



COVERSHEET

Minister	Hon Stuart Nash	Portfolio	Economic and Regional Development
Title of Cabinet paper	Releasing the Draft Advanced Manufacturing Industry Transformation Plan for public consultation	Date to be published	1 June 2022

List of documents that have been proactively released

Date	Title	Author
April 2022	Cabinet paper – Releasing the Draft Advanced Manufacturing Industry Transformation Plan for public consultation	Office of the Minister of Economic and Regional Development
13 April 2022	Draft Advanced Manufacturing Industry Transformation Plan: Release for Public Consultation DEV-22-MIN-0084	Cabinet Office

Information redacted

YES / NO

Any information redacted in this document is redacted in accordance with MBIE's policy on Proactive Release and is labelled with the reason for redaction. This may include information that would be redacted if this information was requested under Official Information Act 1982. Where this is the case, the reasons for withholding information are listed below. Where information has been withheld, no public interest has been identified that would outweigh the reasons for withholding it.

Some information has been withheld for the reasons of Constitutional conventions.

BUDGET-SENSITIVE

Office of the Minister for Economic and Regional Development

Chair, Cabinet Economic Development Committee

Releasing the Draft Advanced Manufacturing Industry Transformation Plan for public consultation

Proposal

- 1 This paper seeks agreement to release for public consultation the draft *Advanced Manufacturing Industry Transformation Plan* that has been co-created in partnership between business, unions and government. I plan to release the Draft as soon as possible after consideration by Cabinet.
- 2 The advanced manufacturing sector is broad, diverse and a major contributor to the economy, jobs and communities. The sector employs 10.7 per cent of the workforce (248,400 people), accounts for 10 per cent of GDP (\$24.1 billion), 73.5 per cent of goods exports (\$44.5 billion), and 24 per cent of business expenditure on Research and Development (\$649 million). It is the second largest employer of Māori, largest employer of Pasifika and important contributor to regional employment and growth.
- 3 Following feedback received from public consultation, I intend to seek Cabinet approval of the final *Advanced Manufacturing Industry Transformation Plan* in August 2022 before public release in September 2022.

Issue identification

- 4 Advanced manufacturing was prioritised by Cabinet for an Industry Transformation Plan (ITP) due its scale and the potential to significantly increase productivity leading to higher wage jobs and a globally competitive low emissions sector. The actions in the Draft ITP align with the government's economic strategy of a high wage, low emissions, productive, sustainable and inclusive economy as we build back better.

Relation to government priorities

- 5 The Advanced Manufacturing ITP supports the government's overarching priorities to accelerate the economic recovery and rebuild from COVID-19 to achieve a high wage and low emissions economy [DEV-21-MIN-022 refers].
- 6 There are eight ITPs underway across government. ITPs are a key delivery mechanism for our refreshed Industry Strategy that aims to accelerate the transformation of certain sectors to support the government's economic strategy and priorities [DEV-20-MIN-0110 and DEV-19-MIN-0006 refer].
- 7 The actions in the Advanced Manufacturing ITP will deliver on the government's focus on creating higher wage jobs through lifting productivity, growing skills and investing in innovation. A globally competitive, circular, net-zero emissions

advanced manufacturing sector will accelerate our transition to a more productive, sustainable, inclusive and resilient future as we build back better.

- 8 The Advanced Manufacturing ITP aligns and supports other government priorities including the Emissions Reduction Plan, the Reform of Vocational Education, the Immigration Reset, and Te Ara Paerangi - Future Pathways.
- 9 The initiatives in the Advanced Manufacturing ITP are designed to support all manufacturing, including sub-sectors covered by the Agritech, Food and Beverage and Forestry and Wood Processing ITPs. The Digital Technologies ITP and Construction Sector Accord are also relevant to the advanced manufacturing sector and initiatives across these ITPs are intended to be mutually reinforcing.

Executive Summary

- 10 The *Advanced Manufacturing Industry Transformation Plan* is an opportunity for business, unions, government, Māori and wider stakeholders to co-create and co-own a plan to accelerate the growth and transformation of Aotearoa New Zealand's advanced manufacturing sector.
- 11 A driving principle of ITPs is partnership. Representatives from business, unions, government agencies, Māori and wider stakeholders have participated in a Steering Group and four Working Groups to prepare a Draft *Advanced Manufacturing Industry Transformation Plan* (Appendix One).
- 12 The Draft ITP provides an overview of Aotearoa New Zealand's advanced manufacturing sector and outlines a series of actions to accelerate its growth and transformation.
- 13 The priorities and actions in the Draft ITP align with the government's focus on creating higher wage jobs through lifting productivity, growing skills and investing in innovation. Its actions to support a globally competitive, circular and net-zero emissions advanced manufacturing sector will accelerate our transition to a more productive, sustainable, inclusive and resilient future as we build back better.
- 14 Public consultation on the Draft is proposed over six weeks. Public consultation will be focused on refining and prioritising the actions in the ITP Draft Action Plan. A final list of actions will be included in the Final ITP that I intend to bring to Cabinet for approval in August 2022 before public release in September 2022.

Background

Advanced manufacturing sector and opportunities for transformation

- 15 Advanced manufacturing is vitally important for Aotearoa New Zealand. It is a broad and diverse sector and a major contributor to the economy, jobs and communities.
- 16 The sector employs 10.7 per cent of the workforce (248,400 people), accounts for 10 per cent of GDP (\$24.1 billion), 73.5 per cent of goods exports (\$44.5 billion), and 24 per cent of business expenditure on Research and Development (\$649 million). It is

the second largest employer of Māori, largest employer of Pasifika and important contributor to regional employment and growth.

- 17 Two trends provide an opportunity to accelerate the growth and transformation of the sector over the next 20 years. First, advanced manufacturing is undergoing a fundamental shift through the application of advanced technologies and processes. Second, more focus than ever is being placed on economic activity that is sustainable, circular and low emissions.
- 18 Aotearoa New Zealand advanced manufacturing can adapt and thrive in this changing landscape. Growth and transformation will however require action. Currently, our manufacturing sector has relatively low capital investment in advanced technologies and processes compared to international benchmarks. This correlates with relatively low productivity by international standards.
- 19 There is, however, significant opportunity to encourage and grow investment and adoption of advanced technologies, processes and innovation to boost the manufacturing sector's productivity. If this is combined with other initiatives in the ITP, it will contribute to higher wages.
- 20 To support this evolution to advanced manufacturing, the sector will need to upskill existing workers. There is an opportunity to create new high-wage careers in advanced manufacturing, offering great workplace cultures and excellent long-term prospects for a wider diversity of workers.
- 21 While manufacturing employs a higher proportion of Māori and Pasifika than other industries, more can be done to build a diverse and inclusive workforce including at leadership and ownership levels. This includes attracting women that make up only 30 per cent of workers in manufacturing.
- 22 As the ITP describes, the sector's future competitiveness must be underwritten by an ambition and actions to create a leading sustainable, circular and net-zero emissions sector. Importantly, globally competitive advanced manufacturing will require not only a significant increase in productivity but also enhanced global connectivity.

Creation of the Draft Advanced Manufacturing ITP

- 23 The *Advanced Manufacturing Industry Transformation Plan* is an opportunity for business, unions, government, Māori and wider stakeholders to co-create and co-own a plan for the future of Aotearoa New Zealand advanced manufacturing.
- 24 A hallmark of the Advanced Manufacturing ITP has been the level of stakeholder engagement and partnership across the Steering Group and four Working Groups made up of representatives from business, union, government, Māori and wider stakeholders. The Steering Group Co-Chairs are: Brett O'Riley (Chief Executive, Employers and Manufacturers Association), Rachel Mackintosh (Vice-President, NZ Council of Trade Unions and Assistant National Secretary, E Tū), and Paul Stocks (Deputy Chief Executive, Labour Science and Enterprise, Ministry of Business, Innovation and Employment).

- 25 There are 13 representatives from across the sector on the Steering Group and 44 sector representatives on the four Working Groups. The Working Groups were established to identify key initiatives that would accelerate the growth and transformation of advanced manufacturing. Full membership of these Groups, as well as a wider Partnership Group, is contained in Appendix Two of the attached Draft ITP.
- 26 The active engagement by these groups to create the Draft ITP despite COVID-19 disruptions demonstrates the importance the manufacturing sector attaches to the ITP. Steering Group Co-Chairs Brett O’Riley and Rachel Mackintosh recently expressed a desire to maintain momentum despite the Omicron outbreak.
- 27 Māori play an important role in Aotearoa New Zealand’s advanced manufacturing sector as workers and increasingly as leaders and owners of manufacturing businesses. Māori perspectives, including te ao Māori, can strengthen the growth and transformation of the sector. The results of the Advanced Manufacturing ITP are intended to help create more high-skilled high-wage work opportunities for Māori as well as support Māori-owned and Māori-led manufacturing businesses. Effort has been made to include Māori perspectives in this draft through the participation of Māori business, Māori workers and Te Puni Kōkiri on the Steering and Working Groups. The intention is for active engagement with Māori to both widen and deepen in the next phase of development of the ITP to capture and support the opportunities for Māori in advanced manufacturing.
- 28 Eight government agencies have been involved in the ITP’s creation and its working groups. The Ministry of Business, Innovation and Employment (MBIE) is the lead government agency for this ITP but a number of other agencies work closely with the manufacturing sector. They include Callaghan Innovation, Ministry of Education, Ministry for the Environment, Ministry of Foreign Affairs and Trade, New Zealand Trade and Enterprise, Te Puni Kōkiri, and the Tertiary Education Commission.

Structure and outcomes of the Draft Advanced Manufacturing ITP

- 29 The Draft Advanced Manufacturing ITP is contained in Appendix One. It provides an overview of Aotearoa New Zealand’s advanced manufacturing sector and outlines a series of actions to accelerate its growth and transformation.
- 30 The Draft Advanced Manufacturing ITP is structured as follows:
- 30.1 It begins with two Forewords (Ministerial and from the Steering Group Co-Chairs) and an Executive Summary.
- 30.2 Part 1 then describes the wider economic and global context, the reasons that New Zealand’s refreshed industry policy has prioritised the advanced manufacturing sector, and the partnership process for ITP creation.
- 30.3 Part 2 provides an overview of our diverse and broad manufacturing sector, including its significant contribution to the economy, jobs, regions and trade.

30.4 Part 3 outlines priorities and actions to accelerate the growth and transformation of advanced manufacturing. The following six priorities have been identified:

- improving New Zealanders' perceptions of manufacturing
- increasing investment to lift productivity and wages
- making innovation, R&D and science work for manufacturing
- attracting and developing a diverse high-skilled and high-wage workforce
- creating a leading sustainable circular net-zero emissions sector
- enhancing global connectivity and opportunities.

30.5 Part 3 identifies 21 specific initiatives to drive transformation. These are also included in a Draft Action Plan Table along with measurable implementation actions over 1 to 3 years (see Appendix One Table of the Draft ITP).

31 Collectively, the initiatives identified in this ITP aim to achieve the sector's proposed vision of:

A thriving Aotearoa New Zealand advanced manufacturing sector of world-class creators, innovators and makers delivering quality products, sustainable solutions, and intergenerational wellbeing.

32 These ITP priorities and actions align with the government's focus on creating higher wage jobs through lifting productivity, growing skills and investing in innovation. A globally competitive, circular and net-zero emissions advanced manufacturing sector will accelerate our transition to a more productive, sustainable, inclusive and resilient future.

33 Implementing certain initiatives will require significant investment and policy support from government. For instance, the proposal in Initiative 4 to support greater capital investment and adoption of advanced technologies and processes in manufacturing aims to increase productivity and wages Constitutional conventions. There are other significant initiatives, including a strategy to improve the perceptions and profile of manufacturing (Initiatives 1 and 14), creating an Aotearoa New Zealand Centre for Manufacturing Excellence (Initiative 8), upskilling the workforce (Initiatives 11 to 14), and transitioning to net-zero emissions manufacturing (Initiative 17).

34 The implementation of the Action Plan will also require action by the business, unions, and wider stakeholders. The ITP partners recognise that the actions identified in the ITP will require active participation and commitment from all partners.

35 A key deliverable from public consultations will be to refine and prioritise the 21 initiatives. These have already been narrowed down from an initial list of over a hundred identified actions by selecting those considered to have the greatest impact.

Public Consultations Proposal

- 36 I plan to release the Draft ITP as soon as possible after consideration by Cabinet. I propose that we undertake six weeks of public consultation on the Draft ITP. This could commence as soon as late April.
- 37 Business and union partners are working with government to plan the consultation activities to ensure we reach a wide range of stakeholders. Due to the uncertainty surrounding Omicron, the majority of engagement activities will be online, with an option to hold some face-to-face engagements if the situation allows. The activities will include a mix of general information sharing and targeted workshops with businesses, workers, Māori and wider stakeholders.
- 38 Consistent with the partnership approach of this ITP, the Employers and Manufacturers Association (EMA) will actively support consultations with business including hosting the launch webinar and using its networks and platforms to ensure wide business engagement on the ITP. Union representatives are also planning to lead engagements with workers, including a series of workshops.

Timeline for finalising the Advanced Manufacturing ITP

- 39 The following table sets out the proposed timeline for public consultations and finalising the ITP.

Action	Dates
Draft ITP to Cabinet	April
Public consultation	April - June
Final ITP to Minister for Economic and Regional Development	July
Final Advanced Manufacturing ITP to Cabinet	August
Ministerial launch of Final Advanced Manufacturing ITP	September
Constitutional conventions	Constitutional conventions


Implementation

- 40 MBIE will continue working with other agencies including Callaghan Innovation, Competenz, Ministry of Education, Ministry for the Environment, Ministry of Foreign Affairs and Trade, New Zealand Trade and Enterprise, Te Puni Kōkiri, and the

Tertiary Education Commission on implementation of the actions identified in the Final ITP.

- 41 This ITP is an iterative and continuing process that requires ongoing collaboration for its success. The intention is for the partnership across business, workers, government, Māori and wider stakeholders to expand, solidify and endure during the implementation phase. Implementation of the actions requires ongoing collaboration and commitment from all partners.
- 42 During the public consultation phase the actions in the Draft Action Plan will be refined and prioritised. They will then be implemented, outcomes will be measured, and necessary adjustments made to ensure impact overtime.

Financial Implications

- 43 Additional investment is required for the final actions identified in the Advanced Manufacturing ITP to be realised. Constitutional conventions
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Legislative Implications

- 44 There are no legislative implications of releasing the Draft ITP for consultation.

Impact Analysis

Regulatory Impact Statement

- 45 There are no regulatory changes proposed in this paper.

Climate Implications

- 46 The initiatives in the Draft ITP are designed to support the transition of advanced manufacturing to net-zero emissions.

Population Implications

- 47 Encouraging and increasing diversity and inclusion within the advanced manufacturing sector is a key objective of the ITP.
- 48 Manufacturing is the second largest Māori employer (41,900), representing 12.7 per cent of the Māori workforce. It is also the largest employer of Pasifika (20,900), accounting for 15 per cent of the Pasifika workforce. The manufacturing sector employs a diverse range of other ethnicities and 45 per cent of manufacturing jobs occur in regional New Zealand, outside the three main population centres.

- 49 The actions and initiatives in this ITP are designed to create higher wage and higher skilled jobs for all these people. They also seek to achieve greater diversity and inclusion at the leadership and ownership levels of manufacturing. The initiatives seek to attract more women that currently make up only 30 per cent of workers in manufacturing and to support workers with disabilities.

Human Rights

- 50 There are no specific human rights implications arising from this paper.

Consultation

- 51 The following government agencies have been actively involved in the creation of the Draft ITP: Callaghan Innovation, Ministry of Education, Ministry for the Environment, Ministry of Foreign Affairs and Trade, New Zealand Trade and Enterprise, Te Puni Kōkiri, and the Tertiary Education Commission.
- 52 The ITP Steering Group and Working Groups, made up of representatives of business, unions, Māori and wider stakeholders have co-created the Draft ITP. Wider consultation has occurred with a Partnership Group as well as through a series of engagements throughout New Zealand to understand the challenges and opportunities facing the sector and priorities to accelerate growth and transformation.

Communications

- 53 I intend to release this Draft ITP by way of media release and speech at a launch webinar hosted by the Employers and Manufacturers Association and Union representatives.
- 54 The Draft ITP will be available at the URL: www.advancedmanufacturing.nz
- 55 The release will be followed by six weeks of active public consultation as described above.

Proactive Release

- 56 I intend to release this Cabinet paper proactively based on current content, subject to appropriate OIA redactions, such as Budget sensitive material.

Recommendations

The Minister for Economic and Regional Development recommends that the Committee:

- 1 **Note** that as part of the government's refreshed Industry Strategy, Cabinet agreed to create an Industry Transformation Plan for the advanced manufacturing sector.
- 2 **Note** that the *Advanced Manufacturing Industry Transformation Plan* is an opportunity for business, unions, government, Māori and wider stakeholders to co-create and co-own a plan to accelerate the growth and transformation of Aotearoa New Zealand's advanced manufacturing sector.

- 3 **Note** that a driving principle of Industry Transformation Plans is partnership and representatives from business, unions, government, Māori and wider stakeholders have participated in a Steering Group and four Working Groups to prepare a Draft *Advanced Manufacturing Industry Transformation Plan* (Appendix One).
- 4 **Note** that the priorities and actions in the Draft *Advanced Manufacturing Industry Transformation Plan* align with the government’s economic strategy of a high wage, low emissions, productive, sustainable and inclusive economy as we accelerate economic recovery and build back better.
- 5 **Note** that the priorities identified in the Draft *Advanced Manufacturing Industry Transformation Plan* include increasing investment in advanced technologies and processes to lift productivity and wages; making innovation, R&D and science work for manufacturing; attracting and developing a diverse high-skilled and high-wage workforce; creating a leading circular net-zero emissions sector; and enhancing global connectivity and opportunities.
- 6 **Note** that implementation of the final action plan will require funding and policy support from government as well as active and ongoing commitment from business, unions and wider stakeholders.
- 7 **Agree** to release the Draft *Advanced Manufacturing Industry Transformation Plan* for public consultation.
- 8 **Note** that feedback from public consultations and the outcomes of Budget 2022 will be reflected in the Final Industry Transformation Plan that will be brought to Cabinet in August 2022 before public release in September 2022.

Authorised for lodgement

Hon Stuart Nash
**Minister for Economic and Regional
Development**

Appendices

Appendix One:

Draft Advanced Manufacturing Industry Transformation Plan



Advanced Manufacturing Draft Industry Transformation Plan

PUBLIC CONSULTATION DRAFT – APRIL 2022

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Ministerial Foreword

As Minister for Economic and Regional Development it is my pleasure to support the release of the *Draft Advanced Manufacturing Industry Transformation Plan* for public consultation.

Industry Transformation Plans were instigated across sectors of the economy where we can gain or enhance global competitive advantage but where it was recognised that we have to significantly increase productivity to achieve this. Advanced manufacturing is such an area where we can be world leaders but where our productivity is low by international standards.

Manufacturing is a major contributor to our economy, jobs and communities. The sector employs 10.7 per cent of the workforce (248,400 people), accounts for 10 per cent of GDP (\$24.1 billion), 73.5 per cent of goods exports (\$44.5 billion), and 24 per cent of business expenditure on Research and Development (\$649 million). It is the second largest employer of Māori, largest employer of Pasifika and important contributor to regional employment and growth.

The *Advanced Manufacturing Industry Transformation Plan* is an opportunity to accelerate the sector's growth and transformation. Partnership is a key principle and I thank representatives from business, unions, government, Māori and wider stakeholders that have contributed to this Draft. This includes members of Steering, Working and Partner Groups.

This next stage of wider public consultation is critical. If you haven't already, this is a chance to get involved. I encourage you to offer your views and support the plan as it is implemented.

Many countries have introduced strategic modern industry policy to grow and transform productive sectors. This includes transformation plans for their advanced manufacturing sectors. New Zealand must not be left behind.

In 2019, the Government released a refocused approach to industry policy. It seeks to grow and transform sectors of the economy with potential for significant productivity gains and therefore for increased wages and improved wellbeing of New Zealanders.

Industry Transformation Plans are the key mechanism for delivering this modern industry strategy. They set a long-term vision and propose a near-term action plan to accelerate transformation. Advanced manufacturing was selected as a priority sector because of its scale, importance and potential.

As this document describes, two trends provide an opportunity to accelerate the growth and transformation of the sector over the next 20 years. First, manufacturing is undergoing a fundamental shift through the application of advanced technologies. Second, more focus than ever is being placed on economic activity that is sustainable, circular and low emissions.

I'm excited and confident about the future of Aotearoa New Zealand advanced manufacturing. Our focus is on creating higher wage jobs through lifting productivity, growing skills and investing in innovation. It is heartening to see the priorities in this Draft align with that focus. A high-performing, circular and net-zero emissions advanced manufacturing sector will accelerate our transition to a more productive, sustainable, inclusive and resilient future as we build back better.

Hon Stuart Nash

Minister for Economic and Regional Development

Co-Chairs Foreword

Right now is our moment. We have an opportunity to grow and transform advanced manufacturing in Aotearoa New Zealand.

Manufacturing is vitally important for the New Zealand economy and society. It is a broad, diverse, innovative sector. It is a major employer supporting communities in both regions and major cities.

The *Advanced Manufacturing Industry Transformation Plan* provides an opportunity for business, workers, government, Māori and wider stakeholders to co-create and co-own a shared plan for a future advanced manufacturing sector.

