Australia's National
Science Agency

Funding and resourcing for the Commonwealth Scientific and Industrial Research Organisation (CSIRO)

Economics References Committee

CSIRO Submission 25/054

30 January 2026

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CSIRO acknowledges the Traditional Owners of the lands, seas and waters of the areas that we live and work on across Australia. We acknowledge all Aboriginal and Torres Strait Islander Peoples and their continuing connection to their culture. We pay our respects to Elders past and present.

CSIRO is committed to reconciliation. We recognise that Aboriginal and Torres Strait Islander people have made, and will continue to make, extraordinary contributions to all aspects of Australian life including culture, economy and science.

'Eternal Wisdom, Infinite Innovation'
artwork by Rachael Sarra, working with Gilimbaa.

The authors acknowledge the significant contribution of the broader CSIRO team in developing this submission. With special thanks to Anita Jonceski, Jack Steele and the CSIRO Government Engagement team.

Executive summary

For 100 years, CSIRO has been entrusted with public funding to deliver its legislative purposes: most importantly, research to assist Australian industry and to further the interests of all Australians. For generations, CSIRO's research has underpinned Australia's prosperity, resilience and global competitiveness – turning public investment into science that shapes Australia's future. Successive independent reviews since the 1980s have consistently confirmed the indispensable value of CSIRO's research and the need for appropriate levels of public investment into Australia's national science agency.

CSIRO is acutely aware of its accountability to the Australian community and its elected representatives in parliament and appreciates that its funding and resourcing is an important – and ongoing – public discussion. CSIRO therefore welcomes the Senate's decision to establish this inquiry.

The inquiry focuses on the funding and resourcing for CSIRO including the recent announcement of strategic changes to CSIRO's research direction. These changes may impact between 300 to 350 research staff. CSIRO recognises the impact of this on its incredibly passionate and talented staff and their families.

Importantly, the terms of reference go beyond these immediate changes to CSIRO's research direction. They also examine the role of public funding for science, CSIRO's long-term capability needs including workforce, infrastructure and equipment, and the processes that support resourcing decisions. The terms of reference also explore the commercialisation of research. This includes how CSIRO leverages public investment to generate external revenue (revenue from non-appropriation sources such as contracted research, equity generation and royalties) for reinvestment into science.

CSIRO addresses each of the terms of reference in this submission and seeks to demonstrate the:

- value that CSIRO delivers to the community, industry and government from the significant investment of public funds
- challenges to CSIRO's long-term sustainability presented by its historical financial arrangements – including the indexation of appropriation, constraints on funding for depreciation, as well as the generation of external revenue
- importance and independence of CSIRO's research portfolio review process to both inform its research direction and ensure accountability for achieving research impact at scale.

Critically, CSIRO's submission demonstrates the importance of investing in research, strategically, while operating within budget. As Australia's national science agency, CSIRO must always evolve its scientific focus to meet the nation's needs – pivoting to tackle unexpected challenges, responding to government priorities and steadfastly solving multi-generational problems. At the same time, it is crucial for CSIRO to adapt to changing financial circumstances to deliver the scientific research and development that Australia needs now and, in the years, and decades ahead.

Introduction

In response to CSIRO's long-term sustainability challenges and precipitated by the proposed reduction of CSIRO's research staffing levels by 300 to 350 full time equivalent (FTE) staff, the Senate Economic References Committee announced an inquiry into *'funding and resourcing for the Commonwealth Scientific and Industrial Research Organisation'*.

CSIRO welcomes the opportunity to provide input into this important inquiry.

CSIRO understands the committee seeks clarity on how CSIRO evolves its scientific focus, maintains the ability to work on 'public good science' – particularly focussed on climate change, biodiversity and the environment – while operating sustainably.

Each term of reference is specifically addressed within this submission, however, by way of introduction, this section provides an overview of CSIRO's:

- purpose
- distinctive role and contribution to Australia's research and innovation systems
- funding arrangements, covering revenue, asset base and expenditure.

CSIRO's purpose

CSIRO was established under the *Science and Industry Research Act 1949 (Cth)* (SIR Act)[1] and is publicly funded to carry out its primary, and a range of secondary, purposes. Since 2022, CSIRO's primary purpose is:

(a) to carry out scientific research for any of the following purposes:

(i) assisting Australian industry;

(ii) furthering the interests of the Australian community;

(iii) contributing to the achievement of Australian national objectives or the performance of the national and international responsibilities of the Commonwealth;

(iv) contributing to giving effect to Australia's obligations under the Paris Agreement;

(v) any other purpose determined by the Minister;

(b) to encourage or facilitate the application or utilisation of the results of such research.

Under the Act, the CSIRO Board works with management to determine the organisation's strategy and is accountable to the Australian Government for CSIRO's overall direction, development, assurance and performance. The Board oversees the delivery of CSIRO's functions, approves strategic plans, monitors implementation and approves CSIRO's risk management frameworks and policies. Specifically relevant to this Inquiry, the Board is legislatively responsible for CSIRO's annual Corporate Plan and budget and must ensure the proper use and management of public resources including the on-going financial sustainability of the organisation.[2] In line with these duties, the Board approved the recent strategic shifts in research direction outlined in this submission and has reviewed the submission itself.

[1] *Science and Industry Research Act 1949 (Cth)* (SIR Act) as amended by the *Climate Change (Consequential Amendments) Act 2022* (Cth).

[2] Further detail provided in the response to item (g) the role and independence of the CSIRO's leadership in making resourcing allocation decisions (page 49).

The Minister for Science provides greater clarity on whole-of-government objectives and expectations by issuing a Statement of Expectations to the CSIRO Board. The current Statement of Expectations, issued on 10 October 2025 by Senator the Hon Tim Ayres, Minister for Industry and Innovation and Minister for Science, highlights the important role of CSIRO in supporting a productive, resilient and sustainable economy through applied research that advances Australia's net zero transformation and builds economic advantage in technologies such as artificial intelligence and quantum (**Appendix A**). The expectation is that CSIRO focuses on national priorities, fostering partnerships, and driving the translation and commercialisation of research – noting, and respecting, CSIRO's independence. The Minister also recognised CSIRO's role to host national-scale scientific and research infrastructure on behalf of Australia to assist with the delivery of research and provide sovereign capability – a secondary purpose under the SIR Act. CSIRO's Statement of Intent is a direct response to the Statement of Expectations and outlines how CSIRO is delivering on the identified areas (**Appendix B**).

Making choices

Neither the SIR Act nor the Statement of Expectations are so prescriptive as to create a list of research programs that CSIRO should deliver. With finite resources, choices must be made about CSIRO's portfolio of research. CSIRO must be nimble enough to respond to unexpected crises and the rapidly changing directions of science, respectful of the elected government's priorities and resolute enough to work on long-term problems that may not enjoy universal support.

CSIRO balances the needs of industry and the community, understanding that these are seldom dichotomous. Similarly, the interests of the Australian community are not singular; rather, the interests of different groups are sometimes discordant.[3] This rich tapestry of community interests is reflected in the diverse issues about which different elected representatives advocate on behalf of their constituents. This diversity of interests means that when CSIRO makes independent choices about the organisation's research direction, the collective stakeholders will not be entirely content.

Considering diverse views and making choices about research direction is a crucial element of CSIRO's independence.

CSIRO's distinctive role and contribution to Australia's research and innovation systems

CSIRO's distinctive role comes from its legislative purpose, its position as a government agency and the nature of its funding as a publicly funded research agency (PFRA). Unlike universities – where academics have a high degree of autonomy, pursue curiosity-driven research, and retain inviolable freedom to set their own research agenda – CSIRO has a responsibility to focus its research capacity on areas that deliver against its legislative purposes and government expectations.

In contrast to industry – where research direction is ultimately shaped by shareholder benefit – CSIRO is guided by its primary purposes to undertake research that advances the interests of the Australian community, as well as benefiting Australian industry. Enabled by the 'block grant' it receives in the form of appropriation, CSIRO serves as a cornerstone of Australia's national research ecosystem – able to convene with universities, industry and government to help solve 'wicked' problems for the nation and drive economic growth.

[3] Neelam, R. 2025, *2025 Lowy Institute Poll: Australia and the new world disorder*, Lowy Institute, viewed 5 January 2026, <https://poll.lowyinstitute.org/report/2025/>

CSIRO's distinctive role means that it contributes exceptionally high value to Australia, achieving longer-term economic and societal return – including an 8:1 return on investment though research across all of CSIRO's disciplines.[4, 5] CSIRO's impact is not just financial but spans productivity, environmental resilience, operational scientific capability, and industry transformation. To deliver this impact, CSIRO:

- invests directly in research and development (R&D)
- catalyses research translation, working with Australian governments and industry to use R&D to drive impact
- generates patents, reports and publications in relation to both basic and applied research
- hosts a significant array of scientific and research infrastructure on behalf of Australia, including research facilities and specialised laboratories that are available to both Australian and international users.

This enables science and technology that is critical to Australia's interests, including environmental conservation, national resilience and security.

From concept to market: partnership brings omega-3 canola to fruition

Australian agricultural company Nufarm is commercialising world first transgenic technology to produce long chain polyunsaturated fatty acids (omega-3 fatty acids) on land. Using genetic research developed with the Grains Research and Development Cooperation over 30 years, CSIRO modified canola's metabolic pathways to enable omega-3 production.

Nufarm Total Omega-3 Canola is approved for cultivation in Australia, the United States and Canada, and is proven safe for human and animal consumption, offering omega-3 nutrition with the same bioavailability as fish oils. This innovation has delivered new economic opportunity for Australian and global agribusiness while contributing to improved health and environmental outcomes by reducing pressure on wild fish populations and helping meet nutritional demands in a sustainable way.

This example illustrates CSIRO's approach of developing the research platform and working closely with industry for commercialisation to deliver economic and societal impact from CSIRO's initial research investment.[6]

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[4] Based on case study analysis, see The Value of CSIRO: The Broader Impact of CSIRO's Portfolio of Activities, Harmeet Kaur, Amanda C Walsh & Jonathan Merker, RTI International & Tractuum Pty Ltd (2024), accessed 22 January 2026 and Assessment of CSIRO Value and Impact studies in 2022 and 2020, accessed at Ensuring our impact - CSIRO.

[5] CSIRO 2025, CSIRO Annual Report 2024–25, CSIRO, Canberra, viewed 22 January 2026, <https://www.csiro.au/annual-report>

[6] Further detail provided in response to item (e) CSIRO's commercialisation of scientific research (page 32) and with additional examples provided in Appendix D (page 73).

Direct investment in R&D

CSIRO invests more in economic development and environmental R&D than any other research organisation in Australia,[7] including any individual university.[8]

CSIRO also plays a major role as an R&D partner to Australian industry. In the 2024–25 financial year, CSIRO worked on R&D projects with more than 500 Australian small and medium enterprises (SMEs) and more than 650 large Australian corporations. It also supported more than 400 companies through technical testing services, and more than 650 companies in programs that connect SMEs with Australian R&D capabilities, training programs and students.[9]

Research translation

CSIRO aims to accelerate scientific concepts and technologies from early-stage development through to late-stage market and technology readiness, supported by a strong pipeline of pilots and prototypes. Programs delivered by CSIRO address barriers to high-risk, high-reward research and entrepreneurship, helping to strengthen Australia's research-translation culture across the publicly funded research sector.[10] Key initiatives include CSIRO's ON Program and the Main Sequence Fund,[11] which make important investments in capabilities and workforce skills essential for effective research translation and the realisation of benefits.

While CSIRO's work is largely focussed on applied research undertaken for government and industry,[12] rather than publication, the organisation remains a major contributor to the Australian research system, producing significant patents, reports and publications across both applied research and strategic basic research (**Appendix C**).[13]

[7] Socio-Economic Objective (SEO) groups, classifying R&D expenditure according to the area that may benefit from the R&D.

[8] *'CSIRO is…by far the biggest individual contributor to R&D in the economic development and environmental SEO groups when compared with all [Australian] universities, almost doubling the university with the biggest expenditure on these areas'*. Dandolo Partners, *Long-term trends in R&D Expenditure – Final Report*, Dandolo Partners, 2025.

[9] Further detail is provided in CSIRO's response to item (e) CSIRO's commercialisation of scientific research (page 32) and Appendix D (page 73).

[10] Further detail is provided in CSIRO's response to item (e) CSIRO's commercialisation of scientific research (page 32).

[11] Main Sequence is the CSIRO Innovation Fund established in 2017 to increase the translation into commercial opportunities from the public research sector, structured as a series of early-stage venture capital limited partnerships.

[12] Upstill, G. & Spurling, T.H. 2025, 'Setting priorities for publicly funded research: the CSIRO priorities method', *Historical Records of Australian Science*, vol. 36, HR25003, https://doi.org/10.1071/HR25003.

[13] CSIRO ranks in the top 0.1% of global institutions for citation of its scientific publications in the areas of Plant and Agricultural Sciences, Environment/Ecology and Geosciences and Engineering.

CSIRO ON Program

The ON accelerator program has strengthened Australia's research translation ecosystem, equipping researchers with entrepreneurial and commercialisation skills to **engage with business and drive greater uptake of their research and ideas.** Since 2015, the ON Program has supported thousands of researchers and built a vibrant national community of founders, advisors, industry partners, and investors.

CSIRO Innovation Fund: Main Sequence

Main Sequence was launched in 2017 as a new, publicly funded approach to increase research commercialisation in Australia, attracting investment to address the 'valley of death' between research and commercialisation. Investments by Main Sequence have crowded in additional private co-investment of $3.26 for every $1 invested.

CSIRO's funding arrangements, covering revenue, asset base and expenditure

CSIRO's funding is drawn from multiple sources, with appropriation funding from government being the largest component. Over the past decade, appropriation has accounted for an average of 63% of CSIRO's revenue. In the 2024–25 financial year, appropriation totalled $916 million, representing 59% of CSIRO's total revenue of $1.554 billion.

Over the last 15 years, the average indexation applied to CSIRO's appropriation, including savings and efficiencies dividends, has been 1.3% per annum (excluding terminating budget measures). As a Corporate Commonwealth Entity, CSIRO's appropriation also includes a fixed, non-indexed amount for depreciation, which is used to fund capital replacement.[14]

In addition to its appropriation funding, CSIRO generates 'own-source' revenue, leveraging its appropriation to co-invest and collaborate with industry and government, and earning additional revenue from collaborative development of intellectual property via milestone payments, royalties and sale of equity.[15] As a not-for-profit organisation, all revenue is reinvested back into CSIRO's research and operations.

[14] Further detail is provided in CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

[15] Further detail is provided in CSIRO's response to item (e) CSIRO's commercialisation of scientific research (page 32).

CSIRO's response to the terms of reference

(a) the nature of recent and proposed job and program cuts in the CSIRO

This term of reference relates to the proposed changes to CSIRO's research staffing announced on 18 November 2025. In responding, CSIRO has focussed on research staffing, recognising the essential role played by non-research staff.[16]

CSIRO changes research staffing for 2 main reasons. First, to enable strategic shifts in its science direction; and second, to operate optimally within budget – expanding research capacity when additional funding is available and contracting when it is not. While these drivers are distinct, they often intersect. To demonstrate this interplay, CSIRO's response to this term of reference outlines:

- how CSIRO determines its scientific direction and undertakes strategic science shifts – including the recent research portfolio review
- the funding constraints and budget parameters that shape the level of research capacity CSIRO can sustain.

Item (h) the effects of these cuts on the program of scientific work conducted by the CSIRO (page 52) [17] provides further detail on the proposed research changes announced on 18 November 2025, which may potentially impact 300 to 350 researchers. For the purposes of responding to term of reference (a), CSIRO emphasises that the proposed changes to research staffing stem from strategic science shifts that the organisation has identified as being necessary to maximise impact in priority areas. As a strategic shift, the proposed changes to CSIRO's research direction are not budget driven and are independent of the recent announcement in the Mid-Year Economic and Fiscal Outlook (MYEFO) 2025–26 of additional funding for CSIRO.[18]

Funds released as a result of strategic shifts would generally be reinvested into areas of high priority; however, given the challenges to on-going sustainability, CSIRO needs to realise the savings from the proposed reduction of 300 to 350 FTE.

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[16] Since 2018, CSIRO has averaged 10% staff change (both research and non-research) annually, with the majority of that figure (85%) comprised of 'business as usual' staff turnover, including resignations, retirements and completion of terms.

[17] Specific impacts and changes will only be known as CSIRO progresses through formal consultation processes in accordance with the CSIRO Enterprise Agreement 2023–26.

[18] On 17 December 2025, Dr Hilton wrote to all CSIRO staff on the MYEFO funding announcement, stating:

> *We welcome the federal government's significant short-term investment in CSIRO of $233 million, which enables us to take the first steps toward addressing our long-term sustainability challenges.*
>
> *This funding will allow us to continue to deliver research in priority areas, while we take immediate action to address urgent repairs and maintenance, strengthen cyber security, and progress essential property consolidation planning. It will also allow us to maintain operations at the Australian Centre for Disease Preparedness.*
>
> *While this short-term support is appreciated, achieving sustainability for CSIRO will require a sustained and significant investment over the next decade. Today's news will not change the recently announced changes to our research direction, which will focus our science on areas where we can deliver the greatest impact and tackle problems at scale.*
>
> *We will still need to retain the savings that will come from these changes – reducing our staffing by an estimated 300-350 FTE – while also investing at least an additional $80-135 million per annum over the next 10 years into essential infrastructure and technology.*
>
> *As we have explained previously, the cost of operating a modern science agency has increased significantly, compounded by the cumulative impacts of an ageing property and infrastructure portfolio. To continue to deliver the science Australians need in the years and decades ahead, we must adapt.*
>
> *We remain committed to being transparent with you about the challenges we face and the steps being taken. We know these changes are difficult, particularly for those working in Research Units that will be losing some of our talented and dedicated people.*

The challenges to CSIRO's long-term sustainability and the quantum of investment needed to address these are detailed below.[19] In summary, based on current estimates, in addition to the savings that will come from recently announced changes to its research direction, CSIRO needs to invest at least $80 million to $135 million per annum for the next 10 years to achieve long-term sustainability.

Determining CSIRO's scientific direction

Since its creation in 1926, CSIRO has reviewed and adapted its research to continue to deliver on its legislative purpose and maximise the return to the nation from the public funding it receives. How CSIRO has made choices about its research direction has changed over the decades.[20]

In 2023, the newly appointed Chief Executive, Dr Doug Hilton, announced a review of CSIRO's entire research portfolio to commence in 2024[21]. The review was primarily conducted because CSIRO needed to:

- prioritise across its research portfolio that had not, *in toto*, been reviewed for over a decade
- reduce the complexity of research delivery mechanisms to increase transparency, agility, and delivery efficiency
- ensure its research was maximising impact for national benefit
- increase accountability for delivery of the intended outcomes of research by clearly and transparently articulating the desired outcomes.

The review of CSIRO's research portfolio was also undertaken in the context of significant budget challenges (outlined below). During 2024–25, CSIRO conducted a thorough review of its enterprise services and operational expenses, and the organisation's research facilities and services will be reviewed in 2026. The objective of all the reviews is to prioritise investments into statutory functions and maintain a dedicated focus on achieving impact with the resources available.

[19] Further detail is provided in CSIRO's response to term of reference (f) the long-term capability needs of the CSIRO, including workforce, infrastructure and equipment (page 41).

[20] This is reflected in changes to the structure of CSIRO's research areas, for instance:

- CSIRO has operated with a multitude of organisational units (a mixture of discipline-based and sector-based entities) responsible for delivering programs of research of various sizes.
- From 2001, 'flagships' were a structural organisation to direct research output towards a national challenge and a single point of contact for industry sectors, with 'divisions' holding capability (staffing).
- From 2014, market facing 'business units' focusing on research for sectors (for example, Agriculture & Food, Manufacturing) as well as research capability (including career progression, labour and operating costs) and external revenue generation. Business units ran their own profit and loss statements.
- From 2017, strategic cross-cutting investments such as 'Future Science Platforms' and 'Missions' were created.

[21] Dr Hilton announced three strategic priorities for CSIRO to staff on 28 February 2024:

> *First, we want to look at how we ensure our research infrastructure is sustainable, safe and fit-for-purpose. This includes looking at how we deepen our partnerships with organisations who use and benefit from this infrastructure to share the load going forward.*
>
> *Second, we want to ensure our Enterprise Services (ES) teams are equipped to support CSIRO sustainably and effectively. This includes work underway, since last year, into our ES Reform, which started with analysis from each of our ES Directors of their key functions and priorities.*
>
> *And third, we want to create more clarity about our research priorities. This includes being clearer about what we want to achieve in our six challenge areas so we can ensure the research problems we're trying to solve will deliver on our challenge ambitions.*

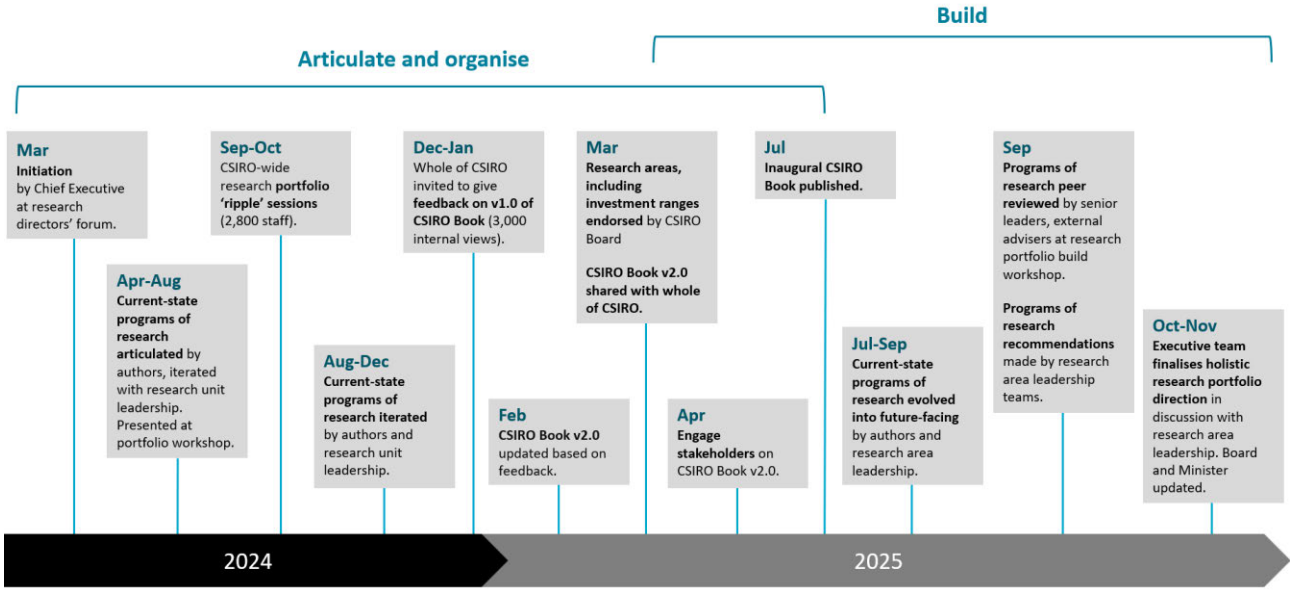

Figure 1: Process to review and refresh the CSIRO research portfolio

The first step in refining CSIRO's research portfolio was gaining visibility of its existing research programs (**Figure 1**). This culminated in the 'CSIRO Book', a strategic tool that provides a transparent and organised view of CSIRO's research. It enables CSIRO and its stakeholders to see where CSIRO's work fits into the bigger picture, make connections and catalyse collaboration. As priorities shift and research advances the CSIRO Book will change to reflect the evolving research portfolio. CSIRO expects new editions on a regular basis.

The inaugural 'CSIRO Book' was released publicly in July 2025. The CSIRO Book outlines:

- The 6 **research areas** on which CSIRO will focus (Energy and Minerals, Food and Fibre, Nature, One Health, Tech Economy, Wonder to Discovery), each of which contains research that addresses 'wicked' problems like climate change and stagnating productivity.
- Specific **programs of research** being undertaken with collaborators in industry, academia and government to deliver on the ambitions articulated for each research area.

The view provided by the CSIRO Book, alongside valuable feedback from stakeholders, was a foundational input to the subsequent phase of the process. With visibility of CSIRO's existing portfolio, the next step was to embark on planning and prioritisation of the future research portfolio in a process internally known as 'the portfolio build'. Collaborative peer review assessed the ongoing strategic relevance of the programs of research and informed evidence-based decisions on prioritisation and future investment. The review drew on input from research teams to a workshop held in September 2025 and attended by approximately 300 CSIRO and external research leaders. More than 50 internal and external senior science and enterprise leaders reviewed the proposed programs of research against 6 evaluation questions.[22]

[22] The 6 questions focused on the problem being addressed, how the work will provide solutions, who will partner with CSIRO and why it matters; they were adapted from international innovation organisational practices and validated to support portfolio management and decision-making. The questions were: What is the problem you are trying to solve?; Who are the key beneficiaries?; Why now, what has been tried before and why should CSIRO succeed now?; What are the sub-problems or components that you need to solve along the way?; What are the major milestones and final 'measures' to check for success?; Be convincing about why CSIRO is the one to solve this problem.

Feedback from the workshop reviewers was then considered to determine how programs of research should be prioritised, and in some cases merged or reshaped, to arrive at the portfolio mix and program investments; first by research area and then across all research areas in the portfolio. Deliberations were informed by all inputs from prior steps and a holistic view of the portfolio.

Priority was given to programs of research that clearly and compellingly addressed the 6 evaluation questions (either during the presentation or in materials submitted). Deliberations also considered 'whole of portfolio' opportunities that would:

- increase CSIRO's ambition for research impact
- address government and national priorities
- focus on areas where CSIRO has a unique and differentiated position in the innovation system and a track record of strong commitment from collaborative partners
- support Indigenous science and knowledge systems enabling new ways to approach innovative solutions and technologies for the benefit of all Australians
- identify synergies and collaborative opportunities across the portfolio
- achieve a financially sustainable, future-facing portfolio
- ensure a balanced overall portfolio incorporating a mix of early and late-stage science, research to inform policy, public good research, industrially-focused research, economy-wide approaches, sector-specific solutions and revenue and leverage mix and implications
- manage internal interdependencies and trade-offs, including an analysis of several enterprise-wide financial sustainability scenarios.

Based on this process, CSIRO agreed to strengthen its focus to deliver impact at scale in key areas including:

- supporting a clean, affordable energy transition, including transforming critical minerals to materials
- addressing the pressing problem of climate change, with a renewed focus on adaptation and resilience
- applying advanced technologies (including artificial intelligence, quantum, sensing, robotics and manufacturing) to drive the next wave of innovation in core Australian industries
- increasing the productivity and resilience of Australian farms by focusing on the deployment of technological solutions
- mitigating and eradicating biosecurity threats to Australian industries, landscapes and communities
- applying disruptive science and engineering to unlock the unknown and solve unanswered questions.

Additionally, CSIRO identified programs of research to be scaled back wholly or in part or consolidated into new or existing programs due to:

- challenges in achieving impact at scale and securing collaborative partners for translation
- opportunities to align and consolidate areas for greater impact
- science and technology activities reaching successful endpoints and therefore shifting to implementation
- areas where research needs are increasingly provided by another research organisation.

Examples include human nutrition and preventative health, medical devices and imaging, food processing and food manufacturing.

The changes CSIRO will make to its programs of research are to principally sharpen its focus on the priorities identified above (**Appendix F**). In making these changes, CSIRO is responding to its unique and differentiated role in the national research system and positioning itself to deliver a future-focused ambitious portfolio, consistent with its Statement of Expectations and aligned with Australia's national science and research priorities.

