

IOP Institute of Physics

The UK Spending Review 2020

On Wednesday 25 November, HM Treasury (HMT) published its [spending review](#) (SR) after undertaking an assessment of public investment.

The process of a SR is part of the UK Government's financial planning cycle. Ordinarily, these reviews dictate departmental spending limits in areas which can be reasonably planned in advance, for between two and four years. However this year, the spending review was shortened from a comprehensive multi-year spending review (CSR) to a financial plan for 2021-22.

This short-termism is a response to the extraordinary challenges the nation faces. The spending review comes at a momentous time; our researchers and scientists continue to fight against the COVID-19 pandemic and society faces uncertainty and economic disruption from both the virus and the upcoming end of the UK-EU Transition Period. To quote the Chancellor, "The economic emergency is only just beginning", and the nation will feel the impact for years to come, with GDP forecasted to be 3% smaller than predictions in five years' time.

What does this mean for physics and the IOP?

The physics and innovation sector is crucial for the nation's prosperity; research and development (R&D) has saved and supported lives and livelihoods throughout the COVID-19 pandemic, from vaccine development to the shift to digital technology.

The IOP [submitted](#) evidence to the spending review on behalf of the physics community in September; the Institute now welcomes the implementation of many of its recommendations and will work to influence the multi-year spending review in 2021, to push to secure the UK as a nation which supports a thriving physics sector. Responding to the spending review, IOP chief executive Professor Paul Hardaker said:

"Science has led the world through the Covid-19 crisis, and we commend the Government's decision to invest in our discovery, innovation and skills base as it drafts plans for the UK's economic recovery.

"Even while the Government is focused on tackling the short-term economic impacts of the pandemic, this commitment of £14.6bn in research and development (R&D) over the next fiscal year is a strong recognition of the role science – including physics – will play in the levelling-up agenda and improving livelihoods and prosperity over the long term.

"UK physics is already world class and this new investment in physics-based R&D will drive through new innovations for UK PLC that can jump-start the post-Covid recovery. The IOP therefore looks forward to working with the Government to advise on how it can unlock the full economic potential of physics, and ensure the UK remains on track to meet the levels of funding in R&D which the Government set out pre-Covid as necessary for the UK to remain competitive.

"The IOP will continue to work with Government in finding a route to bridge any funding gaps in a way that helps maintain the growth in the UK's high-tech economy."

The key points for UK physics

The budget committed in this review cements, for the short term, the Government's imminent priorities. This statement details the priorities for the physics community in the UK.

1. Responding to COVID-19 and building back stronger

The Government has confirmed the nation's response to the pandemic as its key priority. Its primary aim is to control the virus and support public services, jobs and businesses.

Across the next year it will launch an 'infrastructure revolution', consisting of £100 billion in capital infrastructure and a new **National Infrastructure Strategy**, designed for economic recovery, levelling up, to boost the Union and achieve net zero emissions. The Government has boosted R&D budgets for the health and life sciences, committing £128 million for R&D and vaccines manufacturing.

2. Levelling up

The Government is looking to deliver on its commitments to level up the economy and opportunities in all regions and nations of the UK. It has announced a new **Levelling Up Fund** worth £4 billion for England, delivering £0.8 billion for Scotland, Wales and Northern Ireland. This will invest in local infrastructure and will support economic recovery.

In England, it is a unique opportunity for the sector; it will be open for bids in all regions, and will prioritise bids to drive growth and regeneration in places in need.

3. Research and Development

In a move to put the UK on track to become a 'science super-power', the SR commits **£14.6 billion for R&D in 2021-22**. This resource will support healthcare activities as the nation works to overcome COVID-19, contribute to climate goals and 'build back better' through a green recovery.

Investment in R&D is crucial for the long-term health, wealth and prosperity of the nation. Effective funding for research and innovation will help the UK to be a prosperous and productive society in years to come.

That is why in September when the spending review was scheduled to be a multi-year CSR, the IOP called on the Government to use the review to implement its [R&D Roadmap](#). The IOP compelled the Government to accelerate innovation by increasing public investment in R&D, focus on development to facilitate next generation innovation, and to resource the new high-risk, high-reward funding stream, ARPA.

The IOP applauds the progress made in the SR towards R&D funding targets, **setting the UK on its pathway to invest 2.4% of GDP in R&D by 2027**. HMT has committed this resource to "boost the UK's world-class research base and increase the productivity and international competitiveness of its innovative firms."

