

The Right Honourable Philip Hammond MP, Chancellor of the Exchequer
HM Treasury, 1 Horse Guards Road, London SW1A 2HQ

Elizabeth Truss MP, Chief Secretary to the Treasury
HM Treasury, 1 Horse Guards Road, London SW1A 2HQ

The Right Honourable Greg Clark MP, Secretary of State for Business, Energy and Industrial Strategy
Department for Business, Energy & Industrial Strategy, 1 Victoria Street, London SW1H 0ET

Chris Skidmore MP, Minister of State for Universities, Science, Research and Innovation
Department for Business, Energy & Industrial Strategy, 1 Victoria Street, London SW1H 0ET

Andrew Stephenson MP, Parliamentary Under-Secretary of State for Industry & Energy
Department for Business, Energy & Industrial Strategy, 1 Victoria Street, London SW1H 0ET

AIRTO Ltd
c/o National Physical Laboratory
Hampton Road
Teddington
Middlesex
United Kingdom
TW11 0LW

Tel: 020 8943 6600

Thursday 30 May 2019

Dear Ministers,

Re: 2019 Comprehensive Spending Review

As the 2019 Comprehensive Spending Review, CSR, fast approaches, AIRTO is renewing its call for the government to capitalise on the extensive network of innovation assets across the UK to invigorate future economic growth. AIRTO represents the UK's Innovation, Research & Technology (IRT) sector (encompassing Public Sector Research Establishments, PSREs, Catapult Centres and long-established Research & Technology Organisations, RTOs), which employs more than 57,000 highly skilled people and adds an estimated £34Bn of GVA per annum to the economy. By utilising these existing organisations, which are a world-class, asset to their full capacity to play a central part in achieving the government's target of growing research and development (R&D) to 2.4% of GDP, we stand to gain global competitive advantage by improving the scope and productivity of UK industry.

How does R&D benefit our economy and society?

Investment in R&D leads to innovations, including those that can stimulate business and economic growth, improve efficiency for delivery of essential public services and inform the regulations which protect public safety and orderly trading in goods and services. In developed economies a country's scientific and technological capabilities play a central role in its industrial strategy, and are a key part of any plan to enable economies to grow. Countries with a higher level of investment in R&D reap the benefits to their economy, by supporting and attracting R&D intensive high growth industries such as automotive, pharmaceuticals, aerospace, high-value manufacturing, electronics, telecommunications. This, in turn, boosts regional growth, by creating jobs and wealth in local economies.

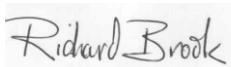
Invest 'smarter' - how can investment in R&D and innovation be better executed to keep pace with competitor nations?

AIRTO has consistently offered support for the UK's Industrial Strategy as a mechanism to stimulate the economy beyond Brexit and we recently issued a position statement pinpointing six critical levers for government to deploy to raise levels of R&D to 2.4% of GDP in the UK by 2027: [Gearing up to 2.4%](#). For the 2019 CSR, we realise that the government has a complex task ahead, requiring difficult decisions and compromises. **We are calling for investment in R&D and innovation to be executed in a much smarter way, to keep pace with competitor nations. We have identified three key recommendations for the 2019 CSR:**

- i). Rebalance the research and applied development mix undertaken in favour of development activity at higher Technology Readiness Levels, TRLs**
- ii). Improve access to private finance for industry to undertake R&D in challenging fields**
- iii). Exploit the export of UK R&D services and knowledge assets by the IRT sector to international markets**

AIRTO is highlighting key policy interventions needed in relation to these three priority areas (see Appendix). We hope this paper is helpful. We would like to arrange a meeting with you to discuss this important topic further, and we look forward to hearing from you in due course.

Yours sincerely,



Professor Richard Brook OBE FREng &
President, AIRTO



Dr Paul Howarth FREng
Chairman, AIRTO
Chief Executive Officer, NNL

Appendix

Discussion paper - recommendations for the 2019 Comprehensive Spending Review

Investment in R&D and innovation: What is it for? Why does it matter? How does it benefit our economy? How can we improve the UK's global performance?

