

Australian Academy of Science submission to Queensland Government Science and Innovation Strategy

The Australian Academy of Science welcomes the opportunity to respond to the Queensland Government Science and Innovation Strategy.

The Academy supports the intent of a future focussed strategy and its broad emphasis on capability, connectivity and commercialisation. These priorities align with longstanding Academy positions and recent national reform directions, including those articulated through the *Ambitious Australia: Strategic Examination of Research and Development final report* (SERD) the *National Reconstruction Fund* and *Future Made in Australia* agenda.

The strategy discussion paper is overly weighted toward economic outcomes, and must embed fundamental research as the foundation for commercialisation, as there is no development without research. It must also adopt science education and science workforce development as strategic priorities; and look to build on Queensland's areas of genuine comparative advantage. Without these foundations, the strategy risks prioritising short-term economic returns over the long-term health, resilience and global competitiveness of Queensland's science ecosystem.

The Academy has consistently called for coordinated, system-wide approaches to research and innovation policy, and this strategy presents an opportunity for Queensland to align with and lead within that national framework while building areas of comparative advantage in science and technology. *Ambitious Australia*, the report of the Strategic Examination of R&D commissioned by the federal government, provides a blueprint for a strategically aligned and coordinated national R&D system. Development of Queensland's Strategy should be informed by this context.

The Academy recommends the Strategy:

- Set clear priority missions to incentivise cross sector collaboration and coordinate efforts to align with comparative advantage and state objectives.
- Sustain foundational research and infrastructure capability through long-term investment aligned with state and national priorities.
- Increase business R&D and industry engagement in research by aligning with Commonwealth incentives, and strengthening industry and research partnerships
- Adopt workforce and education as essential pillars of the Strategy to build science capability and secure a strong pipeline of STEM-skilled people.
- Present a plan to deepen science capability in areas of existing strength and emerging state and national objectives.

Establish a unified, mission-driven Queensland science and innovation system

The strategy should establish a clear framework that aligns existing initiatives and positions Queensland to seize the opportunities of national level research system reforms.

Queensland has an existing portfolio of science and innovation strategies and initiatives, including *Advance Queensland*¹, the *Future Queensland Science Strategy*, and targeted programs like the *Science into Industry Initiative* and the *Queensland Quantum and Advanced Technologies Strategy*. The Science and Innovation Strategy should seek to integrate these existing initiatives into a cohesive system with complementary investment and incentives across the continuum from discovery to commercialisation.

The national Strategic Examination of R&D, *Ambitious Australia*, identified fragmentation as a significant challenge for Australia's research system, limiting scalability, reducing impact, and diluting investment effectiveness. The report also highlighted international evidence which suggests that mission-based policies support cross-sector

collaboration and mobilise investment towards long-term goals². Correspondingly, the report proposes a structure for Australia’s science system with pillars and subgoals that would align with national needs. Queensland’s strategy should consider these pillars for national alignment and co-investment in strategic national research initiatives.

The Strategy should set Queensland’s science and innovation priorities through a focussed set of missions that support Queensland’s priorities, existing investments and align with national priorities and incentives. This mission framework should seek to concentrate effort and investment in areas of comparative advantage and international leadership for Queensland, including environmental science, agriculture, and ecology.

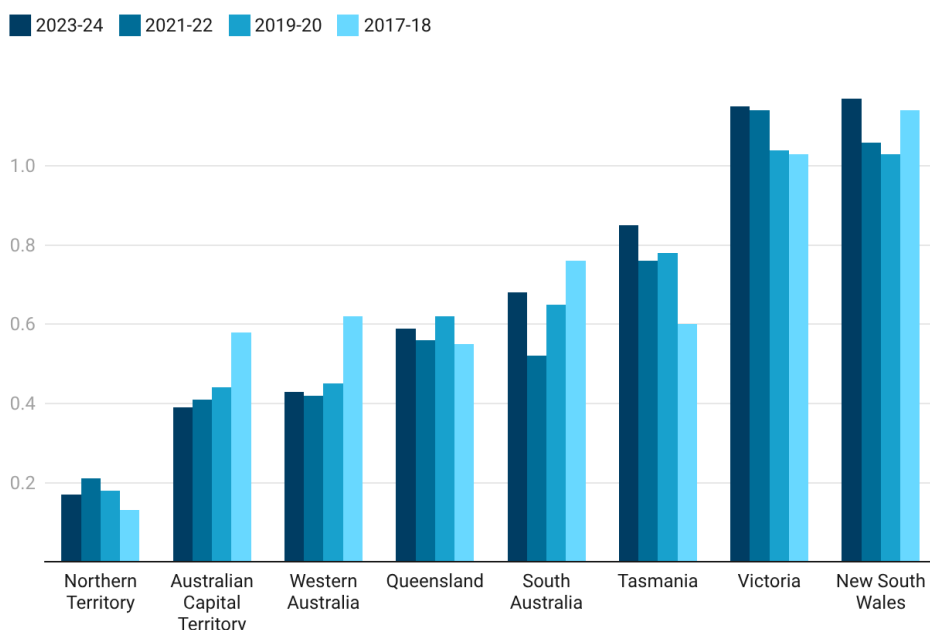
Fundamental research must be embedded in the strategy as a priority

