

# Government Response to the House of Lords Science and Technology Committee Report: Scientific Infrastructure

## Introduction

1. The Government thanks the Committee for its report on scientific infrastructure, and for its helpful recommendations. As the report recognises, scientific infrastructure plays a key role in maintaining the UK's reputation for research excellence. Our high quality facilities attract world class researchers, attract investment from around the world, and enable research projects which support the wealth and welfare of the nation.
2. UK research has a strong international reputation for the quality and range of our research facilities. As the committee rightly points out, it is important that this country maintains and builds upon this reputation if we are to keep up in the global race.
3. The Government's ambition is to make the UK the best place in the world to do science and research. This is why HMG are making a long-term commitment to increase science and research capital investment in real terms to £1.1 billion in 2015-16, and then growing in line with inflation each year to 2020-21. This unprecedented settlement for UK science provides the ideal opportunity to build a strategic vision for world-leading science and research infrastructure. David Willetts will be leading a consultation with the research community on long term science and research capital, which will identify strategic UK priorities for building a world-class science and research infrastructure up to the 2020s.
4. Responses to specific conclusions and recommendations are provided below.

## Scientific Infrastructure: Planning and Governance

### Recommendation 1:

***Scientific infrastructure plays a vital role in underpinning the UK's research excellence and its translation into wealth creating outcomes. We recommend well planned, sustained and efficient future investment in scientific infrastructure in order to ensure that UK research is able to remain internationally competitive. It is imperative that a level of stable investment is achieved that keeps the UK at the forefront of science and technology. (paragraph 27)***

5. Government has already implemented this recommendation with the 2013 Spending Review (SR13) providing an unprecedented long-term investment in science and research infrastructure, increasing capital funding to £1.1bn in 2015/16 and rising with inflation each year to 2020/21. This commitment will provide part of the stability our research base needs to thrive.

Recommendation 2:

***Efficient investment in scientific infrastructure requires long-term planning and clear and transparent decision making. We therefore recommend that the BIS Director General for Knowledge and Innovation (DGKI) is charged with the responsibility of producing a long term strategy and underpinning investment plan for scientific infrastructure. This should take a comprehensive view of scientific infrastructure needs across the UK, extending beyond the jurisdiction of the Research Councils, and including the needs of industry. It should set out clear investment priorities for the next ten to fifteen years, based on the budget available, and include an indicative plan for a longer time frame. It should be reviewed and updated at clearly defined intervals. The principle of awarding funding for scientific infrastructure on the basis of independent, expert scientific advice about the UK's relative position and the opportunities and benefits that could accrue must be upheld. (paragraph 28)***

6. It is vitally important to take a strategic approach to funding research infrastructure. This is why the Minister for Universities and Science will be leading a consultation on long term science and research capital to ensure we make the most of Government's unprecedented commitment to long-term capital investment in science and research. He will be advised by the BIS DG for Knowledge and Innovation and the wider scientific community. This consultation will inform the roadmap on long term science capital, which will be central to the Science and Innovation Strategy HMG are publishing at Autumn Statement 2014.

Recommendation 3:

***We recommend that the BIS DGKI establishes a time-limited, ad hoc advisory group. This group should advise on the development of the long term strategy and underpinning investment plan, and on the response to other recommendations contained in this report, The membership of the group might include independent experts, HEFC, PSRE and Research Council Chief Executives, and representatives from industry and business. Independent experts on the advisory group might include, for example, representatives with a strong record in working on scientific infrastructure overseas. Recommendations for membership of the advisory group should be sought from the National Academies. The development of this strategy should include reviewing the Large Facilities Steering Group. The strategy and investment plan***

***should be published within twelve months of the establishment of the advisory group. (paragraph 29)***

7. Government are establishing a Ministerial advisory group on long term strategy and capital investment. This group will advise Ministers on the strategic roadmap for science and research infrastructure, and on the recommendations of the Committee report. In addition, the advisory group will be tasked with advising on the remaining 2015/16 capital budget, taking a strategic approach to where this money should best be invested.
8. The advisory group will be chaired by the BIS Director General for Knowledge and Innovation. Membership of the group will include representatives from the Research Councils, Higher education funding bodies, industry and charities.

