Strategic examination of R&D

CPD Submission

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Introduction

Around the world, there is deep uncertainty around major trends reshaping economies, from the risks of increasing artificial intelligence to the implications of a changing climate. At the same time, Australia is grappling with a narrow industrial base and an export mix that is heavily exposed to declining demand as other countries reduce their emissions. Although investments in R&D could serve to underpin the start of the innovation process and the development of new industries, Australia's R&D and innovation system is currently less active (compared to GDP) than most OECD countries. All of this means that Australia is ill prepared to develop the industries needed to underpin a prosperous future where our exports will be very different than they are today.

Our submission responds to the expert panel's discussion paper on R&D by focusing primarily on the role of governments. We stress that Australia's innovation system should be supported by a strong and thriving R&D system that enables federal and state governments to make strategic investments in the development of new industries in priority areas alongside more general research investment. Changes are needed to increase funding for early-stage innovation activities. New mechanisms are needed, for example to support capital recycling to provide a continuous supply of funds for R&D, and to increase demand for innovation through public procurement.

The submission draws on two recent reports from the Centre for Policy Development. The report *Setting direction: a purposeful approach to modern industry policy* lays out a practical framework for Australian governments to use industry policy to invest in a sustainable and prosperous economy. *Ideas to industries: how to get the most out of public money for industrial development* finds that government funding for industry development is generally skewed towards the later stages, which are already comparatively well-financed by private capital markets, than the early stages including R&D.[1]

Our recommendations are as follows:

Q1: What should an integrated, sustainable, dynamic and impactful Australian R&D system look like?

1. As part of a modern industry policy, the Commonwealth Government should identify a small number of priority areas for R&D activities to focus on and formulate objectives in these areas that are specific, measurable and time-bound.
2. The Commonwealth Government should focus on a multi-pronged approach to increasing R&D in Australia, providing direct funding and growing demand for R&D, and coordinating supply chains and capacity building.

Q4: What types of funding sources, models and/or infrastructure are currently missing or should be expanded for Australian R&D?

3. Increase the relative share of financial support for early-stage R&D as compared to later stages of commercial investment.
4. Encourage R&D innovation through government procurement.
5. Make broader use of profit-sharing mechanisms for funding R&D, to increase the potential for funding continuity and ensure a fair return to society for incubating nascent industries.
6. R&D tax credits should be designed to have a material impact on early-stage ventures (e.g. by being transferable).
7. R&D projects should be given assistance to navigate the complex system of government funding opportunities and policy frameworks.

(Q1) What should an integrated, sustainable, dynamic and impactful Australian R&D system look like?

Governments around the world, including in Australia, are increasingly introducing more modern forms of industrial policy, in which governments provide a strategic direction and implement an integrated suite of policies to signal and support industries to move in that direction. These modern forms contrast with the "hands-off" economic philosophy that has dominated discussions on industry policy in recent decades. The laissez-faire approach has assumed the best way to promote industry development is to let private capital markets make decisions around capital allocation without governments supporting specific industries.

Australia is also embarking on a greater level of government-led industry policy through initiatives like the Commonwealth Government's Future Made in Australia and the NSW Industry Policy. Modern, directional, industry policymaking does not replace general sector-agnostic industry and innovation policy but is instead a complement. Australian governments should consider more directional industry policymaking in situations where market failures prevent the most efficient and socially-beneficial industries emerging in the short-term, where the country's long-term comparative advantage does not overlap with the short-term investment horizons of the private sector, and where the government also wants to achieve other policy goals alongside boosting innovation.

A well-developed R&D system would be the first stage along this more directional innovation process. It is difficult to imagine the government spending another 1% of GDP on R&D policy (to get the Australian benchmark in line with the OECD average). Using modern industry policy however can make public investment more purposeful, building ambition and consensus across the economy for investment.

An important question is how to do this effectively. The government's discussion paper outlines the complex and multifaceted nature of this challenge through the proposed framework for R&D on p. 16, and additional discussions about the need to build research capacity and institutional capacity. The paper also outlines the important potential role for missions and national priorities. We view three features as essential for an integrated framework for modern industry policy, which includes R&D: (1) directionality; (2) policy mix diversity; and (3) governance.

Directionality

Governments should set clear directional goals for future industry development to ensure that actors – bureaucrats, investors, researchers, political advisers, small businesses, suppliers etc. – are aligned in their efforts. The goals should be

measurable, have timeframes, and there should be a small number of them. It is unrealistic to direct a whole-of-country effort around any more than four or five. These goals should be backed by a high-level political and fiscal commitment from a central whole-of-government portfolio or leader – e.g. the Prime Minister or Treasury – to ensure the goal is taken seriously and interpreted similarly by different agencies, firms and decision-makers.