CSIRO researchers, enterprise services teams, research leaders at different levels including research unit directors and the Chief Executive, continuously assess how CSIRO can generate greater impact by strengthening partnerships with collaborators and increasing scale. Staff at all levels are involved in these ongoing deliberations. CSIRO's research portfolio should never be set-and-forget. It should always be focussed on opportunities to deliver more impact for Australia.

The research portfolio build process outlined above marked a major milestone for CSIRO, representing the first step in implementing a consistent, systematic, portfolio-level approach to research management aimed at strengthening accountability, transparency and sustainability. In the future, CSIRO will undertake an in-depth review of each research area every 5 years, complemented by an annual, lighter-touch whole-of-portfolio review. This annual process is expected to require ongoing business-as-usual adjustments and shifts in CSIRO's capabilities.

This regular strategic review process, modelled on the 2025 process and drawing on both external perspectives and the collective leadership of CSIRO's science community, will enable well-considered decisions, regardless of whether the organisation continues to face funding pressures or benefits from increased investment in science.

CSIRO's funding arrangements and long-term sustainability

This section provides a short overview of the budget constraints and challenges to CSIRO's long-term sustainability arising from CSIRO's funding arrangements, namely the impact of:

- limited funding available for capital investment and the increasing costs associated with ageing property and scientific infrastructure
- the new and accelerating costs of conducting research which are not matched by the indexation of appropriation funding provided for that purpose.[23]

Revenue

CSIRO's revenue comes from multiple sources, the largest of these being appropriation which represents approximately 60% of CSIRO's total revenue.[24] Over the last 15 years, the average indexation of CSIRO's appropriation has been 1.3% per annum (excluding terminating budget measures).[25] CSIRO's appropriation funding for depreciation is not indexed and has remained fixed since 1999–2000 while its annual depreciation expense has increased 129% ($91 million) over this period. The reduction of CSIRO's appropriation funding in real teams, coupled with substantial and ongoing cost increases, has led to significant sustainability challenges for the organisation.

[23] Additional detail, including financial analysis is included in CSIRO's response to item (f) the long-term capability needs of the CSIRO, including workforce, infrastructure and equipment (page 41).

[24] Over the past decade, appropriation has accounted for an average of 63% of CSIRO's revenue. In the 2024–25 financial year, appropriation totalled $916 million, representing 59% of CSIRO's total revenue of $1.554 billion.

[25] Excluding the depreciation component of appropriation but including savings and efficiency dividends.

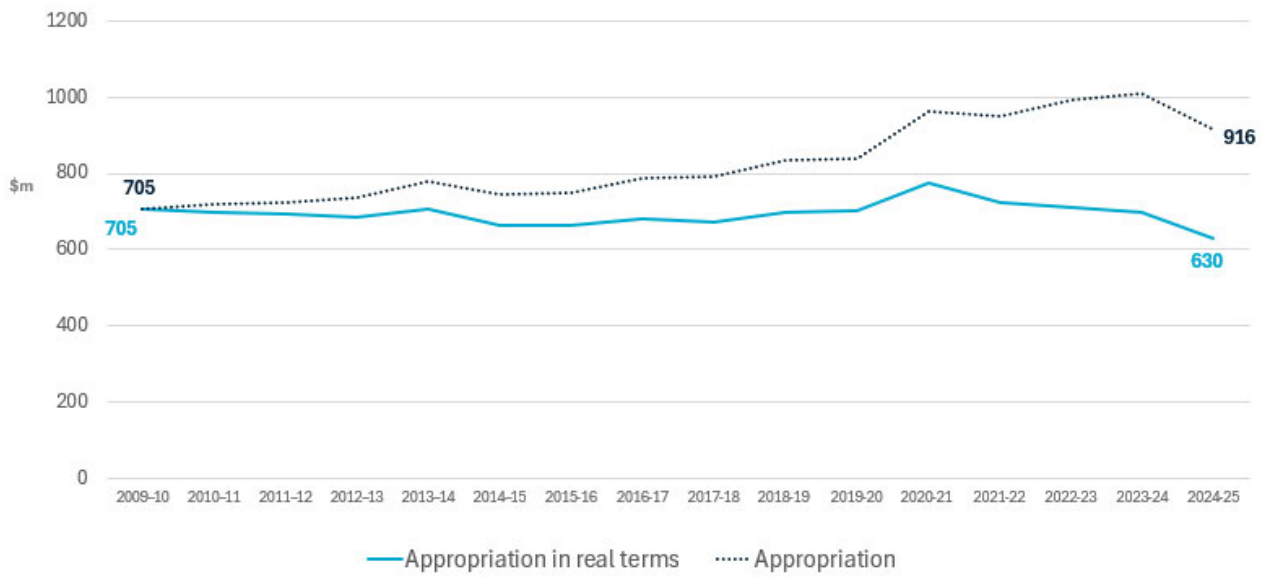

Figure 2: CSIRO's appropriation in real terms ($ million)

Expenditure

CSIRO, like other Australian research organisations,[26] primarily invests its revenue in undertaking research and in the organisational expenses that enable and support that research. CSIRO's current expenditure profile, excluding capital,[27] is outlined in table 1. Historically, the proportion of CSIRO's expenditure invested in delivering research has remained largely consistent (65–70% of total expenditure).

As context for the discussion of CSIRO's funding arrangements and financial sustainability, table 1 provides a breakdown of expenditure and staff numbers by research and support units for 2024–25.

Escalating operating costs (outlined below) have resulted in increasing pressure on CSIRO's research capacity. Historically, CSIRO attempted to balance the preservation of research capacity with the maintenance of physical and digital infrastructure. CSIRO has not been able to achieve this balance with under-investment in infrastructure resulting in increasing safety and security risks.

Cost increases

CSIRO is facing escalating costs, both to conduct science and in enabling operations,[28] in summary this includes cost increases in:

- maintaining, operating and replacing scientific and research infrastructure, plants, and equipment
- enabling infrastructure (physical and digital)
- repairs and maintenance across CSIRO's extensive and legacy property portfolio
- research labour.

CSIRO has tried to address increasing costs by implementing major cost savings and efficiencies in non-research areas. It has also self-funded the consolidation of property to reduce costs and found alternative funding sources for some capital, such as the National Collaborative Research Infrastructure Strategy (NCRIS). As these mitigations are close to exhausted, in order to achieve sustainability CSIRO must further reduce costs in order to increase investment in infrastructure (physical and digital).

[26] Universities Australia 2023, *Response to the Australian Universities Accord Panel Discussion Paper*, Universities Australia, Canberra.

[27] In 2025-25, CSIRO's business as usual capital expenditure was $105.2 million. Of this, 34% ($35.9 million) was on property, 46% ($48.7 million) was on scientific equipment and 20% ($20.7 million) on Information Technology equipment.

[28] Further detail can be found at (e) CSIRO's commercialisation of scientific research (page 32).

Table 1: High level breakdown of expenditure and FTE by research and support services units 2024–25[29]

UNIT/AREA	$ MILLION	FTE
RESEARCH UNITS		
Environment	185.9	741
Agriculture & Food	158.3	661
Space & Astronomy	114.6	393
Data61	99.3	741
National Collections & Marine Infrastructure	92.7	264
Mineral Resources	92.3	366
Energy	89.1	301
Manufacturing	82.8	364
Health & Biosecurity	80.9	361
Science Connect	59.0	239
Australian Centre for Disease Preparedness (ACDP)	43.3	197
Pawsey Supercomputing Research Centre	28.5	66
SUPPORT SERVICE UNITS		
Enabling ICT and Property Infrastructure	326.9	573
Enterprise Services	189.8	712
Total	**1,643.3[30]**	**5,676**

Cascading impacts

The impact of industry-wide increasing costs has led to:

- deterioration of property, scientific and research infrastructure, and scientific plants and equipment
- inadequate information and digital technologies and cyber systems.

This has resulted is increasing risks to health, safety and security – as well as deterioration of Australia's national capacity in research, science and technology.[31] To address these impacts, CSIRO will need to increase investment in these areas – an initial estimate is at least $80 million to $135 million per annum for the next 10 years, in addition to the savings resulting from the recently announced proposed reduction of research staffing of 300 to 350 FTE.

[29] Research unit expenditure includes depreciation for scientific plant and equipment, as well as facility operating costs specific to that research unit, such as the maintenance of farmland used for field trials.

[30] $1,643.3 million is total expenditure and is funded from both appropriation and own-source revenue.

[31] Further detail can be found at (e) CSIRO's commercialisation of scientific research (page 32).

(b) the importance of public funding for public good science

Public funding provides organisations like CSIRO with independence and agency based on a stable and reliable platform of funding. This allows investment into areas that have long term national benefit, or which are unlikely to yield a timely (or any) commercial return for an individual company and therefore would not attract private investment. The benefits of publicly funded research are manifold and can include fundamental science breakthroughs that transform thinking in entire areas of research and development, developments that boost productivity,[32] and drive sustainability for a whole industry sector,[33] and discoveries that shed light on humanity's place in the world or universe. CSIRO is confident that its refreshed research portfolio will deliver all of those benefits.

Public funding also allows investment into scientific and research infrastructure at a scale that is beyond individual institutions or companies, making cutting-edge technologies more widely available than would otherwise be the case.

'Public good research' and 'research for or with industry' are both incredibly valuable for the nation and are sometimes framed as opposing concepts. In practice CSIRO operates across both, which is required under its legislation, and rarely at either extreme end of the spectrum. As a science agency focussed on generating national benefit, the questions CSIRO asks when assessing its research are:

- Does the research produce tangible outputs?
- Are these outputs used?
- Does their use impact the world in positive ways and deliver national benefit?

CSIRO takes its responsibility incredibly seriously to be productive, to maximise the use of its research, and to impact the nation and the world positively.

Navigating the complex inter-relationship between public good and industrial research is a core responsibility of CSIRO's scientists and of the teams that support partnerships, collaborations and business development.[34] For example, successful research for or with industry (the first of CSIRO's primary purposes) generates jobs and drives productivity and sustainability, and ultimately economic growth – all of which benefit the community and the nation (the second of CSIRO's primary purposes). Similarly, classical public good research can require major investment of at-risk capital from the private sector to take the products of research and develop them for widespread use and broad societal impact.

There are many examples of the importance of private investment to derive public good from discoveries, including new pharmaceuticals for devastating diseases and renewable energy technologies to help transition from fossil fuels. There are also many examples of products of research that are initially developed by, used by and benefit industry that can later be seen to have very wide societal benefit.[35]

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[32] Including job creation: *'… it has been estimated that encouraging the commercial development of research results has the potential to generate between 10,000 and 15,000 new jobs in Australia over five years'* (Australian Law Reform Commission, 2010, *Public Funding of Research (ALRC Report 99)*). See also *Strategic Examination of R&D Discussion Paper* (Independent Expert Panel, 2025, p. 11): *'… in the medium and long-run, R&D investment decreases unemployment (Jindal, 2021). In advanced economies, it is estimated that R&D investment creates more jobs than any type of infrastructure investment (World Economic Forum, 2020)'.*

[33] See Andrew J. Fieldhouse and Karel Mertens, *The Social Returns to Public R&D*, National Bureau of Economic Research Working Paper No. 33780, May 2025. Retrieved from http://www.nber.org/papers/w33780, p. 2 — Social returns being *'… the aggregate economic benefits of R&D, including all spillover effects benefiting other firms, industries, or sectors above and beyond the private returns captured by the performers of said R&D activity.'*

[34] See CSIRO's response to terms of reference (b) the importance of public funding for public good science (page 16) and (e) CSIRO's commercialisation of scientific research (page 32).

[35] For example, the AT&T Bell Labs (industry) invented silicon solar panels in 1954. By 2025, solar panels have become a key pillar in transitioning the energy system away from fossil fuels to mitigate climate change, arguably one of the most critical 'public good' challenges confronting the world.

The benefits of private investment into research does not diminish the indispensability of public funding, as outlined in the extensive literature on the topic[36]. The focus of CSIRO's response to this term of reference is therefore to demonstrate the importance of:

- public funding for government research agencies, such as CSIRO
- 'block funding' for publicly funded research agencies (PFRAs)
- public funding for scientific and research infrastructure.

Public funding for government research agencies

Government research laboratories – known as PFRAs in Australia – are part of the R&D ecosystem in many countries (for example Germany, the United Kingdom, the US, Canada, Australia) and they play a distinct role compared to universities or industry. The reasons to provide public funding to research agencies are well articulated by the Productivity Commission in its 2007 report *Public Support for Science and Innovation:*[37]

> *… public funding of these bodies is premised on the need to ensure that research that has a direct significance to national issues is undertaken. This particularly related to strategic and applied scientific research that would not or could not be conducted by other providers.*

The report notes that funding for PFRAs also provides the advantages of building research capacity to flexibly deal with emerging priorities, lower transaction costs and, critically, enabling the dissemination of the results of research for broader benefit.

Public funding for research agencies allows research to be done at scale to address the biggest challenges that confront the nation. This type of funding also ensures that in a time of increased global precarity Australia retains sovereign capability in areas of research critical to security and resilience[38] like quantum technologies, critical minerals processing and artificial intelligence.[39]

CSIRO and other Australian Government research organisations[40] provide significant research capability for the nation. Collectively, PFRAs account for 16.2% of Australian Government R&D investment, with the investment in CSIRO representing 6.2%.[41] For research to develop new knowledge, CSIRO leverages this capability through partnerships and much of this research is conducted in collaboration with domestic universities (**Appendix C**).

[36] R&D is widely acknowledged as a primary driver of productivity, global competitiveness, and broader societal benefit - see *Australian Council of Learned Academies 2025, A deep dive into the value of research to economic growth in Australia, Australian Council of Learned Academies. 'Unpublished report, 2025 personal communication.* Also noting in the US context *'… federal science spending is so fundamental to the overall economy that a 2023 study found that government-funded research and development have been responsible for 25% of productivity growth in the US since the end of World War 2.'*, Klein, E & Thompson, D 2025, *Abundance: how we build a better future*, Profile Books, p. 137.

[37] *Productivity Commission* 2007, *Public support for science and innovation*, Productivity Commission, Canberra.

[38] Sovereign capability as well as knowledge and ownership of critical intellectual property.

[39] Further detail is provided in response to item (c) the importance of public resourcing of Australian sovereign scientific capability (page 23).

[40] For example, Defence Science and Technology Group, Australian Nuclear Science and Technology Organisation, Geoscience Australia, Australian Institute of Marine Science, the Bureau of Meteorology and the Australian Antarctic Division (list not exhaustive).

[41] Figure is for the 2024-25 financial year and is taken from *Department of Industry, Science and Resources* 2025, *Science, research and innovation (SRI) budget tables*, viewed 30 December 2025, www.industry.gov.au/publications/science-research-and-innovation-sri-budget-tables.

According to the independent expert panel for the Strategic Examination of R&D, government investment in R&D has declined in real terms over time.[42] Over the same period, CSIRO's share of total government investment in R&D has halved, from approximately 12% to 6% – in part due to the decline in government investment in R&D but also due to significant shifts in government investment towards the multisector areas of health and medical research and the business enterprise sector.[43]

Table 2 shows the decreased proportion of CSIRO's workforce in the research system since 2001, consistent with the decrease experienced by other PFRAs in Australia's R&D ecosystem.

Table 2: Australian research workforce and CSIRO component[44]

SECTOR	AUSTRALIAN RESEARCH WORKFORCE		CSIRO RESEARCH WORKFORCE AS PERCENTAGE OF TOTAL RESEARCH WORKFORCE	
	2000–01	2022–23	2000–01	2022–23
Non-business:	67,415	105,943	6.7%	4.3%
Higher education[45]	46,287	81,705		
Government	18,407	15,899	27.2%	28.5%
Private non-profit	2,721	8,339		
Business[46]	27,839	91,414		
Total	**95,254**	**197,357**	**4.8%**	**2.3%**

'Block' appropriation funding for PFRAs

Block funding of PFRAs like CSIRO recognises the unique purpose of these agencies – delivering research and the enabling scientific and research infrastructure to achieve long-term national objectives. Research that is aimed at solving intergenerational challenges, like climate change and the energy transition, requires secure, consistent, long-term funding. Such stable and reliable funding is crucial to enable concerted investment in both the research capability and the enabling scientific and research infrastructure to achieve research impact at scale.

[42] From 1993–2022, government expenditure on R&D declined in real terms from 0.41% of GDP to 0.16% (*Independent Expert Panel* 2025, *Strategic examination of R&D discussion paper*, Department of Industry, Science and Resources, p. 22). In addition to this decline, expenditure shifted away from intramural R&D. In the 2021–22 financial year, intramural R&D accounted for 18.3% of government R&D spending (CSIRO was 7.5%), compared to 29.8% in 1993 (CSIRO was 14.7%) (*Department of Industry, Science and Resources* 2025, *Science, research and innovation (SRI) budget tables*).

[43] *Department of Industry, Science and Resources* 2025, *Science, research and innovation (SRI) budget tables*, viewed 30 December 2025, www.industry.gov.au/publications/science-research-and-innovation-sri-budget-tables.

[44] Australian Bureau Statistics – combined results from reports 8104.0 (release of 25/8/23), 8109.0 (release of 12/6/24), 8111.0 (release of 3/5/24); CSIRO results are based on research and technical staff excluding affiliates. Workforce numbers are Person Years Effort.

[45] Higher education figures are for calendar years.

[46] Business figures are published every alternate year and have been selected to align with non-business data.

The Productivity Commission outlined the advantages of 'block funding':

> *Block funding offers significant advantages for mission-based research agencies like CSIRO: it provides greater flexibility to make strategic decisions about research direction; it creates opportunities to respond to emerging priorities; it allows the organisation to plan and build multi-disciplinary research capability; it provides scope to engage in larger scale and longer-term research; and it involves lower administrative and compliance costs compared with competitive funding processes such as grant funding or contracting out. From the community's point of view, these features also deliver potentially valuable contingency or option benefits relating to the capacity to reduce a range of social (e.g. public health) and environmental risks and a preparedness to deal with future uncertainty.*[47]

The Productivity Commission considered appropriation funding critical for CSIRO, stating:

> *Block appropriation funding for CSIRO needs to be sufficient to enable the organisation to make appropriate strategic investment decisions and to maintain its research capability in a range of research areas. The share of CSIRO revenue from that source has declined considerably over the last few years. The real level of block funding should not be reduced.*[48]

Public funding for scientific and research infrastructure

Public funding for scientific and research infrastructure is critical to enable both fundamental and applied science, with the capital requirements of such scientific and research infrastructure far exceeding the capacity of private sector funding, especially in Australia. The National Science and Technology Council (United States of America) found that:

> *… investing heavily in Research and Development Infrastructure… including new laboratory buildings and specialized facilities and equipment… propelled the United States to global science leadership and led to technology breakthroughs that served as a foundation for the nation's economic growth and national security.*[49]

Similarly, in Australia the Prime Minister's National Science and Technology Council has underscored the criticality of scientific and research infrastructure for Australia's future prosperity, emphasising the need for a long-term national investment to maintain sovereign science capability.[50]

[47] Productivity Commission, 2007. 'Public Support for Science and Innovation', Research Reports, Productivity Commission, Government of Australia, number 24, January.

[48] Productivity Commission, 2007. 'Public Support for Science and Innovation', Research Reports, Productivity Commission, Government of Australia, number 24, January.

[49] National Science and Technology Council, *US Federal Research and Development Infrastructure*, Office of Science and Technology Policy, 2025, p 7.

[50] National Science and Technology Council 2024, *National Science and Technology Council – 20th meeting*, Chief Scientist, viewed 6 January 2026, https://www.chiefscientist.gov.au/news-and-media/national-science-and-technology-council-20th-meeting.

In addition to requiring cutting-edge scientific infrastructure to support its own research, one of CSIRO's secondary purposes under the SIR Act is to 'make available facilities, in relation to science'. As outlined in the introduction of this submission, CSIRO plays an important role in the research ecosystem through its stewardship of national-scale scientific and research infrastructure, facilitating multidisciplinary research activity for researchers, government, industry partners and communities both Australian and international. Such stewardship ensures Australia's science sovereignty.[51] This includes, for example, CSIRO's Research Vessel, the *Investigator* (RV *Investigator*).

RV Investigator

The Marine National Facility (MNF) provides Australia with essential blue-water marine research capability. Central to the MNF is the ocean-class research vessel (RV) *Investigator*, commissioned in 2014, which supports oceanographic, geoscience, biological, and atmospheric research. *Investigator's* research outputs have greatly enhanced Australia's understanding of oceans, climate systems, marine geology and ecosystems, generating evidence-based insights critical for resource management, industry practices and climate policies.

The MNF also plays a vital role in developing marine industry leaders through structured training initiatives, including involvement in research projects and specialised programs such as CAPSTAN and the Indigenous Time at Sea Scholarship. These programs equip students from diverse disciplines and educational backgrounds with essential practical skills and experience.

Public and private sectors rely heavily on high-quality data provided by RV *Investigator*, using bathymetric, biological, atmospheric and geophysical information to inform decisions about marine ecosystems, fisheries, climate adaptation and offshore activities. This data underpins resource management strategies, risk assessments and sustainable offshore industry development.

In economic terms, marine industries generated $105.3 billion of Australia's gross domestic product (GDP) and supported 462,000 jobs in the 2021–22 financial year. With 87% of Australians living in vulnerable coastal regions, addressing the impacts of climate change and natural disasters is crucial. High-quality marine data from the RV *Investigator* helps balance economic growth opportunities, such as aquaculture and offshore renewable energy, with the urgent need for sustainability and resilience. Ultimately, MNF and RV *Investigator* contribute significantly to safeguarding Australia's marine environment and enhancing community wellbeing through informed and sustainable decision-making.

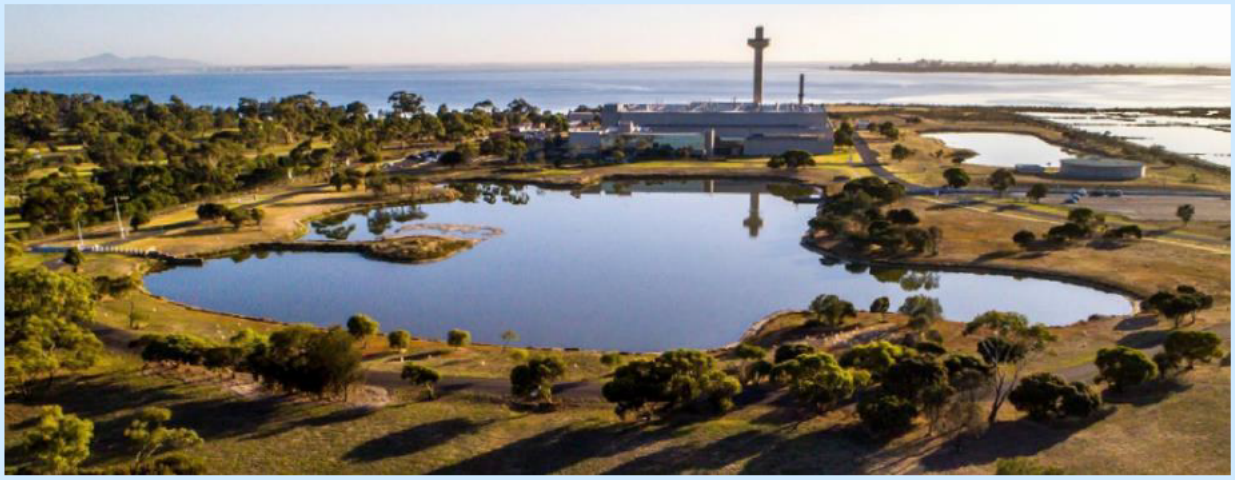
[51] Further detail is provided in CSIRO's response to (b) the importance of public funding for public good science (page 16).

Additional examples are at **Appendix C**, including CSIRO's facilitation of specific scientific and research infrastructure for the higher education system through the Trailblazer Universities program, such as the Resources Technology and Critical Minerals Trailblazer that is enabling the advancement of Australia's 'minerals to materials' manufacturing capabilities.

National scientific and research infrastructure is funded by the government via a range of mechanisms, including NCRIS and various standalone funding measures. CSIRO participates in the NCRIS scheme alongside the Australian university sector and other PFRAs. CSIRO and other PFRAs also provide landmark national scientific and research infrastructure that has a useful life longer than the standard funding cycles provide by grant schemes such as the National Health and Medical Research Council, the Australian Research Council and NCRIS. For landmark national scientific and research infrastructure, the government typically funds the upfront costs of national scientific and research infrastructure however the operations and upgrades of these facilities span decades, and there are limited mechanisms for whole-of-life funding arrangements. The costs of operating, maintaining and building landmark national scientific and research infrastructure have increased significantly, with the additional costs of operating infrastructure predominantly falling to CSIRO.

Capital investment of that scale is often considered on a case-by-case basis by government, requiring agencies to compete for limited funding, which has driven a long-term trend of capital investment without coordination or matched long-term operational investment and capital replacement.

The specific example of the Australian Centre for Disease Preparedness (ACDP) is highlighted below, with an overview of the facility and its operation in CSIRO's response to item (c) the importance of public resourcing of Australian sovereign scientific capability (page 23). However, funding challenges are not limited to large-scale facilities. Facilities and technology with a shorter useful life, like high performance computing, require more frequent upgrades, which exacerbates the funding challenge for PFRAs who host scientific and research infrastructure.



Australian Centre for Disease Preparedness (ACDP)

The need for a broad renewal of the ACDP capital asset (part-life refit) was known when the centre was commissioned in 1985. Detailed planning for part-life refit works to address upgrades and ensure ongoing effectiveness and compliance had been undertaken over the past 12 years; however, progress was delayed due to funding constraints and the COVID-19 pandemic period.

ACDP now faces urgent compliance issues relating to statutory standards, animal welfare requirements and safety codes. Key biocontainment equipment within the facility is at or beyond its intended end-of-life and requires replacement to maintain biosafety and operational licences. In the 2024–25 Budget the government approved CSIRO to commence phase 1 of the part-life refit at a cost of $342 million over 6 years, funded through the sale of CSIRO property assets.

Government funding arrangements for the 24/7 operating costs for ACDP have changed since the ACDP was commissioned in the 1984–85 financial year, resulting in substantial costs falling onto CSIRO as the facility operator.

Over the past 25 years operating costs have escalated substantially (by 53% over the decade to 2025). Appropriation funding to CSIRO for ACDP operations, as well as cost contributions from other agencies, have not kept pace with actual costs. With the facility's annual 'stand-ready operating costs' having increased to $48 million in 2024–25, CSIRO was required to divert $27 million from other research activities to meet the shortfall with CSIRO now covering over 80% of the operating costs of the facility. In effect this has meant that operations at ACDP have been prioritised over other research activities.

Australia is not alone in facing this issue. For example, the US is experiencing a similar challenge:[52]

> *Congressional appropriations have not kept pace with maintenance needs across multiple administrations, resulting in multibillion dollar maintenance backlogs across multiple government agencies, forcing government managers into a position where they must choose between executing science missions or maintaining their facilities.*

[52] National Science and Technology Council 2024, *US Federal Research and Development Infrastructure*, Office of Science and Technology Policy.