Together, we can build an industry that is world-class, where creators, innovators and makers use sustainable processes to produce high-quality products that create no environmental harm. When we get this right, we can have intergenerational wellbeing.

We already have great innovative manufacturing success stories to build on. Some manufacturing businesses currently invest in advanced technologies and processes to lift productivity. We want to expand that activity and create the right incentives to encourage and grow investment in productive assets and innovation.

To support this advanced manufacturing evolution we will need to develop and attract a skilled workforce. We have the opportunity to create new careers in advanced manufacturing, where workers and employers contribute to great workplace cultures with higher wages, and where there are excellent long-term prospects for a wider diversity of workers.

Future competitiveness must be underwritten by an ambition and actions to create a leading sustainable, circular and net-zero emissions sector. We also need to be globally competitive which will require increasing productivity as well as enhancing global connectivity and opportunities.

We are not the only country looking to grow the advanced manufacturing sector to achieve a more productive, high-wage, sustainable and inclusive economy. We cannot be left behind.

This Industry Transformation Plan is a joint project. Partnership is a key driving principle. This Draft has been created through collaboration across business, workers, government, Māori and wider stakeholders. The intention is for this partnership to expand, solidify and endure. This is important as ambitious industry transformation is an iterative process that requires ongoing collaboration for success.

Development of this Draft began with engagements throughout New Zealand to identify opportunities and challenges facing the sector. A Steering Group, four Working Groups and Partnership Group then identified the following priorities for action:

1. improving New Zealanders' perceptions of manufacturing
2. increasing investment to lift productivity and wages
3. making innovation, R&D and science work for manufacturing
4. attracting and developing a diverse high-skilled and high-wage workforce
5. creating a leading sustainable circular net-zero emissions sector
6. enhancing global connectivity and opportunities.

We look forward to hearing your views and feedback as we refine the Draft and Action Plan.

Achieving industry transformation will take all of us. It will take a shared vision, plan and long-term commitment. It will also take investment and action. Once the Industry Transformation Plan is finalised we look to business, unions, government, iwi and communities to invest in its vision and deliverables, and for all partners to implement it together.

Advanced Manufacturing Steering Group Co-Chairs

Brett O'Riley, Chief Executive of the Employers and Manufacturers Association

Rachel Mackintosh, Vice-President of the Council of Trade Unions and Assistant National Secretary E tū

Paul Stocks, Deputy Chief Executive - Labour, Science and Enterprise - Ministry of Business, Innovation and Employment

DRAFT

Purpose of this consultation document

The purpose of the Advanced Manufacturing Industry Transformation Plan (ITP) is to accelerate the growth and transformation of a thriving Aotearoa New Zealand manufacturing sector.

This document sets out a Draft ITP developed in partnership between business, unions, government, Māori and wider stakeholders. The purpose of public consultation on the Draft ITP is to test whether the proposed actions are the right ones to accelerate the growth and transformation of the advanced manufacturing sector.

We want to hear which initiatives in the Draft Action Plan you believe are most important, how they should be prioritised and sequenced, and whether other critical initiatives are missing. We want to hear whether the ITP accurately captures the opportunities and challenges for New Zealand manufacturing. We would welcome case studies, quotes and examples that illustrate New Zealand's diverse and successful manufacturing companies, workers and wider ecosystems that support manufacturing.

Following feedback on this document and its Draft Action Plan, we intend to publish a final ITP in 2022 with clear actions and initiatives. Feedback can be provided through: www.advancedmanufacturing.nz or by email to [to add].

Executive Summary-the Future of New Zealand Manufacturing

This document provides an overview of Aotearoa New Zealand's manufacturing sector and outlines a series of actions to accelerate its growth and transformation.

Manufacturing in New Zealand is already a significant contributor to employment and the economy. It employs 10.7 per cent of the workforce (248,400 people), accounts for 10 per cent of GDP (\$24.1 billion), 73.5 per cent of goods exports and half of total goods and services exports (\$44.5 billion), and 24 per cent (\$649 million) of business expenditure on Research and Development.¹

Defining "Advanced Manufacturing"

We use the phrase "Advanced Manufacturing" broadly. For the purposes of this Industry Transformation Plan "Advanced Manufacturing" covers all manufacturing in New Zealand. This includes both primary and non-primary sector manufacturing. The term "advanced" refers to the use of modern technologies, processes and business practices in the manufacturing process rather than whether the final products are high-tech. This ITP therefore covers the making of products as diverse as computer chips and branded chocolate. Further detail on our diverse manufacturing sector is provided below in Part 2.

¹ Statistics New Zealand: Household Labour Force Survey, Sept Quarter 2021; National Accounts GDP(P), Chain volume, Actual, ANZSIC06 high-level industry groups, Annual-March 2020; Merchandise Exports, Annual-Feb 2020; Research and development survey: 2020.

Two megatrends provide an opportunity to accelerate the growth and transformation of Aotearoa New Zealand manufacturing over the next 20 years:

- First, manufacturing globally is undergoing a fundamental shift through the application of advanced technologies and processes. Rapid innovation in design, production and business models means that small manufacturers can more-easily be world-leaders of customised solutions. These changes are reshaping the competitive landscape for New Zealand manufacturing.
- Second, more focus than ever is being placed on economic activity that is sustainable, circular and low emissions. Customer expectations and regulatory requirements around environmental sustainability are rapidly changing. Businesses and sectors that can understand and respond to changing expectations and requirements are likely to thrive.

Aotearoa New Zealand manufacturing can adapt and thrive in this changing landscape. Growth and transformation will however require action. Currently, the New Zealand manufacturing sector has relatively low capital investment in advanced technologies and processes compared to international benchmarks. This correlates with relatively low productivity by international standards. While the annual median wage in manufacturing is 10.1 per cent above the national level, this is due to a high proportion of full-time workers with hourly wages slightly below the national average.

There is, however, significant opportunity to encourage and grow investment and adoption of advanced technologies and innovation to boost the manufacturing sector's productivity. If this is combined with other initiatives in this Plan, it will lead to higher wages.

To support this evolution to advanced manufacturing, the sector will need to upskill existing workers. There is an opportunity to create new high-wage careers in advanced manufacturing, offering great workplace cultures and excellent long-term prospects for a wider diversity of workers.

Manufacturing employs a higher proportion of Māori and Pasifika than other industries. It also benefits from a multi-ethnic workforce. More can be done to build this diverse and inclusive workforce including at leadership and ownership levels. This includes attracting women that make up only 30 per cent of workers in manufacturing. New more flexible approaches to work will assist as the sector competes for labour.

The sector's future competitiveness must be underwritten by an ambition and actions to create a leading sustainable, circular and net-zero emissions sector. To be globally competitive will require not only a significant increase in productivity but also enhanced global connectivity and opportunities.

The actions outlined in this Industry Transformation Plan have been developed in partnership between business, workers, government, Māori and wider stakeholders. The following key priorities for transformation have been identified by those partners:

1. improving New Zealanders' perceptions of manufacturing
2. increasing investment to lift productivity and wages
3. making innovation, R&D and science work for manufacturing
4. attracting and developing a diverse high-skilled and high-wage workforce
5. creating a leading sustainable circular net-zero emissions sector
6. enhancing global connectivity and opportunities.

Collectively, the initiatives identified in this ITP aim to achieve the sector’s proposed vision of:

A thriving Aotearoa New Zealand advanced manufacturing sector of world-class creators, innovators and makers delivering quality products, sustainable solutions, and intergenerational wellbeing.

This ITP is a continuing process. The intention is for the partnership across business, workers, government, Māori and wider stakeholders that has been a hallmark of its creation to expand, solidify and endure. The Draft Action Plan will be refined through consultation.

The ITP is co-created and co-owned. All of the actions identified for future growth and transformation will require active participation by all partners to implement them. The outcomes will be measured and necessary adjustments made.

Part 1 of this document describes the wider economic and global context, the reasons that New Zealand industry policy has prioritised advanced manufacturing, and the process for the ITP creation. **Part 2** provides an overview of our diverse manufacturing sector, including its significant contribution to the economy and jobs. **Part 3** outlines priority areas and actions to accelerate the sector’s growth and transformation. **Part 4** describes next steps. The Draft Action Plan is attached in **Appendix One**.

What does the ITP mean for me?

Placeholder: “What’s in it for me?”

This section will explain what will be different once the outcomes of the ITP initiatives have been achieved from the perspectives of different stakeholder groups affected by the ITP.

These different stakeholders could include workers (including women and younger workers), a small manufacturer, a large manufacturer, an exporter, an Iwi Leader, a student, an educator, the public.

Introduction

Economic and Global Context

The New Zealand economy and society have many advantages. New Zealand is one of the highest ranked countries in terms of ease of doing business and transparency. A temperate climate coupled with fertile soil and large marine exclusive economic zone has allowed our primary sectors to thrive. New Zealand is globally connected through a network of Free Trade Agreements that support our exports. Partnership with Māori is founded on Te Tiriti o Waitangi and our society benefits from te ao Māori including mātauranga Māori and kaitiakitanga. We are an increasingly multi-cultural and multi-ethnic society. New Zealand has the fourth-highest renewable energy percentage in the OECD, at 84 per cent and growing.

Despite these favourable attributes, New Zealand also faces long-standing economic, social and environmental challenges.

Compared to other OECD and Small Advanced Economies, New Zealanders earn comparatively low wages despite working comparatively long hours.² New Zealand also has a productivity challenge. Over the last 40 years, New Zealand has persistently been one of the poorest performers in terms of productivity. The average New Zealand firm produces just over half the output of similar firms overseas using the same amount of labour.³ The reasons for our poor productivity performance have been identified by the Productivity Commission. These include a small domestic market and lack of domestic competition, New Zealand businesses that are typically capital-shallow (meaning that workers have limited equipment and other capital goods to work with depressing labour productivity), a lack of large firms competing internationally, geographic isolation, and a lack of international connections. Furthermore, the cost of capital in New Zealand has historically been one of the highest in the OECD causing challenges for productive business investment.⁴

We also face challenges of inequality. 11 per cent of New Zealanders live in relative poverty.⁵ Māori live 7.5 years less, and earn \$10,000 less, than non-Māori. New Zealand has among the least affordable housing in the OECD.⁶

New Zealand faces critical environmental challenges, including climate change, as well as soil, water and biodiversity degradation. New Zealand emissions per person are the 6th highest in the OECD and gross emissions are not yet trending downwards.⁷ Nearly half of these emissions come from

² Productivity Commission (2021), Productivity by the numbers.

³ Zheng, G., Hoang, D. & Pacheco, G. (2021). Benchmarking New Zealand's frontier firms, New Zealand Productivity Commission. Our most productive 'frontier firms' produce less than half that of the leading 'frontier firms' in those other economies. New Zealand Productivity Commission (2021), New Zealand firms: Reaching for the frontier. Available at www.productivity.govt.nz/inquiries/frontier-firms/

⁴ OECD (2020), Financing SMEs and Entrepreneurs 2020: An OECD Scoreboard, OECD Publishing, Paris, <https://doi.org/10.1787/061fe03d-en>.

⁵ OECD (2020), How's Life in New Zealand?

⁶ <https://www.stats.govt.nz/news/growth-in-life-expectancy-slows>; Berl (2017), Change Agenda: income Equity for Māori; https://stats.oecd.org/Index.aspx?DataSetCode=HOUSE_PRICES#

⁷ MfE (2021), Te whakarāpopototanga tuihono o Te Rārangi Haurehu Kati Mahana a Aotearoa. New Zealand's Greenhouse Gas Inventory Snapshot 1990–2019.

agriculture compared to 12 per cent across OECD countries.⁸ 72 per cent of our waste goes to landfill and household waste is increasing.⁹

While New Zealand's unemployment rate is one of the lowest in the OECD New Zealand businesses are facing labour and skills shortages. Business growth models based on employing more workers as opposed to investing capital in productivity-enhancing plant and machinery per worker hinder overall productivity gains, global competitiveness and higher wages per worker. The consequences of this lack of productive capital investment are compounded when labour markets are constrained.

The global situation is characterised by an increasingly contested geopolitical environment. This includes trade tensions, economic decoupling of major economies, an erosion of support for multilateral trade rules, and rise in non-tariff trade barriers. The ongoing COVID-19 pandemic has caused disruptions throughout the economy including on supply chains, travel and migration and we are experiencing rising inflation. COVID-19 has also led to deliberate efforts overseas to support supply chain resilience and re-shore or near-shore production. This has resulted in an even greater focus on industry policy overseas.

Modern Industry Policy

For New Zealand to achieve a productive, high-wage, circular and low-emissions economy will require significant economic transformation.

The economic and global context described above demonstrates that New Zealand faces long-standing challenges if we want to be more productive, sustainable and inclusive. A number of other OECD and small advanced economies have however faced and overcome similar challenges.

A common characteristic of many of these countries has been strategic modern industry policy supporting growth and transformation of productive sectors.

As part of their wider industry strategies, countries ranging from Australia, Singapore, Canada, the United Kingdom and United States have all adopted industry plans to seize on their manufacturing sector's potential to grow productivity and jobs. For instance:

Australia's Modern Manufacturing Strategy (2020) aims to build Australia's reputation as a reliable, high-quality and sustainable manufacturing nation. It includes a AUD\$1.3 billion Modern Manufacturing Initiative, a AUD\$107 million Supply Chain resilience initiative, and a AUD\$53 million Manufacturing Modernisation Fund.¹⁰ These initiatives are in addition to wider programs across the economy that also benefit the manufacturing sector such as Full Expensing of Depreciating Assets (estimated to deliver AUD\$26.7 billion in tax relief over the Budget 2020-21 forward estimates and \$3.2 billion over the medium term) and Backing Business Investment.¹¹

In 2020, Singapore embarked on an aggressive 10-year manufacturing industry plan to further grow the sector by 50 per cent by 2030. This is a high ambition plan as Singapore is already the 4th largest exporter of high-tech manufactured goods and manufacturing accounts for 22 per cent of GDP.

Canada has a long-standing manufacturing industry transformation plan "Strengthening Canada's Manufacturing Sector" that provides targeted industry support for manufacturing.

⁸ MfE (2021), Te whakarāpopototanga tuihono o Te Rārangi Haurehu Kati Mahana a Aotearoa. New Zealand's Greenhouse Gas Inventory Snapshot 1990–2019.

⁹ <https://environment.govt.nz/facts-and-science/waste/estimates-of-waste-generated/>

¹⁰ "Make it Happen: the Australian Government's Modern Manufacturing Strategy" (2020)

¹¹ See: https://archive.budget.gov.au/2020-21/download/glossy_overview.pdf

In 2019, the New Zealand Government released a refocused approach to industry policy. This was updated in 2020 in response to the COVID-19 pandemic.

New Zealand's refocused industry policy seeks to grow and transform those sectors of the economy with potential for significant productivity gains and therefore for increased wages and improved wellbeing of New Zealanders.

Industry Transformation Plans (ITPs) are the key mechanism for delivering this modern industry strategy. ITPs are developed in partnership with business, workers, government, Māori and wider stakeholders. They set a long-term vision for the sector and propose an action plan over 1-3 years to accelerate growth and transformation. Alongside the focus on lifting productivity, ITPs focus on sustainability, inclusivity and quality of work.

Advanced manufacturing was selected as a priority sector because of its scale and importance to the New Zealand economy. Growing and transforming manufacturing will accelerate a transition to a more productive, sustainable and inclusive future.

Seven other sectors have been identified for targeted support through an ITP. They are Agritech, Construction, Digital Technologies, Food and Beverage, Forestry and Wood Processing, Fisheries and Tourism.

Related Work Programs

The creation and implementation of the Advanced Manufacturing ITP is related to several other work programs. These include:

Other Industry Transformation Plans

The broad definition of “advanced manufacturing” means that the scope of this Advanced Manufacturing ITP covers manufacturing sub-sectors that are also the focus of other ITPs. This includes the **Agritech ITP** that was launched in 2020 with a vision to develop a world-leading agritech eco-system in New Zealand. A number of successful manufacturing firms operate in the agritech sector. It also includes the **Food and Beverage ITP** and the **Forestry and Wood Processing ITP** that are under development. These are the key primary industries manufacturing sectors. The initiatives in the Advanced Manufacturing ITP are designed to support all manufacturing, including these subsectors.

The **Digital Technologies ITP** was released as Draft for public consultation in February 2022. Digital technologies are a critical enabler of Advanced Manufacturing. Software is required for smart manufacturing whether for advanced business processes, sensors, automation, robots, digital manufacturing such as 3D printing, visualisation technologies, and the internet of things. The Digital ITP is therefore relevant for the manufacturing sector's digital transition described as the Fourth Industrial Revolution (Industry 4.0). The initiatives across both ITPs are designed to be mutually reinforcing.

The **Construction Sector Accord** seeks to address long-term challenges in the construction sector by building skills development, clarifying regulations, improving work pipelines and simplifying contracting. It has a dedicated workstream on procurement and risk. The current Transformation Plan comes to an end in June 2022 and work is underway consulting with industry, government agencies and other ITPs on a second generation ITP. Manufacturing is a key enabler of the New Zealand construction sector. This includes the production of a vast range of materials and sophisticated inputs required for construction ranging from framing, piping, windows, roofing, to

pre-fabricated buildings. Both ITPs share common objectives and provide opportunities for collaboration.

Regional strategies

A number of regions are putting in place strategies to support the growth of their manufacturing sectors. This ITP is designed to align with and support those initiatives. We are looking to deepen and widen regional collaboration in the next phases of ITP development. Please contact us if you would like to be involved.

Other work programmes

As described later in this document, this ITP also has regard to a range of other related work programmes under development and relevant to the manufacturing. These include:

- The **Emissions Reduction Plan** that will set out how New Zealand will meet its first emissions budget (2022-2025) and set the path towards meeting long-term climate targets
- The **Future Pathways Green Paper – Te Ara Paerangi** that will consider government priorities for investment in research, science and innovation systems and workforce.
- The **Reform of Vocational Education** to reflect the future of work and the skills that learners, employers and communities need to thrive.

The process for creating the Industry Transformation Plan

The Advanced Manufacturing Industry Transformation Plan provides an opportunity for business, unions, government, Māori and wider stakeholders to co-create and co-own a plan for the future of New Zealand manufacturing.

Partnership is a key driving and organising principle. The intention is for the partnership created through this ITP to solidify and endure. This is important as the ITP is an iterative and continuing process that requires ongoing collaboration for its success.

Work on the ITP began in July 2020 with early engagements with a wide range of stakeholders throughout New Zealand to understand the challenges and opportunities facing the sector and priorities to accelerate growth and transformation. This included engagements with:

- **Business:** Holding seven workshops throughout New Zealand with nearly 50 manufacturing firms and industry associations. Visiting nearly 20 manufacturing sites across Auckland, New Plymouth, Christchurch, Dunedin and Invercargill. Numerous 1:1 engagements with business and manufacturing industry associations and firms.
- **Workers:** Holding a worker representative workshop and 1:1 engagements with the New Zealand Council of Trade Unions and E Tū.
- **Māori:** Engagement with the Māori Economic Development Advisory Board, Te Puni Kokiri and Te Kupenga.
- **Wider stakeholders:** Engagements with regional economic development agencies (in Auckland, Wellington, Taranaki and Christchurch), universities, and the interim establishment board of the Workforce Development Council.
- **Government agencies:** Holding a cross-government workshop with 14 government agencies as well as numerous 1:1 engagements.

On the basis of that early engagement the “Advanced Manufacturing ITP Scope” was published in July 2021.¹² This document identified key challenges and opportunities facing the sector and priorities to accelerate growth and transformation.¹³

The next phase of the ITP involved developing a shared future vision for the manufacturing sector and a Draft Action Plan to achieve that vision.

To ensure a partnership approach a **Steering Group** was established in July 2021 made up of thirteen representatives from business, workers, government, Māori and the education sector. The Steering Group is co-chaired by Brett O’Riley (Employers & Manufacturers Association), Rachel Mackintosh (E tū and New Zealand Council of Trade Unions) and Paul Stocks (Ministry of Business, Innovation & Employment). The Steering Group has met seven times and full membership is provided in Appendix Two.

The Steering Group developed a Draft Vision and established four **Working Groups** to identify actions to drive growth and transformation across the following areas:

- Grow investment and innovation.
- Attract and develop a skilled workforce.
- Create a leading sustainable, circular and low-emissions sector.
- Enhance global connectivity and opportunities.

These Working Groups are made up of forty-four experienced business, union and Māori representatives as well as eight government agencies with expertise across these priorities. The Working Groups have met four times each and identified initiatives to drive growth and transformation of the sector. Full membership is provided in Appendix Two.

Together, the Steering Group and Working Groups have developed the Draft Vision and Draft Action Plan in this ITP.

The next stage involves consultation with a wider **Partnership Group** and the public to test whether the proposed actions are the right ones to accelerate growth and transformation of the sector. This stage will further refine and prioritise the Draft Action Plan.¹⁴ Once finalised, an implementation strategy will be developed to ensure initiatives progress, outcomes are measured, and adjustments made.

