Science as a guiding light in challenging times:

Royal Society proposals for the 2022-23 parliamentary session

This is a challenging time for the UK and its citizens. Many have experienced deep personal tragedy over the course of the COVID-19 pandemic, and we now face the worst cost of living crisis in a generation.

From infection detection and modelling to the development of lifesaving vaccines and treatments, science has been pivotal in the fight against the pandemic. It must also play a central role in tackling other challenges we now face, whether that's through learning from COVID-19 to better prepare for future pandemics, preventing catastrophic biodiversity loss, or providing solutions to the climate crisis while also strengthening our energy resilience and driving down costs for consumers.

The Government's commitment to boost public investment in R&D over the next five years is welcome and will support progress towards achieving these objectives. However, there are further steps that can be taken over the coming parliamentary session that would maximise this uplift and help tackle our greatest immediate challenges. It is within this context that the Royal Society recommends that the following commitments be included in this year's Queen's Speech:

Meaningfully supporting R&D for the benefit of the UK's economy and society

- **Legislation to enshrine a long-term plan for science that sits outside political cycles.**

Despite the hugely important role science has in our lives and society, science policy has tended to suffer from inconsistency as it is passed from one administration to the next. Short-termism and stop-start investment in science inhibits the UK's ability to pursue ideas, technologies, and innovations that could deliver transformative change over time.

- **Resolve the political impasse to finalise the UK's association to EU research programmes, including Horizon Europe.**

Finalising our Trade & Cooperation Agreement commitment to Horizon Europe association would put an end the ongoing funding uncertainty faced by UK researchers, and open the door to the international collaborations which will underpin further progress in science, technology and innovation.

- **Bring forward plans to reduce visa fees in line with other leading science nations**

The UK is being outcompeted on the upfront costs of work and study visas, which are up to six times higher than the average fees of other leading science nations. This has the potential to discourage talented international researchers - essential to powering our research & innovation ecosystem - from bringing their skills to the UK.

Shaping the knowledge and skills needed for fulfilling future careers

- **Carry out a major and long-overdue review of the secondary and post-16 education systems in England.**

This review will consider the effects that the pandemic, the influence of technology and the consequence of global and environmental challenges on our education system, leading to reform and better educational foundations for young people from all backgrounds.

- **Replace A-level examinations with a broader baccalaureate-style qualification.**

This would ensure that young people in England would experience an education equivalent to their counterparts in other high-performing economies, gaining a broad range of skills valued by employers, and enabling them to continue to study a wider range of subjects.

- **Provide funding to ensure all schools and colleges can offer a Core Maths qualification.**

Core Maths are post-16 qualifications designed to provide students with mathematical, statistics and data skills that they will need for study in most subjects and for future employment. This would help address the substantial unmet need for skilled people from all disciplines to achieve a post-16 qualification in mathematics.

- **Establish an independent expert body responsible for the oversight, dispersal and coordination of funding of science education teacher Continuing Professional Development (CPD). All teachers will be guaranteed 35 hours of subject-specific CPD annually.**

This would help to address the very high rate of science teacher attrition while bringing us in line with other high-performing countries.

Meeting our climate change targets through science, technology and innovation

- **Develop an evidence-based national living technology roadmap to net zero, which is informed by a group of the best independent experts from the science and engineering community.**

Such a roadmap would determine which low-carbon technologies provide the best value for money for the UK taxpayer, unlocking a significant amount of private capital required to decarbonise cost-effectively by providing confidence to business and investors.

- **Use the UK's COP presidency to encourage all countries to create and share their own evidence-based technology roadmap to net zero.**

Nations working together to research, develop and deploy the science and innovation needed to mitigate and adapt to climate change will improve resilience and drive down cost for all.

Treating biodiversity loss with the same urgency as climate change

- **Develop and draw on new approaches to recognising and accounting for the true value of biodiversity, including the Dasgupta Review.**

Despite clear and growing evidence, and despite ambitious global targets, our responses to biodiversity decline at the global and national levels have been woefully insufficient. New approaches to valuing and accounting for biodiversity are required to ensure the integration of the multiple values of biodiversity into decision-making, and to facilitate cross-sectoral solutions that address the biodiversity, climate and other linked crises in a coordinated manner.

Unlock genetic technologies for the benefit of human health and the environment

- **Introduce a regulatory system for genetic modification of new plant varieties and animal breeds that focuses on the outcome rather than the technology.**

Such a system should be flexible enough to evaluate products arising from breeding technologies on a case-by-case basis, and only to trigger more extensive risk assessment if there is a scientifically credible cause for concern that the resulting product might pose significant risk to human health or the environment. It should also be flexible enough to capture any future breeding method, assuming there is no evidence that such methods are inherently risky.

Safely harnessing data science for the benefit of all

o **Establish governance arrangements that enable the safe and rapid use of data to support the achievement of the net zero target.**

Greater access to quality data on emissions and energy use can help drive innovation solutions to the net zero challenge. Wherever possible this data should be made open, while adequately addressing social and ethical dilemmas in data use. Where data cannot be made fully open, appropriate and robust frameworks should be in place, such as data access agreements or data trusts.

o **Bring forward initiatives to help build long term collective resilience against harmful scientific misinformation content.**

Lessons should be learned from the flow of, and response to, harmful scientific misinformation experienced during the pandemic. The challenges of scientific misinformation are unlikely to disappear and will continue to evolve. This will require implementing initiatives which build resilience within platforms and the people who use them.

o **Create cross-society support for the development, adoption, and implementation of privacy enhancing technologies.**

Privacy enhancing technologies can enable the derivation of useful results from data without giving other people access to all of the data. This could enable significantly greater sharing and use of data in a privacy-preserving, trustworthy manner, creating new opportunities to use datasets without creating unacceptable risks. Understanding how best to develop and implement these technologies will be key to safely obtaining their benefits. The Government can play an important role in this by becoming an early adopter, being open about their use so that others can learn from their experience.