

## Budget 2020

*Campaign for Science and Engineering submission 27 January 2020*

### Intro and Rationale

The Chancellor has announced his intention to hold a budget on 11 March 2020. CaSE believes that this provides the perfect opportunity for significant announcements on increased public investment in research and development as promised by the Prime Minister during the election campaign. The Government must also set out plans on how it intends to meet the target of 2.4% of GDP to be spent on Research and Development (R&D) to provide greater long-term certainty to the scientific community.

In the election campaign the Prime Minister pledged to double public research investment by 2024/25 to reach £18bn in that year alone. Rough calculations by CaSE and others, based on the costings document that accompanied the Conservative Party manifesto<sup>1</sup>, show that new and existing Conservative R&D commitments would see public investment reach just over £14bn in 2023/24. CaSE projection work (see below) recommends that a Government seeking to reach a research intensity of 2.4% by 2027 should invest £17.5bn in 2023/24 and £18.5bn in 2024/25. The increases in the costing document are considerable and we are pleased to see that the Government is serious in its endeavour to increase research investment.

It is important that the Chancellor takes the opportunity to set out how this money will be invested, paying particularly attention to the balance and effectiveness of funding, maintaining the existing strengths of UK R&D and the need for a long-term plan to encourage the private investment that is needed to meet the 2.4% target.

Members have told CaSE that leadership and a long-term plan for R&D investment from Government enables them to plan and gives industry confidence to keep on investing in R&D. Backing the Government's positive words on science since it came into office with an announcement on significant, long-term science investment would show that the Government is truly committed to the target of investing 2.4% of GDP in R&D by 2027. It also signals to multi-national businesses that the UK is open to international investment in R&D. If the UK doesn't do this, it risks falling further behind its international competitors. For example, Germany has committed to an annual 3% increasing in funding for research institutes until 2023 through its Pact for Research and Innovation<sup>2</sup>.

### Building on Scientific Strength: Summary of Recommendations

In May 2019 CaSE published a report on R&D investment, [Building on Scientific Strength; The Next Decade of R&D Investment](#), which set out a number of recommendations for how the Government could meet the 2.4% target through increasing public investment, incentivising private investment and investing in people and skills. Those recommendations are summarised below. For more detail please see our report. In the interest of brevity, the rest of this submission will focus on the need for a long-term plan for R&D investment, the 'place agenda' and the importance of association to Horizon Europe to UK science.

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<sup>1</sup> [https://assets-global.website-files.com/5da42e2cae7ebd3f8bde353c/5ddaa257967a3b50273283c4\\_Conservative%202019%20Costings.pdf](https://assets-global.website-files.com/5da42e2cae7ebd3f8bde353c/5ddaa257967a3b50273283c4_Conservative%202019%20Costings.pdf)

<sup>2</sup> <https://www.research-in-germany.org/en/research-landscape/r-and-d-policy-framework/pact-for-research-and-innovation.html>

#### Increase public R&D investment

- Create a vision with a plan and budget that attracts cross-Government support and global R&D attention
- Sustain the unique breadth of the UK's academic science base
- Grow R&D capability by investing in infrastructure

#### Incentivise private R&D investment

- Package the UK's innovation offer simply and with greater appreciation of business needs
- Support start-ups
- Use the power of Government procurement to adopt innovation faster
- Update R&D tax credits to help make the fiscal environment for R&D internationally competitive

#### Invest in people and skills

- Grow the talent pool for R&D by widening diversity, training more researchers and attracting overseas talent
- Strengthen provision for careers guidance and education

#### Why R&D?

There are a few areas in which the UK truly leads the world. R&D is one of them. The UK has benefited from its research strength both culturally and economically. It puts the UK in prime position to shape the future direction of new technologies, industries and sectors. But these benefits aren't inevitable and Government action is needed to realise them.

