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Campaign for Science and Engineering in the UK

Public Funding of UK Science and Engineering: Putting Government Rhetoric to the Test

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The Science Budget (£4.6bn..?)

Government Statement:

"Britain is a world leader in scientific research. And that is vital to our future economic success. That is why I am proposing that we do not cut the cash going to the science budget. It will be protected at £4.6 billion a year."

George Osborne, Chancellor, 20th October, 2010[1]

Has science been protected?

The newly re-defined Science Budget was 'frozen' at £4.6bn. If we use the pre-2010 definition of 'the Science Budget', we see an immediate decline of £200m (or 4.8%) and a total cut of at 12.0% in cash terms over the course of the spending review – even before inflation is taken into account.

Departmental of Health R&D Spending (£1.0bn..?)

Government Statement:

"*The Department of Health will increase spending on health research in real terms.*"

The HM Treasury Spending Review 2010, October 2010

Is health research spending increasing?

Inflation will have to be much lower than seems likely (on average, less that 2.74% - CPI has been 4% or higher for all of 2011) if spending of £1,025m in 2011-12 increasing to £1,089m in 2014-15 is to qualify as a real-terms increase.

Department of Food and Rural Affairs (£210m..?)

Government statement:

"We've been reminding colleagues regularly of the importance of research in their own budgets."

David Willetts MP, Science Minister, October 2010[2]

Have departmental research budgets been protected?

DEFRA has published its projected spending for 2010-11, at £210m, and plans a decline of £43m by 2014-15.[3] Many other departments have not published figures.

In this paper we analyse recent changes in the amount and organisation of public spending on science and engineering and test whether actual spending plans live up to Government rhetoric. CaSE believes that a higher priority needs to be given to science & engineering spending. The Government must develop a long-term investment plan to genuinely secure the future of UK research, and the innovation that such research drives.

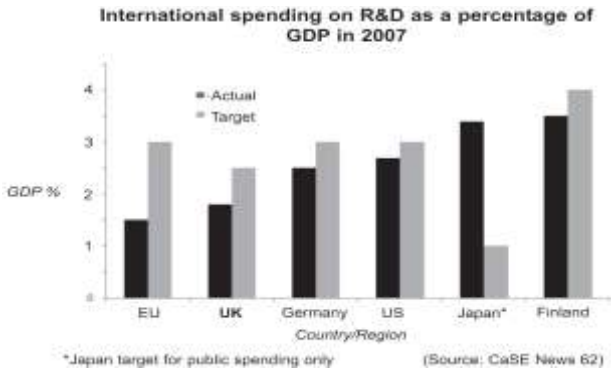
Why spend on science and engineering?

- Investment in science and engineering gives broad and historically proven economic returns over the short- and long-term[4]. Some of these returns can be quantified (e.g., publications, spin-out companies, private investment in R&D, and training the workforce), but others are less easily counted (e.g., benefits to health, security, policy development, quality of life and culture)[5].

- The UK invested £26.5bn in R&D in 2009. 31% of this was direct public investment.

- Public money is needed where private investors are unlikely to spend enough – especially in areas of strategic need, if there are unpredictable outcomes, or if lots of development work is required.[6] The OECD has argued that the importance of public funding for long-term riskier research and research on societal challenges is even greater during a recession[7].

The UK spend on R&D in 2008 was the equivalent of 1.8% of GDP, well below the OECD average (of 2.34%). The UK ranked 16th out of 30 countries, behind nations such as Israel, Finland, Sweden, Japan and Korea (all above 3%), and Iceland, Switzerland, Denmark, the USA, Germany, Austria and Iceland (all above 2.5%).



- The UK will not be able to benefit fully from other countries' R&D spending, including their economic stimulus packages, unless it invests at more appropriate levels[8]; evidence shows that countries with higher R&D intensity gain more from R&D performed overseas[9].

- The EU has a target of 3% GDP to be spent on R&D from all sources by 2020. The previous UK Government set a lower target of 2.5%. The coalition Government has announced that it does not intend to adopt any target for R&D spending[10].

- **These arguments and data show the need for a long-term public spending plan to drive up investment in R&D and bring the UK into line with other competitor and collaborator nations.**

Public Funding of the Research Base

The "research base" is the core of researchers and infrastructure, across the science and engineering disciplines, typically based in universities or research institutes. The UK Government targets investment in the research base to academically excellent work in the following ways[11]:

- Seven **Research Councils** fund research projects, studentships, and national research facilities.
- **Higher Education Funding Councils** distribute research funding depending on a number of factors. Most of this is "quality related" (QR), determined by prior research performance[12].
- **Other Programmes and Academies** fund knowledge transfer (such as the Higher Education Innovation Fund, HEIF), the National Academies (e.g., The Royal Society and Royal Academy of Engineering), science and society programmes, and the Government Office for Science etc.

