ATSE 50 YEARS

SUBMISSION

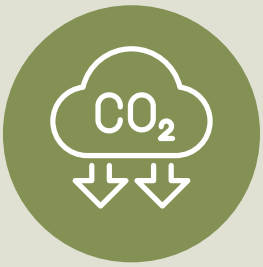
JANUARY 2025

2026-27 pre-budget submission

Australian Academy of Technological Sciences & Engineering

PRIORITY RECOMMENDATIONS

Support implementation of the Strategic Examination of R&D including through uplifting research expenditure and incentivising private investment in research.

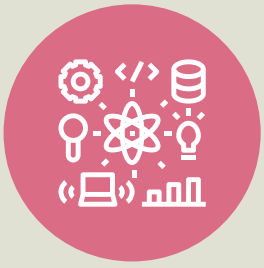


Reduce greenhouse gas emissions through targeting demand, including:

- Creating loan schemes for households to finance energy upgrades and reduce energy costs.
- Enabling vehicle-to-grid capability to reduce consumer electricity costs and support the energy transition.
- Supporting primary producers to reduce emissions by establishing a grant scheme to implement new innovations such as feed additives, equipment electrification and alternative fuels.

Adopt a national Read and Publish Open Access model for Australian research to ensure Australian industry and governments have access to the most up-to-date research possible and lift productivity.

Support proven initiatives to increase diversity in STEM, including increasing number of scholarships, including undergraduate scholarships, available through ATSE's Elevate: Boosting Diversity in STEM program.



Invest in a mission-based approach to sovereign AI capability, with AI factories located across Australia, and develop national infrastructure for storing nationally significant datasets.

SUPPORTING RECOMMENDATIONS

Implement a three-pronged research and development funding model (discovery, mission-oriented, problem-solving) that incentivises interdisciplinary and collaborative research.

Improve coordination of state, territory and federal government research funding (including research infrastructure funding) to reduce red tape and ensure efficient and strategic use of research funding to support national challenges.

Leverage international funding schemes, like the Horizon Europe Research Fund, to support Australian R&D.

Restore and extend funding for the Global Science and Technology Diplomacy Fund – Strategic Element grants program to promote international collaboration in our region, enhance Australia's standing as a science and technology leader, and stimulate investment in innovation.

Resource science agencies to attract global talent to Australia.

Provide dedicated funding for the Learned Academies to work with Traditional Knowledge holders and the research community to embed Traditional Knowledge into research.

Provide secure funding to upgrade and maintain high performance computing for weather and climate research.

Accelerate the transition to net zero energy generation through low emissions electricity generation and storage currently available to Australia, including by reforming approvals processes across jurisdictions for green energy projects.

Establish supporting initiatives to increase efficiency and cost-effectiveness of green hydrogen production, including for innovation, international collaboration, and skills development.

Strengthen Safeguard Mechanism implementation by funding pilot projects and scaling technologies for on-site emissions reductions.

Invest in R&D for mineral resources to support the energy transition.

Implement circular economy reforms, including through standards and certification systems, a legislated right to repair, and leveraging the Future Made in Australia program for recycling of end-of-life solar panels, wind turbines and batteries.

Create a renewed independent national water management authority (i.e. National Water Commission), to provide objective unbiased advice on national water management including the National Water Agreement.

Prepare for the future of the Murray-Darling Basin to support water and energy security, resilient communities, First Nations communities and positive environmental outcomes.

Fund the development of water treatment technologies that are appropriate and tailored for the needs of Aboriginal and Torres Strait Islander communities and regional, rural and remote communities.

Set aside funding for National Food Security Strategy implementation.

Fund the Australian Food Innovation Network to deliver a national, coordinated platform that connects research expertise with processing infrastructure to address challenges relevant to the food industry, fostering collaboration and innovation across the sector.

Expand digital access for regional, rural and remote Australia.

Deliver regular climate risk assessments every three to five years.

