Australian Academy of Science

Submission to the National Commission of Audit

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> 'I'm pleased to pledge the incoming Government to continue to support science to the fullest extent possible'[i]
>
> The Prime Minister, the Hon Tony Abbott MP, 31 October 2013

The Academy welcomes the opportunity to provide a submission to the National Commission of Audit. The Commission has been given the task of ensuring 'the Commonwealth government live within its means and begins to pay down debt'[ii]. The only sustainable way to achieve this objective is through innovation-led productivity gains, and by ensuring that Australia is adequately prepared to meet the future challenges. *Strategic support for Australian science and science education is essential to achieving the goals set for the Commission.*

A compelling case for investing in science

Our nation is facing a range of challenges, each of which is a threat to the long-term sustainability of the budget position, and which collectively threaten our quality of life. Australia needs to plan and prepare for these challenges, including dealing with climate change; ensuring food and water security; ensuring that our population is commensurate with our sustainable resources; addressing obesity-associated chronic health problems; preparing for an ageing population; tackling projected skills shortages; and transitioning from traditional manufacturing to new innovative industries.

Failing to plan and adequately respond to challenges such these is the single biggest long-term risk facing Australia.

Governments around the world have recognised that investing in science is essential to increasing resilience, productivity and competitiveness, and is fundamental to ensuring future prosperity. However, Australia is not investing nearly enough in science, and research has started to move backwards, hampered by already planned budget cuts and expiring programs.

The Prime Minister has recently made a compelling case for a strong investment in science:

> *'Our lives today are testimony to the links between scientific research and the industrial applications that have shaped the modern world. It will be the research of our scientists today that will change the lives of millions of people around the world tomorrow'*[iii]
>
> The Prime Minister, The Hon Tony Abbott MP and the Minister for Industry, The Hon Ian Macfarlane, 30 October 2013

Our best hope for creating a strong economy and addressing looming issues is through investing in science and innovation so that we have the tools in place for tomorrow's problems. *Continued strategic support for Australian science is central to any rational vision for Australia's future.*

Threats to the long-term sustainability of the budget

The Commission has been asked to report on the 'long-term sustainability of the budget position'[iv]. Australia's relatively low (and falling) level of investment in research and development (R&D) is a significant threat to the long-term sustainability of the budget. Our future prosperity and ability to meet the challenges of this century are wholly dependent on the creation and use of knowledge through research.

Australia invests just 2.2% of its GDP on R&D, putting us 13th in the OECD and significantly below the OECD average[v]. Despite their far more difficult financial and economic circumstances, our competitors recognise that investment in science is fundamental to their ongoing economic prosperity, growth and wellbeing. Recently, Australia has started to fall backwards, with a $141 million drop in Commonwealth science investment last year[1], and a further reduction of $291 million this year[vi]. The commitment by the Coalition just prior to the election that '*there will be no reduction in research funding*'[vii] is welcome. We urge the Commission to take heed of this commitment, and indeed to find ways to strengthen Australia's investment in research. *We must restore the investment in R&D to strengthen our medium- to long-term budgetary position.*

The Government's role in science

The Commission has stated it is are working on the principle that the '*Government should do for people what they cannot do, or cannot do efficiently, for themselves, but no more'*. In the absence of government investment in research, neither business nor the non-business sector would carry out the amount of research necessary to sustain national well-being and economic growth[viii]. This is not to say that the government needs to undertake all such research, but rather it needs to provide appropriate investment and resources to universities, government and non-government research institutes, and research councils to undertake the research that Australia needs.

Market failures and the lag-time between research and innovation mean that the private sector is unable to undertake all the research required to develop new products and services[ix] and is increasingly dependent on a robust academic research sector.

The Australian Government cannot provide all of the solutions for future issues facing Australia, but it does have a critical role in setting the agenda in terms of ensuring the right balance of research and innovation is being undertaken, and in setting the policy parameters to encourage private sector investment. The Government must show leadership, set expectations and provide a research environment in which our talented scientists can succeed.

