

The Senate

Economics References Committee

The Australian manufacturing industry

February 2022

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Terms of Reference

The Australian manufacturing industry, with specific regard to:

- (a) what manufacturing capacities Australia requires for economic growth, national resilience, rising living standards for all Australians and security in our region;
- (b) the role that the Australian manufacturing industry has played, is playing and will play in the future;
- (c) the drivers of growth in manufacturing in Australia and around the world;
- (d) the strengths of Australia's existing manufacturing industry and opportunities for its development and expansion;
- (e) the sectors in which Australian manufacturers enjoy a natural advantage in energy, access to primary resources and skilled workers over international competitors, and how to capitalise on those advantages;
- (f) identifying new areas in which the Australian manufacturing industry can establish itself as a global leader;
- (g) the role that government can play in assisting our domestic manufacturing industry, with specific regard to:
 - (i) research and development;
 - (ii) attracting investment;
 - (iii) supply chain support;
 - (iv) government procurement;
 - (v) trade policy;
 - (vi) skills and training; and
- (h) the opportunity for reliable, cheap, renewable energy to keep Australia's manufactured exports competitive in a carbon-constrained global economy and the role that our manufacturing industry can play in delivering the reliable, cheap, renewable energy that is needed.

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Abbreviations and acronyms

3D	Three-dimensional
AAAA	Australian Automotive Aftermarket Association
AAS	Australian Academy of Science
ACP	Australian Citizens Party
ACTU	Australian Council of Trade Unions
AFGC	Australian Food and Grocery Council
AITI	Australian Industrial Transformation Institute, Flinders University
AJA	<i>Australian Jobs Act 2013</i> (Cwlth)
AMGC	Advanced Manufacturing Growth Centre
APPEA	Australian Petroleum Production and Exploration Association
ARA	Australasian Railway Association
ARENA	Australian Renewable Energy Agency
ASI	Australian Steel Institute
ATO	Australian Taxation Office
ATSE	Australian Academy of Technology and Engineering
CEC	Citizens Electoral Council
CEDA	Committee for Economic Development of Australia
CEFC	Clean Energy Finance Corporation
CEO	Chief Executive Officer
CRA	Cooperative Research Australia (previously the CRC Association)
CRC	Cooperative research centre
CRC-P	Cooperative research centre projects
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DESE	Department of Education, Skills and Employment
DFAT	Department of Foreign Affairs and Trade
DGTO	Digital Games Tax Offset
DIIS	Department of Industry, Innovation and Science
DISER	Department of Industry, Science, Energy and Resources
EFTSL	Equivalent full-time student load
EV	Electric vehicles
G7	Group of seven countries
GDP	Gross domestic product
GFC	Global financial crisis
IGEA	Interactive Games and Entertainment Association
IMCRC	Innovative Manufacturing Cooperative Research Centre
IMF	International Monetary Fund
IP	Intellectual property
ISA	Innovation and Science Australia
ITIF	Information Technology and Innovation Foundation
LNG	Liquified natural gas

MA	Manufacturing Australia
MEF(SC)	Manufacturing Excellence Forum (Sunshine Coast)
MMI	Modern Manufacturing Initiative
MMS	Modern Manufacturing Strategy
MotM	Manufacturing on the Move
NCVER	National Council for Vocational Education Research
NMP	National manufacturing priority/priorities
OECD	Organisation for Economic Co-operation and Development
PC	Productivity Commission
R&D	Research and development
RAI	Regional Australia Institute
RDTI	Research and Development Tax Incentive
RBA	Reserve Bank of Australia
RMIT	Royal Melbourne Institute of Technology
RSPs	Research Service Providers (in relation to the RDTI)
RTP	Research Training Program
SEMMA	South East Melbourne Manufacturers Alliance
SMEs	Small and medium enterprises
STA	Science & Technology Australia
STEM	Science, technology, engineering, and mathematics
TAFE	Technical and further education
TRL	Technology readiness level
UK	United Kingdom
US	United States of America
UWU	United Workers Union
VET	Vocational education and training

List of Recommendations

Recommendation 1

6.10 The committee recommends that the Australian Government consider the periodic review of R&D, commercialisation, and investment incentives and tax arrangements to ensure they facilitate the growth of Australia's manufacturing industry and investment including:

- the range of activities covered by mechanisms like the R&D Tax Incentive (RDTI);
- that the incentives and arrangements encourage the development of self-sustaining manufacturing ecosystems incorporating innovation, collaboration, commercialisation and investment, particularly in the advanced manufacturing sector;
- with regard to the minimisation, as far as possible administrative overheads for participants, and the availability of support mechanisms for participants, in particular small and medium enterprises (SMEs);
- the effectiveness of governance, implementation, and reporting; and
- consideration of any further mechanisms that would improve R&D, commercialisation, and investment outcomes.

Recommendation 2

6.11 The committee recommends that the Australian Government establish a Manufacturing Industry Fund to provide a range of co-investment incentives to the manufacturing industry in conjunction with the private sector.¹

Recommendation 3

6.12 The committee recommends that the Australian Government consider the establishment of a Superannuation Task Force to explore, develop and

¹ The Fund should have the flexibility to assist a range of manufacturing sectors (including emerging sectors) and private entities, using a variety of mechanisms, such as direct support for flagship projects, equity, concessional loans, guarantees, and other means that deliver a positive return on investment (ROI).

The Fund should particularly look to accelerate Australia's clean export industries, through funding of a wide range of technologies such as hydrogen, green metals, and battery manufacturing, and assist their transition to full market competition.

For example through minimum guaranteed revenues using mechanism like Contracts for Difference: Department for Business, Energy & Industrial Strategy (UK), [Policy paper: contracts for difference](#), 13 December 2021 (accessed 15 January 2022); UK Government, [Electricity Market Reform: Contracts for Difference: How Contracts for Difference \(CfDs\) will work under Electricity Market Reform](#), 7 August 2013 (accessed 15 January 2022).

recommend structural changes and possible incentives-based programs and regulations to increase the level of Australian superannuation fund investment in Australian manufacturing industries, particularly those with an export focus

Recommendation 4

6.13 The committee recommends that the Australian Government consider significant increases to manufacturing R&D and commercialisation support to improve international competitiveness and stimulate the development of self-sustaining manufacturing ecosystems through:

- expanded investment in industry growth centres and cooperative research centres (CRCs) in alignment with the national priorities, and with view to improving collaboration between training institutions and industry, in particular;
- the establishment of a Research Translation Fund to fund large projects which encourage R&D and the commercialisation of innovative products, processes, and services;
- sponsoring the development of advice and resources for finance providers and investors by industry bodies, to improve understanding and reduce risk perceptions of the manufacturing industry, leading to greater investment;
- the establishment of an expert working group, with industry representation, to support the design and implementation of the patent box scheme.

Recommendation 5

6.18 The committee recommends that the Skills National Cabinet Reform Committee, in collaboration with relevant stakeholders, fast track reform of the VET sector nationally through the development and implementation of a national action plan. The plan should have regard to:

- prioritising the agreement to and implementation of VET sector recommendations from the Review of the Australian Qualifications Framework;²
- improving skills and training quality and delivery, responsiveness and collaboration with industry;
- addressing skills shortages; and
- ensuring that VET courses, particularly in occupations with current or forecast skills shortages, are accessible and affordable.

² Department of Education, Skills and Employment (DESE), [Australian Qualifications Framework Review](#), 24 November 2020 (accessed 25 January 2022).

Recommendation 6

6.19 The committee recommends that the Australian Government address manufacturing skills shortages by considering the following initiatives:

- the creation of a minimum ratio of apprenticeships on all directly-government-funded projects, in consultation with employers, industry and unions;
- higher wages for apprentices to encourage the take up and completion of apprenticeships;
- exploring the benefits of an employer wage subsidy to cover the first 18 months of costs associated with adult apprenticeships;
- the provision of additional funding to higher education providers through the Research Training Program, to enable better support higher degree research students; and
- collaboration with the university sector to encourage more industrial PhDs (inclusive of industry placements), including targeted additional assistance for employers engaging PhD interns and cadets.

Recommendation 7

6.23 The committee recommends that the Fair Work Commission review industrial awards and the 2016 Building Code, with input from manufacturing industry groups, employers, and unions, to ensure fair wages and conditions for Australian workers, including:

- that pay rates are fair and just, including for apprentices, trainees, cadets, and interns, and workers with varying qualifications and experience; and
- mechanisms that promote cooperation between workplaces, employers and workers, including through the involvement of unions.

Recommendation 8

6.24 The committee recommends that the Human Rights Commission, in conjunction with other government agencies, manufacturing industry groups and employers, and unions, take steps to improve the diversity of workers in manufacturing industry through:

- the establishment of an expert working group to deliver an action plan to improve diversity, including how targets can be linked to government funding initiatives, and supporting implementation advice; and
- the implementation of any necessary industrial relations reforms.

Recommendation 9

- 6.27 That Government tenders preference bidders who have sustainable supply chains that maximise the use of local suppliers, manufacturers, and service providers and which are committed to developing the domestic manufacturing industry, and that are sustainable.

Recommendation 10

- 6.28 That the Commonwealth Procurement Rules (CPR) be reviewed for possible amendments that would support the development of Australia's domestic manufacturing capabilities and employment/training opportunities, and that this review also includes an appraisal of the appropriateness of current exemptions from Subclause 4.7 of the CPR for goods and services listed in Appendix A of the CPR.

Recommendation 11

- 6.29 That both Federal and State Governments adopt procurement policies which maximise both domestic production and the provision of local jobs, and that the Commonwealth take on a more active role in facilitating national coordination in industry development, so as to ensure that multiple states are not all trying to replicate identical outcomes when a differentiated result which leverages each state's existing strengths and assets may be more preferable.

Recommendation 12

- 6.32 That all future trade deals negotiated by the Australian Government avoid the inclusion of provisions that would have the effect of restricting the Commonwealth's procurement arrangements from any form of preference for the purpose of providing for the full, fair and reasonable participation of local enterprises, including manufacturing companies, in government contracts as outlined in Commonwealth, state and territory industry participation policies and successor programs and policies.

Recommendation 13

- 6.35 The committee recommends that the Australian Government amend the *Australian Jobs Act 2013* to stimulate activity and create jobs through lowering the current major project threshold amount from \$500 million.

Recommendation 14

- 6.36 The committee recommends that the Australian Government develop minimum ratios of apprentices to tradespeople, with mandatory use of these ratios on all directly-funded government projects.

Recommendation 15

- 6.44 That the Australian Government continue to support green hydrogen as a potential longer-term alternative to gas use in manufacturing.**

Recommendation 16

- 6.45 Establish a CRC for Sustainable Manufacturing to operationalise hydrogen and to identify opportunities that would support the development of a green metals industry powered by clean energy.**

Recommendation 17

- 6.46 That the Australian Government continues to recognise the importance of the supply and affordability of gas in the future of Australian manufacturing, including through greater cooperation between environmental departments at Commonwealth and State Levels on approvals.**

Recommendation 18

- 6.49 That the Australian Government prioritise the need to maintain domestic electrical equipment testing capabilities, including if necessary, interventions to ensure the ongoing operation of the Lane Cove Testing Facility.**

Recommendation 19

- 6.52 Establish a working group with representatives from both employers and unions to examine policy options to secure and strengthen domestic pharmaceutical supply chains.**

Chapter 1

Introduction

Referral and conduct of the inquiry

- 1.1 On 12 August 2021, the Senate referred an inquiry into Australia's manufacturing industry to the Senate Economics References Committee (the committee) for inquiry and report by 24 November 2021.¹
- 1.2 On 24 November 2021, the Senate granted the committee an extension to report by 17 December 2021.² On 10 December 2021 the committee presented a progress report to the Senate out of sitting, requesting an extension to the reporting date until 27 January 2022,³ with a further progress report made on 27 January 2022, extending the tabling date further to 4 February 2022.⁴

Terms of reference

- 1.3 Under its terms of reference, the committee was tasked to inquire into Australia's manufacturing industry, with specific regard to:
 - (a) what manufacturing capacities Australia requires for economic growth, national resilience, rising living standards for all Australians and security in our region;
 - (b) the role that the Australian manufacturing industry has played, is playing and will play in the future;
 - (c) the drivers of growth in manufacturing in Australia and around the world;
 - (d) the strengths of Australia's existing manufacturing industry and opportunities for its development and expansion;
 - (e) the sectors in which Australian manufacturers enjoy a natural advantage in energy, access to primary resources and skilled workers over international competitors, and how to capitalise on those advantages;
 - (f) identifying new areas in which the Australian manufacturing industry can establish itself as a global leader;
 - (g) the role that government can play in assisting our domestic manufacturing industry, with specific regard to:

¹ Senator Anne Urquhart at the request of Senator Kimberley Kitching, *Journals of the Senate*, No. 113, 12 August 2021, pp. 3928–3929.

² The Clerk, *Senate Hansard*, 15 June 2020, pp. 3119–3120; The Clerk, *Proof Senate Hansard*, 24 November 2021, p. 69.

³ Parliament of Australia, [Tabled papers: current list: Documents presented out of sitting after the Senate adjourned on 2 December 2021](#) (accessed 15 January 2022).

⁴ Parliament of Australia, [Tabled papers: current list: Documents presented out of sitting after the Senate adjourned on 2 December 2021](#) (accessed 27 January 2022).

- (i) research and development;
 - (ii) attracting investment;
 - (iii) supply chain support;
 - (iv) government procurement;
 - (v) trade policy;
 - (vi) skills and training; and
- (h) the opportunity for reliable, cheap, renewable energy to keep Australia's manufactured exports competitive in a carbon-constrained global economy and the role that our manufacturing industry can play in delivering the reliable, cheap, renewable energy that is needed.

Conduct of the inquiry

- 1.4 The committee advertised the inquiry on its website and in September 2021 it wrote to stakeholders and interested parties inviting submissions. Submissions closed on 17 September 2021. The committee received 130 submissions to the inquiry. A list of submissions received is at Appendix 1.
- 1.5 Public hearings were held on:
- 11 November 2021 – Canberra by videoconference and teleconference;
 - 6 December 2021 - Canberra by videoconference and teleconference; and
 - 8 December 2021 - Canberra by videoconference and teleconference.
- 1.6 The names of witnesses who appeared at the hearings are listed at Appendix 2.
- 1.7 The committee thanks all individuals and organisations who assisted with the inquiry, especially those who made written submissions and participated in the public hearings.

Scope of the inquiry

- 1.8 Evidence received by the committee permitted it to investigate the following issues, as they relate to manufacturing in Australia:
- the role of manufacturing and a variety of structural arrangements;
 - the need for a strategic and sovereign manufacturing capability;
 - resilient supply chains;
 - manufacturing research and development (R&D) and commercialisation;
 - skills, training and employment;
 - taxation and incentives, including for investment;
 - Industry 4.0;
 - policy and regulation;
 - procurement;
 - energy and critical minerals; and
 - sector-specific issues.
- 1.9 While 130 submissions is a reasonably large number for an inquiry, approximately two thirds of those submissions were made by members or

supporters of the Australian Citizens Party (ACP)—formerly the Citizens Electoral Council (CEC).

- 1.10 The ACP frequently conducts mass campaigns on economic issues such as banking, currency regulations and manufacturing. They are disposed to focus on policies that were implemented in the 1950s and 1960s and they tend to advocate, regardless of the specific issue, for the same suit of measures including:
- the establishment of a national development or postal bank;
 - instituting 'Glass-Steagall' banking regulations;
 - building the 'Bradfield Scheme' to pump water from Queensland to New South Wales and Victoria; and
 - a return to tariff protection.
- 1.11 The ACP itself also provided a submission which mirrored those themes but also included additional modern themes such as thorium nuclear reactors and nanotechnology.⁵

Structure of the report

- 1.12 The first chapter of the report outlines the administrative details of the committee's inquiry and work and sets the scene with an overview of manufacturing in Australia, including its role and recent trends, Australia's manufacturing capability from its weaknesses and threats to its strengths and opportunities.
- 1.13 The remainder of the report is structured as follows:
- **Chapter 2 Why manufacturing**—manufacturing's contribution to the economy and national security, the importance of baseline and sovereign capability, and resilient supply chains;
 - **Chapter 3 Elements of manufacturing**—key elements required to enable manufacturing including R&D, commercialisation, skills and training, employment, and taxation and incentives;
 - **Chapter 4 Transformation of manufacturing**—Industry 4.0 (the fourth industrial revolution) which focusses on rapid changes to technology, industries and societal patterns as a result of interconnectivity, smart automation, data and artificial intelligence;
 - **Chapter 5 Opportunities for government**—areas in which government can shape and influence manufacturing through policy and strategy, the promotion of Australian manufacturing, government procurement, harmonisation of standards and regulation, provision of key capabilities and access to energy; and

⁵ Australian Citizens Party (ACP), *Submission 64*.

- **Chapter 6 Committee view**—the views of the committee, including recommendations.

Role of manufacturing

1.14 'Manufacturing is not just "another" sector of the economy. For several concrete reasons, manufacturing carries strategic importance to broader national prosperity and security'.⁶ The Centre for Future Work noted that:

Australians purchase and use more manufactured goods over time; and manufacturing output is growing around the world. Allowing domestic manufacturing to decline, while our use of manufactured products grows, undermines national economic performance.⁷

1.15 Manufacturing plays an essential role, adding value and providing input back into primary industries and enabling and requiring the provision of services to ensure usable products.⁸ The Centre's 2020 report made a number of key findings, including that:

- manufacturing is the most innovation-intensive sector in the whole economy. No country can be an innovation leader without a strong manufacturing base;
- manufactured goods account for over two-thirds of world merchandise trade. A country that cannot successfully export manufactured products will be shut out of most trade;
- manufacturing anchors hundreds of thousands of other jobs throughout the economy, thanks to its long and complex supply chain. Billions of dollars' worth of supplies and inputs are purchased by manufacturing facilities, supporting many other sectors of the economy; and
- manufacturing offers high-quality jobs, full-time hours, and above-average incomes. And thanks to strong productivity growth and the capacity to apply modern technology, manufacturing offers the prospect of rising incomes in the future.⁹

⁶ Australia Institute, [Media release: post-COVID manufacturing renewal represents potential \\$50 billion boost to economy](#), 28 July 2020 (accessed 2 November 2021).

⁷ Australia Institute, *Media release: post-COVID manufacturing renewal represents potential \$50 billion boost to economy*, 28 July 2020.

⁸ Dr Jim Stanford, The Centre for Future Work at the Australia Institute, [A fair share for Australian manufacturing: manufacturing renewal for the Post-COVID economy](#) (A fair share for Australian manufacturing), July 2020, p. 9 (accessed 2 November 2021).

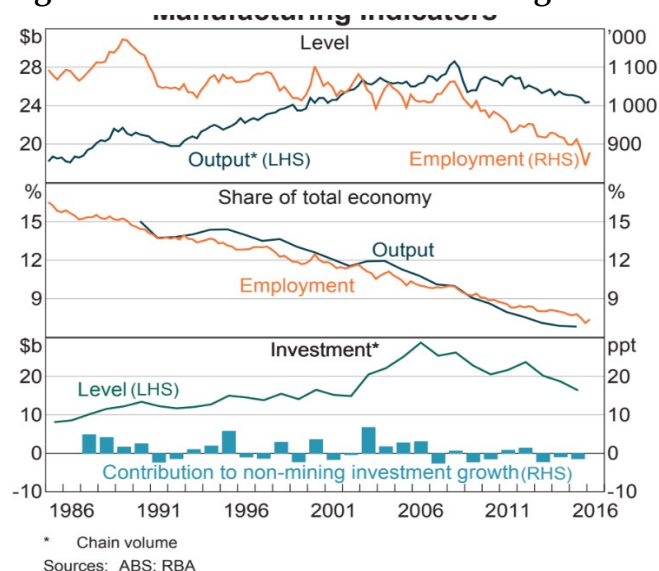
⁹ Australia Institute, *Media release: post-COVID manufacturing renewal represents potential \$50 billion boost to economy*, 28 July 2020.

Overview of Australian manufacturing

Australia's manufacturing performance

- 1.16 Australia is last amongst all Organisation for Economic Co-operation and Development (OECD) countries for manufacturing self-sufficiency, at 72 per cent,¹⁰ reflecting a thirty-year downward trend of Australian manufacturing output and employment. Decline has been more pronounced since the Global Financial Crisis (GFC) and recent resources booms, as shown in Figure 1.1.¹¹
- 1.17 Australia now produces about two-thirds as much manufactured output as it consumes,¹² creating a sizeable trade deficit in manufactures, as illustrated by Figure 1.2.¹³ The Australian Industrial Transformation Institute (AITI) characterises Australia as having 'an industrial structure more akin to a developing country than that of a high-income advanced economy'.¹⁴

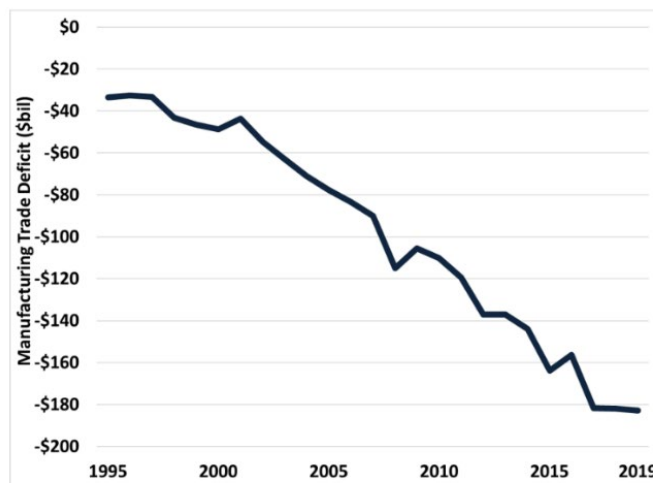
Figure 1.1 Australian manufacturing indicators, 1986-2016



Sean Langcake, Reserve Bank of Australia (RBA), ['Conditions in the manufacturing sector'](#), Bulletin, June Quarter 2016, p. 28.

- ¹⁰ Dr Stanford, The Centre for Future Work, A fair share for Australian manufacturing, pp. 14 and 63.
- ¹¹ Dr Stanford, The Centre for Future Work, A fair share for Australian manufacturing, pp. 14 and 63; Sean Langcake, Reserve Bank of Australia (RBA), ['Conditions in the manufacturing sector'](#), Bulletin, June Quarter 2016, p. 27 (accessed 24 November 2021).
- ¹² Rachel Pupazzoni, ['Australian manufacturing has been in terminal decline but coronavirus might revive it'](#), ABC News Australia, 23 July 2020 (accessed 25 November 2021).
- ¹³ Dr Stanford, The Centre for Future Work, A fair share for Australian manufacturing, pp. 29–30.
- ¹⁴ Australian Industrial Transformation Institute (AITI), Flinders University, [Australian sovereign capability and supply chain resilience: perspectives and options](#) (Australian sovereign capability and supply chain resilience), August 2021, p. 6 (accessed 25 November 2021).

Figure 1.2 Manufacturing trade deficit, 1995–2019



Source: Author's calculations from DFAT TRIEC data.

Dr Jim Stanford, *The Centre for Future Work at the Australia Institute*, [A fair share for Australian manufacturing: manufacturing renewal for the Post-COVID economy](#), July 2020, p. 30 (accessed 2 November 2021).

- 1.18 As a proportion of gross domestic product (GDP) manufacturing has fallen from almost 30 per cent in the 1950s and 1960s to below 6 per cent in 2019¹⁵—considerably lower than other OECD countries and the OECD average.

Domestic manufacturing capability

- 1.19 Australia has a diverse manufacturing industry, comprised of several key sectors including food, beverage and tobacco, machinery and equipment, petroleum, coal and chemicals, and metal products. Together these four sectors account for around 80 per cent of the manufacturing output and employment.¹⁶
- 1.20 Since the mid-1990s the mix of these sectors has changed significantly, with falls in the metal products, textiles, clothing and footwear, and the machinery and equipment sectors, and growths in non-metallic mineral products grew, wood and paper products and food, beverages, and tobacco.¹⁷

¹⁵ Rachel Pupazzoni, 'Australian manufacturing has been in terminal decline but coronavirus might revive it', *ABC News Australia*, 23 July 2020.

¹⁶ Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, pp. 28 and 31.

¹⁷ Colin Clark, Timothy Geer, Barry Underhill, Industry Commission, [The changing of Australian manufacturing: staff information paper](#), December 1996, Chapter 4, p. 11 (accessed 25 November 2021); Ai Group, [Australian Manufacturing in 2019: local and global opportunities](#), May 2019, p. 12.

- 1.21 AITI recently concluded that Australia's manufacturing sectors are relatively immature with variable operational and largely underdeveloped industrial capability levels as Figure 1.3 shows.¹⁸

Figure 1.3 Australian manufacturing—operational and industrial capability levels, 2021

Domain	Operational capability	Industrial capability
Health	High	Low
Defence	Medium-high	Low-medium
Energy, resources & infrastructure	Low	Low
Science, communications & technology	Low-medium	Low
Advanced manufacturing	Low	Low

AITI, [Australian sovereign capability and supply chain resilience: perspectives and options](#), August 2021, p. vi (accessed 25 November 2021).

Weaknesses and threats

Factors in manufacturing's decline

- 1.22 A number of sources point to the sharp increases in the terms of trade, the appreciation of the Australian dollar, and imports from lower-cost economies as factors in Australia's manufacturing decline.¹⁹
- 1.23 Problems with global supply chains and gaps in Australia's manufacturing capability have also contributed to the decline in manufacturing, with AITI observing the weakening of integrated value chain manufacturing, particularly with the departure of primary automotive producers.²⁰ Australia also faces the challenge of geographic isolation, with costs of trading—largely transport related—in the order of 20–25 per cent higher than the global average.²¹
- 1.24 While Australia's remoteness and higher trade costs may protect some local manufacturers from import competition, the Reserve Bank of Australia (RBA) found that domestic producers face disadvantages caused by a relatively small

¹⁸ AITI describes operational capability as 'what they can do' and industrial capability as 'what they can make'. AITI, *Australian sovereign capability and supply chain resilience: perspectives and options*, August 2021, p. vi.

¹⁹ See, for example: Directorate for Science, Technology and Innovation Committee on Industry, Innovation and Entrepreneurship, OECD, *Australian Manufacturing in the Global Economy: study for the Australian Government, Department of Industry, Innovation, Science, Research and Tertiary Education* (Australian manufacturing in the global economy study), DSTI/IND(2012)20/FINAL, 5 May 2015, p. 4 (accessed 24 November 2021); Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, pp. 27 and 30; OECD, *OECD Economic surveys: Australia 2021: 1. Key policy insights*, 2021 (accessed 24 November 2021); Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 30–32.

²⁰ Australia Institute, *Post-COVID Manufacturing Renewal Represents Potential \$50 Billion Boost to Economy*, 28 July 2020; Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 10; AITI, *Australian sovereign capability and supply chain resilience*, p. 8.

²¹ Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, p. 32.

domestic market, lack of ability to scale, and lower rates of collaboration with firms in other advanced economies.²²

- 1.25 A 2015 OECD study into Australian manufacturing in a global context also noted Australia's small-scale disadvantages, high-cost operating environment, and the long-term trend of deindustrialisation in Australia (in line with other OECD countries). However, the study also pointed to opportunities for manufacturing in traditional and higher technology industries, through innovation and a focus on quality, reliability, sustainability, and differentiation, rather than low cost.²³

Enterprise size

- 1.26 Declines in the numbers of manufacturing businesses exposes some of Australia's structural and capacity weaknesses—particularly given medium and large sized enterprises make up just eight per cent of manufacturing firms. Australia needs these larger manufacturing businesses to provide the scale, innovation and finance which are necessary to developing self-sustaining ecosystems.²⁴
- 1.27 Medium and large sized companies also provide the greatest employment opportunities.²⁵ In contrast, small businesses have limited capacity to scale up, innovate, accumulate capital, and reinvest, and grow exports.²⁶

²² Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, p. 32; see also: AITI, Australian sovereign capability and supply chain resilience p. vi.

²³ Directorate for Science, Technology and Innovation Committee on Industry, Innovation and Entrepreneurship, OECD, *Australian Manufacturing in the Global Economy*, p. 4.

²⁴ Manufacturing ecosystems are described as collaborative networks of stakeholders from across the value chain—inclusive of government, large SME producers and supply companies, and other education providers—which collaborate and align their efforts to meet shared objectives and solve shared problems. The value of ecosystems in manufacturing is their ability grow capability and capacity, solve problems, and innovate through scale, demand, and influence.

Vincent Rutgers, [Ecosystems And Smart Manufacturing: Amplify Your Investment \(forbes.com\)](https://www.forbes.com/sites/vincent-rutgers/2021/06/19/ecosystems-and-smart-manufacturing-amplify-your-investment/), Forbes, 19 June 2021 (accessed 14 January 2022); Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 59–60; Dr Dean, Carmichael Centre, *Submission 46*, pp. 10–11.

²⁵ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 44; Rachel Pupazzoni, 'Australian manufacturing has been in terminal decline but coronavirus might revive it', *ABC News Australia*, 23 July 2020; Dr Dean, Carmichael Centre, *Submission 46*, p. 10; Australian Bureau of Statistics (ABS), [81550DO001 201920 Australian Industry, 2019-20: Australian industry by division: Table 5 business size by industry division](https://www.abs.gov.au/81550DO001/201920/Australian%20Industry%202019-20%20Australian%20industry%20by%20division%20Table%205%20business%20size%20by%20industry%20division), released 28 May 2021 (accessed 1 December 2021).

²⁶ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 59–60.

Labour challenges

- 1.28 Australia is last amongst OECD countries for national employment in manufacturing, comprising around eight per cent of Australia's total employment—significantly less than the 16 per cent of the 1980s.²⁷
- 1.29 Australian manufacturing industry employs over one million people directly or indirectly²⁸—inclusive of indirect employment this rises to around 1.5 million.²⁹ Approximately 31 per cent of direct manufacturing employment is in regional areas of Australia.³⁰
- 1.30 However, over the last 10 years the total workforce has shrunk in absolute terms, with over 100,000 positions lost.³¹ Figure 1.4 illustrates manufacturing job losses over the last 20 years.

²⁷ Department of Industry, Science, Energy and Resources (DISER), *Submission 116*, p. 1; Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 14 and 63; Rachel Pupazzoni, 'Australian manufacturing has been in terminal decline but coronavirus might revive it', *ABC News Australia*, 23 July 2020.

²⁸ DISER, *Submission 116*, p. 1.

²⁹ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 24.

³⁰ Department of Industry, Science, Energy and Resources (DISER), *Submission 116*, p. 1; Ms Michele O'Neil, President, Australian Council of Trade Unions (ACTU), *Proof Committee Hansard*, 8 December 2021, p. 31.

³¹ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 44; Rachel Pupazzoni, 'Australian manufacturing has been in terminal decline but coronavirus might revive it', *ABC News Australia*, 23 July 2020; Dr Dean, Carmichael Centre, *Submission 46*, p. 10; Australian Bureau of Statistics (ABS), [81550DO001 201920 Australian Industry, 2019-20: Australian industry by division: Table 5 business size by industry division](#), released 28 May 2021 (accessed 1 December 2021).

Figure 1.4 20-year change in employment by industry, February 2000 to February 2020



Source: ABS, *Labour force, Australia, detailed, seasonally adjusted*

National Skills Commission, [The state of Australia's skills 2021: now and into the future: report overview](#), [2021], p. 1 (accessed 15 December 2021); Ai Group, *Submission 68*, pp. 27–28 (accessed 15 December 2021).

- 1.31 While Australian labour costs have increased significantly, the Centre for the Future of Work found that wage and non-wage labour costs are comparable to or even slightly less than those of other industrial countries.³²

Contracting R&D investment and participation

- 1.32 Australian investment in R&D has declined over the last 20 years and is well below the OECD average. Relative to Australia's GDP, R&D expenditure is around 1.8 per cent—its lowest levels since 1995.³³
- 1.33 In 2019–20 the Australian Government spent around \$10.2 billion on private and public sector R&D, with around \$772 million—or 20 per cent— of this going to manufacturing. Key measures include the Research and Development Tax Incentive (RDTI) (\$2.4 billion, CSIRO (\$616 million) and cooperative research centres (CRCs) (\$145 million).³⁴
- 1.34 Private investment in R&D has also declined since the mid-2000s with manufacturing firms spending \$4.6 billion on R&D in 2017–18.³⁵

³² Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 33.

³³ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 21; Dr Stanford, Centre for Future Work, Answer to question notice: question 4, 11 November 2021 (received 1 December 2021); AITI, Flinders University, *Australian sovereign capability and supply chain resilience: perspectives and options*, p. 64; PC, *Submission 78*, pp. 7–8; Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, pp. 27–28.

³⁴ PC, *Submission 78*, p. 10.

³⁵ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 11 and 21.