R&D should be viewed as a critical, first step towards developing the industries set out in the directional goals. As the discussion paper notes, there have been limited attempts to make Australia's R&D system engage with national needs and public and private organisations that conduct R&D have high degrees of autonomy in deciding where to focus their efforts. Aligning R&D efforts with strategic goals would help create a more streamlined research environment. The discussion paper highlights that jurisdictions that perform highly in R&D funding are more strategically intentional and have national agencies and/or specific strategies to support innovation.

Policy mix diversity

Governments should mobilise a comprehensive set of policy tools for a government-wide approach to support the directional goals. Governments using this framework for policy development should spend time scoping their industrial goals, clearly identifying the binding constraints, and prioritising a diverse policy mix to resolve those constraints. As part of these efforts, they should identify the barriers to R&D investment and where increased funding and support is needed.

Governance

Mobilising broad swathes of the government and the economy in support of a strategic direction requires participation and alignment from many actors. To achieve this, governments should convene ministers or departments to ensure alignment, provide a forum for engagement and leadership from industry, and build institutional capacity. This may best be achieved through some form of overarching governance and coordination mechanism that is spearheaded by a central agency like Treasury with the ability to reach across different portfolios. To support R&D activities, the government should provide a forum for collaboration between researchers, companies, the public sector and civil society to get buy-in from leaders across sectors, build legitimacy and momentum, and distribute funding.

Recommendation 1: As part of a modern industry policy, the Commonwealth Government should identify a small number of priority areas for R&D activities to focus on and formulate objectives in these areas that are specific, measurable and time-bound.

Recommendation 2: The Commonwealth Government should focus on a multi-pronged approach to increasing R&D in Australia, providing direct funding and growing demand for R&D, and coordinating supply chains and capacity building.

(Q2) What government, university and business policy settings inhibit R&D and innovation, why?

We agree broadly with the barriers addressed in the discussion paper. We draw attention to three specific barriers in relation to government investment in R&D: (1) a tendency for government institutions to not want to take risks, (2) the consequent inability for public sector funding to fill the gaps left by the private sector in financing innovation, and (3) the lack of coordination for the many public R&D funding mechanisms.

Governments do not want to be seen as wasting taxpayer money by making risky investments or providing outright subsidies. Government support for R&D projects often requires grants (without a return to the taxpayer), and cannot be guaranteed to succeed. As a result, public spending in Australia currently skews more towards supporting technologies that are already commercially viable or most of the way there. Our own research shows that much of the Commonwealth Government funding to support industry development is for programs that increase financial flows to ventures at a commercial stage (or close to it), including through special investment vehicles (SIVs) such as the Clean Energy Finance Corporation (CEFC) and National Reconstruction Fund (NRF).

The way that these SIVs are set up means that it is difficult for them to support true early-stage R&D. The CEFC and NRF both lend on as close-to-commercial terms as possible. This is reflected in the legislative frameworks guiding the CEFC and NRF. Both have been designed to make a positive return on investment for their general portfolios and their investment mandates require the organisations to take "acceptable but not excessive" levels of risk. The mandates require that the corporations' boards formulate written policies to establish integrated approaches to risk management both for the organisations' investments and for the organisations themselves.

Investment vehicles that make a return are popular for many reasons. First, these types of investment vehicles largely exist "off-budget" and do not impact a government's fiscal surplus or deficit. Because the expenditure comes with a corresponding asset (i.e. the expectation of loan repayment), off-budget expenditures do not add to budget deficits and are less heavily scrutinized in parliamentary processes than "on-budget" measures such as an industry grant program. This makes it easier for politicians to fund off-budget initiatives than if they would need to be accounted for on-budget.

Barrier 1: The Australian government institutions that receive the most funding for industry development are designed to take low levels of risk and pursue profits.

Public sector finance is not currently optimally calibrated to support private sector finance and smooth the path from developing ideas for new technologies to scaling up industries. There is some availability of speculative venture capital to fund very early-stage ventures, and broad availability of commercial scale debt financing, but a "valley of death" between these two extremes creates a gap in the investment pipeline. As the discussion paper notes, Australia's expenditure on R&D as a proportion of GDP consistently falls below the OECD average and Australia's R&D investment is mainly in the very early stages of basic and applied research, rather than in experimental development.