Research and innovation are essential to solving challenges facing Government and citizens. Tackling anti-microbial resistance, cutting transport times, supporting an ageing population to work for longer, securing sustainable energy and more, all require research and innovation.

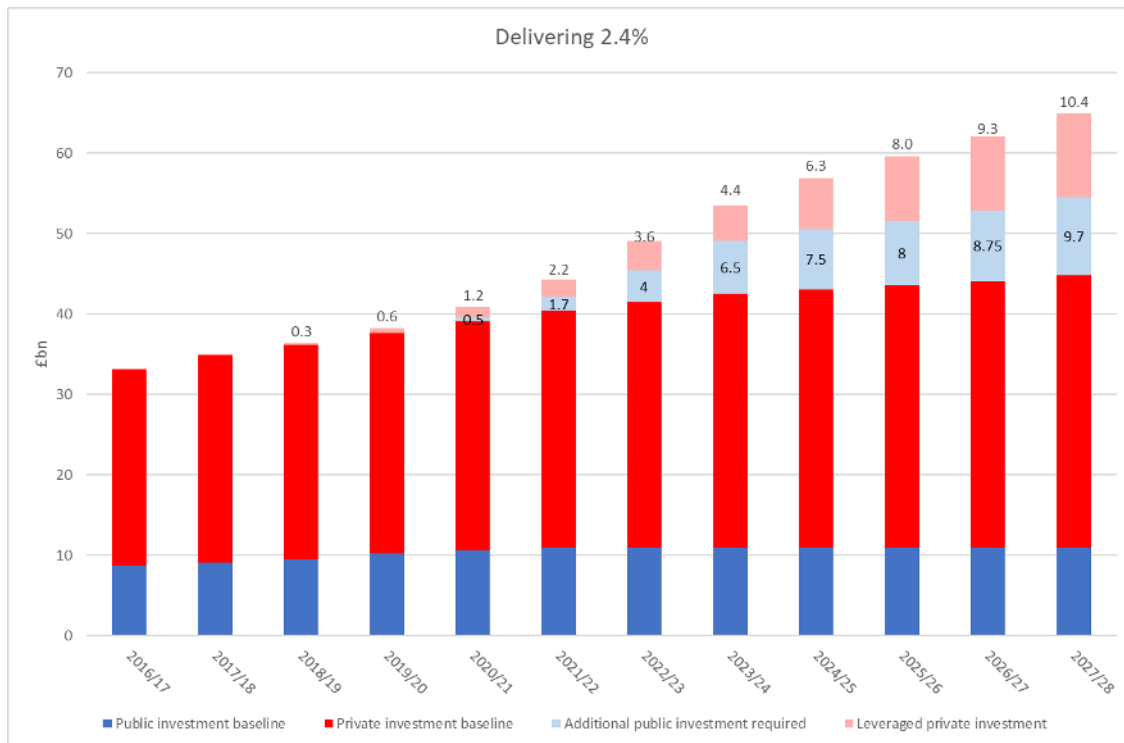
More broadly, public funding of research, particularly at early stages, develops new knowledge, techniques, and skilled people. This sustains the breadth of excellence that is a unique strength of UK research and that allows the UK to draw on diverse expertise to shape societal and technological changes. It also provides an attractive platform for companies do more high-risk, high-return projects and do them in the UK. It is an essential building block of a competitive environment to anchor business investment and jobs in the UK, with evidence showing that public investment 'crowds in' private investment, attracts overseas investment, and raises private sector productivity growth<sup>3</sup>.

#### Reaching 2.4% of GDP invested in R&D by 2027

CaSE has developed a model for public and private R&D investment to reach an intensity of 2.4% of GDP by 2027 and 3% in the long term (2034/35). The assumptions used in the model are set out below. Broadly speaking the model shows public investment in R&D must double by 2027 to reach the target.

