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Australian Academy of Science

Australian Academy of Science submission on the Productivity Commission's *Five pillars of productivity inquiries*

Stimulating research and development (R&D) is essential for the innovation that leads to productivity growth and improved living standards.

The Productivity Commission's report mentions innovation, ideas generation and new technologies as the feedstock of growth: *"Australia has benefited substantially from a combination of its own innovations and from using and building on others' inventiveness."*[1] *(p.11)*

Yet it does not acknowledge where the capability to innovate and adopt technologies from elsewhere comes from – research.

The Productivity Commission notes that it has chosen not to suggest reforms to the R&D system, given the Strategic Examination of R&D currently underway. We agree that these processes should be aligned. However, overlooking mechanisms to stimulate R&D in Australia in the Productivity Commission's recommendations is a significant missed opportunity to address Australia's productivity slump and lack of economic diversity.

The Academy:

- Urges the Productivity Commission to consider solutions to drive business investment in R&D alongside corporate tax reforms.
- Emphasises that clean energy project approvals must maintain strong standards required for environmental protection.
- Recommends coordination and investment in climate and weather science, and in the high-performance computing and data that underpins the best available climate risk information.
- Does not support the Productivity Commission's recommendation to pause implementation of the mandatory AI guardrails for high-risk settings, and recommends that Australia acts quickly to build sovereign AI capability and support responsible and ethical adoption and development of AI.
- Recommends that the proposed national platform for school lesson planning resources include an enforceable national quality-assurance framework to ensure high-quality, evidence-based resources are provided to teachers.
- Recommends that the Job-Ready Graduates reforms to university fees be scrapped.
- Recommends that Australia adopts a national STEM workforce strategy to create a strong, diverse and mobile STEM workforce to be able to create and adopt productivity-boosting innovations.
- Recommends that the Prevention Framework Advisory Board include scientific expertise in its membership.

Response to *Creating a more dynamic and resilient economy*

Solutions to stimulate investment in R&D should be explored to boost productivity and dynamism

The interim report proposes corporate tax reforms, but *excludes* reform of existing research and development tax incentives. The Academy urges the Productivity Commission to consider system-level solutions to improve Australia's R&D environment. In R&D, there is no "D" without "R"— all the Productivity Commission's ambitions for innovation-based productivity depend on a strong domestic research sector.

[1] Productivity Commission, 2025, "Growth mindset: how to boost Australia's productivity, 5 productivity inquiries", Canberra, July

The Australian Academy of Science proposes a measure to incentivise business investment in R&D, a levy on businesses that would be invested directly into research.

As a percentage of GDP, both government and business investment in R&D in Australia has been declining for over a decade. Business investment is strikingly low at 0.9% of GDP, which is less than half the OECD average and equates to a gap of A$29 billion.[2] On the current trajectory we risk dropping to the bottom of OECD countries within the next five years. This low investment severely limits our nation's ability to build economic resilience, boost productivity and be internationally competitive.

The 2016 Ferris, Finkel and Fraser review, and subsequent studies of the RDTI highlighted its limited ability to target additionality, estimating that between 10 and 20 percent of the total R&D spent would not have taken place in the absence of the program.[3,4] Put differently, *80 to 90 percent of R&D expenditure would have taken place anyway.*

Given the persistent decline in business investment in R&D, the RDTI alone is insufficient to raise and maintain business investment in R&D. The suggestion to simply remove the $150 million RDTI cap is not evidence-based and is unlikely to have a material impact on investment. Fresh policy solutions are needed.

The Australian Academy of Science proposes incentivising large business R&D investment by applying a 0.25% or 0.5% R&D levy to businesses with annual revenue of $100 million or more, with offsets available to those businesses that invest in R&D. The Academy encourages the Productivity Commission to consider our proposal within the broader context of national tax reform, including how an R&D levy would interact with corporate tax rates in Australia.

Depending on the levy rate and R&D discount rate, we estimate that a levy could raise between $2.14 billion and $12.84 billion annually (based on 2021-22 ATO data).

