

ENGINEERING PROFESSORS' COUNCIL RESEARCH BRIEFING

The impact of Brexit

on engineering research funding

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Engineering Professors
COUNCIL

The voice of engineering academics

The impact of Brexit on engineering research funding

The EPC represents the academic engineers in the UK, with 85 university engineering faculties as members comprising over 7,500 academic staff.

Our primary purpose is to provide an influential voice and authoritative conduit through which engineering departments' interests can be represented to key audiences such as funders, influencers, employers, professional bodies and Government. All branches of engineering are represented within the EPC's membership.

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After Brexit, the access of UK universities to EU research funding for engineering will be significantly compromised and even if the UK Government provides equivalent funding, the EPC's assessment of the impact is that the sector will be severely undermined.

The combination of a deleterious cascading effect and the removal of the beneficial multiplier effect presents a far-reaching risk, both to regional growth and to the UK-wide Industrial Strategy.

This research briefing examines the impact that UK's departure from the European Union will have on higher education in the UK, on the engineering sector, and on the wider regional and national economies.

The projected financial impact of Brexit on higher education engineering research in the UK has been analysed using data from *HESA Finance 2016-17*. Higher education providers submit income data through an annual return. HESA analyses the data by six main sources, of which 'research grants and contracts' is one.

In 2016-17, UK higher education providers generated £5.9 billion of income from Research grants and contracts. £877 million (14.8%) of this was from the EU.

Engineering accounts for almost one fifth of all UK higher education research grants and contracts income (£1.1 billion) of which £208.6 million (18.9%) was from the EU.

INTRODUCTION

Engineering is a major UK asset, accounting for one quarter of the country's total GDP in 2015ⁱ. The high global standing of UK universities underpins the £420.5 billion per annum contribution engineering makes to the UK economy, with UK universities delivering research and development, and providing a flow of highly qualified UK and overseas talent.

There are widespread concerns, including from the EPSRCⁱⁱ – now part of UKRI, the Government body created by the Higher Education and Research Act (HERA) to enable research and innovation to flourish in UK universities – that the UK's decision to leave the European Union (EU) will make it harder to access research funding and collaboration opportunities.

This reduction in potential funding presents a particular challenge to the Government's stated commitment to raise the level of investment in Research & Development to 2.4% of GDP.

Research is a key part of the mission of many UK universities, with research grants and contracts income reported to HESA totalling £5,916 million in 2016-7. These funds are obtained from the research councils, other public funds, charities and industry. Overall, EU funding – mostly through the Framework Programme – provided approximately 15% of this income (£877 million) in 2016-17.

And the UK receives the lion's share. Britain has recently edged ahead of Germany as the largest benefactor of EU research fundingⁱⁱⁱ and the UK receives a disproportionately larger amount of EU funding for research and development than the relative relevant contribution that it makes to the EU.^{iv} What is more, UK universities are more successful by far than businesses in attracting Framework Programme funding, taking 71% of the total funds awarded to the UK during Framework Programme 7.^v

ENGINEERING RESEARCH

Science and engineering draw on EU research grants and contracts income more than any other sectors. Specifically, the EPC's exclusive analysis of the latest data shows that **EU funds make up nearly £1 in every £5 of all research grants and contracts in UK university engineering departments.** This exceeded £208 million in the year 2016-7.^{vi}

It is a critical funding stream and, if it is removed or even reduced, a number of strategically important research facilities would be likely to become non-viable and the impact is also likely to extend beyond an immediate limitation on research activity.

IMPACT ON REGIONAL ECONOMIES

At a regional level, funding is particularly discipline-fragile, because it is typically dependent on a small number of critical players for whom EU funding is key.

For example, all chemical engineering research in Wales was EU government-funded in 2016-7. Wales is particularly vulnerable, receiving £20.40 in HE engineering research funding from the EU in 2017 per £100,000 of

All chemical engineering research in Wales was EU-funded in 2016-7

total regional output (GVA).^{vii} See map (opposite) which shows relative impact by region.

In IT, systems sciences and computer software engineering, more than half of over £48 million that is at risk is shared by just three regions: the South East, London and Scotland. The South East's EU funding alone matches the £10 million fund made available by UKRI for collaborative research and development in the general field of robotics and AI (notwithstanding UKRI's significant funding on a limited number of key areas, such as extreme environments). Indeed, there is widescale UK risk to IT, systems sciences and computer software engineering, with an impact on 86 UK universities across all regions.