This ITP should be seen as a living document. It tackles the most challenging issues for the manufacturing sector’s future and often in uncertain evolving contexts. In developing the Draft Action Plan, it is apparent that some initiatives address well-understood problems where solutions are clear and implementation-ready. Other initiatives, however, require as a first action a better understanding of a complex uncertain evolving problem in order to then develop concrete solutions that can be implemented. For this reason, other ITPs have created ongoing workstreams to develop, implement and measure Action Plans to ensure impact overtime.¹⁵

¹² The ITP Scope can be found at <https://www.mbie.govt.nz/assets/advanced-manufacturing-ity-scope.pdf>

¹³ This work was also informed by key assessments of the New Zealand manufacturing sector, including MBIE “Manufacturing Report – Beyond Commodities: Manufacturing into the Future” (New Zealand Sectors Report Series) 2018; and Martin Jenkins “Manufacturing Matters: Final Report”, 28 February 2020 prepared for the Manufacturers Alliance (a collaboration between The Manufacturers Network, Metals New Zealand, Plastics NZ, the Wood Processors and Manufacturers Association and the Maintenance Engineering Society of New Zealand).

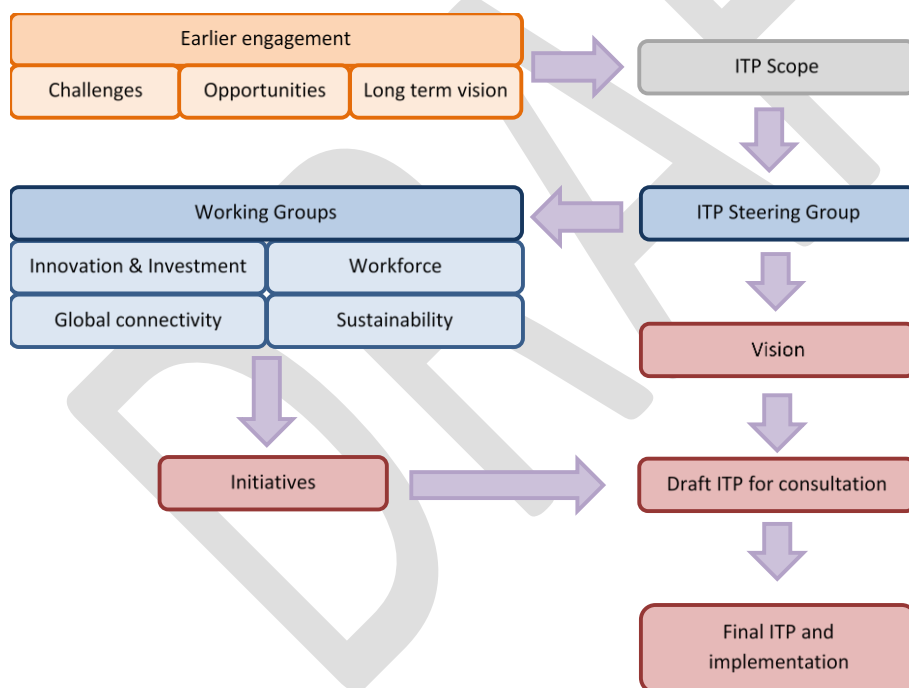
¹⁴ The Partnership Group includes industry and wider stakeholders that expressed an interest in ITP creation. They have received updates and the opportunity to comment on the Draft Vision and Priorities and to engage in any other aspects of the ITP development. Membership is listed in Appendix Two.

¹⁵ See [Growing innovative industries in New Zealand: Agritech industry transformation plan - July 2020 \(mbie.govt.nz\)](#)

As described in Part Two of this document, Māori play an important role in Aotearoa New Zealand’s manufacturing sector as workers and increasingly as leaders and owners of manufacturing businesses. Māori perspectives, including te ao Māori, can strengthen the growth and transformation of the sector. These include values such as kaitiakitanga that can inform a circular low-emissions transition as well as kotahitanga and manaakitanga that can inform upskilling and building a more diverse and inclusive workforce. The results of the work outlined in this ITP are intended to help create more high-skilled high-wage work opportunities for Māori as well as support Māori-owned and Māori-led manufacturing businesses. Effort has been made to include Māori perspectives in this draft through the participation of Māori business, Māori workers and Te Puni Kōkiri on the Steering and Working Groups. The intention is for active engagement with Māori to widen and deepen to inform the next phase of development of the ITP to capture and support the opportunities for Māori in advanced manufacturing.

The Ministry of Business, Innovation and Employment (MBIE) is the lead government agency for this ITP. A number of other agencies work closely with the manufacturing sector. Eight agencies are involved in this ITP’s creation and its working groups. They are Callaghan Innovation, Ministry of Education, Ministry for the Environment, Ministry of Foreign Affairs and Trade, New Zealand Trade and Enterprise, Te Puni Kōkiri, and the Tertiary Education Commission.

Overview of the ITP Process



New Zealand's Manufacturing Sector

Snapshot of New Zealand Manufacturing Sector:

NEW ZEALAND MANUFACTURING



Important contributor to the economy

Manufacturing is our 3rd largest sector, it contributed 10 per cent (\$24.1 billion) of GDP in 2020 and has grown by 15 per cent in the last decade.



Significant employer

The manufacturing sector employed 248,400 people in 2021 accounting for 10.7 per cent of the workforce.



Second largest employer of Māori and largest employer of Pasifika

Manufacturing has considerable ethnic diversity but only 30 per cent of workers are women.



Higher salaries

At \$52,620, median annual wages in manufacturing are 10.1 per cent higher than the New Zealand median but workers tend to work longer hours than other sectors.



Majority of

New Zealand exports

manufactured exports earned \$44.5 billion in 2020 representing 73.5 per cent of goods exports and half of total goods and services exports.



Biggest R&D spender

manufacturing accounts for 24 per cent of business spending on R&D (\$649 million).



Contributor to regional employment and growth

45 per cent of manufacturing jobs are in regional New Zealand with annual manufacturing GDP growth averaging 8 per cent in Northland and Southland since 2014.



Most manufacturers are small and medium size firms
only 3 per cent of firms employ over 50 workers.



Manufacturing is critical to the success of many other sectors and has positive impacts through the economy.

New Zealand’s broad and diverse manufacturing sector

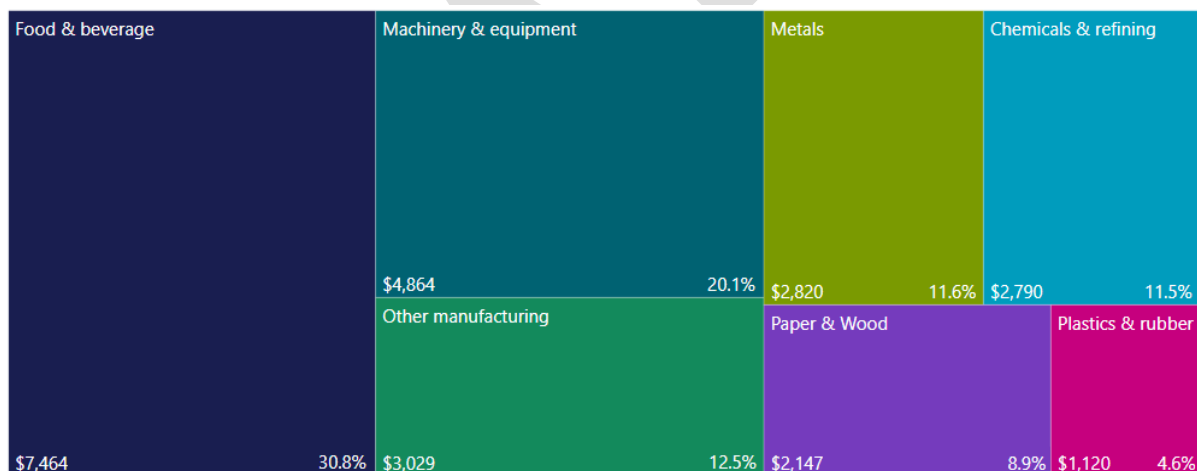
New Zealand’s manufacturing sector is broad and diverse and covers products that range from high-tech medical devices to branded chocolate.

The Advanced Manufacturing Industry Transformation Plan covers all manufacturing in New Zealand. This includes adding value to raw materials and transforming products through primary and non-primary sector manufacturing. The term “advanced” refers to the use of modern technologies, processes and business practices to improve products and processes. Advanced manufacturing is therefore defined by how products are manufactured rather than whether the end products are high-tech.

Manufacturing tends to be divided into seven broad subsectors: “food and beverage”, “machinery and equipment”, “wood and paper products”, “chemicals and refining”, “metals and metal products”, “plastics and rubber” and “other” manufacturing.

The **table** below illustrates the contribution of the seven different manufacturing subsectors to New Zealand’s manufacturing GDP. Non-primary sector manufacturing accounts for 60.3 per cent of output while primary sector manufacturing accounts for 39.7 per cent of output.

Manufacturing GDP by subsector, 2020 (\$millions)



The **table below** provides a description of those seven subsectors including illustrative examples of New Zealand manufacturing firms in those subsectors.

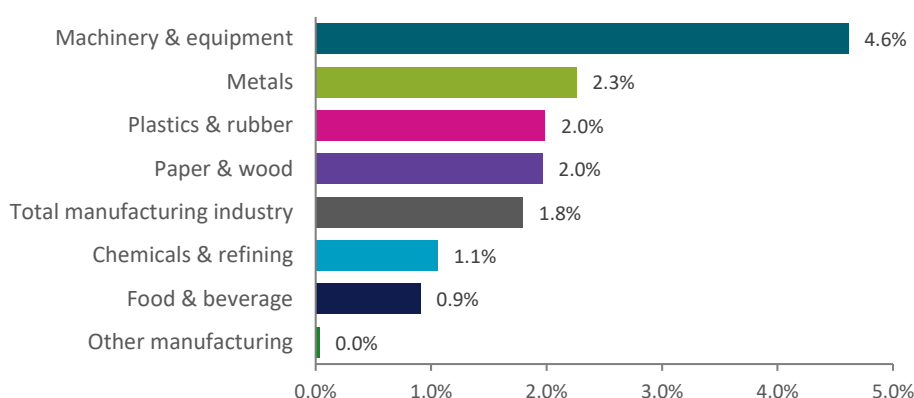
ANZSIC Code*	Sector	Examples
Manufacturing		
C11, C12	Food and beverage Includes processing of raw materials, e.g. meat processing, milk into milk powder, cheese and butter, as well as all the 'food and beverage' products sold in the centre aisles of a supermarket (including pet food).	Fonterra; Sanford; ANZCO; Mudhouse Wines; Whittaker's; Tasti; Tegel; Frucor; Miraka; Hellers; Vitaco; Heinz Watties; McCains; Kaweka Foods.
C14, C15	Wood and paper Wood Includes log sawmilling and timber dressing, the manufacture of engineered wood products such as plywood, laminated veneer lumber (LVL), medium density fibreboard (MDF), prefabricated wooden buildings, cabinetry or wood chips. Paper includes pulp, paper and card manufacturing and products made from these such as boxes, paper bags and toilet tissue and other packaging.	Wood: Sequal, Tenon; Nelson Pine; Juken New Zealand; Red Stag Timber; Xlam. Paper: Kinleith Pulp and Paper Mill (Oji Fibre Solutions); Tasman pulp and paper mill (pulp mill owned by Oji Fibre Solutions, paper mill owned by Norske Skog Tasman).
C23, C24	Machinery and equipment Includes the production of medical equipment; scientific and measuring equipment; cables, wires and fibre optics; computers and communication equipment; and electrical, domestic, commercial and industrial appliances.	Fisher & Paykel Healthcare; Compac Sorting; Buckley Systems; Gallagher Security; Tait Communications; Moffat; Skope Industries; Scott Technology; Trimax Mowing Systems; Southern Spars
C17, C18	Chemicals and refining Chemicals products range from cosmetics and pharmaceuticals to household cleaning and industrial chemicals, fertilisers, pesticides, paint and coatings. Refining covers the manufacture of petroleum and coal and all related products.	Chemicals: Nuplex; Douglas Pharmaceuticals; New Zealand Pharmaceuticals; Trilogy (cosmetics); Ravensdown Fertiliser; Dulux; Resene; Refining: New Zealand Refining Company.
C19	Plastics and rubber Plastic products range from containers and cling film, to children's playgrounds and many pipes and fittings used in construction. Rubber products range from hoses, gumboots and agricultural goods to mud-flaps.	Plastics: Sistema; Alto Packaging Ltd; Axiam Plastics Ltd; Blender Design Ltd Dynex Extrusions Ltd; Talbot Technologies Ltd.; Rubber: Skellerup Industries Ltd; Field Rubber Ltd; Rubber Developments Ltd.
C21, C22	Metals and metal products Includes the smelting of ore to the creation of a wide range of metal products. These may be straightforward (wire for fencing or reinforcing bar) and small (nuts and bolts) to large (beams and bridge supports) and complex (such as a fabricated metal sculpture).	New Zealand Steel; Fletcher Steel; New Zealand Aluminium Smelters; Steel and Tube; Ulrich Aluminium.
C13, C16, C20, C25	Other manufacturing (textiles, leather, clothing and footwear, printing, non-metallic mineral products, furniture and other manufacturing) Effectively, everything else, including furniture and printed material (such as magazines, labels, signs) to clothing and footwear sports goods, jewellery, umbrellas, textiles and many building products such as windows, bricks, cement, concrete.	Firth Industries; Bremworth; NZ Comfort Group (Sleepyhead), Blunt Umbrellas, Noho; Alliance Printers Ltd.

Manufacturing makes a significant contribution to the New Zealand economy

The manufacturing sector accounted for 10 per cent of GDP (\$24.1 billion) in the year to March 2020. This makes it the third biggest sector in the economy.¹⁶ The sector has grown 15 per cent larger over last decade.¹⁷

The **Chart** below summarises the respective growth rates of the seven manufacturing sub-sectors over the last 5 years. The highest growth subsector is machinery and equipment, with growth averaging 4.6 per cent per annum from 2015 to 2020. This corresponds with significant export growth in this subsector of manufacturing, led by products such as medical devices.

Compound annual growth rates for manufacturing subsectors (2015 – 2020)



Manufacturing's overall share of GDP has however declined from 19.4 per cent in 1985 to 10 per cent in 2020.¹⁸ This reflects a global trend in developed countries where, although manufacturing is growing overall, its share of GDP has declined. There are several contributing reasons for this relative decline including the growth of services but also a trend over 20 years for manufacturing to move offshore to lower-cost locations.

However, the manufacturing sector's contribution to the economy goes beyond these headline statistics.

In particular, manufacturing underpins the performance and growth of a range of other sectors in the economy. It is estimated that, depending on the subsector, one dollar of additional output in manufacturing industries produces between \$2.06 and \$3.12 in broader economic activity.¹⁹

Manufacturing is an important enabler of these other sectors in the economy. For example, it provides components, products and packaging for primary, construction, service and hospitality sectors.

It is also a key purchaser of goods and services. It is estimated that around 60 per cent of the output from the agriculture, forestry and fishing sectors in New Zealand were goods processed domestically

¹⁶ Statistics New Zealand: National Accounts GDP(P), Chain volume, Actual, ANZSIC06 high-level industry groups, Annual-March 2020.

¹⁷ Ibid.

¹⁸ Statistics New Zealand: National Accounts GDP(P), Chain volume, Actual, ANZSIC06 high-level industry groups, Annual-March 2020.

¹⁹ MartinJenkins (2020). Manufacturing Matters at 27. Available at <https://www.metals.org.nz/wp-content/uploads/2020/04/Manufacturing-Matters-Final-Report-March-2020.pdf>

by the manufacturing sector.²⁰ Manufacturing is one of the main ways that we add value to our agricultural products. It is a critical enabler of New Zealand’s economic transition beyond commodities to a value-add exports. In addition, many of our services industries exist to service the manufacturing sector.

Given its interconnectedness with other sectors a thriving manufacturing sector is an important enabler of New Zealand’s wider transition to a more productive, sustainable and inclusive future.

Manufacturing is a major employer

Manufacturing is a significant employer of 248,400 New Zealanders, accounting for 10.7 per cent of the workforce.²¹ It provides a diverse range of jobs from process workers, apprentices and tradespeople through to PhDs in engineering and technology.

At \$52,620, annual median wages for workers in manufacturing are 10.1 per cent higher than the New Zealand median.²² This is partly due to a high proportion of full-time workers and the hourly median wage in manufacturing (\$27.1) is slightly below the national hourly wage (\$27.8). This lower hourly wage is also due to the fact that the sector employs a diverse range of workers, including a higher proportion of workers with lower or mid-level qualifications than the national average. When analysed by qualification attained by worker, however, the manufacturing sector often pays higher wages, even on an hourly basis, than the national average. For instance:

- **Highly qualified** workers (defined as those with postgraduate qualifications) account for 7 per cent of the manufacturing workforce and earn 7 per cent more than the general workforce at the equivalent qualification level.
- Workers with **Level 4-6 certificate or diploma** account for 22.1 per cent of the manufacturing workforce and earn 9.6 per cent more than the general workforce at the equivalent qualification level.
- Workers with **no qualifications beyond school** account for 19.7 per cent of the manufacturing workforce and earn 4.2 per cent more than the general workforce at the equivalent level.

Qualification Type	Share of manufacturing employees	Share of employees for all industries	Median hourly earnings for manufacturing	Median hourly earnings for all industries	Difference in hourly earnings for manufacturing
No qualification	19.7%	11.6%	\$25	\$24	+4.2%
Lower secondary school	6.3%	5.3%	\$25	\$24.5	+2.0%
Upper secondary school	22.2%	20.3%	\$24.7	\$24	+2.7%
Other post-school qualification	4.6%	5.7%	\$27.8	\$28	-0.7%
Level 1-3 post-school certificate	2.0%	2.7%	\$22.4	\$23.5	-4.7%
Level 4-6 certificate or diploma	22.1%	17.5%	\$30.7	\$28	+9.6%

²⁰ MartinJenkins (2020). Manufacturing Matters. Available at <https://www.metals.org.nz/wp-content/uploads/2020/04/Manufacturing-Matters-Final-Report-March-2020.pdf>

²¹ Statistics New Zealand. Business Demography Statistics, 2021.

²² Statistics New Zealand Annual Linked Employer-Employee Data, 2019 (LEED).

Bachelors degree and level 7	12.6%	22.9%	\$31.7	\$32	-1.1%
Highly qualified (Postgraduate qualification)	7.1%	11.5%	\$41	\$38.4	+7.0%
Total All Qualifications	100.0%	100.0%	\$27.1	\$27.8	-2.2%

Manufacturing employs a high proportion of Māori and Pasifika but can improve in diversity and inclusion

Manufacturing is the second largest Māori employer (41,900), representing 12.7 per cent of the Māori workforce. It is also the largest employer of Pasifika (20,900), accounting for 15 per cent of the Pasifika workforce.²³ Furthermore, the manufacturing sector employs a diverse range of other ethnicities.

There are great examples of successful innovative Māori-owned manufacturing firms. For instance, MB Century – which provides geothermal drilling and engineering services to the power-generation sector – was named Callaghan Innovation Hi-Tech Māori Kamupene o te Tau/Māori Company of the Year at the 2021 NZ Hi-Tech Awards.²⁴ The Taupō-based company, owned by the Tuaropaki Trust, is a centre of excellence in harnessing geothermal energy. The business's innovative work includes the development of its Multi-Finger High Temperature Casing Calliper (HTCC) – a tool used to assess the condition of geothermal wells (and therefore their safety) with significantly more accuracy than incumbent solutions. MB Century is now providing the HTCC to geothermal well owners, with initial deployments to Indonesia and the Philippines.²⁵

Further work is needed to better understand, and then improve, Māori participation at senior and ownership levels of manufacturing. Māori-owned businesses in the manufacturing sector generate the third highest average estimated operating margin of all Māori-owned businesses. However, relatively few manufacturing firms are Māori-owned and these margins are only 48 per cent of what non-Māori-owned manufacturing businesses generate.²⁶ Te Puni Kokiri has found that there are 870 Māori-owned manufacturing businesses. This represents only 4 per cent of all Māori-owned businesses and manufacturing is only the ninth most significant sector by ownership.

The results of the initiatives in this ITP are designed to increase productivity and profitability of the sector and higher-skilled higher-wage jobs for the significant number of Māori and Pasifika already in manufacturing as well as future workers. They are also intended to help identify opportunities to support Māori-owned and Māori-led manufacturing businesses.

Furthermore, as noted earlier, te ao Māori provides a range of principles and values that can support key priorities for the growth and transformation of the manufacturing sector.

²³ Statistics New Zealand: Income Tables – (Available at NZdotstat.stats.govt.nz) by Ethnicity, 2021.

²⁴ <https://www.callaghaninnovation.govt.nz/news-and-events/mb-century-named-callaghan-innovation-hi-tech-m%C4%81ori-kamupene-o-te-taum%C4%81ori-company>

²⁵ Also finalist in the 2021 Hi-Tech Māori Kamupene o te Tau category was AgriSea New Zealand that specialises in the manufacture of macro-algae concentrates and bioactive extractions that are used as nutritional supplements for soil, plant, and animal health. The company supplies to sectors including horticulture, agriculture, apiculture, viticulture, and dairy, both domestically and to a growing export market.

²⁶ Te Matapaeroa 2019 – looking toward the horizon, Te Puni Kokiri, p. 8. www.tpk.govt.nz. The findings from the 2019 report have been updated.