Work with the states and territories to top up funding for all schools to provide for science education up to the end of Year 10 at a minimum.

Support teachers to deliver STEM education by providing hands on STELR kits to more schools around Australia.

Expand ATSE's STELR program to primary schools and fund development of integrating Traditional Knowledge into STELR modules.

Support development of a diversity and inclusion microcredential for STEM businesses.

Extend paid practical placements to engineering.

Fund longitudinal research on outcomes of graduates of STEM scholarship programs.

Work with the higher education sector to increase the number of universities offering metallurgical, nuclear, and chemical engineering.

Create a Nuclear Skills Taskforce, building on the ATSE Propel: Australian Submarine Scholarship Program.

Develop a national Clean Energy Workforce Strategy to expand and upskill the workforce required to support the energy transition.

Australian Academy of Technological Sciences & Engineering
1975-2025

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts spanning academia, industry and government helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

ATSE's Pre-Budget Submission outlines proposals to support economic growth through innovation, deliver the energy transition and develop the skilled workforce of the future.

Unlocking Australia's innovation potential

Australia's long-term prosperity depends on a thriving, well-coordinated research and development (R&D) ecosystem that drives impactful innovation, addresses national challenges and supports economic growth.

This year, the Strategic Examination of R&D (SERD) has prompted deep engagement across the sector, shining a light on opportunities for reform. Recommendations from the final report are likely to point to the need for funding from this Budget. Options for reform, both to improve efficiency and stimulate investment in R&D – also outlined in ATSE's engagement in the SERD – include leveraging the financial system to improve support for investors backing science, technology, engineering and mathematics (STEM) based start-ups, through tax incentives and the superannuation system; incentivising philanthropic and not-for-profit investment in R&D through a matched funding scheme; developing a grant scheme to incentivise business R&D and better target the R&D tax incentive; and implementing government procurement policies that support innovative and genuine domestic technology development rather than large multinational industries. Central to boosting innovation will be increased Government investment to catalyse total R&D expenditure equivalent to 3% of GDP, drawing across the economy, including from industry, philanthropy and universities. Targeted funding increases are needed in areas such as water, energy, health technologies, biomedical research and First Nations research; with grant funding designed to cover the full cost of delivering research projects and foster collaborative and interdisciplinary research. Restoring ongoing, secure funding to national research institutions, such as CSIRO and ANSTO, is another area for investment in Australia's research capability. The Diversity in STEM Review has identified the need for dedicated funding for First Nations research, supported by ATSE and the other Learned Academies, and working with our academic community and Traditional Knowledge custodians to embed First Nations knowledge in STEM. This would support the National Science and Research Priorities, notably the priority of elevating Aboriginal and Torres Strait Islanders' knowledge systems. Adopting an Open Access model for Australian research would strengthen the impact of all research investment and improve national productivity, with the implementation costs recovered by reducing expenditure on journal subscription fees elsewhere in the system, as outlined in the former Chief Scientist's proposal and cost estimate. The proposal also outlines other suitable options for establishing Open Access, such as setting a 'knowledge dividend' across government departments.

There is also a strategic opportunity to strengthen Australia's global reach by participating in international funding schemes. ATSE welcomes ongoing negotiations to associate with Horizon Europe, and suggests dedicated funding to support involvement in this and other international schemes, such as the World Climate Research Programme. Continued funding for science diplomacy, including ATSE's Global Science and Technology Diplomacy Fund, would also support Australia's engagement with the region.

ATSE's recommendations for this Budget to strengthen the impact of innovation outcomes are:

PRIORITY RECOMMENDATION 1

Support implementation of the Strategic Examination of R&D, including through uplifting research expenditure and incentivising private investment in research.

Cost: In the order of $2 billion annually ongoing to increase research expenditure.

PRIORITY RECOMMENDATION 2

Adopt a national Read and Publish Open Access model for Australian research to ensure Australian industry and governments have access to the most up-to-date research possible and lift productivity.