Maximising science investment

For the past two years, the Australian Government's investment in science, research and innovation has fallen. It currently stands at approximately $8.6 billion. Whilst the quantum of

[1] Erratum issued on 22/01/14 – This document previously stated that the reduction in spending on science between 2011-12 and 2012-13 would be $335 million, based on estimates in the 2012-13 Science, Research and Innovation budget tables published by the Department of Industry. However this estimated reduction has since been revised and will likely by an overestimate. The most recent Science, Research and Innovation budget tables show that the reduction in science spending between these two years will likely be $140.5 million. The most recent figures are available at: http://innovation.gov.au/AboutUs/Budget/Documents/SRIBudgetTable2013-14.pdf

this investment does need to grow, it is essential that value-for-money be delivered from the current investment. The recently developed *National research investment plan*[x] and the Chief Scientist's STEM Strategy[xi] provide constructive ways in which Australia can harness its investment in science efficiently. The Academy, and other influential bodies such as the Business Council of Australia (2013) [xii], has recommended that the STEM Strategy be adopted to ensure maximum value is gained from Australia's science investment through a whole-of-government strategic approach to science.

Research council funding

In recent years, researchers and their employers have had to convince the Government of the day to maintain funding for the Australian Research Council, and the National Health and Medical Research Council. The research grants and fellowships that these agencies award are highly competitive and are the only funding source available for ground breaking, researcher-led discoveries. They also provide a career path for our most outstanding researchers, and attract international research. The quality of such public investment through these research grants is assured by careful expert assessment and they are only awarded to applications deemed to be of outstanding quality. Limited funding availability results in less than 20 per cent of research applications being funded each year.

The Minister for Education, the Hon Christopher Pyne MP, has recently noted:

> *'The ARC is fundamental to the support of both blue sky and applied research, and its peer reviewed competitive funding schemes are the lifeblood of many of the most significant research endeavours in the country.'*[xiii]
>
> Minister for Education, The Hon Christopher Pyne MP, 14 November 2013

Tremendous efforts have been made over the past four years, through the ARC Future Fellowship scheme, to retain the very best and brightest Australian researchers here in Australia, and to attract back to Australia researchers who have moved overseas. As the Minister for Education notes:

> *'The ARC's Future Fellowships scheme is coveted by researchers throughout Australia as it provides the funding boost that can change the course of a career, and enable them to make a crucial contribution to solving major problems'* [xiv]
>
> Minister for Education, The Hon Christopher Pyne MP, 14 November 2013

The ARC Future Fellowship program is set to expire in 2014, and this will result in a significant reduction in investigator-led research.

The Academy recommends that a review of ARC and NHMRC 'career fellowship schemes' takes place with a view to expanding the number of fellowships and rebalancing the number of fellowships at different career stages (early, mid-career, established). Failing to renew or replace the Future Fellowship program, or any measure that winds back or pauses investment in other areas of investigator-led research, threatens to cause inexorable harm to Australia's research capacity. *The Academy urges the Commission to see the awarding of investigator-led grants and fellowships by ARC and NHMRC as essential investments.*

Research infrastructure

The Commission has been asked to review options to manage expenditure growth, including through reviewing existing policy settings and programs. The Commission should pay careful attention to how major national research infrastructure and major research facilities are funded so that such investments are carefully planned and are able to deliver outstanding research outcomes, as well as improved value-for-money.

The current stop-gap measures put in place by the previous government to fund major national research infrastructure facilities are an inefficient way to fund, plan and undertake research. The Prime Minister has already committed to providing the *'the long-term, stable policies and vision that our nation's scientists and researchers need to excel in their work'*[xv]. This commitment is particularly relevant for planning once-in-a-generation major research infrastructure facilities where *long-term and stable policies* are needed.