We propose a temporary levy with the revenue raised invested in a Research Future Fund forming part of the uplift needed to maintain national competitiveness. In the absence of this there is no foreseeable government commitment or initiative that addresses declining research investment in Australia.

We suggest the fund be structured to enable distribution of 0.2% of GDP annually (around $3 billion adjusted over time) and that a fund target be set to $75 billion. It would take approximately 10 years for the fund to reach maturity, depending on the levy rate, discount and investment performance.

Our proposal rewards those businesses that invest in R&D, incentivises those that don't, and grows the pool of funds available for investment in research to maintain the wellspring of innovation needed to keep the R&D system healthy and productive.

R&D levies are commonly applied across our economy. For example, the Australian meat and livestock industry applies several levies, primarily on the sale of livestock. These levies fund various activities, including R&D, marketing, and animal health programs. Similarly, the Australian Government applies agricultural levies. For example, levies are used on some grain crops to fund biosecurity and R&D.

A detailed explanation of the proposal, including independent economic analysis and implementation options, is available here.

[2] Analysis by the Australian Academy of Science based on data from the Australian Bureau of Statistics and OECD Main Science and Technology Indicators.
[3] Centre for International Economics, 2016, R&D Tax Incentive Programme Review
[4] Holt, J, Skali, A and Thomson, R. 2021, The additionality of R&D tax policy: Quasi-experimental evidence, Technovation, 107, p 102293, https://doi.org/10.1016/j.technovation.2021.102293

Response to *Investing in cheaper, cleaner energy and the net zero transformation*

Expediting clean energy project approvals must maintain strong standards required for environmental protection

The Academy agrees that reforms to Australia's national environmental protection laws are overdue, and are urgently needed to protect Australia's unique species, ecosystems and biodiversity. The Academy's position on the reforms has been provided to consultations on the Nature Positive legislation.[5,6]

Australia's commitment to achieve net zero by 2050 (or the recently proposed 62-70% reduction) and reduce the impacts of climate change require urgent emissions reduction across the economy. Creating a fit-for-purpose system of approvals that will enable Australia's rapid energy transition is important to achieve this, but it is vital that this does not come at a cost to our environment by weakening environmental law reforms and regulation. The national environmental standards must be clear, unambiguous, measurable and enforceable. Measures to expedite clean energy project approvals must maintain the strong standards required for biodiversity and environmental protection.

Natural capital and just adaptation should be embedded into our economy for Australia's wellbeing

The 5 pillars inquiry overlooks the significance of natural capital in productivity conversations. Natural capital is closely tied to economic prosperity. Nearly half of Australia's GDP (49%) has a moderate to very high direct dependence on ecosystem services.[7] Even sectors with lower dependence on nature rely on it indirectly through value chains and its influence on people's health and wellbeing. The importance of embedding natural capital into our economy and economic monitoring—and accordingly the significance of protecting and restoring our natural environment—should be a fundamental consideration in the Productivity Commission's advice.

Transitioning to clean energy, reducing greenhouse gas emissions and targeting net zero must be inclusive and equitable. Future Earth Australia's National Strategy for Just Adaptation provides frameworks and evidence for delivering just outcomes at reduced government cost while contributing to a happier and healthier society.[8] It prioritises broad, long-term benefit over narrow, short-term gain and emphasises the importance of engaging with traditional knowledge and community interests in negotiating economic trade-offs to deliver net zero and the UN Sustainable Development goals.

Investment in climate and weather science and high-performance computing and data is essential to provide the best available climate risk information

The Academy supports in principle recommendation 3.1 to establish a climate risk information database. Development of such a database must have at its core engagement across research and government entities to ensure that it incorporates the best available information.

Climate risk information is underpinned by research in climate science, weather science and risk. The Academy's Decadal Plan for Australian Earth system science 2024–2033 identifies knowledge gaps and needs, including coordination of national research capability in climate and weather science, and long-term investment in the high-performance computing and data infrastructure needed to enable high-resolution climate modelling. Australia's high-performance computing needs are outlined in the section below and elaborated in the Academy's proposal, *Bringing Australia's supercomputing up to speed*.