The part of this spending referred to as the "Science Budget" has been frozen at £4.6bn over the spending review period. However, the areas defined as within the Science Budget changed

considerably from the 2007 Comprehensive Spending Review (CSR07)[13] to the Spending Review 2010 (SR10)[14].The key points are:

- The new Science Budget has been changed to exclude capital spending, but include Higher Education funding council research spending.
- The Science Budget must make efficiency savings of £324 million by 2014-15, but these will be kept within the Budget to be invested in research.
- The new Science Budget, like the old one, will be protected by a ring-fence for the spending review period protecting it from the short-term needs of whatever department is administering it. This enables external investors to plan spending with more confidence that public support will be there.
- An additional investment of £100m for research capital in 2011-12 was announced in the March 2011 budget, which CaSE welcomed. This £100m is included in the following calculations.

Table 1 shows the total Research Base Budget – the total of all spending that was included in the Science Budget as defined by either or both of CSR07 and SR10 (see the appendix for more detail).

- Current plans put the initial spend at £5.7bn with an uneven decline over the spending review period to £5.4bn in 2014-15.
- By 2014-15, £1.6bn less will have been spent than if investment was maintained at 2010-11 levels as defined by the current Government in SR10 (and £1.7bn less will have been spent than if investment was maintained at 2010-11 levels as planned by the previous Government in CSR07).
- While the Science Budget as defined in SR10 is frozen at £4.6bn, if the CSR07 definition of the Science Budget had been retained, there would have been an immediate fall of £200m from £4.1 to £3.9bn (-4.9%) and £2.3bn less spent through this funding by the end of 2014-15.

Table 1. *The Total Research Base Budget of all spending included in the Science Budget as defined by either or both of CSR07 and SR010, and projected Science Budget spends as defined by CSR07 and SR10. Also shown is: the percentage change from2010-11 CSR07 levels for each year of the spending review; the difference between total spending accumulated over the spending review period; and spending which would have occurred had 2010-11 CSR07 levels been maintained. Full data and source details are given in the appendix.*

	CSR07	**SR10**				
Year	2010-11	2010-11	2011-12	2012-13	2013-14	2014-15
Total Research Base Budget (£m)	5,790	5,725	5,510	5,343	5,308	5,399
Cumulative shortfall from 2010-11 CSR07 (£m)	0	65	345	792	1,274	1,665
%change from 2010-11 CSR07	0	-1.1	-4.8	-7.7	-8.3	-6.8
Total Science Budget as defined in SR10 (£m)	4,588	4,575	4,576	4,577	4,577	4,576
Total Science Budget as defined in CSR07 (£m)	4,124	3,924	3,736	3,545	3,523	3,628
Cumulative shortfall from 2010-11 CSR07 (£m)	0	200	588	1,167	1,768	2,264
%change from 2010-11 CSR07	0	-4.9	-9.4	-14.0	-14.6	-12.0

Cash vs. real terms

Inflation will substantially erode the value of the Science Budget in real-terms over the spending review period. Current estimates put the Consumer Price Index (CPI) at 4.4% for April 2011, and 2.5% for the second quarter of next year, before approaching the target of 2%[15]. This would yield a real terms reduction in the value of the 2010's cash settlement of 14% by 2015. However, inflation in science and engineering may be higher still: the US Government uses a Biomedical Research and Development Price Index (BRDPI) to reflect this, and it was more than three times as high as growth in the GDP price index (a broad measure of inflation) in 2010[16]. If costs for research in the UK inflate more rapidly than general costs, the overall impact on the UK's Science Budget by 2014-2015 could be real terms cuts of up to 20%.

Government departmental R&D spending

Government Departments fund strategic work that would not benefit private investors but does benefit society, like securing the evidence-base for policy development, investing in research to develop and evaluate new ideas and to evaluate policies already in place, and some areas of defence and health. The latest available data on departmental spending on R&D for 2008-09 put the total civil departmental spend at £2,171m and the Ministry of Defence spend at £1,991m.

The Sainsbury Review recommended better identification of and protection for departmental R&D budgets[17]. The Government had accepted this recommended, but there has been little progress. We discuss the two biggest spending departments below.

