

Chair, House of Lords Science and Technology Committee
Committee Office
House of Lords
London
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14 June 2019

Dear Lord Patel,

I am writing to respond on behalf of the Royal Society of Chemistry to the inquiry on *science research funding in universities*. This letter sets out relevant points and evidence from our recent submission to the Sir Adrian Smith Review call for evidence into *Future Frameworks for International Collaboration on Research and Innovation*.¹ In our response to the Smith Review, we cite evidence from our Survey (February 2019),² which almost 5800 chemical scientists responded to, our case studies and report on [International Collaborations Create Chemistry](#) (December 2018)³ and our response to the House of Commons Science and Technology Committee inquiry into the *Balance and Effectiveness of Research and Innovation Spending*.⁴

1. Funding for discovery research

Support for discovery (or curiosity-driven or fundamental) research must be sustained. Discovery research is vital as whilst its impacts are often long-term, the history of science demonstrates that it delivers the ground-breaking discoveries that open completely new avenues for research and for innovation.⁵ It is this kind of research, often carried out in universities, which can pave the way for advances that are targeted at addressing societal or grand challenges, like those identified in the government's Industrial Strategy.

In our recent survey, funding for discovery research was identified as one of the most important areas of public R&D funding. It was also seen to be one of the most difficult to replicate within the UK if the UK no longer has access to EU funding.

RSC research, alongside other sources, has found a shift in global research agendas whereby research and innovation is being increasingly called upon to provide solutions to societal challenges and to drive economic growth. However, for research and innovation to achieve these goals, investment in discovery research is essential. A 2015 report by UNESCO into the future of basic science found that *"the focus of scientific discovery has shifted from basic research to 'relevant' or big science, in order to solve pressing developmental challenges, many of which have been identified as SDGs by the United Nations. The irony*

¹ - [Response to Future frameworks for international collaboration on research and innovation: Sir Adrian Smith review](#), Royal Society of Chemistry, May 2019

² - RSC Survey of our chemical sciences community on their views of European framework programmes February 2019.

³ [International Collaborations Create Chemistry](#), Royal Society of Chemistry, October 2018

⁴ - [Response to the House of Commons Science & Technology Select Committee inquiry into the Balance and Effectiveness of Research and Innovation Spending](#), Royal Society of Chemistry, September 2018.

⁵ - [Response to the House of Commons Science & Technology Select Committee inquiry into the Balance and Effectiveness of Research and Innovation Spending](#), Royal Society of Chemistry, September 2018.

is that an adequate investment in both basic sciences and applied R&D will be critical to reaching the goals of Agenda 2030".⁶

In order to meet government goals for developing solutions to Industrial Strategy Grand Challenges, a funding system that includes sustained funding for discovery research is vital. Evidence demonstrates that many of the applications of research find their roots in discovery research. As well as leading to applications that can give rise to new technologies, knowledge gains from fundamental research create societal and economic benefits. Fundamental research into gas phase chemistry at the Universities of Leeds and York has led to better policies and regulations around air pollution in the UK and around the world.⁷ Air pollution can be very damaging to human health: studies estimate that each year it may shorten the lives of 40,000 people in the UK and cost the UK economy more than £20bn.⁸ In 1993, researchers started working with Defra and the Met Office to develop a detailed chemical mechanism to understand the formation of key air pollutants. This 'master chemical mechanism' is now widely considered the gold standard, and has been used to improve air quality policies, legislation and abatement strategies in the UK, Europe, US and Hong Kong.

Our report, *Inspirational Chemistry For a Modern Economy*, provides examples of fundamental research carried out in UK universities that have supported the development of applications that are used globally.⁹ The examples outlined in this report are all based on research that was submitted by institutions as case studies in the Research Excellence Framework exercise in 2014.

2. Quality-related (QR) funding in universities

In our response to the House of Commons Science & Technology committee inquiry into the balance and effectiveness of research and innovation spending, we recommended that QR funding allocated in the Research Excellence Framework (REF) should continue to serve as baseline funding for institutions to invest in infrastructure and fund fundamental or early-stage research. We wrote that:

This funding is highly valued, across our community, for providing stable levels of funding over the period between research assessment exercises in a manner that can be deployed at the discretion of the university. QR funding provides a valuable baseline of support for facilities and research operations, enables long-term planning, and gives universities across the country the opportunity to support emerging research areas and new appointees.