The discussion paper places a strong emphasis on translation and industry engagement but does not sufficiently recognise the role of fundamental research or the need to increase investment across the full research continuum. The Academy has repeatedly emphasised the need to raise investment in research across the board, whilst maintaining the balance between fundamental research and translation as essential to sustain capability and deliver long term economic and societal outcomes. Without strategic investment in the feedstock of ideas that drive commercial application and translation, Queensland risks future declining returns.

Fundamental research provides the knowledge base that enables translation and commercialisation, and without adequate support for discovery, the innovation pipeline becomes constrained. Both government and business expenditure on R&D declined in 2022 to 2023. Nationally, 92% of business expenditure on research and development in 2023-24 was concentrated to six fields, with increases in investment largely occurring in New South Wales and Victoria, while Queensland’s investment decreased³. Commonwealth mechanisms such as the R&D Tax Incentive and the National Reconstruction Fund are intended to stimulate private sector investment, but their impact in Queensland to date, has been limited without complementary state action.

Queensland should raise overall investment in research across the state, strengthen alignment with Commonwealth incentives and support R&D-intensive businesses through sustained partnerships between industry and the research sector.

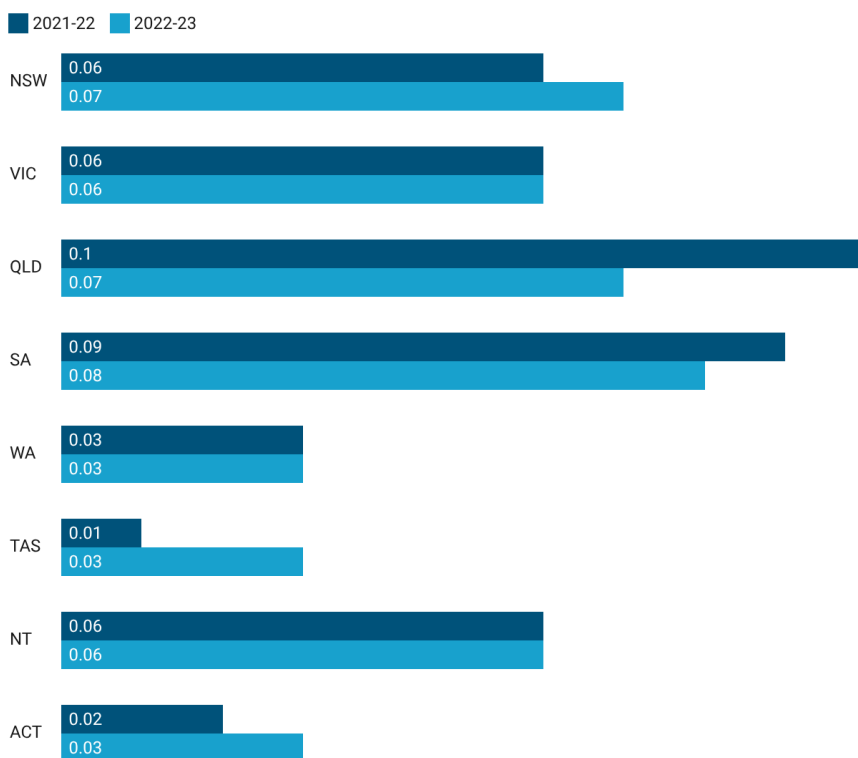
BERD, by location of expenditure as a proportion of GSP



Note: Northern Territory data 2021-22 is an estimate. Estimate has a relative standard error greater than 50% and is considered too unreliable for general use

Source: Australian Bureau of Statistics, Research and Experimental Development, Businesses, Australia 2023-24 financial year • Created with Datawrapper

GOVERD, by location of expenditure - proportion of GSP



a. Refer to the Gross Domestic Product (GDP) and Gross State Product (GSP) section of the Methodology page for details. b. Where figures have been rounded, discrepancies may occur between the sum of the component items and totals.

Source: Australian Bureau of Statistics • Created with Datawrapper

Position Queensland to deepen its science capabilities in areas of existing strength and to support state priorities

Queensland has established scientific capabilities that provide the basis for targeted advancement aligned with state priorities. Geoscience capability underpins exploration across a resource-based jurisdiction and contributes to national critical minerals priorities. Minerals engineering research supports development in critical minerals processing, battery materials and manufacturing systems linked to energy generation, storage, grid management and transmission. Marine and environmental research associated with the Great Barrier Reef contributes to reef science, climate adaptation and ecosystem management. These capabilities, together with established strengths in agriculture, environmental science and robotics, present opportunities to align scientific effort with state objectives, guide investment and support research translation⁴.