Date:
30 May 2019

Compiled by:
AIRTO - Association of Innovation, Research and Technology Organisations

Contact:
Tel.: +44 (0)20 89436600
Email: enquiries@airto.co.uk



Summary

AIRTO has consulted its members and stakeholders regarding their views on recommendations for the forthcoming Comprehensive Spending Review (CSR). AIRTO advocates that investment in R&D and innovation needs to be executed in a much smarter way, to keep pace with competitor nations! These views have been grouped into three high level recommendations:

- Rebalancing the research and applied development mix undertaken in favour of development, with the resulting increased exploitation of research leading to enhanced prosperity and productivity.
- Improving access to private finance for industry to undertake R&D in challenging fields.
- Exploiting the UK's knowledge assets in the Innovation, Research and Technology (IRT) sector in international markets.

These recommendations have been made in the context of increasing impact and economic benefit to the UK, the government's Industrial Strategy, and the target of increasing the national expenditure on R&D to 2.4% of GDP by 2027. AIRTO welcomes and supports the Industrial Strategy White Paper of November 2017, and was invited to provide input on how the 2.4% target might be achieved. In January 2019, AIRTO published a position paper on '[Gearing up to 2.4%](#)¹', identifying six levers for the government to deploy (*incentives for business R&D, supporting public procurement & services, skills for the future, physical infrastructure for R&D, regulation and international R&D exports*). Clearly, the UK's withdrawal from the European Union will affect the detail of any recommendations put forward during the CSR, and some specific actions cannot be proposed until the exact terms of the withdrawal are known. Nevertheless, dialogue with stakeholders has continued on the topic of the Industrial Strategy and the goal of growing R&D. AIRTO is putting forward a position via this paper on policy interventions as part of the 2019 CSR, motivated by a desire to help the UK to achieve maximum value from growing both public and private investment.

About the Association of Innovation, Research and Technology Organisations

AIRTO is the representative body for the innovation sector in the UK. Its membership comprises sixty of the principle organisations operating in the UK's Innovation, Research and Technology (IRT) Sector. The IRT sector has a combined turnover of £6.9 billion per annum (most of which funding from industry or competitively bid part-funded projects), employing over 57,000 scientific and technical staff. The sector contributes £34 billion to UK GDP per annum². AIRTO's members interface with industry and academia, working for both private and public sector clients. Members include not-for-profit and private sector Research and Technology Organisations (including Catapult Centres), government laboratories and some university enterprise offices. Members are an essential part of the UK's infrastructure for innovation, accelerating research outcomes and the exploitation of new products and services, and training significant numbers of staff at a wide range of educational levels.

Preface - Investment in R&D and innovation:

What is R&D for? Why does it matter?

Innovation - the process by which new technologies are translated into products and services that improve our lives and wellbeing, generate national economic wealth and prosperity and attract foreign investment – is underpinned by scientifically intensive Research & Development (R&D). Competitive nations, like the UK, have flourished since the World War II because they have adopted a purposeful and deliberate industrial strategy, harnessing science and engineering capabilities from universities and their equivalents to our public sector research establishments (PSREs) and research and technology organisations (RTOs). R&D prepares industry and government to deal with and take advantage of future societal and competitive challenges as they develop. Without such preparation the nation would be poorer, dependent on others for essential infrastructure and vulnerable to threats such as climate change, commercial competition and international conflicts. Public and private investment in R&D in the past has put the UK at the forefront of innovation and invention, exemplified by its role in creating technologies that have transformed lives around the world, including telephones, television, antibiotics, railways, jet engines, modern computing and radar. The UK should aspire to continue leading the world in developing new technologies in the 21st century.

How does R&D benefit our economy and society?

