SUBMISSION

Submission to the House Standing Committee on Industry, Science and Resources

Submission to the inquiry into Developing Advanced Manufacturing in Australia

30 March 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 opportunity to provide a submission to the House of Representatives Standing Committee on Industry, Science and Resources' inquiry into Developing Advanced Manufacturing in Australia. Australia, while not a traditional manufacturing powerhouse, has the opportunity to become a world leader in advanced manufacturing, particularly in areas that boost our sovereign capacity and protect our national interests. The changing nature of industry, as the world transitions to a net zero carbon future, provides opportunities for Australia to become a leading circular economy, leveraging our skills and expertise in mineral extraction to become a leader in critical mineral recovery and remanufacturing. Taking advantage of these conditions will require a skilled advanced manufacturing workforce that necessitates high quality education and training across core STEM (science, technology, engineering and mathematics) skills.

To develop Australia's advanced manufacturing sector, ATSE makes the following recommendations for the Australian Government to implement:

Recommendation 1: Use the National Reconstruction Fund to invest in building Australian manufacturing that increases sovereign capacity.

Recommendation 2: Use the National Reconstruction Fund to invest in building Australia's green energy manufacturing industry.

Recommendation 3: Develop standards for reused and remanufactured goods to develop consumer confidence.

Recommendation 4: Target manufacturing grants and incentives towards waste avoidance or minimisation and the sustainable use of recycled content.

Recommendation 5: Provide greater assistance to small and medium sized enterprises within medical manufacturing to progress through regulatory approvals processes.

Recommendation 6: Support education providers to establish priority STEM training programs, quality assessed against a national skills assessment framework.

Recommendation 7: Develop a national strategy to optimally utilise international migration to boost Australian manufacturing.

Enhancing sovereign capacity via manufacturing

Australia is a world leader in the extraction and export of minerals. However, most downstream processing of these minerals occurs offshore, requiring Australia to reimport processed minerals from our trade partners. The large initial investments required to set up production and higher labour costs make Australia less competitive for most low-value manufacturing. Nonetheless, international examples demonstrate that successful manufacturing can be developed by focusing on advanced, high value adding manufacturing in niche or highly technical fields, even in countries that cannot sustain large-scale basic manufacturing. For example, Taiwan has become a manufacturing powerhouse by capturing the market for semiconductor manufacturing, with a single Taiwanese company (Taiwan Semiconductor Manufacturing Limited) producing $45 Billion in revenue in 2020 (Wintermeyer, 2022).

Australia has an opportunity to engage with high value adding downstream processing of minerals for use by Australian industry and infrastructure projects, particularly those related to major national interests where supply chain security is crucial. Australia's advantages in mineral extraction can be leveraged by developing manufacturing hubs that enable the processing of materials into advanced products without extensive transport. Hubs are a way to improve efficiency and reduce upfront and ongoing costs, as well as revitalise regional communities.

The National Reconstruction Fund identifies several core targets for value adding manufacturing, including areas that will maximise our sovereign capacity such as defence capability and green energy technologies

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(Department of Industry Science and Resources, 2022b). Developing a strong green energy manufacturing sector would help to develop Australia's energy security, insulating the nation from the impacts of global events (such as the recent gas price rises following Russia's invasion of Ukraine), while also supporting Australia's net zero emissions ambitions. Developing these niche manufacturing industries will require support from the Government to overcome the higher costs of establishing manufacturing in a country with a lack of established manufacturing, and to retool and reskill existing facilities to meet demand in these national priority areas.

Recommendation 1: Use the National Reconstruction Fund to invest in building Australian manufacturing that increases sovereign capacity.

Recommendation 2: Use the National Reconstruction Fund to invest in building Australia's green energy manufacturing industry.

Establishing a circular manufacturing industry

The recycling of Australian minerals and the products they become is crucial for meeting Australia's net zero target and is a key opportunity to establish an Australian processing industry (Australian Academy of Technological Sciences and Engineering, 2020). The development of a circular economy also provides Australia with the opportunity to become a net importer of waste by employing our skills in primary metals production to recycle electronics, including batteries, at the end of their life. The development of this circular economy will only grow in importance as the uptake of electric vehicles and at-home battery storage systems results in growing battery waste. While this waste has the potential to cause environmental damage if not properly handled, end-of-life batteries contain valuable materials that can be extracted and reused. With suitable investment, the extraction of critical minerals from waste streams may be more cost effective than traditional mining (Zeng, Mathews and Li, 2018) and can help fuel the nation's needs for critical minerals.