(c) the importance of public resourcing of Australian sovereign scientific capability

Sovereign capability describes the ability of a government to sustain society, including its economy, security and social cohesion, should trade and other connections to the world be cut off or significantly impeded. So, in that sense, sovereign scientific capability is about agency and control of scientific capability at the nation-state level. There is much public discourse on the necessity to publicly fund a nation's sovereign scientific capability. Recently, Professors Richard Holden and Brain Schmidt outlined to the National Press Club the fundamental importance of sovereign research capacity in driving productivity and Australia's economic resilience: '… it is not an overstatement to stay that generating and applying knowledge is the cornerstone of raising living standards … and driving economic growth'.[53]

Public funding for research agencies ensures that in a time of increased global precarity Australia retains sovereign capability in areas of research critical to security and the resilience of Australia's society and economy. This section does not traverse the extensive literature in this regard but instead focuses on demonstrating how public funding for CSIRO, as Australia's largest and most comprehensive government research organisation, is contributing to Australia's sovereign scientific capability by:

- allowing CSIRO to make strategic research choices that support Australian sovereignty
- underpinning national-scale scientific and research infrastructure, like ACDP that enables both sovereign research across the Australian ecosystem and scientific operational capability.

Strategic research choices that support Australian sovereignty

CSIRO's research portfolio is organised into 6 research areas[54], many of which directly support Australia retaining sovereignty in priority areas such as critical minerals, energy, food, water and Australia's unique biodiversity. Over and above these, CSIRO has made detailed choices within its research areas to support other aspects of Australian sovereignty and deliver against the National Science and Research Priorities (NSRPs).[55] To illustrate those more detailed choices **Figure 3** demonstrates how CSIRO research is delivering against the NSRPs.

This mapping of the CSIRO research portfolio shows that CSIRO has made detailed choices within research areas – especially 'One Health' and 'Tech Economy' – that speak directly to Australia's social cohesion and security; both of which are key elements of maintaining society *in extremis*. There is significant CSIRO research effort directed towards biosecurity, cyber security and critical technologies such as quantum and artificial intelligence; all of which sustain or build Australia's sovereignty and are identified as such in the Future Made in Australia National Interest Framework. Regarding technology areas identified in the government's list of critical technologies in the national interest',[56] CSIRO's outputs (as measured by publications) demonstrate the scale of its investment in the areas on the list, particularly artificial intelligence (10.4% of CSIRO's output or 1,811 publications), advanced manufacturing (11.1%, 1,932) and advanced ICT (13.7%, 2,395). These technology areas are of critical long-term strategic importance to Australia's future economy, security and social cohesion.

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[53] Holden, R & Schmidt, B 2025, *Why sovereign research is critical to Australia's economic future*, UNSW BusinessThink, viewed 6 January 2026, <https://www.businessthink.unsw.edu.au/articles/why-sovereign-research-is-critical-to-australias-economic-future>.

[54] 'Energy and Minerals', 'Food and Fibre', 'From Wonder to Discovery', 'Nature', 'One Health', 'Tech Economy'.

[55] Department of Industry, Science and Resources 2024, *Australia's National Science and Research Priorities,* Australian Government, viewed 28 January 2026, <https://www.industry.gov.au/publications/national-science-and-research-priorities-2024>

[56] Department of Industry, Science and Resources 2024, *List of critical technologies in the national interest*, Australian Government, viewed 6 January 2026, <https://www.industry.gov.au/publications/list-critical-technologies-national-interest>

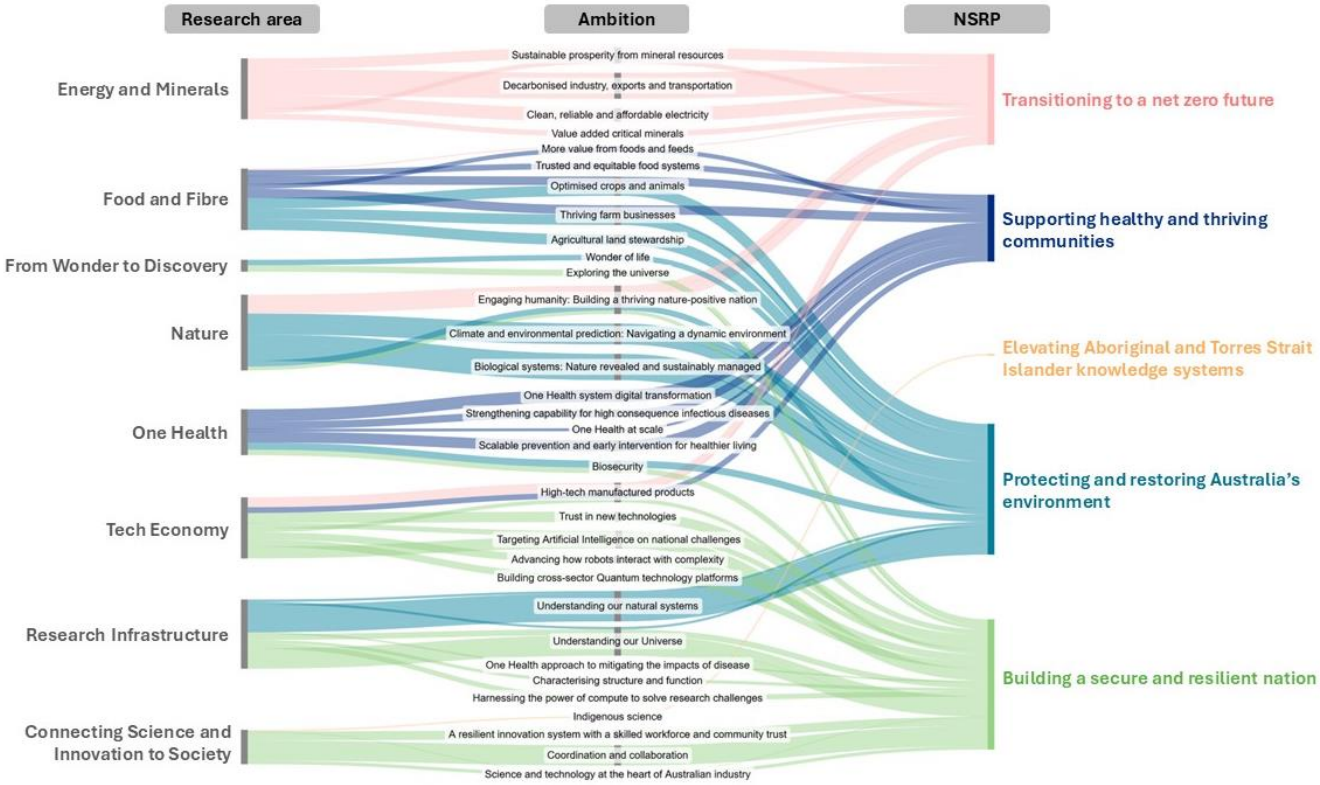

Figure 3: Sankey diagram of CSIRO's research to NSRPs

There is one additional strategic research choice that CSIRO makes to support Australian sovereignty: the intellectual property stance that the organisation takes. Patents are crucial for innovation because they grant inventors exclusive rights, incentivising investment that allows further development, piloting and scaling and transforming inventions into products that can benefit society. Patents are also a way for inventions to be publicly disclosed, allowing others in the innovation system to make further progress, driving economic growth, and creating competition through their unique offerings.

CSIRO is the largest source of Australian provisional patent application among non-corporate organisations – CSIRO accounted for 23% of patent grants in 2024. The value of CSIRO's patents, and therefore the benefit and importance to Australia, is also demonstrated by forward citation count.[57, 58] Ranked against peer international organisations[59], CSIRO received the highest average number of patent citations in 2024 and was ranked in the top 3 in all technology domains in 2023 (the latest year of analysis).

[57] 'Forward citation count, that is, where future patents refer to a patent as prior art. Most frequently used are 'Category X' citations, which indicate that the cited patent alone indicates that a claimed invention is not novel and does not involve an inventive step; and 'Category Y', which indicate that a claimed invention is not novel and does not involve an inventive step when the cited patent is combined with other such patents. The more times a patent has been found to be a novel barrier to a subsequent claim of invention, the more applied or technological impact it is held to have had. Forward Citations to patents have been shown to correlate with different measures of value, including auction prices, company surveys and normative peer valuations. See CSIRO 2024, *Science, health and excellence report summary 2023*, viewed 6 January 2026, https://publications.csiro.au/publications/publication/PIcsiro:EP2024-0281/SQscience%20health%20and%20excellence%20report%20summary%202023/RP1/RS25/RORECENT/STsearch-by-keyword/LISEA/RI1/RT1

[58] Jaffe, AB & de Rassenfosse, G 2017, 'Patent citation data in social science research: Overview and best practices', *Journal of the Association for Information Science and Technology*, vol. 68, pp. 1360–1374, doi:10.1002/asi.23731.

[59] Applied science government research labs globally, including: Max Plank Institutes, Japan Science & Technology, Netherlands Organisation for Applied Scientific Research, Fraunhofer Gesellschaft, Brookhaven National Laboratory, National Research Council Canada, Battelle Memorial Institute, Agency for Science Technology and Research, Helmholtz Association, US Department of Energy, Institut National de Recherche Pour L'Agriculture, L'Alimentation et L'Environnement, US Department of Agriculture, Electronics and Telecommunications Research Institute, Centre National de la Recherche Scientifique, Consejo Superior de Investigaciones Cientificas, National Insitute of Advanced Industrial Science and Technology, Industrial Technology Research Institute, Chinese Academy of Sciences.

CSIRO's scientific and research infrastructure

As outlined above in item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9) and in item (b) the importance of public funding for public good science (page 16), scientific and research infrastructure is critical to enabling research and ensuring scientific sovereignty for Australia.

CSIRO serves a dual role for scientific and research infrastructure: as stewards, CSIRO manages and maintains key infrastructure on behalf of Australia; and CSIRO operates and uses infrastructure to enable delivery of its own research portfolio.

CSIRO's research infrastructure comprises significant physical, biological and digital assets, as well as the expertise of the people who ensure the readiness of this infrastructure to tackle current and emerging scientific challenges for Australia and that the infrastructure is available to be used safely. Collectively, CSIRO's scientific and research infrastructure supports collaborative networks of researchers and users from across Australia's research, industry and community sectors and attracts strong national and international partnerships. These assets include landmark facilities such as ACDP, Australia Telescope National Facility (ATNF) including Murriyang, CSIRO's Parkes Radio Telescope and Marine National Facility (MNF (including the RV *Investigator*).

CSIRO also develops and manages scientific and research infrastructure at an institutional level, allowing CSIRO to deliver against its research priorities and provide services to the Australian ecosystem. This infrastructure includes common-use labs and testbed facilities which enable Australian businesses, particularly SMEs, to engage in R&D that would otherwise be financially or technically inaccessible in Australia. These facilities support early-stage product development, prototyping, demonstration and scale-up, all of which are essential to bridging the commercialisation gap. Their use has been demonstrated to accelerate business growth, mitigate investment risk, and deliver regional innovation benefit. This means that R&D is kept onshore for national benefit.

Scientific and research infrastructure also provides sovereign operational capability – protecting Australian industry and Australians – that could be rapidly pivoted towards non-research needs if needed, or for which operational activities are their *raison d'être*. The former includes landmark facilities such as the ATNF or MNF. The latter is best illustrated by ACDP, which provides Australia critical operational biosecurity capability to protect Australia's agricultural trade and the Australian public from zoonotic diseases, including during the COVID-19 pandemic.

Australian Centre for Disease Preparedness

The ACDP provides critical sovereign capability to protect Australian communities, agriculture industry and the environment.[60] ACDP is central to protecting Australia from exotic, emerging and zoonotic diseases, including foot-and-mouth disease, transmissible spongiform encephalopathy, Hendra virus, Middle East respiratory syndrome, avian influenza, insect-borne diseases and aquatic animal diseases. ACDP also delivers unique expertise, research and services in biosecurity and counter-bioterrorism, supported by its ability to undertake diagnostics and research on large animals at the highest possible level of biocontainment (Physical Containment 4 level (PC4), equivalent to Biosafety Level 4 (BSL-4)).

[60] Acil Allen Consulting, 'Appendix B – Case study: Australian Animal Health Laboratory (AAHL)', *CSIRO's impact and value: an independent evaluation*, 2014, viewed 22 January 2026, <https://www.csiro.au/en/about/Corporate-governance/Ensuring-our-impact/Impact-case-studies/National-facilities-collections/Australian-Centre-for-Disease-Preparedness>

ACDP commenced operations in 1984. Operating continuously, 24 hours a day and 365 days a year, it plays a vital role in protecting Australian communities, wildlife and livestock and aquaculture species from infectious disease threats. Diagnostic testing is conducted under a rigorous quality assurance framework to support export certification, demonstrate proof of freedom from infectious agents following outbreaks, and underpin surveillance programs. This capability provides assurance to international trading partners and facilitates the export of Australian agricultural products. A recent example was the suspension of cattle exports to Indonesia over concerns relating to lumpy skin disease; ACDP testing verified Australia's disease-free status, enabling exports to resume swiftly. It is through these functions that ACDP directly safeguards the Australian community and agricultural industries, which contributed $30.1 billion in livestock production and $3.5 billion in aquaculture output to the economy in 2022–23. ACDP's capabilities therefore play a key role in supporting the ongoing competitiveness of Australia's livestock, fisheries and aquaculture sectors in international markets.

ACDP's engineering and design provide unique capability to safely manage and research the world's most dangerous pathogens. It is one of only 3 maximum-containment animal health laboratories globally capable of handling large animals. It is also the only PC4 level facility located within a high biocontainment envelope (providing additional layers of biocontainment control) in the southern and eastern hemispheres. Prior to ACDP's establishment, samples requiring analysis for exotic animal diseases were sent overseas for analysis, leading to delays and reduced control over sensitive trade-related information. ACDP has enabled exotic diseases to be diagnosed within Australia, strengthening national biosecurity and supporting animal products and live exports trade. During the COVID-19 pandemic, ACDP contributed by conducting vaccine efficacy trials and supporting testing for other protective measures.

ACDP conducts approximately 60,000 diagnostic tests annually and serves as an internationally recognised Reference Laboratory for multiple viral pathogens. It provides critical diagnostic and response support for the Asia-Pacific region for established and emerging diseases of threat to Australia and its neighbours.

In the Budget 2024–25 the government approved CSIRO to commence Stage 1 of the part-life refit at a cost of $342 million over 6 years, funded through the sale of CSIRO property assets. CSIRO is at an advanced stage of planning for Stage 2 of the part-life refit, needing to be brought forward for necessary approvals imminently.

(d) the recruitment and retention of staff including senior and mid-career researchers, along with the training and career paths of early-career researchers

CSIRO's ability to deliver on Australia's national science priorities depends on a sustainable research workforce that spans senior, mid-career and early-career researchers. CSIRO's approach integrates rigorous workforce planning, inclusive recruitment practices and targeted capability development to attract, retain, and grow scientific talent.

- For senior and mid-career researchers, CSIRO's focus is on strategic recruitment, transparent career pathways and leadership development to ensure continuity of expertise and impact.
- For early career researchers, CSIRO invests in structured programs including postdoctoral fellowships, the Industry PhD initiative and university partnerships that provide training, mentorship, and clear career trajectories.

Combined with diversity and Indigenous employment strategies, CSIRO's approach is aimed at securing a resilient talent pipeline that supports innovation and national capability. Staff surveys report that CSIRO staff are motivated by purpose-driven work, scientific excellence, development opportunities, supportive culture, flexible arrangements and strong organisational integrity.

CSIRO is subject to all the relevant commonwealth legislation relevant to employment, including the *Fair Work Act 2009* (Cth), with an Enterprise Agreement in place (CSIRO's Enterprise Agreement 2023-26). CSIRO is not part of the Australian Public Service (APS)[61] but is subject to the Public Sector Workplace Relations Policy 2023 which limits CSIRO's employment conditions, include salary increases. Funding constraints mean that CSIRO's property, scientific and research infrastructure and equipment are no longer cutting-edge which detracts from the desirability of working at a purpose-driven organisation (noting CSIRO cannot match private-sector salaries).

Workforce planning

CSIRO undertakes workforce planning at enterprise and research unit levels to ensure near-term operational readiness and long-term capability needs are met. CSIRO's People team partners with research unit leaders to consider a range of data points such as internal and external workforce data, capability strengths and gaps and sourcing strategies to assess long-term workforce needs. Each CSIRO research unit has a capability committee to ensure workforce decisions align with strategic plans and organisational priorities. Capability committees meet each month and are attended by the research units' senior leadership and are supported by People (human resources) partners.

Committees provide oversight of capability needs and focus on:

- monitoring progress against operational and strategic workforce plans and budgets
- mobilising existing capability effectively – including across research units
- making informed recruitment decisions in line with CSIRO's Enterprise Agreement and policies
- promoting workforce diversity and inclusion, including Aboriginal and Torres Strait Islander employment and progression.

[61] As such CSIRO is not subject to the *Public Service Act 1999* (Cth).

Recruitment practices

CSIRO's recruitment approach combines robust governance, targeted internal and external strategies and a commitment to inclusive workforce practices, alongside dedicated approaches for Aboriginal and Torres Strait Islander employment. Indigenous employment principles are embedded in recruitment governance, incorporating culturally informed considerations alongside merit-based assessment to address systemic barriers and support retention and progression.

Consistent with the APS, CSIRO's recruitment is merit-based and transparent, with indefinite and term roles of 18 months or more advertised externally unless filled through internal mobility or redeployment. Competitive (non-salary) conditions under the CSIRO Enterprise Agreement and targeted outreach and partnerships support a strong talent pipeline of senior and mid-career researchers.

CSIRO's approach to recruitment and retention has been recognised externally for its innovation and impact. In 2025, CSIRO's Talent Acquisition & Indigenous Employment team was awarded the SEEK Public Sector Team of the Year Award, acknowledging the organisation's leadership in inclusive, strategic recruitment and its success in building a diverse and high-performing workforce. This recognition shows how CSIRO's integrated strategies, such as Diversity, Inclusion and Belonging and Indigenous Employment, effectively attract and retain top research talent.

Capability development

CSIRO invests in enterprise-level capability development to support researchers throughout their careers. This ensures capability building is intentional, scalable and aligned with organisational and national priorities, while remaining adaptable to funding and workforce changes.

- A centrally governed **Digital Academy** program builds digital, data and collaboration skills essential across all research domains and career stages. Between 2018 and 2025 it supported over 6,600 learners, delivering impact and efficiency.
- A new **researcher capability framework** currently in development will define capability expectations from early career to senior levels, complementing existing programs and enabling transparent development pathways, workforce planning and mobility.
- CSIRO develops leaders through a **structured leadership curriculum** complemented by executive development initiatives and succession planning. CSIRO's award-winning high potential leadership program Elevate accelerates talent through experiential learning, coaching and strategic projects. The related Senior Leader Program and Experienced Leader Program ensure capability uplift and readiness for future leadership roles.

These initiatives integrate with CSIRO's workforce planning and research strategies, supporting future capability needs and career development. They increase return on public investment by delivering enduring, transferable skills for Australia's research system, whether researchers remain at CSIRO or transition to academia, industry, or government.[62]

[62] CSIRO also offers secondments across the APS, and partners with external providers to enable staff to undertake specialist training. CSIRO also uses grant programs such as Payne-Scott, Julius and Newton-Turner grants to facilitate bespoke career development opportunities, which enable international placements for CSIRO researchers.

Senior and mid-career researchers

CSIRO supports senior and mid-career researcher recruitment, retention and progression through structured career pathways, internal mobility (including redeployment opportunities when projects/programs of research come to an end) and leadership development.

CSIRO has a single classification system that reflects an integrated approach to its workforce, through which technical specialists, such as researchers, are catered for across the entire classification system.[63] The classification system is structured around classification level descriptors that can accommodate both technical specialists and leadership roles. This allows technical specialists to be promoted based on either their specialist role or their managerial functions.

Reward and recognition are integral to CSIRO's retention strategy. Senior and mid-career researchers are regularly acknowledged through internal awards such as the CSIRO Awards for Excellence, as well as through support for external honours, fellowships and scholarships. These programs celebrate outstanding scientific achievement and leadership, reinforcing a culture of excellence and providing additional motivation for high-performing staff to continue their careers at CSIRO.

Early and mid-career researchers

CSIRO is committed to developing future research talent and fostering collaboration with universities to support education. It delivers on this commitment by partnering with universities and industry to offer postgraduate studentships and undergraduate traineeships, providing hands-on research experience and building science, technology, engineering and mathematics (STEM) capability for careers in research and industry.

As a specific example, CSIRO appoints recent PhD and Engineering Masters graduates to structured, term roles (typically 3 years) that build advanced research and leadership skills. These appointments include tailored development plans to prepare researchers for careers within CSIRO or across the research, government and industry sectors. CSIRO identifies this cohort as 'CERC Fellows' (CSIRO Early Research Career Fellows).

CERC fellows are a key part of CSIRO's research workforce, designed to foster the next generation of innovative leaders. Historically, CSIRO maintained around 300 fellows with 37% obtaining an indefinite role upon completion of an initial term. During COVID-19, global disruptions significantly impacted early career researchers across the Australian R&D ecosystem. In response, CSIRO launched the 'Impossible Without You' campaign, increasing recruitment and opportunities for subsequent indefinite roles. This program expanded the cohort to approximately 500 by 2024 and lifted retention from 43-68% between the 2021–22 and 2023–24 financial years.

This campaign was temporary and responsive to transitory national challenges. Numbers were brought back to pre-pandemic levels of 286 by the middle of 2025 and are projected to decline to approximately 117 by the middle of 2026, with all 'Impossible Without You' fellows completing their terms towards the end of 2026. CSIRO will continue to support opportunities for the postdoctoral cohort in the future, but funding constraints will put pressure on CSIRO's ability to maintain the historical average of between 250 to 300 postdoctoral students.

[63] Please note, that the APS Hierarchy and Classification Review in 2022, recognised that CSIRO's classification as a non-APS agency was helpful to the APS In considering how to accommodate for senior specialist roles that do not manage staff.

Table 3: CSIRO early career researcher numbers by year as of 30 June 2025

	2018	2019	2020	2021	2022	2023	2024	2025
CERC Fellows	312	320	264	219	283	452	499	361
CSIRO sponsored and co-supervised postgraduates								
PhD	418	390	451	403	378	343	451	499
Masters	12	7	7	16	16	15	15	19
Total	**430**	**397**	**458**	**419**	**394**	**358**	**466**	**518**
Supervised postgraduates (not sponsored)								
PhD	398	422	337	254	217	323	214	198
Masters	147	137	84	57	58	71	61	38
Total	**545**	**559**	**421**	**311**	**275**	**394**	**275**	**236**

CSIRO delivers tailored programs to facilitate the national pipeline, recruitment and retention of the postdoctoral cohort.

- The **Industry PhD program**[64] creates partnerships between CSIRO, universities and industry to co-design 4-year, industry-focused PhD projects that allow students to gain skills for impact-driven research and collaboration. The program develops advanced research and leadership capabilities, preparing graduates for careers in CSIRO, industry, government and the broader research sector.
- In the 2024–25 financial year CSIRO supported over 1,400 **undergraduate and postgraduate students** through sponsorship and supervision, strengthening Australia's STEM pipeline. While numbers of postgraduate students declined during the 2021–22 and 2022–23 financial years, they rebounded in subsequent years due to CSIRO's provision of sponsored, that is funded positions (Table 3).

For more than two decades, CSIRO has also delivered the nationally recognised STEM Professional in Schools program for the Department of Education connecting Australian teachers with volunteer STEM experts. The initiative brings real-world science, technology, engineering and mathematics into classrooms. Each year, it links 1,145 teachers with 860 STEM professionals from 290 organisations, reaching nearly 18,500 students across Australia. The program has strong engagement from regional and remote schools (26.9%), women in STEM (43.3% of professionals), and schools with high Aboriginal and Torres Strait Islander enrolments (3.3%).

Indigenous research workforce and the STEM pipeline

CSIRO supports Aboriginal and Torres Strait Islander participation, retention and progression in research careers through its Indigenous STEM pipeline framework, which spans early engagement, tertiary education and advancement into research and leadership roles. This holistic approach builds capability across the full career lifecycle rather than relying on point-in-time recruitment.

[64] Building on a successful pilot by CSIRO with UNSW in 2022, the program received $125 million funding over 10 years under the Australian Government's University Research Commercialisation Action Plan. The program funds 50 new projects annually, each for four years. It will support 450 doctoral industry projects over the 10-year period. The program has a strong pipeline of projects with 33 universities involved, supporting a cohort of 88 students (in 2025) with an additional 19 students who commenced in early 2026.

The framework includes pathways for high school engagement, tertiary students, graduates, early-career roles and pre-doctoral development. It emphasises culturally safe supervision, capability building, leadership readiness and long-term retention. A key feature is enabling Indigenous researchers to contribute to and lead research that incorporates Indigenous knowledge systems and methodologies, strengthening research quality and relevance while supporting Australia's future science and innovation capability, in alignment to the Minister's Statement of Expectations and the NSRPs.

By embedding the framework within workforce planning, recruitment, governance and capability development, CSIRO ensures Indigenous workforce growth aligns with national research priorities and supports a sustainable, resilient research pipeline.

Diversity and inclusion

CSIRO's Diversity, Inclusion and Belonging Strategy (2023–26) sets ambitious targets for gender, Indigenous, disability and LGBTQIA+ representation across all levels, including senior research roles. Recruitment panels are trained in inclusive practices and processes are reviewed to mitigate bias. Progress is monitored through regular reporting and integrated into workforce planning.

As of June 2025, CSIRO's staff included 44.2% women, 2.5% identifying as Aboriginal and/or Torres Strait Islander, and 28.6% from non-English speaking backgrounds. Voluntary turnover was 7.7%, with senior and mid-career researcher turnover below sector benchmarks. Internal mobility and leadership appointments are key retention drivers – noting the challenges posed by uncompetitive salaries.[65]

[65] See CSIRO's response to item (f) the long-term capability needs of the CSIRO, including workforce, infrastructure and equipment (page 41).

(e) CSIRO's commercialisation of scientific research

The term 'commercialisation' carries different meanings depending on the context. Generally, commercialisation means the process by which research outputs are turned into products, services or technologies for the market. The commercialisation of CSIRO's research results in both societal impact and develops industry. The commercialisation of CSIRO's research output also generates revenue for CSIRO and its partners, however maximising financial return to CSIRO is not the priority when CSIRO commercialises research – rather, commercialisation activities support the delivery of impact.

Successive governments have supported the commercialisation of Australian research to drive productivity and grow the economy and secure sovereign capability. Consequently, CSIRO has been funded by government to deliver programs to support commercialisation of Australian research.

More generally, CSIRO generates own-source revenue as a result of the activities it undertakes to fulfil its obligation under the SIR Act, namely to 'encourage or facilitate the application or utilisation of the results of its research'. CSIRO generates own-source revenue in 4 ways:

1. **Co-investment for collaboration**

   CSIRO enters contracts with collaborators to deliver R&D on a 'co-investment' basis, meaning the work is undertaken on either a full or partial cost recovery basis.

2. **Consulting and services**

   CSIRO provides advice or testing services on a full cost recovery basis (with any profit reinvested into research).

3. **Intellectual property**

   CSIRO protects intellectual property and then facilitates its utilisation through licensing or sale. CSIRO's intellectual property is usually derived from CSIRO's R&D activities conducted in collaboration with other parties; or appropriation-funded R&D that has not been funded by other third parties.

4. **Equity**

   CSIRO has the authority to form, or participate in the formation of, a company or trust that aligns with its primary or secondary functions in the SIR Act. To support research and commercialisation efforts, CSIRO may invest its intellectual property into start-up companies that align with its mission.[66]

Under the SIR Act CSIRO has a primary purpose to carry out scientific research to assist Australian industry. As stewards of government funding, CSIRO seeks equitable commercial arrangements when working with industry and providing services to other stakeholders. However, CSIRO has attracted public criticism from some quarters; principally centred on the argument that CSIRO has prioritised own-source revenue generation over 'public good science'. CSIRO rejects the implied dichotomy between the 2 activities, noting that the largest share of CSIRO's own-source revenue is from Australian governments (48% of the total in the 2024–25 financial year). This is both consistent with the general state of Australian private investment in R&D and CSIRO's approach to focus on own-source revenue that is 'primarily in areas with strong public good characteristics'[67] or in other words 'public good' research.