- 1.35 Australia has relatively low rates of collaboration between business and industry and low rates of innovation, impacting on its global competitiveness.³⁶

Declining manufacturing productivity

- 1.36 Over productivity has dropped from its peak in the 1960s and continues to decline, as shown in Figure 1.5, also impacting on competitiveness.³⁷ In 2005 the then Chairman of the Productivity Commission (PC) summarised the reasons for Australia's declining performance as follows:

- a fragmented, high-cost manufacturing sector, focussed on the domestic market;
- indulgent, inflexible work practices, powerful unions and lack-lustre management;
- outmoded technologies, low rates of innovation and skill development; and
- high-cost infrastructure services like power, transport and communications, which effectively taxed business users, while cross-subsidising households.³⁸

- 1.37 Australian manufacturers are looking to improve labour productivity through automation,³⁹ business efficiencies, systems, and processes, however Grant Thornton warned that 'with the high cost of production in Australia, it's just not economically feasible to invest in technology and automation on a level that brings real efficiencies'.⁴⁰

³⁶ Australian Sovereign Capability Alliance, *Submission 81*, Attachment 1 (AITI, Flinders University, Australian sovereign capability and supply chain resilience), pp. 66–67; Ms O'Dwyer, CRA, *Proof Committee Hansard*, 11 November 2021, p. 43; Centre for Future Work, Australia Institute, *Submission 88*, p. 8; Dr Stanford, Centre for Future Work, Answer to question notice: question 4, 11 November 2021 (received 1 December 2021).

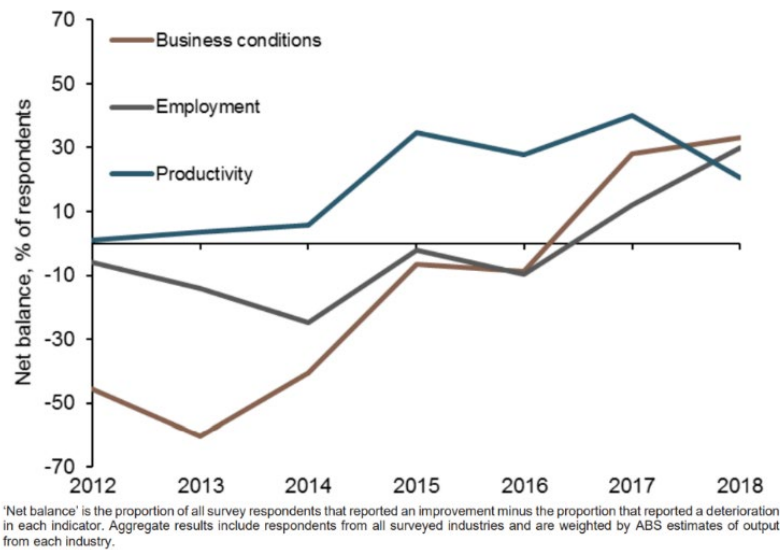
³⁷ Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, p. 31; Productivity Commission (PC), *Australia's productivity performance: visual summary of Australia's productivity in 2019–20*, <https://www.pc.gov.au/research/ongoing/productivity-performance> (accessed 3 December 2021); International Monetary Fund (IMF), *Australia: selected issues*, IMF Country report no. 21/256, December 2021, pp. 13–14 (accessed 13 January 2022).

³⁸ Gary Banks, Chairman, PC, '[Structural reform Australian-style: lessons for others?](#)', [2005], p. 4 (accessed 8 December 2021).

³⁹ Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, pp. 27–28.

⁴⁰ Grant Thornton, *Federal budget: a 10 year retrospective*, November 2020, pp. 34–35.

Figure 1.5 Manufacturing performance indicators, including productivity, 2012–2018



Ai Group, [Australian Manufacturing in 2019: local and global opportunities](#), May 2019, p. 19 (accessed 30 November 2021).

Overreliance on resources and low complexity

- 1.38 Historically, Australia has relied on primary product export, with little or no processing, foregoing opportunities for added income, innovation and economic complexity associated with value-added industry.⁴¹
- 1.39 The Centre for Future Work noted the effects of 'extreme' resource dependence and currency fluctuations which have significantly reduced competitiveness:

When times are good in resource industries, the resulting upward pressure on the national currency ... causes enormous challenges for other export industries: including manufacturing ... Prices for their output do not skyrocket along with global commodity prices—but the competitiveness of Australian production on cost grounds is dramatically harmed by resource-driven surges in the value of the currency.⁴²

- 1.40 Dr Jens Goennemann, the Chief Executive Officer of the Advanced Manufacturing Growth Centre (AMGC) summed up Australia's situation:

'The lucky country needs to become the smart country, because we are running out of luck,' says Dr Jens Goennemann ... Australia has long relied on digging up commodities, particularly coal, and sending it to global markets. There is an urgent need for us to expand from an economy that extracts and farms to one that adds value and manufactures complex things in a sustainable way. 'The simple truth is that if you want to play a relevant role on the international stage, and you cannot make complex

⁴¹ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 26, 28 and 40; Colin Clark, Timothy Geer, Barry Underhill, Industry Commission, [The changing of Australian manufacturing: staff information paper](#) (The changing of Australian manufacturing), December 1996, Chapter 5, p. 15 (accessed 25 November 2021).

⁴² Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 32.

things, you will wake up empty-handed,' says Goennemann. And, if you cannot make complex things, you cannot respond effectively to a crisis, be it a pandemic, a military incursion or global warming. His argument is not an ideological one but a practical one: if the mining sector collapses, or there's a trade war and China stops taking our agricultural products, then what?⁴³

COVID-19 and China

- 1.41 As part of creating a resilient and sustainable manufacturing sector, Australia needs to address the issue that has contributed to undermining Australia's economic security—the lack of critical domestic supply chains.
- 1.42 The widespread shutdown of global supply chains caused by the COVID-19 pandemic (the pandemic) has exposed the world's heavy reliance on the Chinese industrial complex. The extent of this hold, and just how far China will go to defend its share has also been clearly exposed through the pandemic.
- 1.43 While many western nations had pre-existing issues with China's compliance with international law particularly around intellectual property rights and concerns on state-sponsored cyber espionage, the effects of the pandemic and China's handling of the crisis has compounded these issues.
- 1.44 China's refusal to co-operate with world health officials, in regard to investigating the origins of the pandemic, has exacerbated the situation world-wide and arguably prolonged the pandemic. China's resort to churlish retaliatory action against any foreign nation seeming to question its authority is reprehensible.
- 1.45 Any nation that legitimately seeks to raise social or economic issues will find themselves ostracised and punished economically. In contravention of World Trade Organisation (WTO) rules, China has weaponised trade as part of its retaliation. Australia, like other countries which have spoken out, has had a range of its exports to China curtailed for requesting a World Health Organisation inquiry into the origins of COVID-19.
- 1.46 Most recently, the European Union filed a case with the WTO against over what it calls "discriminatory trade practices" against Lithuania for strengthening ties with Taiwan. China imposed an import ban, an export ban and restriction of services against Lithuania, according to the EU stating that:

These measures predominantly concern goods or services from or destined for Lithuania or linked in various ways to Lithuania, but also have an effect on supply chains throughout the EU.⁴⁴

⁴³ Greg Bearup, ['Make Australia make again'](#), *Weekend Australian Magazine*, 23 May 2020 (accessed 25 January 2022).

⁴⁴ Stuart Lau, [EU sues China in WTO over Lithuania blockade](#), *Politico*, 28 January 2022 (accessed 28 January 2022).

- 1.47 Throughout the pandemic, China has continued to impose trade restrictions on a range of Australian exports such as coal, rock lobster, beef, cotton and timber, general citing either dumping or contamination claims as a supporting reason. Tariffs of up to 212 per cent were placed on Australian wine and 80 per cent tariffs were placed on barley, in addition to blocked coal and copper exports.⁴⁵

Post-COVID-19 world

- 1.48 For many countries the pandemic has highlighted their over-reliance on 'Made in China' as a strategy for dealing with the tough decisions to support domestic manufacturing. Certainly, sudden shortages of core supplies such as pharmaceuticals, personal protective equipment, and other critical supplies has helped highlight the risk of Australia's dependency on China.
- 1.49 The main competitive advantage that China has relied on to date has been cheap and probable slave labour and its flagrant violation of international intellectual property law through forced technology transfers by China (as a price for its market access).⁴⁶ At the height of China's growth, many western pundits espoused the virtues of relocating companies' manufacturing operations to China with enticing articles in business publications suggesting 'Manufacturing In China Can Give Your Business The Competitive Advantage'. Such outsourcing has led to a huge 'hollowing out' of a basic western manufacturing capability.

Made in China 2025

- 1.50 The pandemic has allowed nations to reflect and reassess how they have neglected their domestic and strategic manufacturing capabilities. Meanwhile, in December 2021, China released an update to its *Made in China 2025* (MIC 2025) plan largely modelled on the German 'Plattform Industrie 4.0' initiative.⁴⁷

Made in China 2025 is the government's ten-year plan to update China's manufacturing base by rapidly developing ten high-tech industries. Chief among these are electric cars and other new energy vehicles, next-generation information technology (IT) and telecommunications, and advanced robotics and artificial intelligence.⁴⁸

⁴⁵ Ronald Mizen, '[Australia's allies are profiting from China trade bans](#)', *The Australian Financial Review*, 17 September 2021 (accessed 24 January 2022).

⁴⁶ Melissa Cyrill, '[What is Made in China 2025 and why has it made the world so nervous?](#)' *China Briefing*, 28 December 2018 (accessed 24 January 2022).

⁴⁷ Federal Ministry for Economic Affairs and Climate Action (Germany), '[Plattform Industrie 4.0](#)' (accessed 25 January 2022).

⁴⁸ James McBride and Andrew Chatzky, '[Is "Made in China 2025" a Threat to Global Trade?](#)' *Council on Foreign Relations*, 16 May 2019 (accessed 24 January 2022).

- 1.51 China is fully aware that to stay at the forefront it will need to move up the value chain in manufacturing and invest heavily in technology-intensive industries to compete with the US:

Among its various goals, the MIC 2025 sought to raise the domestic content of core components and materials to 40 per cent by 2020 and 70 per cent by 2025. The plan explicitly referred to how much of China's technology market could be controlled by Chinese companies and how many component parts in different products needed to be 'Made in China'.

...

The end goal of the MIC 2025 being self-sufficiency for domestic companies would then enable Chinese companies to compete for a greater foothold in global markets.⁴⁹

- 1.52 The fundamental aspect of the MIC 2025 is to position China in a dominate position in all global supply chains:

China has sought 'self-sufficiency' in core technologies across a range of prioritized industries. Implicitly and often quite explicitly, China's objective to become a manufacturing superpower implies the ambition not merely to catch up with other advanced economies but to surpass and displace them to achieve a dominant position in these industries worldwide.⁵⁰

- 1.53 While this is confronting, it also presents an opportunity for advance economies to harness their skills, R&D, and training to compete better.

Strengths and opportunities

Manufacturing potential

- 1.54 Despite its weaknesses, Australian manufacturing also has strengths to draw on. Dr Stanford pointed to the opportunities for manufacturing in Australia:

I think there is a mistaken assumption that if you're a rich, high-wage, industrial country you just can't do manufacturing. After all, it's much cheaper to do things in China or Thailand or some other low-wage country.

We found that traditional assumption is absolutely false.⁵¹

- 1.55 The Centre for Future Work explained the benefits of increased manufacturing to the Australian economy:

⁴⁹ Melissa Cyrill, 'What is Made in China 2025 and why has it made the world so nervous?' *China Briefing*, 28 December 2018.

⁵⁰ Elsa B. Kania, '[Made in China 2025, Explained](#)', *The Diplomat*, 1 February 2019 (accessed 25 January 2022).

⁵¹ Rachel Pupazzoni, 'Australian manufacturing has been in terminal decline but coronavirus might revive it', *ABC News Australia*, 23 July 2020.

... enormous potential benefits that would be generated by rebuilding manufacturing back to a size proportional to our national needs: including \$180 billion in new sales, \$50 billion in additional GDP, and over 400,000 new [direct] jobs.⁵²

Stability and high regulatory standards

1.56 Australia has a stable political, economic, and social environment and a reputation for high regulatory standards (for example: in relation to employment, safety, raw ingredients, food standards, environmental standards). This makes Australia a suitable location for investment and its high quality and safety compliant products sought after in the market.⁵³

Research capability and skilled workforce

1.57 Australia's manufacturing sector has the advantage of a highly skilled workforce,⁵⁴ including a strong research capability. This positions local businesses well for a transition towards high value add products and advanced manufacturing and participation in enabling services including R&D, design, logistics, sales and services.⁵⁵

Ready access to renewable energy

1.58 Several sources pointed to the potential for renewable energy to reinvigorate manufacturing—as a consumable energy source, in relation to renewables products and components, and energy export. Australia's plentiful sun, wind, spaces, and critical minerals offer a competitive advantage⁵⁶ through cheaper

⁵² Australia Institute, *Post-COVID Manufacturing Renewal Represents Potential \$50 Billion Boost to Economy*, July 2020; Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 10. See also: Michael Climpson, '[Federal budget: Sovereign capability and a manufacturing renaissance](#)', *Grant Thornton*, 30 October 2020 (accessed 25 November 2021); Grant Thornton, *Federal budget: a 10 year retrospective*, November 2020, pp. 34–35.

⁵³ See, for example: Sanofi, *Submission 47*, p. 2; Ai Group, *Submission 68*, p. 3; Australian Steel Institute (ASI), *Submission 70*, p. 4; CSIRO, *Submission 86*, pp. 4 and 6.

⁵⁴ See, for example: Sean Langcake, RBA, 'Conditions in the manufacturing sector', *Bulletin*, June Quarter 2016, pp. 31 and 33; Innovation and Business Skills Australia Group (IBSA Group), '[Scaling up: developing modern manufacturing through a skilled workforce](#)', May 2021, pp. 27–30 (accessed 26 November 2021); Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, p. 45.

⁵⁵ See, for example: OZ Minerals, *Submission 51*, p. 4; Ai Group, *Submission 68*, p. 3; DISER, *Submission 116*, p. 1; IBSA Group, *Scaling up: developing modern manufacturing through a skilled workforce*, May 2021, p. 27.

⁵⁶ See, for example: DISER, *Recycling and clean energy national manufacturing priority road map*, <https://www.industry.gov.au/data-and-publications/recycling-and-clean-energy-national-manufacturing-priority-road-map/why-recycling-and-clean-energy> (accessed 26 November 2021); Dan Nahum, Centre for the Future of Work, Australia Institute, '[Powering onwards: Australia's opportunity to reinvigorate manufacturing through renewable energy](#)', May 2020, pp. 4–5 (accessed 26 November 2021); Adam Morton, '[Ross Garnaut: three policies will set Australia on a path to 100% renewable energy](#)', *The Guardian Australia*, 6 November 2019 (accessed 26 November 2021).

energy,⁵⁷ the ability to manufacture sustainable products with 'green' manufacturing credentials, and the production of renewable energy components for domestic use or export.⁵⁸

Access to Asian markets

1.59 The OECD pointed to the opportunities arising from large emerging consumer markets in Asia which Australia is well positioned to benefit from.⁵⁹ More recently this advice has been tempered, with the OECD warning that Australia's concentration of exports to China—over 25 per cent of its exports⁶⁰—makes Australia vulnerable to future shocks in the Chinese economy or to the imposition of trade restrictions.⁶¹

Reserves of primary inputs

- 1.60 Australia has strengths in its local reserves of strategic minerals, timber, energy products, and high-quality agricultural products,⁶² providing a comparative advantage for domestic manufacturing. Supply and processing of critical resources is an area that Australia needs to be moving out into the lead.
- 1.61 China has recently looked to limit supply of many rare minerals that are critical in the development of advanced manufacturing. For example, the export of rare earth minerals used in production of a range of advanced products:

⁵⁷ Grant Thornton, *Federal budget: a 10 year retrospective*, November 2020, p. 36; Dr Dean, Carmichael Centre, *Submission 46*, pp. 3 and 7; OZ Minerals, *Submission 51*, p. 5.

⁵⁸ Dan Nahum, Centre for the Future of Work, Australia Institute, *Powering onwards: Australia's opportunity to reinvigorate manufacturing through renewable energy*, May 2020, pp. 4–5; Ai Group, *Submission 68*, p. 3; Australian Academy of Technology and Engineering (ATSE), *Submission 38*, p. 3; Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 52 and 54.

⁵⁹ Directorate for Science, Technology and Innovation Committee on Industry, Innovation and Entrepreneurship, OECD, *Australian Manufacturing in the Global Economy* p. 4. See also: CSIRO, *Submission 86*, p. 6.

⁶⁰ Department of Foreign Affairs and Trade (DFAT), *China-Australia Free Trade Agreement: ChAFTA outcomes at a glance*, <https://www.dfat.gov.au/trade/agreements/in-force/chafta/factsheets/Pages/chafta-outcomes-at-a-glance> (accessed 7 December 2021).

⁶¹ OECD, *OECD Economic surveys: Australia 2021: 1. Key policy insights*, 2021 (accessed 24 November 2021). See, for example: Although this primarily affected commodities like minerals, agricultural products and coal. DFAT, *China: China country brief*, July 2021, <https://www.dfat.gov.au/geo/china/china-country-brief> (accessed 7 December 2021); Institute for International Trade, Adelaide University, *Economic coercion by China: the impact on Australia's merchandise exports: working paper 04*, July 2021, p. 1 (accessed 7 December 2021).

⁶² See, for example: OZ Minerals, *Submission 51*, pp. 1 and 4; ASI, *Submission 70*, p. 5; ATSE, *Submission 38*, p. 3; Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 25 and 39.

...[P]roposed guidelines would require rare earth producers to follow export control laws that regulate shipments of materials that 'help safeguard state security'. China's State Council and Central Military Commission will have the final say on whether the list should include rare earths.

Rare earth minerals are also central to the manufacture of products including smartphones, electric vehicles and wind turbines.⁶³

1.62 Australia has established the Critical Minerals Facilitation Office in the Department of Industry, Science, Energy and Resources (DISER). The Office is the Australian Government's central coordination point to:

- help grow Australia's critical minerals sector; and
- position Australia globally as a secure, reliable, and ethical supplier of critical minerals.

1.63 Two main aspects of this strategy are to facilitate strategically important critical minerals projects and partner with other countries (mainly the US) to build global supply chains.⁶⁴

High-technology manufacturing

1.64 While Australia has been ranked as the eighth richest country in the world, it is ranked 86 in its complexity, down from rank 55 in 1995.⁶⁵ There remains considerable potential for Australia to develop its high-tech manufacturing sector further, as shown in Figure 1.6.⁶⁶

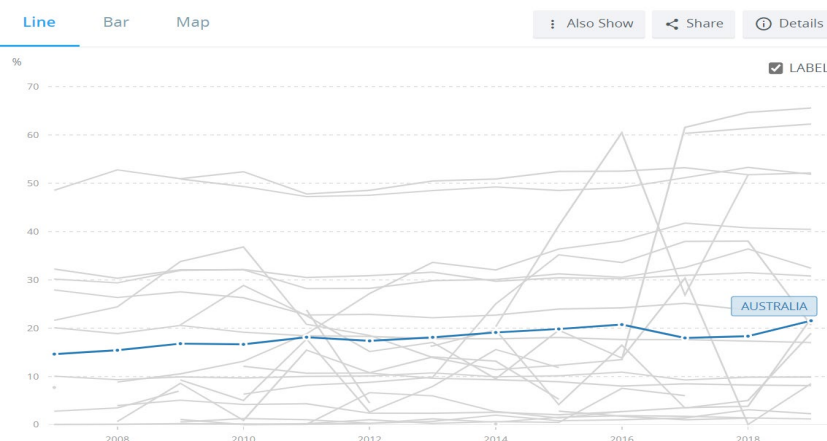
⁶³ Sun Yu and Demetri Sevastopulo, 'China targets rare earth export curbs to hobble US defence', *The Financial Times*, 16 February 2021.

⁶⁴ DISER, *About the Critical Minerals Facilitation Office*, 11 March 2021, <https://www.industry.gov.au/about-us/about-the-critical-minerals-facilitation-office> (accessed 24 January 2022).

⁶⁵ Advanced Manufacturing Growth Centre (AMGC), *Submission 40*, pp. [1–2].

⁶⁶ Ai Group, *Submission 68*, p. 18.

Figure 1.6 Australia's high-technology exports (% of manufactured exports), compared with other nations in the region

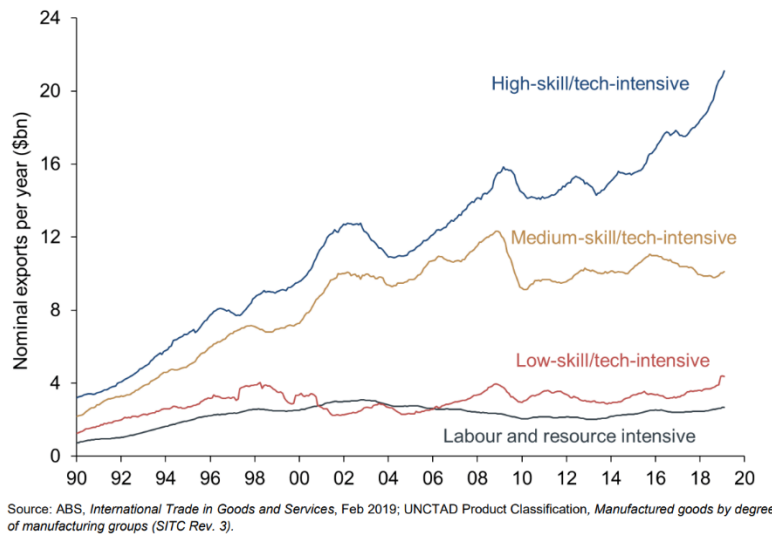


United Nations, High-technology exports (% of manufactured exports) – Australia, Comtrade database through the WITS platform, ID: TX.VAL.TECH.MF.ZS, <https://data.worldbank.org/indicator/TX.VAL.TECH.MF.ZS?contextual=min&locations=AU&view=chart> (accessed 25 November 2021).

- 1.65 Figures show that Australia's high-technology exports—those with high innovation and R&D intensity such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery—have effectively doubled over the last 20 years, as illustrated by Figure 1.7.⁶⁷

⁶⁷ United Nations, High-technology exports (% of manufactured exports) – Australia, Comtrade database through the WITS platform, ID: TX.VAL.TECH.MF.ZS, <https://data.worldbank.org/indicator/TX.VAL.TECH.MF.ZS?contextual=min&locations=AU&view=chart> (accessed 25 November 2021); DISER, *Submission 116*, pp. 1 and 3; ATSE, *Submission 38*, p. 2; Ai Group, *Australian Manufacturing in 2019: local and global opportunities*, May 2019, p. 42 (accessed 30 November 2021).

Figure 1.7 Manufacturing exports by skill level and technology intensity, 1990 to 2019



Ai Group, [Australian Manufacturing in 2019: local and global opportunities](#), May 2019, p. 42 (accessed 30 November 2021).

Manufacturing resilience in the face of COVID-19

- 1.66 The pandemic exposed the flaws in allowing traditional manufacturing to decline, with production and supply chain issues⁶⁸ impacting vital commodities such as medicines, protective equipment, building materials, food and groceries—displaying how fragile domestic economies have become. There have been calls for greater focus on domestic manufacturing capability and given its strategic importance, economic self-sufficiency, and national security.⁶⁹
- 1.67 However, for some domestic manufacturers it provided an opportunity to display flexibility and resilience, with firms increasing capacity, creating new networks, pivoting to new products, or seeing boosts in local demand. For example, in 2019 the total capacity for surgical mask manufacture in Australia was estimated at 37 million per year, however in 2020 over 200 million masks were produced in Australia.⁷⁰

⁶⁸ See, for example: ATSE, *Submission 38*, p. 4; Advanced Manufacturing Growth Centre (AMGC), *Submission 40*, p. [4]; Dr Dean, Carmichael Centre, *Submission 46*, p. 9.

⁶⁹ Dr Stanford, The Centre for Future Work, *A fair share for Australian manufacturing*, pp. 4 and 5–6.

⁷⁰ AITI, *Australian sovereign capability and supply chain resilience* pp. 1–2. See also: James Ried, ['Australia's capacity to manufacture goods lowest in developed world: report'](#), *The New Daily*, 13 September 2021 (accessed 24 November 2021); The Hon Karen Andrews, MP, Minister for Industry, Science and Technology, ['Locally made ventilators boost fight against COVID-19'](#), *Media release*, 1 August 2020 (accessed 25 November 2021); Rachel Pupazzoni, 'Australian manufacturing has been in terminal decline but coronavirus might revive it', *ABC News Australia*, 23 July 2020.

Chapter 2

Why manufacturing?

Introduction

2.1 This chapter will provide the groundwork for the discussion for the following chapters. It will discuss:

- the necessity of maintaining a baseline strategic manufacturing capability;
- the vulnerability of the economy and the nation without such baseline manufacturing capability; and
- the importance of supply chains, including reference to the Productivity Commission's work and international initiatives.

Necessity of maintaining a baseline manufacturing capability

2.2 The committee received many submissions extolling the virtues of the manufacturing sector in Australia,¹ but at the same time expressing concern at the decline of the sector.

2.3 For example, the Advanced Manufacturing Growth Centre (AMGC) argued that:

...manufacturing is an essential capability that is key to lifting Australia's capacity to create complex products for domestic and global markets.²

2.4 The Australia Institute provided a summary of the arguments:

There are many core reasons why Australia needs a healthy, proportionate manufacturing sector:

- Australians are buying more manufactured goods over time; and manufacturing output is growing around the world. The absolute decline of manufacturing in Australia is an exception to the experience of other industrialised countries.
- Manufacturing is the most innovation-intensive sector in the whole economy. No country can be an innovation leader without manufacturing.
- Manufactured goods account for over two-thirds of world merchandise trade. A country that cannot successfully export manufactures will be shut out of most trade.

¹ See Manufacturing Excellence Forum (Sunshine Coast), *Submission 34*, p. 2; Department of Defence, *Submission 36*, p. 2; South East Melbourne Manufacturer's Alliance, *Submission 105*, p. 3; United Workers' Union, *Submission 111*, p. 2; Manufacturing Australia, *Submission 112*, p. 2; and Department of Industry, Science, Energy and Resources, *Submission 116*, p. 1.

² Advanced Manufacturing Growth Centre, *Submission, 40*, p. 1.

- Production costs in Australia are not expensive relative to other industrial countries (now that the Australian dollar is once again trading in normal range).
- Even small remote countries (like Korea, Ireland, New Zealand and Israel) are increasing their manufacturing output and preserving and creating manufacturing jobs. Their experience demonstrates that we cannot blame geographic isolation for our de-industrialisation.
- Manufacturing anchors hundreds of thousands of other jobs throughout the economy, thanks to its long and complex supply chain. A myriad of supplies and inputs are purchased by manufacturing facilities.³

2.5 Despite the recognition of manufacturing's importance, submitters also noted the decline of manufacturing in Australia and that Australia's lack of manufacturing capability has been exposed by the 2020–22 pandemic. Oz Minerals observed:

The COVID-19 pandemic has highlighted issues that can result from reliance on offshore manufacturing. In the mining sector, COVID-19 created supply issues for consumables, heavy industrial components and specialised equipment – all made with general manufacturing skills which are now considered 'highly specialised skills' in Australia. While COVID-19 exposed these issues, they are not necessarily a direct result of the disruption caused by the pandemic.⁴

2.6 A similar point was made by the Australian Sovereign Capability Alliance:

The COVID-19 pandemic has highlighted this dependence on foreign enterprises and governments for PPE, respirators and essential vaccines and pharmaceuticals during this crisis. This submission establishes that the problem extends to other key industry domains and concludes that Australia's lack of manufacturing resilience leaves the nation dangerously exposed to other crises such as war, grey zone conflict, trade disputes, cyberattack, natural disasters, future pandemics, and other events.⁵

2.7 Infrabuild expressed its concern should Australia's manufacturing capacity further decline:

As a relatively isolated country geographically, it is important that Australia retains broadbased manufacturing capability in products that are essential to its sovereign interest.

The absence of robust domestic manufacturing industries would likely lessen competitive price pressure on imports, resulting in greater variability in pricing and overall cost and process inefficiencies. Additional inventory would need to be held at all levels of the supply

³ Stanford, J., 'Pandemic Shows Australia Needs Domestic Manufacturing', The Australia Institute: Centre for Future Work, <https://www.futurework.org.au/pandemic-shows-australia-needs-domestic-manufacturing>, (accessed 11 January 2022).

⁴ OzMinerals, *Submission 51*, p. 2.

⁵ Australian Sovereign Capability Alliance, *Submission 81*, p. 1.

chain to ensure continuity of supply and to reduce risks of late/non-delivery. The longer and more complex a supply chain, the greater the risk that it is disrupted by one or more factors, as is being experienced in the current pandemic.⁶

Vulnerability of the economy and the nation

- 2.8 National emergencies (war, natural disasters and pandemics) have demonstrated the need for strategic good to be manufactured in Australia, despite the costs associated with production relative to importing goods. Such items include, but are not limited to: food; fuel; medical supplies (including medicines); and key transport vehicles such as trucks and shipping.
- 2.9 Documents accessed from the Department of Defence through Freedom of Information provide a window as to how potentially vulnerable Australia is without a comprehensive manufacturing base.
- 2.10 In 2017, the Vice Commander of the Australian Defence Force (VCDF) Rear Admiral (VADM) Ray Griggs initiated a review of Defence's mobilisation architecture with a corresponding report published in June 2019.⁷
- 2.11 The report was developed with information and perspectives from the following sources:
- (a) senior personnel across Defence Groups...;
 - (b) US think tank personnel (CSBA, CSIS, CNAS, Eisenhower Institute);
 - (c) extant legislation, doctrine, policy, procedures and guidance;
 - (d) open source articles on mobilisation related issues;
 - (e) foreign military internet websites;
 - (f) ANU National Security College workshop ' Future Cyber War: How would Australia mobilise a response' held in November 2018, summary provided at annex B;
 - (g) Engineers Australia Workshop on the effects of a collapse in global governance on the global supply chain held in February 2019, summary provided at annex C; and
 - (h) Head National Resilience Task Force and Australian Vulnerability Profile Project members from, CSIRO and Emergency Management Australia.⁸
- 2.12 The report concluded:

Australia is a largely de-industrialised multi-cultural nation. It is highly connected to the global commons and has limited diversity in imports, exports and tax revenue. This situation leaves the nation exposed to major

⁶ Infrabuild, *Submission 73*, p. 2.

⁷ Department of Defence Mobilisation Review, released under FOI 433/19/20, 7 May 2020, <https://defence.gov.au/foi/decisions/DisclosureLog201920.asp>, p. 1.

⁸ Department of Defence Mobilisation Review, released under FOI 433/19/20, 7 May 2020, <https://defence.gov.au/foi/decisions/DisclosureLog201920.asp>, p. 2.

disruptions of global governance and supply, such as could be expected in the event of a major war or global catastrophe.⁹

2.13 Of most interest within the report, was the following document:

- Engineers Australia Workshop 'Industry Responses in a Collapse of Global Governance' on the effects of a collapse in global governance on the global supply chain (February 2019).

2.14 The exercise and report came to some startling conclusions on how vulnerable Australia is. This workshop reviewed the following scenario:

The workshop looked at the effects of a collapse in global governance, resulting in major disruption to the global supply chain. It sought to identify areas within each sector that would be affected, what those effects might be and how effects within one sector might affect others. They considered responses and preparatory methods of mitigation and resilience.¹⁰

2.15 The workshop advised that, in the scenario provided:

Australia would suffer massive upheaval within one week due to job losses, social unease and hoarding.

Within a fortnight, due to stocks of imported supplies drawing down, major social infrastructure such as treated water would begin to fail and essential services such as health care would be degraded.

By the two-month mark liquid fuel would be almost exhausted, and by three months there would be wide-spread unemployment, no transport capability, and services that rely on imported spares (such as electricity and telecommunications) would begin degrading significantly.

To overcome these challenges, the nation would require transformation in terms of the degree of personal responsibility for preparedness, management of industrial and social supplies to survive extended periods without access to global supply chains, and a review of governance to ensure federal, state and local governments can take legitimate control of essential services.¹¹

2.16 The report indicates quite clearly that with limited domestic manufacturing capacity, Australia is vulnerable to major geo-political upheavals and supply-chain issues.

⁹ Department of Defence Mobilisation Review, released under FOI 433/19/20, 7 May 2020, <https://defence.gov.au/foi/decisions/DisclosureLog201920.asp>, p. 1.

¹⁰ Engineers Australia Workshop 'Industry Responses in a Collapse of Global Governance', February 2019 p. 4 in Department of Defence Mobilisation Review, released under FOI 433/19/20, 7 May 2020, <https://defence.gov.au/foi/decisions/DisclosureLog201920.asp>, p. 21.

¹¹ Engineers Australia Workshop 'Industry Responses in a Collapse of Global Governance', February 2019 p. 6 in Department of Defence Mobilisation Review, released under FOI 433/19/20, 7 May 2020, <https://defence.gov.au/foi/decisions/DisclosureLog201920.asp>, p. 23.