Effective and mission-driven national industrial strategies enable governments to organise policy interventions to boost productivity by backing businesses to create good jobs and increase the earning power of people through investment in skills, industries and infrastructure. Investment in R&D is also a tool leading to innovations that can improve the efficiency of delivering essential public services and inform the essential regulations that protect public safety and orderly trading in goods and services.

In advanced, developed economies a country's scientific and technological capabilities play a central role in industrial strategy, and are a key part of any advanced government's plan to enable their economy to grow. In some countries the level of investment in R&D is much higher than the 1.7% of GDP estimated for the UK³. Countries with a higher level of investment in R&D reap the benefits to their economy, by supporting existing and attracting new R&D intensive industries e.g. automotive, pharmaceuticals, aerospace, high-value manufacturing, electronics, telecommunications and enabling them to grow. This, in turn, boosts regional growth, by creating jobs and wealth in local economies.

For the UK to become the "go to" place for innovation and R&D on a worldwide stage, the level of R&D needs to increase to at least 2.4% of GDP. This could mean around £80 billion of additional resources (both public and private) being invested in advanced technology in the next decade, helping to transform whole sectors, create new industries, and support innovation across the country (Industrial Strategy White Paper - Building a Britain fit for the future; HM Government, November 2017).

It is upon this premise that AIRTO – the Association of Innovation, Research & Technology Organisations – which represents the UK's Innovation, Research & Technology sector (that contributes £34 Bn GVA to the UK economy per annum), is highlighting key interventions within the context of the 2019 Comprehensive Spending Review which the government could adopt to enhance the way in which R&D spending impacts on the UK economy, skills base and job creation.

Introduction

AIRTO has consulted its members and stakeholders on recommendations for the forthcoming Comprehensive Spending Review. This consultation has been carried out in the context of the Government's Industrial Strategy and its target of increasing the national spend on R&D to 2.4% of GDP by 2027.

AIRTO's members are a crucial part of the UK's IRT sector infrastructure, working with industry, academia and government to exploit the results of research and development to provide economic and societal benefit. Their work includes supporting UK industry, and attracting overseas investment and exporting R&D services to the rest of the world.

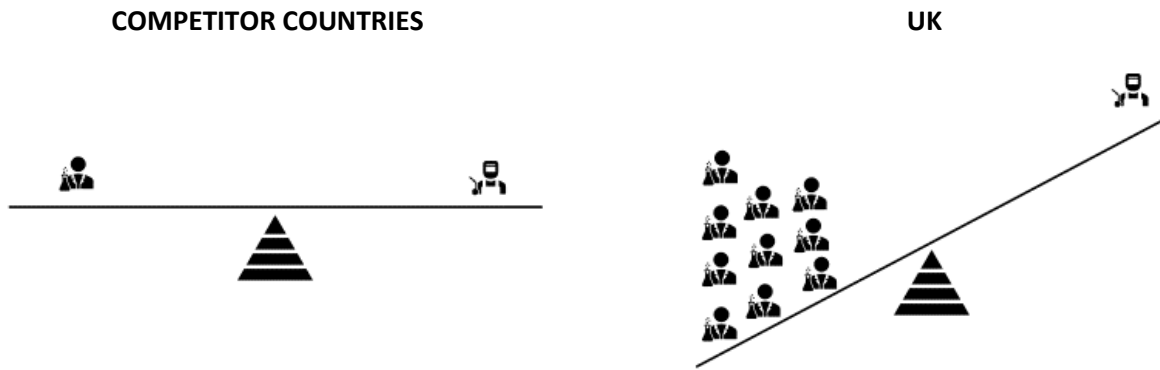
How can we improve the UK's global performance?

The views of AIRTO members and stakeholders have been grouped into three high level recommendations:

Recommendation: i). Rebalancing the Research and Applied Development mix undertaken in favour of higher Technology Readiness Level (TRL) development activity

The UK has a strong academic base, with world-class universities and fundamental research programmes. A substantial level of public funding for these programmes is provided via the Research Councils, which are now part of UK Research and Innovation, UKRI.

