

Campaign for Science and Engineering (CaSE) CSR 2021 submission

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Introduction

This Comprehensive Spending Review (CSR) is a unique opportunity, unlike any the UK's R&D sector has been afforded in modern history, to secure a thriving and sustainable R&D sector for the long-term. Although the pandemic has placed public finances under increased pressure, this has only furthered the need to invest for a more prosperous future. The actions taken now will decide whether the UK will be able to reap the benefits of being a 'science superpower' for the next decade. These actions must be big and bold to match the ambition of the targets for public investment to reach £22bn by 2024/25 and to increase the UK's research intensity to 2.4% of GDP by 2027.

History shows that major uplifts in investment take time and commitment - if we do not plan and start moving towards it now, then the target may remain out of reach. Hitting the target by reallocating existing spending commitments or artificially broadening what's counted as R&D investment only serves to miss the point and undermines the Government's own ambitions.

This representation sets out the steps required at this CSR to put the UK on the track to becoming a science superpower. It will cover issues such as the implementation of a long-term R&D investment plan, the role of the whole of government in supporting UK R&D and providing R&D opportunities across the country. CaSE has also published a [5-point roadmap for becoming a science superpower](#), which sets out these priorities in brief.

A long-term plan for 2.4%

The Chancellor announced plans last year to introduce record increases in R&D investment, pledging to reach a public research budget of £22bn by 2024/25. This would see the budget for R&D increase by over 50% in four years and set the UK well on course to reach a research intensity equivalent to 2.4% of GDP by 2027. The Government has said it wants to work "in close partnership with the private sector" and to encourage greater private sector investment in R&D and innovation. The best way to do this is to set out a long-term budget for public investment in R&D showing how the Government intends to reach £22bn by 2024/25. Our industry members have told us that a long-term plan and budget gives them confidence to make their own R&D investment decisions and to form long-term partnerships with universities and the public sector.

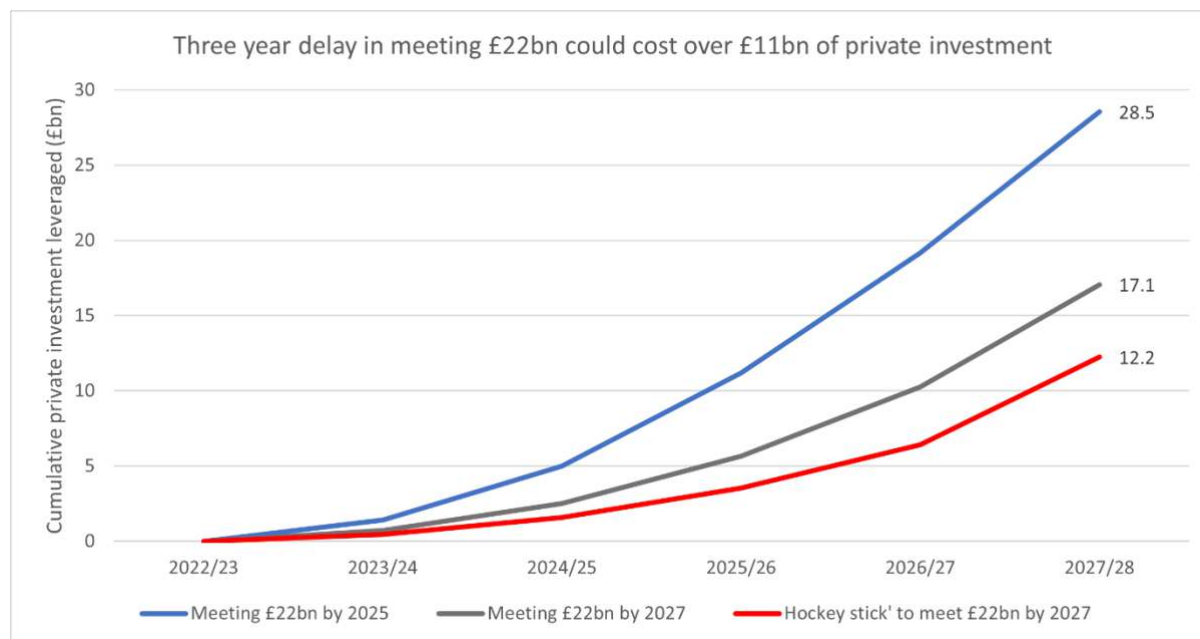
Over the past few months, however, the restatement of the commitment to increase public investment to £22bn has not had a date attached (in, for example, the Innovation Strategy). Postponing the target will trigger a significant loss of private investment, putting the 2.4% target out of reach. Two reports published by BEIS, the first in [2015](#)¹ and latest in [2020](#)², have shown the causal link between additional public investment in R&D and the amount of private investment that can be stimulated as a result of public spending. These reports have allowed us to build models that show how varying levels of public investment will affect private investment.