Funding to support the long term health of science delivers results – the panel assessing chemistry submissions to the REF in 2014 stated that the percentage of research outputs receiving the highest possible rating (4) had increased as a result of “the general strengthening and investment in the discipline over recent years”.¹⁰*

3. Role of research in universities in achieving the 2.4% target

As outlined above, discovery research carried out in universities can lead to breakthroughs that deliver solutions to grand challenges. More broadly, an excellent international discovery research base in our universities is an important part of the UK's 'offer' to international partners and investors. Funding from the private sector is an integral part of the government's 2.4% investment target. Characteristics of the research environment in UK universities can attract this inward private investment. These characteristics include our internationally excellent discovery research base, the ability for talented researchers to come and work in the UK with ease and frameworks to support industry-academia collaborations. In addition to this, association to future EU framework programmes is vital. UK participation in EU funding enables research in UK universities to demonstrate its strength on the world stage.

⁶ - [What is the optimal balance between basic and applied research?](#) UNESCO Media Services, February 2017, accessed 14/06/19

⁷ - [Master Chemical Mechanism](#), University of Leeds, National Centre for Atmospheric Chemistry and University of York.

⁸ - [Every breath we take: the lifelong impact of air pollution](#), The Royal College of Physicians & The Royal College of Paediatrics and Child Health working party report, February 2016

⁹ - [Inspirational Chemistry For a Modern Economy](#), Royal Society of Chemistry, June 2015

¹⁰ - [Research Excellence Framework 2014: Overview report by Main Panel B and Sub-panels 7 to 15](#), January 2015

As part of our evidence gathering on the role of EU funding in UK research in universities, Professor Andy Cooper spoke to us about how a combination of UK and EU funding (from the European Research Council) for his work on finding new materials linked to the development of the Materials Innovation Factory in Liverpool:¹¹

The funding Andy's group have attracted has also helped to build a case for major UK government and industry investment in the city of Liverpool itself. In a £81 million partnership with Unilever and the Higher Education Funding Council for England (HEFCE), the University of Liverpool built the Materials Innovation Factory (MIF) in 2016, developing a unique materials chemistry research hub that aims to be a world leader in computer-aided material science. Andy believes the prestigious European funding, as well as grants from the EPSRC and InnovateUK, combined with the local Unilever site at Port Sunlight, built a strong case for investment in the MIF, which has brought hundreds of jobs to the city.

"The ERC has a certain prestige to it and we have had four of these ERC Advanced grants in Liverpool," says Andy. "Large companies such as Unilever, when they are looking to invest in an area, bear these things in mind. There are now 80 Unilever staff that have relocated there from Port Sunlight, we have a Swiss company relocating its office there, Croda has an office there... That's brought jobs into Liverpool and we have some commercialisation activity going on, with spin-out companies being created. This fundamental ERC funding was quite central to this investment and the knock on effects are considerable. These things are linked and that's an important message to the government."

The UK's success in winning funding for discovery research from successive EU framework programmes is well established. However, the access to networks and leading researchers across the world that EU funding brings is a vital driver for UK competitiveness in the global research and innovation landscape. As another researcher, Professor Peter Coveney told us:

"The metaphor I have used here before is that I may be happy playing in the English Premier League but really, I want to be part of the UEFA Champion's League. We need to be able to work alongside the best."

The UK must also enable the best researchers to live and work in the UK to attract investment and meet the 2.4% investment target. Universities represent a rich pool of research talent that can diffuse to other parts of the UK economy to support innovation and growth. The CEO of the SME, Econic, Dr Rowena Sellens told us:

"We currently have 30 employees from across the EU and the wider world and there is very much a diverse mix of male and female. I think, like many specialist companies, you look for people that have relevant experience in the types of tech you are doing and our employees have been working in [research] groups inside and outside the UK on particularly strong research that just made them good candidates."

I sincerely hope that these points will prove useful to the committee. If you require anything further, please do not hesitate to contact me.

Yours sincerely,

Mindy Dulai

Senior Policy Advisor, Research Landscape, Royal Society of Chemistry

¹¹ - [International Collaborations Create Chemistry](#), Royal Society of Chemistry, October 2018