However, when compared to rival countries, the UK has been investing a much lower level of public funding in applied R&D i.e. R&D at higher TRLs. This leads to less effective exploitation of the results of the UK's fundamental research, a recognised national failing. Although direct, exact comparisons are difficult to draw, the ratio of fundamental research to applied R&D in the UK's funding from UKRI is estimated to be approximately 10:1, whereas in some other developed economies the equivalent ratio is reported as being up to 1:1, as shown below:



In seeking to see this imbalance addressed, AIRTO would stress that it does not advocate any reduction in the overall funding of fundamental research delivered by UK universities. The knowledge thus generated provides this country with an important, although frequently underexploited, asset and must continue to be supported. Rather, AIRTO would advocate that planned and potential future increases in funding be targeted at boosting applied R&D, and the infrastructure to pull through fundamental research outcomes into widespread adoption and everyday use. In essence, investment in R&D, innovation and its commercialisation needs to be executed in a much smarter way, to keep pace with other nations!

Use of public money in this way will:

- Be a catalyst for increasing industry and other private investment in R&D, which will be essential if the 2.4% target is to be achieved. Government figures show that £1 of public funding directly results in £1.13 - £1.60 of private funding for R&D³, and the consequential private funding will be substantial higher.
- Increase the exploitation of the knowledge derived from the UK's research activities, leading to widespread improvements in productivity and prosperity.

Key actions to consider, in the context of the CSR, include:

- Increasing collaborative programmes targeting higher TRLs, i.e., applied R&D and innovation.
- More support for scale-up and demonstration projects.
- More support for cross-sectorial applications as well as general, societal challenge-driven programmes.
- Increasing the capacity of the IRT sector to undertake applied R&D to meet industry demand for R&D services, and capitalisation of those parts of the RTO community that do not currently have core public funding, or the ability to raise private financial capital from private shareholders and other private sources. An example of such an organisation is TWI Ltd., based in Cambridgeshire.
- Channeling of funding for industry and the RTO community to commission applied R&D projects from appropriate university departments.

In targeting increased levels of funding for applied R&D and innovation, consideration should be given to whether the current funding programmes are optimal. New approaches could prove more effective particularly for smaller companies trying to exploit innovations on a short time-scale. Any new funding schemes should still fall under the remit of UKRI with its role as the UK's provider of public funding for R&D. AIRTO is willing to work with government/UKRI to design such schemes, and to be a part of their implementation if appropriate. Approaches used by other developed countries will provide a fast-track to designing effective funding schemes.

Recommendation ii: Improving access to private finance for industry to undertake R&D in challenging fields

An increase in industrially funded applied R&D, in parallel to increased public funding, will be essential if the UK is to reach its goal of 2.4% of GDP invested in R&D by 2027. The achievement of the 2.4% will result in improved productivity and prosperity, but only if industry can raise the substantial private finance needed to pull through R&D outcomes to widespread application and everyday use.

For industry to make the investment in R&D and its exploitation, it is essential that organisations (large and small) have both the mechanisms and confidence to access the necessary 'risk finance'.

Industry can encounter significant challenges in securing the finance to carry through the outcomes of R&D and scale it up to widespread, commercial application and/or for societal benefit. This is particularly relevant for businesses working in sectors where large scale finance is traditionally difficult/challenging to obtain, such as in heavily regulated sectors (e.g. in medicine and areas that could impact on public safety), in heavy engineering projects which require high upfront pre-revenue capital investment (e.g. in offshore energy generation), and in infrastructure provision and improvements (e.g. in the energy and transport sectors where modification and short term disruption of widely used services is involved). Funding challenges in the oil and gas sector, for example, have been well-documented⁴, with regard to the relatively conservative approach to financial structuring in comparison to some other capital-intensive sectors. In the space sector, new challenges are being encountered also in connection with licensing and financing of new constellations of orbiting satellites operated from the UK.