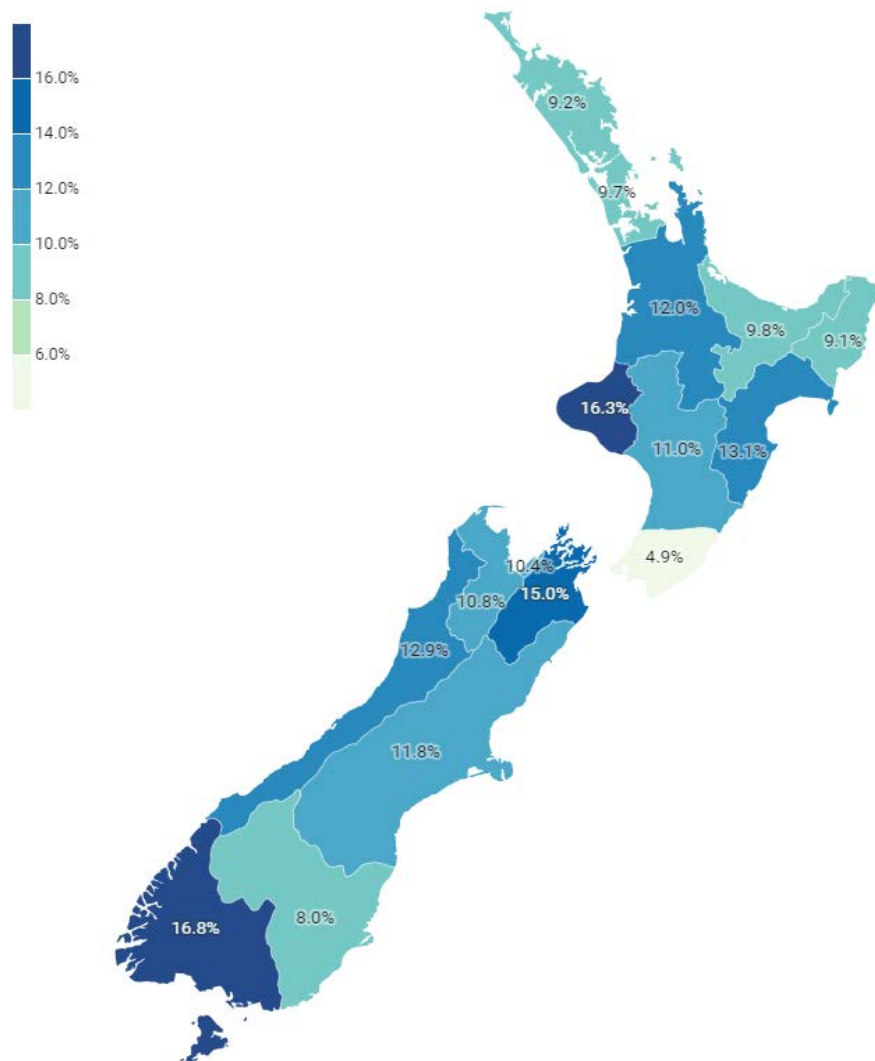
More can be done to build diversity and inclusion in manufacturing, especially as the sector competes for scarce labour. This includes improving gender diversity and attracting more women that currently make up only 30 per cent of workers in manufacturing.²⁷

Manufacturing is important for both regional New Zealand and the main centres

45 per cent of manufacturing jobs occur in regional New Zealand outside the three main population centres.

As the **following map** illustrates, manufacturing makes up a significant share of employment in regional New Zealand. For instance, manufacturing accounts for 16.8 per cent of the Southland workforce, 16.3 per cent of the Taranaki workforce, 15 per cent of the Marlborough workforce and 13.1 per cent of the Hawke’s Bay workforce.²⁸

Manufacturing’s share of regional employment, 2021



²⁷ Statistics New Zealand: Household Labour Force Survey, Persons Employed by Sex by Industry, ANZSIC06 (Annual-Sept 2021).

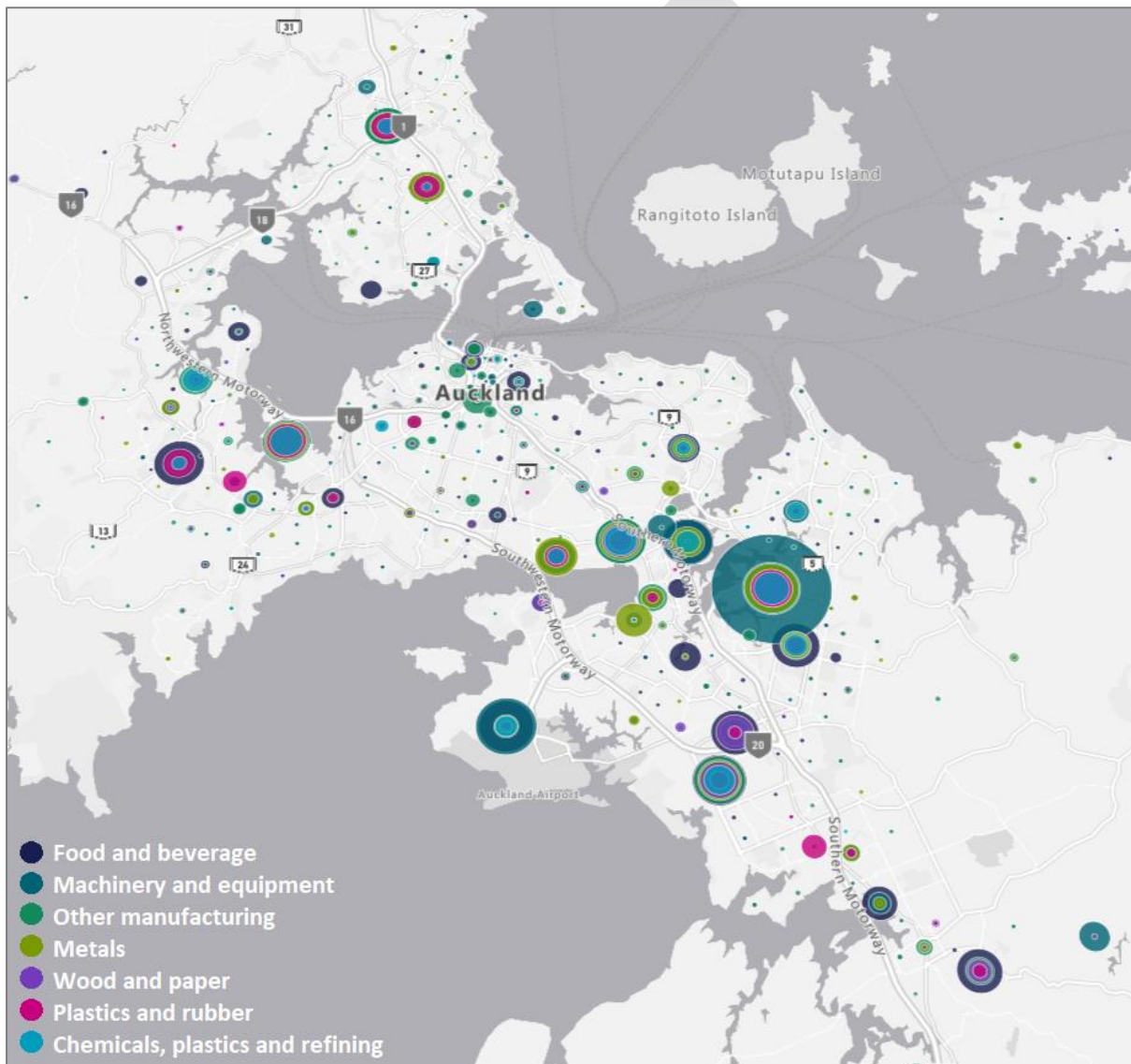
²⁸ Statistics New Zealand: Business demography statistics, 2021.

Manufacturing is also a significant and growing contributor to GDP in regional New Zealand. For instance, over the last 5 years, growth has averaged over 8 per cent per annum in Northland, Southland and Waikato.²⁹

Manufacturing is equally important in the main centres. Just over half of manufacturing jobs are based in Auckland (33.3 per cent), Canterbury (15.4 per cent) and Wellington (5.7 per cent).³⁰ In Auckland, manufacturing accounts for 9.1 per cent of the regional economy (\$11.17 billion) and 9.7 per cent of jobs (77,600 jobs).³¹

The **map below** illustrates that Auckland’s manufacturing jobs are concentrated in industrial areas south of Auckland – and overlap with areas of enduring socio-economic disadvantage. Improving the skills and wages of the manufacturing sector is likely to have high positive impacts on communities in these areas.

Distribution of manufacturing employment in Auckland, 2020



Source: Statistics New Zealand: Business demography statistics, aggregated by Suburb, 2020

²⁹ Statistics New Zealand: National Accounts GDP, Nominal, by Industry and Regional, Annual-March 2019.

³⁰ Statistics New Zealand: Business demography statistics, 2021.

³¹ GDP from Auckland Council Report based on data from Statistics New Zealand and Infometrics, 8 December 2021. Employment from Statistics New Zealand: Business demography statistics, 2021.

Manufacturing consists of small and medium size firms

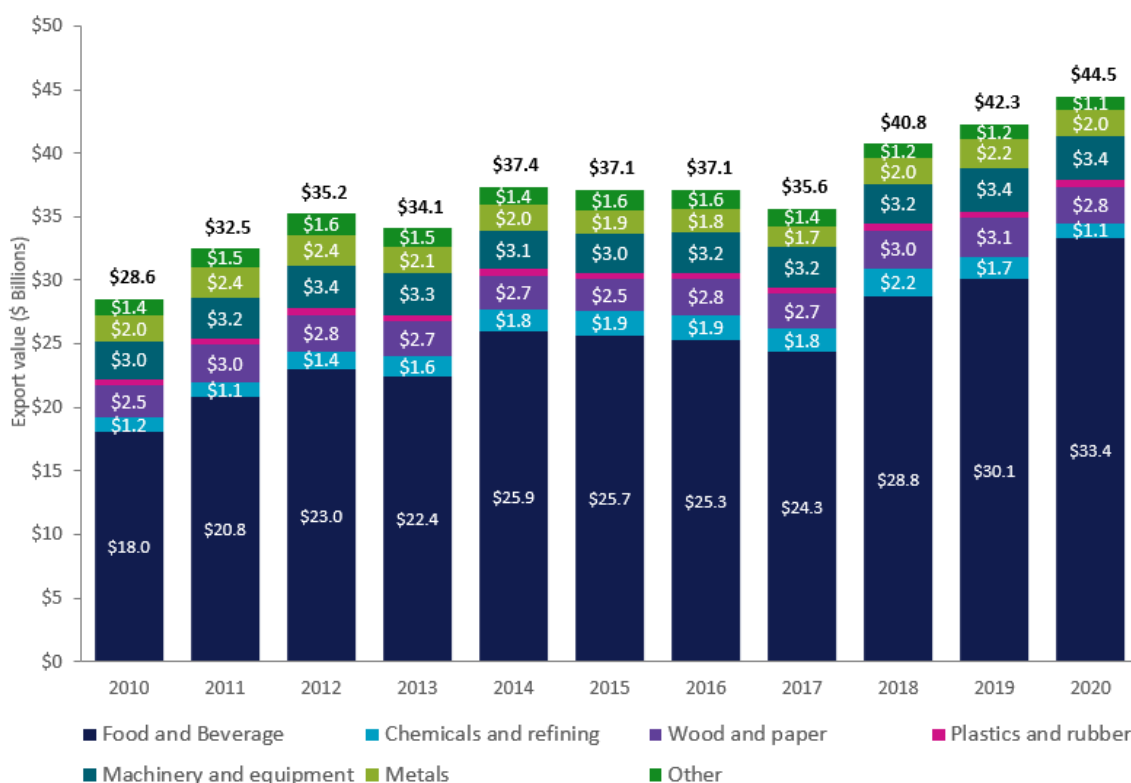
Manufacturing is made up of SMEs. Of the 21,400 manufacturing firms, only 1.6 per cent, or 345 firms, employ more than 100 people.³² Nearly three-quarters (73.5 per cent) of manufacturing firms have annual sales of less than \$1,500,000, and only 5.1 per cent turnover more than \$10 million annually.³³

Manufacturing is the largest contributor to goods exports

Manufacturing accounts for 73.5% (\$44.5 billion) of New Zealand’s goods exports and around half of New Zealand’s total exports of goods and services.³⁴

Manufactured exports by subsector

NZ\$ Billions, year ended Feb, 2010 - 2020



Since 2010, annual exports of non-primary manufactured goods have totalled between \$7.9 and \$9.4 billion. However, the share of non-primary manufacturing exports has declined from 27.9 per cent in 2010, to 18.6 per cent (\$8.3 billion) in 2020. This is largely due to the sustained increase in the value of Food and Beverage exports over recent years.

³² Statistics New Zealand. Business Demography Statistics – year to February 2021.

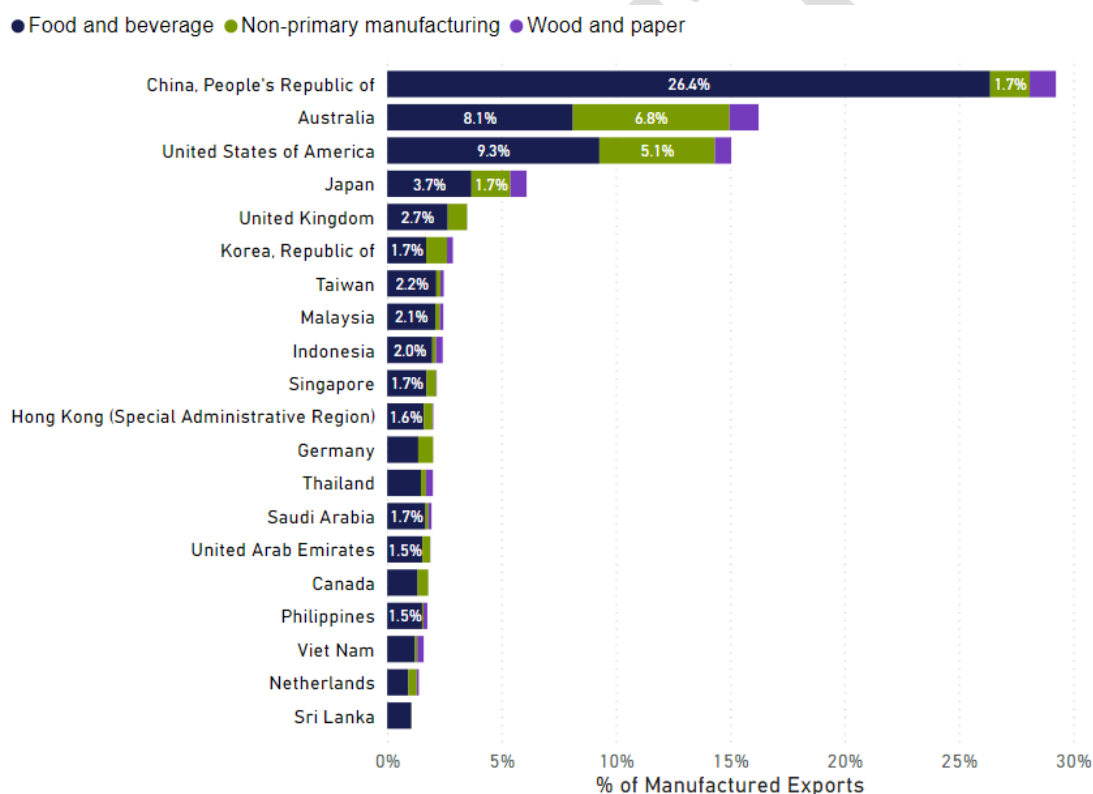
³³ Statistics New Zealand. Annual Enterprise Survey – year to September 2020

³⁴ Statistics New Zealand. Overseas merchandise trade – year to February 2020.

However, the static level of export value derived from non-primary manufactured goods, masks considerable growth occurring across a range of high value-added categories. For example, medical technologies (\$848.4 million), pharmaceuticals (\$449.5 million) and cosmetics (\$183.8 million) reflect areas of strong growth.³⁵ Since 2010, annual growth across the three categories has averaged 4.6 per cent, 6.3 per cent and 11.4 per cent, respectively. At the same time, a range of other non-primary manufactured goods have declined in export value. This includes sub-categories such as petroleum derived oils and organic chemicals.

The largest destination markets for non-primary sector manufactured goods are Australia, the United States, Japan, China, Korea, United Kingdom, Canada, Germany and Singapore. Growth of high-value non-primary manufactured exports will help diversify the economy and build resilience to shocks.

Leading export destinations for manufactured goods by broad industry group
Year ended December 2020



In 2020, 81.4 per cent (\$36.2 billion) of manufactured exports were food and beverage and wood and paper products, with annual growth averaging 6.3 per cent and 1.1 per cent respectively since 2010. In contrast to non-primary sector manufactured goods, China is by far the largest export destination for these products. South-East Asian countries, Australia, the United States and Japan are also large export markets.³⁶

³⁵ Statistics New Zealand. Overseas merchandise trade – year to February 2020; HS categories include medical technology (HS 90), pharmaceuticals (HS 30), and cosmetics (HS 33).

³⁶ Statistics New Zealand. Overseas merchandise trade – year to February 2020.

Similar to the manufacturing sector's contribution to the wider economy, manufacturing is an enabler of a range of other New Zealand exports including services. The New Zealand manufacturing sector is also a significant importer adding value to imported products and materials.

Manufacturing is supported by an eco-system of diverse stakeholders

This ITP demonstrates that the manufacturing sector is supported by an eco-system of diverse stakeholders. Due to the breadth and diversity of New Zealand's manufacturing sector this eco-system is complex and sometimes poorly connected. It has been observed that many manufacturers lack visibility of these various entities and this hinders the ease of access to support. It has also been observed that greater collaboration among these entities could assist the sector, including its ability to implement the initiatives in this ITP. One proposed initiative from this ITP is to create a map of the current eco-systems of support – to be tested and expanded through consultation. This ITP could be a catalyst to improve coherence and visibility of the eco-systems and stakeholders that support manufacturers.

DRAFT

Priorities and actions for transformation

The need to transform to an advanced manufacturing sector

The actions outlined in this Industry Transformation Plan have been developed in partnership between business, workers, government, Māori and wider stakeholders. The following key priorities to drive the growth and transformation of the manufacturing sector have been identified by those partners:

1. improving New Zealanders' perceptions of manufacturing
2. increasing investment to lift productivity and wages
3. making innovation, R&D and science work for manufacturing
4. attracting and developing a diverse high-skilled and high-wage workforce
5. creating a leading sustainable circular net-zero emissions sector
6. enhancing global connectivity and opportunities.

Collectively, the priorities and actions identified in this ITP aim to achieve the sector's agreed long-term vision of:

A thriving Aotearoa New Zealand advanced manufacturing sector of world-class creators, innovators and makers delivering quality products, sustainable solutions and intergenerational wellbeing

Each of the six priority areas holds equal importance. They are inter-connected. Improving one priority area will provide benefits to others. They have been separated and ordered in this document for readability and not by importance.

The ITP is an iterative and continuing process that requires ongoing collaboration for its success. This ITP should be seen as a living document.

Further information on the initiatives, including tangible actions and measures of success over three years, is available in the Draft Action Plan in Appendix One. The Draft Action Plan initiatives are not numbered by importance or priority but by their order in this ITP document. During the consultation phase they will be refined and prioritised. They will then be implemented, outcomes will be measured, and necessary adjustments made to ensure impact overtime.

Priority 1. Improving New Zealanders' perception of manufacturing

Despite being a significant contributor to employment and GDP, New Zealand's manufacturing sector is not widely known or understood.

This could be because much of what New Zealand manufactures is an input into domestic or global value chains. Most New Zealanders have limited visibility over the sector, as much of what is produced is not purchased directly by the public. It may also reflect that New Zealand has relatively few large manufacturers to give the sector public recognition.

While advanced manufacturing is characterised by advanced technologies, sustainable practices and high-skilled high-wage jobs, some New Zealanders have a perception that manufacturing is in decline, dirty, and has limited capacity for fulfilling well-paid careers.

Few New Zealanders appreciate that manufacturing in New Zealand contributes more to GDP (10 per cent) than manufacturing in Australia (6 per cent) where the sector is revered and supported. Its contribution to the economy is similar to that of the United States (11.6 per cent), United Kingdom (9.9 per cent) and Canada (10.6 per cent).³⁷

This lack of profile coupled with negative perceptions by some manifests in a number of ways. New Zealand manufacturing firms at times find it difficult to attract staff as young people, students, educators and workers may not be aware of the range of career opportunities in the sector. Investors may be less likely to commit to the sector due to out-of-date views.

Certain business stakeholders are of the view that a Minister for Manufacturing should be established to demonstrate that manufacturing is seen as important to the economy and jobs.

This ITP presents an opportunity to build awareness, shift perceptions and raise the profile of the sector. A coordinated approach is proposed to:

- highlight the importance of manufacturing to the economy and jobs;
- rebrand manufacturing to reflect its current state and future defined by advanced technologies, innovation and sustainable practices;
- emphasise career opportunities and pathways to high-skilled high-wage manufacturing jobs;
- explore, understand and apply Māori perspective to our manufacturing story; and
- establish an identity that New Zealand manufacturers can be proud of and project globally.

Draft Action Plan – Initiative 1: Improve the perception and profile of manufacturing

Initiative: Government, business and unions develop and implement a strategy that improves the perception and profile of New Zealand manufacturing for multiple domestic and global audiences.

Outcome sought: Improves the understanding and attractiveness of the sector to potential employees, students, educators, women, workers, investors, and consumers.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

³⁷ OECD (2021), *National Accounts of OECD Countries, Volume 2021 Issue 2: Detailed Tables*, OECD Publishing, Paris, <https://doi.org/10.1787/d57d1be0-en>.