The discussion paper does not address the later stages of the innovation cycle sufficiently, including scaling translation and commercialisation. Queensland has strong capability in environmental science, ecology, and agriculture, yet these have not been translated to economic outcomes at scale. Realising this strength into action and establishing an environmental science translation hub to support climate, biodiversity and land use innovation could position Queensland strongly within both national and international markets.

There is also opportunity to strengthen performance in health and medical research translation relative to Queensland's population and institutional capacity. Expanding support for clinician researchers and scaling existing initiatives and pilot programs such as the University of Queensland Genomics mission and the work of the QUT Centre for Microbiome Research, would support preventative and precision medicine and improve integration between research, healthcare delivery and industry, aligning with state objectives. In parallel, workforce and

education initiatives, such as STEM Girl Power, could be more closely aligned with capability forecasts in priority sectors to ensure the pipeline of skills supports areas identified as focus.

While the Academy supports the government's emphasis on precinct and hub development as a means of unlocking collaboration, the strategy should better connect precincts including regional hubs such as those in Townsville. Connecting these into a coherent statewide network with shared infrastructure access, common commercialisation pathways, and clear governance frameworks that include Traditional Owner partnerships will maximise the impact of investments.

Workforce and education are key pillars of a strategic science system

A future-focused Strategy must emphasise education and workforce development, to enhance career pathways, align education and training with industry needs, and include a plan for long-term coordinated workforce planning to build the science and technology capabilities Queensland needs.

The Academy's initiative, *Australian Science, Australia's Future*, identified eight science capabilities most in demand in the coming decade, of which five are directly aligned to Queensland's strengths and priorities—agriculture, artificial intelligence, climate science, geoscience and materials science. However, the analysis also uncovered key gaps in education, workforce and investment in these areas which puts Australia's—and Queensland's—future capabilities at risk.

While NAPLAN numeracy results for Queensland in 2023 and 2024 show consistent performance across years, there is lower attainment in secondary school students⁵. Findings from *Australian Science, Australia's Future* found that nationally only 25.2% of all students with a year 12 qualification in 2023 studied mathematics at an intermediate level, dropping from 30.6% in 2019. Year 12 enrolments in physics and chemical sciences are also declining. Undergraduate commencements in natural and physical sciences fell from 36,296 in 2019 to 32,263 in 2023⁶. This has a direct implication for STEM capability, as reduced attainment in later years affects subject selection, readiness for tertiary pathways, and workforce participation in science related fields.

The proposed education initiatives are primarily student focused including competitions and camps, with limited provision for teacher support beyond the Australian Curriculum Implementation. This would constrain sustained impact on STEM teaching practice and reduce the development of teacher capability through short term funding cycles. Longer term outcomes could be supported and strengthened through targeted training and parallel initiatives implemented alongside student focused programs, to support teacher capability. Previous initiatives from Queensland government introduced targeted incentives to attract and retain teachers in Queensland, including requirements or support for STEM qualifications. This alignment of teacher workforce incentives with STEM capability would support sustained participation in STEM subjects and strengthen the education pipeline required for future science and innovation priorities.

The strategy should adopt a more explicit future capability focus, identifying the scientific and technological areas Queensland will require over the coming decades and alignment with workforce planning. This should be an integrated approach connecting industry demand and the education pipeline from early STEM engagement through to tertiary training. Pathways should enable a workforce capable of supporting education and training with industry needs, and a long term coordinated workforce plan to ensure Queensland has the skills and capabilities necessary for both discovery and translation.

First Nations knowledge and partnerships as a strategic asset

The Academy welcomes the discussion paper's acknowledgement of the importance of partnering with Traditional Owners and integrating First Nations knowledge into Queensland's science and innovation system. The Academy recommends the strategy go further, treating First Nations knowledge systems and partnerships as a genuine strategic asset — not merely an equity consideration.

Queensland's unique natural environment, including the Great Barrier Reef, tropical rainforests, and expansive rangelands, has long been the subject of Indigenous ecological knowledge of direct relevance to modern environmental science, biodiversity management, and climate adaptation. Structured mechanisms to integrate this knowledge into research programs — with appropriate recognition, consent, and benefit-sharing frameworks

— would strengthen Queensland’s environmental science capability and support the self-determination of First Nations communities.

The strategy should also ensure that STEM education and workforce pathways are genuinely accessible to First Nations students and communities, with targeted support that addresses geographic, cultural, and structural barriers.

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

References

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