Crucial importance of supply chains

2.17 This exercise highlighted the crucial importance of supply chains. Again, a number of submitters mentioned supply chains as a key concern in terms of maintaining and developing Australian manufacturing capabilities.¹²

2.18 Sanofi, a global healthcare company, observed:

...increased government restrictions put in place by some countries during the early stages of the pandemic affected the flow of personal protective equipment (PPE) and some medicines, from raw materials to finished pharmaceutical forms. These measures had a serious and detrimental impact on the globally integrated supply chains that ensure quality, safety, innovation, and distribution of medicines and vaccines. This demonstrated that supply chain integrity is inextricably linked to the free move of pharmaceutical ingredients across international borders.¹³

2.19 Consumer Healthcare Products Australia, a peak body representing the manufacturers and distributors of consumer healthcare products, also observed:

...'on-shoring' of manufacturing should not be viewed as a pathway to complete medicines self-sufficiency. With competitive international market conditions and the higher costs of domestic operations, it is in the interest of consumers, government, and sustainable industry that the supply chain for packaging, raw materials, and medicinal products remains robust. Even wholly domestic product manufacturing operations would still be reliant on the international supply chain for raw materials and components.¹⁴

International initiatives

The United States

2.20 Given the increased recognition of supply chains' importance, countries are beginning to introduce new initiatives in order to secure their supply chains.

2.21 In the United States, President Biden signed Executive Order (E.O.) 14017 on 24 February 2021. This EO directed a whole-of-government approach to assessing vulnerabilities in, and strengthening the resilience of, critical supply chains. The EO stated in part:

¹² Some examples are: Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU), *Submission 102*; South East Melbourne Manufacturers' Alliance, *Submission 105*; Complementary Medicines Australia, *Submission 101*; Medicines Australia, *Submission 83*; AusBiotech, Cell Therapies Pty Ltd, MTPConnect and Research Strategies Australia, *Submission 80*; Innovaero, *Submission 79*; Productivity Commission, *Submission 78*; and Maritime Union of Australia, *Submission 77*.

¹³ Sanofi, *Submission 47*, p. 3.

¹⁴ Consumer Healthcare Products Australia, *Submission 75*, p. 2.

The United States needs resilient, diverse, and secure supply chains to ensure our economic prosperity and national security. Pandemics and other biological threats, cyber-attacks, climate shocks and extreme weather events, terrorist attacks, geopolitical and economic competition, and other conditions can reduce critical manufacturing capacity and the availability and integrity of critical goods, products, and services. Resilient American supply chains will revitalize and rebuild domestic manufacturing capacity, maintain America's competitive edge in research and development, and create well-paying jobs. They will also support small businesses, promote prosperity, advance the fight against climate change, and encourage economic growth in communities of color and economically distressed areas.

More resilient supply chains are secure and diverse — facilitating greater domestic production, a range of supply, built-in redundancies, adequate stockpiles, safe and secure digital networks, and a world-class American manufacturing base and workforce. Moreover, close cooperation on resilient supply chains with allies and partners who share our values will foster collective economic and national security and strengthen the capacity to respond to international disasters and emergencies.¹⁵

- 2.22 The United States followed up this initiative with a 'Summit on Global Supply Chain Resilience' on 31 October 2021. This took place:

...with the European Union and 14 like-minded countries to foster greater international cooperation on near-term supply chain disruptions and chart a course to strengthen and diversify the entire supply chain ecosystem over the long term—from raw materials, intermediate and finished goods, manufacturing, to shipping, logistics, warehousing, and distribution.¹⁶

The European Union

- 2.23 Even prior to the pandemic, the European Union (EU) is also looking at strengthening its supply chain resilience. During 2020, in response to the

¹⁵ 'Executive Order on America's Supply Chains', *The White House*, 24 February 2021, <https://www.whitehouse.gov/briefing-room/presidential-actions/2021/02/24/executive-order-on-americas-supply-chains/>, (accessed 12 January 2022). Further information can be found at: 'FACT SHEET: Biden-Harris Administration Announces Supply Chain Disruptions Task Force to Address Short-Term Supply Chain Discontinuities', *The White House*, 8 June, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/08/fact-sheet-biden-harris-administration-announces-supply-chain-disruptions-task-force-to-address-short-term-supply-chain-discontinuities/>, (accessed 12 January 2022).

¹⁶ 'FACT SHEET: Summit on Global Supply Chain Resilience to Address Near-Term Bottlenecks and Tackle Long-Term Challenges', *The White House*, 31 October, 2021, <https://www.whitehouse.gov/briefing-room/statements-releases/2021/10/31/fact-sheet-summit-on-global-supply-chain-resilience-to-address-near-term-bottlenecks-and-tackle-long-term-challenges/>, (accessed 12 January 2022).

pandemic, the European Commission announced further initiatives; in particular, the Strategic Investment Facility.¹⁷ The EU Commission noted:

The outbreak of the pandemic has shown the interconnectivity of global supply chains and exposed some vulnerabilities, such as the over-reliance of strategic industries on non-diversified external supply sources. Such vulnerabilities need to be addressed, to improve the Union's emergency response as well as the resilience of the entire economy, while maintaining its openness to competition and trade in line with its rules. The new strategic European investment window will focus on building stronger European value chains in line with the strategic agenda of the Union and the New Industrial Strategy for Europe, as well as supporting activities in critical infrastructure and technologies.¹⁸

Australian initiatives

The Productivity Commission

2.24 The Productivity Commission (PC) did an extensive study into supply chain vulnerabilities during 2021. Their report was provided to the Commonwealth Government on 22 July 2021 and publicly released on 13 August 2021.¹⁹

2.25 The Commission developed a framework to identify supply chains that are vulnerable to disruption and applied it in the context of Australian imports and exports. The Commission then identified strategies to manage supply chain risks and the circumstances under which government might intervene. The PC explained:

The purpose of this study is to help further Australia's preparedness to deal with possible global disruptions to the supply of inputs (upstream risks) as well as global disruptions to markets for goods and services (downstream risks). The report considers the factors that make supply chains vulnerable, with a focus on the international linkages and dependencies from trade. Significantly, we have developed and piloted a framework for identifying those supply chains and products that are vulnerable to disruption and critical to the effective functioning of the economy, using trade and production data. We then explore risk management strategies for governments and businesses and provide policy guidance on the roles for government.

¹⁷ 'The European Way: How to advance Europe's strategic autonomy', EY Switzerland, 19 June 2020, https://www.ey.com/en_ch/supply-chain/the-european-way-how-to-advance-europes-strategic-autonomy, (accessed 13 January 2022).

¹⁸ Questions and Answers: The proposed InvestEU Programme', 29 May 2020, https://ec.europa.eu/commission/presscorner/detail/ro/qanda_20_947, (accessed 13 January 2022).

¹⁹ The Final Report and other documentation can be found at: 'Vulnerable Supply Chains: Study report', Productivity Commission, <https://www.pc.gov.au/inquiries/completed/supply-chains/report>, (accessed 13 January 2022).

Commonwealth Government policy

- 2.26 In October 2020, as part of its response to the pandemic and JobMaker plan initiative, the Australian Government announced a \$107.2 million Supply Chain Resilience Initiative in order to quickly address critical supply needs..
- 2.27 The intent of the initiative is to place Australia in a stronger position to respond to any disruptions to the supply chain in the future.
- 2.28 The policy aims to build a comprehensive understanding of critical supply chains. The government explained that it will work in conjunction with industry to:
- identify the essential goods and services critical to Australians at times of crisis;
 - map industry supply chains and Australia's manufacturing capabilities; and
 - evaluate supply chain resilience under normal circumstances and in possible crisis situations.
- 2.29 Furthermore, the government explained that it will work with industry to identify possible supply options to identify and address vulnerabilities in domestic and international supply chains for identified critical products. The outcomes of this work will be published in Sovereign Manufacturing Capability Plans.
- 2.30 The Commonwealth Government explained that these could include:
- long-term international supply contracting;
 - domestic manufacturing; and
 - broader activities to promote better information sharing and collaboration between industry and governments.²⁰

Committee comment

- 2.31 This chapter has outlined the importance of manufacturing to a developed economy such as Australia. Innovation, resilience, self-reliance are all key benefits that manufacturing provide to a nation's economy—not to mention employment creation and skills development.
- 2.32 The committee notes how the Australian manufacturing sector has declined since the liberalising economic reforms of the 1980s and 1990s. In 1990, manufacturing stood at just under 14 per cent of the economy, which had more than halved to 5.6 percent of the economy by 2020.²¹

²⁰ 'Meeting our needs in times of crisis', Department of Industry, Science, Energy and Resources, <https://www.industry.gov.au/news/meeting-our-needs-in-times-of-crisis>, (accessed 12 January 2022).

²¹ 'Manufacturing, value added (% of GDP) – Australia', *The World Bank*, <https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=AU>, (accessed 13 January 2022).

2.33 The CFFMEU commented:

The dire state of manufacturing in Australia is highlighted in the Harvard University Atlas of Economic Complexity, which for 2019 state:

- Australia is a high-income country, ranking as the 8th richest economy per capita out of 133 studied. Its 25.4 million inhabitants have a GDP per capita of \$55,057 (\$52,203 PPP; 2019).
- GDP per capita growth has averaged 0.9% over the past five years, in line with regional averages.
- Australia ranks as the 86th most complex country in the Economic Complexity Index (ECI) ranking. Compared to a decade prior, Australia's economy has become less complex, worsening 6 positions in the ECI ranking.
-
- Australia is less complex than expected for its income level. As a result, its economy is projected to grow slowly. The Growth Lab's 2029 Growth Projections foresee growth in Australia of 2.5 percent annually over the coming decade, ranking in the bottom half of countries globally.²²

It will probably come as a surprise to many that countries such as Armenia, Cyprus, Jamaica, Kenya, Panama and El Salvador have a higher ranking than Australia.²³

2.34 The Department of Defence's 'thought experiment' produced some startling analysis of how potentially vulnerable Australia—with its now limited manufacturing sector—has become, reinforcing the need for a diverse economy with a strong manufacturing sector.

2.35 The pandemic has reinforced the view that greater attention and policy work needs to be undertaken to strengthen supply chains, not just here in Australia, but globally. Initiatives taken by the US and the EU demonstrate that open, free-trading economies are reliant one another for primary, secondary and manufactured products for the continued successful functioning of their own economies in time of crisis. The committee is heartened that the PC has undertaken valuable work in identifying Australia's supply chain vulnerabilities.

2.36 To ensure Australia's remains capable of sustaining its security during times of global upheaval, further attention must be given to securing supply chains and maintaining and strengthening a viable manufacturing sector.

²² Harvard University Atlas of Economic Complexity, 2019, <https://atlas.cid.harvard.edu/countries/14>, cited in CFFMEU, *Submission 102*, p. 4.

²³ CFFMEU, *Submission 102*, p. 4.

Chapter 3

Elements of manufacturing

- 3.1 A strong manufacturing industry requires a number of elements to in order to create manufacturing ecosystems of sufficient scale to enable self-sufficiency and growth. This chapter discusses a range of attributes including:
- innovative research and development;
 - the ability to commercialise and attract capital investment
 - an appropriately skilled and trained workforce;
 - employment opportunities; and
 - incentives to develop these capabilities.

Innovative research and development

- 3.2 Research and development (R&D) plays an important part in creating knowledge, understanding what develops technology, what gives it meaning, how it might be used, and stimulating innovation.¹ The Productivity Commission (PC) points to three ways in which R&D benefits manufacturing:
- when conducted within a company it provides a competitive advantage;
 - when undertaken by other manufacturers it provides a spill over effect and is gradually adopted across the sector; and
 - when invested in non-manufacturing sectors it can lower costs or improve the quality of manufacturing inputs.²
- 3.3 The PC notes the value in government's role in setting policy and regulation which fosters innovation and encourages R&D where there is under-investment—particularly for fundamental or strategic research.³
- 3.4 The committee heard that Australia has a strong R&D track record in particular areas, but that more could be done to develop its R&D capabilities.⁴ Witnesses put Australia's somewhat lack lustre performance down to factors such as; a fragmented approach to research funding,⁵ policy and funding shifts

¹ Australian Academy of Science (AAS), *Submission 109*, p. [2]; Nick Enfield, [Tying research goals to business dollars a recipe for mediocrity](#), *The Age*, 22 December 2021 (accessed 11 January 2022).

² Productivity Commission (PC), *Submission 78*, p. 8.

³ PC, *Submission 78*, p. 9.

⁴ Submitters noted strong performance in medical technologies, solar energy and batteries, and agricultural products. See, for example: Science & Technology Australia (STA), *Submission 52*, p. 3; Ai Group, *Submission 68*, pp. 3 and 11; Ms Jane O'Dwyer, Chief Executive Officer (CEO), Cooperative Research Australia (CRA), *Proof Committee Hansard*, 11 November 2021, p. 43.

⁵ Innovation and Science Australia (ISA), [Australia 2030: Prosperity through Innovation: a plan for Australia to thrive in the global innovation race](#), November 2017, pp. 75–76 (accessed 4 January 2022);

from fundamental to applied research,⁶ insufficient focus on collaboration and commercialisation, comparatively lower levels of international collaboration, specialisation at lower technological levels, and structural challenges associated with Australia's lack of scale and concentration of SMEs.⁷

Collaborative research—challenges and opportunities

3.5 A range of witnesses, including the Advanced Manufacturing Growth Centre (AMGC)⁸ and Australian Academy of Technology and Engineering (ATSE),⁹ clearly identified the need for funding which boosts collaboration, including between industry and research bodies to build capability. Manufacturing on the Move (MotM) noted that of the 12 billion taxpayer dollars spent on research over the last decade or so, only the \$230 million spent on cooperative research centres (CRCs) has required collaboration.¹⁰

3.6 Manufacturing Australia (MA) discussed further the value of collaboration:

Incentivising collaboration with both academic and industry partners is key to achieving scale. Incentivising academic collaboration alone is less likely to lead to scale projects in manufacturing industries where Australia is likely to be a "technology taker" rather than a "first mover". In those instances, broadening the global awareness and engagement by Australian manufacturing firms is preferable, and helps to build understanding of global best practice that can be introduced in Australian supply chains.¹¹

3.7 Ai Group told the committee more traditional industry-university collaborations can be challenging, including because universities tend to overvalue intellectual property (IP), while industry focus bringing research to market, and the pace of research tends to be slower than that of business.¹²

AAS, *Submission 109*, p. [2]. See also: Associate Professor Jeremy Brownlie, President, STA, *Proof Committee Hansard*, 11 November 2021, p. 27.

⁶ AAS, *Submission 109*, p. [2].

⁷ ISA, *Australia 2030: Prosperity through Innovation: a plan for Australia to thrive in the global innovation race*, November 2017, pp. 75–76; AAS, *Submission 109*, p. [2]. See also: Associate Professor Brownlie, STA, *Proof Committee Hansard*, 11 November 2021, p. 27; Ms Misha Schubert, CEO, STA, *Proof Committee Hansard*, 11 November 2021, p. 26; Organisation for Economic Co-operation and Development (OECD), [*Australian manufacturing in the global economy: study for the Australian Government, Department of Industry, Innovation, Science, Research and Tertiary Education*](#), DSTI/IND(2012)20/FINAL, 5 May 2015, pp. 54–55 and 57 (accessed 13 January 2022).

⁸ Advanced Manufacturing Growth Centre (AMGC), *Submission 40*, p. [4].

⁹ ATSE, *Submission 38*, p. 4.

¹⁰ Manufacturing on the Move (MotM), *Submission 11*, pp. 1 and 3.

¹¹ Manufacturing Australia (MA), *Submission 112*, p. 3. See also: Mr Barrie Finnin, CEO, Amaero International Pty Ltd, *Proof Committee Hansard*, 6 December 2021, p. 16.

¹² Ai Group, *Submission 68*, p. 3.

Cooperative Research Centres and other collaborative models

- 3.8 Industry abounds with different forms of research organisations, including Cooperative Research Centres (CRCs), companies and institutes, collaborative research organisations, innovation hubs, other research bodies such as universities, industry alumni and professionals, and service providers.¹³
- 3.9 Australia's CRCs are one outstanding example of a collaboration model. Cooperative Research Australia (CRA) explained that CRCs are designed to be flexible, de-risk research investment and improve global competitiveness by building relationships and shifting whole sectors over a period of time, rather than focussing on individual organisations or single innovations. A crucial feature of CRCs is co-funding as it builds commitment to the venture and its success.¹⁴ CRA highlighted the value of supporting CRCs, in particular over the longer term,¹⁵ and their potential as 'the most tried and tested program in the Federal Government's innovation toolkit'. It suggests extension of the model given:

One of the things it [the CRC Program] does is provide a really clear framework for industry and research institutions to engage with one another ... One of the lessons we can take from the CRC Program is the importance of a framework that helps those different organisations learn to work together and explore how they can work together.¹⁶

- 3.10 The committee heard of the success of a range of other collaboration models, such as sector-specific research centres and oversight bodies, and their value to small and medium enterprises (SMEs), in particular, given the latter's potentially limited capability and/or capacity to access scientific and research expertise and specialised equipment, or to build extensive networks.¹⁷

Patent and IP issues

- 3.11 Commercialisation partners recognise the importance of commercialising research, but IP arrangements remain a source of confusion and

¹³ Ms O'Dwyer, CRA, *Proof Committee Hansard*, 11 November 2021, p. 43; CRA, Answer to question on notice, 11 November 2021 (received 1 December 2021).

¹⁴ Ms O'Dwyer, CRA, *Proof Committee Hansard*, 11 November 2021, p. 45.

¹⁵ Ms O'Dwyer, CRA, *Proof Committee Hansard*, 11 November 2021, pp. 44–45 and 47; see also: Mr Finnin, Amaero International, *Proof Committee Hansard*, 6 December 2021, p. 16.

¹⁶ Ms O'Dwyer, CRA, *Proof Committee Hansard*, 11 November 2021, p. 44.

¹⁷ Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 2; MA, Answer to question on notice, 11 November 2021 (received 3 December 2021); Mr Finnin, Amaero International, *Proof Committee Hansard*, 6 December 2021, p. 16; Ai Group, *Submission 68*, p. 12; Australian Steel Institute (ASI), *Submission 70*, pp. 6–7; Infrabuild, *Submission 73*, p. [3]; MUA, *Submission 77*, pp. 7–8 and 31; Ms Natalie Currey, General Manager Supply Chains, ARA, *Proof Committee Hansard*, 6 December 2021, p. 13.

misunderstanding. Witnesses described the tension between industry—which may wish to protect IP for longer—and researchers who need to publish.¹⁸

- 3.12 The CRA outlined the benefits of the CRC model in which IP arrangements are negotiated between the participants on a case-by-case basis, offering significant flexibility to suit both industry and other partners.¹⁹
- 3.13 A range of changes to the IP regime were proposed including changes to copyright fair use provisions, the application of competition law, the strengthening of rules and compliance relating to IP with international partners,²⁰ extensions to current IP protections to improve Australia's foreign investment competitiveness²¹ and amendments to address delayed income earning impacts and processing bottlenecks on manufacturers.²²

Investment and Commercialisation

- 3.14 While Australia has a strong reputation for R&D it 'does not perform as well in terms of commercialising its ideas and innovations and in terms of diffusion as other countries'.²³ The Australian Council of Trade Unions (ACTU) suggests that Australia has failed to develop a culture of 'entrepreneurship and calculated risk-taking'.²⁴ while MA emphasised the challenge of developing the business case for commercialisation of research in Australia.²⁵
- 3.15 However, for some manufacturers the experience has been different. Ms Arabia from the Australian Academy of Science (AAS) elaborated:

While Australia sometimes receives bad press for research commercialisation, the reality can be quite different. Australian scientists

¹⁸ PC, *Submission 78*, p. 11. See also: Ai Group, Answer to question on notice, 8 December 2021 (received 16 December 2021); Manufacturing Excellence Forum (Sunshine Coast) (MEF(SC)), *Submission 34*, p. 5; Ms Anna-Maria Arabia, Chief Executive, AAS, *Proof Committee Hansard*, 11 November 2021, p. 36. See also: David A Miles AM, [Growth through innovation and collaboration: a review of the Cooperative Research Centres Programme](#), March 2015, pp. 7–8 (accessed 6 January 2022).

¹⁹ Ms O'Dwyer, CRA, *Proof Committee Hansard*, 11 November 2021, pp. 44 and 47–48.

²⁰ PC, *Submission 78*, pp. 11 and 17; Medicines Australia, *Submission 83*, pp. 3 and 9; National Civic Council, *Submission 82*, p. 8.

²¹ Medicines Australia, *Submission 83*, p. 10; Ms Elizabeth de Somer, CEO, Medicines Australia, *Proof Committee Hansard*, 8 December 2021, p. 20; Department of the Treasury, [Patent box: discussion paper on policy design](#), July 2021, p. 3 (accessed 5 January 2022).

²² Australian Food and Grocery Council (AFGC), *Submission 84*, p. 61; CropLife Australia, *Submission 41*, p. [3].

²³ PC, *Submission 78*, p. 9.

²⁴ ACTU, *Submission 117*, p. 28.

²⁵ Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 2.

... have had remarkable success commercialising their discoveries, and they make excellent case studies for this.²⁶

- 3.16 Dr Marcus Zipper, Director of Manufacturing at the Commonwealth Scientific and Industrial Research Organisation (CSIRO) explained the value of their flexible model in commercialising R&D,²⁷ with witnesses who have partnered with the CSIRO agreeing:²⁸

We work a lot with consortiums on different initiatives and through investing capital in these sorts of test beds, new ideas and new technologies with SMEs and governments. We do quite a bit of that ... We have all the models. It has to be a flexible model, because every company or every organisation or instance is different.²⁹

- 3.17 In contrast, the Australian Industrial Transformation Institute (AITI) thinks that CSIRO's 'position with respect translation of research to production, together with that of other research organisations, is on the whole, very weak'.³⁰
- 3.18 Several witnesses discussed the importance of access to capital to commercialisation,³¹ with challenges varying from general capital availability, to the type and timing of availability, and perceived risks associated with manufacturing investment.³² The Advanced Manufacturing Growth Centre (AMGC) agreed that perceived risk is a factor, particularly for SMEs:

²⁶ Ms Arabia, AAS, *Proof Committee Hansard*, 11 November 2021, p. 31.

²⁷ See, for example: Commonwealth Scientific and Industrial Research Organisation (CSIRO), [Advanced Manufacturing Roadmap](#), November 2016 (accessed 6 January 2022); [Medical Technologies and Pharmaceuticals Roadmap](#), February 2017 (accessed 6 January 2022); Dr Marcus Zipper, Director, Manufacturing and Ms Kirsten Rose, Executive Director, Future Industries, CSIRO, *Proof Committee Hansard*, 11 November 2021, pp. 37–38 and 40.

²⁸ See, for example: Mr Finnin, Amaero International, *Proof Committee Hansard*, 6 December 2021, p. 16; Mr Fischer, UWU, *Proof Committee Hansard*, 8 December 2021, p. 10; ASI, *Submission 70*, pp. 14 and 18.

²⁹ Dr Zipper, CSIRO, *Proof Committee Hansard*, 11 November 2021, p. 41.

³⁰ As part of the Australian Sovereign Capability Alliance submission: Australian Sovereign Capability Alliance, *Submission 81*, Attachment 1 (Australian Industrial Transformation Institute (AITI), Flinders University, *Australian sovereign capability and supply chain resilience: perspectives and options*), pp. 38–39.

³¹ See, for example: Mr Jonathan Coppel, Special Advisor, PC, *Proof Committee Hansard*, 11 November 2021, pp. 50–51; Associate Professor Wall, Cell Therapies Pty Ltd, *Proof Committee Hansard*, 11 November 2021, p. 61; Mr Russ Campbell, Head of Division, Analysis and Insights, Department of Industry, Science, Energy and Resources (DISER), *Proof Committee Hansard*, 11 November 2021, pp. 74–75; ACTU, *Submission 117*, pp. 28–29.

³² Professor Sharath Sriram, Policy Committee Chair, STA,, *Proof Committee Hansard*, 11 November 2021, p. 29; ACTU, *Submission 117*, p. 30; Ai Group, *Submission 68*, p. 13; AMGC, *Submission 40*, p. [7].

[manufacturers] ... regularly report that banks are unwilling to lend to companies to fund growth or new equipment purchases because banks lack an understanding of what manufacturing looks like today and perceive it to be high risk. Manufacturers report ... there is a 'valley of death' when it comes to finding the larger amounts of money required to grow their enterprises to commercialisation and meaningful scale.³³

- 3.19 The high representation of SMEs and lack of scale in the Australian economy also goes some way to explaining investment and commercialisation barriers.³⁴ Witnesses raised the importance of maintaining key manufacturing sectors onshore in order to develop scale and manufacturing ecosystems to accelerate research translation.³⁵

In the wake of the closure of automotive manufacturing in Australia, because there are very few if any larger firms with which to coordinate production efforts, and thus no reason for firms to share knowledge, the result has been an erosion of the networked knowledge-sharing and commercial collaborations that previously sustained a vibrant manufacturing sector.³⁶

R&D and commercialisation reforms

- 3.20 Witnesses, including Dr Jens Goennemann from the AMGC, advocate for funding across the manufacturing lifecycle, with an emphasis on funding higher technology readiness levels (TRLs):³⁷

... if you look at the scale of technology readiness levels 1 to 9, where the money is being spent in Australia and where we run out of puff is blindingly obvious. It's undisputed ... I'm not advocating against the basic research. It's very important for the problems which occur and need to be solved in 20 to 30 years. However, if we want to be a capable country with regard to manufacturing, we need to fund more in these areas.³⁸

³³ AMGC, *Submission 40*, p. [7].

³⁴ International Monetary Fund (IMF), [Australia: selected issues](#), IMF Country report no. 21/256, December 2021, p. 19 (accessed 13 January 2022).

³⁵ See, for example: Mr Amedeo Fischer, Delegate, United Workers Union (UWU), *Proof Committee Hansard*, 8 December 2021, p. 10; Associate Professor Dominic Wall, Executive Director of Business Ventures and Chief Scientific Officer, Cell Therapies Pty Ltd, *Proof Committee Hansard*, 11 November 2021, p. 60; Australian Council of Trade Unions (ACTU), *Submission 117*, p. 31; Building 4.0 CRC, *Submission 76*, p. 3, Australasian Railway Association (ARA), *Submission 108*, pp. 11–12.

³⁶ Dr Dean, Carmichael Centre, *Submission 46*, p. 11.

³⁷ See, for example: Associate Professor Brownlie, STA, *Proof Committee Hansard*, 11 November 2021, p. 27; Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 11; ACTU, *Submission 117*, pp. 28–29; CRA, *Submission 103*, pp. 1–2; Professor Sriram, STA, *Proof Committee Hansard*, 11 November 2021, p. 30.

³⁸ Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 11.

- 3.21 Statistics provided by the AMGC show that Australia spends 60 per cent of its funding at TRL2. The AMGC argues that early research is being overfunded, at the expense of TRLs 4 to 8—the commercialisation 'valley of death'—and that continuing down this path will not result in commercialised products.³⁹
- 3.22 Collaboration and the development of manufacturing ecosystems emerged as key reform measures, particularly to assist SMEs.⁴⁰ SEMMA and the Manufacturing Excellence Forum (Sunshine Coast) (MEF(SC)) provide successful working examples of collaboration models, with SEMMA explaining that its approach has enabled its members to act as consortiums and access opportunities that would not otherwise have been available to them as smaller manufacturers.⁴¹
- 3.23 Ms Natalie Currey, General Manager Supply Chains at the Australasian Railway Association (ARA) explained the importance of a national, sectorial approach to manufacturing, as well as mechanisms to bring key partners together to work towards common goals. In this context, she expanded on the importance of the National Rail Action Plan in fostering a common direction, collaboration, national coordination of work, and standards harmonisation.⁴²
- 3.24 The ACTU recommends the establishment of a commission for Australian manufacturing as a Commonwealth statutory body with a mandate to support Australian manufacturing by establishing strategy and policy, facilitating collaboration, providing business support, and guiding skills and workforce development.⁴³
- 3.25 Ai Group and AMGC recommend the development of resources aimed at investors and finance providers to explain manufacturing's technological evolution and their role in commercialisation⁴⁴ to 'help shift perceptions of manufacturing being high risk industry'⁴⁵ and open up access to finance.

³⁹ Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 8.

⁴⁰ Associate Professor Wall, Cell Therapies Pty Ltd, *Proof Committee Hansard*, 11 November 2021, p. 60; Complementary Medicines Australia (CMA), *Submission 101*, p. 9; Sanofi, *Submission 47*, p. 3; Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 4; ACTU, *Submission 117*, p. 31; Building 4.0 CRC, *Submission 76*, p. 3, ARA, *Submission 108*, pp. 11–12.

⁴¹ Mr Peter Angelico, President and Ms Vonda Fenwick, CEO, SEMMA, *Proof Committee Hansard*, 8 December 2021, pp. 22–23; MEF(SC), *Submission 34*, pp. 1 and 5.

⁴² Ms Currey, ARA, *Proof Committee Hansard*, 6 December 2021, p. 9.

⁴³ ACTU, *Submission 117*, pp. 30–31.

⁴⁴ Ai Group, *Submission 68*, p. 4.

⁴⁵ AMGC, *Submission 40*, p. [7].

A skilled workforce

The need for a skilled workforce

- 3.26 The committee heard a range of evidence about the crucial role of Australia's manufacturing workforce,⁴⁶ and heard that there is a lack of skilled workers to sustain the sector. This is attributed to an ageing workforce, difficulties attracting new workers, rapidly changing skill requirements, reductions in skills and training funding, and a decline in the ability of the skills and training sector to respond to industry needs or requirements.⁴⁷
- 3.27 Several submitters pointed to the loss of major manufacturing sectors—such as the automotive sector—as having significant impacts on the loss of the skills, diversity, and complexity necessary to drive innovation and productivity.⁴⁸
- 3.28 Some witnesses were concerned that failures to support ecosystems is putting Australia at risk of losing critical skills in manufacturing, particularly in pharmaceuticals. Mr Richard Glenk, Delegate from the United Workers Union commented:

...the greatest concern is that we're going to create a skills vacuum as we're going to lose so many capable people within the industry who are likely going to look elsewhere. There's a huge risk we'll never get these people back for the mRNA once all this comes on board, and it will be a very challenging time for Australia to move on and create their own sovereignty with their own pharmaceutical manufacturing.⁴⁹

- 3.29 Mr Amedeo (Harry) Fischer, Delegate, United Workers Union, also commented:

Western Australia has an issue because their industry will be decimated by Pfizer's removal. Victoria in particular has been a hub of pharmaceutical manufacturing for a long time. As we lose the critical mass we lose all the associated quality parts to that manufacturing process and, like we worked

⁴⁶ See, for example: OZ Minerals, *Submission 51*, p. 4; Ai Group, *Submission 68*, p. 3; AMGC, *Submission 40*, p. [7]; DISER, *Submission 116*, p. 1; Innovation and Business Skills Australia Group (IBSA Group), [Scaling up: developing modern manufacturing through a skilled workforce](#), May 2021, pp. 27 and 30 (accessed 26 November 2021).

⁴⁷ Ai Group, *Submission 68*, pp. 22, 25, 29–30; Dr Jim Stanford, The Centre for Future Work at the Australian Institute, [A fair share for Australian manufacturing: manufacturing renewal for the Post-COVID economy](#) (A fair share for Australian manufacturing), July 2020, pp. 34, 36–37 and 40 (accessed 2 November 2021); ACTU, *Submission 117*; SEMMA, *Submission 105*, pp. 10–11; Ms Tanya Barden, CEO, AFGC, *Proof Committee Hansard*, 8 December 2021, p. 5.

⁴⁸ National Civic Council, *Submission 82*, p. 33. See also: Ai Group, *Submission 68*, pp. 6 and 21. See for example: Senator Paul Scarr, Acting Chair, Senate Economics References Committee and Mr Richard Glenk, Delegate, UWU, *Proof Committee Hansard*, 8 December 2021, p. 9; see also: SEMMA, *Submission 105*, p. 7.

⁴⁹ Mr Richard Glenk, Delegate, United Workers Union, *Proof Committee Hansard*, 8 December 2021, p. 11.

with Monash to produce the Rotarix into a BFS preparation, we then lose the relationships with the universities and the funding from the pharmaceuticals companies of the universities for studies into pharmaceuticals. So, this isn't just about the manufacturing.⁵⁰

- 3.30 Moreover, support for these ecosystems needs to happen quickly in order to retain the skills that already exist. Professor Hugh Bradlow, President, Australian Academy of Technology and Engineering, commented:

But it is a global race, as you point out. A lot of these new technologies are skill limited not resource limited, and we are competing with other countries for those key skills.⁵¹

- 3.31 Mr Fischer continued:

If we wait two or three years, all these people with all their experience and all their validation simply won't be validated...

Realistically, it would take between 18 months and two years before someone could be trained up enough for them to be independent personnel, and that's still not particularly skilled. The point I was making with BFS technology was that I could foresee a future whereby BFS plays a larger and larger role in the manufacturing of pharmaceutical preparations, and, at a time when it is really important to have that capacity, we seem to be literally throwing it away...

...a lot of these people will simply not be there, they will not be available to work. Beyond the validation issue, they won't be there because they will have either found something else or they won't be in a position to attend the new site, if it's in a new location or what have you.⁵²

Identifying skill and training requirements

- 3.32 In July 2020 the Australian Government established the National Skills Commission to ensure that changing skill needs align with education and training, including through the provision of detailed labour market analysis, and identification of skill needs, with the latter potentially addressing the need for a skills audit raised by several witnesses.⁵³

⁵⁰ Mr Amedeo (Harry) Fischer, Delegate, United Workers Union, *Proof Committee Hansard*, 8 December 2021, p. 10.