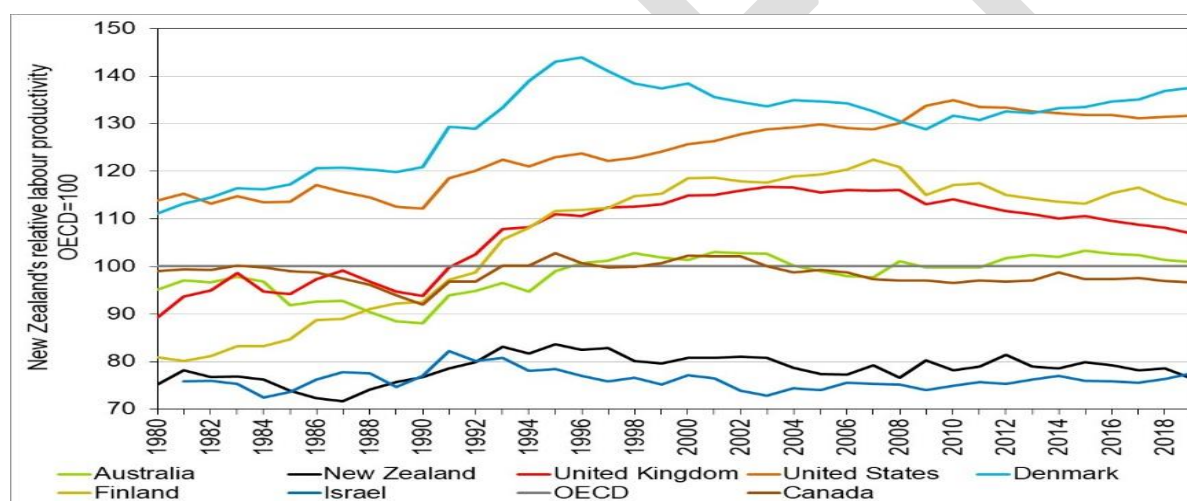
Priority 2. Increasing investment to lift productivity and wages

Manufacturing globally is undergoing a fundamental shift through the application of advanced technologies and processes, often referred to as Industry 4.0.³⁸ There is significant opportunity through greater investment and adoption of advanced technologies and processes to boost the manufacturing sector’s productivity. This, complemented with the initiatives in Priority 4 to upskill workers, should lead to higher wages across the sector.

Low capital intensity contributes to New Zealand’s overall productivity and wage challenges

Overall, New Zealand’s productivity performance is weaker than other Small Advanced Economies.³⁹ This is due to a number of factors, including small and isolated markets, weak international connectedness, New Zealand businesses that are typically capital-shallow, low investment in knowledge capital, and high costs of capital. Sub-optimal business investment in productive assets is a key contributor to New Zealand’s productivity challenge. As the Productivity Commission confirms, “New Zealand businesses are typically capital-shallow (i.e. workers have limited equipment and other capital goods to work with) and this has held down labour productivity”.⁴⁰

Labour productivity, 1980 - 2018



Capital intensity is the ratio of capital inputs to labour inputs and is a key determinant of labour productivity. Unfortunately, in New Zealand, there has been no sustained increase in capital intensity over the last decade and its level has been well below that of other advanced economies for at least the last 40 years.⁴¹

In general, New Zealand businesses have relied on labour-intensive business models as opposed to investment in advanced technologies and processes. This has perpetuated a cycle of low productivity per worker and as a result relatively lower wages across the economy.

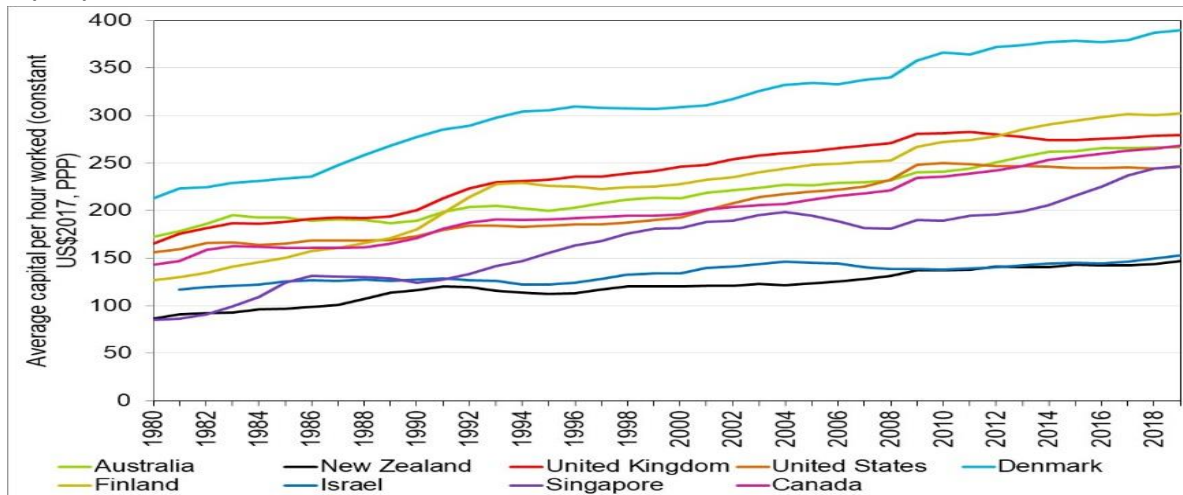
³⁸ See definition of “advanced technologies and processes” in the box below.

³⁹ OECD (2021), Growth in GDP per capita, productivity and ULC. Accessed at https://stats.oecd.org/Index.aspx?DataSetCode=PDB_GR

⁴⁰ New Zealand Productivity Commission (2021). New Zealand firms: Reaching for the frontier. Final report. Available at www.productivity.govt.nz/inquiries/frontier-firms/

⁴¹ Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2021). Penn World Table 10.0. Available at <https://www.rug.nl/ggdc/productivity/pwt/>

Capital per hour worked, 1980 - 2018



There is significant opportunity for advanced technologies and processes in the manufacturing sector to boost New Zealand’s productivity and wages

There is significant opportunity for investment in advanced technologies and business processes across the manufacturing sector to boost New Zealand’s productivity and wages. A 2021 Heavy Engineering Research Association (HERA) report with analysis undertaken by Business and Economic Research Ltd (BERL) found that the uptake of advanced technologies and processes, such as Industry 4.0, in the New Zealand construction sector would boost wages.⁴² Through Computable General Equilibrium (CGE) modelling they find that both GDP and wage gains are likely to be significant over the next five years (2021-2026). In their most optimistic scenario, the GDP gained could be \$8 billion and wages could increase by almost \$3.5 billion across the economy. In the least optimistic scenario these reduce to GDP gains of \$4.1 billion and wage increases of almost \$1.8 billion.

If this opportunity is not seized New Zealand manufacturing will fall further behind global competitors. As an example, New Zealand’s manufacturing labour productivity is only 54 per cent of the US. However, faster adoption of advanced technologies and processes could allow New Zealand manufacturers to increase productivity to 83 per cent of the US, whereas slower adoption would decrease productivity to 29 per cent of the US.⁴³

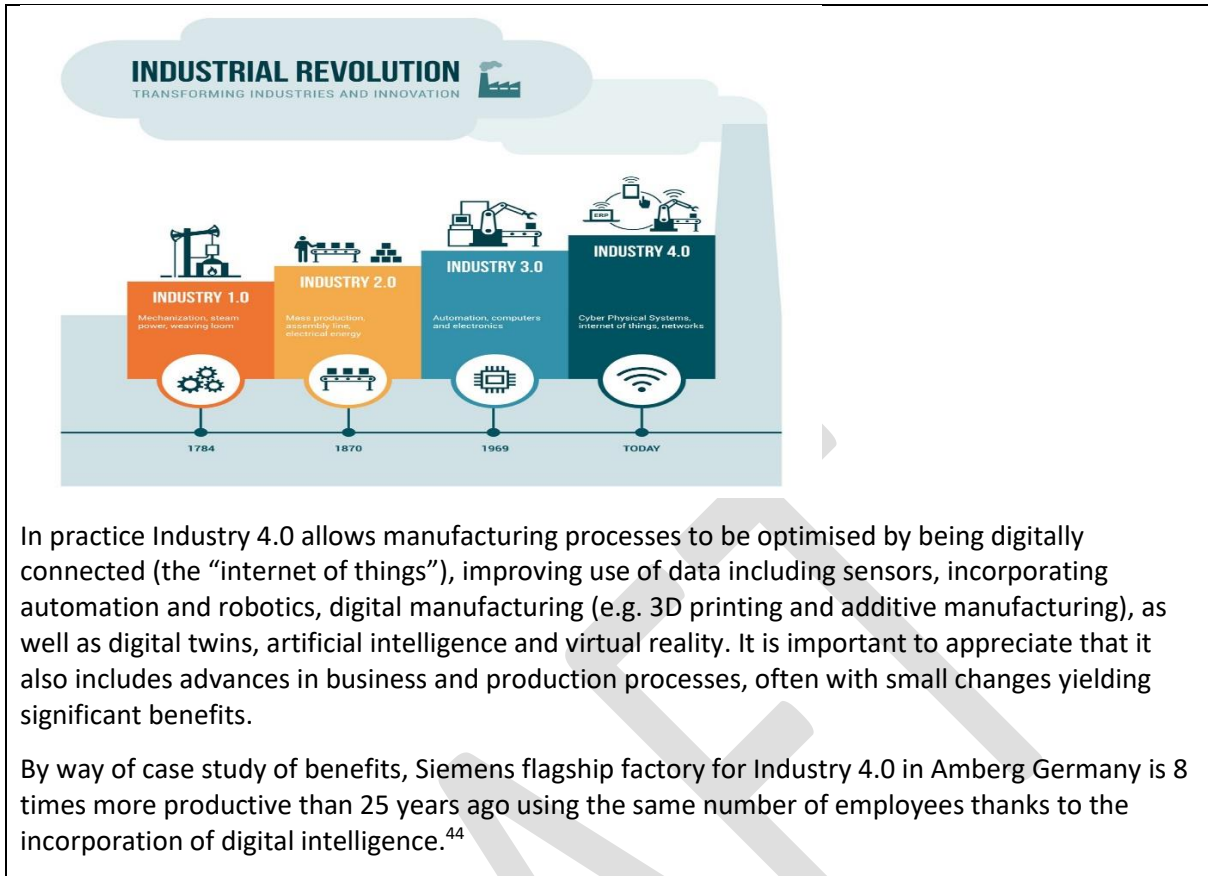
How Advanced Technologies and Processes are transforming manufacturing

We use the phrase “advanced technologies and processes” in this Industry Transformation Plan to capture improvements in the manufacturing process. This can include adopting the latest Industry 4.0 technologies described below but also smaller incremental changes in technology adoption and business processes.

The fourth industrial revolution, or Industry 4.0, is transforming manufacturing. The first three industrial revolutions involved mechanisation through steam power (1784), mass production assembly lines using electricity (1870) and computers and automation (1969). The current fourth industrial revolution fuses digitisation, physical technologies and business processes to enhance manufacturing.

⁴² HERA (2021). Modelling the Potential Economic Impacts of Construction 4.0 in New Zealand. Report No. R5-92:2021. [Resource - HERA report shows adoption of construction 4.0 worth \\$8 billion - HERA](#)

⁴³ Prime Minister’s Business Advisory Council (2019). A Future that Works: Harnessing Automation for a more Productive and Skilled New Zealand.

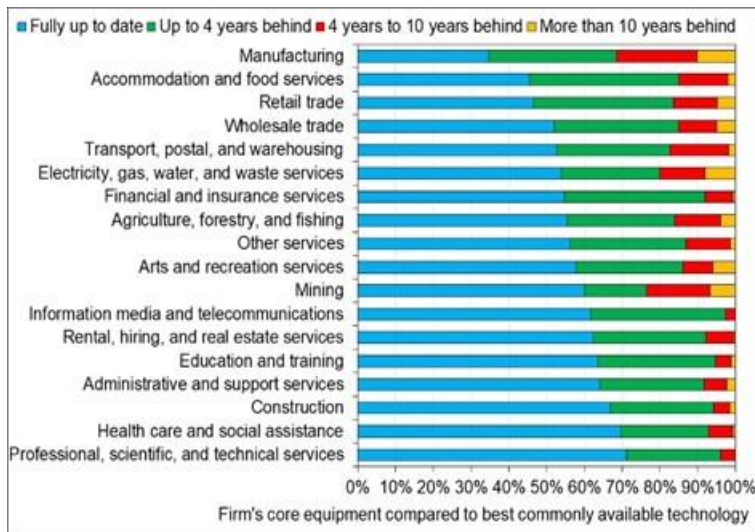


Seizing this opportunity will require a new approach. Currently, productivity growth within the manufacturing sector is particularly low. Between 2008 and 2019 manufacturing productivity grew at just 0.6 percent per year. This is below the New Zealand average of 1.0 percent, which is already low by international standards.

As shown in the next table, only 35 per cent of manufacturers indicate they have up to date core equipment, while more than 10 per cent are at least 10 years behind. This compares to 55.4 per cent and 3.2 per cent across the economy, with manufacturing sitting last of all industries.

⁴⁴ See <https://www.callaghaninnovation.govt.nz/>

Firms' equipment compared to best commonly available technology



This relatively low base of capital-intensity provides an opportunity for large gains for productivity and wage improvement through investment in advanced technologies and processes. This opportunity is available now. For instance, 56 per cent of manufacturing tasks in New Zealand can be improved with technology that already exists.⁴⁵ However, 66.8 per cent of manufacturing firms have no automation to perform routine tasks and a further 31.9 per cent only have partial automation.⁴⁶

Advanced technologies and processes can lead to higher-skilled and higher-wage jobs

The trend of advanced technologies and business processes in global manufacturing may be daunting for some small and medium-sized manufacturers and workers fearful of being displaced by global competitors or of losing their jobs.

Experience domestically and internationally however is that investment in advanced technologies improves productivity, requires higher-skills, and leads to wage growth for workers in manufacturing. We have heard from companies who upskilled existing employees, who were then able to move into new more-productive roles following the introduction of advanced technologies and processes. In a survey of manufacturers, 77 per cent stated that their most significant investment in advanced technologies had a neutral impact on employee numbers. A further 5 per cent increased employees and 18 per cent decreased employee numbers.⁴⁷

Advanced technologies also improve worker safety by reducing high-risk manual tasks and providing and conditions by providing more interesting work. New Zealand manufacturers that have introduced advanced technologies report a 24 per cent decrease in the health and safety risk to workers and a 44 per cent increase in job satisfaction.⁴⁸

Thus, while jobs will change, with the correct support, they can do so by upskilling the existing workforce to enable the shift to higher-skilled, higher-wage, safer and decent jobs.

Placeholder

Case Study: Company that has introduced advanced technology and processes and how this has resulted in upskilling of workers, increased productivity and increased wages, and impact on job numbers.

In this way, boosting investment will contribute to enhanced prosperity and inter-generational wellbeing by leading to improved wages and workforce upskilling. Achieving gains in higher wages and decent work, however, requires important complementary initiatives on upskilling and

⁴⁵ Ibid.

⁴⁶ Statistics New Zealand. Business Operations Survey 2018.

⁴⁷ Statistics New Zealand. Business Operations Survey 2018.

⁴⁸ Statistics New Zealand. Business Operations Survey 2018.

supporting the manufacturing workforce discussed under Priority 3. Supporting workers through this transition is critical, including for any displaced workers.

Advanced technologies and processes can overcome New Zealand's challenges of labour shortages, small scale and accelerate environmental sustainability outcomes

In addition to improved productivity, wages and worker conditions, there are several other benefits to be gained from improved adoption of advanced technologies and business practices in manufacturing.

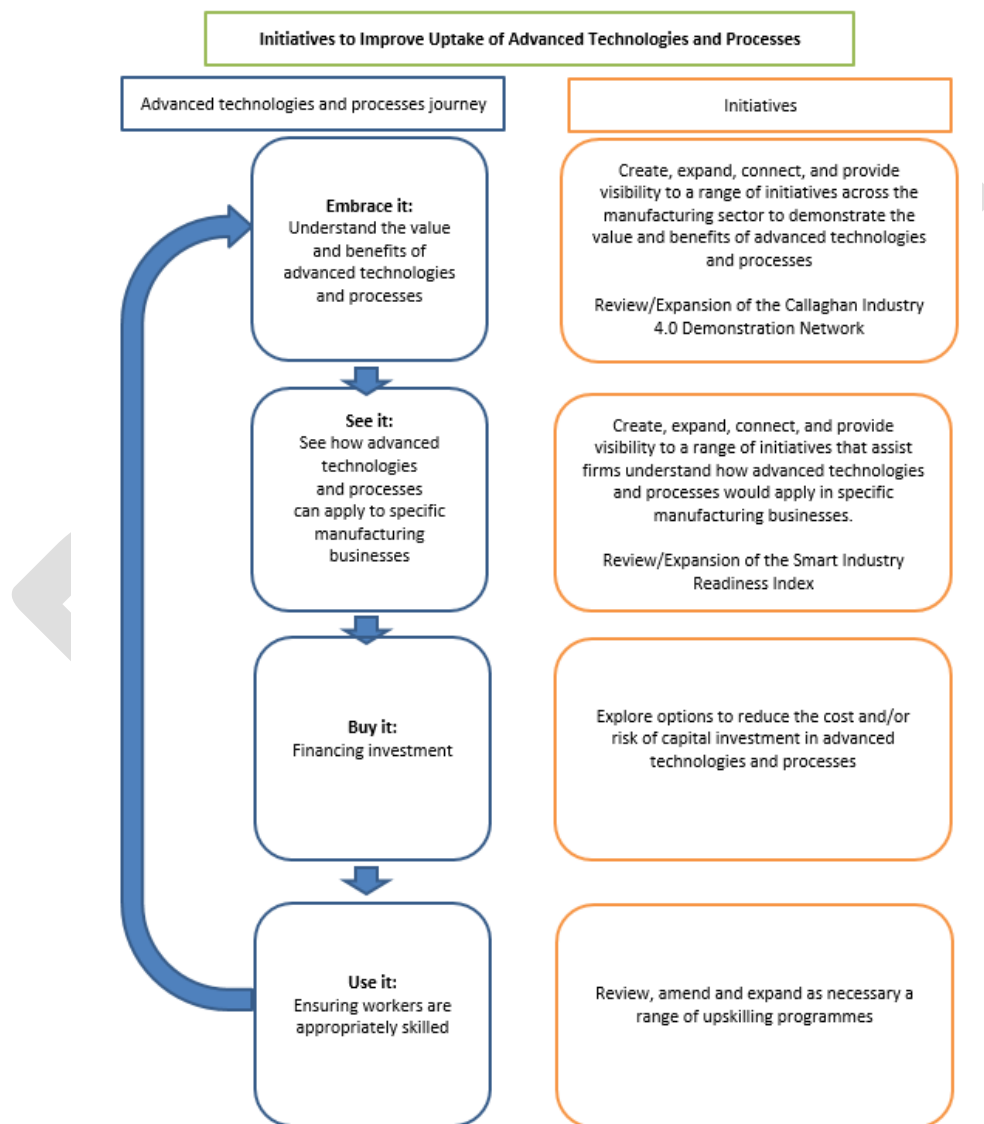
- New Zealand has a finite labour market. A major benefit of advanced technologies and processes for manufacturing is that they increase output per worker. Investment in these technologies will allow manufacturing firms to grow irrespective of labour constraints. As these firms grow and become more profitable, the skills and wages per worker are expected to also increase.
- Another key benefit of advanced technologies is that they can overcome the challenge of scale. Mass production at scale of standardised products has often been seen as important for globally-competitive manufacturing. Through advanced technologies and processes innovation in design, production and business models means that New Zealand manufacturers can more easily respond to rapidly changing environments and consumer demands to be world-leaders of customised solutions.
- Advanced technologies have environmental benefits through optimised design, reduced waste and energy efficiency. Energy monitoring applications lead to energy efficiency and the reduction of carbon emissions, while waste can be reduced through improved manufacturing design, processes, recycling and reuse.
- Advanced technologies also provide opportunities for manufacturers to provide complementary services beyond the traditional production and sale of manufactured goods. Some of the greatest value across a production cycle is derived from pre-production and post-production activities. Advanced technologies provide greater opportunity to offer after-market service activities such as real-time data on the status and performance of products, maintenance and repair services, and software upgrades. These services have become an important source of revenue for advanced manufacturers.

Improving the uptake of advanced technologies and processes requires complementary initiatives

Evidence shows that cost, funding, skills, time and knowledge are the main barriers to New Zealand manufacturers utilising advanced technologies and business processes to a greater degree.⁴⁹

To improve the uptake of advanced technologies and business processes across the New Zealand manufacturing sector requires complementary and concurrent initiatives to:

- **Embrace it:** Owners, managers, and employees understand the value and benefits advanced technologies and business processes for their manufacturing business operations;
- **See it:** Owners, managers, and employees see how advanced technologies and business processes would apply in their specific manufacturing businesses;
- **Buy it:** Firms can invest in productivity-enhancing technologies and processes; and
- **Use it:** Firms can attract and develop a high-skilled workforce able to leverage these technologies and processes to drive productivity and higher wages.



⁴⁹ Hazmeh, R., Zhong, R. and Xu, X. W. (2018). A Survey Study on Industry 4.0 for New Zealand Manufacturing. *Precedia Manufacturing* 26 (2018), 49-57. See also Employers and Manufacturers Association (2018). Findings from the 2018 Employers Survey. Auckland: EMA.