Table 2. *Government departments with largest R&D spends.*

Department, 2008-09	**£m**
Health	783
Innovation & Skills	680
DEFRA	187
International Dev.	149
Transport	60
Total Civil	**2,171**
MOD Development	1,406
MOD Research	584
Total Defence	**1,991**

Ministry of Defence

In November 2010, it was announced that the MOD science and technology budget would increase in cash terms over the course of the Spending Review period[18]. Science and technology typically refers to R&D, but the MOD was using Science and Technology to refer to just a part of the total research element (£584m in 2008-09) of the R&D budget (2.0bn in 2008-09)[19]. There are no publicly available projected figures for the total R&D spend over the coming years.

Department of Health Research Spending

The Department of Health's research budget for 2010-11 was set at £1,025m, with an additional £33m to inform policy-making[20]. SR10 included a pledge for the Department of Health to give a real terms increase in its spending on health research.

The future allocations for R&D are shown in Table 3 (although the actual spend for 2010-11 was £961m)[21]. Inflation will have to be low (on average less that 2.74% - CPI has been 4% or higher for every month of 2011 thus far) for this budget to give a real terms increase from 2011-12 to 2014-15.

Table 3. *Department of Health R&D budget*

Year	**£m**
2010-11	1,025
2011-12	1,004
2012-13	1,030
2013-14	1,059
2014-15	1,089

Further Information

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Appendix

Spending on the research base consists of:

- **Resource near cash -** money available to spend on running costs, salaries, certain subscriptions, etc. It is similar to what we used to call 'resource' or 'recurrent expenditure'.
- **Resource depreciation and impairment** - used in accounting to cover future obligations and things like depreciation (fall in value of capital assets due to wear and tear) and impairment (a change in the value of capital assets due to external changes, like redundant technology). It is similar to what was formerly referred to as 'non-cash', but the non-cash allocation also included cost of capital charges (the cost of raising the money for investment, but not the investment itself).
- **Capital** - money spent on investment in items that will become assets. Buildings, facilities and large pieces of equipment are capital, as are their maintenance costs, but relatively small items of equipment (over £10,000) are also considered to be capital. Research councils can also make capital grants, for example, for the subscription to CERN.

Table A1 shows a detailed attempt to compare all public spending on the research base that was defined to be included in the old or the new Science Budgets. The planned expenditure for 2010-11 from the CSR07 can be contrasted with that laid-out in SR10 and detailed in the Science Budget Allocations 2010[22].

Table A1. *Science Budget and related spending for UK R&D. Sums included in the Science Budget as defined in CSR07 are underlined and those included in the Science Budget as defined in SR10 are in bold, £millions cash terms (note that capital sums for 2012-2015 are indicative).*

	CSR07	SR10				
	2010-11	2010-11	2011-12	2012-13	2013-14	2014-15
Research Councils						
Resource near-cash	**2,682**	**2,549**	**2,596**	**2,574**	**2,587**	**2,600**
Resource non-cash-depreciation & impairment	229	131	178	180	182	180
Capital	346	393	340 [d]	199	181	181
Administration[e]	147	147	142	138	133	126
Other programmes-Academies						
Resource near-cash	**127**	**131**	**112**	**111**	**111**	**111**
Capital (large facilities capital fund)	265	103	115	61	48	128
UK Space Agency						
Resource (near cash)	**~63[a] extra**	**164**	**206**	**192**	**193**	**179**
Capital	(incl. above)	19	19	19	19	19
HEIF (near cash) [b]	**113**	**113**	**113**	**113**	**113**	**113**
Funding council (HEFCE) QR money	**1,603[b]**	**1,618**	**1,549**	**1,587**	**1,573**	**1,573**
HE Research Capital[c]	**215**	357	140	169	168	189
Total Science Budget as defined in CSR07 (underlined)	4,124	3,924	3,736	3,545	3,523	3,628
Total Science Budget as defined under SR10 (bold)	**4,588**	**4,576**	**4,576**	**4,577**	**4,577**	**4,576**
Total Research Base Budget	5,790	5,726	5,510	5,343	5,308	5,399

[a] In April 2010, the UK Space Agency Budget was estimated to be £230m for 2010-11,[23] if it had the same distribution of funding as in 2009-10, £63m would have come from outside the Science Budget[24].

[b] An additional £37m from HEFCE (not QR spending) tops up this funding to £150m.

[c] SRIF and Capital Investment Fund in CSR07; HEI Capital HEFCE and HEI Research in each Nation in SR10.

[d] This includes an additional investment of £100m announced in the March 2011 budget.

[e] This line will decline by 14% over the spending review period – these estimates are based on a linear decline[25].

There have been some other changes in addition to the ones noted in the main text:

- The administrative budget of the research councils (£147m in 2010-11) has been moved out of the Science Budget[26].
- The Science Budget will no longer have to fund £220m for Francis Crick Institute over the spending review period.
- Funding for the UK Space Agency has been consolidated into a specific stream within the Science Budget, where previously it was drawn from within the Science Budget (e.g., STFC, NERC) as well as outside it (e.g., BIS, Met Office), and from the Technology Strategy Board, although some of this will still delivered by the Met Office.