Previous long-term schemes have sensibly promoted collaboration and avoided duplication of major research infrastructure, ensuring value for money is delivered. However these funding schemes have now come to an end and major national research infrastructure facilities now sit underutilised, underfunded and their very survival is at risk. It is not cost-effective, or in the public interest, to invest considerable sums of public money in research infrastructure with no ongoing plan on how it is to be sustained and operated. The 2013-14 budget provided 'emergency' funding for major research infrastructure – this was a temporary measure. *The Academy emphasises the urgent need for a long-term sustainable plan to properly operate and maintain Australia's major research facilities, which are fundamental for the national research effort.*

Investing in STEM education and skills

Australia's past inadequate investment in science, technology, engineering and mathematics (STEM) education is having adverse effects, leaving Australia with a workforce with a 'sagging' skills base. The Chief Executive of the Australian Industry Group has recently stated that:

> *'Our relative decline of STEM skills is holding back our national economy and causing real frustration for employers'*[xvi]
>
> Innes Willox, Chief Executive, Australian Industry Group

Australia will not be able to achieve a sustainable budget position if it does not have a workforce with the necessary skills that employers need. Intervention in this area is vital, and as the Business Council of Australia (2013) has recently stated:

> *'We must continue to invest in our people and equip them with technical skills in science, technology, engineering and mathematics (STEM)'*[xvii]
>
> Business Council of Australia (2013)

The Australian Academy of Science has been working to address this workforce deficiency by developing exciting and innovative science education programs - *Primary Connections* and *Science by Doing* – that are fully aligned with the national science curriculum, engage students and improve the quality of science teaching in Australia. These initiatives show how a high-impact low-cost program that delivers real benefits for the nation can be delivered cost-effectively by the Academy with support from government.

The Minister for Education, The Hon Christopher Pyne MP, recently stated the Government would:

> *'maintain funding of two highly successful science education programmes – Primary Connections and Science by Doing – that were threatened with cuts under the previous government.'*[xviii]
>
> Minister for Education, The Hon Christopher Pyne MP, 3 October 2013

Ongoing funding would ensure that these programs can be kept current and accessible to all Australian students.

International science strategy

In 2001 the previous Coalition Government put in place a productive 10-year International Scientific Linkages program that provided strategic support for the international collaborations that invigorate our national research effort. Regrettably this program was allowed to lapse in 2011, and since then international scientific collaboration has only been possible with China and India through two much smaller country specific funds. This has left Australia at a strategic disadvantage, unable to integrate its research activities with the 96% of high-citation research that occurs overseas.

International scientific collaboration is a competitive undertaking. Our scientific capital gives us a competitive advantage in that international scientists, particularly in Asia, want to collaborate with us. However as Australia is unable to respond, other nations are able to take advantage and seize the opportunities and benefits that come from collaboration. Without strategic international engagement Australia will be less competitive on the international stage in 10 years' time, given global research investment trajectories and increasing international competition for collaboration. *The Academy emphasises the urgent need for a long-term plan for international science collaboration.*

The Australian Academy of Science

The Australian Academy of Science is a core component of the science system. By being able to draw on the expertise of its Fellowship, *pro bono*, the Academy is an excellent example of an organisation from where activities can be effectively carried by the not-government sector. The Academy receives only a very small amount of public funding each year but delivers real benefits for the nation. The Academy stands ready to assist the government in undertaking a range of important initiatives in other areas, such as developing additional science education programs, an international science strategy, long-term research infrastructure planning, and investing in our early- and mid-career researchers who are the future drivers of innovation and prosperity in Australia.