[66] The sale of equity does not appear as 'revenue' on CSIRO's income statement; however, it does provide cash and is an important funding source for CSIRO's activities.

[67] Productivity Commission 2007, *Public support for science and innovation*, Productivity Commission, Canberra p. 481.

Additionally, the generation of own-source revenue has contributed to CSIRO's ability to retain a larger research cohort than would otherwise have been possible, with these research collaborations also realising a range of other benefits as outlined in CSIRO's response to this term of reference. CSIRO's response also provides:

- an overview of CSIRO's commercialisation activities[68]
- an overview of programs delivered by CSIRO to support commercialisation of Australian research
- a more holistic analysis of how and why CSIRO generates own-source revenue, to contextualise the generation of own-source revenue from the private and public sectors.

CSIRO's commercialisation activities

In the 2024–25 financial year, CSIRO leveraged $917 million of appropriation to generate $660.7 million of own-source revenue, split by each type as outlined below in Table 4: 2024–25 revenue by type.

Table 4: 2024–25 revenue by type

REVENUE TYPE	2024–25 ($ MILLION)
Co-investment for collaboration	396.2
Consulting and services	138.9
Intellectual property – royalty and licence revenues	58.5
Other fair value gains and reversals (equity)	22.4
Total own-source revenue and gains on equity	660.7

Like others in the research system, including universities and medical research institutes, CSIRO prudently protects the intellectual property it generates to enable broader national benefit. Having protected intellectual property, CSIRO is then able to more effectively engage in co-development of intellectual property with collaborators who have the necessary knowledge, scale and capital to get to market. In this way, protection of intellectual property and commercialisation deliver societal impact. Protection of intellectual property is important for industry to invest further in the technology as well as enabling CSIRO to negotiate equitable commercial arrangements and protect the equitable interest flowing from public funding. CSIRO receives revenue in the form of licensing fees and ongoing royalties, and cash funding at the time of liquidising equity in the cases where CSIRO has taken equity in a company in exchange for intellectual property rights. This revenue can be deployed flexibly by the organisation to complement appropriation funding.

The cash component from licence fees and royalties is approximately 9% of total own-source revenue (**Table 4**); however, this amount is variable, year to year (**Figure 4**).

[68] For the purposes of CSIRO's response to this term of reference, 'commercialisation' generally refers to market-focussed opportunities with the private sector. Direct commercialisation activities include CSIRO's intellectual property activities and equity holdings. Indirect commercialisation activities are covered in the discussion of 'own-source revenue'.

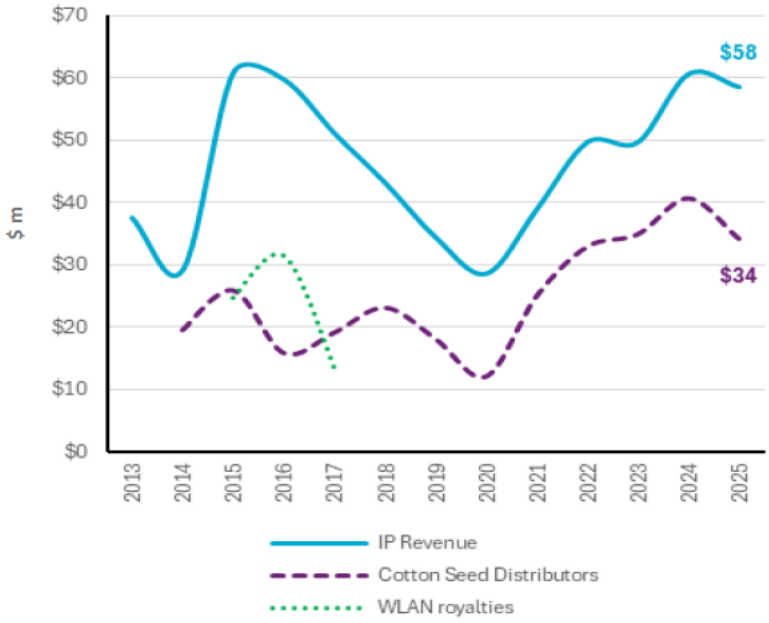

Figure 4: CSIRO intellectual property revenue 2013 to 2025 ($ million)

CSIRO has made a concerted effort to create and scale companies over the last ten years – most notably under the 'Innovation Catalyst' strategy introduced in 2016. CSIRO's primary activity in this regard is the formation of spin-out companies (where CSIRO has developed the underpinning intellectual property) in which it takes an equity position. As a consequence, CSIRO has increased its equity holdings from $9.5 million in the 2015-16 financial year to $254.3 million in the last financial year (**Figure 5**).

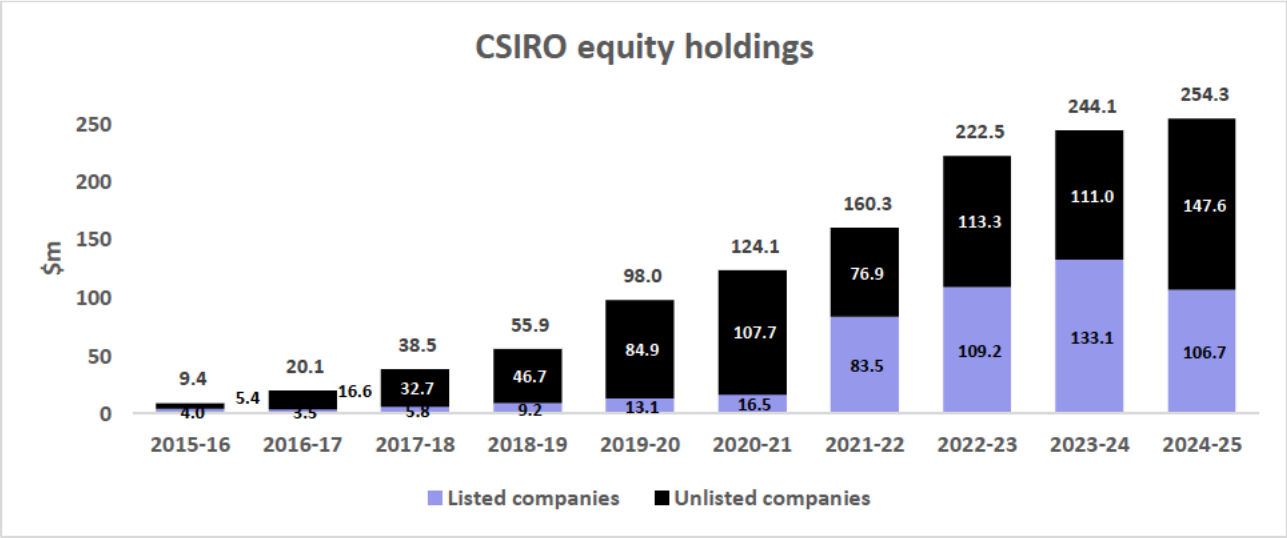

Figure 5: CSIRO equity holdings ($ million)

The benefits of CSIRO's intellectual property licensing and equity generation include:

- creation of new companies and related employment; for example, 103 companies and 3,910 jobs can directly be attributed to CSIRO's intellectual property and research
- technology sovereignty, knowledge retention and a tangible return on research investment in the form of economic diversification and resilient supply chains; spin-out companies are created not just for the balance sheet value, but the creation of new industries and jobs in Australian cities and regions.

CSIRO periodically sells some of its equity holdings and revenue from these sales has increased significantly since the 2018–19 financial year. CSIRO received approximately $85 million from the sale of a tranche of its equity in Chrysos Corporation in the 2025–26 financial year and recorded a total gain on its income statement this financial year of approximately $72 million.[69] CSIRO will use the proceeds of this sale to begin addressing its sustainability challenges. Sell-downs are unpredictable in timing and size and are therefore challenging to confidently incorporate into financial planning.

It should be emphasised that maximising CSIRO's own-source revenue from commercialisation activities (intellectual property or equity) cannot be, and is not, the controlling priority. Rather, commercialisation activities are important for the delivery of impact. There are many instances where the incremental intellectual property benefits to a partner do not justify substantial and complex commercial negotiations for CSIRO to access royalties – as CSIRO is not solely motivated by the pursuit of profit in commercial negotiations CSIRO takes the pragmatic approach of supporting the delivering of impact and not simply preventing the use of intellectual property.

Programs delivered to support commercialisation of Australian research

CSIRO also supports the commercialisation of Australian research more generally (not just its own), through initiatives aimed at the translation of research. This includes the following programs.

CSIRO's **ON Program** equips researchers from across the sector with the skills, networks and confidence to be hands-on in taking their research to the market. The ON Program provides researchers with mentorship and individualised coaching from industry experts and build skillsets in customer discovery, market validation, the selection of appropriate business models, investor relations and intellectual property. The ON Program include access to venture capital partners and networks to help secure capital for business development and provides a pathway to research translation grants under the Australia's Economic Accelerator (AEA) program. Since its launch in 2015 the ON Program has delivered training and support to 1,500 teams and 8,500 researchers. This has resulted in the creation of more than 1,050 jobs through the 89 alumni-funded companies which have attracted over $430 million in investment capital and $360 million in grants - creating a legacy and vibrant community of researchers, founders, industry experts, advisors and investors. The ON Innovation Program is funded until 2026.

Main Sequence Innovation Fund was established by CSIRO to invest in early-stage companies that are commercialising research from the publicly funded research organisation to address the 'valley of death' between research and commercialisation. Main Sequence is a specialist venture fund making equity investments in early-stage opportunities that are based on deep science and technology. Main Sequence conducted 3 rounds of capital raising from the private sector during the period 2017 to 2023. Investors in Main Sequence include superannuation funds, foreign wealth funds and strategic investors, strategic and institutional investors and high net worth individuals. To date the $175 million commitments by CSIRO and government have helped catalysed $850 million in private sector investment. CSIRO does not control Main Sequence investment decisions, which have the same autonomy as a private-sector venture capital fund provided that investments fall within the investment mandate (which includes the government policy intent). As the fund sits outside the government sector and in the government's accounts, CSIRO's investment in Main Sequence is considered an investment in an entity external to government.

CSIRO has been separately funded via budget measures to deliver these programs, recognising the policy objectives of successive governments to stimulate commercialisation of publicly funded research outcomes.

[69] CSIRO acquired equity in Chrysos at the time that the company was established (2016) to commercialise CSIRO's PhotonAssay technology, which provides a faster, safer, more accurate and environmentally sustainable method for analysing gold and other elements. The equity that CSIRO holds in companies is typically acquired as payment for the rights to intellectual property at the establishment of spin-off ventures to take the technology to market.

Own-source revenue

CSIRO has generated own-source revenue for its research since the 1930s, with this revenue representing between 16-23% of CSIRO's total expenditure in the period from 1950 to the late 1980s,[70] increasing to over 30% today.[71]

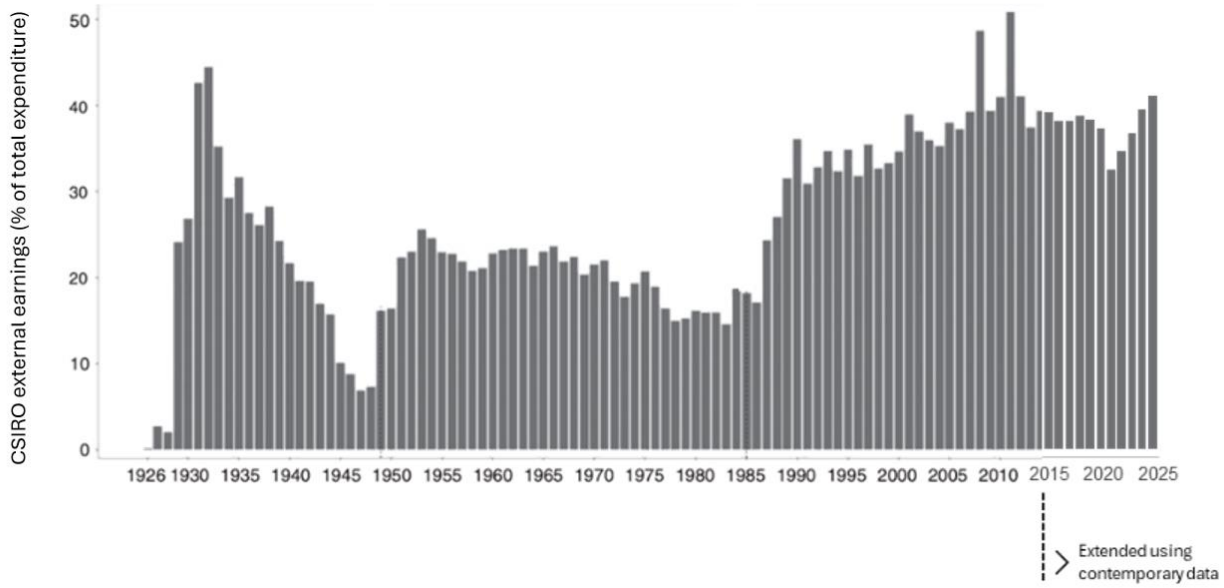

Figure 6: CSIRO's own-source revenue (including licence fees and royalties and equity bookings) as a percentage of total expenditure[72]

The most recent increase in own-source revenue is attributable to the 1988 mandate from the federal government that CSIRO achieve own-source revenue from 'industry' (which included the private sector and government contracts) at 30% of its total expenditure.[73]

This policy intervention was designed *'to encourage CSIRO to improve its links with industry'*[74] and led to a revenue target becoming a performance indicator for CSIRO for over a decade (removed in 2002). The aim of the policy was achieved, however commentators suggested there were unintended consequences: '… *the external revenue requirement had brought CSIRO and industry significantly closer together … however, in the rush to pull external dollars to meet the government's target, its capability in areas other than 'doing its science' was being sorely tested*'.[75]

[71] This increase in own-source revenue is primarily driven by an increase in revenue from Australian governments (Federal and State/Territory) and intellectual property. Lefroy, T & Porfirio, LL 2017, 'Changing fortunes: a brief history of CSIRO funding from treasury and external sources, 1926 to 2015', *Historical Records of Australian Science*, vol. 28, no. 1, pp. 12–17, doi:10.1071/HR16013

[72] The revenue peaks seen in the 2008–09 and 2011–12 financial years include licence fees arising from the settlement of litigation in relation to CSIRO's patent for wireless networking (Wi-Fi).

[73] Reiterated in 1999, see National Archives of Australia (NAA), series A14370, item JH1999/13/1, *ERC submission 1999–2000 budget*.

[74] Commonwealth of Australia 1989, *Budget Paper No. 1 1989–90: Budget statements*, Australian Government Publishing Service, Canberra, p. 3.287, viewed 6 January 2026, https://archive.budget.gov.au/1989-90/downloads/Budget_1989-90.pdf

[75] Sandland, R & Thompson, G 2012, *Icon in crisis: The reinvention of CSIRO*, University of New South Wales Press, Sydney.

In the 2024–25 financial year CSIRO earned more than $637 million of own-source revenue (excluding gains). Critically, by leveraging appropriation in this way, own-source revenue allows CSIRO to support a larger research capacity. From the $503.8 million of appropriation, research units generated $571.1 million of own-source revenue which is invested directly back into research.[76]

CSIRO's own-source revenue has increased 26% as a percentage of appropriation (including budget measures) from the 2000–01 to 2024–25 financial years (43-69%) (**Figure 7**).

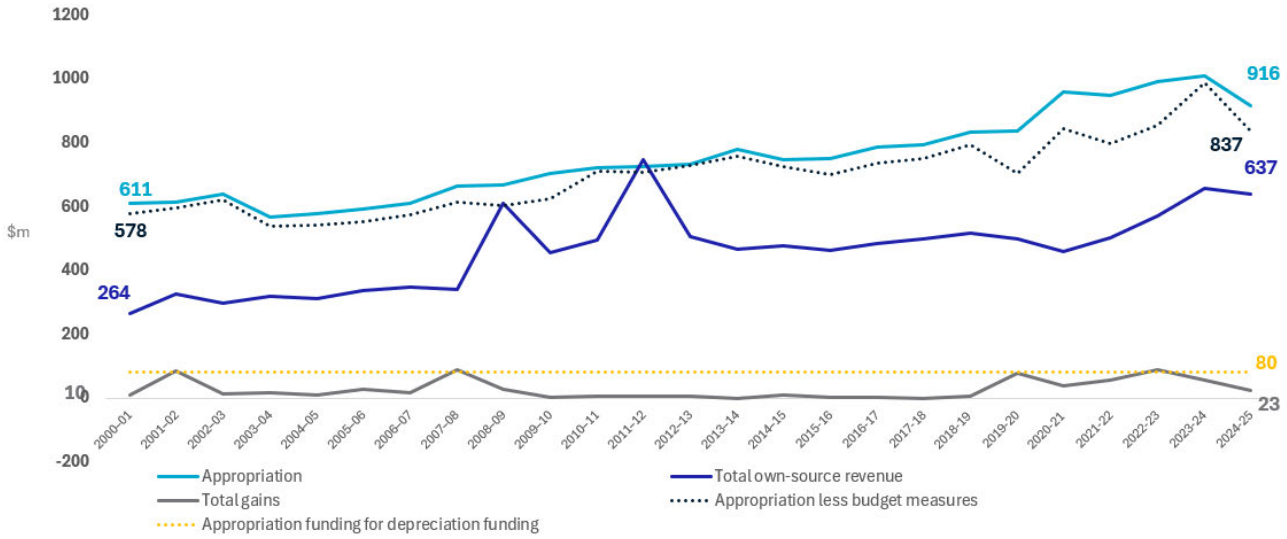

Figure 7: Historical breakdown of CSIRO's revenue ($ millions)

With the generation of own-source revenue CSIRO can retain a larger research cohort than would have otherwise been possible in the face of the rising cost of conducting science.[77] However, there are other benefits realised from CSIRO generating own-source revenue.

In practical terms, engagement with delivery partners (for example, product developers, service deliverers, end users) is critical for the context of the problem or opportunity to be best understood. This ensures the research to be most effectively directed towards an implementable solution, as well as enabling the scale-up of technologies from laboratory to industry scale and thus avoiding the 'valley of death'.

Secondly delivery partner's willingness to invest in CSIRO research provides a validation confirming that the partner considers that the knowledge output from the research will enable them to address genuine market, policy and societal needs. This is true across all partners including domestic and international governments, private businesses (small to multi-national) and other members of the innovation ecosystem.

Finally, the adoption and implementation of the novel technology often moves faster when the commercial partner is involved closely and investing their own funds and resources, creating 'skin in the game'.

While there are benefits, CSIRO has faced criticism for generating own-source revenue. On the other hand, reliance on own-source revenue increases uncertainty in relation to CSIRO's forward budget, as it is dependent on market forces and governments' spending capacity.[78] This can lead to instability in CSIRO's research capacity because of the links between own-source revenue and research staffing levels – as own-source revenue increases, additional staff are required for delivery of the contract, with the reverse also true.

[76] A portion of own-source revenue from intellectual property activities, including licensing and royalties, is also used for re-investment into enterprise needs such as site consolidation, but primarily own-source revenue is reinvested into research (both operating and capital).

[77] See above at CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

[78] Sudden changes in industry profitability (droughts, trade barriers, economic conditions) and significant changes to government policies and priorities may create challenges for CSIRO's own-source revenue.

Contracting with the private sector

As outlined in the SIR Act, CSIRO must conduct research to assist industry.

CSIRO generally generates own-source revenue from the Australian and international private sector (collectively 'industry') via contracting for R&D, consultancy and services. Within the Australian private sector CSIRO engages with both SMEs and large corporations (including multinationals and their subsidiaries).

R&D support is offered by CSIRO to tech-focused Australian SMEs, since most lack the funding and access to scientific infrastructure or the capacity to conduct R&D themselves. SMEs generally seek incremental innovation that improves the efficiency and effectiveness of existing businesses.

CSIRO also engages in strategic partnerships with large corporations and multinationals, for example The Boeing Company and Bayer CropScience Pty Ltd.[79] Under these collaborative partnerships CSIRO conducts R&D at the 'innovation edge' and builds global relationships with flow on benefits to Australian industry. For example, under the agreement with Boeing, CSIRO connected local SMEs into Boeing's global supply chains.

In addition, CSIRO works with more than 400 companies of both types to provide technical testing services to meet Australian and international standards (predominantly focussed on the building and construction sector).

CSIRO's own-source revenue depends on the vibrancy of Australia's private sector investment in R&D. As a result:

- Since 2000, CSIRO's own-source revenue from the Australian private sector has been a reducing proportion of CSIRO's total own-source revenue representing 11% in the 2024–25 financial year. Since 2017, external revenue from Australian private sector and collaboration programs (rural development corporation and cooperative research centre programs) has decreased in absolute terms, dropping from $136 million (or 30.7% of external revenue) in the 2017–18 financial year to $116.7 million (20.7% of external revenue) in the 2024–25 financial year.[80]
- Own-source revenue from the Australian private sector was less than 5% of CSIRO's total revenue in the 2024-25 financial year.[81]

This reduction in own-source revenue from the Australian private sector reflects the composition (and low complexity) of Australia's industrial base (including company size and the demand for innovation) and the multi-decadal decline in Australia's manufacturing sector.[82]

CSIRO often co-invests its appropriation as part of collaborations with the private sector to deliver new R&D outcomes. This is a deliberate strategy to achieve the following aims.

Co-investment can assist Australian industry as required in CSIRO's legislated primary purpose. CSIRO R&D helps industry create jobs and strengthen the Australian economy. Australian SMEs often need an incentive to outlay their limited capital for R&D and SMEs generally have an expectation of co-investment based on their experience of government research grant programs from the 1990s onwards.

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[79] Refer to Appendix E (page 76) for case studies.

[80] In contrast, total external revenue (not including intellectual property revenue and equity bookings) increased from $400.8 million to $504.6 million, over the same period.

[81] This figure varies significantly across research units. Minerals Resources, Manufacturing, Energy and Data61, achieved between 14 – 55% of their total own-source revenue from the Australian private sector. By comparison, Environment received less than 10% of their own-source revenue from the Australian private sector sources, with 84% of coming from Australian governments.

[82] Georgeson, C & Harrison, AW 2015, *Regional impacts of the accelerated decline of the manufacturing sector in Australia*, Research Paper 1/2015, Office of the Chief Economist, Department of Industry and Science, Canberra, viewed 6 January 2026, <https://www.industry.gov.au/sites/default/files/June%202018/document/pdf/regional_impacts_of_the_accelerated_decline_of_the_manufacturing_sector_in_australia.pdf>

Co-investing provides CSIRO with the ability to retain ownership of intellectual property to ensure the deployment of technology for broader industry and societal benefit. For example, CSIRO has co-invested with a large Australian corporation to develop a rapid analysis tool for critical minerals exploration. This co-investment ensures the technology can be utilised across the sector, not just by the initial partner.[83]

Additionally, co-investment helps ensure R&D is deployed for public good, rather than sequestered and not further used, or alternatively only used to generate profit for one company. And it can also help to ensure downstream supply chain and industry benefits.[84]

Co-investing with the private sector offers significant benefits, but it is limited by appropriation constraints, noting the competing demands of funding basic research and operational expenses.

To contextualise CSIRO's response to this term of reference, funding for CSIRO's research units is predominantly a combination of appropriation and own-source revenue generated from Australian Government customers (which represents 48% of own-source revenue).[85] In comparison own-source revenue from the Australian private sector represents 11% of all own-source revenue (**Table 5**).

Table 5: Sources of CSIRO's own-source revenue 2024–25 ($ million)

SOURCE	REVENUE	SHARE OF TOTAL
Australian private sector	69.5	11%
Australian governments	307.2	48%
Overseas entities and international	111.3	17%
Rural industry R&D corporations	36.0	6%
Cooperative research centres	11.2	2%
Work in progress/deferred revenue	-30.5	-5%
Intellectual property —royalty and licence revenues	58.5	9%
Other external revenue	74.2	12%
Total own-source revenue	**637.2**	

Contracting with Australian governments

Revenue from Australian governments was the largest share of CSIRO's own-source revenue in 2024–25, at 48% of the total. The increase in revenue from Australian governments is significant – while it represented 9% of CSIRO's total expenditure in 2001, it increased to 19% in 2024–25 (**Figure 8**). This increase demonstrates both the extent to which CSIRO is contributing to government priorities and the organisation's increased dependence on contracting with Australian governments.

[83] CSIRO contributed 32% of total project costs in this example.

[84] CSIRO's Nufarm collaboration typifies these downstream benefits. This technology was developed in the cotton industry through a long-term research program on crops capability, however, is now being applied to produce Omega-3 Canola, with significant financial, health and environmental returns that would not be possible in a single, fully cost-recovered partnership with one company.

[85] For example, the Environment research unit earned 84% ($95 million) of its revenue from Australian governments, similarly the Manufacturing research earned 45% ($16.9 million) from Australian government.

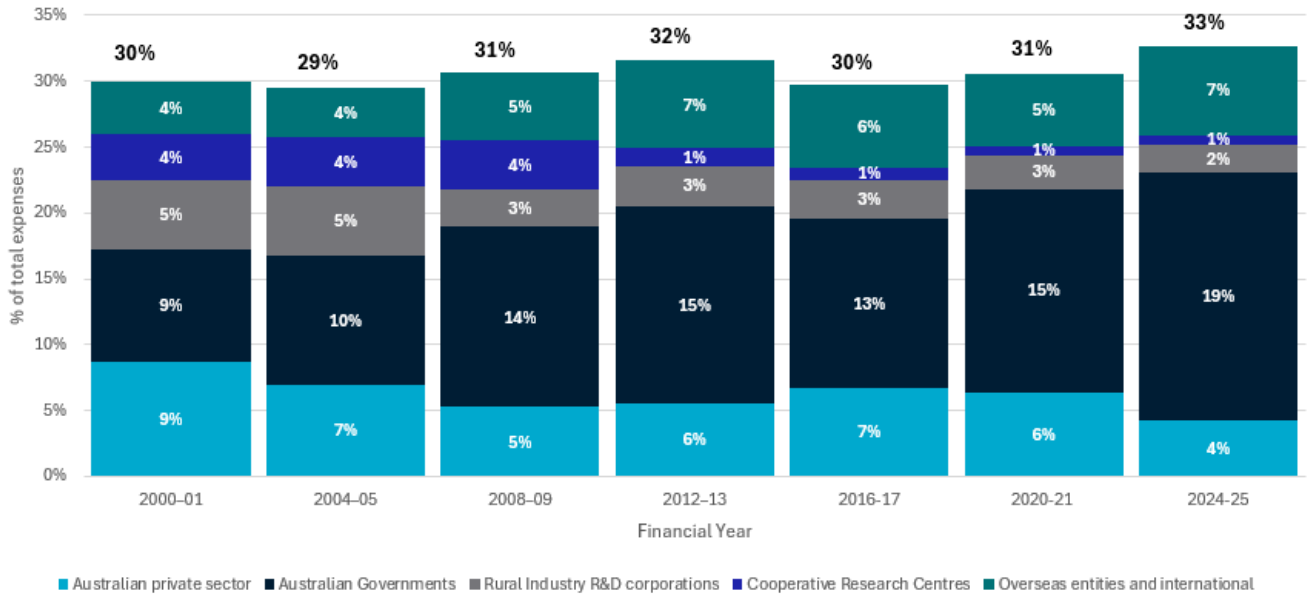

Figure 8: Own-source revenue by customer type as % of total expenditure

Contracts with Australian governments are also of higher value than average. The average lifetime value of the 257 contracts with the Australian government in the 2024–25 financial year was $1.1 million, whereas for Australian corporates it was $0.225 million and for SMEs it was $0.117 million. However, contracts with government often require a co-investment contribution from CSIRO and are not full cost recovery. The increased proportion of CSIRO's research that is done via non-appropriation contracts with government has also influenced the type of research undertaken, increasing emphasis on providing models and data to support policy decisions.