⁵¹ Professor Hugh Bradlow, President, Australian Academy of Technology and Engineering, *Proof Committee Hansard*, 11 November 2021, p. 22.

⁵² Mr Amedeo (Harry) Fischer, *Proof Committee Hansard*, 8 December 2021, p. 11.

⁵³ National Skills Commission, *About the National Skills Commission*, <https://www.nationalskillscommission.gov.au/about/about-national-skills-commission> (accessed 15 December 2021); ASI, *Submission 70*, Attachment 1 (*Ensuring a sustainable Australian steel industry in the 2020s and beyond: white paper*), p. 19; National Skills Commission, *State of Australia's skills 2021*, <https://www.nationalskillscommission.gov.au/SOAS> (accessed 15 December 2021); National Skills Commission, *Skilled Migration occupation lists*, <https://www.nationalskillscommission.gov.au/our-work/skilled-migration-occupation-lists> (accessed 15 December 2021); National Skills Commission, *Australian Skills Classification*,

- 3.33 Witnesses discussed the manufacturing industry's changing skills and training requirements,⁵⁴ advising the committee that manufacturing increasingly requires a range of digital, science, technology, engineering, and mathematics (STEM) based skills.⁵⁵
- 3.34 ATSE emphasised the importance of STEM skills to manufacturing, supporting findings of the National Skills Commission which found that employment in STEM occupations has increased by 85 per cent since 2000 and is projected to grow a further 12.9 per cent by 2025:⁵⁶
- ... traditional manufacturing skills will no longer be applicable in this brave new future. We need a STEM-skilled workforce. The sorts of people who are going to be employed in manufacturing are going to need to have digital skills, data collection skills, analysis skills and a range of skills that come from high levels of STEM training.⁵⁷
- 3.35 The committee heard of the increasing demand for skills in sustainability, advanced maintenance and diagnostics, supply chains, procurement, as well as the demand for management and 'soft' skills such as leadership, workforce planning, creative and analytical thinking, complex problem solving and active learning skills, as well as attributes such as resilience, adaptability, and the ability to cultivate productive interpersonal relationships.⁵⁸

Qualifications framework

- 3.36 Industry representatives told the committee that reforms to curriculum design, qualifications, and skills recognition (including micro credentials),⁵⁹ and the

<https://www.nationalskillscommission.gov.au/our-work/australian-skills-classification> (accessed 15 December 2021); National Civic Council, *Submission 82*, p. 16; AFGC, *Submission 84*, p. 3; AFGC, *Submission 84*, Attachment 1 (*Sustaining Australia: food and grocery manufacturing 2030*), p. 6; SEMMA, *Submission 105*, p. 10.

⁵⁴ Ms Anna-Maria Arabia, Chief Executive, AAS, *Proof Committee Hansard*, 11 November 2021, p. 31; Ai Group, *Submission 68*, p. 24; see also: Australian Railway Association, *Submission 108*, pp. 7 and 19.

⁵⁵ See, for example: National Civic Council, *Submission 82*, p. 16; AFGC, *Submission 84*, p. 3; AFGC, *Submission 84*, Attachment 1 (*Sustaining Australia: food and grocery manufacturing 2030*), p. 6; Ai Group, *Submission 68*, pp. 15, 17–18, 22, 24 and 27. See also: Building 4.0 CRC, *Submission 76*, p. 3; Australian Manufacturing Workers' Union (AMWU), *Submission 114*, p. 6.

⁵⁶ National Skills Commission, [*The state of Australia's skills 2021: now and into the future: report overview*](#), [2021], pp. 3 and 17 (accessed 15 December 2021).

⁵⁷ Professor Hugh Bradlow, President, ATSE, *Proof Committee Hansard*, 11 November 2021, p. 19.

⁵⁸ Ai Group, *Submission 68*, pp. 15, 17–18, 22, 24 and 27. See also: Building 4.0 CRC, *Submission 76*, p. 3; AMWU, *Submission 114*, p. 6.

⁵⁹ Ai Group, *Submission 68*, pp. 24–25 and 29–30; Mr Steve McCartney, WA State Secretary, AMWU, *Proof Committee Hansard*, 6 December 2021, pp. 28–20; SEMMA, *Submission 105*, p. 10; AMGC, *Submission 40*, pp. [7–8]; ASI, *Submission 70*, Attachment 1 (*Ensuring a sustainable Australian steel industry in the 2020s and beyond: white paper*), p. 20.

inclusion of industry and unions is vital. Training provided by the vocational education and training (VET) and university sectors needs to be better aligned with industry requirements and needs to produce a job-ready labour force.⁶⁰ The ACTU expressed its frustration:

While experiences with the system vary, in terms of manufacturing qualifications the current system has proven to deliver primarily bureaucratic inaction ... While government has made some moves towards reforming this system in the latter half of 2021, this reform has taken far too long to occur and has failed to involve industry stakeholders in reform design.⁶¹

VET sector

3.37 Across all industries around 23 per cent of employers use the VET system to train apprentices.⁶² The PC noted that parts of the manufacturing industry are 'especially reliant' on workers with VET qualifications, including more than 40 percent of the construction, mining, and manufacturing workforces.⁶³ As stressed by the ACTU:

The basis of many manufacturing-related skills is a trade-based apprenticeship. Whether in mechanical, electrical, fabrication or other fields, apprenticeship is the basic building block of skill formation. ... The building block approach inherent in these classifications show the importance of the trade as the backbone of the skills required in manufacturing industry. Apprenticeships therefore remain a critical pathway into the manufacturing sector and the health of the sector is itself intrinsically linked to the integrity of the Australian apprenticeship system.⁶⁴

3.38 Enrolments across all manufacturing-related VET qualifications was 101,685 in 2020, a drop from 104,690 in 2019 and 114,430 in 2016. As of March 2021, there were 35,545 apprentices and trainees in training in the manufacturing sector—an increase from 28,395 in March 2017.⁶⁵

⁶⁰ See, for example: ARA, *Submission 108*, p. 19; Mrs Michelle Owen, Delegate, AMWU, *Proof Committee Hansard*, 8 December 2021, pp. 32–33; Mr Steve McCartney, WA State Secretary, AMWU, *Proof Committee Hansard*, 6 December 2021, pp. 28–30; CSIRO, *Submission 86*, p. 4; Arrival, *Submission 110*, p. 41; Ai Group, *Submission 68*, pp. 24–25 and 29–30.

⁶¹ ACTU, *Submission 117*, p. 38.

⁶² PC, [National Agreement for Skills and Workforce Development Review: study report](#), December 2020, p. 78 (accessed 23 December 2021).

⁶³ PC, *National Agreement for Skills and Workforce Development Review: study report*, December 2020, p. 78; PC, *Submission 78*, p. 18.

⁶⁴ ACTU, *Submission 117*, p. 35.

⁶⁵ DESE, Answer to question on notice, IQ21-000158, 11 November 2021 (received 2 December 2021).

Significant problems in the VET sector

- 3.39 However, evidence from a number of witnesses, indicate significant problems in the VET system. Commencement numbers have fallen since 2016, but are still relatively high, but dropout rates are also high, with around 50 per cent of apprenticeships completed and VET course completion below 50 per cent.⁶⁶ The pandemic has not helped—increasing training contract suspensions and resulting in fewer new contract commencements.⁶⁷
- 3.40 Witnesses told the committee that the VET system is in trouble, with SEMMA stating, 'the TAFE [technical and further education] system is broken'.⁶⁸
- 3.41 The Construction and General Division of the Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU) estimates that since 2013 around \$3 billion in federal funding has been cut from the VET sector⁶⁹—almost half of the federal contribution.⁷⁰ The PC confirmed the funding drop, finding that total real government funding for VET had fallen over the last 10 years, largely it says, 'due to reduced State and Territory spending'.⁷¹
- 3.42 Witnesses linked drops in funding and increases in private sector participation to decreases in training quality, fewer training locations and gutted infrastructure, impacting apprentices and employers.⁷² The ACTU told the committee:

... many students do not receive the training they are paying for and where graduates are often not sufficiently skilled. Due to steady declines in funding, and the loss of students to private providers, TAFE is no longer the centrepiece of VET in many areas. TAFE campuses have been closed and much TAFE infrastructure has degraded. Thousands of qualified VET educators leave the sector each year—representing a significant loss of expertise.⁷³

⁶⁶ ACTU, *Submission 117*, p. 36; Mr Coppel, PC, *Proof Committee Hansard*, 11 November 2021, p. 53.

⁶⁷ ACTU, *Submission 117*, p. 36.

⁶⁸ Mr Angelico, SEMMA, *Proof Committee Hansard*, 8 December 2021, p. 27. See, for example: Mr Keith Lang, President, NSW Branch, AMWU, *Proof Committee Hansard*, 6 December 2021, p. 28; ACTU, *Submission 117*, pp. 34–35 and 40.

⁶⁹ Construction and General Division, Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU), *Submission 102*, p. [2], AMWU, *Submission 114*, p. 8.

⁷⁰ ACTU, *Submission 117*, p. 37.

⁷¹ PC, *National Agreement for Skills and Workforce Development Review: study report*, December 2020, p. 71.

⁷² Mr Lang, AMWU, *Proof Committee Hansard*, 6 December 2021, p. 28.

⁷³ ACTU, *Submission 117*, p. 35.

- 3.43 The ACTU believes that the VET sector is 'critical' to manufacturing but that the decision to privatise delivery and allow 'the market' to provide has been unsuccessful.⁷⁴

The government has thus far failed to take any meaningful step towards addressing the issues of quality and quantity of VET graduates or the lack of industry leadership of the training package development system. Significant reforms of both the VET sector and the training package development system are needed to ensure that the manufacturing sector has access to the skilled workers it will need in future.

...

For-profit VET providers are failing to produce a skilled and adaptable workforce. The current return on public investment is unsatisfactory, if not illusory.⁷⁵

- 3.44 Despite evidence to the contrary, Mr Jonathan Coppel, Special Advisor to the PC told the committee that the VET system is generally working well.⁷⁶
- 3.45 This view is not universal, with Ms Rachel Livingston, Assistant Secretary, Industry Advice Branch at DESE advising the committee of employer disengagement with the VET system⁷⁷ and witnesses raising concerns about the relevancy of courses to the skills required by industry, saying that 'the content of some of the programs is antiquated'.⁷⁸
- 3.46 A 2020 Review of the National Agreement for Skills and Workforce Development—an instrument which defines the framework for the VET system—found a number of areas for improvement in the VET system. The review made numerous recommendations, including in relation to improving alignment with industry needs, completions, and quality.⁷⁹

VET reforms

- 3.47 Ai Group, the CFMMEU, and the Centre for Future Work argue for reinvestment in the VET sector,⁸⁰ while other witnesses call for the improvement in training quality and accessibility.⁸¹

⁷⁴ Ms Michele O'Neil, President, ACTU, *Proof Committee Hansard*, 8 December 2021, p. 32.

⁷⁵ ACTU, *Submission 117*, pp. 34 and 40.

⁷⁶ Mr Coppel, PC, *Proof Committee Hansard*, 11 November 2021, pp. 52–53.

⁷⁷ Ms Livingston, DESE, *Proof Committee Hansard*, 11 November 2021, p. 66.

⁷⁸ Ms Fenwick, SEMMA, *Proof Committee Hansard*, 8 December 2021, p. 26; PC, *Submission 78*, p. 18.

⁷⁹ See the full report for more information: PC, [National Agreement for Skills and Workforce Development Review: study report](#), December 2020 (accessed 24 December 2021).

PC, *Submission 78*, pp. 18–19.

⁸⁰ Ai Group, *Submission 68*, p. 27; Construction and General Division, CFMMEU, *Submission 102*, p. [2]; Centre for Future Work, *Submission 88*, p. 23.

- 3.48 The ACTU thinks that a rebuild of the VET system is required to 'ensure coherence, certainty and confidence to delivery skilled manufacturing workers'. It advocates for a clearer purpose and direction for the VET system:⁸²

There is a lack of certainty in what the VET system is producing, increasing calls for flexibility and specialisation designed to meet the narrow interests of individual employers and training providers, rather than the broader interests of the 'industry', are blurring the scope of key production, traditional trade and technical vocations and students and employers have little chance of developing into the informed and demanding consumers our VET system desperately needs while the current levels of fragmentation and incoherence prevail ... We must establish a clear and unambiguous purpose statement to guide our approach to reforming the skills and vocational education & training systems.⁸³

- 3.49 There were also calls for VET to address the needs for higher skilled jobs and further education and training, beyond the Certificate III level.⁸⁴
- 3.50 Stakeholders recognised that changes to the way skills and training are structured would need wider coordination and require changes to the way state-based training authorities recognise qualifications, changes to industrial awards to make provision for higher qualifications, and national tertiary policy and funding amendments in order to be successful.⁸⁵
- 3.51 The ACTU supports the creation of a coordinating Commission for Australian Manufacturing with specific responsibilities for skills analysis, workforce planning and development to guide improvements in occupational skills and workforce development.⁸⁶

More support needed for apprentices

- 3.52 Inquiry evidence pointed to a need for more government support for apprentices to improve completion rates. Surveys of apprentices completed by the Australian Manufacturing Workers' Union (AMWU) 'have consistently

⁸¹ AMWU, *Submission 114*, p. 8; Mr Lang, AMWU, *Proof Committee Hansard*, 6 December 2021, p. 28; PC, *Submission 78*, p. 18.

⁸² ACTU, *Submission 117*, pp. 42–43; see also: Stephanie Dalzell, '[Labor gets election-ready with \\$1.2 billion promise including free TAFE and more university places](#)', *ABC News Australia*, 5 December 2021 (accessed 4 January 2022); Australian Labor Party, '[Free TAFE and more uni places: Labor's Future Made in Australia Skills Plan](#)' (accessed 4 January 2022).

⁸³ ACTU, *Submission 117*, p. 39.

⁸⁴ ACTU, *Submission 117*, p. 35; National Skills Commission, *The state of Australia's skills 2021: now and into the future: report overview*, [2021], pp. 1, 6 and 17; Ai Group, *Submission 68*, pp. 27–28; Ms McGrath, Australian Industry Group, *Proof Committee Hansard*, 8 December 2021, p. 41.

⁸⁵ Ai Group, *Submission 68*, pp. 27–28.

⁸⁶ ACTU, *Submission 117*, pp. 3, 31 and 33.

shown the apprentices are struggling financially due to increased costs',⁸⁷ with the CFMMEU also calling for improvements.⁸⁸

3.53 Mr Coppel from the PC agreed that more can be done:

... better screening of prospective apprentices, better structuring of the support during that apprentice period and the wage received for an apprenticeship, as well as pathways into different occupations. These are all measures that can take the strengths of our education and training system and amplify them to bring in some of the groups that have less access, partly because of their age and partly because of these economic factors.⁸⁹

3.54 The CFMMEU believes that lack of enforceable ratios of apprentices to tradespeople has contributed to skills shortages and has undermined attempts to train young workers.⁹⁰ Both the CFMMEU and the AMWU support a minimum ratio on all government-funded projects.⁹¹

3.55 Adjustments are also required to the timing of employer incentives so that more support is provided at times when the risk of cancellation of apprenticeships is at its highest.⁹²

3.56 Ai Group reported that in their 2020 Skills survey, 80 per cent of respondents said they would take on higher apprentices, cadets, or interns in order to improve skill levels, however half of the respondents expressed the need government support to make this happen. This suggests that:

Tangible action here would be the take up by the Government of proposals such as the national cadetship proposal for VET [students] ... the proposal suggests apprenticeship-style subsidies for employers to take on students at scale using existing system infrastructure.⁹³

Higher education sector

3.57 In their report *Australian Sovereign Capability and Supply Chain Resilience*, the AITI conclude that Australia has a strong university sector, but that it is showing signs of weakness due to funding linked to full fee-paying students—many of whom are international—and significant reductions in

⁸⁷ ACTU, *Submission 117*, p. 37.

⁸⁸ CFMMEU, *Submission 102*, p. [2].

⁸⁹ Mr Coppel, PC, *Proof Committee Hansard*, 11 November 2021, p. 53.

⁹⁰ CFMMEU, *Submission 102*, p. [5].

⁹¹ AMWU, *Submission 114*, p. 7; CFMMEU, *Submission 102*, p. [2].

⁹² PC, *Submission 78*, p. 19.

⁹³ Ai Group, *Submission 68*, pp. 28–29.

revenue resulting in staff reductions of at least 17,300 in 2020, decreasing capacity.⁹⁴

- 3.58 Evidence from DESE showed that funding amounts for courses have decreased⁹⁵ and that costs associated with running courses may be higher than the equivalent full-time student load (EFTSL) determined by some universities, with additional costs borne by students.⁹⁶
- 3.59 The Australian Sovereign Capability Alliance and other submitters recommended more effective university–industry collaborations to improve core capability and outcomes for industry,⁹⁷ including improvements to the Research Training Program to cover employer and salary costs of PhD industry internships, with an industry-led focus and to encourage employment of recent PhD graduates.⁹⁸
- 3.60 The PC suggests that 'there are good reasons to expand the availability of income contingent loans',⁹⁹ with Mr Coppel noting that mature-age workers in particular need assistance to enable 'life-long learning'.¹⁰⁰
- 3.61 Along the same lines, Project Iron Boomerang suggests a HECS-HELP-like loan arrangement to enable skills and training,¹⁰¹ while the Australian Steel

⁹⁴ Australian Sovereign Capability Alliance, *Submission 81*, Attachment 1 (AITI, Flinders University, *Australian sovereign capability and supply chain resilience: perspectives and options*), pp. 38, 40–41; see also Ms Arabia, AAS, *Proof Committee Hansard*, 11 November 2021, p. 32; see also: AAS, *Submission 109*, p. [1].

⁹⁵ Mr Dom English, First Assistant Secretary, Higher Education Group, DESE, *Proof Committee Hansard*, 11 November 2021, p. 64.

⁹⁶ DESE, Answer to question on notice, IQ21-000156, 11 November 2021 (received 1 December 2021); Mr English, DESE, *Proof Committee Hansard*, 11 November 2021, pp. 66–67. See also: DESE, *National Priorities and Industry Linkage Fund (NPILF)*, <https://www.dese.gov.au/job-ready/npilf> (accessed 23 December 2021).

DESE, Job-ready Graduates Package: short courses, <https://www.dese.gov.au/job-ready/short-courses> (accessed 23 December 2021).

⁹⁷ Australian Sovereign Capability Alliance, *Submission 81*, Attachment 1 (AITI, Flinders University, *Australian sovereign capability and supply chain resilience: perspectives and options*), pp. 45–46; see also: CRA, *Submission 103*, p. 6; ATSE, *Submission 38*, p. 2; Dr Dean, Carmichael Centre, *Submission 46*, p. 18.

⁹⁸ STA, *Submission 52*, pp. 2 and 4–5; Ms Schubert, STA, *Proof Committee Hansard*, 11 November 2021, p. 25; CRA, Answer to question on notice, 11 November 2021 (received 1 December 2021); Ai Group, Answer to question on notice, 8 December 2021 (received 16 December 2021).

⁹⁹ PC, *Submission 78*, p. 6.

¹⁰⁰ Mr Coppel, PC, *Proof Committee Hansard*, 11 November 2021, pp. 52–53.

¹⁰¹ Project Iron Boomerang, *Submission 85*, p. 8.

Institute (ASI) recommends that the government provide more general financial support to enable workers to upskill.¹⁰²

Collaborative design and delivery

- 3.62 Skills and training delivery is increasingly being delivered through collaborative arrangements and employers through work-based learning arrangements—arguably because traditional delivery systems are failing. A range of witnesses described the importance of developing these alternative models to meet rapidly changing requirements and skills shortages, with wider reforms needed to address issues relating to curriculum design, qualifications flexibility, skills recognition and transferability, and the participation of industry and unions.¹⁰³
- 3.63 In keeping with the collaboration theme, witnesses support a cooperative and forward-thinking approach which enables co-design, virtual or physical industry training hubs—regional and metropolitan—to support rapid reskilling in specific locations and industries, work-based learning networks, virtual learning platforms, and the development of innovative educational institutions that combine vocational and higher education as needed.¹⁰⁴
- 3.64 A number of organisations expanded on the value of their own collaborative models—including CRCs and ARA's development of a National Rail Skills Hub—and their success in developing partnerships and training.¹⁰⁵ The AFGC agrees that there are many training pathways:

I don't think there's just the one avenue. There is absolutely a role for strengthening VET programs. There is a role for something like an industry training centre and there's very much a role for on-the-job training and programs that can be provided in-house and with partnership

¹⁰² ASI, *Submission 70*, Attachment 1 (*Ensuring a sustainable Australian steel industry in the 2020s and beyond: white paper*), p. 20.

¹⁰³ See, for example: Medicines Australia, *Submission 83*, p. 4; SEMMA, *Submission 105*, pp. 10–11; ARA, *Submission 108*, p. 19; Mrs Owen, AMWU, *Proof Committee Hansard*, 8 December 2021, pp. 32–33; Ai Group, *Submission 68*, pp. 24–25, 29–30.

¹⁰⁴ Ai Group, *Submission 68*, pp. 25–26; Ms Fenwick, SEMMA, *Proof Committee Hansard*, 8 December 2021, pp. 26–27; Ms Barden, AFGC, *Proof Committee Hansard*, 8 December 2021, p. 5; AFGC, *Submission 84*, Attachment 1 (*Sustaining Australia: food and grocery manufacturing 2030*), p. 6.

¹⁰⁵ CRA, *Submission 103*, pp. 1–2 and 5; Ms O'Dwyer, CRA, *Proof Committee Hansard*, 11 November 2021, p. 46; Infrastructure and Transport Ministers' meeting, [*Notes of meeting*], 28 May 2021, p. 2 (accessed 15 December 2021); ARA, *Submission 108*, p. 19. See, for example: Ai Group, *Submission 68*, p. 25; Defence Science Institute, *Request for Information: BAE Systems Education and Skills*, 15 December 2020, <https://www.defencescienceinstitute.com/news/bae-systems-education-and-skills-request-for-information> (accessed 14 December 2021); Unus, *Submission 66*, p. 6; Mining Council of Australia (MCA), *Submission 72*, pp. 3 and 12–13; MCA, *Mining skills organisation pilot*, <https://www.minerals.org.au/mining-skills-organisation-pilot> (accessed 15 December 2021).

agreements between industry and government on those sorts of programs.¹⁰⁶

- 3.65 However, the ACTU warns that the development of broader, transferrable capability and skills is vital—rather than just addressing immediate needs. It also highlights the importance of involving unions:

Over the period of time of this government, the unions have been progressively excluded from the bodies that are designed to advise government about how you align skills that are needed in the VET system with industry. That's a really big gap. You need, of course, to hear from business, but you also need to hear from the voice of worker representatives, because sometimes the approach to skills is driven only by short-term business needs.¹⁰⁷

- 3.66 Ai Group, the Centre for Future Work, the AFGC, the MEF(SC) and others recommend more flexible government funding for skills and training to cover a range of programs including short-form training, on-the-job training, or industry-led learning programs.¹⁰⁸

Manufacturing employment

- 3.67 While a skilled workforce is important, it is vital that skilled workers have secure jobs, meaningful work and appropriate wages and conditions.

Current employment environment

- 3.68 One of the key aspects of Australian manufacturing is that it supports good, secure jobs. Mr Steve Murphy, National Secretary of the AMWU stated:

I would just say that the jobs that we have throughout our manufacturing industry but particularly our energy industry are secure and well-paid jobs because workers have organised and have fought to deliver that job security, the wages and the conditions that they currently enjoy.¹⁰⁹

- 3.69 However, the committee heard that when these good secure jobs are lost, people tend to go into lower paid and less secure jobs. Mr Murphy continued:

We've seen jobs go offshore because our governments haven't been supporting Aussie made. We've seen apprenticeships drying up and young workers missing out on that opportunity to learn a trade in our industries. We've seen those good, secure jobs with the good wages and

¹⁰⁶ Ms Barden, AFGC, *Proof Committee Hansard*, 8 December 2021, pp. 3–4.

¹⁰⁷ Ms O'Neil, ACTU, *Proof Committee Hansard*, 8 December 2021, p. 32.

¹⁰⁸ AFGC, *Submission 84*, Attachment 1 (*Sustaining Australia: food and grocery manufacturing 2030*), p. 6; MEF(SC), *Submission 34*, p. 3; CFMMEU, *Submission 102*, p. [2]; MCA, *Submission 72*, p. 3; Ai Group, *Submission 68*, pp. 29–30.

¹⁰⁹ Mr Steve Murphy, National Secretary, *Proof Committee Hansard*, 6 December 2021, p. 30.

conditions vanish and be replaced by outsourced labour hire and permanent casual workers with no security and no stability.¹¹⁰

- 3.70 The impact on workers is significant. Mr Murphy described the impact on workers when good, secure manufacturing jobs are lost:

...30 per cent of those workers go into decent jobs afterwards—there's generally something within the community they can go to—30 per cent go into low-paid secure work and 30 per cent never work again. That's one of the things that we want to avoid as our energy needs and our economy change all of the time. We want to be able to make sure that we've got a reliable, resilient manufacturing industry that pays those good wages and, of course, has those secure jobs that people can rely on.¹¹¹

- 3.71 At the same time the industry reports a shortage of skilled workers, especially those with in demand niche skills which are and transferrable to other industries such as construction, logistics, and engineering.¹¹² The AMGC reports that manufacturers' 'biggest growth constraint is a shortage of suitable staff'.¹¹³ Skilled worker shortages been exacerbated by pandemic border controls, quarantines, and the halt of skilled migration.¹¹⁴

- 3.72 A 2020 Ai Group survey found that technicians and trade workers are the most difficult roles to fill (including welders, boilermakers, mechanics, process workers), followed by managers, professionals, and sales workers.¹¹⁵ This is supported by the AFGC¹¹⁶ and the National Skills Commission:

There are pockets of shortages across most occupation groups. Generally, shortages are greatest among technicians and trades workers occupations, which includes electricians, carpenters, chefs, fitters and motor mechanics.¹¹⁷

- 3.73 Witnesses described a variety of challenges to recruiting suitably skilled staff including the difficulties in attracting new workers to the manufacturing

¹¹⁰ Mr Steve Murphy, National Secretary, AMWU, *Proof Committee Hansard*, 6 December 2021, p. 26. See also: Institute of Public Affairs, *Submission 74*, pp. 2–3.

¹¹¹ Mr Murphy, AMWU, *Proof Committee Hansard*, 6 December 2021, p. 26.

¹¹² Regional Australia Institute (RAI), *Submission 45*, p. 7; CMA, *Submission 101*, p. [12]; Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 7; ACTU, *Submission 117*, p. 34; see also Ms Lucy Weber, Senior National Legal Officer, Construction and General Division, CFMMEU, *Proof Committee Hansard*, 6 December 2021, p. 35.

¹¹³ AMGC, *Submission 40*, p. [7]. See also: RAI, *Submission 45*, p. 8; Ai Group, *Submission 68*, pp. 6 and 21.

¹¹⁴ Ai Group, *Submission 68*, pp. 21–22; CMA, *Submission 101*, p. [12]; ARA, *Submission 108*, p. 4; AMWU, *Submission 114*, pp. 9–10.

¹¹⁵ Ai Group, *Submission 68*, pp. 22–23.

¹¹⁶ Ms Barden, AFGC, *Proof Committee Hansard*, 8 December 2021, p. 4.

¹¹⁷ National Skills Commission, *The state of Australia's skills 2021: now and into the future: report overview*, [2021], p. 19.

industry—despite 'long-term' stable, well-paid employment.¹¹⁸ An ageing workforce,¹¹⁹ facility closures, rapid technological change, and the transition to low emissions energy are also factors, requiring workers to reskill and redeploy.¹²⁰

- 3.74 The PC recommends financial measures support mature-age Australians needing to reskill and upskill.¹²¹ While SEMMA sees value in programs to transfer knowledge from experienced tradespeople in retirement or semi-retirement to the next generation through mentoring or training.¹²²
- 3.75 Arrival suggests the creation of an energy transition authority to plan and oversee the reskilling, retraining, and redeployment of workers currently employed in fossil fuel industries to ensure a just transition for these workers and their communities.¹²³
- 3.76 Dr Jim Stanford from the Centre for Future Work does not support the view of a general labour shortage, but agrees that there are challenges getting workers with the right skills into suitable jobs:

We still have at least three million Australians who want to work more than they are, because they're unemployed or they're underemployed or they're not actively in the labour force. The idea that we're running out of workers is not true. But, certainly, part of the challenge is that we have to provide people with the right skills and put them in the right place to do the right jobs; that is certainly true.¹²⁴

Projected jobs growth

- 3.77 Research by the National Council for Vocational Education Research (NCVER) found that manufacturing will need to recruit almost 300,000 skilled workers by 2024 in order to meet demand, as shown in Figure 3.4.¹²⁵

¹¹⁸ CSIRO, *Submission 86*, p. 4. See also: Mr Coppel, PC, *Proof Committee Hansard*, 11 November 2021, p. 53; Professor Bradlow, ATSE, *Proof Committee Hansard*, 11 November 2021, p. 22; AMGC, *Submission 40*, p. [7]; Ms Barden, AFGC, *Proof Committee Hansard*, 8 December 2021, p. 4.

¹¹⁹ 45 per cent of workers are aged over 45 years and around 20 per cent are over age 55 years. Dr Stanford, Centre for Future Work, *A fair share for Australian manufacturing*, pp. 45–47 and 49.

¹²⁰ Mr McCartney, AMWU, *Proof Committee Hansard*, 6 December 2021, p. 27; Mr Fischer, UWU, *Proof Committee Hansard*, 8 December 2021, p. 11.

¹²¹ PC, *Submission 78*, p. 19.

¹²² Mr Angelico and Ms Fenwick, SEMMA, *Proof Committee Hansard*, 8 December 2021, pp. 29–30; SEMMA, *Supplementary Submission 105.1*, pp. 3–4.

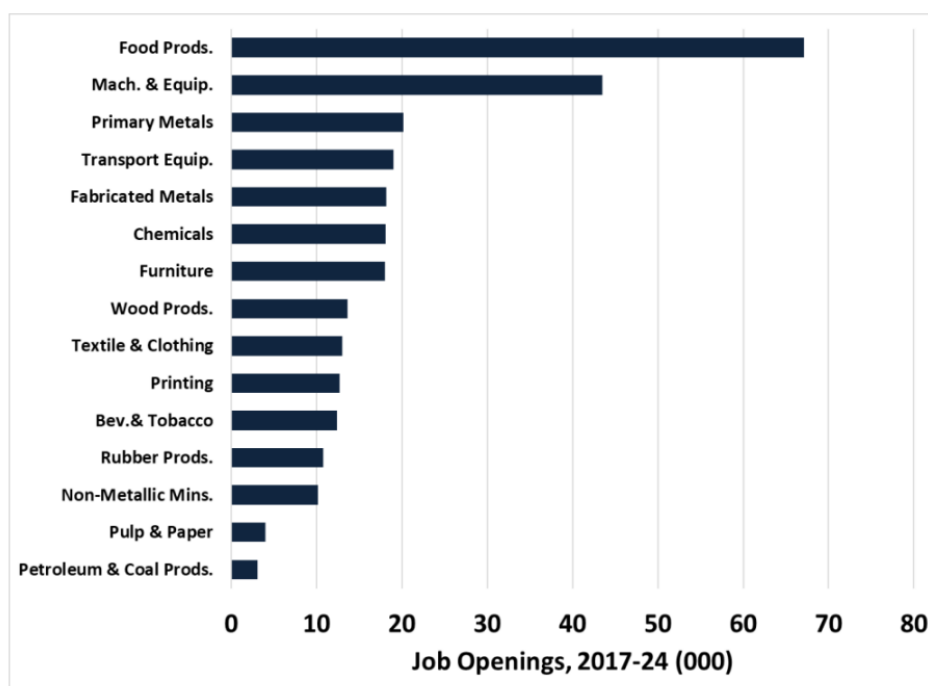
¹²³ Arrival, *Submission 110*, p. 18.

¹²⁴ Dr Stanford, Economist and Director, Centre for Future Work, *Proof Committee Hansard*, 11 November 2021, p. 17.

¹²⁵ Dr Stanford, Centre for Future Work, *A fair share for Australian manufacturing*, p. 45.

- 3.78 Dr Stanford discussed the need for longer-term vision and consistency to build business confidence and subsequent jobs growth telling the committee that manufacturing 'supports better jobs, more stable jobs and potentially higher income jobs'.¹²⁶

Figure 3.1 Forecast Job Openings in Manufacturing, by sector 2017–2024



Dr Jim Stanford, *The Centre for Future Work at the Australian Institute*, [A fair share for Australian manufacturing: manufacturing renewal for the Post-COVID economy](#) (*A fair share for Australian manufacturing*), July 2020, p. 45 (accessed 2 November 2021).

Changing nature of manufacturing jobs

- 3.79 Dr Goennemann stated that overall manufacturing jobs are not contracting, but that the nature of jobs is changing as the sector transforms away from production to automation:

... production jobs are declining for two reasons. Number one, they are being replaced by automation robotics and the former workers are being upskilled to supervise and program these robotics. And the other, more central, reason is that these production jobs move up and down the value chain of manufacturing, hence we have more manufacturers in higher value and higher paying jobs in Australia than we are aware of. That is number one. Number two, with that in mind, is that we don't have the numeric decline of manufacturing; we have a transformation of manufacturing to better, higher paying and more resilient jobs.¹²⁷

- 3.80 Other witnesses agreed, highlighting that automation is making manufacturing more productive and competitive, and enabling workers to be

¹²⁶ Dr Stanford, Centre for Future Work, *Proof Committee Hansard*, 11 November 2021, pp. 13 and 17.