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf

² 'The relationship between public and private R&D funding', BEIS Research Paper Number 2020/010

The graph and table below show that delaying the increases in public R&D investment could cost the UK over £11bn of private investment between now and 2027/28.



Model ³	Cumulative private investment leveraged by 2027/28	UK research intensity in 2027/28
Meeting £22bn by 2024/25	£28.5bn	2.43%
Meeting £22bn by 2027/28	£17.1bn	2.30%
'Hockey stick' by 2027/28	£12.2bn	2.27%

Our international competitors are using long-term budgets to pull further ahead. For example, Germany has committed to an annual 3% increase in funding for research institutes until 2030 through its Pact for Research and Innovation. Since 2005 the pact has guaranteed the basic funding and further development of the research institutions that are jointly funded by the Federal Government and the German states⁴. Similarly, the United States recently met its target of investing 3% of GDP in R&D and has plans to further increase investment.

The challenge of ensuring public money is spent well is exacerbated by short term budgets with near term aims, as we've seen in recent years⁵. A long-term budget will enable the development of a detailed strategy and delivery plan that will allow for efficient use of the funding, minimising wastage and maximising leverage. It would enable Government to consider the appropriate balance of funding and make transparent, evidence-based decisions about how to use public R&D investment and levers most effectively

³ The Russell Group have recently undertaken modelling to project the ways in which the UK could reach public investment of £22bn in 2024/25. CaSE have been able to compare three scenarios: the first is meeting £22bn by 2024/25 through a linear model (equal increases each year), the second is meeting £22bn by 2027/28 through a linear model, and the third meeting is £22bn by 2027/28 through a 'hockey stick' model (larger increases in investment in later years).

⁴ <https://www.research-in-germany.org/en/research-landscape/r-and-d-policy-framework/pact-for-research-and-innovation.html>

⁵ [Cross-government funding of research and development](#), NAO, 2017

Use increasing R&D investment to strengthen the foundations of the UK research base

The Government should continue to expand the budget allocated to discovery research, as a vital counterpart to growing mission-driven funding streams. This will build on the increased allocations in last year's spending review, which are safeguarding the UK's reputation as a world-leader in discovery research.

A narrow approach to investment leaves discovery research underpowered and unable to deliver the dynamic environment in which mission-driven R&D, such as the new ARIA programme and the technological innovations needed to reach Net Zero, thrives. Without a strong research base sustained over many years the UK would not have been able to develop a COVID vaccine or ramp up genetic sequencing in such a short space of time. Global businesses cite the UK's strong academic base and discovery research as a reason for investing here. Rising R&D budgets over recent years have been very welcome. However, headline figures can hide budget pressures on parts of the R&D sector.

Balance of Funding

A clear purpose for increasing the R&D intensity of the UK is necessary to make decisions on the desirable balance of spending and interventions. The past balance between different funding streams or types doesn't necessarily set out a blueprint for the future balance the UK will need. However, it is important that weight is given to two factors when considering the balance of funding. The first is the dual support system. Over time, Quality-Related (QR) funding has reduced as a proportion of higher education institutions' income from a third in 2006/7 to a quarter in 2016/17, and QR funding has decreased by 14% in real terms over the last decade⁶. This has resulted in a change to the types of research funded and the relative level of strategic flexibility HEIs have in making research funding allocation decisions. At a time when the Government is investing heavily in R&D, support must be provided for the research that drives discovery, through QR, to maintain the balanced funding principle.

The second factor is diversity of funding streams. Diversity brings resilience and spurs innovation. The UK currently has strength in breadth, which is widely regarded as an asset. It must continue to foster a breadth and diversity of funders, investment instruments, settings for research & innovation, disciplinary strengths, and people.

Horizon Europe commitments

The UK's involvement in Horizon Europe is something that the research and innovation sector is very pleased to see. We also welcome the extra funding made available to BEIS to pay for the costs of participating in 2021. The CSR gives the UK Government the opportunity to set out how it intends to pay for the next three years of costs associated with Horizon Europe, which should not directly impact domestic research and innovation programmes. As the UK's public research investment envelope is set to grow to £22bn in 2024/25, CaSE is asking for graduated and tapering support from HM Treasury to BEIS over the course of the programme, ensuring that continuity of funding for domestic programmes is retained.