University engineering departments provide important support to regional industries and

there are considerable risks to many important areas of research that may not currently be receiving significant funding from UKRI.

Risk hotspots – where relative dependency on EU funding was more than double the national average – were found in engineering disciplines in every region with the exception of the North West (which still attracted risk in excess of £5 million in general engineering and IT). In 2017, the North West received a relatively modest £5.70 in higher education engineering research funding from the EU per £100,000 of total regional output (GVA).^{vii}

CASCADE EFFECT

Without locally driven EU collaborations, regional and national growth will be compromised because **there is a 'cascade effect' on manufacturing and linked industry jobs dependent on regional research and development.**

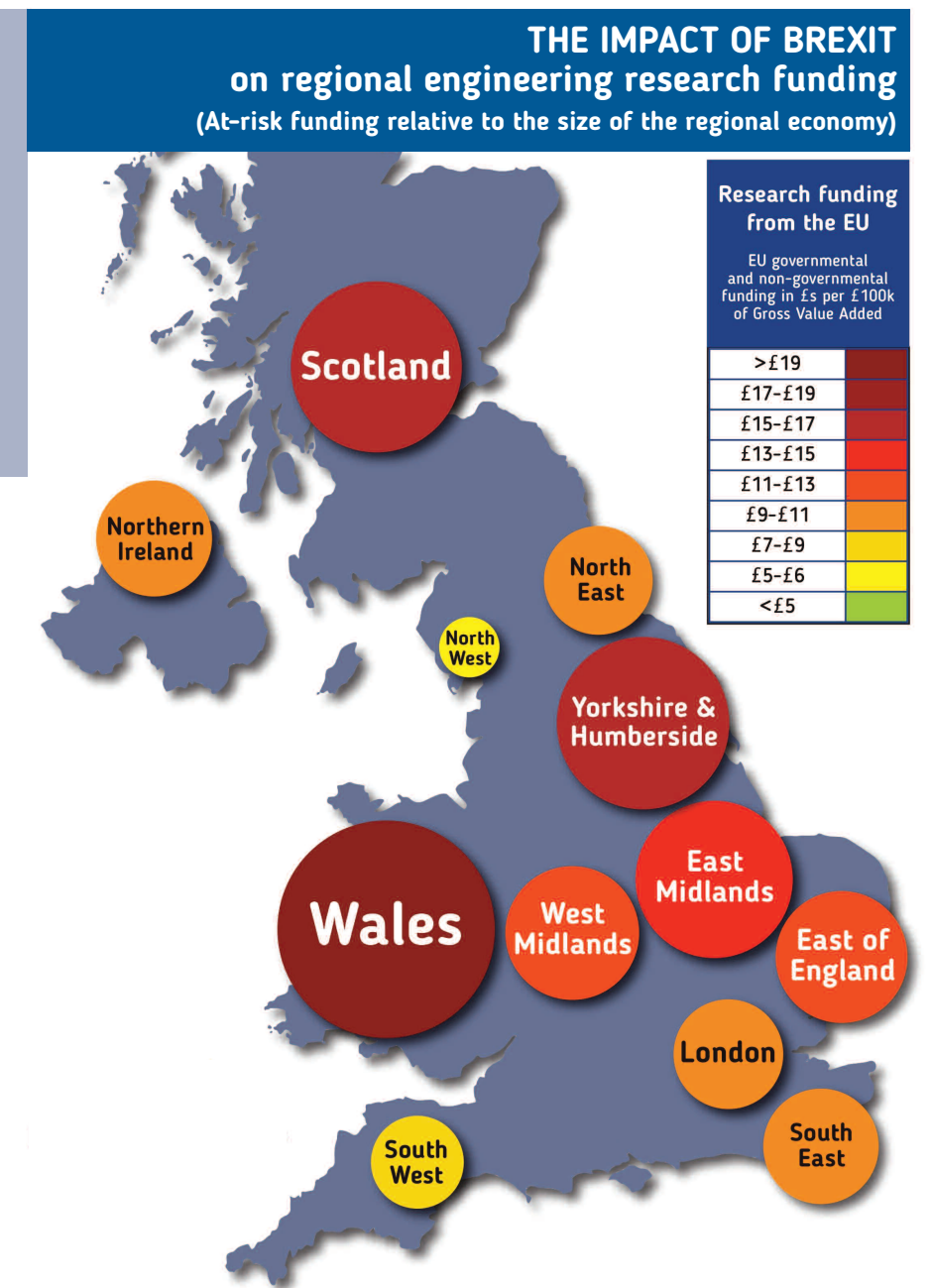
Manufacturing enterprises within engineering-based industries remain the largest economic contributor to the UK economy of all industries: in 2015, engineering generated 9.3% of the Gross Value Added (GVA) and, in 2016, almost half of the engineering footprint turnover came from manufacturing.ⁱ Moreover, **the counter-weight to the cascade effect is the engineering sectors' strong multiplier effect on the economy,** generating a further £1.45 for every £1 GVA created directly in the engineering industries. Every additional person employed through engineering activity is projected to create a further 1.74 jobs down the supply chain.ⁱ