CSIRO will choose to co-invest in government projects for several reasons. As previously outlined, CSIRO co-invests in work that is aligned with CSIRO's capabilities and achieves national and international objectives (one of CSIRO's primary purposes). Further, CSIRO participates as a collaborative partner with universities, other research entities or SMEs in government grant programs. Such government grant programs usually require a co-investment, stemming from a policy decision of government to attract investment.

Co-investment with government also can provide CSIRO non-monetary benefit[86] and co-investment also reflects that CSIRO's work is delivering on government and community priorities, for example CSIRO's work with the Department of Foreign Affairs and Trade on biosafety and diagnostic work on livestock and zoonotic diseases in Papua New Guinea.

However, as outlined above in relation to co-investment with the private sector, co-investment with government requires CSIRO to leverage its limited appropriation and diminishes its ability to invest strategically in the research pipeline on which the collaborative research relies.

[86] Choosing to invest in projects with government also often provides non-monetary benefit to CSIRO, including testing and refining our tools and systems, building capabilities, contributing to information and knowledge databases and facilitating outputs such as contributing to scientific publications or broader application of results.

(f) the long-term capability needs of the CSIRO, including workforce, infrastructure and equipment

To deliver on its research mandate, CSIRO maintains a broad, diverse and highly specialised workforce of research scientists, domain experts, engineers and technical staff to conduct research and operate scientific infrastructure and equipment. CSIRO also needs sophisticated enabling operations – both staff and infrastructure to support the delivery of science and impact from it.

CSIRO's strategic direction is captured in the Corporate Plan, which describes the organisation's key objectives and high-priority capability needs. However, to deliver against the plan CSIRO requires stable and appropriately indexed baseline funding to support the long-term retention and renewal of specialist capability, maintain workforce depth in key research areas, infrastructure and facility operations roles, and sustain the pipeline of early career and technical talent required into the future.[87] Planning and investment for CSIRO's workforce, property footprint, research infrastructure and equipment are intimately intertwined and essential to long-term sustainability.

This section provides more detail on CSIRO's long-term sustainability – starting with additional detail on CSIRO's budget[88] and the at least additional $80 million to $135 million CSIRO needs to invest to achieve sustainability, followed by a summary of how CSIRO's financials are impacting CSIRO's workforce, infrastructure and equipment.

Budget overview

CSIRO's Portfolio Budget Statement (PBS) provides a comprehensive snapshot of the entity's finances. Over the last decade CSIRO has recorded either a small deficit or small surplus between 1-4% of total budget. The exception being in the 2020–21 and 2021–22 financial years, given:

- the Jobmaker budget measure (2020–21 to 2023–24) through which CSIRO received $459 million over 4 years to continue 'essential scientific research'
- non-cash unrealised gains on the valuation of CSIRO's equity portfolio, following significant focus and investment in commercialisation programs.

CSIRO's financial position declined in the 2024–25 and 2025–26 financial years primarily driven by the cost of maintaining current research output, both in terms of research staffing and the associated operating costs of that research. Notwithstanding the significant announcement by the government of an additional $233 million in the 2025 MYEFO, CSIRO's long term sustainability challenges remain. This budget overview provides a summary of CSIRO's:

- revenue, including appropriation, budget measures and own-source revenue
- asset base (including the property and scientific and research infrastructure that enables research) and associated capital funding arrangements
- expenditure and the increasing costs (both labour and operating) of conducting research.

[87] Delivering on the changing research needs of the organisation relies upon evolving capability of its workforce. This can mean redeploying staff from one area to another, retraining staff and in some cases replacing staff with one skill set with those with a new skillset. See above at CSIRO's response to item (d) the recruitment and retention of staff including senior and mid-career researchers, along with the training and career paths of early-career researchers (page 27).

[88] As foreshadowed in CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

Appropriation

Over the last 15 years, the average indexation of CSIRO's appropriation, including savings and efficiency dividends, has been 1.3% per annum (excluding budget measures), a decrease in real terms when indexed to the 2009–10 financial year (**Figure 9**).

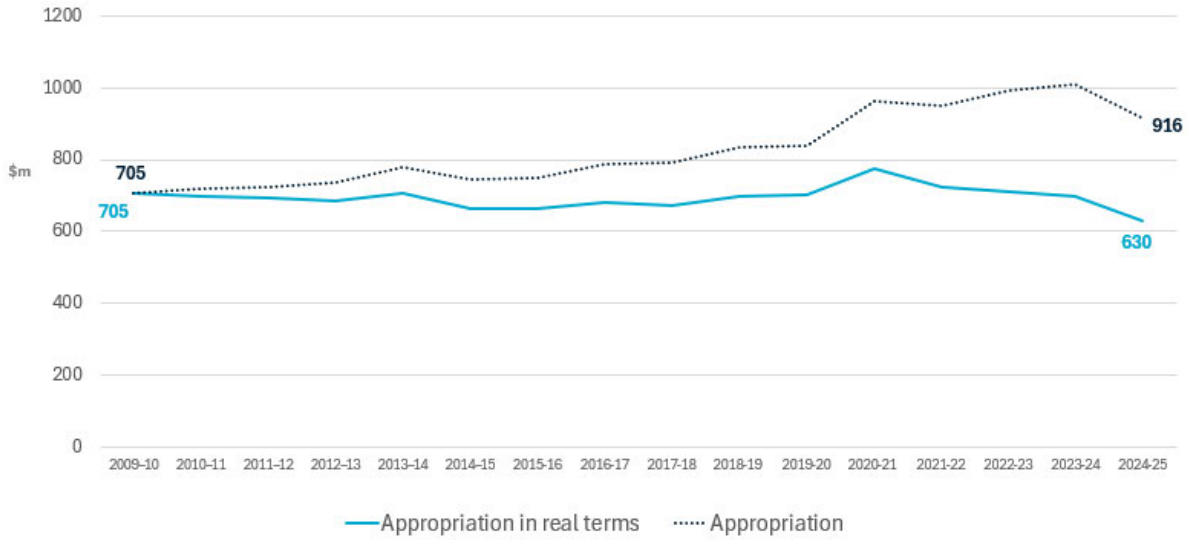

Figure 9: CSIRO's appropriation in real terms ($ million)

Significantly, appropriation funding for depreciation has not been indexed at all since it was set in 1999–2000.[89]

Other budget measures

CSIRO also receives funding from government in the form of terminating budget measures, usually designed to deliver part or all of a specific government initiative. For example, CSIRO has received funding to establish Sparked, part of the Health Delivery Transformation Program under the government's Strengthening Medicare agenda.[90] CSIRO has received substantial short term funding through budget measures to support the delivery of a government policy or priority, including, for example, $459.2 million in the 2020–21 Budget to support essential scientific research during the COVID-19 pandemic[91] and $150 million in equity funding for CSIRO's Main Sequence in the Budget 2022–23.[92] CSIRO can support the delivery of government programs because of its long-term, specialist, highly skilled workforce and infrastructure.

[89] See CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

[90] CSIRO coordinates Sparked, working with all Australian Governments, the Australian Digital Health Agency and the health technology industry to develop and adopt national Fast Healthcare Interoperability Resources standards. Funding has been received through 3 Budget updates - $9.3 million in 2023-24 (p 149, Budget Paper 2), $1.9 million in 2024-25 (p 127, Budget Paper 2), and $8.2 million in 2025-26 (p 54, Budget Paper 2), Australian Government 2023–25, Budget Paper No. 2: Budget Measures, p. 149 (2023–24 allocation), p. 127 (2024–25 allocation), p. 54 (2025–26 allocation), viewed 5 January 2026, https://budget.gov.au

[91] Part of the JobMaker Plan, the Government's response to COVID-19, this funding was provided to address the impacts of COVID-19 on CSIRO's commercial activities and ensure it could continue essential scientific research. Commonwealth of Australia 2020, *Budget Paper No. 2: Budget Measures 2020–21*, p. 115, viewed 5 January 2026,

[92] Part of the Australia's Economic Accelerator (AEA) program, this funding provides capital investment to progress AEA projects with high commercialisation potential to reach at-scale test and prototype stages, Australian Government 2022, *Budget Paper No. 2: Budget Measures 2022–23*, Commonwealth of Australia, Canberra.

Own-source revenue

CSIRO also generates own-source revenue, primarily through contractual arrangements with governments (federal, state and international), industry (domestic and international), the higher education sector and community groups. Additional revenue is earned through R&D, consultancy and service contracts with commercial partners, along with equity holdings, milestone payments and royalties arising from intellectual property. CSIRO has also been able to generate revenue from sale of surplus assets, such as property.

CSIRO has leveraged appropriation to generate own-source revenue, resulting in increased research capacity and impact, beyond that which could be achieved by direct appropriation funding alone. The co-investment of appropriation has also led to strong engagement with industry and wider economic impact. A dependency on own-source revenue is, however, a double-edged sword. Own-source revenue is subject to market forces and the availability of appropriation to co-invest and this leads to increased risk and uncertainty around total funding levels and therefore staffing levels.

Asset base and capital funding

CSIRO, like all basic and applied research organisations, is capital-intensive and requires significant specialised scientific and research infrastructure and equipment. Throughout its century-long history, CSIRO has accumulated one of the most extensive asset portfolios within the Commonwealth, comprising 46 sites across remote, regional and metropolitan locations, as well as an international facility in Montpellier, France. CSIRO sites host a wide range of specialised research facilities and associated plant and equipment, including pilot and demonstration plants, biocontainment facilities, farms, greenhouses, aquaculture facilities, telescopes and space tracking facilities, a research vessel and high-performance computing. CSIRO also maintains extensive laboratory space that must be equipped with cutting-edge technology to ensure research remains impactful and internationally competitive.

While the net book value of CSIRO land, buildings and equipment is $2.4 billion, much of that portfolio has no or low real worth. The replacement value of CSIRO land, buildings and equipment is calculated at $5.9 billion, an increasing gap from the book value. The replacement value may also be conservative and not reflect the underlying and increasing value of unique scientific equipment and assets.

The capital to replace and maintain this asset base is sourced from depreciation funding, proceeds from property sales and grants from sources such as NCRIS. However, CSIRO's depreciation funding component has remained fixed at $80 million, set in the 1999–2000 financial year (based on the actual depreciation expense of its fixed assets base in that year). This funding is received through appropriation, but this has not been indexed or adjusted since that time.

Figure 10 provides an overview of CSIRO's increasing assets and depreciation costs over time. The graph illustrates how CSIRO's capital requirements exceed depreciation funding. Annual depreciation has increased 129% ($91 million) over 20 years.

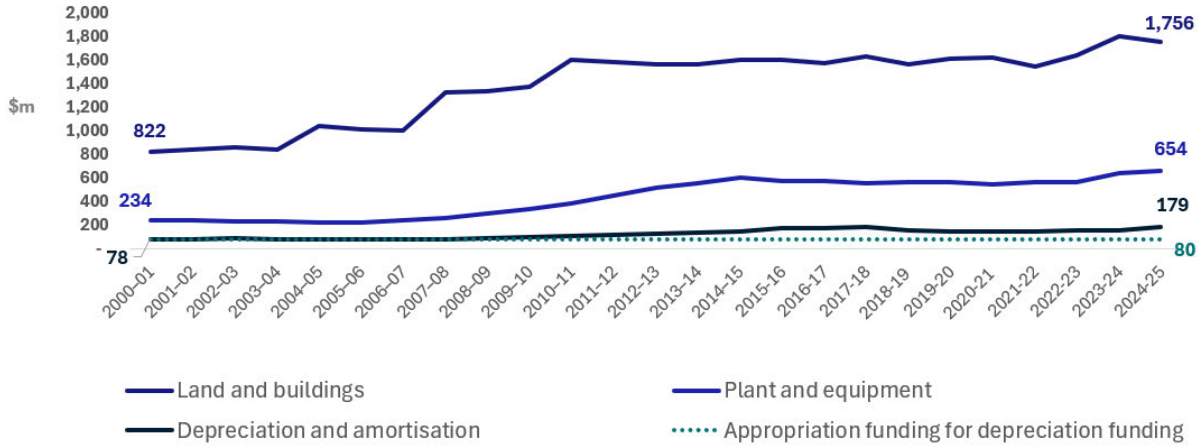

Figure 10: CSIRO's asset base since the 2000–01 financial year ($ million)

Increased depreciation requires CSIRO to divert appropriation funding away from research to meet the budgeted operating result. In 2011, CSIRO secured an operating loss from the Department of Finance for depreciation expenses from, predominately, revaluations and externally funded assets (currently approximately $50 million). This reduces the funding that CSIRO allocates from operating expenditure to meet the depreciation expense but fails to provide CSIRO with cash to ultimately fund the replacement of assets – furthering the decline of the asset portfolio.

Expenditure

CSIRO primarily invests to undertake research directly, but also in the people and facilities that enable and support the delivery of research with impact.[93] Increasing deprecation and property costs have resulted in a reduction in the investment available for research.

Depreciation expenses

As highlighted above, CSIRO's appropriation for depreciation has remained at the level set in the 1999–2000 financial year. Since that time actual depreciation expenses have increased by $91 million (129%),[94] as have the capital investment requirements to conduct science.[95] Consequently, much of CSIRO's capital to replace and maintain its asset base is self-funded. The main cash sources have been proceeds from one-off property sales and external revenue from sources such as NCRIS.[96] Beyond the sale of CSIRO's Ginninderra site, the proceeds of which have been earmarked for refit of ACDP (see below), further property sales are unlikely to yield cash proceeds that can be reinvested into maintaining or replacing CSIRO's asset base due to expected remediation costs.

[93] As outlined in item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

[94] This means that CSIRO's unfunded depreciation is $91 million per annum and increasing – with the gap self-funded.

[95] The replacement cost of scientific infrastructure and assets used for research also results in increasing deprecation costs.

[96] For example, the National Collections Building 'Diversity' at Black Mountain is home to 15 million natural history specimens. It was jointly funded by NCRIS ($43 million) and CSIRO ($37 million), with construction commencing in 2022 and completed in 2025.

Property costs

There are more than 840 buildings with 620,000 square metres of built environment (offices, laboratories, storage, workshops) on CSIRO's 46 sites. That extensive property portfolio is ageing – at least 83% of CSIRO's buildings are beyond technical end of life – with largely outdated designs and often obsolete technical fit-out that:

- present increasing costs for repair and maintenance
- do not meet the requirements for modern research
- often require major investment to decommission, vacate or demolish,
- make it difficult to attract the best scientists
- increasingly carry unacceptable health and safety risks to staff, unless remediated.

While significant progress has been made in consolidating these sites, progress has slowed due to limited capital for refurbishing, remediating and demolishing existing facilities at the consolidated locations.

While CSIRO has taken action to consolidate its property portfolio to save costs and invest in modernisation, the scale of this challenge is increasing rather than diminishing. CSIRO's backlog of operational repair and maintenance is estimated to have increased from $175 million in the 2010-11 financial year to over $280 million in the 2025–26 financial year. Property operating costs and site costs (excluding leases and labour) have also increased 23% over the last 5 years (from $49.6 million to $61.2 million).[97, 98] These cost increases will continue and compound if CSIRO does not invest to address its ageing property portfolio.

Property costs for CSIRO are significantly higher than standard costs, given the specialist requirements and specifications of the research facilities they house, which not only enable research but also provide for the ability to pilot and demonstrate technology to de-risk investment in innovation and deliver to market.

Research facilities have highly specific regulatory, safety and security requirements that significantly influence their design and operation, resulting in higher ongoing costs compared to non-research facilities.[99] For example, mineral processing laboratories use 4 times the amount of electricity as office space. Additional costs are also incurred by specialised controls, like gas sensors and fumigation, stable and high-power requirements, the supply of chemicals or gas, temperature control for experiments and specialised waste services. Additionally, some research facilities and laboratories are required to operate 24 hours a day, 7 days per week, both for research and to maintain controlled environments.

Research labour and operating costs

CSIRO requires a highly specialist workforce to undertake research and currently employs around 4,250 staff in research units. Around 40% of CSIRO's workforce holds a PhD (compared with less than 2% of the general Australian population[100]), showing the highly specialised requirements to do the advanced research CSIRO undertakes. CSIRO competes for talent with universities and industry, both national and internationally.

[97] CSIRO has undertaken significant property consolidation - see footnote 49. Without this consolidation, increasing property operating costs would have impacted CSIRO more significantly.

[98] Similarly, the costs of operating, maintaining and building national scientific and research infrastructure have increased significantly, with the additional costs predominantly falling upon CSIRO. Further detail is provided in CSIRO's response to item (b) the importance of public funding for public good science (page 16).

[99] Cathie, M 2021, 'The construction cost of research', *Built Environment Economist*, pp. 16–21.

[100] World Population Review, *PhD Percentage per Country 2026*, World Population Review, viewed 22 January 2026, <https://worldpopulationreview.com/country-rankings/phd-percentage-by-country>

CSIRO's labour expenditure has increased from $796 million to $987 million over the past 5 years (24% increase). This is reflective of both increasing staff levels during the period of the 'JobMaker' COVID budget measure and the increase in wages over and above the wage cost index (by approximately 11.4%). Despite this increase, CSIRO wages for senior researchers are lower than wages of equivalent researchers working in other parts of the R&D ecosystem,[101] such as the higher education sector or industry, and are therefore less attractive to international talent.

CSIRO undertakes research in areas of significant global demand including future technologies like artificial intelligence and quantum and in areas that support the resources and energy sectors. CSIRO needs to offer market competitive salaries to support Australia's sovereign capability in these areas.

Operating costs of conducting research are also increasing.

- Research project delivery costs, such as laboratory and material supplies, have increased over the last decade, primarily driven by market demand (noting Australia's reliance on imports in this sector)[102] and rising raw material costs.[103]
- Research also increasingly requires data and digital capability – over the past 5 years, CSIRO's information technology costs have increased by 35%, driven by market factors including licensing fees for research software, cyber security, and the increasing requirements for data storage and management to conduct research.

CSIRO faces significant challenges to its ability to continue to meet budget and achieve long-term sustainability. The extent of those challenges is outlined below.

CSIRO's long-term sustainability

The impact of increasing costs has impacted CSIRO's research capacity and led to an underinvestment in property, scientific and research infrastructure and equipment, information technology, digital technologies and cyber security. CSIRO's ability to meet climate resilience and energy efficiency targets across its extensive ageing property portfolio has also been constrained by increasing costs.

Research staffing levels

As mentioned above, CSIRO's primary revenue source, appropriation, has reduced in real terms resulting in CSIRO diverting investment in research capacity to fund some of the significant and ongoing cost increases.

Research unit FTE numbers have steadily reduced from 4,510 FTE in the 2009–10 financial year down to 3,693 in the 2020–21 financial year (with a 5-year average of 4,200 FTE).

Research unit FTE numbers increased between the 2021–22 to 2023–24 financial years due to the short term but significant 'Jobmaker' budget measure (primarily due to an increase in term positions including early career researchers in the 2024–25 financial year (**Figure 11**).

As of 31 December 2025, CSIRO had 4,232 FTE across research units, with a proposed reduction of 300 to 350 FTE before 30 June 2026, announced on 18 November 2025.

[101] Lower wages are reflective of both CSIRO's budget pressures as wage increase constraints under the Commonwealth frameworks for bargaining, most recently *Public Sector Workplace Relations Policy 2023*.

[102] Arizton 2023, *Laboratory Equipment and Consumables Market – Global Outlook and Forecast 2023–28*, Arizton Advisory & Intelligence, USA.

[103] See for example Grand View Research 2023, *Laboratory Plasticware Market Size, Share & Trends Analysis Report by Material (Low Density Polyethylene, High Density Polyethylene, Polystyrene, Polyvinyl Chloride, Polymethyl pentene), By End-use, By Region, And Segment Forecasts, 2024–2030*, Grand View Research, USA.

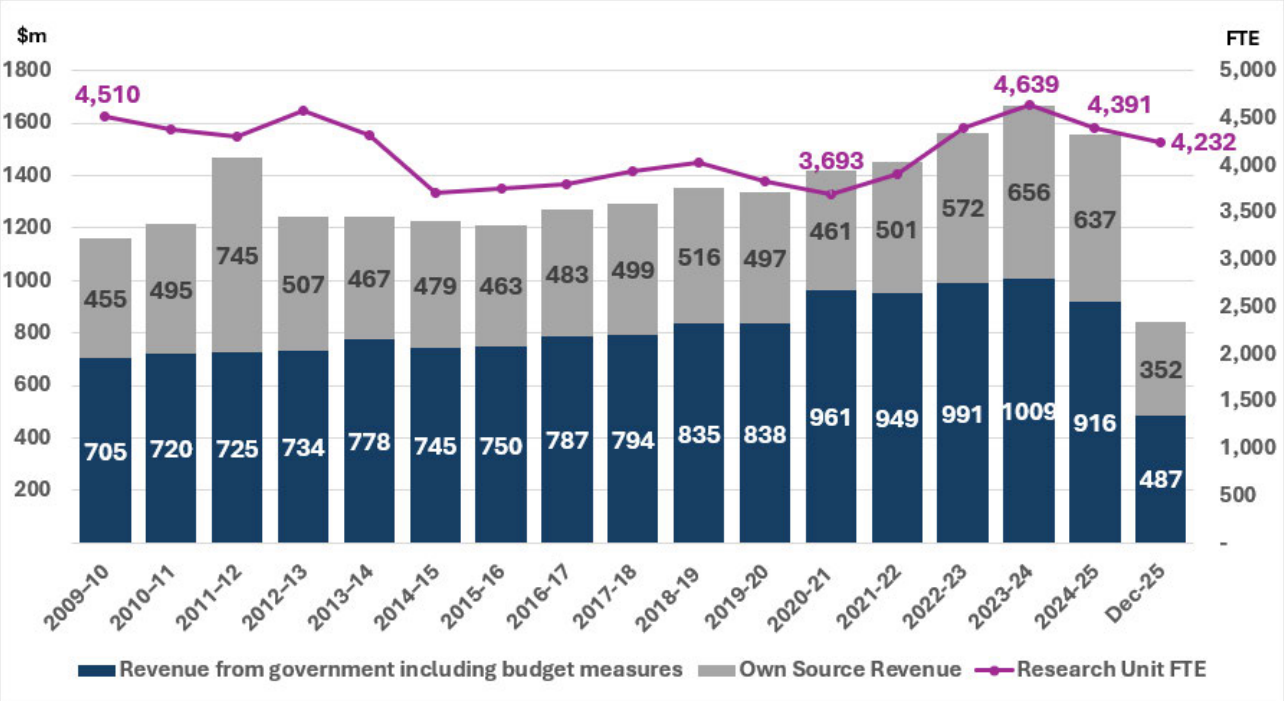

Figure 11: Government revenue, CSIRO own-source revenue and research unit FTE[104]

Underinvestment in scientific equipment

Between the 2019–20 and 2023–24 financial years, total expenditure on scientific equipment was $281 million (some of which was supported through funding from sources such as NCRIS). CSIRO has benchmarked its expenditure levels for scientific equipment against the United States (US) National Science Foundation (NSF) numbers, which are based on expenditure patterns across scientific disciplines at academic institutions in the US (**Table 6**). For CSIRO to have met benchmark across all scientific disciplines would have required an additional $65 million of investment (a 23% increase).[105]

As a result of the constrained capital budget, CSIRO has to make choices between investing in scientific equipment and other capital works. This presents difficult trade-offs, particularly when considering investment into scientific equipment required to undertake research at the leading edge, for example when scientific processes emerge that require new technologies like high-performance computing (HPC) and specialist data and digital requirements. As well as being capital-intensive, cutting-edge technologies are often also more expensive to operate.[106, 107]

To mitigate the impacts of underinvestment, CSIRO implemented a new capital investment model in 2024 to improve transparency and visibility of its capital portfolio, driving a more strategic, integrated approach to investments in scientific equipment, property and information technology. This approach is critical to ensuring alignment of the capital investments to the long-term research direction while also seeking to better coordinate across the system given the analogous nature of funding pressures across institutions undertaking research and development.

[104] As of year-to-date 2025–26.

[105] In the Australian context, ANSTO's plant and equipment is 55% of its asset base, with CSIRO's plant and equipment representing 17%, (Table 2, page 18).

[106] Australian Academy of Science 2022, *Australia's Data-enabled Research Future: Science*, Australian Academy of Science, Canberra.

[107] The shift to more digital and data-driven science is placing exceptional stress on CSIRO's capital funding as these new technologies, like HPC, have high capital costs and shorter life cycles, reaching end of useful life in 3-5 years. CSIRO has a significant HPC holding and currently operates around 20% of Australia's graphics processing unit (GPU) capacity (excluding Pawsey Supercomputing Centre). CSIRO's institutional HPC facilities have required a significant capital outlay - $46 million over the last 5 years, which is expected to increase in the future. The operating costs for HPCs are also increasing significantly.

Table 6: Benchmarking of scientific equipment against NSF benchmarks (5-year average)[108]

RESEARCH UNIT/FACILITY	NSF BENCHMARK (% OF TOTAL EXPENDITURE)	CSIRO EXPENDITURE AS % OF BENCHMARK	VARIANCE TO BENCHMARK LEVEL ($ MILLION)
Manufacturing	4.8	130	$9.0
Health & Biosecurity	2.8	56	($6.1)
Data61	4	59	($11.3)
Environment	3.9	61	($17.4)
Agriculture & Food	3.2	69	($11.1)
Energy	5.4	86	($4.0)
Mineral Resources	4.8	87	($3.6)
National Research Collections	3.4	56	($3.8)
Australian Telescope National Facility	5.6	72	($7.3)
ACDP	2.7	86	($1.3)

Deteriorating property, scientific and research infrastructure

Historical underinvestment in CSIRO's property, scientific and research infrastructure and equipment has compounded and accelerated costs and has also increased regulatory, security and health, safety and environment (HSE) risks relating to both physical and digital assets, despite significant interventions.[109] As outlined above, this underinvestment has accumulated over decades, due to both funding constraints and successive decisions by CSIRO to prioritise the investment of appropriation in research capacity and attempt to self-fund property and infrastructure, mainly via the sale of assets.

The deferral of repairs and maintenance increases HSE risks – as safety is a priority, these are being addressed as required by diverting funds from research activities or by closing facilities unable to be maintained.

Similarly, limited funding for operating costs has resulted in a lack of investment in digital infrastructure, with increasing maintenance costs from legacy systems resulting in significant cyber risk.[110, 111] CSIRO continues to invest in cyber risk mitigation, however further investment is still needed given the risks in this area continues to increase.

[108] Web of Science 2023, *Data acquired May 2023: 2019–23 articles, reviews & proceedings*, Clarivate Analytics. used to profile scientific discipline mix for each Research Unit/facility; National Science Foundation 2020, *Science and Engineering Indicators 2020*, NSF, Washington, DC (based on 2017-18 to 2021-22 average); CSIRO Records 2024, *Actual expenditures for 2018–19 to 2023–24*, CSIRO, Canberra.

[109] For the best part of a decade, CSIRO has recognised the need to consolidate its property portfolio. Significant progress has been made since commencement of the Property Strategy 2019–29, with the overall property portfolio reducing by 14 sites (as well as reductions in the size of sites and locations). The pace of progress has, however, slowed due to limited capital funds needed to divest and consolidate. A more efficient property footprint is required: one that is smaller and financially sustainable as well as being modern, fit for purpose, vibrant and connected to collaborators in academia and industry. CSIRO is currently undertaking work to develop a path to a much smaller, more sustainable property portfolio.