Ensuring the UK's universities are match fit

⁶ <https://www.russellgroup.ac.uk/media/5916/underpinning-our-world-class-research-base-the-importance-of-gr-feb-2021.pdf>

To become a science superpower, the UK's universities must be at their best. In towns and cities across the UK, these institutions are the hub of local partnerships that are driving cutting-edge research.

To deliver their role effectively, universities must achieve a sustainable financial model across both their teaching and research activities. The pandemic has renewed focus on the 'research deficit' across UK universities – the shortfall in funding for research which universities must cover from elsewhere in their budget. UKRI commit to providing 80% of the Full Economic Cost (FEC) of their research grants⁷, but in 2017/18 this figure averaged 72%⁸ for English and Northern Irish universities. In English HEIs, this annual deficit has grown from £1.8bn in 2010/11 to £4bn in 2019/20⁹.

While an increased budget will allow UKRI to fund more research, paying these grants at the current proportion of FEC will only serve to increase the research deficit. All UKRI-research should not necessarily be funded at 100% FEC, but there must be a strategy behind the chosen FEC level that takes the deficit seriously.

Cross-subsidy of research from teaching budgets is common¹⁰, especially from international student fees, and shortfalls in funds for teaching provision would likely affect the amount of money available for research. If implementing any of the recommendations of the review into post-18 education (the Augar Review), the Government should assess and be aware of the potential impact on research activity.

Channel science and technology into all parts of government R&D across Government

Increasing the UK's research intensity is not just a job for BEIS and UKRI. Departmental R&D budgets are responsible for up to 30% of public expenditure on R&D¹¹ and have a crucial role to play. There is great potential for R&D investment to directly benefit the delivery of public services, supporting more effective and efficient policymaking, and in assessing policy outcomes against the Government's objectives. However, increasingly large proportions of recent R&D budgets are channelled through fewer departments. Previous CaSE calculations showed that in 2017, 68% of the UK Government's R&D funds were being channelled through BEIS. The settlements from last year's spending review shows that that figure is now 76%. Calculations from ONS figures suggest that outside of BEIS, MoD and DHSC, the remaining government departments will only have £500m to invest in R&D between them, some 3% of the UK Government total R&D investment in 2021/22¹².

Alongside increased budgets, the Office for Science and Technology Strategy offers a new and powerful tool to co-ordinate R&D investment across Government, supporting departments to get the most out of their research budgets. There is also an important role for departmental Chief Scientists in decision making about their departments R&D budget and while good progress has

⁷ <https://www.ukri.org/files/legacy/documents/fecfaq-pdf/>

⁸ <https://www.officeforstudents.org.uk/media/fd84abb4-49fe-4191-bc3a-6b5cae9b66fe/annual-trac-2019-20-sector-summary-and-analysis-by-trac-peer-group.pdf>

⁹ Ibid

¹⁰ <https://www.hepi.ac.uk/wp-content/uploads/2017/11/HEPI-How-much-is-too-much-Report-100-FINAL.pdf>

¹¹ <http://www.sciencecampaign.org.uk/resource/casesubmissionbalanceandeffectivenessofr-d-s-tcommitteeinquirysept18.html>

¹² <https://www.sciencecampaign.org.uk/news-media/case-comment/analysis-of-the-2020-spending-review.html>

been made on publication of Areas of Research Interest for each department more can be done to make the most of these across all departments.

This approach should utilise Government's existing R&D assets like the over 100 Public Sector Research Establishments (PSREs) and UKRI Research Council Institutes, including the MET Office, National Physical Laboratory and Alan Turing Institute. These organisations' proven research and innovation capability should be actively utilised to strengthen policy formulation and delivery, capitalising on their expertise in strategic science and technology interests, including their understanding of current trends and challenges and links to relevant academia and industry players.

Inclusion of these institutes alongside universities and tech-intensive corporates must become part of the norm in Government policymaking. For example, this cross-national network, with strong local business and research links, has the potential to harness R&D as a tool for Levelling Up. Failure to utilise them would leave globally recognised UK science strength "on the table" and impede the Government's ability to transition cutting-edge fundamental research in to the applied and innovation space.

If departments are shut out of increasing R&D investment, public services can't access the full benefits of the UK being a science superpower.

