SUBMISSION

Submission to the Department of Industry, Science and Resources

Submission to the Industry Growth Program consultation

3 August 2023

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts 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 welcomes the Australian Government's investment in supporting early-stage commercialisation through the Industry Growth Program. This program will enable Australia to build on its research strengths to increase its research translation and commercialisation activity – an area in which Australia trails comparable economies.

ATSE has previously made a [submission](#) to the consultation on the National Reconstruction Fund (NRF), recommending that the NRF is utilised to strategically invest in research and commercialisation of technologies for net zero emissions, agriculture and medical innovations, as well as focusing on developing industry in regional Australia (ATSE 2023). ATSE's submission also recommended aiding medical manufacturing entrepreneurs and small and medium enterprises (SMEs) to navigate complex regulatory processes. The Industry Growth Program will provide a pathway for SMEs to access expert advice and guidance for navigating regulation as well as other aspects of research commercialisation.

To support successful implementation of the Industry Growth Program, ATSE makes the following recommendations:

Recommendation 1: Develop and apply a holistic project eligibility assessment based on the Innovation Readiness Level framework that considers technology, business and customer readiness.

Recommendation 2: Encourage applicants for funding to be working with at least one prospective customer for their innovation.

Recommendation 3: Do not exclude SMEs that have achieved first sales from the Industry Growth Program.

Recommendation 4: Deliver advice to participants on preparing Industry Growth Program funding applications and identifying alternative funding opportunities.

Recommendation 5: Create a community of practice and publicly available resource bank for innovative SMEs.

Recommendation 6: Prioritise advisory service participation for underrepresented groups in STEM (science, technology, engineering and maths).

Recommendation 7: Support all advisory service participants to become more inclusive as they develop and grow.

Recommendation 8: Annually publish demographic data for project applications and awarded funding.

Recommendation 9: Leverage the Fellowships of ATSE and other Learned Academies to source experts for the Industry Growth Program committee.

Recommendation 10: Assess innovation impact using metrics following the approach of the *Improving Innovation Indicators* review.

Recommendation 11: Use a whole-of-systems approach and ESG (environmental, social and governance) criteria to measure success of the Industry Growth Program.

Targeting the Industry Growth Program to maximise results

The Industry Growth Program has the potential to provide expertise and funding to support Australian SMEs through the 'Valley of Death': the period between developing a promising innovation and bringing it to market. This period is characterised by numerous challenges including limited funding; lack of skills, competencies and human resources; lack of cooperation; poor understanding of the business environment, and high risks to the business (Gbadegeshin et al. 2022). Through providing advice and funding to selected SMEs, the Industry Growth Program can address some of these factors. Together with the broader National Reconstruction Fund, it will go some way to uplifting funding for SMEs to scale up, an area in which Australia is behind international competitors such as the United States (Tech Council of Australia 2023).

Technology Readiness Levels (TRLs) – a benchmarking tool for assessing the maturity of an applied technology – will be a useful metric for assessing Industry Growth Program funding applications. ATSE considers that the program should target innovations that are in the development (TRLs 4 – 6, corresponding to validation of the technology in laboratory and relevant environments) and pilot-pre-commercial demonstration (TRLs 7 – 9, corresponding to prototyping, production, and deployment) stages. These stages typically correspond to the Valley of Death. As a condition of entry to the program, applicants should have completed discovery research and progressed to a research translation stage. Applicants may require support to accurately identify their current TRL.

TRLs are also only one component of measuring readiness for the market, as they do not assess the capacity and capability of the management team to execute and scale up their project. It will be important to

assess the business operations capacity of the SME at the time of accessing the advisory service. If aspects such as finance, IT, marketing, and human resources are beyond the managerial capacity of the SME, external resources must be engaged. The SME's decision makers (its board or management team) should be assessed for their ability to deliver, and supported by the advisory function of the Industry Growth Program to access consultants, resources or grow their expertise for any managerial gaps, before they become eligible for funding. The funding selection criteria should then consider whether the SME has appropriately applied the advice they have received through the advisory service or from experts that have been engaged.