[110] The Australian Cyber Security Centre has identified that Australian research institutions are at the highest risk of cyber compromise. As both a government organisation and a research institution, CSIRO is at heightened risk of being targeted. Australian Signals Directorate's Australian Cyber Security Centre 2025, *Annual Cyber Threat Report 2024–25*, ASD, Canberra.

[111] In 2024, the Australian Cyber Security Centre completed a review of CSIRO's cyber security program and concluded there were significant risks that should be addressed by CSIRO as a matter of priority.

(g) the role and independence of the CSIRO's leadership in making resourcing allocation decisions

To understand the role of CSIRO's leadership in making resourcing decisions, it is important to understand the legislative framework, including the statutory roles and responsibilities of the CSIRO Board, Chief Executive, portfolio department (the Department of Science, Industry and Resources) and responsible Minister.

CSIRO's response to this term of reference focuses on CSIRO's legislative context, including the SIR Act and *Public Governance, Performance and Accountability Act 2013* (Cth). In summary, the CSIRO Board, with advice from the Executive Team, sets the strategic direction of the organisation and the Executive Team, led by the Chief Executive, leads, directs, coordinates and controls CSIRO's operations - including resourcing allocation – to deliver the strategy.

Legislative context

CSIRO is a body corporate constituted by the SIR Act and is also a corporate Commonwealth entity (CCE) under the PGPA Act. CSIRO's legislative context provides CSIRO distinct legal personality (can sue and be sued) and a degree of independence from government in relation to CSIRO's management and operations. CSIRO is, however, subject to Ministerial direction and, as a statutory authority, is required to comply with various legislation and regulations including, for example, the finance law under the PGPA Act and the Commonwealth Procurement Rules.

Given CSIRO's statutory independence, including its separate accountable authority, CSIRO briefs the responsible Minister directly on its management and operations.

The SIR Act

The SIR Act prescribes CSIRO's purpose[112] and also prescribes the respective roles and functions of the CSIRO Board and Chief Executive. The Chief Executive manages the day-to-day operations of CSIRO including employment of staff, with Board oversight to ensure such management is 'proper and efficient'. This is different to the operations of a department (see further below in relation to the PGPA Act).

There is no legislated role under the SIR Act for the department as the SIR Act vests executive responsibility for CSIRO in the Minister (and, for some matters, the Governor-General). The SIR Act prescribes that the Board is subject to ministerial direction. Historically, the responsible minister has not frequently issued formal directions to the CSIRO Board, with only 2 formal directions provided since 2014. CSIRO's responsible minister has issued CSIRO with a Statement of Expectations which guides how CSIRO works to resolve national challenges and advance policy priorities and drives CSIRO's performance.[113]

The PGPA Act

The Board is CSIRO's 'accountable authority' for the purposes of the PGPA Act, meaning that the Board has certain duties and obligations in relation to CSIRO including the duty to govern CSIRO properly, to establish and maintain systems relating to risk and control and to keep the Minister (and the Minister for Finance) informed of certain matters. This includes responsibility for delivering the Corporate Plan and Annual Reports of the organisation.

[112] See response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

[113] See Introduction (page 4).

This means that CSIRO is:

- unlike non-corporate Commonwealth entities (such as a portfolio department) in which the Secretary is both the accountable authority for the purposes of the PGPA Act and the officer responsible for conducting the affairs of the department; in CSIRO these roles are essentially divided between the Board and the Chief Executive
- somewhat akin to a corporation with a board of directors providing oversight and governance and a chief executive officer delegated responsibility for 'day to day' business and operations.

In practice, CSIRO management, with the Board's oversight, briefs the Minister on prescribed matters under the PGPA Act, including significant decisions and issues, as well as any additional matters (such as those prescribed under section 51 of the SIR Act).

Resourcing allocation decisions

Consistent with the legislation outlined above, the CSIRO Board, working with management, approves the strategy for CSIRO's broad research direction and operations, which is articulated in the Corporate Plan.

Management, led by the Chief Executive, is responsible for running the organisation to achieve the objectives of the strategy, including making choices about which programs of research to prioritise. In that regard, investment decisions for research are significant - research requires long-term, stable investment because meaningful scientific progress and the infrastructure that supports it cannot be built or sustained in short cycles. Major research facilities, equipment, data systems and specialist capabilities demand substantial capital and ongoing operational funding, often over many decades.

Significantly, when making resourcing decisions the Board and Chief Executive have legislative duties to ensure financial sustainability. This includes sections 15-17 of the PGPA Act which requires the Board to govern CSIRO in a way that:

- promotes the proper use and management of public resources for which the authority is responsible
- promotes the achievement of the purposes of the entity
- promotes the financial sustainability of the entity.

The CSIRO Board and Chief Executive also have a duty to ensure the health and safety of staff under the *Work Health Safety Act 2011*.

These legislative duties mean that resourcing decisions must consider CSIRO's sustainability and staff and site safety and can result in the prioritisation of investment to support these objectives over staff headcount to conduct research.

For completeness, CSIRO's strategic direction including in relation to its research is influenced by government priorities - explicitly through the Statement of Expectations, but also implicitly as CSIRO considers government priorities when determining its research direction[114]. In addition to being respectful of the elected government's priorities, the organisation must be nimble enough to respond to unexpected crises and resolute enough to work on long-term problems that may not enjoy bi-partisan support.

[114] In the 1990s, CSIRO developed a method for assessing national research priorities and deciding its own priorities and strategies in response, known as 'the Priorities Method' (see above at CSIRO's response to item (b) the importance of public funding for public good science (page 16). The essence of this prioritisation method is instilled into the organisational culture and the current CSIRO Impact Framework. Prioritisation decisions need to take into account the potential benefits to Australia in economic, environmental and social terms and Australia's ability to capture these benefits by converting technological progress to commercial or other outcomes; but also, to be considered is the feasibility (taking into account what research could potentially accomplish) and the national capability to achieve the intended goals in a timely way.

As the Productivity Commission noted in 2007 (and which is still an accurate summation today), as a statutory body, CSIRO:

> *… decides how its public funding appropriation is directed to specific research areas (though there is very general guidance provided by the National Research Priorities). In determining that research agenda, the agency has developed what many consider to be a rigorous, flexible and robust priority setting framework which has generated interest from other parts of Australia's research community.*[115]

[115] PC (Productivity Commission) (2007) *Public support for science and innovation*, Productivity Commission, Canberra, p, 470.

(h) the effects of these cuts on the program of scientific work conducted by the CSIRO

CSIRO is currently undertaking a review of its research portfolio, and its implementation is ongoing.[116] CSIRO's response to this term of reference first outlines the current process underway to demonstrate how CSIRO is better focussed on its priority areas and alignment with national and government priorities. It then goes on to address (i), (ii), and (iii), with a focus on the proposed changes to the Environment Research Unit.[117]

The process to implement changes to CSIRO's research direction

As noted in response to item (a), the proposed changes to CSIRO's research direction are a strategic shift and is separate from CSIRO's budget concerns. The proposed strategic changes are, though, intertwined with CSIRO's budget constraints as the challenges to CSIRO's long-term sustainability mean that rather than hiring new staff to bolster areas of high priority, CSIRO needs to realise savings. This means CSIRO will make shifts within its reduced capability envelope to achieve stronger alignment with areas of priority as identified in the research portfolio build process.

The research portfolio build process,[118] determined shifts in CSIRO's scientific direction. The implementation of those shifts has, for some research units, triggered CSIRO's 'Major Change Consultation' process ('the process'). The process was developed to ensure that CSIRO's consultation is consistent with clause 54 of the *CSIRO Enterprise Agreement 2023–26* and the expectations in *Circular 2022/08: Genuine and effective employee and union consultation in Commonwealth agencies*.

CSIRO will adopt the process for each research unit where workplace changes are proposed. This means the process will be conducted in 7 of CSIRO's research units, requiring detailed input at research unit level, including early engagement and pre-decision consultation with staff prior to implementation of any change.

Table 7 below outlines the minimum period for each stage of the process. CSIRO's recent experience of implementing the process for enterprise service units (corporate support functions) was that the first 5 steps, excluding implementation, took between 14 and 35 weeks.

[116] As outlined in the response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

[117] The proposed changes to other research units are further detailed in CSIRO response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9) and Appendix F (page 78).

[118] As outlined in CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO).

Table 7: Implementation process

DESCRIPTION OF ACTIVITY (*STEPS IN AGREED MAJOR CHANGE CONSULTATION PROCESS)	DURATION	NATURE OF ENGAGEMENT
Early engagement	Minimum of 2 weeks CSIRO's Staff Association has previously requested extensions for early engagement (a further 1-2 weeks). CSIRO considers each request on its merits, noting that failing to grant an extension may give rise to a dispute.	Set out in Major Change process as agreed with CSIRO Staff Association. Process was an agreed outcome of a dispute (May 2024).
Proposal development	Estimated minimum of 4 weeks	Timeframe is not specified. Consideration of feedback and developing to an approved proposal has previously taken a minimum of 4 weeks.
Consultation	Estimated minimum of 3 weeks CSIRO's Staff Association has previously requested extensions for early engagement (for example an additional 4 weeks to continue consultation over the Christmas shutdown). CSIRO considers each request on its merits, noting that failing to grant an extension may give rise to a dispute.	CSIRO's enterprise agreement provides at clause 54.2 that at least 2 weeks is required for policies and longer for major change. CSIRO has agreed to at least 3 weeks for major change.
Review feedback	Estimated minimum 2-3 weeks	Timeframe is not specified. Thorough consideration of feedback and whether the proposal should be varied has taken a minimum of 2-3 weeks depending on complexity.
Decision	Estimated minimum one week	Timeframe is not specified. The decision-making timeframe has previously been dependent on the amount of change to the original proposal.
Implementation	Up to 3 months	Timeframes depend on the impact to individuals. Schedule 3 of CSIRO's enterprise agreement outlines the process in the event of redundancy, which involves a minimum 2-month redeployment period, then a formal notice period. Staff can choose whether to leave within 10 days of receiving the formal exit advice; otherwise, an exit can take up to 9 weeks from the date of formal advice.

(i) areas of fundamental and basic scientific study that do not find ready industry funding partners

The proportion of CSIRO's research categorised as 'fundamental' or 'basic' has remained relatively steady over the last 3 years – between 29-31%.[119] CSIRO has contributed significantly to fundamental and basic research in the fields of environment/ecology; chemistry; geosciences; materials science; agricultural sciences; plant and animal science; engineering; and computer science. CSIRO is strongly ranked within the top 1% of global institutions for many of these fields (**Table 8**).

Table 8: CSIRO's Top Research Fields (Ranking by Citations for each Research Field, comparing CSIRO within Global Top 1% of Institutions for that Field)[120]

RESEARCH FIELD	CSIRO'S RANKING IN TOP 1%	NUMBER OF GLOBAL INSTITUTIONS IN TOP 1%	PERCENTILE RANK WITHIN TOP 1% OF INSTITUTIONS
Environment/ecology	17	1,872	Top 0.9%
Geosciences	46	1,059	Top 4.3%
Plant and animal science	23	1,759	Top 1.3%
Agricultural sciences	25	1,226	Top 2.0%
Engineering	205	2,429	Top 8.4%
Computer science	107	772	Top 13.9%
Chemistry	302	1,905	Top 15.9%
Materials science	237	1,391	Top 17.0%

As part of CSIRO's 'portfolio build' process[121] an assessment was made of the impact of any change on the mix of horizons of research that span near-term applied solutions, medium-term innovation and long-term exploratory science, as well as the level of investment in Indigenous-led science.

The proposed changes to CSIRO's research direction will not materially shift the mix of fundamental and basic research.

[119] As reported in CSIRO's Annual Report and the biennial R&D expenditure survey conducted by the Australian Bureau of Statistics

[120] Clarivate Analytics (2024) *Essential Science Indicators*, Clarivate Analytics, viewed 20 May 2024, <https://clarivate.com/products/essential-science-indicators/>.

[121] See CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

(ii) areas of scientific study that relate to emergent, pressing and/or priority issues like the pace, impact and mitigation of climate change including study of the oceans, biodiversity, agricultural adaption to a changing climate, and related issues

CSIRO has identified strategic science shifts that it deems necessary to maximise impact for national benefit.[122] The areas CSIRO has identified are 'emergent, pressing and/or priority issues', namely:

- Supporting a clean, affordable energy transition, including transforming critical minerals to materials
- Addressing the pressing problem of climate change, with a renewed focus on adaptation and resilience
- Applying advanced technologies (including artificial intelligence, quantum, sensing, robotics and manufacturing) to drive the next wave of innovation in core Australian industries
- Increasing the productivity and resilience of Australian farms by focusing on the deployment of technological solutions
- Mitigating and eradicating biosecurity threats to Australian industries, landscapes and communities
- Applying disruptive science and engineering to unlock the unknown and solve unanswered questions.

These priorities position CSIRO to tackle Australia's most significant economic, environmental and technological challenges. Focusing on clean energy and critical minerals strengthens national sovereignty and supports a competitive, low-emissions economy. Addressing climate change – especially adaptation and resilience – helps protect communities, industries and ecosystems already experiencing its impacts. Driving technologies such as artificial intelligence, quantum, robotics and advanced manufacturing ensures Australia can innovate and remain globally competitive. Improving farm productivity and resilience safeguards food security and supports one of the nation's most important export sectors. Strengthening biosecurity protects industries, landscapes and communities from increasingly complex threats. Finally, investing in disruptive, curiosity-driven science ensures Australia continues to generate breakthrough knowledge and future industries. Together, these areas ensure CSIRO delivers long-term national benefit by driving innovation, protecting Australia's environment and economy, and preparing the country for emerging challenges and opportunities.

In relation to climate change specifically, nearly all of CSIRO's research units work on the pace, impact and mitigation of climate change, directly or indirectly. Neither the Environment Research Unit nor the 'Nature' research area are simple proxies for CSIRO's work on climate change – with a significant proportion of CSIRO's research in this space delivered in, with or by other research units. Preliminary analyses indicate that over 60% of CSIRO's confirmed programs of research (18 of 29) are ***directly*** related to climate change as illustrated in figure 3 (page 24), which maps a substantial proportion of CSIRO's portfolio to the National Science and Research Priorities 'Transitioning to a net zero future' and 'Protecting and restoring Australia's environment' (**Table 9**).

[122] Outlined in CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

Table 9: Overview of climate-related programs of research

RESEARCH AREA	OVERVIEW	PROGRAMS OF RESEARCH
Energy & Minerals	Research in this area is critical to mitigating climate change through emissions reduction solutions at scale including: • multisector decarbonisation across industry, exports and transportation • carbon management technologies for domestic and global deployment • transition of the energy system for clean, green, low-cost inputs • sustainably extracting and processing critical minerals including those needed for renewable technologies.	• Electricity transition • Decarbonised industry and transport • Developing green metals production technologies • Reliable and responsible supply chains for critical minerals • Growing Australia's mineral resources • Advanced technologies for a globally competitive Australian minerals industry
Food & Fibre	Research on sustainable agriculture and food systems to mitigate impacts of climate change including research that responds to the climate risks threatening the future viability of Australian farms to: • enhance on-farm decision-making, diagnose production constraints, and drive transformative changes so farming practices are more resilient in future climates. • accelerate genetic improvement to develop crops and animals adapted to future farming environments and market opportunities. respond to market and community demands for agricultural practices that meet expectations for emissions reductions.	• Redesigning genetics • Productive and resilient farms • Aquaculture • Agri-food systems
Nature	The programs of research in Nature are designed to meet the growing demands for food, water, energy and minerals while maintaining Australia's nature systems and the services they provide by ensuring evidence-based decisions and the deployment of technological solutions to ensure nature and its biodiversity adapts and thrives in a changing climate. This area is focussed on: • Transitioning to sustainability • Transformational analytics for recovery and resilience • Valuing biodiversity and healthy ecosystems • Innovative management for environmental resilience	• Future water • Integrated ocean stewardship • Climate resilience, adaptation and monitoring • Decarbonisation pathways • Emissions transition

RESEARCH AREA	OVERVIEW	PROGRAMS OF RESEARCH
One Health	Delivering research to ensure the resilience of Australia's biosphere, prevent health crises and: • Strengthening capability for high consequences infectious diseases – including environmental factors given the impacts of climate change • Catalysing biosecurity to protect Australian Agricultural and environmental systems from increasing risks presented by climate change.	• Biosecurity for plant and environmental health • Indigenous science for One-Health
Tech Economy	This area is focussed on technology development for economic growth including artificial intelligence, automation, robotics and quantum, but also integrates cross-sectoral technological solutions to directly mitigate climate change impacts through waste management technologies to slow the depletion of natural resources and protect the environment.	• Waste Technologies
From Wonder to Discovery	Exploring the universe and understanding the Earth includes a multidisciplinary approach to discovering and monitoring Australia's biodiversity – reducing extinction risk, promoting sustainable fisheries and forestry and reducing the risk of biosecurity breaches. This area also includes using advanced technology to observing Earth from space, to provide crucial data information and analysis.	• Discovering and Monitoring Australia's Biodiversity
Related research infrastructure	Critical to enabling climate change research, CSIRO stewards scientific and research infrastructure for environmental research, including climate data collection and analysis as well as digital capabilities to develop tools to implement technological solutions. This infrastructure underpins biosecurity risks, natural disaster response and environmental assessment planning, land management, capital accounting and environmental service provision.	• Marine Observing Systems • National Resource Collections Australia (NCRA) • Marine National Facility (MNF) • Earth Observation

CSIRO's research publication output measured against the United Nations Sustainable Development Goals (UNSDG) also demonstrates the outsized contribution of CSIRO's research in relation to pressing and priority issues, with over 5,000 publications (28.7% of CSIRO's total output) related to UNSDG (13) 'climate action'.[123]

The shift in research direction for the Environment Research Unit is outlined below in CSIRO's response to (iii). The Environment Research Unit will lead 4 programs of research that address the impacts of climate change, with an increased focus on adaptation and resilience given the seeming inevitability of global temperatures increasing by more than 1.5 degrees Celsius.

[123] Clarivate Analytics (2022) *InCites*, Clarivate Analytics, viewed 27 July 2022, https://clarivate.com/products/incites/ - CSIRO's publications between 2017-2021.

The programs of research to be primarily delivered by the Environment Research Unit in the 2026–27 financial year are:

- **Future Water** for underpinning water research
- **Integrated Ocean Stewardship** for underpinning oceans and coastal systems research
- **Climate Resilience, Adaptation and Monitoring** for actionable climate intelligence
- **Discovering and monitoring Australia's biodiversity** for underpinning biodiversity research.[124]

Further details of these programs are set out in **Appendix F**.

The proposed changes to CSIRO's research direction will not impact the scale of research that CSIRO undertakes in relation to climate change - with new programs of research added that specifically target biodiversity and Indigenous-led science for One-Health (including addressing the impacts of climate change on One-Health) and biodiversity.

[124] The Environment Research Unit also supports the marine observing systems for fundamental oceanographic and atmospheric monitoring and modelling (this program is led by CSIRO's National Collections and Marine Infrastructure research unit).

(iii) the particular burden of proposed cuts on the Environment Research Unit

CSIRO will continually review and adapt its research to ensure it continues to deliver on its legislative purpose and maximise the return to the nation from the public funding it receives.[125]

The proposed changes to CSIRO's research direction announced in November 2025 may impact 300 to 350 FTE, with potential impacts for specific research units (**Table 10**). As a percentage of total FTE, the proposed changes would most greatly impact Health and Biosecurity (29-32%). By comparison, proposed changes to the Environment Research Unit comprise 18-21% of total FTE. The Environment Research Unit has the largest number of potential FTE changes at 130 to 150. For context, Environment is CSIRO's largest research unit both in staff numbers (at over 700 FTE) and expenditure at $186 million per annum (**Table 1**).

Table 10: Potential staffing impacts by research unit (FTE)

RESEARCH UNIT	TOTAL FTE[126]	POTENTIAL IMPACT (FTE)	% OF TOTAL FTE
Environment	701	130 to 150	18-21%
Health & Biosecurity	345	100 to 110	29-32%
Agriculture & Food	638	45 to 55	7-9%
Mineral Resources	365	25 to 35	7-10%

The research portfolio review also identified the need to undertake a deeper review of the Tech Economy research area (with programs primarily delivered by the Manufacturing and Data61 research units), to ensure the right focus and alignment with national priorities. This will take place in the first half of 2026.

The proposed changes to CSIRO's research direction announced in November were not predicated on the relative size of research units; rather, the assessment was made on range of criteria as explained at item a above. However, the prioritisation of research does require making choices. In order to focus CSIRO's research capacity on priority areas, a reduction of capability that does not target and cannot be deployed to those areas is necessary.

While the specifics of the potential impacts on projects and staffing are not yet known and subject to consultation with staff,[127] the proposed changes to the research direction for the Environment Research Unit are focussed on better integrating science across disciplines to more effectively address critical national challenges and deliver maximum science impact.

The Environment Research Unit will have an ongoing but more targeted focus on the climate science that delivers actionable climate intelligence to support adaptation and/or mitigation measures and inform government policy. This includes delivering climate research and products to underpin resilience and adaptation work in environmental and biodiversity management, energy transition, sustainable agriculture, food security and adaptive health.

[125] As outlined in CSIRO's response to item (a) the nature of recent and proposed job and program cuts in the CSIRO (page 9).

[126] As of 31 December 2025.

[127] See above at CSIRO's response to (h) the effects of these cuts on the program of scientific work conducted by the CSIRO (page 52).

The proposed changes to the Environment Research Unit will:

- shift away from research focussed on international engagement with no direct national benefit to Australia
- move away from locally focussed work or work that could be delivered by other PFRAs, universities or state agencies. This will allow the Environment Research Unit to work at scale to identify potential solutions to national problems
- reinforce its unique capabilities and national leadership in freshwater, marine, climate and adaptation science, circularity and social sciences
- focus efforts where better-than-incremental progress can be achieved to deliver maximum impact.

Importantly, CSIRO's commitment to delivering impactful research to address climate change, environmental issues and the energy transition extends beyond the activity in the Environment Research Unit. There are multiple programs of research within CSIRO's research portfolio to address these critical national challenges. Under the proposed changes, the Environment Research Unit will remain one of CSIRO's largest.

Conclusion.

For a century, CSIRO has delivered compelling science to support national resilience and economic prosperity for Australia. This submission demonstrates that the organisation's ability to continue fulfilling its legislative purpose and to meet the expectations of government, industry and the Australian community relies on CSIRO's research capacity, which includes both researchers and the enabling scientific and research infrastructure, plant and equipment.

CSIRO's recent review of its research portfolio shows the organisation is taking deliberate, evidence-based steps to ensure its activities remains focused on the areas of highest national priority. These strategic shifts ensure CSIRO's capacity to deliver impact at scale in fields critical to Australia's future. The review also illustrates CSIRO's commitment to transparency, accountability and long-term stewardship of public resources.

This submission also highlights the significant challenges to CSIRO's ongoing sustainability. With continued investment and a clear, forward-looking research direction, CSIRO will remain well positioned to deliver transformative science and innovation for Australia. Strengthening the organisation's long-term financial sustainability will ensure that CSIRO can continue to support government priorities, drive economic growth, safeguard the environment, and contribute to the security and wellbeing of all Australians.

Appendices

Appendix A Minister's Statement of Expectations

The Minister for Industry and Innovation and Minister for Science, Senator the Hon Tim Ayres, provided this Statement of Expectations to CSIRO on 10 October 2025.

Dear Ms Long,

Science and innovation are core to the Albanese Government's vision for Australia. As the nation navigates geostrategic shifts, the transition to net zero and rapid technological change, our sovereign science and research capability is more important than ever.

Innovation underpins our efforts to make Australia's economy more productive, resilient, diverse and sustainable. We need to continue to orient the economy toward productive and strategically important activities. The Government's Future Made in Australia agenda seeks to maximise productivity and industrial opportunities arising from the net zero transition, and to secure Australia's position in a rapidly changing global landscape.

As our national scientific and industrial research organisation, CSIRO is uniquely positioned to play a lead role in these efforts.

To contribute to a Future Made in Australia, CSIRO should prioritise applied research that supports:

- **Australia's net zero transformation:** I expect CSIRO to prioritise research in areas where Australia can build enduring advantage within a net zero economy, as well as contributing to supply chains as part of global solutions (for example, in hydrogen, green metals, critical minerals processing and low carbon liquid fuels).
- **The tech economy:** I expect CSIRO to prioritise research in areas where Australia has an economic advantage, can capture the economic opportunity and become a leader in artificial intelligence technology and adoption. Promoting and protecting our comparative advantage in other critical technologies, such as quantum, remains important.

More broadly, Australia's National Science and Research Priorities identify the science and research collaborations Australia needs to solve our greatest challenges. CSIRO should continue to consider how it can respond to these priorities, including through partnerships with others, adding value to Australia's excellent fundamental research, and by supporting translation and commercialisation outcomes.

I acknowledge CSIRO's independence as a corporate Commonwealth entity and ask that it deliver on the above priorities in accordance with the expectations outlined below.

1. Innovation and translation through partnerships and collaboration

I expect a renewed focus on driving alignment of effort across the Commonwealth, states and territories, universities and industry. CSIRO must continue to work constructively with other government departments and agencies, including specialist investment vehicles, in areas where its expertise adds greatest impact and supports Australia's global interests. The Government expects CSIRO to translate science into practical solutions and new capabilities through a systematic approach to collaboration with universities, CRCs and industry partners to leverage and consolidate expertise. These collaborations and partnerships should align with the priorities set out in this statement. They should maintain complementarity and avoid duplication with other initiatives.

It is also important CSIRO continues to partner with First Nations communities to create Indigenous-driven science solutions that support sustainable futures for Indigenous peoples, cultures and Country. This includes working with Indigenous partners to support Indigenous-led entrepreneurship, new industries, and sustainable land, water and sea Country-based enterprises.

2. High-impact national science and research infrastructure

I expect CSIRO to ensure its scientific research facilities and partnerships are safe and fit-for-purpose and that they develop, secure and preserve critical, cutting-edge Australian science capability.

Operating infrastructure at the standard and scale required for impactful science demands coordinated, strategic and long-term national planning. As current facilities age and next generation technologies grow in scale, cost, and technical complexity, CSIRO must optimise public investment in its research infrastructure, national facilities and collections for wider use and access.

I expect CSIRO to regularly review its physical and digital infrastructure needs against its core mission and priorities and undertake whole-of-life planning for all infrastructure.

3. Enduring and sustainable operations

It is essential CSIRO's operations are financially sustainable over the long-term. This will require the Board and Executive to clearly prioritise activities and the allocation of resources.

In accordance with the Public Governance, Performance and Accountability Act 2013 (PGPA Act), CSIRO must use resources in the most effective and efficient manner, supporting national priorities without overlap or inefficiency. I expect CSIRO to demonstrate disciplined financial planning and work to monitor expenditure, identify efficiencies and reduce operating costs, while ensuring appropriate levels of co-investment to maximise the impact from its research.

I expect CSIRO to look for opportunities to further consolidate its property portfolio, as part of efforts to strengthen long-term financial sustainability. Consolidation may also present opportunities to enhance research impact through co-location with industry and other partners.

4. Effective governance, safety, security and people management

The CSIRO Board and Executive should demonstrate strong leadership and accountability to deliver outcomes for the Australian people. This includes operating in line with the functions and requirements outlined in the Science and Industry Research Act 1949 and PGPA Act, and applying rigorous governance, ethical conduct, transparency and accountability. CSIRO should model best practice environmental sustainability and act as a model employer, fostering a respectful, inclusive and high-performing workplace and ensuring a safe and healthy working environment across its sites and operations. To protect its operations and the value of its research, CSIRO should ensure its cyber security, research security and intellectual property protections are robust and effective.