[Deliver R&D opportunities for every region of the UK](#)

The shared prosperity fund

The Government must set out details of the innovation element of the Shared Prosperity Fund, detailing how institutions across the UK will be able to access the fund. The Shared Prosperity Fund will support the collaboration between small businesses and universities that drives growth and jobs in all parts of the UK, and in particular those areas with the most untapped potential.

Following the UK's departure from the European Union, the UK is no longer eligible to receive new EU structural funds. A significant proportion of these funds have historically been allocated for research and innovation, helping to support a wide array of projects building research capacity across the UK. Some regions are more reliant than others on this type of funding. For example, The Learned Society of Wales has shown that the per capita contribution of ERDF to research and innovation in Wales is €125 per capita: five times the UK average of €23 per capita¹³.

It will be important for continued funding for building research capacity to be considered in any domestic replacements for structural funds – including the Shared Prosperity Fund¹⁴. Being able to support and increase research capacity and capability across the UK will be an important determinant of successfully 'levelling up' all regions of the country. The Shared Prosperity Fund must contain elements to support research and innovation, with sufficient expertise being given to DLUHC to maximise the impact of investment in building research capacity.

The importance of local leadership

There needs to be greater involvement of leaders from local authorities, combined authorities and LEPs in regional R&D conversations. Those examples we have found where regions have been successful in building R&D capacity have often been driven by strong leadership by a small number of committed individuals. However, this works both ways and it is incumbent on leaders in the

¹³ [European Structural and Investment Funds key to UK research and innovation](#)

¹⁴ [The UK Shared Prosperity Fund](#), House of Commons Library

research community, both in businesses and universities to build a strong narrative to show local civic leaders what R&D can do for the local growth agenda.

Central and local government should work together to improve national coordination between local and national R&D priorities. This will help maintain the breadth of the UK research base by ensuring that regions do not all focus on the same areas or disciplines.

Improving infrastructure and housing will help equip places for increased research intensity. Making places more attractive to live will also help to retain skilled people. It is important that decisions made about regional R&D are linked up with other regional development decisions across local and national Government.

Inspiring Innovation in education

High-quality science education is crucial to driving forward the government's plans to grow and 'level-up' the UK economy and society. In May's Queen's Speech, Prime Minister, Boris Johnson promised a 'skills revolution' in a boost to the Government's levelling up agenda. With the UK set to increase its public research investment to £22bn by 2024/25, it's important that everyone should be able to participate and prosper in a more innovative economy and society. This not only means continuing to inspire an increasingly diverse group of people to become scientists and engineers, but also equipping all young people with the skills to take advantage of advances in research and innovation, whatever their background.

It is vital, therefore, that young people can receive a far-reaching and well-rounded science education in school. Primary and secondary schools up and down the UK are under immense pressure to deliver the best outcomes for pupils, which is why they need support from governments and devolved administrations to deliver high quality science education.

CaSE recommends support in three important areas¹⁵:

- Creating a confident and empowered teaching workforce
- Making science and engineering inclusive to all young people
- Giving students exposure to practical, experimental science

CaSE has produced the briefing with experts in the domestic education policy sector. Individual recommendations include:

- Creating support packages for teachers to attract applications in disadvantaged areas
- All teachers to receive 35 hours of high-quality Continuing Professional Development (CPD) per year
- UK-wide governments to require all primary schools to have Science Leaders
- Ensuring that practical work remains a part of assessment in the sciences
- Reviewing pay and conditions for school science technicians to best attract and retain their expertise

Driving excellence in science teaching

CaSE is also supporting the proposal developed by the Institute of Physics (IOP) to develop a systematic approach to subject-specific CPD for teachers in the sciences. The IOP have outlined proposals for delivering such a system and raising the quality of science teaching across England in

¹⁵ <https://www.sciencecampaign.org.uk/resource/inspiringinnovation.html>

their Subjects Matter report¹⁶, and the Royal Society's paper Science education for a research and innovation economy for the DfE. In summary, it is a cost-effective way of addressing some of the most significant problems within the education system, as well as supporting government ambitions to level up opportunity and cement the UK's status as a science superpower.

About CaSE

The Campaign for Science and Engineering (CaSE) is the UK's leading independent advocate for science and engineering. Our mission is to ensure that the UK has the skills, funding and policies to enable science and engineering thrive. We represent over 115 scientific organisations including businesses, universities, professional bodies, and research charities as well as individual scientists and engineers. Collectively our [members](#) employ over 336,000 people in the UK, and our industry and charity members invest over £32bn a year globally in R&D. We are funded entirely by our members and receive no funding from government.

¹⁶ <https://www.iop.org/about/publications/subjects-matter>