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[1] Spending Review statement The Chancellor of the Exchequer, the Rt Hon George Osborne MP 20 October 2010 http://www.hm-treasury.gov.uk/spend_sr2010_speech.htm

[2] Research avoids UK budget bloodbath, Science Insider

[3] Defra's Evidence Investment Strategy: 2010-2013 and beyond – 2011 update, May 2011 http://www.defra.gov.uk/publications/files/pb13471-eis-110427.pdf

[4] Pre-Budget Briefing – Securing Our Future with Science and Engineering, CaSE, June 2010

[5] Impacts of Investment in the Science & Engineering Research Base, CaSE, September 2009, http://www.sciencecampaign.org.uk/documents/2009/Impacts.pdf

[6] Impacts of Investment in the Science & Engineering Research Base, CaSE, September 2009, http://www.sciencecampaign.org.uk/documents/2009/Impacts.pdf

[7] Policy responses to the economic crisis: Investing for long-term growth. OECD, 2009.

[8] In order benefit from overseas research, nations needs to build their own researchers with comparable and relevant skills and knowledge, creating an 'absorptive capacity' (see reference 7).

[9] R&D and Productivity Growth: Panel Data Analysis of 16 OECD Countries, OECD Science, Technology and Industry Working Papers, 2001

[10] Parliamentary Written Answer 52490, to Chi Onwurah MP, 27/04/2011

[11] 2008-09 Spending data from SET Statistics, 2010, BIS

[12] Most QR money is distributed on the basis of the Research Assessment Exercise (to be replaced by the Research Excellence Framework). One strand of QR money helps to support and incentivise charities to invest in research (which they did with over £1.3bn in 2009) and another stream does the same for business.

[13] The Allocation of the Science Budget 2008/9 to 2010/11, DIUS, 2007 http://webarchive.nationalarchives.gov.uk/+/http://www.dius.gov.uk/reports_and_publications/science_budget

[14] The Allocation of Science and Research Funding 2011/12 to 2014/15, BIS, December 2010 *http://www.bis.gov.uk/assets/biscore/science/docs/a/10-1356-allocation-of-science-and-research-funding-2011-2015*

[15] Office of Budget Responsibility, May 2011, and Bank of England, February 2011 http://www.bankofengland.co.uk/publications/inflationreport/irprobab.htm

[16] *Biomedical Research and Development Price Index, Fiscal Year 2010 Update and Projections for FY 2011-FY 2016*, US Department of Health and Human Services. 2011

[17] The Race to the Top: A Review of Government's Science and Innovation Policies. Lord Sainsbury, October 2007.

[18] Oral answers to Defence questions, 08/11/2010. http://www.publications.parliament.uk/pa/cm201011/cmhansrd/cm101108/debtext/101108-0001.htm#10110810001159

[19] Parliamentary Written Answer 45928, to Robert Ainsworth MP, 15/03/2011

[20] Research funding and priorities, DH website, accessed 17/05/2011 http://www.dh.gov.uk/en/Aboutus/Researchanddevelopment/AtoZ/DH_4069152

[21] Direct communication from DH to CaSE. May 2011.

[22] The Allocation of Science and Research Funding 2011/12 to 2014/15, BIS, December 2010 *http://www.bis.gov.uk/assets/biscore/science/docs/a/10-1356-allocation-of-science-and-research-funding-2011-2015*

[23] Parliamentary Written Answer 324902 to Adam Afriyie MP, 6/4/2010 http://www.parliament.the-stationery-office.co.uk/pa/cm200910/cmhansrd/cm100406/text/100406w0036.htm

[24] UK Space Funding for 2009/10 totalled £313m, of this £130m came from STFC, £70m, came from NERC, and £81m came from TSB, which receives a third of its budget from RCUK. This meant that about 27% of the funding came from outside the Science Budget. UK Space Funding, BIS website, accessed 17/05/2011. http://www.bis.gov.uk/assets/bispartners/ukspaceagency/docs/annual-reports/10-88-uk-in-space-2010

[25] RCUK Delivery Plan 2011/12-2014/15, Excellence, Impact and Efficiency, page 14. http://www.rcuk.ac.uk/documents/documents/RCUK_delivery_plan_2011_15.pdf

[26] Letter to the Chair of the Committee from the Rt Hon David Willetts MP, Minister for Universities and Science, 10 December 2010 http://www.parliament.uk/documents/commons-committees/science-technology/BIS-follow-up-evidence.pdf