Cost: Up to $412 million annually ongoing (to be met by diverting existing expenditure), and $32 million over one year to establish.

Supporting recommendation 1
Implement a three-pronged research and development funding model (discovery, mission-oriented, problem-solving) that incentivises interdisciplinary and collaborative research.
Cost: $2 million over two years to conduct a review.

Supporting recommendation 2
Improve coordination of state, territory and federal government research funding (including research infrastructure funding) to reduce red tape and ensuring efficient and strategic use of research funding to support national challenges.
Cost: To be met with existing resourcing.

Supporting recommendation 3
Leverage international funding schemes, like the Horizon Europe Research Fund, to support Australian R&D.
Cost: $230 million over four years for Horizon Europe association.

Supporting recommendation 4
Restore and extend funding for the Global Science and Technology Diplomacy Fund — Strategic Element grants program to promote international collaboration in our region, enhance Australia's standing as a science and technology leader, and stimulate investment in innovation.
Cost: $25 million spread over three years for three grant rounds.

Supporting recommendation 5
Resource science agencies to attract global talent to Australia.
Cost: In the order of $100 million over four years.

Supporting recommendation 6
Provide dedicated funding for the Learned Academies to work with Traditional Knowledge holders and the research community to embed Traditional Knowledge into research.
Cost: $500,000 over one year for a conference and report.

Realising Australia's AI opportunity

Computing and artificial intelligence capabilities would be a priority area for an increased innovation budget. Australia's innovation potential is increasingly reliant on data storage and computing infrastructure.

ATSE has proposed a mission-based approach to realising our AI opportunity, leveraging Australia's competitive advantages to build sovereign AI capability. ATSE suggests a mission-based approach, with AI factories located across Australia: the jewel in the AI crown around which talent and partnerships will develop, and which will help safeguard cultural identity and build national capacity. This level of investment in AI could lift Australia's GDP by 6-8% over the next decade, adding $160-235 billion to the economy, as estimated by ATSE and Kearney's report. With Australian Government leadership and investment, Australia can position itself as a global leader in ethical, high-impact AI.

ATSE's AI action statement also outlines Australia's nationally significant STEM datasets, spanning observed and modelled data in health, climate, weather, defence, water, mining and energy. Shared infrastructure for storing and accessing nationally significant datasets, especially when paired with AI capabilities, would unlock discoveries based on data that is already being collected and enable evidence-based decision-making in areas such as water management.

This proposal sits alongside calls to upgrade Australia's high-performance computing (HPC) capabilities to support weather and climate modelling. Enhanced HPC infrastructure would improve decision-making in areas such as climate change mitigation and adaptation, energy planning, agriculture and disaster preparedness. While not independently costed here, the Australian Academy of Science has estimated that an investment of $200m per year, over ten years, is required to bring Australia's HPC capabilities up to global standards.

PRIORITY RECOMMENDATION 3

Invest in a mission-based approach to sovereign AI capability, with AI factories located across Australia, and develop national infrastructure for storing nationally significant datasets. Cost: $4.5 billion to $5 billion over five years.

Supporting recommendation 7
Provide secure funding to upgrade and maintain high-performance computing for weather and climate research.
Cost: $200 million annually over ten years.

Supercharging the energy transition

The scale and urgency of the energy transition demand concerted efforts from all levels of government. While progress to date has been significant, there remain areas where the Australian Government can accelerate the energy transition and reduce greenhouse gas emissions, while preparing for future energy demand (e.g., data centres and electric vehicles).

A priority area for reform is accelerating the deployment of renewable energy projects. Project delays are typically caused by the time required to obtain government approvals and address community objections. ATSE advises that the Federal Government reform approval processes, drawing on international best practices such as the European Union's Overriding Public Interest legislation that streamlines the period for community consultations and provides more certainty on timeframes.