Embrace it: Understanding the value and benefits of advanced technologies and processes for manufacturing businesses

For many manufacturing firms advanced technologies are unfamiliar. It has been observed that there is a need to create, expand, connect and provide visibility to a range of initiatives across the manufacturing sector that can help demonstrate the value and benefits of advanced technologies and processes to a wide range of manufacturing businesses. These initiatives could be mapped and made accessible to manufacturers. Outreach, potentially in collaboration with business and industry associations, is required to articulate to a wider group of manufacturers the benefits of advanced technologies and processes that will then make them more likely to invest time in deepening understanding of opportunities.

To improve understanding of advanced technologies and their applicability, Callaghan Innovation has developed the Industry 4.0 Demonstration Network (I4DN). This is an initiative to help New Zealand manufacturers realise the benefits of a range of advanced technologies that will enhance manufacturing performance, output, monitoring and control.

In collaboration with Beca and the Employers and Manufacturers Association (EMA), the I4DN provides three services:

- The [Mobile Showcase](#) provides an opportunity to engage, learn and imagine what is possible with advanced technologies. Using a mini-production line, a specialist shows participants advanced technologies in action and shares successful implementation stories to inspire their next steps.
- The [Network Site Visits](#) is a programme to encourage sharing of Industry 4.0 knowledge across the sector through webinars and visits to manufacturers who have already adopted advanced technologies.
- The [Smart Factory Tour](#) is designed to provide an immersive experience where participants will be able to see first-hand what modern manufacturing in New Zealand looks like. This has yet to be operationalised.

Participant surveys indicate that the I4DN programme has made a positive impact to the manufacturing industry's uptake of Industry 4.0. All respondents that have taken part in Industry 4.0 Demonstration Network events either agree or strongly agree that these have helped improve their understanding of Industry 4.0 and inspired them to make a change. At all levels of digital maturity, respondents wanted a variety of support, from workshops, meet-ups and webinars on Industry 4.0 case studies in New Zealand through to a guide to Industry 4.0 suppliers in New Zealand.⁵⁰

Feedback to date, however, has also been that many manufacturers are not aware of the I4DN and its services. Its reach could be expanded to a wider audience of manufacturers. There are also several other initiatives that provide a similar service that demonstrate the value of advanced technologies and processes but where visibility could be improved and services could potentially be expanded. For example, the Heavy Engineering and Research Association (HERA) has a range of initiatives to improve understanding and uptake of Industry 4.0 for the heavy engineering industry including metal fabricators.⁵¹

⁵⁰ Callaghan Innovation (2021). Industry 4.0 2021 Insights Survey. Available at <https://www.industry4.govt.nz/sites/default/files/casestudies/Industry%204.0%20Demonstration%20Network%20Survey%20Insights%20Part%202.pdf>

⁵¹ See the initiatives at <https://www.hera.org.nz/research-development/quality-productivity/> including the Fab4.0Lab [Fab4.0Lab](#) - HERA.

Draft Action Plan – Initiative 2: Demonstrate the value of advanced technologies

Initiative: Create, expand, connect and provide visibility to a range of initiatives across the manufacturing sector that demonstrate the value and benefits of advanced technologies and processes to a wide range of manufacturing businesses. This could include reviewing and potentially adjusting and expanding the Callaghan Industry 4.0 Demonstration Network.

Outcome sought: Increase the understanding of the benefits and opportunities provided by advanced technologies and processes.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

See it: See and understanding how advanced technologies and processes can apply to specific manufacturing businesses

Once firms understand the value and benefits of advanced technologies, it is important to supplement this with guidance and concrete steps on how they can be applied to specific manufacturing businesses.

It has been observed that while technology can be seen as a great enabler, uncertainty on how to apply it in specific businesses limits adoption. There is a need to create, expand, connect and provide visibility of a range of initiatives across the manufacturing sector that assist firms understand how advanced technologies and processes *would apply in specific manufacturing businesses*.

For instance, as part of the I4DN, Callaghan Innovation fully-funds company-specific assessments. Utilising the World Economic Forum’s Smart Industry Readiness Index (SIRI). External experts analyse the current state of a manufacturer’s factory, identify high-impact areas for improvement, benchmark against industry peers, and develop a roadmap to maximise returns from investing in these technologies. There are also several other initiatives that provide similar be-spoke services, such as HERA’s welding productivity and automation assessments to identify Industry 4.0 opportunities.⁵²

There is an opportunity to expand these initiatives to increase understanding of how advanced technologies and processes would apply to a wide range of manufacturing businesses.

Draft Action Plan – Initiative 3: Company-specific advice on advanced technology adoption

Initiative: Create, expand, connect and provide visibility of a range of initiatives across the manufacturing sector that assist firms understand how advanced technologies and processes would apply in specific manufacturing businesses. This could include reviewing and potentially adjusting and expanding the Callaghan Innovation’s Smart Industry Readiness Index company-specific assessments to increase its reach and effectiveness.

Outcome sought: Greater awareness and adoption of advanced technologies and processes within the manufacturing sector.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

⁵² See <https://www.hera.org.nz/industry-4-0/>

Buy it: Supporting investment in advanced technologies and equipment

Transformation of the manufacturing sector to be more productive and higher wage will require a significant investment in advanced technologies.

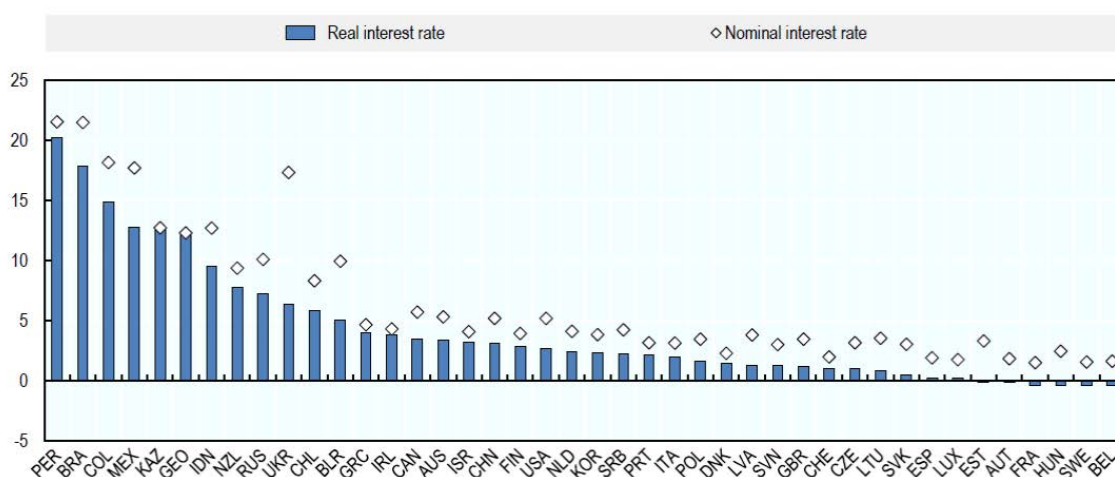
However, the cost of advanced technologies is a key barrier preventing greater update. 66 per cent of New Zealand manufacturers find that the inability to secure initial funding is a barrier to utilising advanced technologies to a greater degree.⁵³

This is because investment in new technology is particularly expensive in the manufacturing sector and there are significant business risks when making capital investments in productivity-enhancing plant and machinery. As one small firm has explained, a large deposit is required when ordering innovative machinery with full payment on delivery. However, there is a minimum of 9-month delay between committing to an asset and having it in full production (for advanced machinery under \$500,000) and between 12- and 18-months' delay for major assets (over \$1 million). This capital investment by manufacturing firms is particularly risky due to a lack of long-term supply contracts in the New Zealand market and often inaccurate client forecasts, especially in the COVID-19 environment.

Investing in plant and machinery also creates cash-flow challenges for firms, in particular in the early years. In addition, firms can struggle to borrow for investment at a reasonable interest rate. For domestic investment a challenge has been to make investment in plant and machinery as attractive as investment in land.

Furthermore, the cost of capital in New Zealand has historically been one of the highest in the OECD causing challenges for business investment.⁵⁴ As demonstrated in the chart below, the OECD has assessed credit conditions for SMEs and entrepreneurs based on data on the cost of bank finance. The study found that New Zealand and Chile were outliers as the only high-income economies with nominal interest rates close to 10%, well above the median of 4.08%.

SME Credit Conditions - interest Rates, real and nominal (2018)



Note: Definitions differ across countries. Detailed information on sources and definitions is available in the full country profiles. Nominal interest rates were adjusted using World Bank data on inflation. Data from Ukraine for 2017 are missing
Source: Data compiled from the individual country profiles.

⁵³ Statistics New Zealand. Business Operations Survey 2018.

⁵⁴ OECD (2020), Financing SMEs and Entrepreneurs 2020: An OECD Scoreboard, OECD Publishing, Paris, <https://doi.org/10.1787/061fe03d-en>.

OECD data from 2020 demonstrates that New Zealand had the second-highest cost of capital for “tangible assets” (mainly plant, machinery and equipment) benchmarked against the 37 other OECD countries. Higher costs of capital reduce productive investment and capital stock because fewer investments will generate the required hurdle rate of return for businesses.⁵⁵

There are a number of complementary means to support greater investment in productivity-enhancing technologies, options include:

- **Accelerated depreciation on new plant and equipment:** Accelerated depreciation has the potential to be a pivotal action incentivising increased investment in innovative technologies across a range of manufacturing sectors. Accelerated depreciation on new plant and machinery would encourage more investment resulting in greater productivity and higher-skilled and higher-wage jobs. Due to rapid technological change advanced manufacturing firms need to upgrade their plant and machinery in increasingly shorter timeframes to maintain productivity, wages and global competitiveness. A global assessment has found that accelerated depreciation incentives occur in most OECD and Small Advanced Economies and New Zealand is an outlier in the amount of capital investment costs that can be recovered by manufacturers through the tax system.⁵⁶
- **A Business Growth Fund:** A growth equity funding model that pools bank capital to create a fund of scale could be considered. It would operate commercially, and make investment decisions independently of shareholders, to provide a source of minority-only, patient, growth capital to SMEs. Deliberate efforts could be made to ensure this fund supports investment in the manufacturing sector. This could bridge the funding gap between bank loans and mid-market private equity. It would allow manufacturing owners to retain control of what they’ve built while leveraging capital and capability support to achieve their growth aspirations.
- **Investment grants:** Grants to support manufacturers with co-funding to modernize by adopting new technologies that improve productivity and/or energy efficiency have been used by some countries. An investment grant could provide targeted assistance for firms to invest in technology, and these can be linked to other desired outcomes. Australia’s \$50 million Manufacturing Modernisation Fund supports manufacturers by co-funding capital investments and associated reskilling for firms with up to 199 employees. It is delivered through two streams of funding: (i) an estimated \$20 million for small grants (\$50,000 to \$100,000) covering up to 50 per cent of eligible project costs to support small scale technology and efficiency improvements; and (ii) an estimated \$30 million for larger grants (\$100,000 to \$1 million) covering up to 25 per cent of eligible project costs to support transformative investments in technologies and processes.
- **Loans:** Low interest or government guaranteed loans could help manufacturers purchase new capital that improve productivity. This could help firms with the time delay from committing finance to an asset and having it generate revenue.

⁵⁵ Data derived from OECD Databases.

⁵⁶ Findex Report – Tax and Financial Incentives (2022) (forthcoming).

In exploring options to incentivise further investment, focus will also need to be given to ensuring that government support improves workforce participation, diversity and inclusion, good employment practice, and wider public good outcomes.

Draft Action Plan – Initiative 4: Support greater capital investment in advanced technologies

Initiative: Explore options to incentivise and support capital investment in advanced technologies and processes including accelerated depreciation, business growth funds, investment grants and loans.

Outcome sought: Increase the number of firms utilising advanced technologies and processes leading, in combination with targeted skills initiatives, to higher-skilled higher-wage jobs.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

There is a need to facilitate manufacturing firms' understanding of, and access to, these various new finance and funding options. There are existing mechanisms, such as those provided by NZTE, that provide these services to firms and these could be expanded or modified so that they are tailored to the manufacturing sector and firms.⁵⁷

Alternatively, a new mechanism could be established. By way of example, MPI's new Investment Ready pilot programme connects primary industry projects with the wider funding and investment community through a commercial manager.⁵⁸

Draft Action Plan – Initiative 5: Improve access and visibility to finance & funding opportunities

Initiative: Expand or create a service for manufacturing firms to understand and connect to various financing and funding opportunities (both public and private).

Outcome sought: Increase the number of firms utilising advanced technologies and processes leading, in combination with targeted skills initiatives, to higher-skilled higher-wage jobs.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Use it: Ensuring staff are appropriately skilled to operate emerging technologies

Experience shows that the introduction of more advanced technologies and processes leads to a different mix of jobs and skills required. Priority area 4 discusses a range of initiatives to ensure existing workers are upskilled and supported in the transition to advanced manufacturing and business practices.

⁵⁷ For instance the investment services provided by NZTE: [Invest or raise capital with NZTE](#)

⁵⁸ See [Investment Ready – The Factory \(thefactorynz.co.nz\)](#)

Priority 3. Making innovation, R&D and science work for manufacturing

Innovation is a key driver of economic growth

Innovation is how firms become more competitive and is a driver of economic growth and productivity. Firms innovate by creating or adapting knowledge into improved design, processes, products, business models, services or marketing methods.⁵⁹

As noted above, the adoption of advanced technologies in manufacturing is one contributor to innovation. Research and Development is also related to innovation. Research involves investigations undertaken with the prospect of gaining new knowledge while development is the application of research or other knowledge to improve products, processes, systems or services.⁶⁰

Innovation, R&D and science are critical to the transformation of New Zealand's manufacturing sector. Studies confirm that productivity increased by around 2-3 per cent over three years for New Zealand manufacturing firms that undertook R&D activity or product innovation that was new to the world.⁶¹

The manufacturing sector is a significant contributor to New Zealand's R&D spending. Total R&D spending from manufacturers was \$825 million in 2020, which has increased 53.9 per cent since 2012. Manufacturing accounts for 30.5 per cent of business spending on R&D and 33 per cent of businesses performing R&D are from the manufacturing sector.⁶²

Despite this record, there is significant opportunity for innovation, R&D and science to support the manufacturing sector's future transformation. This support is warranted as manufacturing related innovation, R&D and science involves significant investment. It is commercially risky, especially for New Zealand's smaller manufacturing firms that are not servicing large markets and have little certainty to recoup those upfront costs.

Supporting innovation eco-systems for manufacturing

One option is to support industry-focused innovation eco-systems. This includes supporting improved connections between business, scientists, researchers and developers to innovate and translate great ideas to commercial outcomes.

The Productivity Commission recommends significant investment to developing innovation ecosystems to emulate other successful Small Advanced Economies. Eco-systems in these Small Advanced Economies create a network of entities including larger "anchor" frontier firms, SMEs, research bodies, workers, education and training providers, government agencies, mentors and investors. They can help create scale, share fixed costs and risks associated with innovation, generate innovations spill over, and exploit synergies.

⁵⁹ MBIE, *Beyond Commodities: Manufacturing into the Future* (2018) at 85.

⁶⁰ MBIE, *Beyond Commodities: Manufacturing into the Future* (2018) at 86.

⁶¹ Wakeman, S. and Conway, P. (2017). *Innovation and the performance of New Zealand firms*. Wellington. New Zealand Productivity Commission

⁶² Statistics New Zealand. *Research and Development Survey 2020*.

Through the ITP process, concerns have been expressed that manufacturing ecosystems are not well known, fragmented, and often working in isolation. One initiative from this ITP could be to develop a map of the current eco-systems that support manufacturers. As a first step, this ITP could be a catalyst to improve visibility and coherence of eco-systems of support for manufacturers.

Draft Action Plan – Initiative 6: Map manufacturing eco-systems

Initiative: Develop a resource that maps the current eco-systems that exist to support manufacturers. This can be tested through consultation and be in a format that provides visibility and ease of access for manufacturers.

Outcome sought: To improve visibility across the sector of current eco-systems of support and improve connections and coordination.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

As a second step, this ITP could consider deepening or establishing manufacturing ecosystems. These clusters could provide an opportunity to improve the outcomes from innovation activity and simulate 'scale' benefits for New Zealand manufacturers. Careful assessment would need to be made as to appropriate clusters given the breadth and variety of manufacturing subsectors. Clusters could be based on regions and/or technologies. They could be virtual or physical.

Funding could be allocated to industry-led ecosystem organisations carrying out activities including: information sharing; facilitating coordination between firms; providing shared infrastructure and facilities; coordinating productive skills matching between workers and firms; establishing stronger links with the science and research systems; capital raising and support for start-ups; developing international linkages and partnerships; attracting foreign investment; and identifying export opportunities.

A pilot of a contestable process with full business cases could be developed to inform potential wider eco-system development co-funding.

Draft Action Plan – Initiative 7: Strengthen manufacturing eco-systems

Initiative: Deepen or establish manufacturing ecosystems based around appropriate clusters.

Outcome sought: Obtain innovation and 'scale' benefits from healthy manufacturing ecosystems.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Create an Aotearoa New Zealand Centre for Manufacturing Excellence

Innovation ecosystems could be further supported by an *Aotearoa New Zealand Centre for Manufacturing Excellence*. The Centre could be in one location or across a national network of open-access facilities to support advanced manufacturing. There may be an opportunity for different focus areas based on regional locations.

There are international and domestic manufacturing technology centres that New Zealand could learn from while preparing a business case.

Boston's Autodesk Technology Centre is a research and development workspace focused on innovation in manufacturing, architecture, engineering, and construction. It encourages teams (from start-ups, SMEs, to universities) to explore ways to advance innovation in manufacturing, architecture, engineering, and construction. With a focus on digital fabrication, automation and robotics resident teams test and develop products and solutions.

The New South Wales government has announced a \$1 billion fund into the Bradfield City Centre. The Bradfield City Centre will grow and evolve over the next 30 years to become a cyber-secure, hydrogen-ready location for advanced manufacturing and other high-tech circular economy industries. It aims to drive the creation of tens of thousands of jobs and support education and training opportunities.

Domestic technology centres in New Zealand that could be examined include FoodBowl, the Food Innovation Network, Gracefield Innovation Quarter, and Drury South Crossing Advanced Industrial Park. FoodBowl is an open access facility which is designed for F&B companies to use for research and development trials and to pilot commercial runs of new products. Gracefield is an innovation centre that gives resident businesses access to specialist facilities and expertise that help manufacturers fast-track product development, scale up, deploy and test technology as well as collaborate. Drury South Crossing is an advanced industrial park that aims to build a community and industry within the natural landscape. This includes integrating a business hub with complementary retail and commercial services.

One objective of manufacturing technology centres is to help reduce the risk and cost of innovation as firms do not incur production downtime or need to purchase new equipment to support their innovation activity. They can also bring together different actors and provide a central hub for ecosystems. This approach would likely require a sizeable capital and operating investment but could be co-funded with industry. As an initial step, a business case would be developed to understand the benefits, costs and risks of this approach, along with possible focus, locations and funding arrangements. It would also identify existing centres and labs to understand how these could be connected as a network, if it would be preferable to expand an existing centre or centres, as well as potential gaps.

Draft Action Plan – Initiative 8: *Aotearoa New Zealand Centre for Manufacturing Excellence*

Initiative: Create and prepare a Business Case for a potential *Aotearoa New Zealand Centre for Manufacturing Excellence*.

Outcome sought: To make the future possibilities of manufacturing tangible and accessible to manufacturers while providing a focal point for ecosystems and a range of other ITP initiatives.

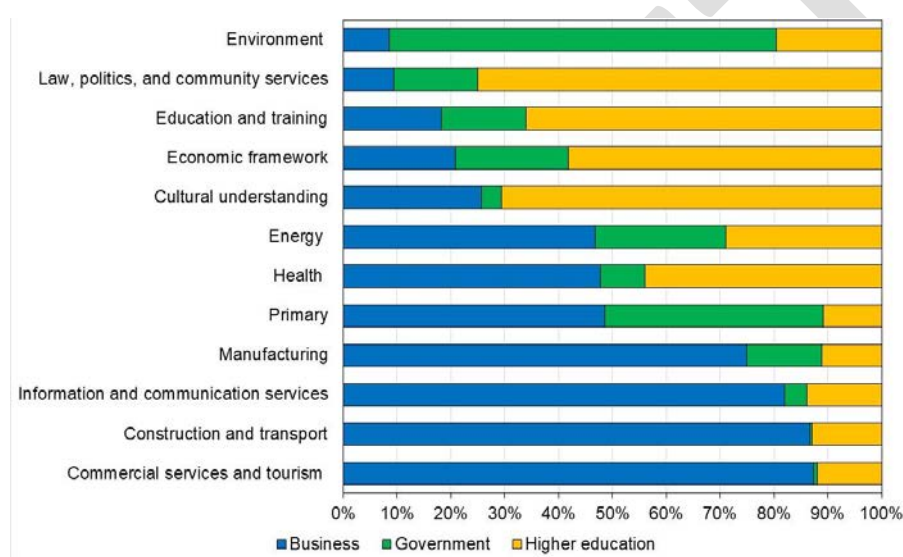
For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Connecting science, research and innovation to commercial outcomes for manufacturing

Through the ITP process, concerns have been raised that much of publicly-funded science research has limited links to commercial outcomes for manufacturing. The Productivity Commission finds that compared to other small advanced economies, there are relatively weak links between public research institutions and businesses, with an emphasis on “science push” where the innovation process starts with an idea or a discovery, rather than “industry pull” where innovation comes from the needs of society or the business sector.