¹²⁷ Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 7.

redeployed away from dangerous and repetitive manual tasks to higher skilled and more highly paid roles.¹²⁸ The OECD highlighted the potential benefits of this high-value manufacturing but warned but it may not result in significant employment growth:

Labour costs will overall be less important in these new products and production processes; hence curbing the need for offshoring of manufacturing activities to low labour cost regions. This would especially create growth opportunities for high technology manufacturing in developed economies; it is not sure however that this would directly result in large numbers of extra jobs given the small importance of labour (costs) in the total production process. Furthermore, given the high technology intensity, most of these jobs would be concentrated at the high skill end.¹²⁹

Employment reforms

Stimulating jobs

- 3.81 Witnesses want to see greater investment in manufacturing, through for example, government procurement and local content procurement rules, with more local jobs resulting from increased business opportunity, activity, and business confidence.¹³⁰ Business confidence is an important factor with several witnesses explaining that loss of confidence—due to the rising cost of inputs, or the declining profits—has a direct effect impact on jobs.¹³¹
- 3.82 One mechanism that may be used to develop this confidence is the *Australian Jobs Act 2013* (AJA), which requires major projects with a total capital expenditure of \$500 million or more to have an Australian Industry Participation Plan and provide opportunities for local businesses.¹³²
- 3.83 Both the ACTU and the AWU suggest that the threshold under the AJA be lowered to stimulate activity and create jobs, with the ACTU recommending

¹²⁸ ASI, *Submission 70*, p. [6]; Ms Barden, AFGC, *Proof Committee Hansard*, 8 December 2021, p. 4; Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 12; Professor Bradlow, ATSE, *Proof Committee Hansard*, 11 November 2021, p. 20.

¹²⁹ OECD, *Australian manufacturing in the global economy: study for the Australian Government, Department of Industry, Innovation, Science, Research and Tertiary Education*, DSTI/IND(2012)20/FINAL, 5 May 2015, p. 31.

¹³⁰ See, for example: Mr Murphy, AMWU, *Proof Committee Hansard*, 6 December 2021, pp. 30–31; Ms Weber, CFMMEU, *Proof Committee Hansard*, 6 December 2021, p. 35; Mr Taylor Rundell, National Economist, Australian Workers' Union (AWU), *Proof Committee Hansard*, 8 December 2021, p. 13; Ms O'Neil, ACTU, *Proof Committee Hansard*, 8 December 2021, p. 34; Ai Group, *Submission 68*, p. 5.

¹³¹ Dr Peter Burn, Chief Policy Adviser and Ms McGrath, Australian Industry Group, *Proof Committee Hansard*, 8 December 2021, p. 39 and 41; Mr Angelico and Ms Fenwick, SEMMA, *Proof Committee Hansard*, 8 December 2021, p. 25.

¹³² *Australian Jobs Act 2013*, s. 8(2); Ms Donna Looney, Head of Division, Industry Growth Division, DISER, *Proof Committee Hansard*, 11 November 2021, pp. 71–72.

that threshold levels should be around half the current \$20 million to address the combined employment impact of smaller projects and procurements.¹³³

- 3.84 In order to help fill manufacturing vacancies the AMWU recommend that employers required to train young workers so that they are sufficiently skilled to take up employment opportunities.¹³⁴

Improving workforce diversity

- 3.85 Several witnesses told the committee of the need to improve diversity in manufacturing workplaces—particularly in STEM sectors. They submit that a more diverse and inclusive workforce—which includes women, people with a disability, First Nations people, people from a culturally and linguistically diverse background and other diverse people—will make the industry more attractive and create cultural, community and social benefits.¹³⁵ The ACTU recommend reforms to enable the targeting of certain sectors of the workforce to improve diversity, with targets for key groups.¹³⁶

Industrial relations reforms

- 3.86 Multiple witnesses told the committee that they want to ensure appropriate wages and conditions for manufacturing workers through industrial relations reform, government policy and procurement measures, including for workers taking flexible, non-apprenticeship pathways into manufacturing. They want to see wages and conditions which take account of the social and community value of jobs:¹³⁷

... you should also be requiring in those tenders and contracts that it be ethical employment, that it's not simply any job that can then be outsourced to somebody else on a lower set of pay and conditions. You want direct employment, you want secure jobs where people get fair wages and conditions and you want an ethical approach to supply chains.¹³⁸

- 3.87 The ACTU¹³⁹ and the CFMMEU¹⁴⁰ argue for industrial relations law reform—in particular changes to the 2016 building code—to promote cooperation within

¹³³ Mr Rundell, AWU, *Proof Committee Hansard*, 8 December 2021, p. 15; Ms O'Neil, ACTU, *Proof Committee Hansard*, 8 December 2021, pp. 35 and 37.

¹³⁴ AMWU, *Submission 114*, pp. 9–10.

¹³⁵ Professor Bradlow, ATSE, *Proof Committee Hansard*, 11 November 2021, p. 20. See, for example: Medicines Australia, *Submission 83*, p. 10; ACTU, *Submission 117*, p. 26; Mr Angelico, SEMMA, *Proof Committee Hansard*, 8 December 2021, p. 27; Unus, *Submission 66*, pp. 4–5.

¹³⁶ ACTU, *Submission 117*, p. 43.

¹³⁷ Ai Group, *Submission 68*, p. 27; ASI, *Submission 70*, Attachment 1 (*Ensuring a sustainable Australian steel industry in the 2020s and beyond: white paper*), p. 44; Ms Weber, CFMMEU, *Proof Committee Hansard*, 6 December 2021, pp. 35–36; IPA, *Submission 74*, pp. 2–3.

¹³⁸ Ms O'Neil, ACTU, *Proof Committee Hansard*, 8 December 2021, pp. 34–35.

¹³⁹ ACTU, *Submission 117*, p. 43.

and between workplaces, and between employers and workers. It wants workers to be given a 'real voice' in their workplaces, and the establishment of a system that recognises and values the rights of workers and unions 'as a necessary precondition to the success of businesses that rely on them'.¹⁴¹

Incentives to develop manufacturing

3.88 Key Federal Government incentives for manufacturing are discussed here, with a fuller list in Appendix 3. This section discusses witness views on the effectiveness of key measures and potential alternatives.¹⁴²

3.89 The committee received a variety of evidence pointing to the importance of stable, long-term funding, particularly given long term lead times in manufacturing, as well as immediate, short-term funding and co-investment with government.¹⁴³ STA said:

... one of the things that we've observed about schemes that tend to work very well in other countries is the idea of long-term stability in the policy framework—so setting up an investment vehicle, whether that's a mix of early-stage direct grants or grants and loans, but then ideally having a strongly stable policy framework. That's really important to foster industry confidence in investing, knowing that the scheme isn't going to be chopped and changed but that there'll be a long-term commitment to those schemes that can enable them to get on and prove the product up to commercialisation and manufacture.¹⁴⁴

Co-funding incentives

3.90 Witnesses also drew the committee's attention to the value of industry-led, co-investment opportunities,¹⁴⁵ with Dr Goennemann of the AMGC advising:

Australia is obsessed with grants—throwing money at something and hoping it sticks; usually it doesn't. But the difference when an initiative is industry led and a grant is co-invested ... That is the magic difference between just a grant—fire and forget—and checking homework and making sure that the co-investment for the advanced manufacturing is happening.¹⁴⁶

¹⁴⁰ Ms Weber, CFMMEU, *Proof Committee Hansard*, 6 December 2021, pp. 35–36.

¹⁴¹ ACTU, *Submission 117*, p. 34.

¹⁴² For details of other initiatives and incentives see: DISER, *Submission 116*, pp. 9–10.

¹⁴³ See, for example: Ms Barden, AFGC (AFGC), *Proof Committee Hansard*, 8 December 2021, p. 2; Dr Anna Lavelle, Chair, Medicines Australia Board, Medicines Australia, *Proof Committee Hansard*, 8 December 2021, p. 19; Ms Schubert, STA, *Proof Committee Hansard*, 11 November 2021, p. 29.

¹⁴⁴ Ms Schubert, STA, *Proof Committee Hansard*, 11 November 2021, p. 29.

¹⁴⁵ See, for example: Mr Stephen Porter, Head of Sustainability, Innovation and Trade, InfraBuild, *Proof Committee Hansard*, 6 December 2021, p. 45, Mr Mark Cain, CEO, ASI, *Proof Committee Hansard*, 6 December 2021, p. 49; Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 3.

¹⁴⁶ Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 8.

Industry Growth Centres

- 3.91 Industry growth centres appear to have made headway in stimulating networks and manufacturing ecosystems,¹⁴⁷ with Complementary Medicines Australia (CMA) advising that further government support is needed for growth centres, such as MTPConnect, in order to further develop manufacturing ecosystems.¹⁴⁸
- 3.92 Dr Goennemann explained that the success of the AMGC has hinged on four pillars: direction setting through research, demonstration of research through projects, creating industry-wide awareness through networks, and measurement of outcomes. He advocates for the growth centre model and calls for additional investment and government recognition of the value of growth centres, including their role in supporting the Government's agenda:

I'm not advocating for the extension of the growth centres in the sense in the sense [sic] of being dependent on government. All the growth centres knew from the outset that we had to become self-sufficient, and we're happy to do that, but we highly recommend continuing to work closely with federal, state and territory government to continue doing what works and transform Australian manufacturing ...¹⁴⁹

Tax incentives

Company tax

- 3.93 Certain witnesses emphasised the importance of Australia's regulatory and tax regimes, including company tax, to its success in attracting investment, with the Ai Group stating:¹⁵⁰

Of course, it's a globally competitive environment. Everyone is searching for capital. We need to make ourselves an attractive destination as best we can. There are many factors working against us, not least our very small market size and our distance from other key markets. So any cause of friction, such as a taxation regime that's out of step with the rest of the world, will make us less attractive ... The lower the company tax rate, the better the after-tax return.¹⁵¹

- 3.94 However, others, such as SEMMA, warn against tax cuts, instead suggesting that improving domestic demand and improving investment incentives would be more effective:¹⁵²

¹⁴⁷ See, for example: Sanofi, *Submission 47*, p. 3; CRA, *Submission 103*, p. 9; AMGC, *Submission 40*, p. [1]; Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, p. 10.

¹⁴⁸ CMA, *Submission 101*, pp. 8–9.

¹⁴⁹ Dr Goennemann, AMGC, *Proof Committee Hansard*, 11 November 2021, pp. 10–11.

¹⁵⁰ Ai Group, *Submission 68*, pp. 4 and 14; Minerals Council of Australia, *Submission 72*, p. 11.

¹⁵¹ Ms McGrath, Australian Industry Group, *Proof Committee Hansard*, 8 December 2021, p. 39.

¹⁵² Arrival, *Submission 110*, p. 7; National Civic Council, *Submission 82*, p. 16.

... despite current financial stresses, [survey results showed that] an Investment Incentive, on a dollar for dollar basis, would encourage them to commit to purchase equipment/technologies to grow their business. Reduced company tax rates were not generally seen as offering incentives to invest i.e., when revenues and profits are down, the corporate tax rate loses its efficacy for stimulus.¹⁵³

Research and Development Tax Incentive (RDTI)

3.95 The committee heard varying evidence as to the success of the RDTI in encouraging innovation and investment.¹⁵⁴

3.96 MA supports a broad-based tax incentive approach (such as the RDTI) but emphasises that any incentive must be predictable and stable to improve competitiveness.¹⁵⁵

Australia's Research and Development Tax Incentive has been subject to considerable review and amendment in recent years. While the overall rate of incentive has been reduced and is now lower than many competing jurisdictions, the first priority should be to stabilise the scheme to enable confidence in the reliability of the incentive to rebuild amongst industry. Ideally, in future years the R&DTI should be increased, at least in line with neighbouring incentives in New Zealand, to ensure the rate remains globally competitive over time.¹⁵⁶

3.97 Ai Group backs additional support for the RDTI to stimulate R&D—noting that SMEs in particular may be reluctant to fund R&D without clear government signals or demand.¹⁵⁷

3.98 Several witnesses recommend changes to RDTI processes and support to make it easier for manufacturers to apply for the incentive and to migrate to commercialisation incentives without starting from scratch.¹⁵⁸

Patent box scheme

3.99 MA, the STA, Medicines Australia are supportive of the patent box scheme with modification. Medicines Australia believes that the concessional rate

¹⁵³ SEMMA, *Submission 105*, p. 13.

¹⁵⁴ Australian Sovereign Capability Alliance, *Submission 81*, Attachment 1 (AITI, Flinders University, *Australian sovereign capability and supply chain resilience: perspectives and options*), p. 67; PC, *Submission 78*, pp. 6, 9 and 11; ACTU, *Submission 117*, pp. 29–30.

¹⁵⁵ Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 2.

¹⁵⁶ MA, Answer to question on notice, 11 November 2021 (received 3 December 2021).

¹⁵⁷ Ai Group, *Submission 68*, pp. 3, 11; Ai Group, Answer to question on notice, 8 December 2021 (received 16 December 2021).

¹⁵⁸ For more information see: Mr Bill Ferris AC, Dr Alan Finkel AO and Mr John Fraser, [2016 Review of the R&D Tax Incentive](#), 4 April 2016 and ISA, *Australia 2030: Prosperity through Innovation: a plan for Australia to thrive in the global innovation race*, November 2017. AMGC, *Submission 40*, p. [7]; Ai Group, *Submission 68*, p. 3; ATSE, *Submission 38*, p. 4; STA, *Submission 52*, p. 2.

'must be lowered', and that the concessional tax rate be applied to all publicly funded R&D, whereas the STA would like to see an earlier start date to include earlier investments. Other submitters want to see the scheme extended to sectors such as low emissions technologies.¹⁵⁹

Accelerated depreciation deduction

3.100 The committee heard from several submitters in support of this scheme, with MA recommending it be extended to cover the long capital investment cycles in the manufacturing industry.¹⁶⁰ The AFGC expressed concerns about the current eligibility threshold, suggesting that the threshold for large manufacturers be removed or that it has regard to existing capital assets in need of upgrade.¹⁶¹

Grant incentives

Modern Manufacturing Initiative (MMI)

3.101 MA is supportive of grant funding such as that provided through the Modern Manufacturing Initiative (MMI) and argued that a more targeted approach is needed for sectors the government is trying to encourage and where R&D activity is in the national interest.¹⁶²

3.102 However, not all witnesses are satisfied at the Government's approach, with Ai Group supporting public funding for broader innovative activity on any topic, not just those which align with the National Manufacturing Priorities (NMPs),¹⁶³ and other stakeholders encouraging a merits-based approach:¹⁶⁴

... we were so disappointed to see such a narrow set of industries that can participate in the Modern Manufacturing Initiative ... it's quite disappointing that a program that promises so much in the title and preamble delivers nothing for our industry.¹⁶⁵

¹⁵⁹ Medicines Australia, Answer to question on notice, 8 December 2021 (received 14 December 2021); Professor Sriram, STA, *Proof Committee Hansard*, 11 November 2021, p. 26; STA, *Submission 52*, p. 5; Department of the Treasury, [Patent box: discussion paper on policy design](#), July 2021, p. 3 (accessed 5 January 2022); Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 6.

¹⁶⁰ Ms Barden, AFGC (AFGC), *Proof Committee Hansard*, 8 December 2021, p. 1; MCA, *Submission 72*, p. 11; Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 6.

¹⁶¹ Ms Barden, AFGC (AFGC), *Proof Committee Hansard*, 8 December 2021, p. 7.

¹⁶² Mr Eade, MA, *Proof Committee Hansard*, 11 November 2021, p. 2.

¹⁶³ Ai Group, Answer to question on notice, 8 December 2021 (received 16 December 2021).

¹⁶⁴ Mr Stuart Charity, CEO, Australian Automotive Aftermarket Association (AAAA), *Proof Committee Hansard*, 6 December 2021, pp. 1 and 3–4; AAAA, *Submission 31*, p. [2]; Mr Cain, ASI, *Proof Committee Hansard*, 6 December 2021, p. 51; ASI, *Submission 70*, p. [6]; Ms Fenwick, SEMMA, *Proof Committee Hansard*, 8 December 2021, p. 28.

¹⁶⁵ Mr Charity, AAAA, *Proof Committee Hansard*, 6 December 2021, p. 1.

3.103 The ACTU¹⁶⁶ and the AFGC expressed their dissatisfaction with the funding available and the effectiveness of the roll out:

I would say that the sector has been disappointed. The pace at getting the dollars rolled out has been slower than anticipated, and the level of funding coming forward has been lower than anticipated ... I know many companies are very disappointed about that as they had put a lot of effort into grant applications. Had they known such a small amount was forthcoming, they may not have bothered. There has been disappointment around that.¹⁶⁷

3.104 DISER defended the scheme, telling the committee:

... we have seen that the private investment is definitely there. The Modern Manufacturing Strategy is sending a signal to industry about government's investment in these six priority areas, and we're seeing private investment coming in at around two to one, so it's \$2 of private sector investment for \$1 of government investment. So there definitely is a lot of interest from private sector investors and from industry. Like I said, 150 applications purely in the recycling and clean energy space is really encouraging.¹⁶⁸

Support for other grant initiatives

3.105 A number of submitters supported the Government's Technology Investment Roadmap, with MA highlighting the value of initiatives which de-risk investment in new technologies.¹⁶⁹

3.106 The Centre for Future Work, ACTU and Ai Group support the further expansion of the Australian Renewable Energy Agency's (ARENA) funding to enable it to support a range of organisations and technologies, with the ACTU supporting the use of the Clean Energy Finance Corporation (CEFC) model in other sectors.¹⁷⁰

3.107 Ai Group stands by the continuation and expansion of the Entrepreneurs' Programme to develop the capabilities and ambitions of Australian manufacturers, advising:

The Entrepreneurs Program [sic] and its predecessors provide countless examples of a successful and adaptive policy measure that has materially improved the management of the businesses that have benefited from its

¹⁶⁶ ACTU, *Submission 117*, p. 5.

¹⁶⁷ Ms Barden, AFGC (AFGC), *Proof Committee Hansard*, 8 December 2021, p. 3.

¹⁶⁸ Ms Narelle Luchetti, Head of Division, Manufacturing Division, DISER, *Proof Committee Hansard*, 11 November 2021, pp. 73–74.

¹⁶⁹ MA, *Submission 112*, p. 4. See also: Australian Petroleum Production and Exploration Association (APPEA), *Submission 96*, p. 9; AWU, *Submission 113*, p. [11]; ACTU, *Submission 117*, p. 15.

¹⁷⁰ Centre for Future Work, *Submission 88*, p. 19; ACTU, *Submission 117*, pp. 8 and 16; Ai Group, *Submission 68*, p. 40.

services. There is considerable scope for expansion and rejuvenation of this, and similar programs.¹⁷¹

Innovation, collaboration, and research

3.108 Witnesses suggested a range of other measures to fund innovation, collaboration, and research:

- prizes, with financial reward for the first proponent to reach a specified innovation milestone, large enough to cover development costs and risks and provide an attractive return, potentially coupled with open access to the resulting IP;¹⁷²
- outcomes-based procurement by government (procurement is discussed further in Chapter 5);¹⁷³
- a 100 per cent depreciation rate for IP under corporate income tax arrangements to help foster faster investment;¹⁷⁴ and
- the creation of a general manufacturing fund which encourages and rewards collaboration across currently disconnected entities, which focusses on areas where Australia can uniquely value add, and which facilitates new research resources.¹⁷⁵

Capital investment and commercialisation

3.109 The committee also heard from witnesses who suggested incentives to improve capital investment and commercialisation in manufacturing, including:

- the importance of regulation, government policy and favourable tax settings to Australia's success in attracting foreign direct investment;¹⁷⁶
- tax incentives or deductions, or the utilisation of special economic zones or activities to encourage capital investment, including by superannuation and investment funds;
- the establishment of a tradable tax credit market to allow pre-taxable manufacturers to trade future tax credits; and
- the use of royalty structures, similar to those used by extractive industries.¹⁷⁷

3.110 The STA recommends the introduction of a research translation fund which directly funds industry and research bodies to bridge the gap between an idea

¹⁷¹ Ai Group, *Submission 68*, p. 14.

¹⁷² Ai Group, Answer to question on notice, 8 December 2021 (received 16 December 2021).

¹⁷³ Ai Group, Answer to question on notice, 8 December 2021 (received 16 December 2021).

¹⁷⁴ AMWU, *Submission 114*, p. 13; Centre for Future Work, *Submission 88*, p. 25.

¹⁷⁵ MotM, *Submission 11*, pp. 1 and 3.

¹⁷⁶ Ai Group, *Submission 68*, p. 4.

¹⁷⁷ MEF(SC), *Submission 34*, pp. 4–5; Ms Barden, AFGC, *Proof Committee Hansard*, 8 December 2021, p. 3; SEMMA, *Submission 105*, p. 11; Carmichael Centre, *Submission 46*, p. 16.

and a product,¹⁷⁸ noting the funding gap between traditional research grants and when a product becomes commercially viable—a significant for SMEs.¹⁷⁹ SEMMA also recommends the establishment of a new fund, but with the added requirement to invest in Australian-made goods and/or services.¹⁸⁰

3.111 The Australian Citizens Party¹⁸¹ and National Civic Council called for more government investment, recommending a national, government-backed development bank, such as those used in Norway, Germany, China, and Japan and not dissimilar to existing entities such as the Northern Australia Infrastructure Facility (NAIF) and the Clean Energy Finance Corporation¹⁸² or the original Commonwealth Bank.¹⁸³

Sector-specific support

3.112 Several witnesses argued for sector-specific support, beyond those areas identified in the NMPs. For example:

- the MUA suggest government investment and shareholding in a strategic shipping fleet, as well as R&D, regulatory and taxation support for the maritime and shipping industry in order to support and grow the industry, creating new products and jobs;
- the Grattan Institute thought that there should be support for R&D into technologies that match zero-emission energy or feedstock with demand, addressing both industry and emissions reduction needs;
- the Carmichael Centre recommends the establishment of an authority to oversee the decarbonisation of transport systems and associated transition, supported by equity funding; and
- other submitters suggested the establishment or ongoing support for sector-specific research centres and oversight bodies to facilitate collaboration and advise government on policy and fiscal measures.¹⁸⁴

¹⁷⁸ STA, *Submission 52*, pp. 2–3.

¹⁷⁹ Associate Professor Brownlie, STA, *Proof Committee Hansard*, 11 November 2021, p. 27; Ms Schubert, STA, *Proof Committee Hansard*, 11 November 2021, pp. 27 and 29; Sanofi, *Submission 47*, p. 3.

¹⁸⁰ SEMMA, *Submission 105*, p. 11.

¹⁸¹ Australian Citizens Party, *Submission 64*, pp. 4–5.

¹⁸² National Civic Council, *Submission 82*, pp. 23–25.

¹⁸³ Australian Citizens Party, *Submission 64*, p. 4; National Civic Council, *Submission 82*, pp. 23–25.

¹⁸⁴ MUA, *Submission 77*, pp. 5–7 and 22; Grattan Institute, *Submission 65*, p. 4; see also: MUA, *Submission 77*, p. 9; Carmichael Centre, *Submission 46*, p. 16; see, for example: ASI, *Submission 70*, pp. 6–7; Infrabuild, *Submission 73*, p. [3]; MUA, *Submission 77*, pp. 7–8 and 31.

Chapter 4

Transformation of manufacturing

Introduction

- 4.1 It is perhaps an obvious statement, but manufacturing, like other aspects of life, is a place of constant change and transformation. The large-scale manufacturing of the past, such as cars, whitegoods, and heavy industry have, at least in part, been replaced with the manufacture of high-technology goods such as sophisticated health-care equipment, computers, mobile phones, virtual reality, artificial intelligence, and autonomous vehicles. This has collectively been labelled as 'Industry 4.0' — the fourth industrial revolution.
- 4.2 This chapter will examine some of these new trends in manufacturing and how they can be utilised to strengthen Australia's manufacturing.

Industry 4.0

- 4.3 The remarkable transformation in manufacturing in the past few decades has become known as Industry 4.0 – a fourth industrial revolution. This fourth industrial revolution is changing the way people around the world live and work. Technological advancements in the areas of artificial intelligence and smart devices have meant disruptive technologies are now part of everyday life for both individuals and businesses.¹

- 4.4 The University of Swinburne explained Industry 4.0 further:

Industry 4.0 fundamentally changes the way in which businesses create and capture value. This shift is enabled by a set of technologies including autonomous robots, simulation technology, system integration, the Internet of Things (IoT), cybersecurity, cloud computing, additive manufacturing, augmented reality and big data.

Industry 4.0 technologies have been around individually for a while, more recently, they have begun to mutually influence and impinge on each other, enabled by the Internet and a significant reduction in cost. This allows businesses to take advantage of the technology to significantly shift their business models.²

- 4.5 Mr Bernard Marr, in Forbes magazine, described some of the opportunities that this transformation offers:

Identify opportunities: Since connected machines collect a tremendous volume of data that can inform maintenance, performance and other

¹ 'Industry 4.0 Design Principles', <https://www.rmit.edu.au/news/c4de/industry-4-0-design-principles>, (accessed 14 January 2022).

² 'What is Industry 4.0?', Swinburne University, <https://www.swinburne.edu.au/about/strategy-initiatives/industry-4-0/what-is-industry-4-0/>, (accessed 14 January 2022).

issues, as well as analyse that data to identify patterns and insights that would be impossible for a human to do in a reasonable timeframe, Industry 4.0 offers the opportunity for manufacturers to optimize their operations quickly and efficiently by knowing what needs attention. By using the data from sensors in its equipment, an African gold mine identified a problem with the oxygen levels during leaching. Once fixed, they were able to increase their yield by 3.7 per cent, which saved them \$20 million annually.

Optimize logistics and supply chains: A connected supply chain can adjust and accommodate when new information is presented. If a weather delay ties up a shipment, a connected system can proactively adjust to that reality and modify manufacturing priorities.

Autonomous equipment and vehicles: There are shipping yards that are leveraging autonomous cranes and trucks to streamline operations as they accept shipping containers from the ships.

Robots: Once only possible for large enterprises with equally large budgets, robotics are now more affordable and available to organizations of every size. From picking products at a warehouse to getting them ready to ship, autonomous robots can quickly and safely support manufacturers. Robots move goods around Amazon warehouses and also reduce costs and allow better use of floor space for the online retailer.

Additive manufacturing (3D printing): This technology has improved tremendously in the last decade and has progressed from primarily being used for prototyping to actual production. Advances in the use of metal additive manufacturing have opened up a lot of possibilities for production.

Internet of Things and the cloud: A key component of Industry 4.0 is the Internet of Things that is characterized by connected devices. Not only does this help internal operations, but through the use of the cloud environment where data is stored, equipment and operations can be optimized by leveraging the insights of others using the same equipment or to allow smaller enterprises access to technology they wouldn't be able to on their own.

While Industry 4.0 is still evolving and we might not have the complete picture until we look back 30 years from now, companies who are adopting the technologies realize Industry 4.0's potential. These same companies are also grappling with how to upskill their current workforce to take on new work responsibilities made possible by Internet 4.0 and to recruit new employees with the right skills.³

4.6 AIGroup has recognised the importance of this new industrial revolution, and argued that Australia is still grappling with it:

[Well before the pandemic], Australian manufacturing was evolving into more advanced modes, requiring very different mindsets, business

³ Mr Bernard Marr, 'What is Industry 4.0? Here's A Super Easy Explanation For Anyone', *Forbes*, <https://www.forbes.com/sites/bernardmarr/2018/09/02/what-is-industry-4-0-heres-a-super-easy-explanation-for-anyone/?sh=7e83fda49788>, (accessed 14 January 2022).

models, skills and capabilities. These innovative approaches built on digital technologies are often referred to as Industry 4.0 or Smart Manufacturing.

Rapidly advancing technologies are producing waves of wider innovation across the economy as businesses and individuals build new social practices and business models upon them. Manufacturers are grappling with these changes in different ways and with different levels of readiness and capability.⁴

Connectivity and data

4.7 Connectivity and the ability to share data is at the centre of Industry 4.0, as it provides accurate real-time information and flexibility to the manufacturing sector. Utilising connectivity is the key to developing automation, robotics, virtual and reality, Blockchain, and other Industry 4.0 capabilities. Without connectivity, data could not be fully exploited and only by increasing connectivity will nations and industry be able to harness the opportunities that Industry 4.0 offers.

4.8 Mr Colin Koh, Senior Business Development Manager, Industry 4.0 Consultant, explained:

However, connectivity is useless unless the machines communicating can understand one another. So, in our journey to Industry 4.0, the field of interoperability has come to the fore to facilitate the smooth exchange of information between various devices and systems, often made by a range of manufacturers...

The primary role of connectivity in Industry 4.0 is to enable companies throughout the manufacturing supply chain to form networks and optimise individual steps in the supply chain. Various information and communications technologies enable creation of networks, which include entire manufacturing processes. Links connect warehousing systems, smart machines, human workers, and production operations, to bring about a wide range of enhanced processes and services.⁵

Skills & training

4.9 Science and Technology Australia recognised the need for specific training and skills development for Australia to take advantage of the manufacturing transformation.

The future of manufacturing in Australia lies in the areas of advanced and additive manufacturing. It is crucial that we can produce customised products on demand for consumers. To achieve this, the manufacturing sector is going to require additional skills and training, extending the skilled workforce needs of the sector. The new opportunities ahead will

⁴ AiGroup, *Submission 68*, p. 9.

⁵ 'Connectivity & Interoperability Part 1 – The Ultimate Enablers for Industry 4.0', *ElectGo*, 30 March 2021, <https://www.electgo.com/connectivity-interoperability-part-1-the-ultimate-enablers-for-industry-4-0/>, (accessed 15 January 2022).

require expertise in engineering, software, design, and material science sciences - to name just a few of the specific fields of expertise.⁶

4.10 AiGroup also made specific mention of the need to develop skills and training in the context of Industry 4.0:

If Australians are to have access to challenging, high-paid jobs in high-productivity industries with greater social and economic opportunities, our education and training outcomes need to lift and be more closely aligned with the rapidly changing opportunities in the labour market.

Digitalisation is disrupting the skills that education and training systems strive to supply. It is leading to reallocations of employment between tasks, sectors and regions. It is shifting labour demand towards higher level, more cognitive skills for which many workers are not adequately trained – in critical enquiry, problem solving and communication – that can be coupled with technical capability to build a broader set of skills for application in different environments, including global environments.

These pressures are reflected in significant skills shortages, particularly for professionals, technician and trades workers with STEM [science, technology, engineering, and mathematics] capabilities. At the same time, almost all employers are currently impacted in some way by low levels of literacy and numeracy – a concern when foundational skills now include digital literacy.

Dynamic workplaces mean that continuing education and training needs to be provided to existing workers when required, in shorter forms, for quick adaptation to new skill demands. Workers more capable of undertaking productive and engaged roles are better able to contribute to innovation in the workplace.⁷

4.11 Moreover, AiGroup also identified the need to revamp Australia's apprenticeship system to accommodate the Industry 4.0 revolution:

We identified that, while the traditional apprenticeship model could still have a role within Industry 4.0, it didn't have that high degree, as we like to say, that higher diploma, of digitalisation and those digital skills that are required. The current apprenticeship model obviously gives fantastic on-the-job skills training, but we actually want future skills training. We piloted an apprenticeship model that combined on-the-job training with university-based training...⁸

I think the industry 4.0 example is exactly that, and that can be applied more broadly. Apprenticeships are still very rigid, and they're governed within the industrial system, whereas we could have much more flexibility

⁶ Science and Technology Australia, *Submission 52*, p. 4.

⁷ 'The Fourth Industrial Revolution: Australian businesses in transition, August 2019, AiGroup, https://cdn.aigroup.com.au/Reports/2019/AiGroup_Fourth_Industrial_Revolution_Report.pdf, p. 55, (accessed 14 January 2022).

⁸ Ms Louise McGrath, Head, Industry Development and Policy, Australian Industry Group, *Committee Hansard*, Canberra, 8 December 2021, p. 41.

and a broader application of training and work-related training that could come under an apprenticeship model and be much more widely used.⁹

- 4.12 A joint submission by AusBiotech, Cell Therapies Pty Ltd, MTP Connect and Research Strategies Australia also argued that for Australia to participate in and take advantage of, the emerging new wave of medical innovation, then this would require scarce highly-skilled personnel. Amongst other factors, they see a key barrier as being lack of a highly skilled advanced manufacturing workforce pipeline and recommend the development of such a pipeline.¹⁰

Programming and Gaming

- 4.13 As noted above, 'Industry 4.0' takes manufacturing beyond the traditional mass production of physical goods. In this context, the committee received a particularly interesting submission from Interactive Games and Entertainment Association (IGEA), one which gave emphasis to the advantages of the Industry 4.0 evolution. IGEA represents the Australian video games industry, including the developers, publishers, and distributors of video games, and the makers of video game systems, consoles, devices, and accessories.¹¹
- 4.14 IGEA argued that these software and gaming developers represented a new and potentially lucrative sector of the manufacturing economy, even though the fell outside the traditional perspective of what constitutes 'manufacturing' – i.e. the construction of physical 'things'. They argued:

As very credibly a form of Australian manufacturing, video game development has many unique and desirable characteristics that we believe will be of interest to the Committee and Australian policy-makers more generally, particularly during the current COVID-disrupted world:

- As digitally-created software-based goods, limitless copies of a game can be manufactured at no cost (and only at a small additional cost for disc versions of the game).
- Digital versions of games, which comprise the bulk of sales in our sector, will never experience supply shortages, unsold inventories, or disruptions to manufacturing processes (such as those that occurred with many industries during COVID).
- Digitally-distributed games, being the most common way games are bought, incur no transport costs or transport-related emissions, are delivered instantaneously, and are very resilient to global trade disruptions (such as those experienced during COVID).
- Australian-made video games have a global market, with well over 90 per cent of sales going offshore, as well as a highly diversified

⁹ Dr Peter Burn, Chief Policy Adviser, Australian Industry Group, *Committee Hansard*, Canberra, 8 December 2021, p. 41.