ATSE has proposed demand-side measures to reduce electricity demand and give consumers greater choice in their power consumption. Announcements since that publication give rise to the development of a priority area to focus on enabling vehicle-to-grid capability, enabling consumers to get more out of their electric vehicles and reducing peak demand on the electricity grid. Universalising vehicle-to-grid capabilities would deliver net savings by reducing the need for large-scale battery storage, according to ARENA. Incentivising households to install energy upgrades was also recommended by the recent inquiry into Residential Electrification, in which ATSE participated.

Research and development will be crucial to solving complex challenges in the energy transition. Energy research funding in Australia has decreased over the past decade, both in absolute terms and compared to other economies. An increased innovation budget would enable collaborative, industry-driven research and development, particularly in on-site emissions reductions for heavy industry, early-stage support for the green hydrogen sector, and the use of new technologies in the mineral resources sector to provide and process minerals vital to electrification and renewable energy projects. Priority areas for R&D in the mineral resources sector include AI applications for exploration, planning, equipment operations, and predictive maintenance; identifying and further developing processing and metals-recovery technologies for cleaner, more efficient onshore processing facilities; and improving the sustainability of mine remediation.

Additionally, a fund to support industry and primary producers in adopting new low-carbon technologies, where operators lack the capital to navigate this alone, would further accelerate progress. The need for such support has been identified in the seafood industry.

A successful energy transition would also be underpinned by broader circular economy reforms. Legislative and regulatory solutions include standardisation and right to repair. Innovation and industrial policy can support improvements in recycling technologies, especially for end-of-life components from renewable energy production and storage.

PRIORITY RECOMMENDATION 4

Reduce greenhouse gas emissions through targeting demand, including:

Creating loan schemes for households to finance energy upgrades and reduce energy costs.

Cost: $26 million annually.

Enabling vehicle-to-grid capability to reduce consumer electricity costs and support the energy transition.

Cost: Net saving due to reduced need for large-scale battery installations.

Supporting primary producers to reduce emissions by establishing a grant scheme to implement new innovations such as feed additives, equipment electrification and alternative fuels.

Cost: $200 million annually.

Supporting recommendation 8
Accelerate the transition to net zero energy generation through low emissions electricity generation and storage currently available to Australia, including by reforming approvals processes across jurisdictions for green energy projects.
Cost: In the order of $2 million over two years to reform approvals processes.

Supporting recommendation 9
Establish supporting initiatives to increase efficiency and cost-effectiveness of green hydrogen production, including for innovation, international collaboration, and skills development.
Cost: $150 million over four years over the forward estimates for Hydrogen Headstart.

Supporting recommendation 10
Strengthen Safeguard Mechanism implementation by funding pilot projects and scaling technologies for on-site emissions reductions.
Cost: $100 million annually over the forward estimates for 2028-29's Powering the Regions Fund.

Supporting recommendation 11
Invest in R&D for mineral resources to support the energy transition.
Cost: To be met within the proposed $2 billion annually ongoing for research expenditure.

Supporting recommendation 12
Implement circular economy reforms, including through standards and certification systems, a legislated right to repair, and leveraging the Future Made in Australia program for recycling of end-of-life solar panels, wind turbines and batteries.
Cost: In the order of $5 million over four years for regulatory reforms.

Building resilient regions

We have the applied research, technology, and Traditional Knowledge to strengthen our regions and support better outcomes for people and industries. This Budget can make progress towards interdependent objectives across the energy transition, water management, agriculture and digital communication.

Australia's changing climate is placing increasing pressure on water management and agriculture, with significant economic implications for regional communities. Water security and availability for agricultural, industrial and energy sectors are fundamental. Alongside the impact of climate change on water systems, Australia will face increased demand for industrial water cooling such as for data centres, energy generation and storage, and hydrogen production. ATSE's essay collection, *A thriving Murray-Darling Basin in 50 years: Actions in the face of climate change*, provides an evidence-based snapshot of the challenges facing the Basin's health and sustainability. It outlines a suite of recommended actions across governance, data management and knowledge sharing to support the Basin's future and support economic development in the regions.

