



ROYAL
ACADEMY OF
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From the Chief Executive
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Mr Chris Milward
Associate Director
Higher Education Funding Council for England
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14 November 2013

Dear Chris

Strategically important and vulnerable subjects (SIVS)

Thank you for your letter on strategically important and vulnerable subjects dated 6th August 2013. This has been discussed with Fellows of the Royal Academy of Engineering who serve on our Standing Committee for Education and Training. The conclusions reached, as set out below, update the advice we provided to HEFCE in 2011.

In your letter you state your interest in *'any subject areas where [we] have concerns about the quantity or character of undergraduates and postgraduates flowing through the system or the sustainability of expertise'*. You also express interest in hearing *'why the area is considered to be strategically important and any steps [we] believe should be taken to address [our] concerns'*.

The strategic importance of engineering

We believe, on the basis of public interest, it is right that engineering should continue to be considered as a strategically important subject and the teaching of engineering should continue to receive additional public funding support.

Our evidence for this comes from the Perkins' Review of Engineering Skills¹

This Review endorses the widely accepted view that it would benefit the economy to substantially increase the supply of engineers entering the labour market. It would add flexibility and resilience to our economy, and enable more people to take advantage of the new opportunities that technological change presents.

Professor John Perkins FREng, Chief Scientific Advisor, BIS

¹ Perkins' Review of Engineering Skills, BIS, November 2013



and from the Academy's deep analysis of the supply and demand for engineering skills²

There is good econometric evidence that the demand for graduate engineers exceeds supply and the demand is pervasive across all sectors of the economy. The implication of this is that the economy needs more graduate engineers for both engineering and non-engineering jobs. The evidence can be seen in a persistent, sizeable wage premium for people holding engineering degrees and this premium has grown over the last 20 years.

Concerns for the quantity of *quality* undergraduate engineers and sustainability of expertise

We are concerned to see continued funding support from HEFCE for engineering as a practical, laboratory-based subject. The costs of securing academic staff with appropriate industrial experience, of technicians, and of maintaining laboratory spaces all significant and all are vital to maintaining teaching quality.

We are concerned to see renewed growth in engineering undergraduate provision in Post '92 institutions as has been seen elsewhere in the HE sector. Our evidence comes from our recent in-depth analysis of undergraduate engineering provision in the UK³ (acknowledging that the HEFCE jurisdiction is for England alone).

We also have concerns over the lack of diversity in engineering undergraduate (and other) provision⁴

Diversity is a pressing problem and has been a consistently recurring theme throughout the course of my work on this Review. The lack of diversity remains an acute issue for engineering in the UK. There are a number of different groups that are under-represented in the talent pipeline. However, the lack of diversity is seen most starkly in the gender gap. The UK has the lowest proportion of female engineers in the European Union, less than one in ten engineering professionals is a woman. This is a crucial issue: engineering is failing to draw on the whole of the talent pool.

Professor John Perkins FREng, Chief Scientific Advisor, BIS

We have concerns over fluctuations in UK domiciled students studying engineering and technology subjects⁵. There were over 57,000 FTE in 2001-2 and this number dropped year on year to just under 50,000 in 2008/9. Numbers have steadily improved since 2009 and may have already exceeded those seen in 2001-2 (we await the 2012/13 analysis) but we

² Jobs and growth: the importance of engineering skills to the UK economy, Royal Academy of Engineering, September 2012

³ Skills for the nation: engineering undergraduates in the UK, Royal Academy of Engineering, 2013

⁴ Perkins' Review of Engineering Skills, BIS, November 2013

⁵ Data available from www.hefce.ac.uk/whatwedo/crosscutting/sivs/data

signal concern over the potential for future volatility. EU (non-UK) domiciled FTE (7% of provision) have followed a similar pattern. International student FTE (20% of provision) have grown steadily over that period.

UK domicile FTE on integrated Masters courses have increased 63% over the same period to nearly 18,000. Other domicile FTE (circa 30% of provision) have also grown strongly.

We offer a brief comment on part-time provision. This is negligible for integrated Masters courses in engineering and technology but represents a significant minority of undergraduate FTE in those disciplines. The proportion was 10% in 2001/2 and fell steadily to a little under 9% by 2011/12. We are concerned that the progressive erosion of part-time provision will affect employer-sponsorship of students and widening participation.

We present this mixed picture of trends in FTE as evidence of a need for ongoing monitoring of student flows in undergraduate engineering and technology.

Concerns about postgraduate provision

The trends seen in UK domicile undergraduate FTE are replicated in PGT engineering and technology. However, this is set against strong growth in non-UK domicile students to the point that they now represent circa 70% of provision.

We remain concerned that the funding base to engineering education is particularly vulnerable to loss of income from overseas students if visas continue to be restricted as a relatively high proportion of engineering undergraduates are from non-EU countries (reflecting the quality and reputation of engineering higher education in the UK attracting students from around the world – a real success story). The requirement for non-EU postgraduates to return to their home countries after graduation puts the UK engineering research base at threat as well as restricting the supply of higher education teaching staff in engineering.

Concerns over particular engineering disciplines

We have concerns over declines in undergraduate numbers in some engineering. We provided evidence to the HEFCE review on the impact of the 2012 higher education reforms⁶

⁶ Higher education in England: impact of the 2012 reforms, HEFCE, March 2013

'Mechanical, chemical, process and energy engineering have all seen sharp increases in applications in 2012-13, reflecting increases in the number of students studying chemistry and physics at A-level.


'The demands of the labour market can have a direct impact on the relative popularity of different engineering degrees – increasing applications to mechanical engineering may be due, in part, to a returning confidence in the automotive sector and in advanced manufacturing. Decreasing applications to study civil engineering are likely to be caused by the sharp contractions in construction output that have been widely reported in the UK and around the world.

Of most concern in the engineering profession, decreasing applications to electrical and electronic engineering represent the continuation of a generally downward trend for more than a decade.'

Looking forward, there are disciplines where future shortages must be avoided⁷

'We also have evidence of shortages in some specific areas of engineering. As our economy rebalances, it will create increased demand for engineering and other types of skills. Industrial Strategy sectors are already identifying future growth opportunities, and note the need, for example, for systems engineers in the automotive sector and composite technicians in aerospace.'

Professor John Perkins FREng, Chief Scientific Advisor, BIS

yours sincerely


Cc: Professor Helen Atkinson FREng, Chair of the Standing Committee for Education and Training

⁷ Perkins' Review of Engineering Skills, BIS, November 2013