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<sup>3</sup> [The Economic Significance of the UK Science Base](#), Haskel et al for CaSE, 2014



#### Model assumptions:

- The 1.36 leverage ratio<sup>4</sup> was applied over 10 years to calculate the growth in public investment required to reach the necessary overall uplift in investment, assuming GDP grows according to OBR forecasts.
- The model begins at 2016/17, using the latest year of available data on the Gross Expenditure on R&D (GERD) in the UK,<sup>5</sup> split into public and private spending using GERD categories. The £2.3bn extra announced in Autumn Budget 2017 becomes part of the new baseline level.
- The baseline for public expenditure remains flat in cash terms and the private expenditure baseline increases in line with GDP growth, as per trends in the past decade, using OBR forecasts for GDP growth in the short<sup>6</sup> and medium term<sup>7</sup>.

#### Why is a long-term plan is needed?

The Government should set out the long-term budget for public investment in R&D up to 2027 in line with the ambition for R&D investment to reach 2.4% of GDP and it should coordinate action and delivery across Government. UKRI and BEIS cannot deliver the transformation of the UK R&D environment alone. This long-term transformation of R&D will require ambitious and coordinated action, including a significant uplift in public investment in R&D.

Members have told CaSE that leadership and long-term R&D investment from Government enables them to plan and gives industry confidence to keep on investing in R&D. The long-established

<sup>4</sup> [What is the relationship between public and private investment in science, research and innovation?, BIS, 2015](#)

<sup>5</sup> [UK Government expenditure on science engineering and technology 2016, ONS, 2018](#)

<sup>6</sup> <https://www.gov.uk/government/statistics/gdp-deflators-at-market-prices-and-money-gdp-march-2018-spring-statement>

<sup>7</sup> <http://cdn.obr.uk/FSR-July-2018-1.pdf>

principles and mechanisms for funding research have contributed to the UK being a highly efficient research nation. A long-term plan gives confidence for long-term R&D investment decisions by the private sector and for long-term partnerships between the public and private sector. Every country that has successfully raised R&D intensity by a significant margin over the period of a decade has done so through raising both public and private investment<sup>8</sup>.

Public investment drives increased private investment, with a time-lag. Government analysis shows that an extra £1 of public spending gives rise to an increase in private funding of £1.36 over a ten-year period<sup>9</sup>. Furthermore, for companies that have previously chosen to invest in R&D elsewhere, a bold, long-term, investment plan, could catch their attention and make the UK a candidate destination for new 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 years<sup>10</sup>. A long-term budget will enable the development of a detailed strategy and delivery plan that will allow for efficient use of the funding, minimizing wastage and maximizing leverage. It would enable Government to consider the appropriate balance of funding and make transparent, evidence-based decisions about how to most effectively use public R&D investment and levers.

#### Balance and effectiveness

For many years the UK has had a relatively stable system of funding and evaluation for R&D. However, significant increases in funding are likely to chance both the balance between and the effectiveness of the different funding streams. The past balance between different funding streams or types doesn't necessarily set out a blue print for what future balance should be. Rather, a clear vision of the purpose of increasing the R&D intensity of the UK is necessary to make decisions on the desirable balance of spending and interventions.

Similarly, evaluating the effectiveness of research and innovation spending requires a clear view of the purpose and outcomes against which success will be measured and it isn't yet clear what these are. That said, there are some principles and patterns of investment on which the UK's strength in research and innovation is built, and there are lessons to learn from the experience of those in different parts of the research and innovation landscape on what they need to thrive in the UK.