The Productivity Commission also found that “[o]ther than in the primary sector, the government has devoted only a very small proportion of its research, science and innovation funding, export assistance funding and economic development funding directly to its chosen areas of focus”. For example, of R&D directed towards the manufacturing sector, 75.1 per cent is funded by businesses, 13.9 per cent provided by the government, and 11.2 per cent provided by higher education. However, in the primary sector, the government provided 40.0 per cent of funding.⁶³

Source of research and development expenditure, 2018



There is significant work currently underway to transform the New Zealand research system. [Te Ara Paerangi – Future Pathways](#) is a fundamental review of the research, science and innovation sector. The desire is to create a modern research system that is adaptable for a rapidly changing future,

resilient to changes, and connected (to itself, to industry, to public sector users of research, and internationally). The review is taking an inclusive, deliberative and open approach to gather a broad base of views, drawing on the collective wisdom, experience and inspiration of our researchers and research users. It is important for the manufacturing sector that its perspectives shape the future direction of the research system to ensure a more targeted and coordinated approach to innovation.

This could include raising awareness of the Science for Technological Innovation National Science Challenge to enhance use physical sciences and engineering for economic growth and prosperity. It has a research focus on materials, manufacturing technology and design, sensors, robotics and automation, data science & digital technologies and vision Mātauranga.⁶⁴

⁶³ Statistics New Zealand. Research and Development in New Zealand: 2018.

⁶⁴ See <https://www.sftichallenge.govt.nz/>

Draft Action Plan – Initiative 9: Manufacturing perspectives feature in the current review of the research, science and innovation sectors

Initiative: The manufacturing sector contributes towards the Te Ara Paerangi – Future Pathways review of the research, science and innovation sector.

Outcome Sought: To ensure the future of the research, science and innovation sector reflects the needs of the manufacturing sector.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

However, there are already some examples where science, research and innovation is linked to commercial outcomes for manufacturers such as the New Zealand Product Accelerator. This helps connect industry with research expertise, solving industry challenges and could potentially be expanded in scope. Stakeholder feedback however is that while highly regarded by those that have used it, few manufacturing firms are aware of the Product Accelerator service. Growing the visibility of the Product Accelerator, and any similar initiatives, would be important for connecting science and research to commercial success.

Draft Action Plan – Initiative 10: Link science, research, innovation to commercial outcomes

Initiatives: Grow the visibility of the New Zealand Product Accelerator, and any similar initiatives, to a wider range of manufacturers. Review and potentially adjust and expand the New Zealand Product Accelerator and related initiatives.

Outcome Sought: To ensure that research expertise is connected to solving commercial challenges for manufacturing.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Priority 4. Attracting and developing a diverse high-skilled high-wage workforce

The manufacturing sector is significant employer of 248,400 New Zealanders accounting for 10.7 per cent of the workforce.⁶⁵ It provides a diverse range of jobs from process workers, apprentices and tradespeople through to PHDs in engineering and technology.⁶⁶ It is the second largest Māori employer (41,900) and largest employer of Pasifika peoples (20,900).⁶⁷ Manufacturing is also a major employer in both regions and major cities.⁶⁸

As noted above, advanced technologies and processes provide a significant opportunity to grow productivity. To support this advanced technology evolution, the sector will need to develop the skills of the existing workforce, attract new workers, and improve diversity and inclusion.

The initiatives in this chapter are designed to support high-skill high-wage careers in manufacturing where workers and employers contribute to great workplace cultures and there are excellent long-term prospects for a wider diversity of workers.

This chapter outlines proposed skills and workforce initiatives to support the advanced manufacturing sector benefit from advanced technologies and the transition to a sustainable, circular, net-zero carbon future. There is an opportunity for the sector to be a leader in training and development aspects of the transition to circular net-zero emissions manufacturing.

While some of these proposed initiatives are not new ideas, there is a need to reflect and connect with the new vocational education operating environment. These initiatives complement significant change in New Zealand's vocational education system, as outlined in the following box.

How the ITP fits with the changes to the vocational education system

This ITP provides a mechanism for the manufacturing sector to develop strong connections and collaboration with the new vocational education system so that employers and workers can be assured the new model will meet their skills and training needs across all levels – from management to operational staff.

The Reform of Vocational Education (RoVE) represents a significant change to the vocational education system. The aim of RoVE is to create a vocational education system that is fit for the future of work and delivers the skills that learners, employers and communities need to thrive.

Through RoVE, learners will receive more support while they are training, and vocational education that is more relevant to work. The new system will also have a stronger focus on employers, delivering the skills they need, providing more support for their employees, and ensuring greater consistency in vocational education.

The RoVE operating model is currently in the establishment phase. The new entities include:

⁶⁵ Statistics New Zealand. Household Labour Force Survey, Persons Employed by Sex by Industry, ANZSIC06 (Sept Quarter 2021).

⁶⁶ Manufacturing consists of a high proportion of technicians (close to 23 per cent in 2019 compared to 12.5 per cent), labourers (over 22 per cent compared to just 11 per cent), and machinery operators and drivers (12 per cent compared to around 5.5 per cent) than the economy as a whole. Professionals (10.5 per cent compared to 24 per cent) and service workers (1.7 per cent compared to 9.3 per cent) are less prevalent in the sector.

⁶⁷ Statistics New Zealand: Income Tables – (Available at [NZdotstat.stats.govt.nz](https://nzdotstat.stats.govt.nz)) by Ethnicity, 2021.

⁶⁸ Statistics New Zealand: Business demography statistics, 2021

- **Te Pukenga** – replacing 16 Institutes of Technology and Polytechnics, Te Pukenga will support work-based, campus-based and online learning as a unified system.
- **Workforce Development Councils (WDCs)** – which will give industries greater leadership and influence across vocational education. Of particular relevance is Hanga-Aro-Rau, the WDC for Manufacturing, Engineering and Logistics.
- **Regional Skills Leadership Groups** – to provide advice about the skills needs of their regions to the Tertiary Education Commission (TEC), workforce development councils, and local vocational education providers.

The new model will be supported by a **Unified Funding System**, which is being designed so that tertiary education organisations can deliver education and support work-integrated learning which is responsive to regional and national skills needs, supports learners and employers in ways that best meets their needs, and drives new and innovative ways of delivering learning.

Improving workforce and skills planning

The skills and workforce system is complex. Three related initiatives are proposed to improve workforce and skills planning: (i) skills system mapping, (ii) a long-term workforce plan, and (iii) an accessible online platform for this information.

As a first step, a **skills system map** is proposed as a key ITP initiative to provide a better understanding of the roles of all the various actors within the system in the context of the RoVE changes (from education to the manufacturing plant), including what levers can be pulled, capacity gaps/opportunities, and major constraints to unlocking the pipeline. The skills system map will reflect the current state of the manufacturing workforce and the future state of the workforce in a transformed industry, and would be developed collaboratively by employers, unions and Hanga-Aro-Rau (the Manufacturing, Engineering and Logistics Workforce Development Council).

The transition to a low carbon future is a key component of considering the future state of the manufacturing workforce. The government is currently developing its Emissions Reduction Plan, which will set the direction of climate action for the next 15 years. The Emissions Reduction Plan discussion document proposes the development of a comprehensive equitable transitions strategy to drive a well-signalled and inclusive transition, maximise opportunities and minimise disruption and inequities. Mapping transition skills as part of the overall skills mapping exercise would put the manufacturing sector in a good position to pro-actively begin preparing for the transition and provide a strong manufacturing voice into the development of the equitable transitions strategy.

The second step to improving workforce and skills planning is to support the sector to develop a **long-term workforce plan**. The plan would capture all of the skills needs of a technologically-advanced and net-zero carbon manufacturing future. This initiative would be led by Hanga-Aro-Rau, in collaboration with employers and unions.

Using the information and data from the skills system map, the long-term workforce plan would identify current and future workforce needs, including how potential workers could transition from other industries into the manufacturing sector using their existing skills (for example, workers displaced from sectors in decline or from industries impacted by the move to a low carbon future). It will also include an examination of what skilled positions are needed over the long term, and how New Zealand can grow these skills domestically using the skills system map.

The long-term workforce plan would inform prioritisation of training efforts, including government support targeted towards industry skill needs where demand from employers will continue to be strong or is expected to grow.

Finally, an **online workforce information platform** is proposed to house both the skills system mapping exercise and long-term workforce plan. This would be similar to the Construction and Infrastructure Workforce Information Platform (WIP) that is a forecasting tool that displays national and regional gaps and surpluses within the construction and infrastructure labour market. Work on the tool was led by BCITO, in partnership with MBIE, TEC, RSLGs, Competenz, Stats NZ, and others.

Draft Action Plan – Initiative 11: Skills system map and long-term workforce plan housed on an online workforce information platform

Initiative: Develop a skills system map and a long-term workforce plan to be hosted on a new online workforce information platform. The platform will also provide and regularly update data on national and regional skills and workforce gaps and surpluses, including links to reports and insights developed by the Regional Skills Leadership Groups. This will be similar to the Workforce Information Platform that was developed in 2021 for the Construction and Infrastructure sectors.

Outcome: The sector has the information it needs to plan for its future skills and workforce needs and ensure the benefits from investment in advanced technologies and the shift to a net-zero carbon future are gained across all levels of the sector.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Upskilling the workforce across all levels

Individual Development Plans, aimed at upskilling across all levels and linked to the long-term workforce plan, would ensure that workers have time to plan their future career pathway and access the training and services they need to achieve their next step. The actions in the Individual Development Plans could include a mix of mentoring, on the job training, placements in other firms, and formal learning (identified using the skills map and enabled through the Unified Funding System).

This upskilling is critical to achieve the productivity, skills and wage gains from increased investment in advanced technologies and processes. As discussed below, an immediate proposed upskilling initiative is to expand the successful Digital Upskilling Pilot.

There is also a need to improve leadership and management capability-building, including people leadership, creating positive work cultures, understanding and applying diverse cultural values (particularly Māori and Pasifika, but also other groups), and promoting positive behaviours. For example, upskilling managers to identify potential in their employees who may not put themselves forward for opportunities, or who may have a confidence issue rather than a capability one.

Initiatives to improve leadership and management capability-building could extend to managers having the opportunity to learn from other successful manufacturing businesses (including internationally, where possible) to improve leadership, people management and culture.

As outlined above, the manufacturing sector is comprised of many small firms, both in terms of number of employees and annual turnover. From a skills perspective, this means many manufacturing firms are focused on the everyday operations of running a business, and may struggle to dedicate time and funding to train and upskill. The proposed upskilling and training initiatives could be coupled with support such as training entitlements and/or transition support. We will also consider options for ensuring that employers are accountable for implementing their workers' Individual Development Plans including providing the time for training.

By having Individual Development Plans for their employees, business owners and managers will be able to see the potential within their existing workforce and the benefits to their business of allowing staff to have time for training. Individual Development Plans will also help employers to identify any additional gaps (also using the long-term workforce plan).

By having a Plan themselves, leaders and managers will be able to build leadership capability and develop the skills and support needed to create a transition plan for their business, including how to successfully expand their business internationally. The proposed Aotearoa New Zealand Centre for Manufacturing Excellence could also have a leadership capability-building function, noting the role of improving workers' skills and qualifications as a tool to improve productivity.

Draft Action Plan – Initiative 12: Individual Development Plans

Initiative: Develop guidance for Individual Development Plans across all levels of the sector (including lifting leadership and management capability), in collaboration with the Hanga-Aro-Rau and Te Pukenga. Adopt mechanisms to ensure that employers implement these pathways. Develop mechanisms for apprentices and workers to be able to develop by working in different manufacturing firms through secondments and placements.

Outcome – Upskilling all workers with accountable pathways for achieving their career goals and ensuring that manufacturers maximise productivity, skills and wage gains from advanced technologies and processes.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Improve digital and foundational skills

The introduction of advanced technologies and processes needs to be complemented with on-the-job training of existing staff to ensure they are adequately upskilled and it is fully utilised.

This requires manufacturers to provide regular up-skilling and on-the-job training, particularly for those jobs that are shifting away from manual labour typical for many process workers to tasks requiring a greater level of digital or foundational competency.

This may prove challenging for some manufacturers that do not have dedicated in-house training capability. Yet accessible digital and foundational skills training is necessary to raise the productivity and wages of workers in manufacturing. This training should be provided to all workers, including currently low-paid process workers with limited hopes of advancement in the absence of upskilling.

In collaboration with Competenz, the Manufacturers' Network has developed and run a digital upskilling pilot. The nine-week on-the-job course covers basic digital literacy and tailored machinery training. This is one example of a number of digital and foundational skills initiatives required for the manufacturing sector's future.

Draft Action Plan – Initiative 13: Improve digital and foundational skills

Initiative: In partnership with Hanga-Aro-Rau support the digital skill shift pilot programme as well as foundational skills training to increase their reach and effectiveness. Ensure that training is available to all staff but well understood by factory floor leaders, business owners, directors and senior managers so that they support uptake of the training on offer for all workers.

Outcome sought: Increase the skills of workers to ensure they are suitably trained to transition and utilise new technology implemented at their workplace.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Attracting a larger and more diverse workforce

To attract a larger and more diverse workforce an attraction strategy (industry-led, government supported) that engages young people, the education system and workers at all levels will be developed.

The manufacturing sector has the opportunity of increasing its workforce by increasing its diversity. This includes attracting more women to a workforce that is currently 70 per cent male.⁶⁹ A key initiative will be improving perceptions of the sector discussed in Priority 1 but this will need to be coupled with a series of discrete concrete initiatives, such as:

- To attract younger people at the primary school level support can be provided to expand the Wonder Project and Fab Labs to encourage excitement in science, digital fabrication, manufacturing and engineering. At secondary school level, an assessment should be undertaken of the number of schools providing hard tech and digital courses as part of the curriculum. Support should be provided for school teachers to understand that manufacturing is a viable and accessible career pathway and there should be industry-led scaling up of business programmes with schools (e.g. “inspiring the future”, trades academy programmes, and internships). There should be a deliberate effort to promote manufacturing to school girls and their parents before the age of 14 to build awareness of the new set of advanced innovative manufacturing jobs and to increase gender diversity across the full spectrum of roles.
- “Seeing is believing” for young people and a key component of any *Aotearoa New Zealand Centre for Manufacturing Excellence* or eco-system initiatives would be a youth focus and visits to motivate students to join the sector.
- Deliberate efforts should be made at the tertiary level to create a pipeline of the skills required for the manufacturing sector. This can be complemented with industry-led initiatives to promote work opportunities and internships. New innovative approaches could also be explored such as the possibility of combining a university degree with vocational education.

⁶⁹ Statistics New Zealand. Infoshare – Household Labour Force Survey, Persons Employed by Sex by Industry, ANZSIC06 (Annual-Mar).

Advanced manufacturing firms that improve their culture and values will be able to attract and retain people in the sector. A programme around Māori values and aligning ITPs with government strategies that promote Māori wellbeing such as the *Māori Economic Resilience Strategy* could increase buy-in and diversity while providing wider benefits. Manufacturers that can support greater diversity and inclusiveness within the workforce, for example by being culturally competent and embracing more flexible approaches to work, will be able to draw on a greater pool of talent (e.g. younger people, older people, women, Māori and Pasifika, and other ethnic groups).⁷⁰

Case study:

- how diversity and inclusion can be transformational
- why diversity and inclusion are good for manufacturing (as an industry and for individual businesses) and
- why it is also good for those diverse people that work in manufacturing

In addition, manufacturers that create a positive culture of learning will be better prepared to achieve the transformation change the sector needs to thrive. High-performing New Zealand manufacturing firms are seeing the benefits of an inclusive, diverse and flexible workplace.

Building on Te Puni Kokiri's analysis including Te Matapaeora, there is a need to deepen our understanding of Māori participation in manufacturing. Acknowledging the high employment of Māori in manufacturing and instances of high-performing Māori-owned manufacturing businesses, this work will include undertaking deeper research to map Māori involvement in manufacturing to inform where and how we might target initiatives in this ITP, or identify additional actions, to support Māori success in manufacturing. For instance, a recent study for the Sustainable Steel Council found that in the steel industry Māori and Pasifika were over-represented in low-skilled occupations (such as labourers, machinery operators and drivers) and under-represented in high-skill occupations (managers and professionals). However, over the last decade there has been a positive shift to more high-skilled employment for both Māori and Pasifika in that sector.⁷¹

⁷⁰ The Human Rights Commission is currently leading a public inquiry into the Pacific pay gap to examine the causes and contributory factors of the pay gap, conditions of work, promotion, and career advancement of Pacific workers. Manufacturing is one of three industries that the inquiry is focussing on (along with Construction and Health). Relevant recommendations will inform ongoing development of this ITP.

⁷¹ The report *Māori and Pacific Peoples Employment in Steel Industries*, Final Report to Sustainable Steel Council, BERL, December 2021 (<https://www.sustainablesteel.org.nz/employing-maori-and-pacific-peoples/>) notes a positive shift to more high-skilled employment for Māori and Pasifika with managers growing by 122 per cent and 188 per cent respectively and professionals growing by 192 and 567 per cent respectively.

Draft Action Plan – Initiative 14: Attraction Strategy increasing diversity

Initiative: Led by the manufacturing sector, but in collaboration with the Tertiary Education Commission, Ministry of Education, and Hanga-Aro-Rau, develop a comprehensive manufacturing attraction strategy for young people, students at all education levels (including university), educators, women and workers. This initiative would build on the actions under Initiative 1 to improve the perception and profile of New Zealand manufacturing.

The attraction strategy would need to be complemented with a suite of initiatives developed by business, workers and government to attract a larger more diverse workforce.

Deepening understanding of Māori participation in the manufacturing sector to inform how we might target initiatives in the ITP, or identify additional actions, to support Māori success in manufacturing.

Outcome – Increased number and diversity of workers in manufacturing.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Business, union and government members of the ITP recognise the importance of globally-experienced advanced manufacturing talent to support upskilling of our manufacturing workforce. The Immigration Rebalance is designed to ensure immigration settings achieve these objectives and deliver better outcomes for our communities, economy and skill development. Improving those settings away from low-skilled immigration can incentivise skills development domestically to achieve benefits in productivity growth, high-value innovation and well-paid jobs.

Priority 5. Creating a leading sustainable circular net-zero emissions sector

The imperative for sustainable, circular and low-emissions manufacturing provides both opportunities and challenges for the future of New Zealand manufacturing. Firms and sectors that understand and respond rapidly to changing customer expectations and regulatory requirements are likely to thrive.⁷²

Sustainable manufacturing is not just about transition by reducing waste and emissions but also about manufacturing providing innovative solutions and technologies to achieve these goals across the wider economy.⁷³

Case study:

Where manufacturing is leading in environmental sustainability – including providing innovative solutions to achieve sustainability goals.

By incorporating sustainable practices into their business models and processes manufacturers may be able to become market leaders that maximise profit as they innovate and adapt ahead of regulatory change. With shifting demand for more sustainable solutions, new market opportunities are created that these firms might exploit. A manufacturing sector that is sustainable will be resilient to this changing landscape. Sustainable manufacturing will also bolster public perceptions of the sector and New Zealand's global manufacturing reputation.

The initiatives outlined in this chapter are designed to support the sector to achieve the vision of a leading sustainable circular net-zero emissions sector. A number of the initiatives identified elsewhere in this ITP will also support the sector to achieve that vision. For instance, increased use of advanced technologies and processes can provide environmental benefits through improved energy efficiency, lower emissions and reduced waste. The sector has also identified an opportunity to be a leader in training and workforce development aspects of the transition to circular and net-zero emissions manufacturing.

Success will be optimised by prioritising a te ao Māori approach bringing in Māori expertise and perspectives as kaitiaki.

Understanding the sustainability challenge for the manufacturing sector

As noted earlier, this ITP tackles the most challenging issues for the manufacturing sector's future and often in uncertain evolving contexts.

In developing actions to achieve circular net-zero emissions manufacturing it is apparent that the initiatives require as a first action a better understanding of these complex uncertain evolving problems in order to then develop concrete solutions that can be implemented.

⁷² <https://www.oecd.org/coronavirus/policy-responses/building-back-better-a-sustainable-resilient-recovery-after-covid-19-52b869f5/>

⁷³ In this ITP, the term "sustainable" refers to environmental sustainability as opposed to the wider meaning of sustainability reflected in the wide range of United National Sustainable Development Goals.

A first action therefore is a full granular investigation into the waste and emissions produced by the manufacturing sector in order to understand the current state of the sector. This includes identifying areas of high-waste and high-emissions and understanding key opportunities and barriers to their reduction.

Draft Action Plan – Initiative 15: Map emissions and waste profile

Initiative: Comprehensive investigation into the emissions and waste profile of New Zealand’s manufacturing sector as well as opportunities and barriers to decreasing waste and emissions.

Outcome sought: Understand at a granular level the manufacturing sector’s emissions and waste profiles, and opportunities and barriers for reduction, to inform ITP actions and initiatives.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Manufacturing is sustainable and embeds circular economy principles, including minimising waste

A key ITP priority is that manufacturing embeds circular economy principles, including minimising waste. There are growing demands for manufacturers to implement more circular operating models, and more firms are repurposing and reusing waste from other firms.

There is also a significant opportunity to design waste out in the first place. About 80 per cent of waste is designed into products at the design phase so the inverse is also possible. New Zealand manufacturing can be a leader in minimising waste in the design phase.