Of this investment into R&D, the Government has allocated BEIS £11.1 billion in R&D funding to drive economic growth and 'forge the UK's future as a global scientific superpower'. This settlement will:

- Provide at least £490 million in 2021-22 for Innovate UK core programmes and infrastructure to support ground-breaking technologies and businesses.
- Dedicate £350 million in 2021-22 for UK Research and Innovation to support strategic Government priorities, build new science capability and support the whole research and

innovation ecosystem. This includes the first £50 million towards an £800 million investment by 2024-25 in high risk, high-payoff research.

- Increase support for net zero innovation, including £200 million in 2021-22 for the Net Zero Innovation Portfolio, to develop new decarbonisation solutions and accelerate near-to market low-carbon energy innovations.

The Institute welcomes the Government's substantial investment in science and technology across 2021-22, an investment which will facilitate improvements to the health and wealth of the UK and significantly boost the physics community and the UK's innovation capabilities. The IOP moreover supports the beginning of investment for high-risk, high-reward R&D, and awaits clarification on how projects of this style will be undertaken.

Looking ahead, the Treasury has gone beyond single-year funding commitments to announce a multi-year settlement for the National Academies and UK Research and Innovation's core research budgets. These agencies will grow by more than £400 million on average per year for the next three years.

By 2023-24, the Government announced that it will be investing "£1.4 billion more per year in core funding for its world-leading research base." In these areas of science-led R&D, UK Research and Innovation will open its grant competitions to "the dispersed network of outstanding public sector labs across the country" from next year, allowing participation from the UK's Public Sector Research Establishments (PSREs) and the Catapults in competitively won R&D work. This is a welcome announcement, in line with the recommendations made by the IOP in its submission to the [R&D Roadmap](#).

The resources committed today will shape and benefit our nation in years to come. Thus, as we look ahead to the CSR of 2021 and beyond, the IOP will be asking the Government to continue to deliver on its commitments to science and invest in the sector at a scale which will ensure the nation is on track to achieve the OECD average of investing 2.4% of GDP in R&D by 2027. The IOP will continue to represent its community to advocate for the implementation of the R&D Roadmap, and to ensure physics is effectively supported and exploited to unlock the benefits the sector generates for the society and economy, as set out in the Institute's [strategy](#).

4. International Collaboration

The UK's transition period with the EU ends on 31st December, however no agreement has been made to secure the UK's participation in the EU funding programmes which the UK physical sciences community contributes to and benefits from, nor are provisions and details for a domestic alternative available.

As the end of the transition period with the EU looms, many physicists face the reality of a cliff-edge in funding provisions, the termination of projects, and damage to the relationships they've fostered. These threats risk the integrity and continuity of ongoing and up-and-coming ground breaking innovation.

The Treasury has announced the UK is continuing to negotiate with the European Union to gain membership to Horizon Europe. The IOP has asked the Government to urgently protect the sciences by securing association status of the EU Framework Programme Horizon Europe, or resourcing a domestic alternative which matches, or exceeds, funding which would have been available if the UK were a full member of the Framework Programme as an EU member state. This programme must be

up and running and available to UK science in time, to allow a smooth transition from Horizon 2020 to the programme's successor, to avoid a hiatus in funding.

Responding to the spending review, IOP chief executive Professor Paul Hardaker said:

“While Covid-19 presents a major challenge to all economies around the world, the UK's challenge is compounded by the immediate prospect of an uncertain future outside the EU.

“In the event of no-deal Brexit, the absence of European funding, which has played such an important role in UK science and innovation, will mean that many physics and material science institutions and businesses across the UK face a cliff-edge on 1 January.”

Beyond Horizon Europe, the UK has historically invested and benefitted from internationally collaborative projects such as CERN, the European Centre for Medium-Range Weather Forecasts (ECMWF) and Copernicus observation programme, and the European Extremely Large Telescope (ELT).

However, the UK Space Agency has recently been forced to abandon plans to develop a back-up to GPS satellite navigation, and there have been arguments in some policy quarters in favour of re-joining the EU's Galileo system, much of which was informed, developed and funded by the UK. To avoid similar costly withdrawals and the loss of valuable intellectual property and commercial opportunities, the IOP asked the Government to provide clarity on how it intends to support the UK's capabilities and R&D in these areas.