¹⁰ AusBiotech, Cell Therapies Pty Ltd, MTPConnect and Research Strategies Australia, *Submission 80*, pp. 3, 7 and 8.

¹¹ Interactive Games and Entertainment Association (IGEA), *Submission 16*, p. 1.

market, with Australian-made games one of the very few Australian-made products to have been exported to every country in the world.

- The global video games market that our developers target is insatiable, worth around \$250 billion last year (well over twice the size of the global film and music industries combined). It is also a consumer market that thrives during periods of disruption, with the global games market experiencing accelerated growth throughout COVID.
- Unlike most manufactured products, which are typically sold just once to an end-user or another business, video games can continue to generate revenue year after year as they are often (and increasingly) both a 'good' as well as a 'software-as-a-service'.
- Australia has two natural advantages over other countries in game development: the first being a strong global reputation for creating skilled game developers, as well as a beneficial time zone roughly halfway between Europe and North America that allows for continuous global game development under a 'follow-the-sun' production model.
- Video game development is both specialised and highly labour-intensive. This means that the sector can create thousands of jobs for Australians. Game jobs are also 'sticky' because they are driven by creativity and collaboration, meaning that once in Australia, those jobs tend to stay and cannot be easily outsourced.
- The skills created by a strong game development sector are highly relevant to other unrelated sectors, including many other manufacturing sectors. For example, video game engines and the physics engineers trained in them are increasingly finding applications across the Australian economy, such as in Australia's mining and ship-building sectors.
- A strong game development sector genuinely benefits Australia's national resilience and security. Video game technology has been developed and employed across Government, from a recruitment tool for intelligence officers to simulation software for combat training, while many Australians with a game development background currently work in Defence.¹²

Role for Government in Industry 4.0

4.15 There has certainly been a role for government in this new industrial frontier. Mr Fengwei Yang and Mr Sai Gu noted in their paper that: "the continuous development and practical applications of Industry 4.0 rely on government policies and supports." Furthermore, they argued that: "it is to the governments' benefits for materialising the outcomes of various Industry 4.0 practices."¹³

¹² Interactive Games and Entertainment Association (IGEA), *Submission 16*, pp. 2–3.

¹³ Yang, F., Gu, S. 'Industry 4.0, a revolution that requires technology and national strategies', *Complex & Intelligent Systems*, Volume. 7, 1311–1325 (2021). <https://doi.org/10.1007/s40747-020-00267-9>, (accessed 15 January 2022).

- 4.16 They also examined the initiatives governments around the world had introduced. A table listing those countries and their main policy documents are in the table below.

Table 4.1 Industry 4.0, a revolution that requires technology and national strategies

Country	Iconic industrial plan
Australia	Industry 4.0 Testlabs
Belgium	Made Different
Denmark	Manufacturing Academy of Denmark (MADE)
France	Industrie du Futur
Germany	Industrie 4.0
Italy	Impresa 4.0
Japan	Society 5.0
Netherlands	Smart Industry
People's Republic of China	Made in China 2025
Portugal	Indústria 4.0
Singapore	Research, Innovation and Enterprise 2020 Plan
South Korea	Manufacturing Industry Innovation 3.0
Spain	Industria Conectada 4.0
United Kingdom	The Future of Manufacturing
United States of America	Advanced Manufacturing Partnership

Source: <https://link.springer.com/article/10.1007/s40747-020-00267-9/tables/2>

- 4.17 The two authors concluded:

Many governments have started their tailored policies to support this technological revolution. However, we are still in the beginning of its transition...

From the existing literature, it is clear and have been repeatedly highlighted that within the industries, an interdisciplinary approach is essential to the Industry 4.0 development...

In addition, it is widely accepted that an international coordination and governmental support are necessary... We can see in many countries, the

idea of an industrial revolution has long been on the horizon before 2011. Countries are tailoring their plans in accordance with their strength.¹⁴

4.18 Notably, Australia signed a Cooperation Agreement with Germany in November 2015 on Industry 4.0:¹⁵

Plattform Industrie 4.0 in Germany and the Prime Minister's Industry 4.0 Taskforce in Australia have agreed to cooperate in the following areas:

- Reference architectures, standards and norms
- Support for Small- and Medium sized Enterprises (SMEs)
- Industrie 4.0 Testlabs
- Security of Networked Systems
- Work, education and training¹⁶

Committee comment

4.19 Manufacturing world-wide has entered a period of transformation. The rapid development of computing power and internet connectivity are changing what is being manufactured and how that manufacturing is done.

4.20 While this may very well be disruptive, it generates new opportunities for Australian industry. It is encouraging that the Australian Government recognised this opportunity through the Testlabs initiative and its agreement with Germany.

4.21 There does, however, appear to be much further work to do as this fourth industrial revolution is still in its relative infancy. In particular, further consideration to training and skills needs to be made.

¹⁴ Yang, F., Gu, S. 'Industry 4.0, a revolution that requires technology and national strategies', *Complex & Intelligent Systems*, Volume. 7, 1311–1325 (2021). <https://doi.org/10.1007/s40747-020-00267-9>, (accessed 15 January 2022).

¹⁵ 'German-Australian Cooperation on Industrie 4.0', <https://www.industry.gov.au/sites/default/files/2019-03/german-australian-cooperation-on-industrie-4.0.pdf>, (accessed 15 January 2022). See also: <https://www.industry.gov.au/data-and-publications/industry-40-testlabs-in-australia>, (accessed 15 January 2022).

¹⁶ 'German-Australian Cooperation on Industrie 4.0', <https://www.industry.gov.au/sites/default/files/2019-03/german-australian-cooperation-on-industrie-4.0.pdf>, (accessed 15 January 2022).

Chapter 5

Opportunities for government

Introduction

- 5.1 This chapter will examine what opportunities are available for government to facilitate to create a future looking, sustainable and efficient manufacturing sector in Australia.
- 5.2 The opportunity exists for Government to establish a framework for manufacturing without running the risk of favouring specific sectors or business models. This can be achieved through:
- Policy
 - Government procurement and local content targets
 - Harmonisation of standards and procedures
 - Provision of key capabilities
 - Energy
- 5.3 The observations made in this chapter will feed into the committee's comments and recommendations in the following chapter.

Policy

Developing a resilience domestic manufacturing sector

- 5.4 As part of creating a resilient and sustainable manufacturing sector, Australia needs to address the single biggest issue that has arisen out of the covid crisis—the impact of a limited domestic manufacturing capability.
- 5.5 As outlined in chapter 1, the widespread shutdown of global supply chains caused by the Covid-19 pandemic (the pandemic) has exposed the heavy reliance on China and the extent to which they will retaliate to any questioning of its actions.

China and the post-Covid world

- 5.6 The pandemic has created a unique opportunity to refocus domestic security of supply. The pandemic has assisted in lifting the fog for many countries, highlighting their over-reliance on 'Made in China' as a strategy for dealing with tough decisions to support domestic manufacturing.

Broad policy and strategy

- 5.7 The Commonwealth Government has at its disposal several levels through which it can strengthen and promote Australian manufacturing. The following section will address some of those areas.

- 5.8 The Productivity Commission (PC) argued that the role for government in the development of Australia's manufacturing industry is specific, and:

...focuses on tailoring government intervention to the circumstances: where markets can function well, a key role of government is to foster efficient and dynamic markets; where markets cannot function well, it can be appropriate to fund, supply or regulate in ways that enhance the living standards of the community as a whole.¹

- 5.9 Dr Jens Goennemann, of the Advanced Manufacturing Growth Centre (AMGC), explained to the committee that there are four pillars for manufacturing: government, industry, public service, and research. While he believes that industry should lead the way to reform, he sees government as playing a vital support role:²

First of all, I believe that industry needs to lead the charge. Government needs to support. The first thing government needs to do in support is to be consistent: have a plan and stick to it for 20 years. The plan doesn't need to be perfect but needs to be good enough to be successful—and stick to it.³

- 5.10 Dr Mark Dean, Carmichael Distinguished Research Fellow, Centre for Future Work, notes that the policy decision to end automotive manufacturing lacked strategic insight to the extent of role it played in the broader economy

Political decisions to end automotive manufacturing in Australia were short-sighted and bucked the trend of strategic, long-term industry policy and planning adopted by the world's leading economies including the United States, Germany, Japan, China, and other advanced industrial nations. The renewed global interest in active industry policy demonstrates an implicit understanding that manufacturing carries a unique strategic importance to economic growth and development.⁴

- 5.11 Thus, there is space for government to implement well-informed and pro-active policies.

Performance of existing policies

- 5.12 The committee has, through submissions and hearing testimony, received evidence that suggests that Australia's current policy is failing to sustain and support the growth of manufacturing in Australia.

- 5.13 Former South Australian Member of Parliament, and current Director of the Australian Sovereign Capability Alliance (ASCA), the Hon. Mr Martin Hamilton-Smith, remarked:

¹ Productivity Commission (PC), *Submission 78*, p. 6.

² Dr Jens Goennemann, Managing Director, Advanced Manufacturing Growth Centre (AMGC), *Proof Committee Hansard*, 11 November 2021, p. 8.

³ Dr Jens Goennemann, *Proof Committee Hansard*, 11 November 2021, p. 8.

⁴ Dr Mark Dean, Carmichael Centre, *Submission 46*, p. 3.

If we keep doing things the way we have in recent decades, we're at risk of seeing an ongoing decline in manufacturing.⁵

5.14 Dr Mark Dean argued that there is no overarching strategic policy direction:

In one phrase: the lack of industry policy. I think that's strategic. There needs to be a federally coordinating industry policy strategy in place to actually shape the direction of our industrial capabilities. As I mentioned, we have a history in Australia of manufacturing in the automotive sector particularly, and that has actually set us on a particular pathway which means that, as we let more of that automotive supply chain go, we actually lose a lot of the capabilities and skills related to that. So the first step is obviously coordinating that and overcoming that barrier of simply having no strategy for such an important industry within the manufacturing sector.⁶

5.15 Ms Natalie Currey, General Manager Supply Chains, Australasian Railway Association, also lamented the fragmented nature of policy that had impacted the rail sector:

The current unprecedented level of investment in rail provides huge opportunities for the Australian rail manufacturing sector. However, due to the fragmented nature of rail and the numerous legacy issues in Australia, the full benefits for local manufacturers are significantly constrained.⁷

5.16 The new manufacturing of digital programming and games is one that also has, according to one submitter at least, been neglected. Interactive Games and Entertainment Association (IGEA) commented:

If we have one request in this letter for the Committee to consider, it is for any recommendations that it eventually makes to also reflect on opportunities to boost digital manufacturing sectors like game development. Historically, federal policies focused on keeping and strengthening manufacturing industries, such as support measures, grants, red tape reduction, and hiring and investment incentives, have focused on traditional sectors that make physical 'things' like cars or textiles. By design or unintentionally, these policies have tended to exclude or be unsuitable for digital industries. We believe a broader and more strategic view of 'manufacturing' in policymaking will lead to stronger economic outcomes for Australia over the coming decades.⁸

⁵ Mr Martin Hamilton-Smith, Director, Australian Sovereign Capability Alliance, *Proof Committee Hansard*, 8 December 2021: Page 46.

⁶ Dr Mark Dean, Carmichael Distinguished Research Fellow, Centre for Future Work, *Proof Committee Hansard*, 11 November 2021, p. 14.

⁷ Ms Natalie Currey, General Manager Supply Chains, Australasian Railway Association, *Proof Committee Hansard*, 6 December 2021, p. 9.

⁸ Interactive Games and Entertainment Association (IGEA), *Submission 16*, p. 3.

Modern Manufacturing Initiative

5.17 As discussed earlier in this report, on 1 October 2020 the Commonwealth Government introduced its Modern Manufacturing Initiative (MMI). A number of submitters expressed their disappointment with the MMI itself and its implementation.

5.18 The Australian Automotive Aftermarket Association (AAAA) commented:

It is therefore very disappointing that a majority of Australia's manufacturing industry – including the 4WD aftermarket sector – is shut out of access to the MMI's programs, as it does not fit into the MMI's six priority categories. Our industry, and many other industries are deprioritised and unable to access the funding and support required to operate and grow in a difficult global environment.

By failing to recognise the opportunity this industry presents, this confusing exclusion could mean the forfeiting of Australia's competitive advantage in this sector.

The narrow focus of the MMI's priorities exclude many industries that could be worthy of funding. Not every worthy industry is included in the six priority categories – and not every activity in the priority sectors is automatically worthy of funding.

5.19 When asked on how the MMI is playing out in their sector, the Australian Food and Grocery Council, commented:

I would say that the sector has been disappointed. The pace at getting the dollars rolled out has been slower than anticipated, and the level of funding coming forward has been lower than anticipated. The big call out is a big centre point for manufacturing policy, and for a sector that—currently we have capital investment of around \$3 billion per annum; we need to grow that to about \$7½ billion per annum. Recently we saw \$33 million granted through one element of the Modern Manufacturing Strategy. I know many companies are very disappointed about that as they had put a lot of effort into grant applications. Had they known such a small amount was forthcoming, they may not have bothered. There has been disappointment around that.⁹

Research and Development

5.20 A theme that did present itself in the evidence received was the greater emphasis that research and development (R&D) should have in a modern manufacturing economy.

5.21 For example, the Australian Academy of Science recommended:

- The Australian Government and universities should nurture strategic and patient investment across the entire innovation pipeline. In particular, they should ensure that the investment in fundamental

⁹ Ms Tanya Barden, CEO, Australian Food and Grocery Council, *Proof Committee Hansard*, 8 December 2021, p. 3.

research does not fall below current levels (22 per cent of overall R&D investment).

- Introduce a program to transition early and midcareer researchers (EMCRs) who have lost positions during the pandemic into roles in the manufacturing ecosystem that will allow their STEM [science, technology, engineering, and mathematics] skills to be of use.
- Pursue existing opportunities to utilise the R&D tax incentive to encourage investment in priority research areas, including those that support manufacturing, and boost the employment of PhD qualified Australians in manufacturing...
- Develop schemes to build capacity in entrepreneurial and translation expertise, including facilitating greater mobility between research and industry.¹⁰

5.22 Similarly, Science & Technology Australia commented:

We think a research translation fund is going to help to provide that direct pipeline of funding into those products to get them across that valley of death in commercialisation and into our manufacturing system so that ultimately we build that sovereign capability.¹¹

5.23 There were also observations that the current R&D tax system could also be improved in terms of helping Australian companies to scale up and turn commercialising of concepts into Australian jobs.

5.24 Mr Ben Eade of Manufacturing Australia, commented on the need to commercialise innovation:

Australia does outstanding R&D in a range of fields. I would contend that the key challenge for us is how we make sure that the business case is there not just to undertake R&D in Australia but to commercialise that R&D.¹²

Promotion of Australian manufacturing

5.25 The committee received little evidence as to how Australian manufacturing was or is being promoted by government in Australia and overseas. Although the 'Australian Made' organisation exists, it is not a government body:

The Australian Made, Australian Grown logo is administered by Australian Made Campaign Limited (AMCL), a not-for-profit public company established in 1999 by the Australian Chamber of Commerce & Industry (ACCI) and the network of state and territory chambers of commerce, with the cooperation of the Federal Government.

AMCL is not a government body and does not receive government funding for its core operations, which are licensing companies to use the logo and promoting Australian products both in Australia and overseas.¹³

¹⁰ Australian Academy of Science, *Submission 109*, p. 1.

¹¹ Ms Misha Schubert, CEO, Science & Technology Australia, *Proof Committee Hansard*, 11 November 2021, p. 26.

¹² Mr Ben Eade, CEO, Manufacturing Australia, *Proof Committee Hansard*, 11 November 2021, p. 2.

The World Trade Organisation and Australia's international commitments

5.26 A frequently cited reason as to why Australia cannot do more for its manufacturing sector in terms of Australian Government pursuing local procurement policies is the requirement to conform to international trade agreements – particularly the obligation of the World Trade Organisation (WTO).

5.27 For example, the Department of Industry, Science, Energy and Resources commented:

What we would say is that mandating Australian content for some of the Commonwealth government projects needs to be in line with those international government procurement obligations, particularly the national treatment obligation, which prohibits discrimination between Australian suppliers and foreign suppliers.¹⁴

5.28 However, some submitters and witnesses argued that Australia can improve its procurement and local content policies while maintaining our WTO obligations.

5.29 Mr Mark Cain, CEO, Australia Steel Institute, argued that:

If a project is strategic in nature, I believe governments can prosecute an argument to have local content...

There are allowances within the WTO rules to give favour to local SMEs. So I think very often it's a convenient excuse not to engage locally using the argument of free trade.¹⁵

5.30 The Australian Council of Trade Unions (ACTU) also argued that a more proactive policy could be pursued while still conforming with WTO requirements:

There are mechanisms. Australia has lagged behind the rest of the world in doing this. You can see multiple examples in the US. A key one is that, within trade agreements, it's possible to support small and medium-sized enterprises and to be completely consistent by preferencing small and medium-sized enterprises and not breaching any of those WTO commitments.¹⁶

Government procurement and local content targets

5.31 Submitters did provide evidence that a lack of clear, consistent national procurement policies was undermining Australian manufacturers.

¹³ 'About Australian Made', *Australian Made* website, <https://www.australianmade.com.au/why-buy-australian-made/about-australian-made/>, (accessed 17 January 2022).

¹⁴ Ms Donna Looney, Acting Head, Industry Growth, Department of Industry, Science, Energy and Resources, *Proof Committee Hansard*, 6 December 2021, p. 54.

¹⁵ Mr Mark Cain, CEO, Australia Steel Institute, *Proof Committee Hansard*, 6th December 2021, p. 50.

¹⁶ Ms Michele O'Neil, President, Australian Council of Trade Unions, *Proof Committee Hansard*, 8 December 2021, p. 34.

- 5.32 The Department of Industry, Science, Energy and Resources acknowledged that there is no local mandate in terms of procurement:

As was mentioned, in the specific circumstances that I've raised, there is a possibility that approaches can be made at different thresholds and in different ways, but, still, we don't have a local content mandate. Again, that goes back to what I've spoken about, in terms of ensuring that the Australian government is getting value from these contracts.¹⁷

- 5.33 Making the point that the pandemic had really emphasised the need for local production, Mr Barrie Finnin, CEO, Amaero International Limited commented:

I'm a taxpayer. I'd like to see Australian taxpayer money spent on Australian activity. There are some strong economic reasons for having the local capacity and capability to supply these things, and COVID really brought that down to earth.¹⁸

- 5.34 Speaking in terms of renewable energy projects and the importance of having local content policies and the effects of not having them, Dr Jim Stanford, Economist and Director, Centre for Future Work, observed:

Without direct targets and tools to achieve those targets in domestic content in the renewable energy projects themselves and the industrial spin-offs upstream and downstream of those products, there is no guarantee that Australia will get that work.¹⁹

- 5.35 Ms Michele O'Neil, President of the ACTU, defended the idea of local procurement as part of a reasonable use of public funds for the public good:

It's a reasonable and sensible proposition that that is tied to clear requirements that public money be used for public good and that it not just lead to profit by a few. Public money for public good requires local commitment to local jobs. It's critical to any assistance given for this transition.²⁰

- 5.36 Finally, the AMWU observed:

As the manufacturing gets more high-tech and more specific, the job creation downstream becomes higher and higher, which means you're creating more local jobs. The shift to not requiring local procurement is simply shaping a race to the bottom, where you go for the cheapest possible option.²¹

¹⁷ Ms Donna Looney, Acting Head, Industry Growth, Department of Industry, Science, Energy and Resources, *Proof Committee Hansard*, 6 December 2021, p. 54.

¹⁸ Mr Barrie Finnin, CEO, Amaero International Limited, *Proof Committee Hansard*, 6th December 2021, p. 16.

¹⁹ Dr Jim Stanford, Economist and Director, Centre for Future Work, *Proof Committee Hansard*, 11 November 2021, p. 17.

²⁰ Ms Michele O'Neil, President, Australian Council of Trade Unions, *Proof Committee Hansard*, 8 December 2021, p. 37.

²¹ Mr Steve Murphy, National Secretary, Australian Manufacturing Workers Union, *Proof Committee Hansard*, 6th December 2021, p. 30.

We're asking for a fair chance for Australian manufacturers and Australian workers to get a foothold in the industries that are important, particularly when there are large government spends.²²

State local content policies support industry

5.37 Evidence was presented to the committee that state government do, in fact, provide a degree of support for their local industries through procurement policies.

5.38 Mr Steve Murphy, National Secretary, Australian Manufacturing Workers Union (AMWU), commented:

If you look around the country we've got examples in Victoria where they're able to successfully have procurement policies, whether they be about renewable energy, rail manufacture or government purchasing, that allow for a really strong foothold for local industry; they are doing those things effectively.²³

An approach of the Victorian government previously was their VRET system, the Victorian Renewable Energy Target, where they did include local content. Keppel Prince went from 50 workers up to 170, and then they grew after the VRET was kicking along for a period of time. That approach delivered high-skilled, high-wage renewable manufacturing jobs in regional Victoria. Now they are placed at risk because it's highly likely the wind farms that are going to be built around the country for the federal government will not have wind towers built in Australia but brought in from overseas.²⁴

5.39 In contrast:

... in New South Wales we've seen no end of trouble for at least the last 10 years—procurement levels went from having 75 per cent local content, when we made some of the best trains in the whole world, down to no local content now, where we're seeing imported trains that don't fit on the tracks, don't get through tunnels and don't line up with the platforms. We're seeing ferries that are full of asbestos and don't fit under bridges, and light rail with cracks that will delay it for 18 months. This short-term idealism around the cheapest cost will cost us more in the long run. Those costs are hidden, but they are borne by public money, and if we're going to have an honest look at it then we should look at whole-of-life costs. We should look at what the return is back to government from those workers paying their taxes and spending money in their communities, creating more jobs down the line.²⁵

²² Mr Steve Murphy, *Proof Committee Hansard*, 6th December 2021, p. 31.

²³ Mr Steve Murphy, *Proof Committee Hansard*, 6th December 2021, p. 31.

²⁴ Mr Steve Murphy, *Proof Committee Hansard*, 6 December 2021, p. 32.

²⁵ Mr Steve Murphy, *Proof Committee Hansard*, 6th December 2021, p. 31.

Harmonisation of standards and procedures

5.40 The committee also received evidence that the harmonisation of standards and procedures would be of benefit to the manufacturing sector.

5.41 The Australian Automotive Aftermarket Association (AAAA) commented in both their submission and hearing evidence that harmonisation would be of great benefit to their industry.

5.42 In their submission they stated: "33 per cent of businesses in the industry are impeded by the lack of harmonisation between Federal and State regulations."²⁶ When asked to explain further the AAAA commented:

Australian design rules are indeed federal, and all of the importation of vehicles is subject to Australian design rules. But, after the vehicle is registered in the state, it is subject to state government in-service vehicle standards. Those standards regulate how much you can do things such as lift the vehicle. So, we're responsible for suspension lift, particularly for vehicles that are going over rough terrain. We do that for a lot of emergency vehicles. That's subject to state government regulations, and how far you can lift a vehicle and when you need specific engineering certification varies on a state-by-state basis... Many of our members are, of course, working across all states and territories in Australia and they've got to comply with different regulations, and that makes a difference in terms of designing the product and how you fit the product. So a great deal of what we do—because we're aftermarket: we're after the vehicle, often, is registered—is subject to state-by-state regulations, and they can vary. They can vary by a small level and they can vary enormously.²⁷

5.43 Such harmonisation is particularly important when it comes to medicines. Medicines Australia explained:

The overarching recommendation is for national coordination regarding things of significance. As we've seen with the mRNA manufacturing, we think it's critical that there is a nationally coordinated approach for that... When we talk about clinical trials, in particular, harmonisation of systems at a national level will make us much more competitive to move ahead of other countries that are moving ahead of us.

In the clinical trial environment, for example, we lead the world and punch above our weight in our scientific endeavour, in our research institutions and in our healthcare provision. However, each state and territory has a competitive advantage to have different regulatory systems and different ethics approval systems. In Australia that creates a delay and a barrier to actually setting up, initiating and starting to recruit patients into clinical trials, before you even get to how you are manufacturing and supplying those clinical trials with product. National coordination and national harmonisation across the entire clinical trial environment to enable a single measure or a single approach to ethics approval, regulation and initiation

²⁶ Australian Automotive Aftermarket Association (AAAA), *Submission 31*, p. 1.

²⁷ Ms Lesley Yates, Director, Government Relations and Advocacy, Australian Automotive Aftermarket Association, *Proof Committee Hansard*, 6 December 2021, p. 2.

of clinical trials would be the first step. It is something that the industry and both sides of government have agreed on for a long time, but actually translating that into agreement across the states and territories has been more difficult.²⁸

5.44 The Australian Academy of Science also observed:

There are ways we can simplify our system. I know that at the moment there are efforts being made to have a bit of a one-stop shop or one-front-door approach to clinical trials. There is a fair bit of fragmentation across the federal versus state and territory trials that are done, even in trying to identify some, let alone in establishing them. So there are some harmonisation and efficiency gains, and, of course, that would lead to a more competitive position for Australia and a more attractive destination for those perhaps looking to initiate clinical trials here.²⁹

Provision of key capabilities

5.45 This inquiry has also highlighted the need for Australia to possess its own testing facilities for key industrial capabilities.

Lane Cove testing facility

5.46 The specific case of the Lane Cove testing facility was brought to the committee's attention through a joint submission by Ai Group and Engineers Australia. They explained:

The Lane Cove Test Station (LCTS) is an electrical equipment testing facility in Sydney. It has supported Australia's electricity networks and electrical manufacturing sector for more than 50 years. It is an integral part of Australia's manufacturing infrastructure.

The LCTS provides a critical and unique service to electrical manufacturers, allowing them to demonstrate compliance of electrical equipment, as it is the only test facility in the southern hemisphere that has the capability to carry out standards compliance testing at the 100kA level. This testing capability is a requirement for innovation and development of electrical equipment, and as such plays a critical indirect role across many sectors which rely on electrical equipment, including energy, manufacturing, transport, health, mining, heavy industries, defence, building and construction, process industries, and water.

PLUS ES, an affiliate of Ausgrid and the owner of the LCTS since 2017, has announced that it intends to close the LCTS by the end of October 2021 for commercial reasons.

Without a domestic testing facility with this capability, Australia's electrical manufacturing industry would be severely challenged by the higher costs and lead-times of testing abroad. Many, particularly smaller

²⁸ Ms Elizabeth de Somer, Chief Executive Officer, Medicines Australia, *Proof Committee Hansard*, 8 December 2021, pp. 17–18.

²⁹ Ms Anna-Maria Arabia, Chief Executive, Australian Academy of Science, *Proof Committee Hansard*, 11 November 2021, p. 35.

businesses, would not be able to compete with imported equipment and our exporters will be significantly disadvantaged. The local capability for research and development of new electrical equipment will be significantly diminished as industry is reliant on proof-testing at the LCTS. There is a clear threat of a hollowing-out of the domestic electrical manufacturing industry.³⁰

- 5.47 The closure of Lane Cove testing facility would deprive Australia of a critical piece of infrastructure used by Australian electrical equipment manufacturers, hurting small and medium sized manufacturers who will, without Lane Cove, need to access international facilities.
- 5.48 Offshoring testing also adds expense and increases the time to perform testing from four weeks to 16 weeks, which means it is often cheaper and quicker to simply import equipment from overseas instead of source it from an Australian manufacturer when type testing is required.

Energy

- 5.49 The Australian manufacturing industry accounts for nearly 20 per cent of Australia's energy consumption, with gas providing an important energy source, supplying around 41 per cent of the industry's energy and feedstock needs. As a result of efficiencies and a move away from energy-intensive manufacturing, the industry's energy source has been declining over the course of the last decade.³¹ Even so, Australian manufacturing is among the most energy intensive in the Organisation for Economic Co-operation and Development (OECD), in part reflecting the high percentage of basic metals and chemical manufacturing.³²
- 5.50 A number of witnesses emphasised the importance of access to secure, reliable and cheap energy to manufacturing in Australia and the impact of rising energy prices on the competitiveness of Australian products.³³ The Australian Council of Trade Unions (ACTU) submitted:

For those manufacturers who use large amounts of electricity Australia's largely unplanned and disorderly energy transition has seen significant price fluctuations over the past decade in a period in which 12 coal-fired power stations have closed and dozens of solar and wind farms have entered the market.

...

³⁰ Ai Group and Engineers Australia, *Submission 49*, p. 1.

³¹ Department of Industry, Energy, Science and Resources, *Submission 116*, p. 10.

³² Australian Council of Trade Unions (ACTU), *Submission 117*, p. 11.

³³ See, for example: Australian Academy of Technology and Engineering (ATSE), *Submission 38*, p. 5; Australian Citizens Party, *Submission 64*, pp. 5–8; Centre for Future Work, Australia Institute, *Submission 88*, p. 16.

Gas-reliant manufacturers in the NEM [national energy market] states have had a particularly wild ride over the past decade, falling victim to massive increases in the wholesale (and in turn contract) price of gas that resulted from Australia's east coast gas market being linked to global gas markets via LNG [liquified natural gas] shipments from Queensland.³⁴

- 5.51 However, the Ai Group notes that Australia's previous low-cost coal and gas energy was partially the result of cross-subsidies for some manufacturers, and partially the result of shifting the costs of greenhouse gas emissions until future generations. It told the committee that most manufacturers are not energy-intensive and that other input costs such as labour productivity are much more important to competitiveness.³⁵ This contrasts with evidence provided by the South East Melbourne Manufacturers Alliance (SEMMA), who advised the committee that one of their members reported energy costs which rose from \$4 million in 2017 to \$11 million in 2020, resulting in the closure of one of their production facilities.³⁶
- 5.52 A number of submitters drew the committee's attention to the opportunities for Australia to maximise its natural competitive advantage for reliable, cheap renewable energy and the role that Australian manufacturing can play in its delivery through the manufacture of supporting technology and products, (such as solar photo-voltaic cells, batteries, electric vehicles, bioenergy, and green hydrogen)—particularly given its reserves of critical minerals, rare earths and base metals—and the export of renewable energy.³⁷ For example, Science and Technology Australia estimates that the production and export of hydrogen fuel could be worth \$26 billion to the Australian economy by 2050³⁸ and the ACTU told the committee:

... hydrogen, green steel, critical minerals, battery manufacturing, education and training as well as other services. Together, that has got the potential to generate \$89 billion of gross value and create nearly 400,000 jobs in Australia up to 2040—and that's good jobs, especially in those regions that have been the basis of powering both Australia and many of our manufacturing centres.

³⁴ ACTU, *Submission 117*, p. 13.

³⁵ Ai Group, *Submission 68*, pp. 7 and 31–32.

³⁶ South East Melbourne Manufacturers Alliance (SEMMA), *Submission 105*, pp. 11–12.

³⁷ DISER, *Submission 116*, p. 11. See, for example: Manufacturing Australia, *Submission 112*, p. 5; Manufacturing Excellence Forum Sunshine Coast, *Submission 34*, pp. 5–6; Australian Academy of Technology and Engineering (ATSE), *Submission 38*, pp. 1 and 3; Advanced Manufacturing Growth Centre (AMGC), *Submission 40*, p. [4–6]; Dr Mark Dean, Laurie Carmichael Distinguished Research Fellow, Carmichael Centre, *Submission 46*, p. 1; Sanofi, *Submission 47*, p. 2; Amaero International Ltd, *Submission 48*, p. 2; Grattan Institute, *Submission 65*, pp. 2–4; Maritime Union of Australia, *Submission 77*, p. 6; Centre for Future Work, Australia Institute, *Submission 88*, p. 16; Australian Council of Trade Unions (ACTU), *Submission 117*, p. 20.

³⁸ Science and Technology Australia, *Submission 52*, p. 5.