5. Working with my office and the Department of Industry, Science and Resources

CSIRO should maintain close coordination with my office and department. This includes providing timely notice of major announcements or events. It also includes early consultation on significant public documents, including Corporate Plans and Annual Reports, as well as plans for property consolidation or major staffing changes.

I look forward to working with CSIRO to progress Australia's science, industry and innovation agenda. I also look forward to receiving your response outlining how CSIRO intends to implement the priorities set out in this Statement of Expectation.

Tim Ayres

Appendix B CSIRO's Statement of Intent

CSIRO Board Chair, Ms Ming Long AM, provided this Statement of Intent to the Minister for Industry and Innovation and Minister for Science, Senator the Hon Tim Ayres, on 16 December 2025.

Dear Minister Ayres,

On behalf of the CSIRO Board, I am pleased to present CSIRO's Statement of Intent.

As the national science agency, CSIRO has been improving Australian lives for over a century. In doing so, it has continuously evolved its scientific focus to meet the nation's needs of the time and help drive prosperity and progress. CSIRO has also adapted to shifting operational pressures, delivering impact to the nation throughout.

As today's stewards of the organisation, CSIRO's Board and Executive are determined to again evolve and adapt. This is not a choice, it's an imperative because scientific research and development are at the core of Australia's future.

That means making deliberate choices about where we invest our resources and how we maintain the trust placed in us by the Australian community. As priorities evolve, CSIRO's Board and Executive are committed to ensuring we are ambitious, accountable and responsible, and resolve to use the resources entrusted to us to deliver significant positive impact.

I appreciate your acknowledgement of CSIRO's independence as a corporate Commonwealth entity. This independence is something that we will always safeguard.

You have clearly outlined your expectations of CSIRO, to which I am pleased to respond in more detail.

1. Research that delivers to government priorities

CSIRO is focusing its efforts where Australian science can deliver national advantage, with research that delivers a Future Made in Australia. We will prioritise applied research and align our capability to support the net-zero transformation and a technology-driven economy. We will do this by focusing on research where CSIRO is uniquely placed to deliver, bringing a greater emphasis on inventing and deploying technological solutions to tackle national problems. This includes research programs that:

- Support a clean, affordable energy transition, including transforming critical minerals to materials.
- Address the pressing problem of climate change, with greater emphasis on adaptation and resilience.
- Apply advanced technologies (including artificial intelligence, quantum, sensing, robotics and manufacturing) to drive
  the next wave of innovation in core Australian industries.
- Increase the productivity and resilience of Australian farms by focusing on the deployment of technological solutions.
- Mitigate and eradicate biosecurity threats to Australian industries, landscapes and communities.
- Apply disruptive science and engineering to unlock the unknown and solve unanswered questions.

Through our research programs, CSIRO will continue to deliver to the National Science and Research Priorities, maintaining a mix of strategic, basic and applied research to deliver solutions over multiple time horizons. We will continue to respond to emerging needs and unexpected challenges that confront the nation, while also delivering research to solve multi-generational problems.

2. Innovation and translation through partnerships and collaboration

CSIRO will continue to collaborate extensively across the research, development and innovation system. We will adopt an outcomes-oriented approach to collaboration, translating applied research through complementary partnerships.

CSIRO will play a constructive role as part of wider government efforts to facilitate innovation system reform. Where appropriate, we will orchestrate system -wide coordination and contribute our research expertise, infrastructure, and innovation facilitation skills in areas where we hold strong capability. Role clarity, not duplication, will guide our choices to help lift national innovation system performance.

CSIRO will respectfully partner with Aboriginal and Torres Strait Islander communities to co-develop Indigenous-led research agendas that elevate and embed Aboriginal and Torres Strait Islanders knowledge systems, foster Indigenous entrepreneurship and economic development and respond to key challenges facing Indigenous communities now and into the future.

Through focused STEM education and outreach programs, CSIRO will strive to nurture the ecosystem needed for the Future Made in Australia agenda to thrive. Internationally, CSIRO will maintain trusted partnerships where this strengthens Australia's strategic priorities and market access.

3. High-impact national science and research infrastructure

CSIRO serves a dual role in research infrastructure, as a partner and steward managing national assets that strengthen Australia's science capability and readiness for the coming decades; and as the national science agency, using these assets to enable our own research portfolio.

To ensure stewardship is coordinated, strategic, safe, and aligned with long-term national needs, a review of CSIRO's Science and Research Infrastructure (SRI), including National Facilities and Collections will take place in 2026, engaging with the wider system.

Through this review and considering forthcoming recommendations of the Strategic Examination of R&D (SERD), we will assess fitness-for-purpose, sustainability, and future requirements to support national innovation system success, while responsibly optimising external access and usage. In addition, we will embed whole-of-life planning through an asset management framework and Capital Operating Model to ensure ongoing, clear and transparent decisions on capability and cost.

4. Enduring and sustainable operations

Ensuring long-term financial sustainability while delivering safe and modern facilities is fundamental to CSIRO's continuing research impact. Through disciplined financial planning, the Board and Executive will prioritise addressing long-term underinvestment in physical and digital infrastructure and facilities, progressing property consolidation towards a leaner national footprint, investing in technology – including artificial intelligence – to increase science and operational productivity, and maintaining efficient operations.

A whole-of portfolio review, linking research program goals with infrastructure and appropriate co-investment levels will optimise impact, efficiency, and long-term sustainability. Together, these measures will keep staff safe and put the organisation on a path to sustainability over the coming decade, while delivering significant economic, social, and environmental value to the community. This reflects our commitment to our staff and to maximising the return on public investment.

5. Effective governance, safety, security and people management

CSIRO's trust as a national institution is built on strong governance, dedicated people, ethical and impactful research, and secure, resilient, and safe operations. Operating under the SIR Act 1949 and PGPA Act, CSIRO will maintain robust and accountable governance. We will focus on well-defined research problems with accountability and ambition.

CSIRO will maintain a high-performing operational environment, supported by adaptive practices, environmental sustainability aligned with the Commonwealth climate disclosure regime, rigorous safety measures, appropriate cyber security measures and foreign interference and intellectual property protection.

Together, these practices will ensure CSIRO remains a forward-looking, effective, and trusted research partner, safeguarding the value of Australian science and its national scientific capability.

6. Working with your office and the Department of Industry, Science and Resources

CSIRO will continue to maintain close coordination and early engagement with your office and the Department of Industry, Science and Resources to ensure a predictable and transparent partnership. Your office will have timely notice of major announcements and events and be consulted early, according to agreed thresholds, on significant public documents and property and staffing changes.

We will demonstrate accountability and regularly report on progress, including through the objectives outlined in our Corporate Plan and reported on in our Annual Report.

On behalf of the Board, the Executive, and the rest of CSIRO, we look forward to working with you and your department to achieve the priorities outlined. Your support for CSIRO is greatly appreciated.

Ming Long AM
CSIRO Board Chair

Appendix C CSIRO and the Australian research and innovation systems

This appendix provides additional detail in relation to CSIRO's activity in the Australian research and innovation systems.

Patents

CSIRO was the largest applicant for Australian provisional patents in the 2024–25 financial year and has held this place for all but one of the last 10 years. CSIRO was the largest non-industrial recipient of granted Australian patent rights in the key technology areas of biotechnology, analysis of biological materials, macromolecular chemicals and polymers, and food chemistry. In the 2024–25 financial year CSIRO had 616 licences in force, with 340 of those patents having active revenue generation clauses.

Patents are crucial for innovation because they grant inventors exclusive rights, which incentivises investment that allows further development, piloting and scaling and transforming inventions into products that can benefit society. Patents are also a way for inventions to be publicly disclosed, allowing others in the innovation system to make further progress, driving economic growth and creating competition.

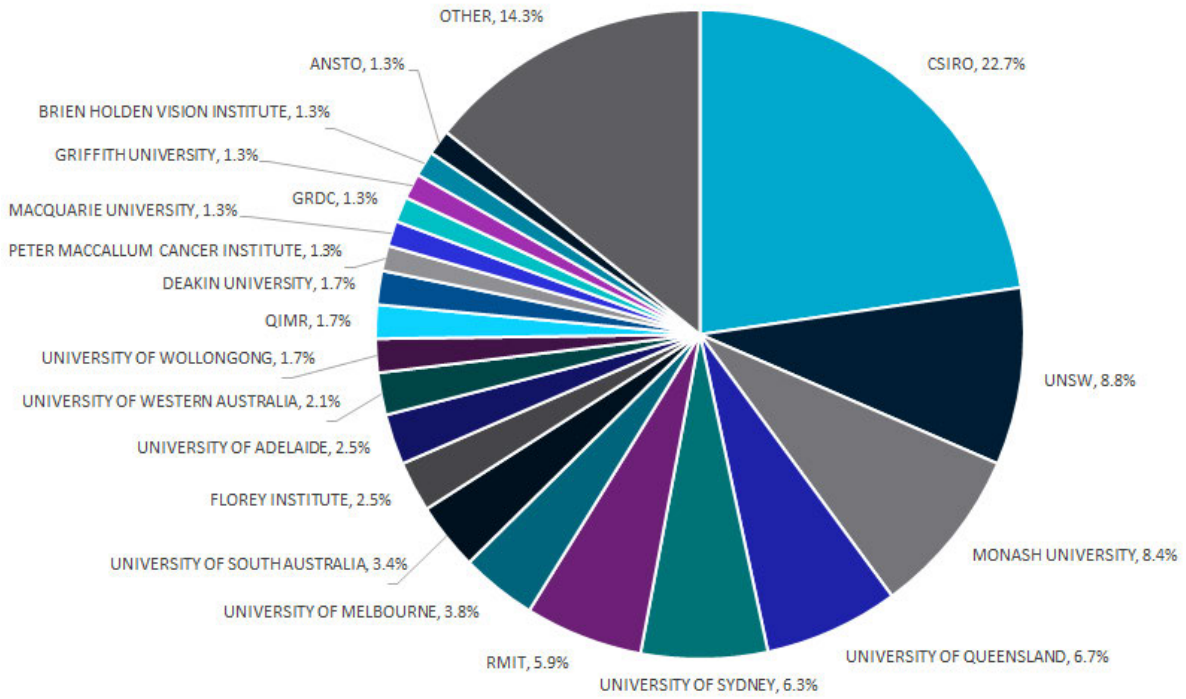

Figure 12: Proportion of Australian complete patent applications by non-corporate organisations

Patents are classified into technology fields called 'domains'. CSIRO's domains are illustrated in figure 13.

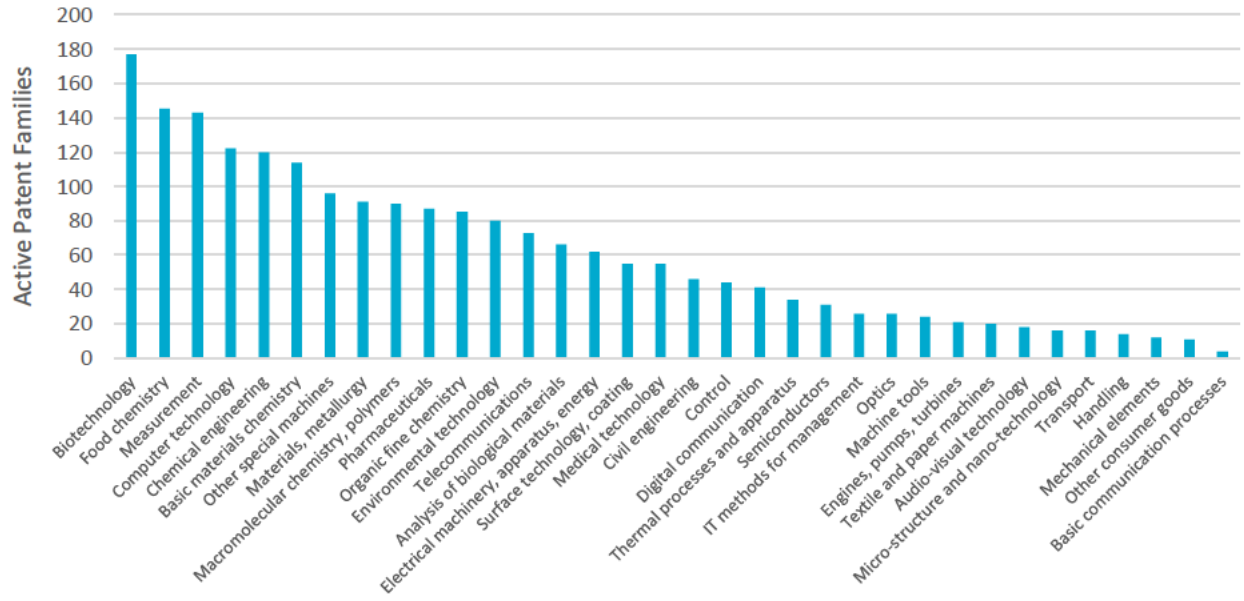

Figure 13: CSIRO's patent technology domains categories[128]

The value of CSIRO's patents, and therefore benefit and importance to Australia, is best demonstrated (other than by licensing and revenue) by forward citation count – that is, the number of other patents that cited a CSIRO patent.

Ranked against peer international organisations, CSIRO received the highest average number of patent citations in 2024 (**Table 11**).

Table 11: CSIRO patent citation compared to selected international applied research organisation peers[129]

INSTITUTION	COUNT OF PATENT FAMILIES	TOTAL FORWARD CITATIONS	AVERAGE FORWARD CITATIONS
CSIRO	334	456	1.37
Max Plank Society	452	548	1.21
Japan Science & Technology Agency (JST)	163	133	0.82
Netherlands Organisation for Applied Scientific Research (TNO)	387	292	0.75
Fraunhofer-Gesellschaft	2,962	2,069	0.70
Brookhaven National Laboratory	38	23	0.61
National Research Council (NRC) Canada	236	138	0.58
Battelle Memorial Institute	1,057	617	0.58
Agency for Science, Technology and Research (A*Star)	649	366	0.56
Helmholtz Association	330	162	0.49
United States Department of Energy	148	72	0.49

[128] Orbit (13 June 2024), Alive & Dead Patents Families Application Date 2019-23, All Forward Citations; duplicate cites from patents within the same family are counted.

[129] Orbit (13 June 2024), Alive & Dead Patents Families Application Date 2019-23, All Forward Citations; duplicate cites from patents within the same family are counted.

INSTITUTION	COUNT OF PATENT FAMILIES	TOTAL FORWARD CITATIONS	AVERAGE FORWARD CITATIONS
Institut National De Recherche Pour L'agriculture, L'alimentation Et L'environnement (INRAE)	225	100	0.44
United States Department of Agriculture (USDA)	240	101	0.42
Electronics and Telecommunications Research Institute (ETRI)	6598	2745	0.42
Centre National de la Recherche Scientifique (CNRS)	3310	964	0.29
Consejo Superior de Investigaciones Científicas (CSIC)	454	119	0.26
National Institute of Advanced Industrial Science and Technology (AIST)	1745	291	0.17
Industrial Technology Research Institute (ITRI)	2197	312	0.14
Chinese Academy of Sciences (CAS)	99,066	13,868	0.14

CSIRO's rank by all forward citations against peer organisations, broken out by technology domain shows CSIRO ranked in the top 3 in all domains in 2023 (**Table 12**).

Table 12: CSIRO patent citation rank trend against selected global peers by domain[130]

PATENT DOMAIN	CSIRO RANK 2023
Analysis of biological materials	2
Basic materials chemistry	1
Biotechnology	2
Chemical engineering	2
Food chemistry	2
Macromolecular chemistry, polymers	2
Materials, metallurgy	1
Measurement	2
Other special machines	3
Pharmaceuticals	3

Reports

CSIRO's research output also includes reports used by industry and government to inform private sector investment as well as policy. A key example of this is the GenCost report, an economic report that estimates the cost of building new electricity generation, storage, and hydrogen production in Australia out to 2050. GenCost has been published each year since 2017 in partnership with the Australian Energy Market Operator.

This report is used by government, industry and community to inform policy and investment decisions in relation to transitioning Australia to net zero while ensuring cheaper energy for industry and consumers.

[130] Orbit (13 June 2024), Alive & Dead Patents Families Application Date 2019-23, All Forward Citations; duplicate cites from patents within the same family are counted. Only domains where CSIRO produced more than 25 patents during the period are included.

Publications

CSIRO's contribution to Australia's research in 'hard science' disciplines is significant and represents an outsized percentage of the total Australian publication output.[131] In 2023, 94% of CSIRO's publication were undertaken in collaboration with authors from other institutions (Australian and international). Generally, CSIRO's citation levels are in line with or below the Australian average, reflecting its focus on applied aspects of the technologies which tend to be less cited but do generate patent applications.

In relation to CSIRO's publication output (which is only one measure of scientific output, see above in relation to CSIRO's patent applications), CSIRO is most active in National Science and Research Priorities 4 and 5, which comprise 22% (4,232 publications) and 14% (2,630 publications) of CSIRO's publication output respectively. CSIRO also makes an outsized contribution to publication output in technology areas identified in the 'List of Critical Technologies in the National Interest', particularly artificial intelligence (10.4% of CSIRO's output or 1,811 publications), advanced manufacturing (11.1%, 1,932) and advanced ICT (13.7%, 2,395). These technology areas are of critical long-term strategic importance to Australia's future economy, security and social cohesion.

Connection to the wider scientific community through collaborations between researchers is key to a role that CSIRO plays as networker. One measure illustrating the extent of these interactions is scientific publication co-authorships. Across the period 2019 to 2023, an average of 69% of CSIRO publications were produced with a domestic collaborator. CSIRO collaborated with 30 Australian universities during this period which generated at least 140 scientific publications, and weighted network analysis indicates that CSIRO is ranked in the top 2 in 3 of its 5 main research fields. Geographically, CSIRO's connections spread all across Australia.

The top 3 domestic collaborator universities for each of CSIRO's main research fields are most commonly members of the Group of Eight, although the University of Tasmania (in particular), Curtin University, University of Technology Sydney, Macquarie University, RMIT and Queensland University of Technology were also frequent collaborators (**Table 13**).

Table 13: Domestic collaborator universities for CSIRO's main research fields

FIELD	TOP COLLABORATORS
Environmental/geosciences	• University of Tasmania • University of Western Australia • University of Queensland
Agricultural Sciences and Plant Fields	• University of Tasmania • University of Queensland • ANU
Space Science	• University of Western Australia • Curtin University • Swinburne University
Computer Science	• University of New South Wales • University of Technology Sydney
Chemistry and Materials Sciences	• Monash University

[131] Abbott, Tadro; Finch, Adam, CSIRO 2023 Science Health & Excellence Report - Full Version. Adelaide, South Australia: CSIRO; 2023. csiro:EP2024-0280. https://doi.org/10.25919/c4nd-5c65

Stewarding national scientific and research infrastructure for Australia

As outlined in Section 1, CSIRO plays an important role in the research ecosystem through stewardship of national scientific and research infrastructure, which facilitates multidisciplinary research activity for a broad network of researchers, government, industry partners and communities both Australian and international.

National scientific and research infrastructure is at a scale which would not be able to be absorbed by any single institution and would be otherwise inaccessible to the broader scientific community in Australia.

For example, the *RV Investigator* is a 94-metre ocean research vessel commissioned in 2014. It has a wide range of on-board and modular laboratories and facilities. The vessel supports biological, oceanographic, geological and atmospheric research, as well maritime training and education and outreach activities.

In 2024 the *RV Investigator* celebrated 10 years of operation including:

- 110 voyages from the Antarctic ice edge to equator covering 516,592 km
- 1,427 participants from 215 institutions
- 3,244,810 km^2 seafloor mapped
- 112 new species described and 6 shipwrecks discovered
- 3,895 km of Conductivity, Temperature, Depth (CTD) casts to profile the ocean
- 1,844 voyage publications.

This impact was assessed at over $3 billion including advances in marine research, ecosystem management and weather forecasting. The flow-on benefits include delivering critical national and international projects, enabling better resource management and environmental stewardship, and enhanced scientific understanding of marine ecosystems.

CSIRO has also facilitated specific scientific and research infrastructure for the higher education system – connecting universities with industry – through the Trailblazer Universities program. As part of the government funding for the Trailblazer Universities program, $45 million was provided to enable CSIRO to acquire and install 16 items of highly specialised equipment required for Trailblazer consortia.[132] University and industry researchers are accessing this specialist equipment, building technical expertise and accelerating the delivery of impact from their research.

For example, Curtin University partnered with both the University of Queensland and James Cook University to form the Resources Technology and Critical Minerals Trailblazer, aiming to build Australia's advanced manufacturing capabilities and drive commercialisation outcomes for the resources and critical minerals sector.

CSIRO supported this Trailblazer through the acquisition of 2 major pieces of equipment: a plasma spheroidisation capability and a binder jet additive manufacturing system (a technique that is designed to make a large volume of parts at a lower price than those made via other additive manufacturing processes) . The combination of the Binder Jet printer and the Spheroidiser will allow for lower cost powder to be produced from Australian minerals and have them converted to higher value products for use in modern manufacturing processes.

[132] $45 million was provided to CSIRO in the 2022–23 Budget - see Portfolio Budget Statement Industry Science Energy and Resources 2022–23, page 243 Table 1.2 footnote.

CSIRO is also providing access to its suite of characterisation equipment that can be used to study mineralogical samples. The Advanced Resource Characterisation Facilities at CSIRO include analytical chemistry, particle analysis, 3D characterisation including a micro and medical CT (computed tomography) facilities, drill core research and clay mineralogy characterisation.

Research translation programs for the research sector

CSIRO received funding in the 2022–23 Budget in the form of terminating budget measures, to support the following programs:

- $37.4 million for CSIRO's *Research Translation Start* program (the ON Program)
- $45 million to support the delivery of the specialist equipment component of the Trailblazer Universities Program
- $150.0 million in equity funding for CSIRO's Innovation Fund (Main Sequence Ventures).

Appendix D Impact case studies

The impact from CSIRO's research delivered in collaboration is best illustrated by case studies, demonstrating how investment in CSIRO delivers transformative technology with domestic and global benefit.

Fast Wi-Fi - Wireless Local Area Network

A CSIRO patented technology lies at the centre of the most popular way to connect to computers indoors: Wireless Local Area Network (WLAN). With the world seeking a way to quickly communicate large amounts of data without wires in indoor environments, a team of CSIRO scientists solved the main problem of wireless networking indoors – combating reverberation by applying lessons learnt from work in radio astronomy.

The research culminated in an invention that allowed indoor wireless communication between electronic devices at high data rates, now used in more than 5 billion devices worldwide. It is used in Wi-Fi hotspots in offices, public buildings and homes, supporting equitable access to the internet. CSIRO has licence agreements with more than 20 international companies and has received around $430 million in licensing revenue.

Today, its many applications have fundamentally transformed approaches to and uses of technology in everyday life, serving as a prime example of how CSIRO's multidisciplinary science achieves economic and social outcomes.

Cotton

The cotton industry is one of Australia's major agricultural industries, with exports worth over $4 billion in the 2023–24 financial year.

During the 1960s and 1970s, all cotton varieties grown in Australia were sourced exclusively from the US. CSIRO commenced a cotton breeding program in 1972, focused on developing varieties that can maximise productivity and quality under Australia's unique conditions.

Over the past 30 years, CSIRO has released a total of 102 cotton varieties. CSIRO's cotton research project has increased the productivity of Australia's cotton yield due to the development of cotton varieties that are more resistant to common diseases, are more water efficient, and are better adapted to Australian weather and soil conditions.

CSIRO-bred cotton varieties have increased Australian cotton farmers' productivity. Australia's cotton growing productivity, measured in terms of kilograms of lint yield per hectare, is the highest in the world. This has resulted in a 7:1 benefit-to-cost ratio for CSIRO (measured between 2006–2023).[133] Broader impacts include:

- improved ecological health and lower exposure of farmers and farming communities to pesticides because of reduced pesticide use
- increased water efficiency, meaning Australian cotton farming is now the most water-efficient in the world
- increased sustainability of local farming communities, due to the increased resilience of the cotton industry to risks such as disease and drought.

[133] Alan C O'Connor & Amanda C Walsh, *The Value of CSIRO: The Broader Impact of CSIRO's Portfolio of Activities*, RTI International, 2020, accessed 22 January 2026, < https://www.csiro.au/en/about/Corporate-governance/Ensuring-our-impact/Auditing-our-impact/2020-impact-assessment>

Developing the world's first Hendra vaccine

Since 1994, Hendra virus (HeV) has been the cause of death in more than 100 horses and 4 humans. As part of the initial detection in 1994, the diagnostic team from ACDP isolated and identified what proved to be a new virus that had not been previously reported anywhere else in the world.

As a national facility, ACDP provides diagnosis of emergency animal diseases, which includes:

- index case confirmation
- national emergency response capability
- use of accredited and validated tests.

The strength of ACDP's capabilities was clearly demonstrated by the way the infectious agent was isolated, the disease reproduced in horses and the virus eventually identified using electron microscopy and gene sequence analysis, all completed within 2 weeks.

Hendra outbreaks continued over the next 2 decades, with a particularly severe spike in cases in 2011, with 18 outbreaks across both Queensland and NSW. By May 2011, CSIRO had announced that it was working with partners to develop a vaccine. This vaccine was tested in several animal models in collaboration with the CSIRO – with ACDP the only lab in Australia able to work with a BSL-4 disease like Hendra – as part of an extensive evaluation process where it was found to be potently protective against HeV infection.

Following rigorous safety testing, CSIRO and its partners launched the Equivac HeV vaccine in November 2012, a world-first commercial vaccine for a BSL-4 disease agent. This vaccine has wide ranging economic, social and environmental benefits, enabling commercial and private equine activities to continue with minimal negative impact by increasing personal safety for horse owners, vets and others regularly interacting with horses. It also enhances security for the Australian horse industry and reduces time horses spend in quarantine. The vaccine has reduced costs attributed to future disease response and containment and minimised the chances of the Hendra virus mutating and spreading more readily between horses, or from human to human.

Improving the energy efficiency of buildings: OptiCOOL

Buildings are responsible for more than one-third of global energy-related greenhouse gas emissions, with heating, ventilation and air conditioning (HVAC) systems in commercial buildings accounting for 43% of energy use.

CSIRO developed OptiCOOL, a system that alters the operation of a building's control system intelligently to provide cost savings, occupant comfort and energy efficiency. The technology, commercialised in 2009 under an exclusive licence to start-up BuildingIQ, gathers data from building occupants plus weather data, and energy market pricing is used by the intelligent air-conditioning controller to alter the operation of the building's air-conditioning to:

- reduce energy consumption
- reduce greenhouse gas emissions
- save money
- improve comfort for occupants.

OptiCOOL is helping building owners across Australia and the United States to reduce their energy consumption by 12 to 30 per cent. The CSIRO Energy Centre in Newcastle has achieved energy savings of up to 30 per cent using this technology, and it is also being used at the Rockefeller Center in New York in the United States. OptiCOOL has an estimated benefit-to-cost ratio of 95:1 for CSIRO (in the period 2006–2024), as well as a range of social and environmental impacts, including a reduction in energy costs for building tenants and reduced greenhouse gas emissions.[134]

Next generation green whistle

CSIRO invests in Australian companies, providing the technologies and platforms needed to scale production and get Australian-made products around the world. An example of this is CSIRO's work with and investment in Medical Developments International (MDI), who utilised CSIRO's cutting-edge flow chemistry in the manufacturing of their Penthrox green whistle, an inhaler that delivers pain relief which is now helping reduce the burden on health systems in over 30 countries. At home, this investment has allowed MDI to scale-up, building a new manufacturing facility in Melbourne (creating 26 new jobs so far) and growing their market value from less than $10 million dollars in March 2010 to around $517 million today.

