

# Budget Submission

## Spreading UK prosperity by increasing R&D investment and supporting science education

February 2020

In 2017, public and private R&D spending in chemical and pharmaceuticals manufacturing businesses amounted to over £5 billion. This note sets out recommendations to ensure that increased public UK R&D investment, alongside measures to support science education from school through to university, balances regional prosperity, positions the UK as an innovation leader, and improves the UK's ability to leverage private R&D investment.

### We call on government to:

1. Create a 'digital shop window' for UK R&D investment that guides domestic and international researchers, innovators and investors to the UK's research and innovation offering.
2. Increase the level of quality related funding (QR) by at least 13% to reverse the recent real terms decline.
3. Ensure that the Shared Prosperity Fund (UKSPF) supports the growth of R&D across the UK at a scale at least equivalent to that of the European Structural Investment (ESI) Funds.
4. Ensure the balance of investment recognises the importance of curiosity-driven, discovery research as a vital element of a diverse R&D funding landscape.
5. Protect university teaching grants for chemistry and related subjects.
6. Boost technical science courses in 16-19 education with a sustained funding increase and support for SMEs.
7. Support subject-specific professional development for science teachers.

### 1. Create a 'digital shop window' for UK R&D investment that guides domestic and international researchers, innovators and investors to the UK's research and innovation offering.

The Science Minister recently acknowledged the need for transparency in research funding to ensure that R&D investment drives prosperity across all UK regions. Transparency in research funding can also help to leverage private investment into the UK.

The government should create a 'digital shop window' for R&D investment that clearly sets out all available funding streams and grants, their purpose and source budgets. In 2017 over half of business R&D expenditure in the UK was by foreign-owned businesses; clear information on the UK's public R&D offer is vital to attract the international researchers, innovators and investors crucial to reaching the 2.4% target.

### 2. Increase the level of quality related funding (QR) by at least 13% to reverse the recent real terms decline.

We welcome the Science Minister's recognition of the crucial role of QR funding and the commitment to deliver a further real-terms increase. QR enables institutions to train the next generation of researchers and entrepreneurs, to fund cutting-edge infrastructure and early-stage, risky or disruptive research. Between 2010 and 2017, QR funding has seen a real terms decline of 13%. In order to appreciably reverse this decline, QR funding needs to increase by at least 13%.

3. **Ensure that the Shared Prosperity Fund (UKSPF) supports the growth of R&D across the UK at a scale at least equivalent to that of the European Structural Investment (ESI) Funds.**

The UK's position as a global science leader can be used to 'level up opportunity across the country'. Evidence shows that using regional growth funding for research and development supports sustainable prosperity in regional economies by enabling local businesses to harness the power of research and innovation, knowledge and infrastructure. The Shared Prosperity Fund (UKSPF) must support this.

**Case Study: The impact of ESI funding**

The Collaborative Technology Access Programme (cTAP) is a technology facility at Lancaster University, part-funded by ESI Funds, that enables businesses to access cutting-edge instrumentation, infrastructure and expertise. Interactions range from simple one-off analysis/consultancy through to fully-funded research partnerships between an industry client and the chemistry department at Lancaster University. Since its establishment in late 2015, the cTAP has facilitated the department's engagement with around 30 SMEs and 20 large companies.

4. **Ensure the balance of investment recognises the importance of curiosity-driven, discovery research as a vital element of a diverse R&D funding landscape.**

Discovery research underpins current and future research and innovation activities, leading to groundbreaking discoveries, new technologies or completely new avenues of research. Private sector R&D investors say they value public investment in discovery research that builds understanding of fundamental scientific principles. Whilst the benefits from this work take time to manifest, they can change our economy, society and the environment. Government plans for delivering the 2.4% target need to recognise the role of discovery research in delivering the cutting-edge ideas that lead to new technologies.

**Case Study: The importance of discovery research**

Discovery research that understood the interactions between molecules linked together into chains, axles and other complex structures led to the eventual development of molecular machines. These tiny machines have the potential to support the development of new materials for batteries or better ways to deliver drugs. In 2016, work on molecular machines was recognised with the Nobel Prize in Chemistry.

5. **Protect university teaching grants for chemistry and related subjects.**

Following a reduction to the recurrent teaching grant for the financial year 2020-21, proposals from the Office for Students suggest that chemistry degrees – like most others – will see a reduction of approximately 6% in funding. The Review of Post-18 Education and Funding noted that the current system, before these reductions, already under-funds high-cost subjects such as the physical sciences. Support for university teaching in these subjects is vital to secure the pipeline of talent to fill the future R&D roles across the country that will help to level regional growth. Additionally, as teaching and research activities are frequently linked, reduction of department budgets risks limiting university R&D activity in the short term. Further review of the post-18 funding system needs to ensure that both teaching and research in chemistry and related subjects are properly funded.

6. **Boost technical science courses in 16-19 education with a sustained funding increase and support for SMEs**

There is a growing skills gap in laboratory technicians in the chemical sciences that will only be compounded by the ageing workforce. Targeted interventions to grow the number of students and apprentices is required if the UK is to be a hub for science and discovery. The government must give targeted support to SMEs to get involved in scientific technical education, including via apprenticeships and work experience. Furthermore, funding for scientific technical education, including T-Levels, must receive a sustained funding uplift to reflect that scientific courses are more expensive to run due to the requirement to maintain laboratories.

## 7. Support subject-specific professional development for science teachers.

Every child should have an unbroken chain of experts teaching them throughout their school education. Current teacher shortages in some subjects, including chemistry, make it unlikely that this aim will be met through increased recruitment alone, so supporting the existing teaching workforce is key. There is a widespread practice of science teachers being deployed outside their specialist science discipline. Furthermore, regional inequalities exist in the system: schools in the most deprived areas are less likely to have science teachers with a qualification relevant to the main science discipline they teach.

Initial Teacher Training (ITT) is just the start of a teacher's journey to become an expert practitioner, and teachers across the UK must be supported to develop and expand their knowledge throughout their careers. This should include:

- a) **Investing in a coherent programme of subject-specific training and development for all teachers, throughout their careers.** It should meet the needs of a broad range of teachers, including those teaching beyond their original area of disciplinary expertise.
- b) **Developing and implementing a system for quality-assuring teachers' CPD and pre-service Subject Knowledge Enhancement courses.** Teachers and school leaders need an efficient way of assessing which pre-ITT and in-service CPD options will be most likely to improve student outcomes.
- c) **Developing a system to collect and record information about teachers' subject-specific expertise.** The tracking of teachers' subject expertise by government, (including that which is gained through in-service CPD) would allow for the planning and coordination of teacher development and recruitment initiatives at a national and local level. We advocate the formation of a digital "badging" system as a standard way for teachers' disciplinary expertise to be recognised and recorded.

### Contact

We would be happy to discuss any of these issues raised in more detail; please contact Phoebe Rountree at [routreep@rsc.org](mailto:routreep@rsc.org)

### About us

With about 50,000 members in 120 countries and a knowledge business that spans the globe, the Royal Society of Chemistry is the UK's professional body for chemical scientists, supporting and representing our members and bringing together chemical scientists from all over the world. Our members include those working in large multinational companies and small to medium enterprises, researchers and students in universities, teachers and regulators.