House of Lords Science and Technology Committee: People and Skills in UK science, technology, engineering, and mathematics - response by the Institution of Engineering and Technology

About the Institution of Engineering and Technology (IET):

The IET is one of the world's largest engineering institutions with over 158,000 members in 150 countries. Our aim is to inspire, inform and influence the global engineering community to engineer a better world. We are a diverse home across engineering and technology and share knowledge to engineer solutions to global challenges like climate change. With our roots in electrical engineering, we have been championing engineering solutions and the people who deliver them for 150 years. The IET provides independent, impartial, and expert advice, spanning multiple sectors including Energy, the Built Environment, Transport, Manufacturing and Digital. On behalf of the profession, the IET strives to inform and influence government on a wide range of engineering and technological issues. The organisation's membership spans a broad range of professional knowledge, and regularly offers unbiased, independent, evidence-based advice to policymakers via several channels. We believe that professional guidance, especially in highly technological areas, is critical to good policymaking.

Introduction:

The bi-annual IET _Skills and Demand in Industry_ 2021 survey[1] identifies that there continues to be a serious skills gap in the engineering workforce. This will significantly impact the ability to grow innovation in the UK and meet workforce demands now and in the future. The UK needs to focus on digital skills, reskilling and upskilling its workforce, and recognition for the role of technicians in the workforce to address these skills gaps. The UK also needs to make it attractive for highly skilled international workers to work in the UK and ensure STEM education is suitable to meet the needs of the workforce in the future.[2] Agility and opportunity for development is key to ensuring that we can incentivise and provide the right education and training for people at the right time and in the right place, whether at a young age or later in their career.

Executive Summary:

- **The IET Skills and Demand in Industry Survey identifies that almost half of employers in the engineering and technology sector continue to experience difficulties recruiting**
- **There are key gaps at technician level, partly due to a lack of recognition for the role**
- **We need to ensure there is a strong STEM education pipeline and incentives to enter into a STEM career**

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[1] The IET carries out an out an annual skills survey of engineering employers in the UK. In 2021 we focused on the current skills challenges employers are facing, identify barriers to building the supply of the needed skills and the skills that will be needed in the future. The survey was delivered to senior decision-makers in engineering businesses through an online mode. The fieldwork was conducted online between 6 August and 2 September 2021. All of the business professionals who responded were drawn from the YouGov panel of over 1.8m people in the UK. In total 1,039 respondents from engineering employers completed the survey.

[2] IET response to the House of Lords inquiry: _Delivering a UK Science and Technology Strategy. March 2022_. Delivering a UK Science and Technology Strategy: consultation response by the Institution of Engineering and Technology (theiet.org)

- **Reskilling and upskilling the workforce is vital to ensure we are agile to meet future demand**
- **Digital, manufacturing and sustainability skills will be needed to meet net-zero targets and grow the economy**
- **Skill development in the UK needs a whole system approach that also addresses regional variation and supports levelling up**

Current skills gaps in the workforce:

The proportion of employers experiencing difficulties in recruitment has remained consistent in recent years with almost half of those who responded, reporting problems (48% 2019, 47% in 2020, 49% 2021).[3] Over a quarter (27%) say that the greatest skill gaps are in highly skilled (university level or higher) roles and a further 31% finding gaps at intermediate level (A-Level, NVQ 3 Level, apprenticeship). When asked what skills will be important in the future, 36% of employers say that they need design and manufacturing skills.[4]

It is becoming increasingly important that all engineers have a broad understanding and knowledge of the digital landscape to ensure that they can innovate and implement new technologies in the workplace. For example, the use of digital twins, advancements in 5G and 6G, and AI. **The provision of micro-credentials would benefit the sector in this area.** However, there is also a need for specific skills in the digital sector with 29% of employers saying they will need AI or machine learning skills and 28% data analytics[5]. The IET is currently undertaking further research into the digital skills gaps within the engineering workforce and will share the findings with the committee in due course.

The IET 2020 skills for net-zero survey identified that industry, government, and academia need to collaborate to identify the essential skills that will be required in order to support a green recovery from the pandemic for businesses[6]. Despite targets to meet net-zero, there are a significant number of employers in the 2021 *Skills and Demand in Industry* survey that have a sustainability strategy (51%), yet 81% of those employers think that they need additional skills in order to deliver it.[7] Skills they feel are missing include innovative thinking for new technologies, strategic skills to implement new processes and agility to adapt and implement new technology.[8] With 20% of employers already upskilling their employees to meet sustainability skills gaps and 35% saying they will need energy and environmental sustainability skills in future, **it is clear that skills remain a key factor in meeting net-zero targets.[9]**

The STEM education pipeline:

[3] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org) Summary page 3. IET 2021 skills survey – summary (theiet.org)

[4] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org) Summary, page 6, IET 2021 skills survey – summary (theiet.org)

[5] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org) Summary, page 5=6, IET 2021 skills survey – summary (theiet.org)

[6] Key Facts. IET skills for a net zero and a green recovery: examining the engineering skills needed to meet net zero. 2020. IET skills for net zero and a green recovery 2020 survey - key facts and recommendations (theiet.org)

[7] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org) Summary, page 5, IET 2021 skills survey – summary (theiet.org)

[8] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org) Summary, page 5, IET 2021 skills survey – summary (theiet.org)

[9] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org) Summary, page 5, IET 2021 skills survey – summary (theiet.org)

The future health of the engineering profession is dependent upon children being aware of, and interested in, STEM topics. It has never been more important to inspire young people into STEM careers. There is a well-known teacher shortage in secondary education and many STEM teachers are not specialists in the subject they teach; for instance, only 63% of physics teachers and 78% of maths teachers have relevant post-A level qualifications. This can have a bearing on the quality of teaching young people receive[10].