### **Not just machines**

#### Recommendation 4:

***There is substantial evidence of a damaging disconnect between capital investment and the funding for operational costs. We recommend that the BIS Director General for Knowledge and Innovation, in the development of the strategy and an underpinning investment plan (paragraph 28), reviews the current situation to determine how capital investment and the funding for operational costs can be tied together in one sustainable package. (paragraph 39)***

9. Government recognises the importance of greater alignment between capital and resource funding. This is why SR13 provided a long term commitment to capital infrastructure by increasing capital funding to £1.1bn in 2015/16, rising with inflation each year to 2020/21. This commitment matches the stability created by the long-established ring fence for resource funding. Similarly, this is why the consultation on long-term science and research infrastructure will, as recommended, seek views on the sustainability of capital investments, including in terms of the underpinning operational costs.

#### Recommendation 5:

***We recommend that the training and other costs, as well as the value of the skilled workforce needed to operate scientific infrastructure, are fully taken into account in developing the strategy and an underpinning investment plan (paragraph 28). To maximise the return on investment, ways to facilitate viable career paths must be found. (paragraph 43)***

10. Government recognises the importance of highly skilled individuals in maintaining the UK's world-class research infrastructure. This is why

training and associated costs will be considered as part of the overall resource requirements for each capital project.

11. Last year's Information Economy Strategy identified digital skills as a high priority. In response, a working group has been established to lead action to ensure the UK has the digital skills it needs to grow. One of its strategic objectives is to develop a stronger pipeline of new tech talent. The Government has already taken action to reform what is taught in schools by developing a new and more rigorous computing curriculum which will be compulsory in September 2014. The strategy also initiated action to improve outcomes from computer science degree courses. A workshop involving business and the higher education sector considered this issue in November 2013 and proposed a number of action areas, including the development of career profiles and better careers information, improving course content through greater business engagement and accreditation and promoting the use of Massive Open Online Courses.
12. In addition to this, the Government's data capability strategy '*Seizing the data opportunity*' published in October 2013 contains a range of actions to develop the UK's skills base in managing, analysing and communicating data. These include a review by Universities UK on how data analytics skills are taught and embedded across different disciplines, and work with partners including e-skills UK and techUK to promote the range of different opportunities and career pathways available in this profession.
13. The Government has also announced plans to reform Apprenticeships so that they become more rigorous and responsive to the needs of employers. Trailblazer groups of employers and professional bodies will be the first to develop new concise Apprenticeship standards for occupations in their sectors. Two of the first Trailblazers, announced in November, are focusing on digital industries and on life sciences & industrial sciences.

Recommendation 6:

***We are concerned that the ability of Public Sector Research Establishments and National Laboratories to deliver national objectives is being eroded by underfunding and a wide variety of funding and governance models. PSREs are often custodians of data, expertise and mid-range facilities. We recommend that BIS Ministers ensure that the funding and governance mechanisms in place effectively protect the public goods generated by these institutions. (paragraph 50)***

14. PSREs have evolved over many decades into a diverse range of institutions with many different relationships with central Government. There is no one approach to how they should be managed. Each individual PSRE is the responsibility of its parent Departments. The Minister for Universities and Science commissioned Manchester Institute of Innovation Research to provide expert advice on the principles that should be considered when PSREs are reviewed. These principles took account of the public goods generated by these institutions and guidance

based on this expert advice has been agreed by Ministers across all departments. It has now been incorporated into the guidance on Triennial Reviews and is publicly available at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/237343/Additional\\_Guidance\\_for\\_Reviews\\_of\\_Public\\_Sector\\_Research\\_Establishments.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/237343/Additional_Guidance_for_Reviews_of_Public_Sector_Research_Establishments.pdf)

Recommendation 7:

***There is evidence of some difficulties in the funding of mid-range scientific infrastructure. The establishment of university consortia and equipment sharing initiatives is a welcome step forward in terms of efficiency savings and improved access to mid-range infrastructure. We recommend that the Research Councils and HEFCE continue to support these initiatives, expand their scope where possible, and work with universities to find effective means for removing barriers and resolving administrative issues. The Research Councils and HEFCE should publish a regular report on progress with these initiatives. We note that such initiatives are also being undertaken in the devolved administrations and we invite the respective Higher Education Funding Councils to take similar steps where appropriate. (paragraph 61)***