Key actions to consider, in the context of the CSR, include:

- Adjusting the R&D tax credit regime:
 - to encourage the declaration on R&D content in public sector and other procurement contracts
 - to ensure that the benefit to the claimant is reinvested in future R&D
 - to better target the relief to encourage collaboration with suppliers, including suppliers of R&D services.
- Extending the applicability of tax relief (EIS, SEIS and similar) to a wider range of financial securities where small early stage investors need to follow through with convertible loans and preferred financial instruments to guard against excessive dilution during scale up of their supported innovations. This would encourage more early stage and R&D investments by individual seed and similar high risk-taking private investors.
- Reviewing the complexity of the UK's regulatory environment to ensure that:
 - it is competitive with what other countries offer
 - it is effective in underpinning foreign direct investment into the UK
 - the work needed to make changes (where advantageous) is undertaken.
- Supporting an increase in capacity to invest in infrastructure by facilitating specialist funds capable of attracting finance from UK and overseas pension funds and similar long-term investors.

Recommendation iii: Exploiting the export of UK R&D services and knowledge assets by the IRT sector to international markets

There is a growing recognition that the UK's IRT organisations form an 'innovation' industrial sector, already attracting significant overseas investment in UK R&D with the potential for this to increase substantially. This is very much in accord with the government's ambition for the UK to be the "go to place" for the world to undertake its R&D. In addition to stimulating foreign investment in UK R&D services, the IRT sector's international reach can also lead to overseas investment in manufacturing facilities and infrastructure in the longer-term. Amongst the AIRTO membership, overseas income is vibrant, with on average a third of their income coming from outside the UK, and two-thirds of this overseas income being derived from non-EU markets². AIRTO members have a significant overseas footprint, which may be able to be further leveraged by other UK based entities as a conduit to building new international trade.

To fully realise this ambition, a more coordinated approach is needed across government, supported by a better informed understanding of the UK's national capabilities and strengths.

Research and marketing actions will be vital, with the involvement of both the Department for Business, Innovation & Skills (BEIS) and the Department for International Trade (DIT).

Key actions to consider, in the context of the CSR, include:

- Mapping of current levels of activity and participants.
- Best practice in working with different countries.
- Exemplars of best practice from other countries selling R&D services to overseas customers.
- Support needed to increase/enhance activities.
- Case studies on why overseas organisations invest in UK R&D.
- Identification of the capabilities and areas of expertise that should be promoted in different countries worldwide, particularly those that will address national and international priorities.

Such actions will lead to the creation of a cohesive plan for both government and the IRT sector to promote the UK's R&D services, innovation and strengths and capabilities worldwide.

This plan should then deliver:

- International influence /soft power diplomacy.
- A stronger innovation base.
- Funding for exporting our expertise and work.
- Inward investment funding UK R&D.

Next steps – continuing refinement of recommendations

AIRTO will continue consulting with members, stakeholders and government bodies and departments to expand specific aspects of its recommendations, and to consider the economic benefits of any interventions proposed by government for the CSR. To share thoughts and ideas, please contact us at enquiries@airto.co.uk.

References

- [1 *Gearing up to 2.4% - Growing the UK's R&D activity to meet the 2.4% GDP target: AIRTO 2019.*](#)
- [2 *The impact of the innovation, research and technology sector on the UK Economy: Oxford Economics 2014.*](#)
- [3 *Investing in Innovation: The Royal Academy of Engineering 2015.*](#)
- [4 *Funding challenges in the oil and gas sector: Ernst & Young, 2014 EYGM Limited.*](#)

Declaration of Interests

AIRTO Ltd is a company limited by guarantee registered in England No 1217006. Registered office address: National Physical Laboratory, Hampton Road, Teddington, Middlesex, TW11 0LW. AIRTO is a not-for-profit organisation funded by membership subscriptions, and managed under contract by NPL Management Ltd. Please note that this paper does not necessarily represent the views of individual member organisations. A full list of AIRTO's current membership can be found at: <http://www.airto.co.uk/about/members/>