Changing consumption and waste habits requires the overcoming of consumer inertia and market disincentives to develop new business models, led by consumer demand (Australian Academy of Technological Sciences and Engineering, 2020). Consumers must be confident in the quality of reused or remanufactured products to adopt these new habits. The Government can lead the way on this by developing standards for reused and remanufactured products manufactured in Australia and applying these standards to imported products. These standards should be supported by a grants and incentives scheme to help overcome the high initial costs of developing a circular manufacturing sector.

Recommendation 3: Develop standards for reused and remanufactured goods to develop consumer confidence.

Recommendation 4: Target manufacturing grants and incentives towards waste avoidance or minimisation and the sustainable use of recycled content.

Supporting the Medical Manufacturing Industry

Improving Australia's medical manufacturing industry has been highlighted by the National Reconstruction Fund as a priority area for the government (Department of Industry Science and Resources, 2022b). As outlined in ATSE's submission on the National Reconstruction Fund, the growth in medical manufacturing is impeded by regulatory processes that are excessively complex compared to similarly developed countries. This incentivises companies to manufacture new medical devices internationally, depriving Australia of opportunities in medical manufacturing. This is further compounded by streamlined approvals processes for products from overseas that already have international approvals (e.g., the EU's CE mark), that are not available to local manufacturers. While it is important that medical products are shown to be safe and functional, for the Australian medical manufacturing industry to flourish, local regulatory burdens need to be equivalent to our international competitors. This burden is particularly great for small and medium sized

enterprises, particularly start-ups, that often struggle to navigate the complex regulatory requirements. Providing greater support for Australian small and medium sized enterprises to navigate the Therapeutic Goods Administration's processes and regulations will help to encourage these businesses to manufacture new medical devices in Australia, promoting the growth of our domestic medical manufacturing industry.

Recommendation 5: Provide greater assistance to small and medium sized enterprises within medical manufacturing to progress through regulatory approvals processes.

Developing manufacturing skills

For Australia to build a world-class manufacturing sector, we need to ensure that we have enough high-skilled workers, including engineers and technology workers as well as plant technicians and operators, to fuel our manufacturing growth Developing these skills must start early, in classrooms, and continue throughout the working lives of Australians to ensure our industries have access to workers who meet the nation's requirements. ATSE's *Our STEM Skilled Future: An education roadmap for an innovative workforce* highlights the need to prioritise and invest in evidence-based approaches to developing STEM education and training and to establish a single shared skills framework. This will enable alignment of critical skills needs with education and training opportunities, including reskilling and upskilling of the workforce.

Part of this program must be encouraging underrepresented groups in STEM to consider a STEM pathway. Women, for example, make up only 27% of the workforce across all STEM industries and earn 18% less than their male colleagues (Department of Industry Science and Resources, 2022a). Increasing the participation rate of women within the STEM workforce would go a long way to addressing current skills shortages. Similarly, we must encourage individuals from culturally and linguistically diverse backgrounds, as well as Aboriginal and Torres Strait Islander people, to consider careers in STEM. This will not only help to fill skills shortages, but also allow for a greater diversity of experiences that can help industry to succeed. Initiatives such as ATSE's Diversity and Inclusion Toolkit (Australian Academy of Technological Sciences and Engineering, 2022) can be expanded to enable small and medium employers to create workplace cultures and policies requisite to attract and retain this workforce.

As training pipelines will take several years to fully train local talent, it is also essential to take immediate measures to ensure Australia can attract international talent with the skills necessary to develop Australian manufacturing. As ATSE has argued previously, a well-targeted, sustainable migration system enables priority areas to be adequately resourced, while having minimal impact on local workforce participation or wages (Australian Academy of Technological Sciences and Engineering, 2023). Immigration processes need to be flexible to support changing industry needs, while enabling minimal administrative burdens on applicants and short processing times to keep Australia internationally competitive. A national strategy would enable a consistent approach to skilled migration in manufacturing, allowing for migration to be used to build Australian capacity and develop well paid jobs into the future.

Recommendation 6: Support education providers to establish priority STEM training programs, quality assessed against a national skills assessment framework.

Recommendation 7: Develop a national strategy to optimally utilise international migration to boost Australian manufacturing.

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