[5] Australian Academy of Science, 2024, Submission—New National Environmental Laws, 2024
[6] Australian Academy of Science, 2024, Submission—Nature Positive (Environment Protection Australia) Bill 2024 [Provisions] and related bills
[7] Australian Conservation Foundation, 2022, *The nature-based economy: How Australia's prosperity depends on nature*
[8] Future Earth Australia, 2022, *A National Strategy for Just Adaptation*, Australian Academy of Science, Canberra, Australia

Response to *Harnessing data and digital technology*

Policy frameworks are needed to support responsible AI development and adoption – but Australia must act quickly

Australia must advance our national artificial intelligence (AI) capability through significant investment in fundamental AI science and strategically plan for our future high-performance computing and data facilities (HPCD).

The Academy does not support the Productivity Commission's recommendation to pause steps to implement mandatory guardrails for high-risk settings. AI tools and artificially generated content can be misused, including in both scientific and democratic processes. Responsible and appropriate use of AI tools will depend on government leadership, and requires a national strategy guided by evidence and research.

In its submission on the guardrails, the Academy emphasized the need for an economy-wide policy framework to provide necessary consistency across the economy to support Australian AI development. Australia must act quickly to build sovereign AI capability and support responsible and ethical adoption and development of AI. Sovereign capability consists of the ecosystem of AI models, compute power, data infrastructure, research capability, skilled people, security and guardrails needed to enable AI use and development. The lagging response from the government on implementing the AI guardrails and developing a national AI capability plan puts Australia at risk.

AI technologies are advancing at a rate that exceeds the capacity of current policy and legislation to adapt and anticipate. While the recommended urgent gap analysis would be helpful, new or additional risks that AI may pose or create must be considered. The regulatory environment for AI must be flexible and adaptable to respond to future developments.

Australia must plan for and invest in AI capability and high-performance computing infrastructure for AI development

The national AI capability plan must be delivered with an investment strategy that is informed and co-developed with the Australian research community. This plan must include the infrastructure, workforce and scientific knowledge required for Australia to participate in AI research and development.

Investing in national, coordinated advanced computing is a clear opportunity for Australia to boost its productivity. Advanced computing capabilities enable data-intensive applications in research and industry, supporting more reliable climate models, accelerating drug discovery, optimizing healthcare systems and developing AI and quantum technologies. Australia's data and digital economy requires onshore advanced computing power—but Australia currently has no long-term plan to maintain and expand its existing national HPCD infrastructure.[9] Australia must plan for and invest in development of our national computing infrastructure to support AI development and be able to tailor AI tools to Australia's challenges.

Response to *Building a skilled and adaptable workforce*

A new single national resources platform should provide an enforceable, national quality-assurance framework for lesson planning materials

The Academy has delivered evidence-based teacher-professional learning programs and lesson planning materials for science and mathematics for over thirty-years through its programs *Primary Connections, reSolve:Maths by Inquiry, Science by Doing* and *Science Connections*. The Academy's programs have been extensively independently reviewed and are proven to be effective for teachers with varying levels of training, resources and experience in science and mathematics. Our resources and programs have delivered measurable outcomes supporting a strong foundation in STEM.

[9] Australian Academy of Science, 2025, Bringing Australia's supercomputing up to speed, https://www.science.org.au/files/userfiles/support/documents/bringing-australias-supercomputing-up-to-speed-fact-sheet.pdf

As noted in the interim report, teacher shortages, out-of-field teaching and high workloads place significant stress on educators and schools. The Productivity Commission's recommendations will not address these systemic issues.