Assessing engagement with customers can also contribute to selecting SMEs with the greatest chance of success. Applicants for Industry Growth Program funding should be required to be working with at least one prospective customer (which may be international) or provide strong evidence for why this would not be a strategic approach for their product. Having this customer relationship supports SMEs in developing the business case, particularly pertaining to integration of the technology into supply chains, as well as tailor their innovation to remove first market objections. A requirement to be working with a customer would likely contribute to greater success rates for bringing products to market. Applicants that have not already developed these relationships could be supported to identify and connect with customers through the Industry Growth Program's advisory and industry partner components. Ongoing relationships between customers and SMEs (or researchers) also enables identification of needs and the development of innovative solutions. Collaborating with academia should also be considered an advantage for funding applications.

Combining assessments of TRL, business, customer, and commercial readiness suggests the need for a holistic assessment framework. ATSE recommends applying a holistic framework based on the [KTH Innovation Readiness Level (IRL)](#) framework, which considers TRL, as well as a range of additional factors such as business, customer and funding readiness levels, and provides milestones and criteria to progress business model readiness. Readiness frameworks specific to industries – such as the Australian Renewable Energy Agency's [Commercial Readiness Index](#) for the renewable energy sector – could also be used to support funding applications where appropriate. This more holistic model will support the approach proposed by the Industry Growth Program and provide a practical tool for both SMEs and advisors to grow Australian enterprises.

Critically, Government funding must be additive rather than displacing industry or private investment. Government funding should be targeted at promising innovations from SMEs that cannot raise the entire amount of capital required. While the program should be primarily for SMEs that have not had first sales, ATSE recommends that the program does not specifically exclude SMEs that have had first sales as they may require additional support to be successful or have a sustainable business model. This can include SMEs that are not profitable due to low sales volumes, or that have found new information about the market and identified that their product requires modification but do not have the funds to do so. It is also important that funding outcomes are determined and communicated expediently. Delays introduce risks of SMEs failing as they await outcomes.

Recommendation 1: Develop and apply a holistic project eligibility assessment based on the Innovation Readiness Level framework that considers technology, business and customer readiness.

Recommendation 2: Encourage applicants for funding to be working with at least one prospective customer for their innovation.

Recommendation 3: Do not exclude SMEs that have achieved first sales from the Industry Growth Program.

Empowering SMEs to navigate the investment landscape

The advisory service as part of the Industry Growth Program will provide much needed support to SMEs in bringing their products to market, uplifting SMEs' competency in aspects such as market research, customer communication, understanding competitors, business model validation, growth strategies, developing value propositions and seeking investment. The advisory aspect of the program also provides an assurance mechanism to Government that businesses are getting the right type and level of support for their current needs.

To support success of the Industry Growth Program, the advisors must be suitably qualified, with a breadth of expertise in the team (e.g., experience in sourcing venture capital, supporting startups and international markets). ATSE agrees with the proposal to have advisors specialising in NRF priority areas, noting that some projects may be cross-sectoral.

ATSE proposes two additional functions for the advisory service that will be crucial in maximising Industry Growth Program outcomes. Firstly, within the Industry Growth Program, advisors should be equipped to

provide advice and feedback on draft funding applications. This can include assisting applicants to accurately assess their business against a framework such as the IRL and develop plans for business growth. Secondly, ATSE proposes that the advisor role also assists SMEs to navigate the funding landscape more broadly. Advisors should be able to connect applicants with other suitable funding programs including from federal and state governments. This will be especially important where SMEs working with advisors have re-evaluated their project (including its TRL) and discovered that they are not at a stage suitable for Industry Growth Program funding. For this function to be successful, the Industry Growth Program must develop close ties with other programs such as the Department of Education's Australia's Economic Accelerator (AEA) program. These relationships will also reduce the risk of activity being duplicated across different government programs.

To maximise the Industry Growth Program's impact on the innovation ecosystem, there should additionally be a community of practice integrated into the program. Advisors can also broker connections between adjacent SMEs to facilitate business activity and knowledge-sharing. A community of practice could also include participants in the Australia's Economic Accelerator program and provide an interface with university or institutional researchers interested in collaborating with innovative SMEs. This community of practice should be supported by a publicly available online resource containing information packages and templates for common needs of innovative SMEs, such as developing a business case, creating governance structures and navigating legal matters. The NSW Government Office of Social Impact Investment resource bank is an example of a similar high-quality resource that is freely available online. This would benefit SMEs beyond those involved in the program, and would also function as a point of entry to attract SMEs to the program.

