

The Science Budget – submission by *Engineering the Future*

Recommendations for the Committee to consider making to Government

1. Regard the Science Budget as an investment, not a cost
2. Rename the Science Budget to reflect the breadth of activity it supports
3. Perform far-reaching analysis of the 'unintended consequences' of funding cuts
4. Continue ringfencing the science budget from other expenditure demands
5. Increase the value of the science budget in real terms to catch up with the 2010-11 level
6. Guarantee annual uplifts by level of inflation or level of closest country competitor, whichever is higher
7. Encourage co-funding with employers and more innovative funding models

1. *Engineering the Future* is an alliance of professional engineering institutions and national organisations that between them represent 450,000 professional engineers and technicians. Through *Engineering the Future*, the engineering profession speaks with one voice on engineering issues of national and international importance.

Investment, not cost

2. *Engineering the Future* would like to recommend that the Committee highlights the fact that that investment in science results in a net benefit to the country. It is not an empty 'cost' which drains reserves and reduces resources. Rather, it results in tremendous positive impacts across the economy.
3. The BIS research paper, *International Comparative Performance of the UK Research Base – 2013*, found that the UK's research base as a whole puts it well ahead of its global rivals in terms of relative numbers of citations and patents.¹
4. However, this same publication noted the impact of the 'flat cash' settlement for research in science which started in 2010, finding that the UK was publishing proportionally fewer articles in the environmental, biological and physical sciences compared to a decade previously. In the same decade, China, Japan and Russia had boosted publication of their scientific research. We have no reason to believe this has changed since the start of 2014.
5. As a result, the UK is in danger of losing its place in the global research market, with the following likely consequences:
 - Slow access to new technology and innovation. Those countries which are in 'on the ground floor' of technical research are able to capitalise on it more quickly.
 - Increased cost of exploiting technology developed elsewhere. Where innovation is held by a particular country, they are able to control access to it, and charge those who wish to exploit it. Where the innovation is as a result of public funding, the country itself benefits directly from these charges, and often ploughs some of the cash back in to developing the 'next big thing', creating a virtuous cycle of innovation and research funding.
 - Lower interest from international academics and researchers to come to the UK to undertake their most exciting and remarkable work. These individuals attract others, including extraordinary UK academics, who would otherwise go overseas.
 - Lower interest from international companies seeking host nations for their research and development activities.

Renaming the "Science Budget"

6. Many areas beyond the purest definition of 'science' benefit from the Science and Research Budget. The common abbreviation of the funding to 'Science Budget' limits the narrative and fails to reflect the intensely 'applied' nature of some of the funding outcomes. From

¹ "While the UK represents just 0.9% of global population, 3.2% of R&D expenditure, and 4.1% of researchers, it accounts for 9.5% of downloads, 11.6% of citations and 15.9% of the world's most highly-cited articles. Amongst its comparator countries, the UK has overtaken the US to rank 1st by field-weighted citation impact (an indicator of research quality). Moreover, with just 2.4% of global patent applications, the UK's share of citations from patents (both applications and granted) to journal articles is 10.9%."

PhD research in food production to the UK Space Agency, this funding stream accomplishes much more than just funding scientific research in laboratories. Perhaps the 'Science and Innovation Budget' or 'Science and Technology Budget' would convey this more accurately?

Understanding 'unintended consequences'

7. *Engineering the Future* is keen that the Government understands fully the reach of the benefits from the Science Budget. As mentioned above, if the UK's global position were to suffer, there are many implications for the wider economy. One which is not often discussed is the fact that other countries have different research priorities. If we do not push forward research and investigation in the areas of importance to the UK, there is no guarantee that another country will do so. Other countries are naturally concerned with funding their own national research priorities.
8. Some members of *Engineering the Future* report a cycle of negative cause and effect from the current cash freeze. It had become increasingly difficult to engage with officials as resources have been stretched and reduced in 'real terms'. This means there is less dialogue between officials and organisations, such as professional engineering institutions, about the consequences of policy decisions. Without an improvement in cash investment (see next point), the problem of unintended consequences will only worsen, as fewer officials are forced to implement policy which is not developed with, or understood/ supported by, the wider community.

Increasing the cash value

9. Since 2010, the cash value of the Science Budget has been ringfenced. The price paid was the 'flat cash' levels, meaning that the true value of the Budget has fallen by the rate of inflation over five years (more than 14% if using the Consumer Price Index, 19% if using the Retail Price Index). We therefore urgently need this Budget to be increased to 114-119% of its 2010 rate, if the UK is to return to 2010 levels of influence and effectiveness.
10. In addition, *Engineering the Future* recommends that the Committee considers how competitor countries are investing in science and research. Should the UK not seriously consider matching their growth in investment, particularly if it is above the rate of inflation?

Securing the future

11. Ringfencing of the Science Budget, even at flat cash levels, has been very welcome in terms of providing stability for leveraging additional investment, and for investing in long term research activity. Sustained, rather than 'feast and famine' funding levels increases confidence in potential investors, particularly those overseas. It also reduces the likelihood of the loss of skills and knowledge which occurs during times of funding restrictions, and cannot be quickly regained when funding levels increase.
12. We strongly recommend that the Committee highlights these benefits and urges the Government to continue to safeguard science spending. We also recommend that the Committee seeks all party support for such a safeguard, which would give investors even more confidence to invest long-term.

The role of employers and innovative funding models

13. If the Government wishes to continue to encourage investment in science and technology, it might wish to consider further incentivising science and engineering research carried out in partnership between industry and academic institutions to boost economic and commercial potential. The recent *Dowling Review of Business-University Research Collaborations* concluded that "pump-prime funding would stimulate the development of high quality research collaborations with critical mass and sustainability."
14. Encouraging more joined-up thinking with Industrial Partnerships, InnovateUK, the UK Commission for Employment and Skills, the Department for Education, etc. would also link scientific developments with the required skills pipeline and/or employer support more closely.