Alongside governance reforms, thorough and continued investment in water security is essential, and builds on the previous Budget commitments. ATSE's publication *Closing the Water Gap* outlines the potential to implement technologies for water security in remote Aboriginal and Torres Strait Islander communities.

ATSE welcomes progress on developing a National Food Security Strategy – highlighted in ATSE's 2025-26 pre-budget submission. The next step would be to allocate funding in this Budget for implementing the final strategy, expected in 2026-27. The agriculture and food sector presents a significant opportunity for research translation to deliver health and economic benefits.

Expanding telecommunications coverage across Australia is another significant opportunity for investment in regional, rural and remote Australia. This would support multiple outcomes across industries such as agriculture, water management and mining, and help more Australians to access healthcare, education, government services and economic participation. This could be achieved through extending the Better Connectivity Plan for Regional and Rural Australia – noting that the 2026-27 forward estimate was reduced by $26 million (to $81 million) in the 2025-26 Federal Budget.

Finally, regular updates to climate risk assessments would provide a shared understanding of scenarios and risk quantification, enabling better planning for the regions. This would build on the first National Climate Risk Assessment conducted in 2025.

This Budget presents an opportunity to prepare for future environmental pressures and strengthen the potential of research and technology-driven solutions. ATSE's recommendations for this Budget to enhance resilience and support economic development in the regions are:

Supporting recommendation 13
Create a renewed independent national water management authority (i.e. National Water Commission), to provide objective unbiased advice on national water management including the National Water Agreement.
Cost: $20 million annually for four years.

Supporting recommendation 14
Prepare for the future of the Murray-Darling Basin to support water and energy security, resilient communities, First Nations communities and positive environmental outcomes.

Supporting recommendation 15
Fund the development of water treatment technologies that are appropriate and tailored for the needs of Aboriginal and Torres Strait Islander communities and regional, rural and remote communities.
Cost: $80 million over four years.

Supporting recommendation 16
Set aside funding for National Food Security Strategy implementation.

Supporting recommendation 17
Fund the Australian Food Innovation Network to deliver a national, coordinated platform that connects research expertise with processing infrastructure to address challenges relevant to the food industry, fostering collaboration and innovation across the sector.
Cost: $2 million annually

Supporting recommendation 18
Expand digital access for regional, rural and remote Australia.

Supporting recommendation 19
Deliver regular climate risk assessments every three to five years.
Cost: Up to $30 million every 3–5 years.

Building Australia's STEM capability

The current approach to education and skills will not be enough to meet future demand for a STEM-skilled workforce. In addition, STEM literacy is vital as Australians face complex challenges, including climate change and public health misinformation. While school education is primarily under the jurisdiction of states and territories, the Australian Government can make targeted interventions to improve the standards, status and accessibility of STEM education, regardless of where students live.