Recommendation 4: Deliver advice to participants on preparing Industry Growth Program funding applications and identifying alternative funding opportunities.

Recommendation 5: Create a community of practice and publicly available resource bank for innovative SMEs.

Supporting diverse participation in the Industry Growth Program

Gender and demographic diversity contribute to enhanced outcomes in research teams, with some international studies finding positive correlations between gender diversity and innovation, as measured by patent output (Nielsen et al. 2018). Ethnic diversity in research teams is also associated with increased research impact, being positively correlated with increased number of citations (AlShebli et al. 2018). Gender diversity also contributes to improved outcomes in business. There is a causal relationship between women in leadership and company performance in Australia (Cassells & Dunacn 2020). Similarly, gender diversity of boards and senior management in large firms internationally has positive correlations with return on assets and equity, and profit margins (Nash & Guido 2022).

Diversity must be embedded in the design and implementation of the Industry Growth Program to maximise benefit from the investment and avoid compounding the barriers for underrepresented groups in STEM (science, technology, engineering and maths).

ATSE recommends that the Industry Growth Program advisory service (including access to industry partner advice and support) should prioritise underrepresented groups, providing them with the culturally-appropriate support and education they need to successfully apply for funding. The focus should be on actively incentivising and recruiting underrepresented groups to participate and thrive in STEM, and uplifting capability to facilitate equitable access to funding for project groups that include diverse teams or leadership. The Department of Industry, Science and Resources (DISR) should build on the outcomes from the Diversity in STEM review to define the underrepresented groups to be targeted for this program (such as women, Aboriginal and Torres Strait Islander people, migrants, and culturally and linguistically diverse (CALD) people) and establish metrics and reporting frameworks to assess success while also balancing privacy concerns for participants..

The advisory service should also support all project teams to become more inclusive, especially as they scale up. This can support SMEs to recruit and retain more diverse teams. The advisory service can provide access to resources such as ATSE's Diversity and Inclusion Toolkit for STEM SMEs to enable the development of appropriate structures as SMEs grow.

To ensure these measures are successful and to provide transparency of this to the sector, DISR should publish data annually on grant applications and awarded funding, including aggregate, deidentified demographic breakdowns for project teams and project leadership for the total number of applications, number of projects awarded and average funding level. There will be inherent limitations in this data as some applicants may choose not to disclose being part of an underrepresented group.

Recommendation 6: Prioritise advisory service participation for underrepresented groups in STEM (science, technology, engineering and maths).

Recommendation 7: Support all advisory service participants to become more inclusive as they develop and grow.

Recommendation 8: Annually publish demographic data for project applications and awarded funding.

Designing robust governance and evaluation of the Industry Growth Program

ATSE welcomes the inclusion of an independent committee to provide program oversight and advise DISR on grant assessment. In addition to ensuring good program governance, this committee also provides an opportunity for close collaboration with industry and other experts, as well as embedding diversity from the top. ATSE also recommends DISR utilises the networks of ATSE and other learned academies to source experts for the committee, including experts in NRF priority areas and with experience in research translation and commercialisation. Committee members participating in assessment should also be provided suitable guidance and training, with processes in place to manage conflicts of interest.

There is inherent risk and uncertainty in each project supported by the Industry Growth Program. Government investment via the Industry Growth Program or other funding initiatives moves some of this risk from the SME and onto the funder. As such, the committee should consider their risk tolerance and threshold for funding and imbue this into funding eligibility tied to the holistic readiness framework. The committee may consider managing risk through understanding the business operations capacity of SMEs awarded funding, and providing funding in instalments requiring interim reports.