This collaboration has an estimated benefit-to-cost ratio of 170:1 for CSIRO (over the period 2014–2029),[135] and the adoption of this research has delivered various incremental economic, social, and environmental impacts for a range of stakeholders:

- brand recognition of MDI worldwide, the creation of new jobs and improved patient outcomes when medical practitioners use Penthrox for both emergency and minor procedures
- reduced the burden on the healthcare system by lowering the need for prolonged hospital stays and expensive interventions
- fostered new collaborations between CSIRO and MDI, as well as other organisations, to advance R&D in continuous flow chemistry.

[134] Amanda C Walsh, Jonathan Merker, Alison Bean de Hernandez & Alan C O'Connor, *The Value of CSIRO: The Broader Impact of CSIRO's Portfolio of Activities*, RTI International, 2022, accessed 22 January 2026, < https://www.csiro.au/en/about/Corporate-governance/Ensuring-our-impact/Auditing-our-impact/2022-impact-assessment>

[135] Alan C O'Connor & Amanda C Walsh, *The Value of CSIRO: The Broader Impact of CSIRO's Portfolio of Activities*, RTI International, 2020, accessed 22 January 2026, <https://www.csiro.au/en/about/Corporate-governance/Ensuring-our-impact/Auditing-our-impact/2020-impact-assessment>

Appendix E Commercial partnership case study: CSIRO and Boeing

CSIRO and Boeing have collaborated for over 35 years, delivering over 220 projects and investing over $200 million across aerospace, sustainability and space. This long-term partnership has supported Boeing's growth in Australia, including establishing R&D centres in Brisbane and Melbourne which employ more than 120 scientists. Boeing's Australian presence is the second largest outside of the USA, behind India.

Key outcomes from the collaboration include the development of a topcoat reactivation technology now used on over 1,000 Boeing aircraft, reducing maintenance time and cost; airspace modelling software used in major Australian airports; and a jointly developed roadmap to establish a domestic sustainable aviation fuel (SAF) industry.

From CSIRO's early work in the 1990s on carbon fibre and resins to recent testing of a multi-resolution scanner on robots in space, CSIRO and Boeing have collaborated on over 220 projects. These projects have also provided indirect benefits as well as delivering a range of innovative technological breakthroughs.

Topcoat reactivation technology

CSIRO and Boeing developed a simple and effective 'spray-on and leave-on' re-coating technology that has been applied to Boeing's new commercial aircraft, including aircraft delivered to both Qantas and Virgin Australia. The technology allows a plane's topcoat to be repainted without the need for potentially damaging sanding, saving Boeing millions of dollars in maintenance costs and countless hours of manual labour.

Airspace and airport congestion simulation tools

Total Airspace and Airport Modelling (TAAM) simulation software was first developed within CSIRO and spun off into The Preston Group, later acquired by Boeing. TAAM is in operation across the globe, including by Airservices Australia and at Melbourne, Sydney and Brisbane airports. It reduces airspace congestion, airport disruption and conflict avoidance and ensures safer Australian skies.

Sustainable aviation fuel

CSIRO is exploring the use of sustainable aviation fuel (SAF) in collaboration with Boeing. Unlike conventional jet fuel, SAF is produced from renewable sources, such as agricultural waste, animal fats and vegetable oils, and significantly reduces carbon emissions throughout the fuel's lifecycle. This makes it a more sustainable alternative for powering aircraft. Recently, CSIRO and Boeing developed the SAF Roadmap.[136] The roadmap identified key opportunities for building an Australian SAF industry and recommended key actions required to help overcome financial, legal and technological barriers. It showed that Australia is well placed to supply renewable sources for a domestic SAF industry, setting the scene for continued research and development on sustainability alongside Boeing.

[136] CSIRO & Boeing, *Sustainable Aviation Fuel Roadmap 2023*, CSIRO & Boeing, 2023, accessed 22 January 2026, <https://www.csiro.au/en/work-with-us/services/consultancy-strategic-advice-services/csiro-futures/energy/sustainable-aviation-fuel-roadmap>

Building space capability

CSIRO and Boeing are working together in a range of space-related research areas. For example, CSIRO is helping Boeing discover better ways to track objects in space, like the tens of thousands of bits of space debris already in orbit. In addition, CSIRO and Boeing are developing lightweight radiation shielding materials for spaceflight, as well as manufacturing methods that will work in space stations to produce components such as satellite parts. These projects involve teams throughout Boeing, including its space R&D and Boeing HorizonX teams. Boeing HorizonX is a pathfinder organisation that accelerates innovation and explores what's possible outside of Boeing's traditional market offerings.

Recently CSIRO designed a multi-resolution scanner – a powerful package of 3D sensing and mapping technology. Boeing saw the possibilities of this smart tech and supported the CSIRO team’s application to the International Space Station National Laboratory. As a result, this technology is currently being tested in space. The scanner is designed to conduct full 3D scans inside the International Space Station and keep track of the movement of inventory. It will help astronauts and mission controllers in planning activities on board the station. The scanner fits onto a NASA robot platform that roams the station, assisting with a range of tasks. If multi-resolution scanning passes this gravity-defying test, CSIRO and Boeing will develop the technology for other space applications.

Appendix F Research portfolio workshop assessment

Table 14: Research portfolio workshop assessment of programs of research

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
Energy & Minerals	Electricity transition	Progress with minor to moderate refinements	The electricity sector is leading Australia's greenhouse gas emissions reductions, with immense changes in renewable generation and increasing demand, necessitating new forecasting, modelling and operational approaches to ensure ongoing secure, reliable and affordable electricity for all Australians. By 2030, around half of existing conventional coal fired generation is expected to have been retired and the demand for renewable electricity is predicted to more than double. CSIRO can convene researchers, industry and government, and works internationally with electricity system operators, universities and energy innovators. CSIRO's research and innovations are increasing the security, productivity and efficiency of the electricity sector, and its milestones deliver on these metrics. The benefits are widespread - for individuals they provide comfortable affordable housing and lifestyle; for businesses and industry the confidence to make long-term investments and remain internationally competitive.
Energy & Minerals	Decarbonised industry and transport	Progress with minor to moderate refinements	Industry and transport are now the most emissions-intensive sectors. Their decarbonisation is challenging: the scale is significant, electrification is not always suitable, and it requires an unprecedented degree of sector coupling. The high cost of critical technologies (for example, sustainable aviation fuels), technology integration risks (for example, introducing bioenergy or hydrogen), and limited government and industry familiarity with these approaches create additional challenges. Success will see the commercialisation of new technologies to reduce the cost of sustainable heat and fuels, and the demonstration of concepts like hydrogen integration, bioenergy, and solar thermal systems. New knowledge of materials and press compatibility with new fuel sources as well as concept demonstrations of sustainable fuels pathways will also support uptake and investment. CSIRO has strong industry-researcher partnerships, established science teams in hydrogen, bioenergy, CO2 capture and renewable heat, and a growing track record of technology commercialisation.
Energy & Minerals	Developing green metals production technologies	Progress with minor to moderate refinements	With the growth of demand for decarbonisation and shifts to renewable energy, new technologies and innovations are essential to enable Australia to continue extract maximum value from its resource endowments through the production of 'green metals'. Australia is uniquely positioned to meet this demand due to its abundant mineral wealth, renewable energy potential and proximity to global markets. This transition will benefit regional communities, boost exports, create jobs and contribute meaningfully to global decarbonisation efforts. Progress requires the demonstration of technologies tailored to the unique characteristics of Australian ores and availability of renewable energy. Success will be defined by substantial investment in local green metal manufacturing, measurable reductions in carbon emissions, and preservation of export earnings.

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
Energy & Minerals	Reliable and responsible supply chains for critical minerals	Progress with minor to moderate refinements	Australia can capitalise on the global shift to low-carbon economies by developing sovereign capabilities in value-added critical minerals and supplying these minerals with high environmental, social, and governance (ESG) standards. This will strengthen global supply chains, bringing broad economic benefits, especially for Indigenous Australians and regional communities through job creation and improved services. Australia's geological endowment of critical minerals and world-leading minerals position the country well to respond with a focus on 'energy transition' critical minerals such as rare earth elements, lithium, graphite and cobalt. Key technological focus areas to support the response include developing high-purity analytical techniques, high-ESG processing and recycling technologies, and targeted international collaborations. With globally recognised minerals-related capabilities, along with expertise in collaborating with a range of public and private R&D investors and key stakeholders, CSIRO is well-placed to play a leading role. Success will be measured by increasing levels of investment in domestic value-added critical minerals operations, supported by new technologies and advancement of technological readiness levels.
Energy & Minerals	Growing Australia's mineral resources	Progress with minor to moderate refinements	High-quality metals from mineral resources are crucial to supporting the net zero transition and sustaining the resource pipeline that drives Australia's sovereign and export minerals success (12% of GDP). Global demand for metals is rising while new discoveries decline, making technological innovation essential for sustainable growth and production. Scaling these innovations through industry and government will help the global community and bolster Australia's reputation as a dependable metal supplier. CSIRO can turn sensing data into resource discovery tools, with high resolution satellite imagery, advanced modelling and artificial intelligence able to provide even more effective exploration techniques. Integrating and interpreting multiscale, multidimensional data are key for detecting buried or small deposits. This involves precise regional characterisation through ore genesis fingerprinting, enhanced interpretation via data fusion and quantifying the effects of cover.
Energy & Minerals	Advanced technologies for a globally competitive Australian minerals industry	Progress with minor to moderate refinements	Australia needs to increase the productivity, safety and sustainability of Australian mining to remain globally competitive. To enable this, CSIRO will develop advanced technologies for mining and mineral processing. CSIRO's vision of future mining is an industry more akin to a highly controlled and connected manufacturing process, utilising safe and precise rock extraction, ore treatment, refining and reduced waste, strengthening the industry's social licence. This approach will create safer, higher-skilled jobs, will benefit local communities through sustainable and economically resilient mines, and will maintain national income from mineral resources for all Australians. CSIRO has a strong track record of industry partnership and technology transfer through piloting, licensing and spin out (for example Chrysos, LASC, NextOre).

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
Food & Fibre	Redesigning genetics	Progress with minor to moderate refinements	Genetic improvement underpins 50% of Australian agricultural productivity gain, supporting the growing demand for food and bio-based products. CSIRO is on the cusp of significantly lifting the pace of genetic gain through recent advances in artificial intelligence and genome engineering. CSIRO's track record includes high-yielding pest-resistant cotton varieties, now supplying 100% of Australia's cotton production, and omega-3 enriched canola, a sustainable alternative to marine sources. CSIRO will deliver, via key partnerships: • high-performing varieties of cotton and other crops using artificial intelligence driven optimisation • novel trait development and genome engineering to enhance welfare, pest and disease resistance, market value, and consumer acceptance • crops transformed into bio-factories for replacement products (for example, dairy fats).
Food & Fibre	Productive and resilient farms	Progress with minor to moderate refinements	Intensifying climate risk and stagnant productivity gains threaten the future viability of Australian farms. CSIRO offers multi-disciplinary farming-systems innovation, national scale and strong industry partnering to deliver solutions that increase farm productivity. Expertise in crop and livestock biology, agronomy and data science is being used to develop new opportunities such as sprayable-biodegradable mulch to preserve water for crops, maximising the effectiveness of fertilisers, and microbial products to protect crops from disease. In parallel, we are digitising experimental sites and commercial farms across Australia to generate data, models and artificial intelligence platforms that can enhance on-farm decision-making, diagnose production constraints and drive the transformative changes needed to adapt farming practices to be more resilient in future climates. We will deliver measurable increases in the productivity of farming systems that underpin the future success of Australian farmers and the broader agribusiness sector.
Food & Fibre	Aquaculture	Progress with minor to moderate refinements	Australia currently imports 70% of its seafood and is heavily dependent on the global supply. Diversifying and scaling up Australian aquaculture will help ensure food security and unlock economic opportunities. Australia can harness advances in aquaculture technologies, genomics, circular aquafeeds and land-based systems tailored to its environment. CSIRO is working to transform the sector by expanding the species portfolio, boosting production capacity, developing innovative sustainable feeds and establishing robust sustainability credentials. Success will be seen in reduced seafood imports, new species commercialised domestically, expanded Indigenous-led ventures, and improved environmental outcomes. Backed by 25 years of science leadership and strong partnerships, CSIRO is uniquely positioned to help make Australia a global leader in sustainable aquaculture.

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
Food & Fibre	Agri-food systems	Continue for a defined period, with a plan to transition key elements into other areas of the portfolio, including a new Waste Technologies program of research	Australia's agri-food system impacts the daily lives of 26 million people, contributes over $200 billion to the economy, and employs 3.5 million. However, more is being expected from the agri-food system. One-third of households face food insecurity each year, while two-thirds of adults are overweight. Foodborne illness costs the public approximately $3 billion annually and 33 million tonnes of organic waste is generated. Beyond maintaining long-term viability of food and fibre production, the system must also ensure access to safe, nutritious food, reduce waste, and minimise environmental impact. These interconnected goals demand solutions that integrate technical, social, institutional and policy innovation at multiple scales. CSIRO partners with policymakers, industry and communities to co-design practical pathways for real-world change – especially to improve outcomes for Indigenous Australians and marginalised groups. In the Asia-Pacific, CSIRO science takes a Team Australia approach, building capacity with partners to navigate agri-food system challenges and opportunities including managing climate change, growing markets, and building preparedness for disasters and supply chain disruptions.
Nature	Future water	Progress with minor to moderate refinements	Water is fundamental to Australia's productivity, environmental resilience and prosperity. As one of the most water-stressed continents, Australia faces increasing pressure from a highly variable climate, frequent droughts and floods, and growing demands across sectors. Water directly supports critical industries – underpinning $13.4 billion in irrigated agriculture, $8 billion in mining and energy production, and $15 billion in water utilities— while also supporting the clean energy economy, including green hydrogen. CSIRO provides national leadership and excellence in water science, delivering trusted research and solutions to guide policy and management decisions. Through Future Water, CSIRO enables Australia to meet its productivity goals, build resilience against climate impacts, and foster environmental stewardship that supports people and nature. Milestones include: scaling to national level to support governments, industries and communities to manage water security; establishing nationally consistent hydroclimate and sustainable yield prediction and forecasting approaches; conducting national groundwater characterisation, prediction and assessments critical for securing water; advancing water science at the core of climate mitigation and adaptation, including transitioning to net zero; and leading freshwater ecosystem and Indigenous water science, ensuring that environmental health and cultural values are integral to water security.

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
Nature	Integrated ocean stewardship	Progress with substantial refinements to ensure efforts are more focused on high impact opportunities	Australia's oceans are experiencing unprecedented environmental disruption and new economic opportunity and pressure. Current marine management efforts are sector-specific and reactive. A thriving Blue Economy demands solutions that harmonise ecological health with industrial growth as competition for space and resources threatens sustainable use and economic productivity. CSIRO will convene and lead national integration efforts on marine protein, environmental health, future habitats and ecosystems and ocean-based industries to climate-proof marine and coastal systems and infrastructure, sustain and restore habitats, ecosystems and biodiversity, and support integration with existing (for example fishing, energy) and nascent sectors (for example, offshore renewables, deep-sea mining). Our novel genetic and analytical tools and models will support scenario exploration and socio-ecological prediction. This will provide decision-makers and stakeholders with tools and evidence-based advice to ensure integrated stewardship of our marine systems. Success will be measured through research uptake to support decision-making resulting in reduced resource-use conflict and increased resilience across marine ecosystems supporting a vibrant Blue Economy.
Nature	Emissions transition > multilevel systems change	Prospective	Explore the prospect of establishing a new program of research that combines existing research activities from other Programs of Research with a focus on societal transition, such as energy and emissions transitions.
Nature	Climate resilience, adaptation and monitoring	New	Design a new program of research that focusses on climate adaptation and resilience. It will have a strong emphasis on understanding impacts and interventions relating to climate change on biodiversity and ecosystem functioning, informed by efficient incorporation of data from monitoring and modelling products.
Nature	Decarbonisation pathways	New	Design a new program of research that enables both conventional and novel carbon removal solutions and technologies. It will draw on existing decarbonisation economic modelling work and establish ambitious aspirations for the deployment of specific solutions.
One Health	Biosecurity for plant and environmental health	Progress with minor to moderate refinements	Native and introduced biological threats (vertebrate and invertebrate pests, weeds and diseases) negatively impact Australia's agricultural, environmental and cultural systems. Biosecurity (including managing exotic threats and bio-protection from native threats) is vital to ensure the productivity and profitability of our agricultural sector, to secure market access for Australian produce, and to conserve our unique environment. Transformative science and technology, along with fit-for-purpose systems and processes, are needed to stay ahead of an ever-changing biological threat profile. CSIRO will continue catalysing biosecurity in Australia and our region by developing innovative genomic and digital decision support systems to prevent, prepare for, detect and respond to these threats. In addition it will co-design, deploy and adopt enterprise- and landscape-scale integrated biological (for example, biocontrol, biopesticides), genetic (for example, RNAi, gene drives) and digital (for example, remote sensing, artificial intelligence enabled analytics) solutions.

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
One Health	Biosecurity for human and animal health	Progress with minor to moderate refinements	In a globalised world under climate change, the escalating risk posed by infectious diseases requires new mitigations to avoid health, social and economic consequences. CSIRO will develop more effective methods for early detection and management of high-consequence pathogens through better detection, greater understanding of pathogens and vectors, and development of countermeasures such as vaccines. Examples of outcomes from this research include improved rapid field diagnostics to enable widespread testing, early detection of animal borne pathogens, and reducing the risk of mosquito-borne pathogens through genetically modified vector control strategies deployed in partnership with Indigenous communities.
One Health	Animal disease diagnostics for decision-makers	Progress with minor to moderate refinements	The animal health sector is under constant threat from disease outbreaks. Prevention and response to outbreaks requires internationally trusted and timely diagnostics. Our impact is measured through our ability to deliver timely and trusted diagnostics, and through appropriate national and international technology transfer. We will continue to build on our expertise in integrating next-generation sequencing into outbreak responses and biopharmaceutical safety testing, establishing approaches for distinguishing between intentional and naturally occurring biothreats, and developing rapid responses to suspected outbreaks (such as Avian influenza).
One Health	Developing and translating complex therapeutics	Continue for a defined period of investment with a plan to transition to alternative business model	In the area of manufacturing of drugs, vaccines and biologics, Australia faces a gap in scaling from basic research to industry adoption. By developing and translating complex medicines and their associated delivery biotechnologies, this research enables equitable access to medical and animal health products in Australia and our region. This will also contribute to Australia's sovereign capability for manufacturing drugs, vaccines and biologics at scale, strengthen regional health and biosecurity, and address global supply chain failures.
One Health	Accelerating the digital transformation of health care	Progress with substantial refinements to ensure efforts are more focused on One Health	Opportunities exist to increase efficiency and quality of response in Australia's public health system through the deployment of innovative digital platforms. These platforms enable data interoperability and sharing across scales from the individual patient to clinical workflows and at national scales. This research will ensure health care providers can easily access the strength of nationally coordinated data to inform proactive and effective care solutions. These platforms also offer opportunity to improve the management of infectious diseases and biosecurity responses across a One Health approach (animal, environment, human).
One Health	Indigenous Science for One-Health	New	Design a new program of research that hosts Indigenous science delivering to a broad definition of the One Health ambition and scope. This requires the development of a future-facing research agenda with a 10-year vision for an ambitious and vibrant program of research that builds on and expands links with Indigenous communities.
Tech Economy	Waste technologies	New	Design a new program of research with scope that combines existing research activities from other areas of the portfolio with a focus on the energy and minerals sectors and pollutants, and subsequently agriculture. The aim is to capitalise on Australia's circular economy opportunities via technology interventions.

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
Tech Economy	Sovereign artificial intelligence	Progress with substantial refinements to ensure efforts are more focused on high impact opportunities and extended ambition	Australia needs its own advanced artificial intelligence capabilities to drive innovation, improve economic productivity, minimise geopolitical risk and ensure responsible and reliable artificial intelligence systems tailored to national priorities. CSIRO will develop the next generation of artificial intelligence for Australia's priorities using Australian datasets. This will inform complex decision-making and deliver a step-change in industrial innovation and increased productivity through new models and systems.
Tech Economy	Quantum technologies	Progress with minor to moderate refinements	Quantum science and derived technologies are a rapidly growing frontier that could transform pervasive technologies such as computing, sensing, artificial intelligence, energy storage and communications. Thanks to a visionary and combined effort across the research sector, Australia is amongst the global leaders in multiple areas of quantum research. After several years of exploratory strategic investment, the differentiated opportunity for CSIRO is to focus into several promising areas for development, industry uptake and transformation. CSIRO will grow the maturity of early-stage technology and work with industry and the defence sector to adapt and embed this technology. Examples include quantum research that could add game-changing efficiency to machine learning approaches that underpin artificial intelligence. Quantum sensing technologies could deliver highly precise, sensitive and secure insights to national monitoring at various landscape scales.
Tech Economy	Cyber security and digital resilience	Progress with minor to moderate refinements	Cyber security is a national and global challenge with growing scale and risk. Cyberattacks disrupt services, compromise data sovereignty and privacy, and hinder technology adoption, which weakens the digital foundations of investment and productivity. New threats from artificial intelligence deepfakes and 'harvest now, decrypt later' quantum approaches are increasing the urgency. This research will generate impact by securing critical technologies, building resilient infrastructure, enabling trusted transactions, and ensuring secure digital services. Examples of CSIRO's work in this area include data sensitivity tools, privacy-preserving techniques, secure 6G, deepfake mitigation and supply chain tools for the energy and telecommunications sectors.
Tech Economy	Productive industries with human-robot teaming	Progress with substantial refinements to ensure efforts are more focused on high impact opportunities and extended ambition	Australia's productivity growth is at a 60-year low at 0.2%. A 1% increase in robotics adoption could lift productivity by 0.8%, yet Australia ranks 32nd in robotics adoption globally. By leveraging CSIRO's leading position in field robotics human-centered solutions can be created tailored to Australian industry needs, such as in mining and energy. This will generate lasting productivity gains, increase sovereign capability and create safer working conditions (including zero-entry mines) and such solutions can also be deployed in the clean energy sector to accelerate the transition to net zero. We will develop intuitive interfaces (so non-experts can use robotics), teams of autonomous robots capable of working in underground mines and solar farms that operate with minimal human supervision.

RESEARCH AREA	PROGRAM OF RESEARCH	DIRECTION	DESCRIPTION
Tech Economy	Advanced manufacturing for minerals and energy	Progress with substantial refinements to ensure efforts are more focused on high impact opportunities and extended ambition	Australia's traditional strengths in resources and commodity exports will no longer be sufficient to maintain sovereign resilience in a world transitioning to low emissions. The opportunities of a technology driven economy could be supported by our strong sovereign production base. Both areas require manufacturing innovations that enable Australian industries to be globally competitive and differentiated in the production and export of value-added products. This program of research will support the development of novel materials, manufacturing processes and devices that are integrated into industry, and that will help to underpin diversification and growth of Australian industry sector, energy transition and socioeconomic prosperity.
Wonder to Discovery	Discovering and monitoring Australia's biodiversity	Progress with minor to moderate refinements	Australia's extraordinary biodiversity, which underpins our economy and wellbeing, faces an extinction crisis. The nation's environmental monitoring systems are chronically underpowered for our vast continent leaving us unable to make confident decisions around conservation or resource use. By applying robotics, molecular biology, space science and data science to biodiversity, we could achieve biological measurement and understanding in detail, at scale and with speed. Success will mean accelerated species discovery, autonomous monitoring networks, confident conservation decisions, and an understanding of the wonderful complexity of our biodiversity. This will have economic, environmental and social impacts, from sustainable natural resources such as fisheries and forestry to reduced extinction, improved biosecurity and enjoyment of the natural world, including cultural connection with Country. It will be achieved through real-time autonomous monitoring networks, DNA references for all species, epigenetic biomarkers, automated trait extraction and artificial intelligence assisted species identification. CSIRO is uniquely positioned to lead this transformation, leveraging its remarkable biological collections, multidisciplinary expertise, national remit and proven innovation capacity.
Wonder to Discovery	Radio astronomy and space science	Progress with substantial refinements to ensure efforts are more focused on high impact opportunities	We are pushing the boundaries of radioastronomy technology to explore the Universe and tackle humanity's biggest questions: When did stars first form? What is the nature of gravity? Is there life out there? By marrying astrophysics with superconducting devices, low noise electronics, digital design, quantum computing, artificial intelligence, algorithms and big data we are enabling discoveries that inspire, connect and drive innovation. This will benefit industry development (such as in signal processing), build home-grown critical engineering capability and enable broader workforce development that builds competitive advantage. As understanding the Universe requires collaboration across international borders, there are significant opportunities for science diplomacy.
Wonder to Discovery	Science fiction to reality	New/Prospective	Proposed new program of research, yet to be scoped but designed to unlock creativity, serendipitous discovery and truly transformational opportunities.

Glossary

ACRONYM	TITLE	DESCRIPTION
ACDP	Australian Centre for Disease Preparedness	A purpose-built, high-containment biosecurity facility operated by CSIRO in Geelong, Victoria.
AI	Artificial intelligence	A collection of interrelated technologies used to solve problems autonomously and perform tasks to achieve defined objectives, in some cases without explicit guidance from a human being.
CSIRO	Commonwealth Scientific and Industrial Research Organisation	Australia's national science agency
	Economic development	Under the Australian and New Zealand Standard Research Classification, R&D is categorised in a number of Socio-economic Objective (SEO) classifications. CSIRO defines 'economic development' as including the classifications of Agriculture, Energy, Exploration and exploitation of the Earth, Exploration and exploitation of space, Industrial production and technology, and Transport, telecommunications and other infrastructures.
ES	Enterprise services (units)	Organisational units that provide corporate functions and services for CSIRO, such as finance, human resources and business development.
ET	Executive Team	The top level of CSIRO's organisational structure, including the Chief Executive, approximately equivalent to Secretaries and Deputy Secretaries in the APS.
FTE	Full-time equivalent	A unit of measurement representing the number of hours of a full-time employee.
GPU	Graphics Processing Unit	A specialised electronic circuit designed for digital image processing and to accelerate computer graphics.
HPC	High Performance Computing	Supercomputers and computer clusters used to solve advanced computational problems.
NCRIS	National Collaborative Research Infrastructure Strategy	Coordinates and co-funds national research infrastructure.
PBS	Portfolio Budget Statements	The Statements provide information (financial and non-financial) at the portfolio and entity level on the ongoing policy and program delivery initiatives undertaken by the government.
	Research capacity	Refers to both the direct research activities and the enabling scientific and research infrastructure, plant and equipment.
RV *Investigator*	Research Vessel *Investigator*	An advanced ocean research vessel owned and operated by CSIRO as national research infrastructure to support Australia's atmospheric, oceanographic, biological and geoscience research.
RU	Research unit	Structural and organisational units that house CSIRO's science capability.
SIEF	Science and Industry Endowment Fund	A not-for-profit entity that invests in scientific research focused on Australia's national priorities.
SRI	Science and Research Infrastructure	A term used to describe infrastructure that enables discoveries and innovation across the breadth of scientific disciplines and supports science-based services from healthcare to weather forecasting, for example high-performance computing and pilot labs for mineral processing.
STEM	Science, technology, engineering and mathematics	A shorthand reference to the interdisciplinary fields of study and practice in the subject areas contained in the title of the acronym.

As Australia's national science agency, CSIRO is solving the greatest challenges through innovative science and technology.

CSIRO. Creating a better future for everyone.