But these opportunities are not going to fall in our lap. We need rapid and ambitious action to coordinate this change, and government leadership to help everyone play their part. This is definitely a race, and we still seem to be at the starting line.³⁹

- 5.53 Witnesses were concerned that not enough is being done to secure the potential jobs of the future. Mr Steve Murphy, National Secretary, AMWU, commented:

Government has an important role to play. That's in three parts. The first is a plan for jobs for the future. There's a race on around the world to secure the rights to these jobs and to get good at them, and Australia still has a chance to secure these jobs and to be the world leader when it comes to them. The second is that the government's got an absolute obligation to provide a framework that delivers secure jobs. We've seen with the solar panel boom, on how we've imported those and had insecure work in installing them on people's roofs and even in the big solar plants around Australia, that the jobs aren't secure or well paid. The third is the right for workers to organise, join a union and collectively bargain.⁴⁰

- 5.54 Dr Jim Stanford, Economist and Director, Centre for Future Work, commented:

There's certainly huge potential in renewable energy technologies themselves but also in the industries that are connected to those technologies for future investment, exports and employment. The jobs associated with the rollout of renewable energy itself can be, and should be, quite significant.⁴¹

- 5.55 Australia's plentiful supply of solar, wind, and hydro energy, the societal push to de-carbonise,⁴² and the reducing costs of renewable energy⁴³ are seen to be advantages for the manufacturing sector.⁴⁴ It is also welcome that some sections previously hesitant to commit to zero emissions by 2050 have now done so.

Committee comment

- 5.56 This chapter has reviewed the potential for the Australian Government to implement policies that are supportive of manufacturing.

³⁹ Ms Michele O'Neil, President, Australian Council of Trade Unions (ACTU), *Proof Committee Hansard*, 8 December 2021, p. 31.

⁴⁰ Mr Steve Murphy, *Proof Committee Hansard*, 6 December 2021, p. 30

⁴¹ Dr Jim Stanford, *Proof Committee Hansard*, 11 November 2021, p. 16.

⁴² Australian Academy of Technology and Engineering (ATSE), *Submission 38*, pp. 1 and 3.

⁴³ ATSE, *Submission 38*, p. 5.

⁴⁴ See, for example: OZ Minerals, *Submission 51*, p. 5; Science and Technology Australia, *Submission 52*, p. 5; Ai Group, *Submission 68*, pp. 32–33.

- 5.57 Notwithstanding certain constraints—such as WTO commitments—submitters and witnesses have identified areas where the Commonwealth can proactively support and promote Australian industry.
- 5.58 State, territory and federal governments are purchasers of a significant amount of manufactured goods, there is scope for supporting Australian manufacturing through coordinated procurement policies without compromising on value for money or undermining the operations of the free market. The committee would encourage such initiatives.
- 5.59 Bureaucratic obstacles, such as lack of regulatory harmonisation, also seem to be a simple way of increasing business efficiency and supporting Australian manufacturing.
- 5.60 The committee notes the disappointment expressed by some submitters regarding the MMI and other initiatives, as well as calls for further support for R&D initiatives.
- 5.61 The committee also notes the significant potential in supporting renewable energy innovation. Not only will this spur manufacturing itself but will contribute to cheaper and more sustainable energy prices through which other industries in the manufacturing sector can benefit.

Lane Cove

- 5.62 The committee feels compelled to make a special mention on the status of this facility. It is the only one of its kind in Australia and is used by many electrical equipment manufacturers in Australia. Its closure will mean that when electrical products are required to be changed in response to new standards or regulations, manufacturers will be faced with the difficult option of sending equipment overseas to be tested or choosing to either import products or product designs, which will disadvantage them compared to overseas competitors.
- 5.63 The closure of the Lane Cove Testing Facility increases the probability that Australia will simply have to rely on imported designs, undermining the Australian Government's innovation goals and imperilling the likelihood that a strong local industry will be developed.

Chapter 6

Committee comment

Introduction

- 6.1 During the course of this inquiry the Senate Economics References Committee (the committee) has received evidence from a range of witnesses and examined a number of matters of concern. In the evidence presented to the committee, a number of common themes emerged that have implications for public sentiment regarding the strategic outlook, funding, and support of manufacturing in Australia.
- 6.2 In this chapter, the committee will comment on the most prominent themes raised during the committee's inquiry and make recommendations.

Stimulating research and development (R&D), commercialisation and investment

- 6.3 Australia's R&D performance has some bright spots but is generally not delivering on its full potential due to the lack of an integrated, national approach to R&D funding, insufficient levels of investment, policy shifts away from fundamental to applied research, insufficient emphasis on commercialisation, and Australia's structural challenges.
- 6.4 It is clear from the evidence that collaboration needs to be improved both domestically and with international partners to develop the innovation and scale necessary for Australia to realise the benefits from its R&D activities. These connections need to be built between federal and state governments, higher education institutions, research organisations, manufacturing businesses and organisations, investors, and skills and training organisations. This includes encouraging international collaboration, advanced manufacturing R&D, commercialisation, investment, and support for manufacturing modernisation to improve international competitiveness.
- 6.5 The committee is of the view that the government should consider improvements to funding and development incentives to build a more integrated, national approach to R&D through proven collaborative models.
- 6.6 Government support for R&D must be substantial to encourage sufficient innovation to bring about new developments. This includes providing support to fundamental basic research—detached from commercialisation considerations in order to foster innovation and ensure a pipeline of future development and commercialisation opportunities.
- 6.7 It is also vital that manufacturing incentives have longevity and stability to provide certainty to manufacturers and investors. Focussing incentives on key

areas such as the national manufacturing priorities (NMPs) will have the greatest impact on building capacity and scale, however, the committee is of the view that incentives should also be available for truly innovative products which may be outside the current NMPs.

- 6.8 The committee has heard about the importance of advanced manufacturing to improving the complexity and productivity of Australian manufacturing and believes that there is more that can be done to identify opportunities and stimulate growth across this sector, including through improving business confidence.
- 6.9 The committee supports a range of incentives and stimulus measures including the provision of equity, co-investment, direct government investment, and facilitating private sector investment, including by superannuation funds.

Recommendation 1

- 6.10 **The committee recommends that the Australian Government consider the periodic review of R&D, commercialisation, and investment incentives and tax arrangements to ensure they facilitate the growth of Australia's manufacturing industry and investment including:**

- **the range of activities covered by mechanisms like the R&D Tax Incentive (RDTI);**
- **that the incentives and arrangements encourage the development of self-sustaining manufacturing ecosystems incorporating innovation, collaboration, commercialisation and investment, particularly in the advanced manufacturing sector;**
- **with regard to the minimisation, as far as possible administrative overheads for participants, and the availability of support mechanisms for participants, in particular small and medium enterprises (SMEs);**
- **the effectiveness of governance, implementation, and reporting; and**
- **consideration of any further mechanisms that would improve R&D, commercialisation, and investment outcomes.**

Recommendation 2

- 6.11 **The committee recommends that the Australian Government establish a Manufacturing Industry Fund to provide a range of co-investment incentives to the manufacturing industry in conjunction with the private sector.¹**

¹ The Fund should have the flexibility to assist a range of manufacturing sectors (including emerging sectors) and private entities, using a variety of mechanisms, such as direct support for flagship projects, equity, concessional loans, guarantees, and other means that deliver a positive return on investment (ROI).

Recommendation 3

- 6.12 The committee recommends that the Australian Government consider the establishment of a Superannuation Task Force to explore, develop and recommend structural changes and possible incentives-based programs and regulations to increase the level of Australian superannuation fund investment in Australian manufacturing industries, particularly those with an export focus

Recommendation 4

- 6.13 The committee recommends that the Australian Government consider significant increases to manufacturing R&D and commercialisation support to improve international competitiveness and stimulate the development of self-sustaining manufacturing ecosystems through:
- expanded investment in industry growth centres and cooperative research centres (CRCs) in alignment with the national priorities, and with view to improving collaboration between training institutions and industry, in particular;
 - the establishment of a Research Translation Fund to fund large projects which encourage R&D and the commercialisation of innovative products, processes, and services;
 - sponsoring the development of advice and resources for finance providers and investors by industry bodies, to improve understanding and reduce risk perceptions of the manufacturing industry, leading to greater investment;
 - the establishment of an expert working group, with industry representation, to support the design and implementation of the patent box scheme.

Skills and training

- 6.14 There are clearly serious deficiencies in Australia's skills and training—in particular in Australia's vocational education and training (VET) sector. These must be addressed as a matter of urgency with particular regard to improved collaboration between the skills and training sector and industry. Around 50 per cent of VET funding is provided by states and territories, so

The Fund should particularly look to accelerate Australia's clean export industries, through funding of a wide range of technologies such as hydrogen, green metals, and battery manufacturing, and assist their transition to full market competition.

For example through minimum guaranteed revenues using mechanism like Contracts for Difference: Department for Business, Energy & Industrial Strategy (UK), [Policy paper: contracts for difference](#), 13 December 2021 (accessed 15 January 2022); UK Government, [Electricity Market Reform: Contracts for Difference: How Contracts for Difference \(CfDs\) will work under Electricity Market Reform](#), 7 August 2013 (accessed 15 January 2022).

improvements to the sector will require a concerted joint effort across government, as well as in conjunction with private sector training organisations.

- 6.15 The committee heard that qualifications need to be modernised, that skills and training recognition needs to be more flexible and that the skills and training sector needs to be more responsive to the needs of industry, while ensuring that training participants are provided with a wide range of knowledge and skills. Schemes such as the Automatic Mutual Recognition of Occupational Registrations (AMR) scheme² will improve recognition and occupational mobility but there is more that can be done.
- 6.16 The current levels of support provided to apprentices are inadequate to support them through their qualification and are insufficient to attract the new blood necessary to fill existing and forecast future skills shortages across a range of occupations. The committee believes that better support, in particular for key occupations in current or forecast demand, will attract more people to trades and improve completion rates. More can also be done to foster industry-academia collaboration through greater use of industry placements and employer incentives for the employment of higher degree graduates.
- 6.17 The committee is of the opinion that these initiatives will result in more skilled workers and more successful employment outcomes—a win for manufacturing employers and a win for Australians.

Recommendation 5

- 6.18 **The committee recommends that the Skills National Cabinet Reform Committee, in collaboration with relevant stakeholders, fast track reform of the VET sector nationally through the development and implementation of a national action plan. The plan should have regard to:**
- **prioritising the agreement to and implementation of VET sector recommendations from the Review of the Australian Qualifications Framework;**³
 - **improving skills and training quality and delivery, responsiveness and collaboration with industry;**
 - **addressing skills shortages; and**
 - **ensuring that VET courses, particularly in occupations with current or forecast skills shortages, are accessible and affordable.**

² Department of Prime Minister and Cabinet, [Improving occupational mobility](#), (accessed 15 January 2022).

³ Department of Education, Skills and Employment (DESE), [Australian Qualifications Framework Review](#), 24 November 2020 (accessed 25 January 2022).

Recommendation 6

6.19 The committee recommends that the Australian Government address manufacturing skills shortages by considering the following initiatives:

- the creation of a minimum ratio of apprenticeships on all directly-government-funded projects, in consultation with employers, industry and unions;
- higher wages for apprentices to encourage the take up and completion of apprenticeships;
- exploring the benefits of an employer wage subsidy to cover the first 18 months of costs associated with adult apprenticeships;
- the provision of additional funding to higher education providers through the Research Training Program, to enable better support higher degree research students; and
- collaboration with the university sector to encourage more industrial PhDs (inclusive of industry placements), including targeted additional assistance for employers engaging PhD interns and cadets.

Creating secure, well-paid employment

6.20 Employment is anticipated to grow with stimulation of the manufacturing industry, however there is more that can be done to improve wages and conditions through industrial relations reforms, including in relation to workforce diversity.

6.21 Long and complex supply chains coupled with lack of transparency and monitoring enable modern slavery. The committee is of the view that stronger anti-slavery provisions will help address slavery in supply chains, while improvements to wages, conditions and access by unions will improve conditions for workers engaged in Australia.

6.22 Manufacturing workers and their families will face skills, employment, economic and social challenges as Australia's economy decarbonises and communities reliant on employment in fossil fuel industries are required to diversify. The committee believes that this transition needs to be just and that it is vital for workers and their communities to have access to resources that enable them to develop new capabilities and sources of economic growth.

Recommendation 7

6.23 The committee recommends that the Fair Work Commission review industrial awards and the 2016 Building Code, with input from manufacturing industry groups, employers, and unions, to ensure fair wages and conditions for Australian workers, including:

- that pay rates are fair and just, including for apprentices, trainees, cadets, and interns, and workers with varying qualifications and experience; and
- mechanisms that promote cooperation between workplaces, employers and workers, including through the involvement of unions.

Recommendation 8

6.24 The committee recommends that the Human Rights Commission, in conjunction with other government agencies, manufacturing industry groups and employers, and unions, take steps to improve the diversity of workers in manufacturing industry through:

- the establishment of an expert working group to deliver an action plan to improve diversity, including how targets can be linked to government funding initiatives, and supporting implementation advice; and
- the implementation of any necessary industrial relations reforms.

Procurement

6.25 Chapter 5 provided a summary of testimony with regard to procurement policies both state and Federal governments could pursue. There is some evidence that although there has been some support provided in state based policies, a lack of clear, consistent national procurement policies is holding back Australian manufacturers.

6.26 The committee believes that a greater effort should be made by the Commonwealth Government to support Australian manufacturing through its own procurement policies.

Recommendation 9

6.27 That Government tenders preference bidders who have sustainable supply chains that maximise the use of local suppliers, manufacturers, and service providers and which are committed to developing the domestic manufacturing industry, and that are sustainable.

Recommendation 10

6.28 That the Commonwealth Procurement Rules (CPR) be reviewed for possible amendments that would support the development of Australia's domestic manufacturing capabilities and employment/training opportunities, and that this review also includes an appraisal of the appropriateness of current exemptions from Subclause 4.7 of the CPR for goods and services listed in Appendix A of the CPR.

Recommendation 11

- 6.29 That both Federal and State Governments adopt procurement policies which maximise both domestic production and the provision of local jobs, and that the Commonwealth take on a more active role in facilitating national coordination in industry development, so as to ensure that multiple states are not all trying to replicate identical outcomes when a differentiated result which leverages each state's existing strengths and assets may be more preferable.**
- 6.30 In Chapter 5, the committee noted the restraints that international trade agreements can have on Australian Government procurement policies. Nonetheless, the committee also noted that a number of submitters argued that Australian government can support Australian manufacturing through active procurement policies without violating those international agreements.
- 6.31 Accordingly, the committee recommends that future trade agreements be made that undermine the potential for Australian Government procurement policies to legitimately support Australian manufacturing.

Recommendation 12

- 6.32 That all future trade deals negotiated by the Australian Government avoid the inclusion of provisions that would have the effect of restricting the Commonwealth's procurement arrangements from any form of preference for the purpose of providing for the full, fair and reasonable participation of local enterprises, including manufacturing companies, in government contracts as outlined in Commonwealth, state and territory industry participation policies and successor programs and policies.**
- 6.33 The Australian Government can also stimulate manufacturing activity and create jobs by lowering the current major project threshold amount from its current level of \$500 million. This threshold will capture more projects, requiring them to have an Australian Industry Participation Plan, creating more opportunities for local businesses to bid for the supply of goods and services.⁴
- 6.34 Furthermore, it can promote the development of a skilled workforce and address skills shortages through the use of mandatory minimum apprentice-tradespeople ratios on government-funded projects.

Recommendation 13

- 6.35 The committee recommends that the Australian Government amend the *Australian Jobs Act 2013* to stimulate activity and create jobs through lowering the current major project threshold amount from \$500 million.**

⁴ *Australian Jobs Act 2013*, s. 4.

Recommendation 14

- 6.36 The committee recommends that the Australian Government develop minimum ratios of apprentices to tradespeople, with mandatory use of these ratios on all directly-funded government projects.**

Anti-dumping provisions

- 6.37 Challenges with Australia's anti-dumping framework were identified in a number of submissions, hearings, and supplementary responses.⁵ Several arguments were made that the current system was not up to date with changes in other countries.
- 6.38 For example, in China, the government imposes variable Value-Added-Tax (VAT) rebates and export taxes on state owned enterprises, thereby distorting Chinese export prices. On the Australian end, a zero-profit calculation is used by the Anti-Dumping Commission to determine whether dumping is occurring, despite other jurisdictions such as the European Union (EU) using a 6 per cent margin to determine whether dumping is occurring.
- 6.39 The Australian Council of Trade Unions (ACTU) observed:
- Australian manufacturers' ability to address and remedy predatory imports through anti-dumping and countervailing measures has improved in the last decade. Despite this, the pace of reform has slowed dramatically with the last significant tranche of anti-dumping reforms occurring in 2015. Vigilance and continual refinement form is required to avoid circumvention of duties and to pre-empt or at least react to overseas exporters and unscrupulous importers' adaptive behaviour in response to the levying of duties.
- The ACTU support further reforms to the Anti-Dumping system which promote transparency of import data, the combatting of circumvention and the avoidance of Anti-Dumping duties, the use of benchmark labour costs in cost construction methodology when considering a "fair price" of exports" and adequate funding of the Anti-Dumping Commission.⁶
- 6.40 The combination of these and other factors means that Australian industry is often forced to compete on an uneven playing field. In addition to these challenges, concerns have been raised that small and medium enterprises (SMEs) have insufficient access to anti-dumping systems.

Energy policy

- 6.41 The committee also discussed in reasonable detail Australian energy policy, particularly with regard to transitioning to renewable energy. The committee noted that Australia's plentiful supply of solar, wind, and hydro energy, the

⁵ For example see: Australian Council of Trade Unions (ACTU), *Submission 117*; Maritime Union of Australia, *Submission 77*.

⁶ ACTU, *Submission 117*, p. 45.

societal push to de-carbonise and the reducing costs of renewable energy are seen to be advantages for the manufacturing sector. It is also welcome that some sections previously hesitant to commit to zero emissions by 2050 have now done so.

- 6.42 While a transition to renewable energy is warranted, it is also expected that gas will continue to play an ongoing role, particularly with regards to the advanced manufacturing sector. Gas will remain a critical input for many manufacturers, separate to its utility as an energy source.
- 6.43 Accordingly, the committee makes the following recommendations:

Recommendation 15

- 6.44 That the Australian Government continue to support green hydrogen as a potential longer-term alternative to gas use in manufacturing.**

Recommendation 16

- 6.45 Establish a CRC for Sustainable Manufacturing to operationalise hydrogen and to identify opportunities that would support the development of a green metals industry powered by clean energy.**

Recommendation 17

- 6.46 That the Australian Government continues to recognise the importance of the supply and affordability of gas in the future of Australian manufacturing, including through greater cooperation between environmental departments at Commonwealth and State Levels on approvals.**

Domestic electrical equipment testing capabilities

- 6.47 In Chapter 5, the committee made specific mention of the Lane Cove testing facility which was brought to the committee's attention through a joint submission by Ai Group and Engineers Australia.
- 6.48 The committee noted that the closure of Lane Cove facility would deprive Australia of a critical piece of infrastructure used by Australian electrical equipment manufacturers, hurting small and medium sized manufacturers who will, without Lane Cove, need to access international facilities. Accordingly, the committee recommends that this facility be maintained if necessary through the intervention of the Commonwealth Government.

Recommendation 18

- 6.49 That the Australian Government prioritise the need to maintain domestic electrical equipment testing capabilities, including if necessary,**

interventions to ensure the ongoing operation of the Lane Cove Testing Facility.

Pharmaceutical supply chains

- 6.50 Chapter 2 discussed supply chains and their disruption. A number of submitters were pharmaceutical and noted the importance of reliable supply chains – particularly during the 2020–22 pandemic.
- 6.51 The committee believes that it is vital that these supply chains be secured and strengthened and recommends establishing a working group with representatives from both employers and unions to examine policy options with the aim of achieving that result.

Recommendation 19

- 6.52 **Establish a working group with representatives from both employers and unions to examine policy options to secure and strengthen domestic pharmaceutical supply chains.**

Senator Anthony Chisholm
Chair
Labor Senator for Queensland

Dissenting Report - Liberal Senators

Introduction

- 1.1 Whilst we share the view expressed in the majority report of the importance of the manufacturing sector to Australia, we disagree with a number of key recommendations in the report.
- 1.2 The majority report proposes a number of recommendations which would underpin a government driven interventionist approach in the manufacturing sector. Such policies have not worked in the past and there is no evidence to suggest that they will work in the future. The danger is that they will distort the market and cause more harm than good.
- 1.3 The Federal Government should continue to progress policies which drive an increase in productivity. Policies should aim to remove impediments and barriers to investment, growth and job creation. Any Federal Government expenditure needs to be carefully targeted. The Modern Manufacturing Strategy meets this objective. As stated in the submission from the Department of Industry, Science, Energy and Resources:

The Modern Manufacturing Strategy (MMS) sets out a ten-year pathway led by industry for industry, with a vision for Australia to be recognised as a high quality and sustainable manufacturing nation that helps to deliver a strong, modern and resilient economy for all Australians. To achieve this, the MMS focuses government efforts in sectors of competitive and comparative advantage and strategic importance.¹
- 1.4 In this regard, there are a range of current Federal Government initiatives which are strategically targeted, proportionate and effective.² Relatively recent employment statistics indicate that the policies are working. There are now 80,200 more jobs in manufacturing than there were at the start of the COVID-19 pandemic. Total manufacturing employment in Australia now sits at above 1 million jobs, which is its highest level since August 2009.³
- 1.5 The majority report proposes a fundamentally different approach from that adopted by the current Federal Government—a step change in government intervention and expenditure. Whilst no doubt being sincere and well intentioned, those promoting such an interventionist approach (to be funded by the Australian taxpayer) would do well to reflect on the history of such endeavours. The work of the Productivity Commission makes for sobering reading in this regard.

¹ Department of Industry, Science, Energy and Resources, *Submission 116*, p. 2.

² Refer to Appendix 3 of the report for a comprehensive list of government policies.

³ Australian Bureau of Statistics (ABS), 'Labour Force, Australia, Detailed', catalogue number 6291.0.55.001, 2021, released 23 September 2021. Data is in seasonally adjusted terms.

- 1.6 In the balance of this report, we discuss in more detail some of the recommendations proposed in the majority report. Given the breadth and scope of the report and the number of recommendations made, we have endeavoured to focus on a number of key areas.

Establishment of Manufacturing Industry Fund (Recommendation 2)

- 1.7 A centrepiece of the recommendations contained in the majority report is a so-called Manufacturing Industry Fund. Whilst not directly referenced, this recommendation appears consistent with the Federal Opposition's policy to establish a \$15 billion National Reconstruction Fund.⁴

- 1.8 In our view, the reasoning in the majority report underpinning the establishment of such a fund is problematic.

- 1.9 At section 5.2 of the majority report, it is stated:

The opportunity exists for Government to establish a framework for manufacturing without running the risk of favouring specific sectors or business models.

- 1.10 But at section 6.9 of the majority report, it is then stated:

The committee supports a range of incentives and stimulus measures including the provision of equity, co-investment, direct government investment, and facilitating private sector investment, including by superannuation funds [we deal with the reference to superannuation funds in section 3 below].

- 1.11 There is a gross inconsistency between the two statements.

- 1.12 On the one hand, the majority report recognises the dangers inherent in the government favouring particular sectors. On the other hand, it then proposes measures which would involve investment (including the provision of equity) in not just particular sectors, but specific businesses.

- 1.13 This reasoning then culminates in Recommendation 2 which provides:

The committee recommends that the Australian Government establish a Manufacturing Industry Fund to provide a range of co-investment incentives to the manufacturing industry in conjunction with the private sector.

- 1.14 We do not support the establishment of a manufacturing industry fund of the scope and nature proposed in the majority report.

- 1.15 Policy makers would do well to heed the warnings of the Productivity Commission. In the Productivity Commission's submission, it was noted that any resources directed towards particular industries (whether in the form of fiscal support or regulated flows of income) have alternative uses. The main

⁴ 'National Reconstruction Fund', Australian Labor Party webpage, https://www.alp.org.au/policies/national_reconstruction_fund, (accessed 7 February 2022).

objective for policy should be to ensure an environment that allows resources to move to their most productive use.

- 1.16 In terms of any government “co-investment” in business enterprises (i.e. the government taking equity positions in private sector businesses), the following questions must always be asked:
 - Why can’t the particular venture attract equity investment or debt support; and
 - If the private sector will not invest its equity in the venture nor commercial lenders advance sufficient debt funds, why should the Government risk taxpayers’ money?
- 1.17 In our view, the focus should be on government policies which drive productivity and remove barriers to private sector investment.
- 1.18 We note the footnoted reference to: “contracts for difference” in relation to electricity market reform in the United Kingdom (UK). Given the current situation in the UK, this reference deserves more than a footnote. Those promoting the UK model should refer to current issues relating to electricity and gas prices in the UK. Some energy retailers have collapsed. The UK Government has had to pay billions of dollars in support to households to compensate them for soaring electricity prices. Soaring electricity and gas prices particularly hurt those on low incomes, pensioners and the vulnerable.
- 1.19 In an Australian context, we note that the Federal Government has announced more than \$1.43 billion in the 2020–21 Budget and \$1.8 billion in the 2021–22 Budget to support affordable and reliable energy, while boosting jobs and continuing to reduce emissions. The focus is on ensuring access to reliable, affordable and secure energy for Australian households and businesses, including the manufacturing industry, while successfully integrating new technologies, and meeting Australia’s international emissions reduction obligations. In our view, this is the correct approach.

Superannuation Funds (Recommendation 3)

- 1.20 In recommendation 3, the Majority Report refers to the establishment of a:

Superannuation Task Force to explore, develop and recommend structural changes and possible incentive-based programs and regulations to increase the level of Australian superannuation fund investment in Australian manufacturing industries, particularly those with an export focus.
- 1.21 We disagree with this recommendation.
- 1.22 Superannuation funds should make investments in the best financial interests of the Australians who own those funds.
- 1.23 The purpose of superannuation is to provide for the retirement of the Australians who worked to earn those superannuation funds, not to support some collateral purpose.

- 1.24 Any initiative which does not recognise this fundamental principle should be rejected.
- 1.25 Government should not view superannuation funds as a potential pool of capital to be mobilised to achieve government policy objectives, however well intentioned.
- 1.26 The proposed task force and what it might lead to in practice is scant on detail. Phrases such as: “structural changes” and “possible incentive-based programs and regulations” are a cause for concern.
- 1.27 At best, they may result in the distortion of decision-making processes to try and achieve a public policy aim which is collateral to the purpose of superannuation. At worst, they could drive (or mandate) investments which may not be in the best financial interests of members who own the superannuation.

Research and Development (Recommendations 1 and 4)

- 1.28 In our view, the recommendation provides insufficient recognition to the initiatives already in place in this regard. There is already a wide range of programmes being successfully implemented.
- 1.29 The Research and Development (R&D) tax incentive is already Australia’s largest innovation support programme. Each year since 2011, the programme has provided an average of \$2.5 billion to over 11,000 businesses. In 2019–20, it is estimated that approximately 38 per cent of the scheme promoted R&D in the manufacturing sector.
- 1.30 There have been a number of recent reviews and reforms. In particular, a number of enhancements were made to the programme as part of the Government’s Jobmaker Plan in the 2020–21 Budget.
- 1.31 In addition to the R&D programme, the Federal Government has implemented an array of related policies to promote R&D capability and activity, including:
 - The \$2.2 billion University Research Commercialisation Action Plan, including \$1.6 billion for Australia’s Economic Accelerator, \$150 million to expand CSIRO’s Main Sequence Ventures, \$242.7 million for the Trailblazers Universities programme and development of the Higher Education Research Commercialisation Intellectual Property Framework and \$296 million to PhD’s and Fellows;
 - The Entrepreneurs Programme which has provided matched funding of over \$0.5 billion to over 21,900 businesses since June 2014, including assistance to accelerate commercialisation;
 - The Business Research and Innovation Initiative which provides opportunities for Australian start-ups to work with Australian Public Service agencies to develop innovative solutions to improve public policy and service delivery outcomes; and

- The Boosting Female Founders Initiative which provides support to women entrepreneurs, including mentoring services needed to scale their start-ups to take advantage of domestic and global markets.

Skills and Training (Recommendations 5 and 6)

1.32 Again, the recommendations fail to recognise the initiatives already undertaken by the Federal Government. These include:

- Reform of the VET sector, including assistance provided to victims of the previous Labor Government's failed VET FEE HELP scheme;
- The commissioning of the Joyce Review and implementation of a range of reforms including the establishment of the National Skills Commission and the National Careers Institute;
- The Supporting Apprenticeship and Trainees wage subsidy which assisted in keeping 100,000 apprentices in training through the COVID 19 pandemic;
- Implementation of the Boosting Apprenticeship Commencement programme which provides a wage subsidy — there are now approximately 220,000 trade apprenticeships;
- Implementation of the Completing Apprenticeship wage subsidy; and
- Establishment of the Job Trainer Fund with the States and Territories which is driven by the National Skills Commission and supports training and re-skilling.

Miscellaneous

1.33 There are a range of additional recommendations upon which we provide high level comments.

- Recommendation 6 proposes a mandated minimum ratio of apprentices to tradespeople on government funded projects. We are not satisfied that the case has been made for such government intervention. Given the incentives currently being provided for apprenticeships, we query the need for any such mandate. We are concerned that there may be unintended consequences which operate to favour larger businesses over small and medium sized enterprises.
- Recommendation 7 proposes a range of industrial relations reforms which are vague and scant on detail. For example, "mechanisms which promote cooperation between workplaces, employers and workers, including through the involvement of unions." What does this mean in practice? Moreover, we note that the recommendation proposes a review of the 2016 Building Code. This has been an important instrument to protect the principle of freedom of association on construction work sites.
- Recommendation 8 proposes measures to improve the diversity of workers in the manufacturing industry, including through the possible linking of targets to government funding initiatives. There is also a reference to: "the implementation of any necessary industrial relations reforms". Many

successful employers have measures to promote diversity. It is in the best interests of a business to draw talent from the widest pool possible. They do this without government mandates. Again, we are concerned about the impact of an increase of government interference and regulation upon private sector employers.

- Recommendations 9 to 11 propose various initiatives with respect to government tendering processes. In our view, insufficient recognition has been given to the success of small and medium sized Australian businesses who have participated in government tendering processes. The latest Federal Government procurement statistics indicate that 86 per cent of Federal Government suppliers are small and medium sized businesses with 96 per cent of those businesses having an Australian address. Moreover, the government procurement rules have been updated to allow agencies to directly engage with SME's on procurements valued up to \$200,000. This cuts red tape, reduces tendering costs and provides an opportunity for more small businesses to participate in government tendering processes.
- Recommendation 12 proposes limits in relation to future trade agreements, particularly with respect to anything that would restrict preferences being given in Commonwealth Government procurement processes. The implications of such a change in policy require careful consideration. Australia is a trading nation. Our access to export markets has been enhanced through Free Trade Agreements. The costs and lost opportunities arising from the recommendation should be carefully weighed.
- Recommendation 13 provides a lowering of the threshold project amount under the *Australian Jobs Act 2013*. The recommendation is scant on detail with respect to the amount it should be lowered to and the consequences for projects which would fall within the lowered cap.
- Recommendation 14 provides for mandatory ratios of apprentices to tradespeople in relation to government funded projects. Refer to our comments above in relation to Recommendation 6.
- Recommendation 15 supports green hydrogen as a potential long-term alternative to gas. The Federal Government has a detailed hydrogen strategy which is not limited to green hydrogen. For the short and medium term, it appears that blue hydrogen (made from natural gas or coal with CCS) provides a materially less expensive alternative. It is accommodated for in the Government's hydrogen strategy. In our view, it is unwise to limit Australia's strategy to green hydrogen.
- Recommendation 16 calls for the establishment of a CRC for Sustainable Manufacturing to operationalise hydrogen and to support the development of a greens metals industry. In our view, there is insufficient recognition of the work currently taking place under existing policies. Query how the recommendation would add anything to the work currently taking place

within ARENA, the CEFC and the Clean Hydrogen Industrial Hubs initiative.

- Recommendation 17 call for the Government to recognise the importance of the supply and affordability of gas for the future of Australian manufacturing. The Federal Government does recognise this. That is why the Federal Government implemented the Gas Fired Recovery Plan as a key pillar in the Federal Government's economic agenda.
- Recommendation 18 deals with domestic electrical equipment testing capabilities, in particular at Lane Cove Testing Facility. Given a 49 per cent interest in this facility is already owned (indirectly) by the New South Wales Government, it is a matter where they might be expected to take a lead role. Having said that, it is important for Australia to maintain its major industrial capacity in such areas. This issue warrants further consideration.
- Recommendation 19 deals with the pharmacy supply chain. This is an important issue. However, we consider that the subject requires further examination.

Conclusion

1.34 In our view, the Government's policies have been effective in promoting the development of Australia's manufacturing industry. We are concerned that a material step up in government intervention and regulation (as countenanced by many of the recommendations in the Majority Report) will be counter-productive, will not achieve the desired results and will impose a cost upon all Australian taxpayers without the commensurate benefits.

