

Submission on behalf of the Engineering Professors' Council to the House of Lords Science & Technology Committee's Inquiry into delivering a UK science and technology strategy

The [Engineering Professors' Council](#) represents the academic engineers in the UK. Our primary purpose is to provide an influential voice and authoritative conduit through which engineering departments' interests can be represented. Our membership comprises engineering departments in 85 UK universities with over 8,000 academic staff in all branches of engineering, all UK administrations (and regions) and diverse provider types.

The EPC – together with our members – have much to contribute on this topic and, for the sake of brevity in such a wide-reaching inquiry, we have restricted ourselves to highlighting key issues facing UK policymakers. We would be delighted to support the inquiry in any way we can in offering more detailed insight and recommendations on these or other topics.

Levelling Up

The EPC sees engineering education as critical to the Government's missions to level up disadvantaged areas of the UK. This can be done through research that attracts investment and industry and by raising skills within regions. However, raising skills without investment in jobs and infrastructure will not lead to successful levelling up as trained and educated people will move away. A virtuous circle needs to be stimulated in disadvantaged areas by simultaneous focused investment in skills, infrastructure and inward business migration.

Sustainability

The world will not be able to move away from fossil fuels nor address the damage already done to the planet without energy alternatives and technological solutions that use less energy and actively ameliorate environmental harm. Engineering education and research will therefore be critical to achieving Net Zero. The future of the planet depends on the future of engineering, which depends on engineering education being able to attract new and more diverse students, for whom a values-led, problem-solving approach is their key driver to become engineers. Government policy must remove barriers that discourage diverse young people from succeeding in pathway subjects.

Industry-academia collaboration

The EPC has launched the Crucible Project – an initiative to encourage closer partnership between engineering academia and industry across five areas (teaching and learning; graduate recruitment; research; knowledge transfer; and development of regions and communities). The government should seek ways to normalise, facilitate and better reward close collaboration between industry and academia. The Crucible Project seeks to anatomise ways in which this can be encouraged.

Post-pandemic recovery

In order to build back better, engineers will be the key workers of the recovery. We need policies that encourages and retain a pipeline of engineering talent and fosters a positive environment for them to thrive as engineers. That will require not only a pipeline of young people, but better opportunities to retrain in engineering later in life and incentives to attract engineers and potential engineers to the UK from overseas.

Research funding

We are deeply concerned about the future of Horizon funding and, if that does not return, the government needs not only to replace the funding lost (or stimulate it from other sources), but also, foster the international partnerships with international neighbours that are also critical to cost-effectiveness of research funding. EPC research found that the multiplier effect of international partnership significantly outweighs the direct effect of funding. Both are essential to remaining a research-leading nation of international standing.

ARIA is welcome and it would be valuable to consider how the opportunities it presents can be given the best chance of success while accepting that the opportunity to fail is a critical part of discovery and innovation.

Skills shortages in STEM

The government needs to adopt a long-term view of the STEM skills pipeline, particularly the engineering pipeline. Where will the engineers and engineering academics and researchers of tomorrow come from?

The EPC has previously contributed to the two Perkins Reviews on this topic, but in a post-Brexit, post-pandemic, Net Zero-focused world, the questions are ever more pertinent. At the moment, given the large number of international students in UK Engineering HE (especially at Masters and PhD levels), the UK is in effect creating the skills pipeline for our competitors, potentially at the expense of our own since we do not do enough to encourage (nor even facilitate) those people to stay in the UK. That is not to say we want to see a reduction in international student numbers in UK Engineering HE as they bring a great deal – and not merely a funding stream without which our UK students would need to be far more heavily subsidised. Rather we must create the conditions for attracting the best of international students to remain in the UK.

Innovation and entrepreneurship

Similarly, the UK must better develop a culture of innovation and entrepreneurship. Internationally, the UK has a strong reputation and track record in cultivating creativity and innovation skills among graduates from UK universities. However, too many seek opportunities to exploit those skills by going abroad (predominantly to the US) to launch start-ups or the return to their home countries (if non-British). The UK's entrepreneurial environment needs to be adjusted.

In the UK, academics tend to feel they need to leave their university in order to create a business, rather than remaining inside the institution and in time creating more spin-outs of their own and helping colleagues and students to do so. Studies published elsewhere (UC Berkeley) demonstrated that academics who tend to be serial entrepreneurs also tend to have higher-than-average research outputs. Some universities are already attempting to address this directly, developing programmes in Engineering & Entrepreneurship.

In terms of policy changes, there may not be much to do although the government should consider whether the regulatory framework of higher education adequately fosters entrepreneurialism among academics and encourages a university-led complementary economic growth pathway. The government should also do more to facilitate and reward university-industry collaboration (such as, perhaps, via tax breaks).

The government and politicians should also work more actively to dispel populist mythologies about higher education (that universities are full of 'low-value degrees' and that they fail to deliver a return on investment for taxpayers' money) rather than, all too often, amplifying them, often promoted by politicians.

Differences in engineering research and science research

The two are often bundled together but have distinct differences. Apart from anything else, much engineering research is not only more likely to have direct private sector funding, but it is often more directly monetised. These distinctions should be better understood and appreciated in order to recognise the benefits that different research areas bring.

Funding of the Engineering skills pipeline

We are concerned that the downward pressure on costs in HE may stifle the quality and availability of engineering education. Other courses cost less to run and so if the per student revenue falls – even if it falls for those other courses, but not for Engineering – that will mean that those less expensive courses remain viable while Engineering courses do not.

Making the UK attractive to international Engineering talent

This connects to issues above, but the government needs to urgently address the obstacles for international Engineering academics and engineers to work here and to retain those who come to the UK to study. The UK is already highly attractive for these skilled individuals that we want to attract, until it comes to the bureaucracy and barriers to working and settling in the UK with dependents. The Home Office's hostile environment prevents not only those economic migrants who arguably it is imagined would not make a valued contribution to society, but also those economic migrants who are highly skilled experts that we want to attract.

The post-study work visa is a great help, but it still allows a shorter stay than in many competitor nations and has other limitations. There is also the possibility to create programme variants 'with Industrial Placement' that could attract engineering talent in the UK.