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COLLABORATIONS

European funding adds direct value to UK research, but the value of the scope for joint working must not be underestimated. National research collaborations, facilities and EU research expertise – facilitated by EU collaboration and coordination – enhance the quality, reach and impact of UK research to an extent that enables approaches to large-scale problems that one country

21.8% of all engineering researchers are from the EU



would struggle to achieve alone (such as Engineering's 'Grand Challenge' problems). These benefits are widely acknowledged within the sector^{viii} and by research funders.ⁱⁱ

It is essential for UK researchers to have access to knowledge, expertise and facilities that lie outside the UK. (For example, the ITER fusion research project, for which 45% of the €13 billion cost is funded by the EU.^{ix}) Engineering research addresses global issues, for which international and EU partnerships are vital to the effectiveness and impact of the work.

UK engineering departments have higher than average proportions of international researchers:

62% of engineering research-only staff in 2017-8 were from overseas compared to 46% across other subjects, and 21.8% of all researchers in engineering were from the EU compared with 18.9% elsewhere.^x The ability of the UK to attract the best researchers in a field is crucial to the maintenance of the UK's excellence in research and higher education and its attractiveness to experts from all over the world as a destination to research, study and teach. The UK higher education sector's reputation as a collaborator of choice in critical cross-border research is key to its success as a learning provider (in which capacity it attracts £13.4 billion annually in education export revenues^{xi}).

MULTIPLIER EFFECT

The risks extend beyond the financial loss of the removal of access to EU funding mechanisms. In preparing evidence for the Brexit Select Committee in January 2017^{xii}, the EPC described a ‘multiplier effect’ deriving from EU-funded research, because the UK benefits from the total research output, not just that component which is conducted within the UK. The EPC conservatively estimated that effect as increasing the value to the UK of EU-funded research income by a factor of 3.35.

Universities UK found in 2016 that the £836 million of EU research funding to UK universities in 2014/15 generated over 19,000 full-time-equivalent jobs across the UK, £1.86 billion of output and contributed over £1 billion to GDP.^{xiii} Meanwhile, Horizon 2020 impact assessments calculated that across all member states, every euro of funding for the programme led to an increase in industry-added value of €13.

The role and benefits of EU membership to UK research is broader than simply the funding for research that EU projects bring to the UK. EU research funding is an investment not only in higher education research – and therefore the economy – but also in sustaining the UK’s productivity and competitiveness globally.

ABBREVIATIONS

EPC: Engineering Professors’ Council
EPSRC: Engineering and Physical Sciences Research Council
EU: European Union
GVA: Gross Value Added
HE: Higher Education
HERA: Higher Education and Research Act
HESA: Higher Education Statistics Agency
IT: Information Technology
UK: United Kingdom
UKRI: United Kingdom Research & Innovation

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FURTHER INFORMATION

A more detailed analytical report, including data at the level of different engineering disciplines, can be found on the EPC website (bit.ly/EPCBrexit_data).

Attribution: HESA Finance Record 2016–17 Table 5. Copyright Higher Education Statistics Agency Limited. Neither the Higher Education Statistics Agency Limited nor HESA Services Limited can accept responsibility for any inferences or conclusions derived by third parties from data or other information obtained from Heidi Plus.

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