[i] Prime Minister, the Hon Tony Abbott MP (2013) Address to prime minister's prizes for science dinner, parliament house. *Speech*, 31 October 2013. Available at: http://www.pm.gov.au/media/2013-10-31/address-prime-ministers-prizes-science-dinner-parliament-house

[ii] National Commission of Audit (2013) *Terms of Reference*. Available at: http://www.ncoa.gov.au/docs/NCA_TERMS_OF_REFERENCE.pdf

[iii] Prime Minister, the Hon Tony Abbott MP and Minister for Industry, the Hon Ian Macfarlane MP (2013) Prime Minister's Prizes for Science Announced. *Media release*, 30 October 2013. Available at: http://www.pm.gov.au/media/2013-10-30/prime-ministers-prizes-science-announced

[iv] National Commission of Audit (2013) *Terms of Reference*. Available at: http://www.ncoa.gov.au/docs/NCA_TERMS_OF_REFERENCE.pdf

[v] OECD (2012) Main Science and Technology Indicators. Available at http://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB

[vi] Senate Economics Legislation Committee (2013) *Estimates*. Available at: http://parlinfo.aph.gov.au/parlInfo/download/committees/estimate/a049f008-88db-4153-b099-842edc075d40/toc_pdf/Economics%20Legislation%20Committee_2013_06_03_1988_Official.pdf;fileType=application%2Fpdf#search=%22committees/estimate/a049f008-88db-4153-b099-842edc075d40/0000%22

[vii] Jamie Briggs MP (2013) Shadow Parliamentary Secretary for Supporting Families Chairman of the Scrutiny of Government Waste Committee. 'Ending more of Labor's waste'. *Media release*, 5/9/13

[viii] DIISRTE (2012) *National Research Investment Plan*. Available at: http://www.innovation.gov.au/research/Pages/NationalResearchInvestmentPlan.aspx

[ix] DIISRTE (2012) *National Research Investment Plan.* Available at: http://www.innovation.gov.au/research/Pages/NationalResearchInvestmentPlan.aspx

[x] DIISRTE (2012) *National Research Investment Plan.* Available at: http://www.innovation.gov.au/research/Pages/NationalResearchInvestmentPlan.aspx

[xi] Office of the Chief Scientist (2013) *Science, Technology, Engineering and the Mathematics in the National Interest: A Strategic Approach*. Available at: http://www.chiefscientist.gov.au/2013/07/science-technology-engineering-and-mathematics-in-the-national-interest-a-strategic-approach/

[xii] Business Council of Australia (2013) *Action Plan for Enduring Prosperity*. Available at: http://bca.com.au/publications/action-plan-for-enduring-prosperity-read-the-plan-and-give-your-feedback

[xiii] Minister for Education, the Hon Christopher Pyne MP (2013) Australian Research Council Amendment Bill 2013 Second reading speech. *Hansard*, 14/11/13, page 12-14 Available at: http://parlinfo.aph.gov.au/parlInfo/genpdf/chamber/hansardr/aec24641-694d-4aba-adb3-c0e00179d7a4/0026/hansard_frag.pdf;fileType=application%2Fpdf

[xiv] Minister for Education, the Hon Christopher Pyne MP (2013) Australian Research Council Amendment Bill 2013 Second reading speech. *Hansard*, 14/11/13, page 12-14 Available at: http://parlinfo.aph.gov.au/parlInfo/genpdf/chamber/hansardr/aec24641-694d-4aba-adb3-c0e00179d7a4/0026/hansard_frag.pdf;fileType=application%2Fpdf

[xv] http://www.biomelbourne.org/news_items/view/553

[xvi] Australian industry Group (2013) *Lifting our Science, Technology, Engineering and Maths (STEM) Skills*. Available at: http://www.aigroup.com.au/policy/reports

[xvii] Business Council of Australia (2013) *Action Plan for Enduring Prosperity.* Available at: http://bca.com.au/publications/action-plan-for-enduring-prosperity-read-the-plan-and-give-your-feedback

[xviii] Minister for Education, the Hon Christopher Pyne MP (2013) *Speech to the National Conference of the Independent Education Union of Australia*. Available at: http://www.pyneonline.com.au/media/speeches-media/speech-to-the-national-conference-of-the-independent-education-union-of-australia-canberra