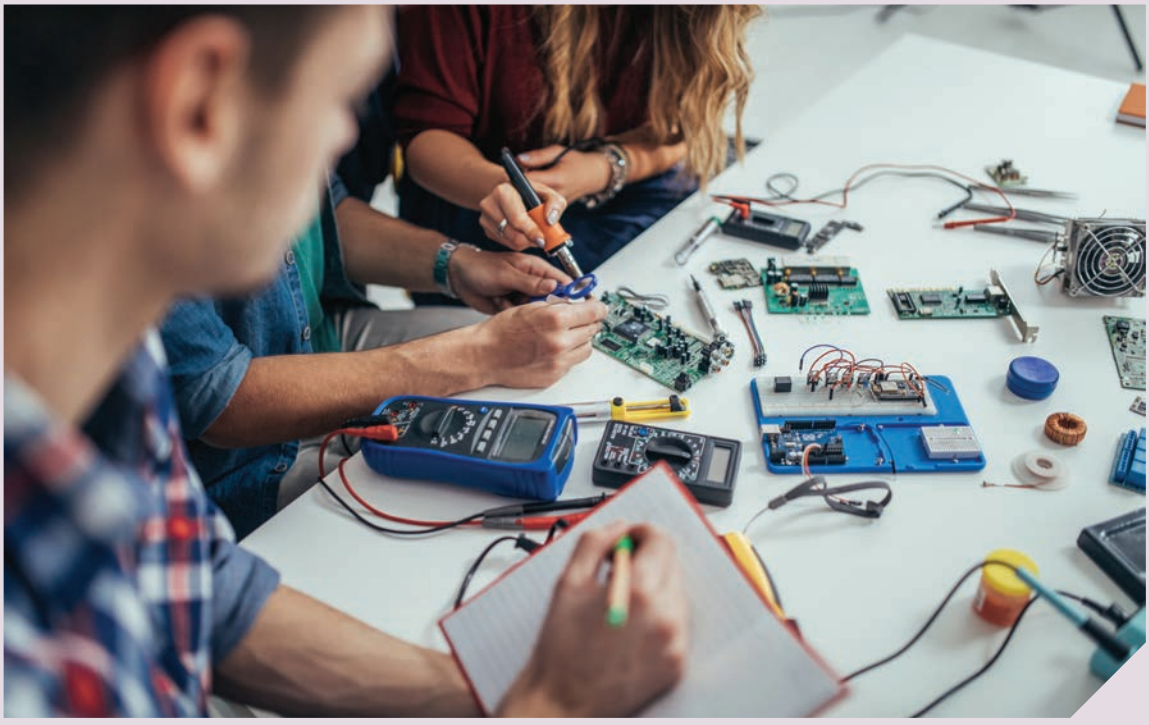
Proven programs such as ATSE's STELR classroom STEM program — a hands-on, inquiry-based program designed to be taught within the curriculum — can be scaled to empower teachers to deliver engaging, hands-on STEM learning. This is one part of the puzzle in equipping schools to deliver STEM education for all students up to the end of Year 10, at a minimum, and to foster enthusiasm that drives enrolments in senior secondary STEM subjects and tertiary STEM qualifications. There is also an opportunity to support high-impact STEM learning by integrating Traditional Knowledge themes into STELR modules, enabling teachers to deliver this content in the curriculum.

ATSE's recommendations for this Budget to address STEM in schools are:

Supporting recommendation 20
Work with the states and territories to top up funding for all schools to provide for science education up to the end of Year 10 at a minimum.

Supporting recommendation 21
Support teachers to deliver STEM education by providing hands on STELR kits to more schools around Australia.
Cost: $20 million for 600 schools.

Supporting recommendation 22
Expand ATSE's STELR program to primary schools and fund development of integrating Traditional Knowledge into STELR modules.
Cost: $200,000 over one year.



At the tertiary education and workforce levels, critical areas require Australian Government leadership to address blockages in the STEM pipeline. Targeting underrepresented groups – such as women – not only supports equitable access to economic opportunities, but also offers easy wins for growing the STEM-skilled workforce.

National priorities such as the energy transition, delivering AUKUS and supporting states with infrastructure building will require a significant expansion of the engineering workforce, which is already in short supply. Relying on skilled migration alone will not meet this demand and risks overlooking the opportunity to build domestic capability.

Leveraging existing resources – such as ATSE's Diversity and Inclusion Toolkit, which offers practical guidance for STEM workplaces to be more diverse and inclusive – can assist with increasing and retaining the STEM-skilled workforce. This Toolkit could be adapted into a free, nationally accessible microcredential to support increased uptake.