15. We welcome the support of the Committee for equipment sharing and the benefits it can bring. A recent report by Professor Luke Georghiou<sup>1</sup> found three main benefits from equipment sharing: it can create concentrations of research activity between universities and within industry; it can increase efficiency by reducing the number of items that need to be purchased and obtaining higher load factors on existing items; and finally it allows capital items too large for a single institution to be purchased.
16. As Professor Georghiou's report noted, universities and the research community are already actively engaged in facilitating equipment sharing. Regional collaborative networks of universities play a key role here, and EPSRC funding has accelerated progress on compiling asset databases with shared registers of research equipment for regional alliances of universities – the N8<sup>2</sup>, M5<sup>3</sup>, SE5<sup>4</sup> and GW4<sup>5</sup> groups of universities. Over 10,000 items of research equipment have been catalogued on asset registers through the work of these cluster groups, providing a significant resource to support both national capital investment planning and business access to publicly funded research facilities.

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<sup>1</sup>[http://www.n8research.org.uk/assets/14137%20N8%20Sharing%20for%20Excellence%20and%20Growth%20Report\\_WEB.pdf](http://www.n8research.org.uk/assets/14137%20N8%20Sharing%20for%20Excellence%20and%20Growth%20Report_WEB.pdf)

<sup>2</sup> The N8 universities are Durham, Lancaster, Leeds, Liverpool, Manchester, Newcastle, Sheffield and York

<sup>3</sup> The M5 universities are Aston, Birmingham, Leicester, Loughborough, Nottingham and Warwick

<sup>4</sup> The SE5 universities are Cambridge, Imperial, Oxford, Southampton and UCL

<sup>5</sup> The GW4 universities are Bath, Bristol, Cardiff and Exeter

17. Collaboration across institutions is particularly evident where institutions are collaborating to purchase state-of-the-art equipment which would be neither affordable nor perhaps fully utilised by one institution alone. For example, the N8 universities all benefit from a shared £3.25m world-leading high performance computing facility, giving scientists access to larger and higher specification machines than would otherwise be possible. Clusters like this allow universities to make the most of their assets in order to remain at the leading edge of scientific excellence.
18. The consultation on long-term capital investment for science and research will challenge universities and research communities to do even more in this area. Through an efficiency review led by Professor Sir Ian Diamond Government will look further at how, working together, we can make the most of science capital funding by ensuring researchers have access to state of the art research equipment. In addition, the Ministerial Advisory Group on Science and Research Capital - which has representatives from research councils and HEFCE - will consider how equipment sharing can be further facilitated.

Recommendation 8:

***We recommend that the scientific infrastructure strategy and underpinning investment plan (paragraph 28) take into account local and regional benefits, the importance of national and regional connectivity (real and virtual), and wider facilitation of access for users. (paragraph 64)***

19. The consultation on long-term capital investment in science and research will recognise the important local and regional benefits of scientific infrastructure and will consider accessibility. However, investment decisions will remain on the basis of scientific excellence and national need.

Recommendation 9:

***The DGKI should commission a review of the costs and benefits of hosting European and international infrastructure in the UK and use this as an evidence base for the development of the strategy and an underpinning investment plan (paragraph 28). The investment plan should clearly set out the UK's ambitions, objectives and budget for involvement in European and international projects, and establish procedures and processes to ensure that that the UK can be engaged, proactive and well-coordinated, with a clear external face, within the EU and internationally. (paragraph 76)***

20. Government has already published a review of the existing evidence surrounding benefits of big science infrastructure, which includes

European and international projects<sup>6</sup>. Government will shortly be publishing further research on the benefits of big science.

21. The OECD's Global Science Forum has also considered the topic of research infrastructures, and will shortly be publishing a report of some relevance to the question (albeit not about a facility located in the UK) through a case study of the wider impact of CERN, which is based in Geneva.
22. There is strong UK involvement in European infrastructure planning initiatives such as; the European Strategy Forum on Research Infrastructures (ESFRI), which is chaired by Professor John Womersley, and Science Europe whose President, Professor Paul Boyle, has recently been elected for a second term. This will be important for the developing of future facilities.
23. The consultation on long term science and research capital will consider priorities for European and international capital investment, setting out the UK's ambitions and objectives.