Senator Paul Scarr
Deputy Chair
Liberal Senator for Queensland

Senator Andrew Bragg
Committee Member
Liberal Senator for New South Wales

Additional Comments - Senator Rex Patrick

STOP JUST EXPORTING ROCKS

- 1.1 One would think the Government would have learned from the supply chain issues that plagued us during COVID-19. They haven't.
- 1.2 A strong manufacturing sector is essential for national resilience and national security. It's also the segment where we train and then employ skilled people, develop intellectual property and generate value that then circulates throughout the community. A strong manufacturing sector means more exports and better balance of trade figures. We must foster manufacturing.
- 1.3 The Federal Government doesn't like to interfere in the market. It is philosophically wedded to a fair playing field and the economic theory of comparative advantage. But the reality is that markets are skewed.
- 1.4 In Australia, rightly, government imposes costs on businesses such as minimum wages, leave loadings, long service leave, quality standards, occupational health and safety standards, environmental standards and more, and then buys cheaper goods and services from countries where few or none of those obligations exist. It buys from multinational companies that don't pay tax and ignores Aussie companies that, rightly and fairly, do pay tax.
- 1.5 As manufacturing companies fail, it makes it harder for other manufactures to operate. Conversely, as manufacturing grows, it makes it easier for other manufactures to thrive.
- 1.6 The Federal Government must take action to establish the environment that supports investment in and support for Australian manufacturing and capitalising on Australia's elements of difference that can provide advantage. Imagine using our gas to give our manufacturers cheaper energy, gaining an advantage over foreign competitors (instead of giving our gas away to multinational companies who give us nothing for our resource). Or our lithium to establish a battery manufacturing industry, rather than supporting foreign battery manufacturers.
- 1.7 We need to:
 - Export steel, not iron ore
 - Export batteries, not lithium
 - Export titanium alloy powder, not rutile or ilmenite (titanium ores)

1.8 We need to stop just exporting our rocks.

Senator Rex Patrick
Committee Member
Independent Senator for South Australia

Appendix 1

Submissions and additional information

- 1 Mrs Janet Pukallus
- 2 Ms June English
- 3 Ms Monica Mesch
- 4 *Name Withheld*
- 5 Mr Peter Davies
- 6 Mr Andreas Soulos
- 7 *Name Withheld*
- 8 Mr Leon Brooks
- 9 Mr Keith Kerr
- 10 Mr Adam Kommer
- 11 Manufacturing on the Move
- 12 Mr Alexander Walsh
- 13 Mr Peter Luther
- 14 Mr Geoffrey Savage
- 15 Mr Dennis Pukallus
- 16 Interactive Games & Entertainment Association (IGEA)
- 17 Ms Janelle Patch
- 18 Mrs Ann Lawler
- 19 Mr Alan Baker
- 20 Mr Marinus Tummers
- 21 Mr Les Anderson
- 22 Mrs Caroline Larnier
- 23 Mr Graham Crowther
- 24 Mr Max Goulter
- 25 Mr David Stow
- 26 Mr Desmond Whyte
- 27 Mr Michael De Nieuwe
- 28 Mr Derek McIntosh
- 29 Mr James Hazzard
- 30 Mr Brad Golding
- 31 Australian Automotive Aftermarket Association
- 32 Ms Helen Leach
- 33 *Name Withheld*
- 34 Manufacturing Excellence Forum (Sunshine Coast)
- 35 Mr Kenneth Bebb
- 36 The Department of Defence
- 37 *Name Withheld*
- 38 The Australian Academy of Technology and Engineering
- 39 Mr Tony Lovett

- 40 Advanced Manufacturing Growth Centre
- 41 CropLife Australia
- 42 Mr Frank Flood
- 43 Ms Faith O'Malley
- 44 Ms Louise Ackland
- 45 Regional Australia Institute
- 46 Carmichael Centre
- 47 Sanofi
- 48 Amaero
- 49 Ai Group and Engineers Australia
- 50 Dr Mark McGovern
- 51 OZ Minerals
- 52 Science & Technology Australia
- 53 Mr John Gates
- 54 *Name Withheld*
- 55 Mr Greg Thomson
- 56 Mr Darryn Wiley
- 57 Mr Anthony Allison
- 58 Mr Robert Butler
- 59 Mr Timothy Mortimer
- 60 *Name Withheld*
- 61 Mr Tom Marwick
- 62 *Name Withheld*
- 63 *Name Withheld*
- 64 Australian Citizens Party
- 65 Grattan Institute
- 66 UNUS
- 67 Mr Tim de Beaux
- 68 Australian Industry Group (Ai Group_
- 69 *Confidential*
- 70 Australian Steel Institute
- 71 Flinlex Pty Ltd
- 72 Minerals Council of Australia
- 73 InfraBuild
- 74 Institute of Public Affairs
- 75 Consumer Healthcare Products Australia
- 76 Building 4.0 CRC
- 77 Maritime Union of Australia
- 78 Productivity Commission
- 79 Innovaero
- 80 AusBiotech, Cell Therapies, MTP Connect and Research Strategies Australia
- 81 Australian Sovereign Capability Alliance
 - Attachment 1

- Attachment 2
 - Attachment 3
 - Attachment 4
- 82 National Civic Council
- 83 Medicines Australia
- 84 Australian Food and Grocery Council
- Attachment 1
- 85 Iron Boomerang Project
- 86 Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- 87 Mr Lex Stewart
- 88 Centre for Future Work
- 89 Ms Kay Christensen
- 90 3ME Technology
- 91 Mr Roger Fairfax
- 92 Dr Shumi Akhtar
- 93 Mr Richard Burian
- 94 Mr Stefan Kos
- 95 Mr Rocco Perna
- 96 The Australian Petroleum and Exploration Association (APPEA)
- 97 Ms Margaret Thornton
- 98 *Confidential*
- 99 Mr Dennis Denning
- 100 Mr Alan McMullan
- 101 Complementary Medicines Australia
- 102 The Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU)
- 103 Cooperative Research Centres Association
- 104 The Australian Nuclear Science and Technology Organisation (ANSTO)
- 105 South East Melbourne Manufacturers Alliance (SEMMA)
- 105.1 Supplementary to submission 105
- 106 Mr Andrew Stepien
- 107 Mr Gerard Flood
- 108 Australasian Railway Association
- 109 Australian Academy of Science
- 110 ARRIVAL
- 111 United Workers Union (UWU)
- 112 Manufacturing Australia
- 113 Australian Workers Union (AWU)
- 114 Australian Manufacturing Workers' Union (AMWU)
- 114.1 Supplementary to submission 114
- 115 Northern Territory Government
- 116 Department of Industry, Science, Energy and Resources
- 117 Australian Council of Trade Unions

- 118 Mr Allan Clark
- 119 Mr Graeme Muldoon
- 120 Mr Herman Duiker
- 121 Mr David Orr
- 122 Mr Bernie Bourke
- 123 Mr Brian Hession
- 124 Mr Jeff Leddin
- 125 Mr Andrew Dunn
- 126 Tasmanian Government
- 127 BioDiem Pty Ltd.
- 128 Ms Jenny Koschutzke
- 129 Mr Kevin Lawlor
- 130 Mr and Ms John and Helen Casanova

Answer to Question on Notice

- 1 Centre for Future Work: answer to question on notice from hearing in Canberra on 11 November 2021 (received 1 December 2021).
- 2 Science and Technology Australia: answer to question on notice from hearing in Canberra on 11 November 2021, (received 1 December 2021).
- 3 Department of Education, Skills and Employment: answers to question on notice IQ21-000153 from hearing in Canberra on 11 November 2021, Research programs (received 1 December 2021).
- 4 Department of Education, Skills and Employment: answers to question on notice IQ21-000155 from hearing in Canberra on 11 November 2021, University course funding (received 1 December 2021).
- 5 Department of Education, Skills and Employment: answers to question on notice IQ21-000156 from hearing in Canberra on 11 November 2021, University funding and course data (received 1 December 2021).
- 6 Advanced Manufacturing Growth Centre: answer to question on notice from hearing in Canberra on 11 November 2021 (received 1 December 2021).
- 7 CSIRO: answer to question on notice from hearing in Canberra on 11 November 2021 (received 1 December 2021).
- 8 AusBiotech, Cell Therapies, MTP Connect and Research Strategies Australia: answers to question on notice from hearing in Canberra on 11 November 2021 (received 1 December 2021).
- 9 Australian Academy of Technology and Engineering: answer to question on notice from hearing in Canberra on 11 November 2021 (received 1 December 2021).
- 10 Department of Education, Skills and Employment: answers to question on notice IQ21-000157 from hearing in Canberra on 11 November 2021, University enrolments affected by COVID-19 (received 1 December 2021).
- 11 Cooperative Research Australia: answer to question on notice from hearing in Canberra on 11 November 2021 (received 1 December 2021).

- 12 Australian Academy of Science: answer to question on notice from hearing in Canberra on 11 November 2021 (received 3 December 2021).
- 13 Manufacturing Australia: answer to question on notice from hearing in Canberra on 11 November 2021 (received 3 December 2021).
- 14 Department of Defence: answer to question on notice from hearing in Canberra on 8 December 2021, High-voltage electrical testing facility (received 13 December 2021).
- 15 Australian Steel Institute: answer to question on notice from hearing in Canberra on 6 December 2021, Building Confidence (received 14 December 2021).
- 16 Australian Steel Institute: answer to question on notice from hearing in Canberra on 6 December 2021, CSIRO - Quantifying Australia's returns to innovation (received 14 December 2021).
- 17 Australian Steel Institute: answer to question on notice from hearing in Canberra on 6 December 2021, Successful projects and economic contribution (received 14 December 2021).
- 18 Australian Steel Institute: answer to question on notice from hearing in Canberra on 6 December 2021, Steel research hub and Anti-dumping system (received 14 December 2021).
- 19 United Workers Union: answer to question on notice from hearing in Canberra on 8 December 2021 (received 14 December 2021).
- 20 Medicines Australia: answer to question on notice from hearing in Canberra on 8 December 2021 (received 14 December 2021).
- 21 Australasian Railway Association: answer to question on notice from hearing in Canberra on 6 December 2021 (received 14 December 2021).
- 22 Australasian Railway Association: answer to question on notice from hearing in Canberra on 6 December 2021, Australian Rollingstock Market 1994-2001 (received 14 December 2021).
- 23 CFMMEU (Construction & General Division): answer to question on notice from hearing in Canberra on 6 December 2021, (received 15 December 2021).
- 24 Australian Automotive Aftermarket Association (AAAA): answer to question on notice from hearing in Canberra on 6 December 2021, (received 15 December 2021).
- 25 Maritime Union of Australia: answer to question on notice from hearing in Canberra on 6 December 2021 (received 15 December 2021).
- 26 The Australian Industry Group: answer to question on notice from hearing in Canberra on 8 December 2021 (received 16 December 2021).
- 27 The Australian Workers Union: answer to question on notice from hearing in Canberra on 8 December 2021 (received 16 December 2021).
- 28 InfraBuild: answer to question on notice from hearing in Canberra on 6 December 2021 (received 17 December 2021).
- 29 Australian Manufacturing Workers' Union: answer to question on notice from hearing in Canberra on 6 December 2021 (received 17 December 2021).

- 30 Australian Manufacturing Workers' Union: answer to question on notice from hearing in Canberra on 8 December 2021 (received 20 December 2021).
- 31 Australian Council of Trade Unions (ACTU): answer to question on notice from hearing in Canberra on 8 December 2021 (received 20 December 2021).
- 32 Department of Education, Skills and Employment: answers to question on notice IQ21-000151 from hearing in Canberra on 11 November 2021, Connections between industry and our education/training providers (received 2 December 2021).
- 33 Department of Education, Skills and Employment: answers to question on notice IQ21-000154 from hearing in Canberra on 11 November 2021, Migration training levy (received 2 December 2021).
- 34 Department of Education, Skills and Employment: answers to question on notice IQ21-000158 from hearing in Canberra on 11 November 2021, VET data breakdown (received 2 December 2021).
- 35 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 8 December 2021, Departmental process (received 24 January 2022).
- 36 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 11 November 2021, Determination of manufacturing priorities (received 24 January 2022).
- 37 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 8 December 2021, Extent of local investment in supplying COVID related products (received 24 January 2022).
- 38 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 8 December 2021, Goods Production (received 24 January 2022).
- 39 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 8 December 2021, Impact on Industry (received 24 January 2022).
- 40 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 6 December 2021, QoN 1: Local content mandates (received 24 January 2022).
- 41 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 11 November 2021, Moving from mining products to making products (received 24 January 2022).
- 42 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 11 November 2021, Potential for carbon tariffs overseas to impact on Australia's advance manufacturing capabilities (received 24 January 2022).
- 43 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 11 November 2021, Potential to scale up CRCs in Australia (received 24 January 2022).

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- 44 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 11 November 2021, Risks to Australia's sovereign capability from tariff reductions (received 24 January 2022).
 - 45 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 8 December 2021, Testing Facility Closure Update (received 24 January 2022).
 - 46 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 11 November 2021, Trade obligations opportunities (received 24 January 2022).
 - 47 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 6 December 2021, QoN 2 - Vision of Manufacturing (received 24 January 2022).
 - 48 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 8 December 2021, Shortage of welders and metal trades in the manufacturing sector (received 24 January 2022).
 - 49 Department of Industry, Science, Energy and Resources: answers to question on notice from hearing in Canberra on 11 November 2021, Australia's current R&D investment to support the development of a domestic advanced manufacturing sector (received 24 January 2022).

Additional Hearing Information

- 1 Additional information provided by Australian Council of Trade Unions from the public hearing in Canberra, 8 December 2021.

Appendix 2

Public hearings

Thursday, 11 November 2021

Committee Room 2S3

Parliament House

Canberra

Manufacturing Australia

- Mr Ben Eade, Chief Executive Officer

Advanced Manufacturing Growth Centre

- Dr Jens Goennemann, Managing Director

Centre for Future Work

- Dr Jim Stanford, Economist and Director of the Centre for Future Work
- Dr Mark Dean, Carmichael Distinguished Research Fellow

The Australian Academy of Technology and Engineering

- Professor Hugh Bradlow, President
- Dr Dimity Dornan, Fellow

Science and Technology Australia

- Ms Misha Schubert, Chief Executive Officer
- Associate Professor Jeremy Brownlie, President
- Professor Sharath Sriram, Policy Committee Chair

Australian Academy of Science

- Ms Anna-Maria Arabia, Chief Executive
- Mr Chris Anderson, Director Science Policy

Commonwealth Scientific and Industrial Research Organisation (CSIRO)

- Ms Kristen Rose, Executive Director
- Dr Marcus Zipper, Director—Manufacturing

Cooperative Research Australia (was Cooperative Research Centres Association)

- Ms Jane O'Dwyer, Chief Executive Officer
- Mr Jordan Gardner, Advocacy and Policy Manager

Productivity Commission

- Mr Michael Brennan, Chair
- Mr Jonathan Coppel, Special Advisor
- Dr Patrick Jomini, Assistant Commissioner

AusBiotech, Cell Therapies, MTP Connect and Research Strategies Australia

- Ms Lorraine Chiroiu, Chief Executive Officer
- Associate Professor Dominic Wall, Executive Director of Business Ventures—Chief Scientific Officer, Cell Therapies Pty Ltd

Department of Education, Skills and Employment

- Ms Renae Houston, First Assistant Secretary—VET Quality and Policy Division
- Ms Belinda Campbell, Assistant Secretary—Workforce and Apprenticeships Services Branch
- Ms Rachel Livingston, Assistant Secretary—Industry Advice Branch

Department of Industry, Science, Energy and Resources

- Ms Jo Evans, Deputy Secretary
- Ms Narelle Luchetti, Head of Division—Manufacturing Division
- Ms Donna Looney, Head of Division—Industry Growth Division
- Mr Russ Campbell, Head of Division—Analysis and Insights
- Mr James White, A/g Head of Division—Electricity Division
- Ms Emma Greenwood, Head of Division—AusIndustry
- Mr David Luchetti, General Manager—Vaccine Manufacturing Taskforce, Science and Commercialisation

Monday, 6 December 2021

Committee Room 2S3

Parliament House, Canberra

Australian Automotive Aftermarket Association

- Mr Stuart Charity, Chief Executive Officer
- Ms Lesley Yates, Director of Government Relations and Advocacy

Australasian Railway Association

- Ms Natalie Currey, General Manager—Supply Chain, ARA
- Mr Todd Garvey, Commercial Director—Australia and New Zealand, Alstom Group
- Mr Michael McLellan, Managing Director—Knorr Bremse Australia

Amaero

- Mr Barrie Finnin, Chief Executive Officer

Maritime Union of Australia

- Mr Jamie Newlyn, National Assistant Secretary

The Australian Manufacturing Workers' Union (AMWU) and the Australian Manufacturing Workers' Union (AMWU) WA

- Mr Steve McCartney, WA State Secretary

- Mr Steve Murphy, National Secretary
- Mr Cam Brady, Delegate
- Mr Keith Lang, President—NSW Branch
- Ms Pepe Jones, Delegate

The Construction, Forestry, Maritime, Mining and Energy Union (CFMMEU)

- Mr Nigel Davies, National Assistant Secretary—Construction & General Division
- Ms Lucy Weber, Senior National Legal Officer

InfraBuild

- Mr Stephen Porter, Head of Trade and Innovation

Australian Steel Institute

- Mr Mark Cain, Chief Executive
- Mr David Varcoe, National Manufacturing Advisor

Department of Industry, Science, Energy and Resources

- Ms Donna Looney, A/g Head of Division—Industry Growth
- Mr Mark Weaver, General Manager—Strategic Industry Policy, Industry Growth Division
- Mr Nick Purtell, General Manager—Manufacturing Priorities and Supply Chains Branch, Manufacturing Division
- Ms Rebecca Manen, General Manager—Strategy and Analysis Branch, Manufacturing Division
- Mr Wayne Calder, General Manager—Economic & Industry Analysis Division, Analysis & Insights Divisions
- Mr David Luchetti, General Manager—Vaccine Manufacturing Taskforce, Science & Commercialisation Division
- Ms Narelle Luchetti, Head of Division—Manufacturing Division
- Mr Russ Campbell, Head of Division—Analysis & Insights Division
- Ms Alison Drury, General Manager—Trade and International Branch, Strategic Policy Division
- Ms Beth Brunoro, Head of Division—Strategic Policy Division

Wednesday, 8 December 2021

Committee Room 2S1

Parliament House, Canberra

Australian Food and Grocery Council

- Ms Tanya Barden, Chief Executive Officer

United Workers Union

- Mr Godfrey Mouse, Director Allied Industries
- Mr Harry Fischer, Delegate

- Mr Richard Glenk, Delegate

Australian Workers Union

- Mr Taylor Rundell, National Economist

Medicines Australia

- Ms Elizabeth de Somer, Chief Executive Officer
- Dr Anna Lavelle, Chair Medicines Australia Board

South East Melbourne Manufacturers Alliance (SEMMA)

- Mr Peter Angelico, President
- Ms Vonda Fenwick, Chief Executive Officer

Australian Council of Trade Unions

- Ms Michele O'Neil, President
- Mr Ben Moxham, Director of Legal, Research & Policy
- Ms Michelle Owen, Delegate

AiGroup

- Mr Peter Burn, Chief Policy Advisor
- Ms Louise McGrath, Head of Industry Development and Policy

Australian Sovereign Capability Alliance

- Hon Mr Martin Hamilton-Smith, Director

Department of Defence

- Mr Stephen Moore, Assistant Secretary—Defence Industry Policy
- Ms Francesca Rush, Chief Counsel Commercial & A/g First Assistant Secretary, Australian Industry Capability

Department of Industry, Science, Energy and Resources

- Ms Alison Drury, General Manager—Trade and International Branch, Strategic Policy Division
- Ms Beth Brunoro, Head of Division—Strategic Policy Division
- Mr David Luchetti, General Manager—Vaccine Manufacturing Taskforce, Science & Commercialisation Division
- Ms Donna Looney, A/g Head of Division—Industry Growth
- Ms Judith Blake, A/g General Manager—Industry Settings, Industry Growth Branch
- Mr Nick Purtell, General Manager—Manufacturing Priorities and Supply Chains Branch, Manufacturing Division
- Ms Rebecca Manen, General Manager—Strategy and Analysis Branch, Manufacturing Division
- Mr Wayne Calder, General Manager—Economic & Industry Analysis Division, Analysis & Insights Divisions

- Ms Narelle Luchetti, Head of Division—Manufacturing Division
- Sabrena King, Acting General Manager

Appendix 3

Government assistance for domestic manufacturing

In addition to the MMS the Australian Government directly supports the manufacturing industry through a number of key programs which target:

- research and development;
- attracting investment;
- supply chain support;
- government procurement;
- trade policy; and
- skills and training.¹

Table 3.1 Government programs supporting domestic manufacturing

Program	Description	Target category
Business Research and Innovation Initiative (BRII)	<p>The BRII aims to drive innovation that addresses Government policy and service delivery challenges, with the help of small and medium enterprises (SMEs). The BRII complements the Entrepreneurs' Programme, CSIRO Data61's Innovation Challenges marketplace and the Small Business Innovation Research for Defence. BRII includes the following three stages:</p> <ol style="list-style-type: none"> 1. Australian government agencies and Innovation and Science Australia to nominate five real life government policy and service delivery challenges. 2. SMEs are invited to submit proposals to address the challenges. SMEs with the most innovative ideas are granted up to \$100,000 to do a feasibility 	<p>Attracting Investment</p> <p>Research and Development</p> <p>Skills and Training</p>

¹ Source: DISER, Submission 116, pp. 13.

	study over three months to test their proposals.	
	3. The most successful ideas are eligible for a further grant of up to \$1 million to develop a prototype or proof of concept.	
Cooperative Research Centres (CRC)	<p>The Cooperative Research Centres (CRC) Program aims to improve the competitiveness of Australian industries by fostering high quality research, and to encourage SME participation in collaborative research.</p> <p>The CRC Program has two streams:</p> <ul style="list-style-type: none"> • CRCs undertake industry-led, high quality collaborative research for up to 10 years. This research is to solve industry-identified problems and capture industry-wide opportunities. CRCs must include at least one Australian industry entity and one Australian research organisation as partners. CRCs have no set funding limit. • CRC Projects (CRC-Ps) undertake industry-led collaborative research for up to three years with grants capped at \$3 million. CRC-Ps must have at least two Australian industry entities (at least one of which is an SME) and one Australian research organisation as partners. 	<p>Research and Development</p> <p>Supply Chain Support</p> <p>Attracting Investment</p>
Cyber Security National Workforce Growth Program	<p>The Cyber Security National Workforce Growth Program seeks to ensure that cyber security skills required now can be developed quickly and a pipeline of cyber security skills for the future is embedded in Australian business to support secure ongoing operation in a digital economy. The program comprises of:</p> <ul style="list-style-type: none"> • the Cyber Security Skills Partnership Innovation Fund • enhanced data collection on cyber security labour force • an expansion of Questacon's STEM 	Skills and Training
Cyber Security Skills	The Cyber Security Skills Partnership Innovation Fund will create a pipeline	Skills and Training

Partnership Innovation Fund	of cyber security professionals that can meet growing demand for cyber security jobs across the Australian economy.	
Digital Skills Finder Platform	The Digital Skills Finder Platform provides Australian job seekers and businesses with access to free and paid digital skills training courses.	Skills and Training
The department's overseas counsellor network	The department has seven counsellors based in key countries/regions overseas—Japan, North America, China, India, and Europe. Counsellors are charged with seeking out new markets for Australian exports (including manufactures).	Attracting Investment
Energy Storage	Support for energy storage projects reflects the potential benefit derived from these dispatchable sources of supply. Storage is needed to complement variable renewable energy, by providing firming necessary to ensure demand can be met. In the case of battery energy storage, these technologies also provide essential system services, necessary to keep the grid in a safe operating state.	Attracting Investment
Entrepreneurs Programme	The Entrepreneurs' Programme delivers advice, networking, and grants to help Australian SMEs to strengthen, grow, innovate, and commercialise nationally and globally. This helps to drive economic growth and jobs, improving broader community outcomes. The program provides businesses with access to tailored expert advisory services and grant funding. The program delivers this support through an independent national network of over 170 industry experts.	Research and Development Supply Chain Support Skills and Training Attracting Investment
Free Trade Agreement (FTA) Negotiations	The department contributes to FTA negotiations for goods related matters, notably industrial, (manufactured) and resources goods. Current FTA negotiations are with the European Union, the United Kingdom and India is expected to launch soon.	Trade Policy
Gas-Fired Recovery	Gas is a critical enabler of Australia's economy and helps to support our	Attracting Investment

manufacturing sector that employs over 900,000 Australians. On 15 September 2020, the Prime Minister announced the Australian Government's Gas-Fired Recovery as a key pillar in the Government's economic agenda. The Gas-Fired Recovery is designed to support a strong economy by ensuring Australian gas is working for all Australians, through ensuring domestic users have access to internationally competitive prices. The Gas-Fired Recovery Plan focusses on three key actions: unlocking gas supply, delivering an efficient pipeline and transportation market, and empowering customers.

Hydrogen

Australia's National Hydrogen Strategy —released in 2019 —sets the vision for Australia to be a major hydrogen producer and exporter by 2030.

Our focus on hydrogen reflects it can be used:

- to power vehicles
- to generate heat and electricity
- as an industrial chemical feedstock for products such as ammonia and steel
- to globally trade clean energy.

Like the rest of the world, the main use of hydrogen in Australia currently is as a raw material for industrial processes. Current production processes for hydrogen result in carbon emissions. For hydrogen to be a clean fuel that contributes to lowering emissions we need to change this production to methods which release low or no carbon emissions. In Australia, most clean hydrogen producers are considering three different approaches to production. These are: electrolysis using renewable electricity through thermochemical reactions, using coal (in a process known as gasification) or natural gas (in a process known as steam methane reforming) with substantial carbon capture and storage.

Attracting Investment
Research and
Development

Clean hydrogen use in Australia would help us reduce emissions in those high temperature industries as well as some transport sectors. When it is produced using renewable energy or processes, hydrogen becomes a way of storing renewable energy for use at a later time when it is needed.

Clean hydrogen can be blended through existing natural gas pipelines as a source of low emissions heat and power in homes and in industrial applications. When converted to a liquid or another suitable material, hydrogen can also be transported on trucks and in ships. This means hydrogen can also be exported overseas, effectively making it a tradable energy commodity.

Industry Growth Centres Initiative

Through an industry-led process the Industry Growth Centres Initiative aims to drive innovation, productivity, and competitiveness.

Research and Development
Attracting Investment
Supply Chain Support
Skills and Training

Landing Pads Program

Landing Pads are an initiative of the Australian Government's National Innovation and Science Agenda to stimulate innovation and entrepreneurship. The program provides Australian start-up businesses with a workspace for up to 90 days in a global innovation hub. The program provides market-ready scaleups with an operational base and customised support for their overseas expansion goals. Landing Pads provide:

- a dedicated Landing Pad manager
- a co-working space
- access to in-market Entrepreneurs in Residence
- connections to local founder communities
- introductions to Austrade customer networks, partners and

Attracting Investment
Research and Development
Skills and Training

contacts.

Liquid Fuel Security	The <i>Fuel Security (Consequential and Transitional Provisions) Act 2021</i> (Cth) commenced on 29 June 2021. In the 2021-22 Budget, the Government committed up to \$2.4 billion to deliver fuel security certainty to Australia and has secured Ampol and Viva Energy's commitment to continue refining until 2027.	Attracting Investment
Microgrids	Microgrids can represent more reliable, secure, and cost-effective energy supply options for regional and remote communities in Australia. In September 2020, the Australian Government announced a further \$53.6 million to support the development of microgrid pilot projects, which will be delivered by ARENA under the Regional Australia Microgrid Pilots Program. These pilot projects will demonstrate the design and performance of microgrids and help communities and businesses understand and break down the barriers to deployment.	Attracting Investment Research and Development
Moon to Mars: Demonstrator	The Moon to Mars Demonstrator program supports demonstrator and pilot projects. This program is divided into feasibility grants, to develop the feasibility of space projects and missions; and mission grants, for space activities at more advanced stages of mission development.	Research and Development
Moon to Mars: Supply Chain	The Moon to Mars Supply Chain initiative consists of both grant and facilitation components, targeting projects and activities that support Australian industry to deliver products and services into domestic and international space supply chains.	Supply Chain Support
National Artificial Intelligence Centre	Establishment of a National AI Centre and four AI and Digital Capability Centres will bring together Australia's leading AI researchers and industry, and support businesses to adopt and use AI technologies.	Research and Development
Next Generation	Supporting Australia's Next Generation Artificial Intelligence Graduates to	Skills and Training

Artificial Intelligence Graduates Program	develop industry co-funded scholarships to attract and train home-grown, job ready Artificial Intelligence specialists.	
Next Generation Emerging Technologies Graduates Program	The Next Generation Emerging Technologies Graduates Program will deliver industry co-funded competitive national scholarships to support emerging technologies areas such as robotics, cyber security, quantum computing, blockchain and data science.	Skills and Training
Offshore Renewable Energy	Offshore renewable energy, in particular the use of wind resources, is booming globally with the International Energy Agency viewing offshore wind as one of the big three sources of clean energy alongside solar and onshore wind. Australia is yet to fully capitalise on its potential to harness our capacity in this new energy resource, although there is increasing investor interest in the region. The advantages Australia's offshore wind can bring through higher capacity factors, a diverse energy supply that complements solar and onshore wind along with employment opportunities cannot be underestimated, with new developments in floating offshore wind turbines only increasing access to deeper water sites with higher quality generation capacity. The Offshore Electricity Infrastructure Bill 2021, which is intended to be introduced into Parliament in Spring 2021, will establish the licensing framework required for offshore electricity generation and transmission projects, such as offshore wind farms, to commence construction in Australian waters. The framework covers the construction, operation and decommissioning of offshore low emissions projects. The government has committed \$4.8 million to the development of the framework, which is intended to commence in 2022.	Attracting Investment Research and Development
Renewable Energy	Renewable energy from sources like wind, solar and hydro generated 24% of Australia's electricity in 2020. This included electricity from both large, utility scale generators and small systems owned by Australian families and	Attracting Investment Research and Development

businesses. Australia is the world leader on rooftop solar with more than 16GW now installed as of June 2021. Today, Australian businesses and householders have more options than ever to generate and manage energy. Over one in four Australian homes now have solar panels on their roof—the highest uptake of household solar in the world. Uptake of household battery storage is also expected to increase over the coming years. The key challenge to ensuring continued strong growth in new renewable capacity is to drive down the cost of storage and backup as well as transmission and grid upgrades. The Government has invested \$1.4 billion in reliable renewable generation and storage, supporting a high-tech expansion of the Snowy Hydro scheme and the development of the Marinus Link, the second Bass Strait interconnector needed to turn Tasmania’s Battery of the Nation vision into reality. The Australian Government has also established a \$1 billion Grid Reliability Fund. Co-investments that reduce costs, will increase demand. This in turn will create incentives to invest, unlocking economies of scale, reducing prices further and stimulating more demand. This can complete a virtuous circle that supports greater scale and improved cost competitiveness in an emerging industry. Contributing to the growth of the clean energy sector in Australia while enhancing opportunities for a range of Australian industries, including manufacturing, is the proposed offshore renewable energy regulatory framework currently being prepared by the department. The proposed regulatory framework will allow Australia to develop new industries and jobs, and act to open up regional communities to investment through large scale offshore renewable energy projects and interconnector infrastructure

Research and
Development (R&D)
Tax Incentive (RDTI)

The RDTI aims to encourage businesses to invest in R&D. R&D is often the first critical step in innovation. The RDTI drives technological improvements that lead to productivity improvements and increased economic growth.

Research and
Development

Companies tend to underinvest in R&D for several reasons, including:

- not being able to capture the benefits of their R&D because new knowledge tends to leak out or 'spill over' to benefit competitors and the rest of the economy
- difficulties finding external finance because of uncertainties around the likely success of their R&D projects.

This is why the government has a role to play in encouraging industry to invest more in R&D. The tax incentive offers a way for companies to invest in R&D while alleviating some of their initial reasons for not investing.

Securing Electricity
Supply and Lower
Prices

The department is focussed on delivering affordable, reliable, and secure electricity for Australian households and businesses. Australia's electricity system is changing. To balance and integrate high shares of renewable energy, more flexible back up generation and storage is needed, such as gas, pumped hydro and batteries. The department is supporting reliability of affordable, reliable and secure electricity through a range of measures, including \$149.9 million for the development of the Marinus Link, \$1.38 billion in equity investment for Snowy 2.0, the \$1 billion Grid Reliability Fund, the Retailer Reliability Obligation, and has established the Underwriting New Generation Investments program.

Attracting Investment

Standards and
Conformance

Australia's standards and conformance infrastructure provides businesses and consumers with confidence in the goods and services they are developing or using. Standards underpin business competitiveness in global markets, they act as a launching pad for innovation and establish a common language for new concepts and technologies.

Trade Policy

Tariffs and Tariff
Concession

Tariffs exist to protect local industry and assist with the domestic competitiveness of locally produced goods. Tariffs can be effective where

Trade Policy

Programs	Australia is looking to develop a sovereign capability, protect against global shocks and demonstrate continued support of industry in the face of tariffs and subsidies applied in competitive markets. Consistent with Australia's support for open and free trade, a range of tariff concessions are also provided for by Government. These exist to enhance the global competitiveness of Australian industries by lowering input costs for firms as well as reducing costs to the general community where the application of a tariff serves no industry assistance purpose	
Using blockchain technology to reduce business compliance costs	The Blockchain Pilot Grants provide funding to demonstrate the potential for blockchain to reduce regulatory compliance burden for business. Two pilots will be funded to develop measures that demonstrate this potential in the Critical Minerals sector and the Food and Beverage sectors.	Research and Development

Source: DISER, Submission 116, pp. 13–21.