THE ROYAL SOCIETY

13 October 2023

Royal Society representations to the Autumn Statement (2023)

The Royal Society is the UK's national academy of science. Our fundamental purpose is to recognise, promote, and support excellence in science and to encourage the development and use of science for the benefit of humanity.

Key policy recommendations:

- The UK should lead the G7 on R&D investment as a percentage of GDP and seek to be among the top science nations globally.
- Spending should be supported by a long-term strategy for science which considers the system as a whole, over cycles of a minimum ten years, providing the stability needed by researchers, innovators and investors.
- This year's Horizon Europe underspend should be ringfenced to enable talented researchers to pursue groundbreaking ideas and discoveries.
- Upfront visa costs for researchers should be reduced in line with other leading science nations.
- An evidence-led net zero technology roadmap should be produced to guide investment to fledgling sectors and technologies.
- The Government should kick-start the construction of large-scale hydrogen storage facilities if it is to meet its net zero commitments.
- An alternative to A-Levels, including the study of maths to 18, should be pursued, but these plans must be supported by more funding for Core Maths in all schools and expanded provision of teacher CPD.

Introduction

UK science produces enormous value for society. We led the world in developing an effective Covid-19 vaccine, building on a strong base in biological science that had been cultivated over decades. British physicists pioneered radar during the Second World War to protect the country from attack. From the steam engine to machine learning, science has fuelled the creation of countless jobs and turbocharged our economy in every part of the country.

We now face a raft of massive generational challenges including an ageing population, climate change, biodiversity loss and the rapid advance of technology. If the UK is to continue to flourish, we need a high-functioning science system the brings the knowledge, capacity and skills to adapt and respond to these challenges. This cannot be created on the fly, and the necessary long-term investment decisions must be put in place now to ensure that science and technology can deliver the advances that underpin a more secure, prosperous and resilient future.

An R&D landscape fit for the future

The Society supports the sustained increase in government R&D spending to £20 billion per year by 2024/25, as confirmed by the Chancellor in last year's Autumn Statement.

However, our ability to pursue the technologies and innovations which underpin future prosperity and resilience is greatly hampered by the prevalence of short-termism and stop-start investment in science.

Providing long-term stability is not just valued by researchers, innovators and the investors the UK is seeking to attract, but also necessary as we face some of the biggest global-scale challenges humanity has ever seen.

- *The Government should implement a long-term strategy for science which takes a long view of the UK's research and innovation priorities and opportunities – at least 10 years ahead with a regular review cycle – and consider the system as a whole.*

The UK is not alone is seeking to grow its domestic R&D capabilities. China, for example, is increasing its R&D spend by 7% every year until 2026, while the USA has committed an additional $250 billion to core science and technology budgets. France meanwhile is trebling the budget of its National Research Agency.

- *The UK should lead the G7 on R&D investment as a percentage of GDP and aim to be among the top science nations globally.*

The UK's success as a leading science nation depends on being open to the rest of the world, and we strongly welcome the UK's association to the European research programmes, Horizon Europe and Copernicus.

- *This year's Horizon Europe underspend should be ringfenced to enable talented researchers to pursue groundbreaking ideas and discoveries.*

Now, urgent action is needed to remove further barriers to international collaboration and to ensure we are an attractive destination for the world's best and brightest.

Researchers who want to bring their skills to the UK face upfront visa costs up to ten times higher than the average fees of other leading science nations, with fees set to rise even further next year - the proposed increase in fees means that the Global Talent Visa will have an upfront applicant cost of £5,891. The upfront cost for an applicant to bring a family of four to the UK will be close to £21,000.

This amounts to a punitive tax on talent for UK business and public/non-profit research organisations, which undermines our ability to attract the best international researchers and innovators to the UK.

- *To show the UK is open for business, upfront work and study visa costs for researchers should be reduced in line with other leading science nations.*

Scaling up net zero delivery

The Society calls on the Government to work with the research and innovation sector to fully deliver the recommendations made by Chris Skidmore's independent review of net zero. Not only do the benefits of delivering net zero outweigh the costs of inaction, this could also be the 'economic opportunity of the 21st Century'. A wealth of subsidiary benefits and considerations will be created, including protecting biodiversity and enhancing wider natural capital.

- *To do this, Government should immediately bring forward an evidence-led UK technology roadmap to accelerate the rate of decarbonisation and guide investment to fledgling sectors and technologies that will be critical for delivering net zero by 2050.*

The Society has recently published a major report on *Large Scale Electricity Storage (Sept 2023).*
The report concluded that large scale electricity storage is essential to mitigate variations in wind and sunshine, and therefore has a critical role in meeting net zero targets. In particular, enhancing storage capability would guard against long-term variations in the wind, and keep the nation's lights on. Storing most of the surplus as hydrogen, in salt caverns, would be the cheapest way of doing this.

Storage on this scale, which would require up to 90 clusters of 10 caverns, is not possible with batteries or pumped hydro. This level of storage requirement is not currently foreseen by the government.

- *The Government should immediately kick-start the construction of large-scale hydrogen storage facilities if it is to meet its pledge that all electricity will come from low carbon sources by 2035 and reach legally binding net zero targets by 2050.*

Skills for productivity and future career resilience

As the Prime Minister has acknowledged, education is an essential component in unlocking our national potential and driving future productivity, growth and competitiveness. The problem-solvers of tomorrow, working across the UK's

research & innovation landscape on global issues such as net zero, will need a solid foundation in science, maths, digital and data skills necessary for an adaptive economy.

It is the Society's view that students in England currently face an illusion of choice. In theory they are able to choose their own subjects for GCSE and A levels, but in reality, their choices are restricted, and entry requirements into higher education conspire to narrow options for many too early. Students are often making these choices without knowledge of the subjects and importance in future study, training and career opportunities.

- *The Government should continue to pursue an alternative to the current narrow A-level examinations. This would ensure that young people experience a more expansive education equivalent to that experienced by their counterparts in other high-performing economies, including an opportunity to combine technical education and academic options for some.*

The Society welcomes the Prime Minister's plans for students to continue to study mathematics in some form to age 18, and we were pleased to see additional funding allocated in the in the '*World Class Education System' paper (October 2023).*

- *Funding should be increased to ensure that all schools and colleges can offer a Core Maths qualification. This qualification is designed to provide students with the mathematical, statistics and data skills that they will need for further study in most subjects and for future employment.*

Accelerating teacher continuous professional development (CPD) would support a broadening of post-16 education by addressing the very high rate of teacher attrition.

- *The Government should guarantee teachers 35 hours of subject specific CPD annually, along with the establishment of an independent expert body to oversee its coordination and resourcing.*

For more information, please contact public.affairs@royalsociety.org