ATSE recommends a systems-thinking approach for measuring success of the Industry Growth Program that includes measurement of innovation activity as well as economic and social outcomes. The 2019 *Improving Innovation Indicators* review – of which ATSE was a co-author – provides a roadmap for better tracking of innovation metrics (Finkel & Cully 2019). It recommends a yearly scorecard reporting on progress of the Australian innovation system; better data, metrics, and ongoing analysis for measuring innovation; and the creation of an entity to provide innovation reporting. The review provides an innovation metrics assessment matrix, stipulating that selected metrics must be relevant, accurate and valid, reliable and precise, timely, coherent, comparable, accessible, and clear. The review, which was publicly released in 2022, has not been implemented to date. To accurately evaluate the problems that the Industry Growth Program is trying to solve, and its success in doing so, an innovation metric framework (developed in consultation with the STEM sector and the Australian Bureau of Statistics) will be required.

In addition to innovation metrics, reporting for the program should consider environmental, social and governance (ESG) factors. Frameworks such as the Sustainable Development Goals (SDGs) can also provide a simple framework for such reporting and will enable the committee to possess a view of individual SMEs and the impact of funding at a whole-of-portfolio level. There will be a need to provide resources and advice for SMEs to understand and apply social impact frameworks to their reporting.

To support a systems-thinking, whole-of-business ecosystem perspective for program success, the committee has an opportunity to undertake a portfolio-management approach that assesses the SIPOC (supplier, input, process, output, customer) of a program participant and other businesses in the overall ecosystem that act as suppliers and customers. This can enable program assessments to consider process improvements in customer businesses as well as within SMEs as they progress through readiness levels, as compared to their readiness as assessed upon entry to the program. While this information should be provided by SMEs as part of reporting requirements, some degree of independent validation by assessors will be required. These whole-of-system assessments can be considered alongside more conventional (short-term) indicators of program success such as job creation and profitability increase.

Program-level reporting must be supported by robust reporting from participants. Milestone or end-of-funding reporting can assess proposed growth against actual growth, with assessment performed in partnership between SMEs and advisors. This process will also highlight domains where additional support is needed, allowing refinement of the Industry Growth Program and its advisory services. As the program develops, it is important to track both successful and unsuccessful products and businesses supported by this program. Collecting data on SMEs that do not progress with their technology would provide an opportunity to learn how to better target support and select types of projects that are more likely to be successful. ATSE agrees with the proposal that reporting should not be overly burdensome, but must capture information that provides indicators and accountability for the program's success as well as opportunities to improve.

Recommendation 9: Leverage the Fellowships of ATSE and other Learned Academies to source experts for the Industry Growth Program committee.

Recommendation 10: Assess innovation impact using metrics following the approach of the *Improving Innovation Indicators* review.

Recommendation 11: Use a whole-of-systems approach and ESG (environmental, social and governance) criteria to measure success of the Industry Growth Program.

ATSE thanks the Department of Industry, Science and Resources for the opportunity to respond to the Industry Growth Program consultation. For further information, please contact academypolicyteam@atse.org.au.

References

AlShebli, BK, Rahwan, T, and Woon, WL (2018), 'The preeminence of ethnic diversity in scientific collaboration', *Nature Communications*, 9, 5163.

Australian Academy of Technological Sciences and Engineering (ATSE) (2023) *Submission to the National Reconstruction Fund (NRF) Consultation,* accessed 24 July 2023.

Cassells, R, and Duncan, A (2020), 'Gender equity insights 2020: Delivering the business outcomes', Bankwest Curtin Economics Centre and Workplace Gender Equality Agency, 5, accessed 2 August 2023.

Finkel, A, and Cully, M (2019), 'Improving innovation indicators: Better data to track innovation in Australia', Department of Industry, Innovation and Science and Australian Academy of Technological Sciences and Engineering, accessed 2 August 2023.

Gbadegeshin, SA, Al Natsheh, A, Ghafel, K, Mohammed, O, Koskela, A, Rimpiläinen, A, Tikkanen, J, and Kuoppala, A (2022) 'Overcoming the Valley of Death: A New Model for High Technology Startups', *Sustainable Futures*, 4:10077

Nash, J and Guido, R (2022), 'Beyond lip service: tracking the impact of the gender diversity gap', First Sentier Investors, accessed 2 August 2023.

Nielsen, MW, Bloch, CW, and Schiebinger, L (2018), 'Making gender diversity work for scientific discovery and innovation', *Nature Human Behaviour*, 2, 726-734.

Tech Council of Australia (2023) *Shots on Goal*, accessed 24 July 2023.