Most private sector institutional investors have fiduciary duties (and, for the case of superannuation companies, legislation) that create incentives for them to focus on maximising short-term risk-adjusted returns – usually defined by investment analysts using volatility metrics like the Sharpe ratio. However, for firms operating in nascent industries, it can be incredibly difficult to assess expected risk-adjusted returns in the first place. Pre-commercial ventures will have low (or no) sales volumes, few trading partners, less process documentation, and less data covering their financial management. All of this makes it hard for investors to assess expected returns and creditworthiness. And even if it were possible to accurately assess expected returns, estimating a risk-adjusted return would require quantifying price volatility in a market that is not yet mature. All of this means that more capital is channelled towards later-stage ventures, and less capital is allocated to genuine R&D.

Governments could play a crucial role in plugging the gaps left by private sector finance. However in Australia, the amount of capital allocated to funds targeting the development of new technologies, including early-stage R&D, is much lower than the amount allocated to initiatives that support scale-up and market adoption. Our research supports the more general findings in the discussion paper and shows that in FY2024, the Commonwealth Government spent $3.18 billion on supporting industry development focused on reducing emissions in Australia.[2] Of this, $1 billion (31%) was spent on programs focusing on technology innovation, such as the Australian Renewable Energy Agency (ARENA) and CSIRO and the Research and Development Tax Incentive. The government spent considerably more ($2.18 billion) on initiatives that support scale-up and market adoption.

Barrier 2: Public sector funding does not currently sufficiently plug the gaps left by private sector financing of new industry development.

Government support for new industries ranges from investments designed to *provide financial assistance and subsidies* for projects to progress through the various stages of technological innovation to those designed to *facilitate increased flows of finance* into various priority sectors. The discussion paper highlights the challenge of government investment in R&D being spread thinly across many broad initiatives. Our research shows that there are many Commonwealth funds that support the early stages of innovation in new industries that address climate change by reducing emissions, and far fewer for the later stages of commercialisation and market adoption. $2.18 billion is concentrated in 11 funds for scaling-up markets, while there is $1 billion dispersed across 24 initiatives for the earlier stages of industry development.[3] For the R&D stage, there are many potential avenues to benefit from public support, however no clear coordination mechanism to assist firms to navigate this system.

Barrier 3: There is no clear coordination mechanism to navigate the many potential avenues for public funding of R&D projects.

(Q4) What types of funding sources, models and/or infrastructure are currently missing or should be expanded for Australian R&D?

Amendments to public sector support for Australian R&D should include both boosting investment activities and smoothing the supply-side through common infrastructure and an increased workforce capable of conducting early-stage innovation.

Boosting investment in R&D

To increase Australia's currently very low levels of R&D, governments should increase their investment in the earliest stages of innovation. Currently, government support of innovation by both federal and state governments skews towards the later stages of new industry development. Commonwealth entities like the CEFC and NRF are not set up with a focus on R&D. The Commonwealth Government could therefore allocate higher levels of funding to entities such as ARENA or the Industry Growth Program, which already focus on technology innovation, and ensure these entities also fund R&D or are well-integrated with other R&D funding mechanisms. This would rebalance the allocation of capital so that there is more funding going towards early innovation activities. Governments can provide funding to public organisations, universities and research institutes for research that contributes to R&D activities linked to industrial development priorities.

Recommendation 3: Increase the relative share of financial support for early-stage R&D as compared to later stages of commercial investment.

The discussion paper notes that much of the R&D in Australia does not address the needs of industry, government, and the community (the users of research). Government procurement can be a particularly useful way to encourage early-stage research and innovation that addresses consumer needs. As the discussion paper states, the US Small Business Innovation Research Program enables small businesses to creatively solve issues and challenges that government departments are experiencing. A similar program was run in NSW in 2021, with the NSW Government now having invested in the Circular Innovation Fund initiative to support research into new technologies and uses for recycled materials in government projects.

There are also other examples for how governments can use procurement to support innovation. Governments could encourage potential suppliers to work with universities and Cooperative Research Centres (CRCs) on certain issues, such as engaging the CRC Smartcrete when it comes to decarbonising cement or the Digital Health CRC on digital health projects.

Increased funding for R&D could assist government departments to make changes to their procurement practices. For example, funds could be provided to infrastructure departments to enable them to work with universities to test new ideas around low-carbon projects or different ways to surface roads. Alternatively, government tender processes could allow suppliers to seek additional top-up innovation funding to support new products or approaches.

Recommendation 4: Encourage R&D innovation through government procurement.

Currently, the public sector provides much of its capital to support R&D through grant funding. However, this can be very costly and allocated funds can quickly run dry. Australian governments should therefore implement a broader range of mechanisms to recoup some of the potential financial gains from their investments in R&D to enable profit-sharing and capital recycling. This would help reduce the fiscal costs of supporting early innovation, and it would partially address arguments that governments are better off investing in off-budget commercial stage lending. It would also ensure that society can benefit from the public sector investments in innovation.