In the UK we are fortunate to have a range of high-quality curriculum enrichment and enhancement opportunities in engineering for schools to take advantage of, including many designed and delivered by the professional engineering institutions. The benefits of pupils attending one or more STEM careers activities, were 3.5 times more likely than those who hadn't attended any to know about what people working in engineering did. They were also 3.4 times more likely than those who had not attended a STEM careers activity, to consider a career in engineering[11]. However, most STEM activities tend to be optional, some are costly, are only suitable for particular year groups, take up valuable curriculum time, or require pupils to participate out of school time. **Further investment is needed in STEM teaching and curriculum enrichment activities to support the pipeline of skills.**

One aspect of higher STEM education that is a particular concern is the challenge of attaining a University place in England. There is an increased focus on attracting international students, who are charged significantly higher fees in comparison to a UK student. It is a concern that following A level results day this year many Universities did not have places for UK students in clearing, yet places were available for international students. This is to the detriment of UK students and will impact the future STEM talent pipeline, as many international students may not remain in the UK after completing their STEM education.

Reskilling and upskilling:

The profile of skills within the engineering workforce is constantly changing and the UK needs to respond. To be competitive the UK must move quickly to keep up with technological change. Industry needs to innovate fast but often academia is less agile. **The UK needs to be able to divert and convert the usual spectrum of engineers as and when they are needed.** The most common response to skills shortages is to reskill or upskill existing employees, with 40% of employers choosing to take this approach, followed by recruitment. Broader skills are also important, for example when needing to translate science from academia to businesses. **There is a need to focus on whole career development for employees and include upskilling the business workforce in their strategies.[12] Rapid reskilling would benefit employers, employees and the UK as a whole.**

Support to address skills gaps:

When asked, employers responded that the most important thing Government can do to support them in filling the skills gaps is funding for apprenticeships both nationally (54%) and locally (45%).[13] Employers also said support to reskill in priority areas or grants and loans for businesses to run reskilling programmes would help to ensure that the workforce could adapt to the changing needs of

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[10] Engineering UK 2020 Educational pathways into engineering

[11] Engineering UK Securing the future STEM careers provision in schools and colleges in England, June 2021

[12] IET response to the House of Lords inquiry: *Delivering a UK Science and Technology Strategy*. March 2022. Delivering a UK Science and Technology Strategy: consultation response by the Institution of Engineering and Technology (theiet.org)

[13] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org) Summary, page 3, IET 2021 skills survey – summary (theiet.org)

technology in the future. **Government should provide further support for apprenticeships and there is a significant need for business and government to provide further support for reskilling and upskilling the workforce.**

Levelling up:

Local support for STEM skills such as apprenticeships and Institutes of Technology can support levelling up in certain regions. Many businesses are linked directly to the training provided locally to fill skills gaps, which is more important than ever to ensure that the whole of the UK can innovate and grow its technology businesses. **Local government should facilitate collaborations and partnerships between universities, colleges, and industry, regionally.**

The link between innovation and skills:

Innovation can drive skills and vice versa, which is part of a whole systems approach to boosting the R&D sector. To develop and grow, engineering employers need a skilled workforce both for sector specific and core engineering skills. Particularly in the current climate where technology is evolving faster than ever before (e.g. alternative energy sources, machine learning and AI). Additionally, the rise of digital techniques means an increase in digital experts and data scientists are needed. To meet this demand, there needs to be a world class education system that supports STEM skills from an early age.

Whole systems approach to skills:

Science is a complex system of systems; there are a range of interconnecting policies that facilitate success in the R&D sector. For example, a strong educational base and links with industry are crucial but we must also ensure that the UK works collaboratively on a global scale and learns from others who are strong in this area.[14]

Technicians:

Technician level employees are a crucial yet unrecognised and uncelebrated part of the workforce. This is a challenge for the UK as 44% of employers report a skills gap at technician level[15]. In order to incentivise people into these rewarding careers there needs to be greater recognition for the routes of progression and role in industry. **This role can also be further supported by developing T level progression routes and increasing funding for apprenticeships.**

Conclusion:

Skill gaps persist in the engineering and technology sector and businesses will need support to help reskill and upskill the existing workforce to meet future skill requirements and continue to advance and innovate. We need to consider the whole landscape of skills and its relationship with innovation. It is a constantly changing landscape that requires agility and a holistic approach to incentivise people of all ages to engage in a STEM career.

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[14] IET response to the House of Lords inquiry: *Delivering a UK Science and Technology Strategy*. March 2022. Delivering a UK Science and Technology Strategy: consultation response by the Institution of Engineering and Technology (theiet.org)

[15] IET Skills and Demand in Industry Survey, Dec 2021. IET skills survey 2021 (theiet.org)