It is important that weight is given to two factors when considering the balance of funding. The first is the dual support system. In 2017, Parliament put the dual support system, or the 'balanced funding principle', into law for the first time<sup>11</sup>. The dual support system refers to the principle that public research funding is allocated by two different streams of funding, which have complementary methods of allocation and evaluation. Research Council funding, used responsively to fund research grants, is allocated by prospective assessment of potential, and is confined to the purposes set out in the grant. Quality-Related (QR) research funding is used to fund institutions (universities) on a formula basis<sup>12</sup>. It is allocated by retrospective assessment of the quality of past research output and

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<sup>8</sup> [OECD MSTI database](#), data extracted 4 November 2018

<sup>9</sup> [What is the relationship between private and public investment in science, research and innovation?](#) BIS, 2015

<sup>10</sup> [Cross-government funding of research and development](#), NAO, 2017

<sup>11</sup> [The Higher Education and Research Act 2017](#)

<sup>12</sup> Direct funding of higher education institutions (HEIs) is devolved. In England QR funding is administered by Research England, in Scotland by the Scottish Funding Council (where it is called Research Excellence Grant) and in Wales by the Higher Education Funding Council for Wales.

the funds are not hypothecated. It is widely regarded as a unique asset to UK research and innovation strength and resilience.

Over time QR funding has reduced as a proportion of higher education institutions income from a third in 2006/7 to a quarter in 2016/17. 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 the 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. This will give the UK the potential to lead the world in new research areas, work across boundaries and create new markets.

### A new Funding Agency

CaSE welcomed the Government's proposal on science in the Queen's Speech and looks forward to working with the Government to develop its proposals for a new funding agency<sup>13</sup>. Alongside announcements on investment, the budget would be a good time to set out further details on the proposed creation of a new 'ARPA-style' funding agency. CaSE and the wider sector are interested in how it will complement the work of UKRI, itself just a few years old.

### The Place Agenda

Improving regional growth through R&D investment is a growing political priority. The Government have spoken about directly tackling regional differences and 'levelling-up' those areas of the UK that have not seen high levels of investment in recent years. Investing in areas of excellence and building regional research capacity across the whole of the UK is one important way to ensure communities can prosper. This investment in regional R&D will also play a significant role in reaching the Government's target of increasing combined R&D investment to 2.4% of GDP. The announcement of a Place Strategy for R&D, to be published later this year, is welcome.

Recognising different local strengths and existing local capacity for research, will be vital in unlocking the potential of every region. CaSE has been working with its diverse, UK-wide membership to develop an evidence base for the impact of place-based regional R&D investment on local economic growth. CaSE has initiated a series of discussions across the regions and devolved nations to bring together senior representatives from academia, industry and local government to review areas such as the enablers and barriers of different places in increasing research intensity, the structure of partnerships between organisations and the opportunities that R&D investment could bring for local economies.

This is an ongoing project and so far, discussions have been held in Scotland, London, the West of England, the West Midlands and the North East. The work will continue across the UK in the coming months, including in Northern Ireland, Wales, and other English regions. Even though this work is not yet complete some of the initial findings are set out below, including a summary of common enablers and barrier to greater regional R&D intensity. These should be useful and provide a guide as to what should be considered by the Treasury when making decisions about how to target regional R&D investment.

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<sup>13</sup> <http://www.sciencecampaign.org.uk/news-media/press-releases/case-responds-to-queen-s-speech.html>

## Summary of common enablers and barriers to greater R&D intensity across English regions and the devolved nations

ENABLERS	BARRIERS
<ul style="list-style-type: none"> <li>• Strong academic skills base</li> </ul>	<ul style="list-style-type: none"> <li>• More branding and championing of local strengths is needed to attract national and overseas investment</li> </ul>
<ul style="list-style-type: none"> <li>• Growing SME and university spin-out successes</li> </ul>	<ul style="list-style-type: none"> <li>• Often lack of coordination of activities on a local and national level</li> </ul>
<ul style="list-style-type: none"> <li>• Strong collaborations between universities and big businesses</li> </ul>	<ul style="list-style-type: none"> <li>• Research ecosystem is often complex and fragmented, hindering SMEs from accessing finance easily and collaborating further with universities</li> </ul>
<ul style="list-style-type: none"> <li>• Places have diverse R&amp;D strengths</li> </ul>	<ul style="list-style-type: none"> <li>• Limited infrastructure to prepare for growing research intensity</li> </ul>
<ul style="list-style-type: none"> <li>• Devolved nations have powers and levers to make decisions and design their own innovation environments</li> </ul>	<ul style="list-style-type: none"> <li>• Local government in England has little autonomy from central government to make decisions and design their own innovation environments</li> </ul>