Recommendation 10:

***The strategy and underpinning investment plan for scientific infrastructure (paragraph 28) should include consideration of measures to encourage and facilitate further access to scientific infrastructure for industry. This should include reviewing the charges for access and improving the clarity of communication about charging. Consideration should also be given to how facilities can be encouraged to market infrastructure for external use more proactively. (paragraph 81)***

24. The research community are actively engaged with facilitating greater access for industry. Through their research institutes, Research Councils provide a thriving environment for businesses and industry, in addition to the support that they and HEFCE provide for collaboration between universities and business. Campuses such as Harwell, Oxford and Sci-Tech Daresbury offer access to advanced facilities and scientific services, a culture of collaboration and innovation to support the creation and growth of new businesses, and access to a unique training environment and world-leading expertise. Research clusters have been specifically designed to enable collaboration between Research Council facilities, academia and industry. The Hartree Centre for Computational Science and Engineering, for example, was established to focus on partnerships with business to help deliver the opportunities offered by high performance computing systems. In addition to this, STFC offers a comprehensive package of technical and business support, designed to support industry in accessing research facilities.

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<sup>6</sup> <https://www.gov.uk/government/publications/big-science-and-innovation--2>

25. In addition, the recently launched *RCUK Gateway to Research* is making information about publicly funded research from the seven Research Councils and the Technology Strategy Board (TSB) freely accessible to the public. This Gateway is proving to be a revolutionary tool in connecting businesses, and in particular SMEs, with researchers.
26. Government recognises that often both cutting edge research and industry require access the same high tech facilities to thrive. This is why the consultation on long-term capital investment in science and research will challenge the research community to do even more to facilitate access to industry.

Recommendation 11:

***We congratulate the Government on the launch of their Research Partnership Investment Fund and their commitment to funding until 2016–17. We recommend that the Government take steps to extract maximum value from the scheme. To achieve this, the DGKI, in developing the strategy and an underpinning investment plan (paragraph 28), should review whether the scheme should be made more flexible and whether funding calls need to be open for longer to enable collaborative partnerships to be developed. (paragraph 85)***

27. We welcome the support of the Committee for the Research Partnership Investment Fund (RPIF), and the recognition of its success in leveraging significant private and third sector funding for research in the UK. It has so far ensured that over £1bn, including £300m from the Fund itself, is invested in university research infrastructure through strategic research partnerships between universities, businesses and charities across the UK. As part of the long-term commitment to science capital, the Government has announced that it will provide further allocations for RPIF of £100million per annum for the years 2015-16 and 2016-17 to support major research infrastructure projects in universities and colleges undertaking world-leading research and stimulating university-business collaboration in key industries.
28. The Higher Education Funding Council for England (HEFCE) has reviewed the experience and outcomes from the first two rounds of the Fund, to ensure that the programme continues to deliver highest levels of value for money. In December 2013, HEFCE launched an expression of interest phase for the next round of RPIF<sup>7</sup>. This two phase approach has sought to allow institutions and potential partners longer lead times in order to develop the more complex partnerships which are required by this Fund. Several of the earlier successful projects include a strong SME element. In this call, HEFCE is actively encouraging proposals from a broader range of disciplines and sectors not identified in the previous

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<sup>7</sup> <http://www.hefce.ac.uk/pubs/year/2013/201335/#d.en.85243>

rounds, and also from consortia of higher education institutions where this supports a stronger collaboration with partners.

29. Funding is also available at lower levels than UK RPIF through the HEFCE Catalyst Fund, which is open at all times. It has some broad themes which set scope - spanning research, teaching, KE, national growth and local economic boundaries - but it is largely open to topics that HEIs put forward at any time. Under the Catalyst Fund, HEFCE is particularly interested in cross-cutting proposals which support economic growth, and unlock private sector investment that would otherwise not be available. When assessing value for money, return on investment and contributions from other partners are considered, but no strict proportion or scale of co-investment is mandated. HEFCE will ensure that the Catalyst fund and UK RPIF are fully aligned to provide a seamless range of funding opportunities.

## **Monitoring and evaluation**

### Recommendation 12:

***We recommend that all future funding of large and mid-range scientific infrastructure includes provision for an ongoing monitoring and evaluation mechanism to determine the impact and return on investment and provide an evidence base for future decision making. Monitoring and evaluation processes should be embedded from the point of investment and outcomes should be published and clearly communicated to industry, policy makers and the scientific community. (paragraph 88)***

30. Government recognises the importance of monitoring and evaluation in determining impact and providing an evidence base for future investment decisions. The overall performance of the UK science and research base is evaluated extensively, but the contribution of scientific infrastructure to that is for HEFCE and Research Councils to evaluate. The Ministerial advisory group will consider the portfolio of existing evaluations and whether this evidence base needs to be strengthened.

27 January 2014