5. Green Recovery

The Government has made commitments to a green recovery from COVID-19, in order to reach the global goal of reducing greenhouse gas emissions. The SR resources the [Government's Ten Point Plan](#) to tackle climate change, and brings the total investment committed to support a green industrial revolution to **£12 billion**.

Within the Ten Point Plan, the Treasury has provided resources for solutions in a range of emerging areas and crucial physics-based technologies:

- Clean Energy

The SR has announced and resourced over £280 million in 2021-22 for net zero R&D, including an £81 million multi-year commitment for hydrogen heating. It provides more than £1 billion towards the construction of 4 new Carbon Capture and Storage plants by 2030, as well as additional investment into low hydrogen carbon production, offshore wind, and nuclear power. Projects include:

- £160 million to upgrade portside manufacturing capabilities to help build the next generation of offshore wind farms.
- £240 million to support industry to produce low-carbon hydrogen at scale and over £80 million to test its use in heating buildings
- Up to £525 million towards the development of a large-scale nuclear project, and advanced nuclear technologies, including novel small modular reactors and next generation advanced modular reactors
- £500 million for development and mass-scale production of electric vehicle batteries and support for associated supply chains, notably in manufacturing bases including in the Midlands and North East.

- Transport

As one of the most polluting sectors, the Chancellor has committed £1.9 billion for charging infrastructure and consumer incentives. This includes:

- £950 million to support the rollout of rapid electric vehicle (EV) charging hubs at every service station on England's motorways and major A-roads.
- £90 million to fund local EV charging infrastructure to support the roll out of larger on-street charging schemes and rapid hubs in England.

The IOP applaud the resourcing of the Ten Point Plan. IOP chief executive, Professor Paul Hardaker [said](#):

“The government's ambition and clarity of vision are both timely and commendable.

“[This] investment in the necessary research and innovation, education, skills and training, and its links to the levelling-up agenda, will help to underpin and enable plans for a sustainable future.”

6. Education

The Government has announced that the schools and education budget will increase from £47.6 billion in 2020-21 to **£49.8 billion in 2021-22; an uplift of £2.2 billion**. In light of the significant pressures facing public resources, the IOP welcomes this uplift, in line with the SR in 2019.

This investment will boost the resources and delivery of the school curriculum, making steps towards building a workforce able to adopt and develop next generation innovation, and a society which thrives in the next industrial revolution.

The Government has also announced support for Further Education (FE) and apprenticeships. The Treasury announced £291 million for FE to ensure that core funding for 16 to 19-year-olds is maintained in real terms per learner, committed to £375 million from the National Skills Fund towards delivering opportunities for lifelong learning to support reskilling at any age and career stage, and lastly, promised improvements to the apprenticeship system, committing £2.5 billion for apprenticeships and improvements.

Research has found that around the country, COVID-19 has exacerbated inequalities in education; the Institute for Fiscal Studies (IFS) has [reported](#) that *“the closure of schools to most pupils during lockdown has led not only to a significant loss of learning but also to a widening of existing educational inequalities. Mitigating these effects will be a major challenge facing the school sector over the next few years.”*. A [survey](#) by the National Foundation for Educational Research (NFER) has quantified this, finding that as a result of the lockdown measures in the UK, teachers expect the learning gap between disadvantaged pupils and their peers to widen by 46%.

In light of this, we applaud the Government's commitment of an **additional £1.4 billion in funds for 'catch-up learning'**. The catch-up learning fund announced by the Government will be a vital resource for schools, enabling them to help students catch up on their learning.

Teaching STEM subjects is a vital component for achieving and surpassing the 2.4% target; the students of today are tomorrow's innovators who will invest in, and undertake, R&D. That is why when looking to the future, the IOP will be recommending that in the next CSR, the Government invests in the next generation by resourcing a world-class system of subject-specific continuing professional development (CPD) for teachers, to provide them with the necessary subject knowledge

quickly and efficiently and build a more confident, engaged teaching profession. The IOP believes supporting teachers will boost education outcomes, making progress towards creating a highly skilled and diverse STEM workforce.

As the UK faces economic disruption on a scale not seen for decades, the education of this generation will be vital for driving the UK's economy recovery in the coming years post COVID-19. The IOP will continue to represent the physics education sector to advocate for well-resourced and well-delivered physics for all.