### Preliminary findings

- One of the barriers to attracting R&D investment in specific places is often the lack of regional branding. Strong branding and a clearer definition of a region's strengths provides clarity on what differentiates a place from others nationally and internationally.
- Strong local civic leadership, and an understanding by local leaders of R&D and the role it can play in economic growth, is essential to driving forward increased R&D intensity.
- University-business collaborations play a powerful role in describing the local innovation ecosystem and promoting a region. Universities often act as an anchor point around which a local innovation ecosystem can be built.
- Attracting and retaining highly skilled graduates in a region is important in order to attract innovative businesses to that region. This is often affected by the wider perceptions of a region and quality of life factors outside of R&D, such as housing affordability.
- More infrastructure will be essential to prepare places for growing research activity.

### Horizon Europe Association

UK research and innovation has been greatly supported by EU funding programmes. To date, the UK has secured €6.4bn of Horizon 2020 funding since the inception of the programme in 2014, the second largest recipient of funding<sup>14</sup>, and most universities receive between 15-35% of their competitive funding from Europe<sup>15</sup>. We strongly recommend that the UK Government commit to seeking full association with Horizon Europe, which is due to begin in 2021, after Brexit. The Government should make additional funding available in order to participate.

While all parts of the UK are reliant on EU R&D funding to some extent, the areas with the highest dependency overall are South West England, outer London and parts of North England and

<sup>14</sup> [Horizon 2020 projects and participations statistical database, European Commission](#)

<sup>15</sup> Digital Science, Examining the implications of Brexit for the UK research base, 2016

Scotland<sup>16</sup>. Due to the intertwined nature of UK and EU funding streams in recent years, a situation has developed where some fields of research are more dependent on EU funding than others, both for competitive research funding but also for facilities and networks. Some disciplines such as Archaeology, Chemistry and IT are very reliant on EU funding, while EU grants account for at least 20% of research funding for 15 academic disciplines<sup>17</sup>. Equally large grants for blue skies research funding in the UK are limited and the European Research Council has been an important source of such funding.

Participation in EU Framework Programmes has also provided the UK with a number of ‘intangible’ benefits. While not directly measurable, these benefits are wide ranging and help to grow research in the UK. A letter from our chair, Professor Graeme Reid, to the previous Science Minister summarised the outcomes of a workshop co-hosted by CaSE and the Wellcome Trust on the intangible benefits of European Collaboration in September 2018<sup>18</sup>. The following were among the intangible benefits identified by the workshop participants.

- Competition for EU funding raises standards and accelerates research progress.
- EU funding increases the diversity of the UK research base by complementing domestic spending.
- Participation in EU programmes provides access to advanced facilities and access to large data sets unavailable in the UK alone.
- Participation in EU programmes helps attract talented researchers to the UK. The pool of top quality researchers in the EU is clearly larger than that in the UK alone.
- Many research-intensive businesses operate across several EU member states and are attracted to EU research programmes with similar geographic coverage. Business participation in these collaborative programmes may improve access to markets elsewhere in the EU.
- Participants in EU programmes have opportunities to influence the future shape of EU research and innovation and sometimes have opportunities to influence technical standards that shape future regulation.

#### 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 to 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 around £32.2bn a year globally in R&D.

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<sup>16</sup> <http://sciencecampaign.org.uk/CaSEVATbriefing2015.pdf>

<sup>17</sup> [The role of EU funding in UK Research](#), Royal Society, 2017

<sup>18</sup> <http://www.sciencecampaign.org.uk/news-media/press-releases/case-letter-science-minister-intangible-benefits.html>