Governments could implement various options for recycling capital spent on R&D. Conditions could accompany government-financial support, for example, conditionally repayable grants could require companies to pay back (part of) the money if the company hits a certain profit or sales threshold, goes public, or is bought out by a large company. More of the funding could be provided through equity investment, to allow governments to capture the benefits of high-return investments.

Examples exist from other countries of government programs that recoup a financial return from industry in exchange for public sector investment in R&D. Israel provides grants for R&D projects of Israeli companies, with an expectation that the grant will be repaid via royalty payments if the project is commercially successful. New Zealand's Deep Tech Incubators program channels funds towards large R&D projects in advanced scientific and engineering technologies. Firms receive a minimum of NZ$1 million in grants and must make repayments when they start generating revenue, regardless of how long it takes to repay the grant.

Recommendation 5: Make broader use of profit-sharing mechanisms for funding R&D, to increase the potential for funding continuity and ensure a fair return to society for incubating nascent industries.

The largest program for supporting technology innovation is the Research and Development Tax Incentive, which has provided $32.95 billion in tax concessions since 2011 to companies that engage in R&D activities.[4] An issue with this type of funding is that companies that conduct R&D

innovation do not always pay sufficient taxes to fully benefit from such a policy. Partially to address this, the US made it possible for tax credits received through the Inflation Reduction Act to be transferred – creating a secondary market where large companies would buy the tax credits from start-ups with minimal tax exposure. The Commonwealth Government should establish similar arrangements for R&D tax credits to ensure that its policies can impact the economic viability of start-ups and SMEs involved in early-stage innovation.

Recommendation 6: R&D tax credits should be designed to have a material impact on early-stage ventures (e.g. by being transferable).

Supply-side coordination:

Alongside funding R&D activities directly (or in conjunction with the private sector), governments should also focus their efforts on coordinating the supply side to create an enabling environment for early-stage innovation. There is a need to support education and training initiatives to grow the capacity of the Australian population to undertake R&D, as well as for skilled migration streams to attract and retain the best talent around the world in Australia for early-stage innovation in key industries. The need for efforts in workforce and culture is noted in the discussion paper, which highlights the lack of collaboration and research translation between academia and industry as well as the need to build a more diverse research workforce. There is also a need for greater investment in enabling technology and common infrastructure for R&D, with government support for key enablers including digital systems and major research facilities helping with many early innovation projects concurrently.

One key enabler would be a coordinating mechanism to inform R&D project proponents of the various types of funding and advisory opportunities available to them and how they can navigate different regulatory processes. This would assist start-ups bring their ideas to market, which the discussion paper highlights as an important pathway for generating new ideas. Common across all types of innovation projects is that there are several parallel pathways to navigate for proponents to engage with government, many regulatory processes that may differ at the Commonwealth versus state/territory government level, and that projects would likely benefit from access to public sector funding. However, initiatives like the Commonwealth Treasury's "front door" mechanism in Future Made in Australia focus only on "major, transformational projects". It is likely that many R&D activities would not be at a scale to attract support from such facilities.

A coordinating mechanism would be helpful in assisting firms focused on R&D, even if they do not reach the threshold of "major and transformational". At the Commonwealth Government level, potential options would be to expand the front door to offer similar services

to firms with R&D projects or to roll the AusIndustry regional adviser network for innovative SMEs into the front door. Alternatively, governments could support the formation of innovation clusters to bridge the gap between research and industry. Innovation clusters are industrial precincts of R&D centres that specialise in technology and innovation and benefit from geographical proximity to each other. The discussion paper mentions some examples, including the Catapult Network in the UK and the Fraunhofer Society in Germany.

Recommendation 7: R&D projects should be given assistance to navigate the complex system of government funding opportunities and policy frameworks.

Endnotes

[1] T Phillips and E Koh, *Setting direction: A purposeful approach to modern industry policy*, CPD, 2024.; M Hammerle, T Phillips and A Dibley, *Ideas to industries: How to get the most out of public money for industrial development*, CPD, 2024.

[2] M Hammerle, T Phillips and A Dibley, *Ideas to industries: How to get the most out of public money for industrial development*, CPD, 2024.

[3] M Hammerle, T Phillips and A Dibley, *Ideas to industries: How to get the most out of public money for industrial development*, CPD, 2024.

[4] *Venture capital dashboard FY 2023/24*, Department of Industry, Science and Resources, 2024.

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