Continuing to support and expand proven programs that advance diversity in STEM will be critical to addressing workforce shortages. ATSE's Elevate: Boosting diversity in STEM program — which was recognised in the Diversity in STEM review and was a finalist for the 2025 Eureka Prize for STEM Inclusion — provides a targeted mechanism to support women and non-binary people in STEM through scholarships and wraparound support. Elevate has a 96% retention rate, and 96% of scholars report that they have benefited from participation in the program. ATSE is proud to administer Elevate, primarily funded by the Department of Industry, Science and Resources, to address gender inequities in STEM. Elevate sits alongside ATSE's Propel: Australian Submarine Scholarship Program, a new program providing 3000 undergraduate scholarships aligned with AUKUS workforce needs, in partnership with the Australian Submarine Agency.

Additional funding to support undergraduate and postgraduate Elevate scholarships commencing in 2027 and 2028 would help more women start their STEM careers and help alleviate future workforce shortages. While the program can support current scholars through to completion, scholarships for new undergraduate and postgraduate scholars commencing from 2027 have not been funded. Funding additional scholarships through Elevate would leverage existing investment in the highly successful administrative machinery to deliver the program. To make the most of outcomes and lessons of these programs, ATSE also recommends providing funding for longitudinal research to track career outcomes and workforce experiences of STEM graduates supported by these pathways.

Two areas emerge as fields requiring intervention to attract and train a skilled engineering workforce: nuclear (for AUKUS) and clean energy (for electrification and the energy transition). Developing and funding workforce strategies, co-designed with industry and experts such as ATSE Fellows, will help identify effective interventions to build these capabilities and unlock opportunities for Australian workers. As part of this effort, collaboration with higher education providers is needed to ensure engineering courses are available. For example, some universities have discontinued metallurgical engineering programs due to financial pressures, despite evident and ongoing skills shortages.

ATSE also recommends extending the Commonwealth Prac Payment to engineering degrees with mandatory placements. While many engineering placements (particularly in large engineering firms) are remunerated, the limited availability of these paid positions often means some students must undertake unpaid placements to meet their course requirements. A targeted program to support students undertaking otherwise unpaid placements would reduce financial barriers to completing engineering qualifications. This would also help students form connections with engineering SMEs, helping retain engineering graduates in the profession and reduce attrition to other fields such as finance.

ATSE's recommendations for this Budget to strengthen the STEM-skilled workforce are:

PRIORITY RECOMMENDATION 5

Support proven initiatives to increase diversity in STEM, including increasing number of scholarships, including undergraduate scholarships, available through ATSE's Elevate: Boosting Diversity in STEM program.

Cost: $22.75 million for Elevate split over two years to support 450 undergraduate and postgraduate scholarships for scholars commencing before 2028.

Supporting recommendation 23
Support development of a diversity and inclusion microcredential for STEM businesses.
Cost: $250,000 annually over three years.

Supporting recommendation 24
Extend paid practical placements to engineering.
Cost: $49 million annually ongoing.

Supporting recommendation 25
Fund longitudinal research on outcomes of graduates of STEM scholarship programs.
Cost: $250,000 annually over four years.

Supporting recommendation 26
Work with the higher education sector to increase the number of universities offering metallurgical, nuclear, and chemical engineering.
Cost: To be met with existing Department of Education funding.

Supporting recommendation 27
Create a Nuclear Skills Taskforce, building on the ATSE Propel program.
Cost: In the order of $3 million over two years.

Supporting recommendation 28
Develop a national Clean Energy Workforce Strategy to expand and upskill the workforce required to support the energy transition.
Cost: In the order of $3 million over two years.

ATSE 50 YEARS

Australian Academy of Technological Sciences & Engineering

ATSE is Australia's foremost impact network for leading applied scientists, technologists and engineers.

Since 1975 we have been an authoritative and independent voice to government, delivering frank, fearless and evidence-based policy advice to help drive a technology-powered, human-driven future.

atse.org.au

Australian Academy of Technological Sciences & Engineering

atse_aus

Australian Academy of Technological Sciences & Engineering

Australian Academy of Technological Sciences & Engineering

260105