The Productivity Commission highlights the range of resources and resource hubs (such as Scootle) already available for teachers, the different approaches by states, and the need for ongoing funding to ensure its currency. The single national resources platform proposed in draft recommendation 1.1 could add value by providing an enforceable national quality-assurance framework for the resources available on the platform to ensure that they are high-quality, evidence-based, curriculum-aligned and meet the needs of pre-service, in-service and out-of-field teachers.

The Academy's long track record in providing evidence-based resources to teachers positions us well to provide advice on the development of a quality-assurance framework.

Australia needs a comprehensive STEM workforce strategy

The current pipeline and study choices of students are not aligned with the needs of our future workforce. As workforce needs evolve, our education pipeline needs to be responsive to these changes.

In terms of tertiary education reform, the Job-ready Graduates scheme should be ended with urgency. Instead of shifting enrolments towards areas of national need, it has created perverse financial incentives, devaluing science degrees and disincentivising universities from offering places in disciplines where Australia faces capability gaps. Alternatives should be explored to strategically align skills and research being developed by universities with Australia's national needs. The Academy reiterates the recommendation in its previous submission for a national STEM workforce strategy to build an adaptable, capable workforce required to develop and implement productivity-boosting innovations and respond to future uncertainty.[10]

The recent Academy report Australian Science, Australia's Future: Science 2035 is the most comprehensive, evidence-based capability analysis of Australia's science system to support our national ambitions, informed by the forces shaping our economy. It identifies the eight science capabilities that will see the greatest increase in demand over the coming decade: agricultural science, artificial intelligence, biotechnology, climate science, data science, epidemiology, geoscience and materials science. The Academy would welcome the opportunity to brief the Productivity Commission on this work.

Response to *Delivering quality care more efficiently*

Expert science advice is a non-negotiable input to Australia's investment in prevention.

If established, the Prevention Framework Advisory Board must have scientific expertise represented in its membership. New prevention opportunities will be identified through science and research, as will robust evidence on the effectiveness of prevention interventions. Without the relevant scientific expertise, opportunities may be missed, or under- or over-valued. For example, the interim report observes that where government agencies have lacked the expertise to interpret epidemiological modelling this may have been a barrier to available and rigorous evidence informing funding decisions.

The Prevention Framework Advisory Board must also have access to mechanisms to draw on additional expertise. As highlighted in the interim report, prevention opportunities are broad, spanning beyond health. This will require a corresponding breadth of expertise to inform decisions.

Improving indoor air quality is an example of a prevention opportunity requiring such a broad range of expertise, including but not limited to, aerosol scientists, atmospheric chemistry scientists, engineers, epidemiologists, environmental and climate change scientists, architects, legal and regulatory experts and occupational health and hygiene specialists.

[10] Australian Academy of Science, 2025, *Australian Academy of Science submission on Australia's Productivity Pitch, Pillar 2: Building a skilled and adaptable workforce*.

There is a robust scientific evidence-base for the negative impacts of poor indoor air quality on human health and wellbeing, and solutions to improve it are available with current technology.[11] Further, recent analysis has demonstrated the potential economic benefits of improved indoor air quality.[12,13,14] The Academy reemphasises our previous recommendation to this consultation for national, coordinated action on managing indoor air quality as a population-level prevention initiative to enhance Australia's productivity.[15]

To discuss or clarify any aspect of this submission, please contact Lauren Sullivan, Manager Policy at science.policy@science.org.au.

[11] Australian Academy of Science, 2025, *Australian Academy of Science submission on Australia's Productivity Pitch, Pillar 4: Delivering quality care more efficiently*

[12] The Safer Air Project, 2024, *Safer shared air - a critical accessibility and inclusion issue*.

[13] Facilities Management Association of New Zealand, 2024, *Time to clear the air: The economic benefits of improving New Zealand's indoor air quality*.

[14] Liu, N. et al. The burden of disease attributable to indoor air pollutants in China from 2000 to 2017. Lancet Planet Health 7, e900–e911 (2023).

[15] Australian Academy of Science, 2025, *Australian Academy of Science submission on Australia's Productivity Pitch, Pillar 4: Delivering quality care more efficiently*