] Engineering Council (2024), Guide to professional registration for engineers and technicians – 2024/25
[4] EngineeringUK analysis completed for this briefing in January 2025
[5] Department for Education (originally published 2023; updated 2024), Employer Skills Survey 2022: Research report
[6] Jonathan Portes and John Springford (2023) The impact of the post-Brexit migration system on the UK labour market, Contemporary Social Science, 18:2, 132-149
[7] EngineeringUK publication – no longer available online but we can share on request
[8] Higher Education Policy Institute (2024), HEPI Policy Note 59, Aligning the Lifelong Learning Entitlement and the Growth and Skills Levy
[9] EngineeringUK (2024), Women in engineering and technology
[10] EngineeringUK (2024), The engineering and technology workforce
[11] EngineeringUK (2024), The engineering and technology workforce
[12] EngineeringUK (2024), The engineering and technology workforce
[13] EngineeringUK (2023), Engineering skills needs – now and into the future, a report produced by Lightcast for EngineeringUK
[14] EngineeringUK (2023), Engineering skills needs – now and into the future, a report produced by Lightcast for EngineeringUK
[15] The Institution of Engineering and Technology (2022), Engineering Kids' Futures
[16] EngineeringUK (2023), Engineering skills needs – now and into the future, a report produced by Lightcast for EngineeringUK
[17] EngineeringUK (2023), Engineering skills needs – now and into the future, a report produced by Lightcast for EngineeringUK
[18] See page 49, EngineeringUK (2023), Engineering skills needs – now and into the future, a report produced by Lightcast for EngineeringUK
[19] EngineeringUK (2023), Engineering skills needs – now and into the future, a report produced by Lightcast for EngineeringUK
[20] Climate Change Committee (2023), A net zero workforce
[21] Energy & Utility Skills (2024), Workforce demand estimates – 2024 to 2030 – the energy and utilities sector
[22] EngineeringUK (2024), Net zero workforce: an analysis of existing research
[23] EngineeringUK (2024), Net zero workforce: an analysis of existing research

[24] EngineeringUK analysis of birth rate data from https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/birthsummarytablesenglandandwales/2023
[25] EngineeringUK (2024), Women in engineering and technology
[26] EngineeringUK (2024), Engineering facts and statistics
[27] EngineeringUK (2024), GCSE and Scottish National 5 results
[28] EngineeringUK (2024), A level and Scottish Highers results
[29] EngineeringUK (2023), Science Education Tracker
[30] EngineeringUK (2024), Engineering facts and statistics
[31] EngineeringUK (2024), Advancing STEM careers provision in England: key lessons and opportunities
[32] EngineeringUK (2024), Advancing STEM careers provision in England: key lessons and opportunities
[33] EngineeringUK (2024), Advancing STEM careers provision in England: key lessons and opportunities
[34] EngineeringUK (2024), Engineering facts and statistics
[35] DfE data tables: https://explore-education-statistics.service.gov.uk/data-tables/permalink/4fc08209-b3eb-41a8-7fae-08dd45163c72
[36] DfE data tables: https://explore-education-statistics.service.gov.uk/find-statistics/school-workforce-in-england
[37] EngineeringUK and MakeUK (2022), Unlocking talent: ensuring T Levels deliver the workforce of the future
[38] EngineeringUK (2022), Anyone for T? Awareness of T Levels in England, November 2022
[39] EngineeringUK (2024), T Level results
[40] House of Commons library (2024), Apprenticeships policy in England, page 27
[41] EngineeringUK (2024), Apprenticeships pathways into engineering - 2023/24 annual data update - November 2024
[42] EngineeringUK (2024), Apprenticeships pathways into engineering - 2023/24 annual data update - November 2024
[43] EngineeringUK inquiry led by Lord Knight and Lord Willetts (2024), Fit for the future: a 5-point plan to grow and sustain engineering and technology apprenticeships for young people
[44] Kobayashi and Warner (2023), Raising the standard: sectoral approaches to raising apprenticeship achievement rates, Association of Employment and Learning Providers and City & Guilds
[45] EngineeringUK (2024), Graduate outcomes – engineering and technology
[46] EngineeringUK inquiry led by Lord Knight and Lord Willetts (2024), Fit for the future: a 5-point plan to grow and sustain engineering and technology apprenticeships for young people
[47] Based on EngineeringUK's June 2024 publication, Investing in the future: policy priorities for STEM workforce planning, education and skills