In addition, resource recovery and recycling are key to circular approaches. Manufacturers can be supported in adopting circular approaches through initiatives such as the Plastics Innovation Fund (Te Tahua Pūtea mō te Kiriho Auaha), a \$50 million fund, recently launched to support business minimise plastic waste through circular approaches to recycling and reusing. New initiatives could be explored across other manufacturing sub-sectors as the manufacturing sector currently generates approximately 240,000 tonnes of waste per year.⁷⁴ There is also opportunity to consider how best to leverage existing efforts such as those by the circular economy cluster of manufacturers as part of the Sustainable Business Network.⁷⁵

Eco-parks also provide untapped opportunities for circular manufacturing. One manufacturing firm’s waste may be integral to products created by another firm.

Ngawha EcoPark

There is already a pre-existing manufacturing ecopark called Ngawha Innovation and Enterprise EcoPark. The crux of Ngawha is to stimulate employment, encourage circular economies and enhance regional capability development.⁷⁶ It is underpinned by partnership which is exhibited in their manufacturing community as they work together to manufacture various products. By 2023, it is estimated that Ngawha will have a \$30m impact on GDP per year.

Auckland Eco Park

⁷⁴ For instance, HERA is currently researching a material passport for structural steel re-use. See [Steel sustainability research fund - HERA](#)

⁷⁵ The Sustainable Business Network was created in 2002 and works with a significant network of businesses, predominantly SMEs, across three main priorities: acting on climate, designing out waste and regenerating nature. See <https://sustainable.org.nz/>

⁷⁶ <https://ngawhapark.nz/>

There is a three-point plan involving infrastructure, financial capital and innovation that will help Auckland become a circular economy. The infrastructure platform is divided into investing in current and new spaces to scale in a networked way (phase 1) and building a large scale, world-class economy business park (phase 2).⁷⁷ The design of the Eco Park is to be a one-stop hub that recovers materials for repurposing to minimise waste, foster innovation and creates high value jobs.

Draft Action Plan – Initiative 16: Embed circular economy principles in manufacturing

Initiative: Identify and implement actions to embed circular economy principles in the manufacturing sector, including design-led solutions, waste-minimisation and recycling. These could include:

- Placing circular economy principles (including design-led solutions, waste-minimisation and recycling) as key and accountable objectives of other ITP initiatives including the *Aotearoa New Zealand Centre for Manufacturing Excellence* (Initiative 8), support to deepen or establish manufacturing eco-systems and clusters (Initiative 7), and policies to support innovation and advanced technologies and processes (Initiatives 1-10).
- Placing manufacturing at the centre of eco-parks (Auckland Eco-Park and Nga Wha Eco Park).
- Consider mechanisms to support design-led waste minimisation in manufacturing.
- Consider expansion of initiatives such as the Plastics Innovation Fund to other manufacturing sub-sectors.

Outcome sought: To implement a range of actions that embed circular economy principles in the manufacturing sector, including design-led solutions, waste-minimisation and recycling.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Manufacturing is a test-bed for net zero-carbon manufacturing

An ambitious goal is for New Zealand to become a world-leading test-bed for net-zero carbon manufacturing.

As set out by the Sustainable Business Council, a key part of the transition to a low-emissions and climate-resilient planet is showing the world that net-zero carbon manufacturing is achievable.⁷⁸ Net-zero carbon manufacturing could present opportunities for New Zealand, including the potential to attract new industries, and to differentiate our existing industries by completely net-zero carbon outputs. The Sustainable Business Council is of the view that New Zealand could do more, and could, with the right policies, develop into a testbed for net-zero carbon manufacturing.

The Sustainable Business Council believes New Zealand is in a unique position to show the world how to decarbonise in a relatively short timeframe. This is due to the significant renewable portion of our electricity grid. A successful transition would also present opportunities to export knowledge gained to the rest of the world.

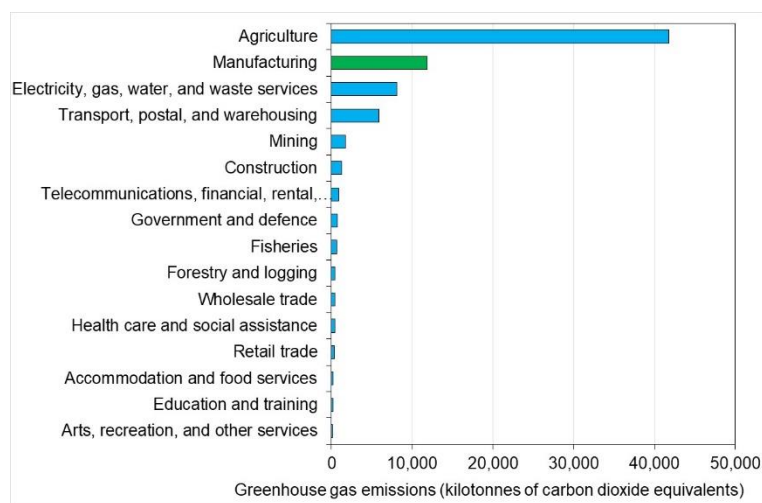
Achieving net-zero carbon manufacturing is ambitious. The manufacturing sector emits almost 11,866 kilo tonnes of carbon dioxide equivalent, making it the second biggest contributor to greenhouse gas emissions behind agriculture. The sector accounts for 14 per cent of New Zealand's

⁷⁷ [Creating shared prosperity through the circular economy by Tuputau Lelaulu - Flipsnack](#)

⁷⁸ https://www.sbc.org.nz/_data/assets/pdf_file/0019/214138/SBC-and-CLC-submission-to-Climate-Change-Commission-26-March-2021.pdf

emissions and these have grown 16.2 per cent between 2007 and 2019.⁷⁹ To achieve New Zealand’s goal that net emissions of all greenhouse gases other than biogenic methane will be zero by 2050, the manufacturing sector, like all other sectors, will need to significantly decrease their emissions.

Greenhouse gas emissions by industry, year ended 2019



New Zealand manufacturing, however, has a major opportunity to benefit from renewable energy sources. In 2019, 82.4 per cent of electricity generation came from renewables, which places New Zealand the third-highest in the OECD.⁸⁰ This provides a key platform towards net-zero emissions especially when coupled with the opportunities to replace aging manufacturing machinery with more energy and waste efficient advanced technologies and processes.

Manufacturers may be apprehensive to lowering emissions due to upfront costs. However, there are already resources to support manufacturers transition to low-emissions as set out in the following Box. These mechanisms can support an approach whereby transition is seen as an investment into higher profitability over the medium-term. This work ties in with the Emissions Reduction Plan to phase out fossil fuels, and plans related to decarbonisation and energy efficiency.

There are funds as well as information available to support sustainable manufacturing and help cushion costs but this information is not centralised and relies on the initiative of the manufacturer. However, the majority of New Zealand manufacturing firms are SMEs that do not have the capacity to go searching for potential funds or support that may help them.

⁷⁹ Statistics New Zealand. Greenhouse gas emissions (industry and household): Year ended 2019.

⁸⁰ Ministry of Business, Innovation and Employment (2020). Energy in New Zealand 2020.

Another challenge for SMEs is that they have limited resources to measure their current carbon footprint which means that they often do not know their current outputs and cannot provide evidence of their low carbon footprint, should customers request it. The likelihood of customers requesting manufacturers to be accountable for their emissions will proliferate in the future as global pressures and the drive to reduce greenhouse emissions grow. Options could be explored to establish a mechanism that helps them to measure their emissions while offering green alternatives.

Existing resources and work plans to support manufacturers to lower emissions

Emissions Trading Scheme (ETS)

The ETS is New Zealand's primary lever to achieve its long-term commitment to reducing greenhouse gas emissions. 'Emissions trading' is a market-based approach for reducing emissions of greenhouse gases. The ETS puts a price on emissions, by charging certain sectors of the economy for the greenhouse gases they emit. While this price has been historically low, the price is expected to climb to meet New Zealand's emissions target by incentivising abatement activities. There are opportunities for manufacturers to consider how best to reduce emissions to avoid regulatory costs driven by the ETS.

EECA's Energy funds

EECA offers four key programmes that will assist manufacturers:

- *Government Investment in Decarbonising Industry (GIDI) Fund*
- *Technology Demonstration Fund*
- *Energy Transition Accelerator*
- *Sector decarbonisation roadmaps*

The first three funds are all targeted at lowering a manufacturer's energy usage through funding fuel switching, encouraging adoption of technology or innovative processes to reduce emissions and face to face help with an expert that identifies the best technological and economically viable solutions for business. McCains Food used the Technology Demonstration Fund and saved \$1 million per year by using the fund to invest in Pulsed Electric Field (PEF) technology which replaced coal used in the pre-heating process of chip production.

Draft Action Plan – Initiative 17: Net-zero emissions manufacturing

Initiative: Identify and implement actions needed for New Zealand to become a world-leading test-bed for net-zero carbon manufacturing. This could include:

- Create the right incentives coupled with support for the industry to become a test-bed for net-zero carbon manufacturing, including greater energy efficiency and reliance on renewable energy
- Placing net-zero carbon manufacturing at the centre of innovation eco-systems, the *Aotearoa New Zealand Centre for Manufacturing Excellence*, and policies to support innovation and advanced technologies and processes (Initiatives 1-10)
- Consider how the New Zealand Green Investment Fund might be used to support the manufacturing sector
- Creation of a virtual hub and easy access online tools designed to collate and make information on existing funds and support available for manufacturing firms' transitions to sustainable, circular and low-emissions manufacturing
- Mechanisms to help SMEs measure their emissions.

Outcome sought: To implement a range of actions to enable the New Zealand to become a test-bed for net-zero emissions manufacturing.

Engage with global leaders in sustainable manufacturing

New Zealand can learn from other countries' manufacturing businesses and policy makers that have taken significant steps towards sustainable manufacturing. This could involve a global scan of best practice to identify leaders, including businesses, in this space that are able to spend time and share their knowledge with New Zealand manufacturers and policy makers of what good looks like. In addition, the sector can seek from NZTE, Callaghan and MFAT an understanding of manufacturing sustainability trends and policies in different countries.

Draft Action Plan – Initiative 18: Connect with global leaders in sustainable manufacturing

Initiative: Understand and connect with global leaders in sustainable manufacturing from business and government.

- Global scan of best practice including identifying leaders in sustainable manufacturing. Once best practice and leaders have been identified, work on connecting them with domestic manufacturers and policy makers to discuss and demonstrate what good looks like.
- Seek from NZTE, Callaghan and MFAT an understanding of manufacturing sustainability trends and policies in different countries.

Outcome sought: New Zealand manufacturers and policy makers understand and connect with global best-practice examples of sustainable manufacturing to inspire and influence future actions.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Priority 6. Enhancing global connectivity and opportunities

The manufacturing sector makes up 11% of New Zealand’s economy but accounts for 73.5 per cent of our goods exports (\$44.5 billion) and nearly half of all exports (goods and services).⁸¹ Manufacturing firms also have higher rates of foreign investment and outward investment than the New Zealand average and add value to a range of imports.

Greater detail on the trade profile of the manufacturing sector is contained in Part Two of this report.

A strength of New Zealand manufacturing lies in the sector’s ability to be adaptable and agile because it is comprised of many small firms operating in niche areas. There are opportunities for New Zealand manufacturers to service increasing demands for customised solutions globally.

At the same time, due to the physical distance of overseas markets, New Zealand manufacturers face barriers that their overseas counterparts do not. These barriers include building an international reputation and regular global connection with customers and leading offshore manufacturers enabling the cross-fertilisation of ideas and upskilling.

Manufacturing and COVID-19

The COVID-19 pandemic has highlighted the importance of global connections for our manufacturers.

New Zealand manufacturers often provide a niche and customised input into a larger offshore value chain. International customers value New Zealand inputs when reliable, timely, high-quality and at the right price.

The COVID-19 pandemic highlighted that customers will shift to geographically closer suppliers if the New Zealand inputs can’t be relied on to arrive in a timely manner (due to shutdowns or transport delays) or cannot be serviced by New Zealand engineers (due to travel restrictions). This makes New Zealand manufacturing vulnerable to manufacturing “onshoring” and “supply chain resilience” initiatives of overseas firms and governments.

The COVID-19 pandemic also highlighted that New Zealand manufacturing is reliant on foreign expertise to train domestic workers in specialised areas and to service certain advanced technologies. Our closed borders also resulted in a lack of foreign expertise and workers resulting in a need for medium-term solutions through upskilling and increased adoption of technologies.

The initiatives below are designed to strengthen New Zealand manufacturers’ global connectivity and opportunities. There are a number of initiatives described under other Priorities that relate to this global connectivity and opportunities priority area, including Initiative 1 to improve the profile of manufacturing globally and Initiative 18 to connect with global leaders in sustainable manufacturing.

⁸¹ Statistics New Zealand. Overseas merchandise trade – year to February 2020.

Enhancing manufacturing global connections through trade missions, strategic relationships and global insights

NZTE, MFAT and Callaghan provide a range of services to support exporters. It is proposed those efforts focus on supporting New Zealand's manufacturing sector at a time when global connections are more important than ever.

This includes developing **a pipeline of manufacturing focused trade missions**. These could be led by the Prime Minister or Ministers and could include a NZ manufacturing pavilion at the major trade shows like Hanover.

New Zealand could also **prioritise strategic relationships with key countries based on manufacturing**. A number of close partners have introduced manufacturing industry policies including Australia, Singapore, Germany, Canada, the United Kingdom and the United States. This provides a platform for collaboration at both government and industry-level. Manufacturing could be a focus at the next Australia New Zealand Leadership Forum.

There is also significant opportunity to learn from other countries more advanced in their manufacturing industry policy implementation on what has been most successful. As we refine the actions in this ITP an international comparison of New Zealand manufacturing with manufacturing sectors overseas to highlight areas of strength and where New Zealand is behind is proposed.

NZTE and MFAT could provide **manufacturing specific global insights** from their network of offshore embassies and commissions including identifying and supporting opportunities for advanced manufacturing. These can include insights of emerging supply chain resilience initiatives offshore including assessments of the implications and opportunities from re-shoring, near-shoring and friend-shoring in manufacturing. KEA can connect New Zealand manufacturers with our leading expat manufacturing community offshore.⁸² These global initiatives should be developed and implemented in a manner consistent with Trade for All principles so as to support a more diverse and inclusive globally-connected advanced manufacturing sector.

Industry will be a key driver and participant in all these initiatives and could supplement this with sharing experience of successful global partnerships with offshore technology centres, universities and customers (public and private).

Draft Action Plan – Initiative 19: Trade missions, strategic relationships, and improved global insights

Initiative: Enhance manufacturing's global connections through a pipeline of trade missions, prioritised strategic relationships with key countries based on manufacturing, manufacturing-specific global-insights and support from New Zealand's network of overseas posts, leveraging the KEA network of leading manufactures offshore, and industry-led sharing of successful global partnerships.

Outcome sought: To enhance and foster global connections and opportunities.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

⁸² <https://keanewzealand.com/about-us/>

Understanding other mechanisms to enhance manufacturing global connections

Connecting with manufacturing overseas provides a cross-fertilisation of ideas from offshore as well as upskilling for domestic workers.

For some of our manufacturing firms this occurs by owning a subsidiary offshore or being part of an international network. For other manufacturing firms, this might occur through highly skilled employees that have gained experience from overseas. For others, this may be through industry study tours overseas to see best-practice offshore.

These benefits from global connections for manufacturing firms were discussed in ITP working groups and appear to warrant deeper analysis and understanding. This could inform other potential initiatives to support and leverage global connections for our manufacturing firms.

Draft Action Plan – Initiative 20: Study of the importance of global connections for New Zealand manufacturing

Initiative: A study of how global connections, including immigration, investment, and offshore experience assists the skill development of workers and competitiveness of New Zealand manufacturing firms.

Outcome sought: The purpose of this study is to further understand the benefits from global connections for New Zealand manufacturers and potential initiatives to enhance those connections.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Scaling international study tours for Advanced Manufacturing

One area that could be refined and scaled in the near-term would be to scale up international study tours for advanced manufacturing. Building on the domestic focus of the I4DN's Network Site Visits, there is an opportunity to scale-up a programme of study tours, site visits and case studies of international manufacturers using advanced technologies and processes and leading sustainable manufacturing.

This initiative could be modelled on the NZTE "Better by Design" programme but co-developed for manufacturing and scaled by NZTE, Callaghan Innovation, the Manufacturers Network and other relevant stakeholders.

The purpose of these overseas missions is to see what great manufacturing looks like internationally across a range of firms with different levels of technology adoption and understand their transition, lessons, reflections and benefits.

Draft Action Plan – Initiative 21: Global advanced manufacturing Study Tours

Initiative: Develop and then scale a programme of global advanced manufacturing study tours focused on a range of successful offshore manufacturing firms.

Outcome sought: Gain insights and experience from offshore manufacturers that have adopted advanced technologies and processes and sustainable practices.

For further detail, see the Draft Action Plan in Appendix One which contains tangible actions and measures of success over three years.

Next steps

Together, the Steering Group and Working Groups have developed the Draft Vision and Draft Action Plan in this ITP. Members of the Partnership Group have also been consulted.

The next stage involves consultation with the public to test whether the proposed actions are the right ones to accelerate growth and transformation of the sector. This stage will further refine and prioritise the Draft Action Plan.

Following public consultation, revisions will be made based on feedback. The Steering Group will finalise the draft for agreement by Cabinet and release to the public in 2022.

Once finalised, an implementation strategy will be developed to ensure initiatives progress, outcomes are measured, and adjustments made. All the actions identified for future growth will require active participation by all parties to implement them.

DRAFT

Appendix One: Draft Action Plan

		2022-2023 Deliverables	2023-2024 Deliverables	2024/2025+ Deliverables
Priority 1. Improving perceptions of manufacturing				
<p>Initiative 1</p> <p>Improve the perception and profile of manufacturing</p>	<p>Initiative: Government, business and unions develop and implement a strategy that improves the perception and profile of New Zealand manufacturing for multiple domestic and global audiences. This will include actively exploring Māori perspectives on the history, current situation and future of Māori in manufacturing.</p> <p>Outcome sought: Improves the understanding and attractiveness of the sector to potential employees, students, educators, workers, investors, and consumers.</p> <p>Note: this initiative overlaps in part with the Initiative 14</p>	<p>Determine target audiences and co-develop strategies and business cases to improve their perceptions of the manufacturing sector.</p> <p>These strategies will require commissioning research to understand what drives the mismatch between perceptions and realities of different audiences and how best to address them. This will be a benchmark for evaluation of success.</p> <p>Actively explore with iwi Māori partners the iwi Māori history of manufacturing in Aotearoa New Zealand and current and future contribution and potential of Kaupapa Māori businesses and workers.</p> <p>Strategies used by other sectors will be examined such as the use of NZ Story (for the Global Tech Story) and TEC (for the Construction sector worker attraction scheme).</p> <p>NZ Story to create a “Manufacturing Story” within its toolkit – but with a domestic as well as export focus.</p> <p>Once strategies are developed and funded they can be commenced.</p>	<p>Develop and use resources to improve the perception and profile of New Zealand manufacturing for multiple domestic and global audiences.</p> <p>Further work with iwi Māori partners and other business, union, government partners to embed the Māori perspective within and alongside other products under this initiative as well as Initiative 14 (and related skills and training initiatives to attract Māori workers and entrepreneurs to the sector and to inform the design of training programs and resources).</p>	<p>Evaluate the use and impact of the strategies and refine if needed.</p>

Priority 2. Increasing investment to lift productivity and wages				
<p>Initiative 2</p> <p>Demonstrate the value of advanced technologies</p>	<p>Initiative: Create, expand, connect and provide visibility to a range of initiatives across the manufacturing sector that demonstrate the value and benefits of advanced technologies and processes to a wide range of manufacturing businesses. This could include reviewing and potentially adjusting and expanding the Callaghan Industry 4.0 Demonstration Network.</p> <p>Outcome sought: Increase the understanding of the benefits and opportunities provided by advanced technologies and processes.</p>	<p>Identify the range of <i>existing</i> initiatives that demonstrate the value and benefits of advanced technologies and processes.</p> <p>Identify gaps and develop strategies to create new, or expand, initiatives working closely with industry associations and other stakeholders. This should include presenters that make this topic accessible to all.</p> <p>Create platforms to ensure that these initiatives are visible and accessible to manufacturers.</p> <p>Review and potentially adjust and expand the Callaghan Industry 4.0 Demonstration Network.</p> <p>Develop business cases and seek and secure funding.</p>	<p>Implement the creation, expansion, connection and visibility of these initiatives.</p>	<p>Evaluate the use and impact of the initiatives and make adjustments as required.</p>
<p>Initiative 3</p> <p>Company-specific advice on advanced technologies</p>	<p>Initiative: Create, expand, connect and provide visibility of a range of initiatives across the manufacturing sector that assist firms understand how advanced technologies and processes would apply in specific manufacturing businesses. This could include reviewing and potentially adjusting and expanding Callaghan Innovation’s Smart Industry Readiness Index company-specific assessments to increase its reach and effectiveness.</p> <p>Outcome sought: Greater awareness and adoption of advanced</p>	<p>Identify the range of <i>existing</i> initiatives that assist firms understand how advanced technologies and processes would apply in specific manufacturing businesses.</p> <p>Identify gaps and develop strategies to create new, or expand, initiatives working closely with industry associations and other stakeholders.</p> <p>Create platforms to ensure that these initiatives are visible and accessible to manufacturers.</p> <p>Review and potentially adjust and expand Callaghan Innovation’s Smart</p>	<p>Implement the creation, expansion, connection and visibility of these initiatives.</p>	<p>Evaluate the use and impact of the initiatives and make adjustments as required.</p>

	technologies and processes within the manufacturing sector.	Industry Readiness Index company-specific assessments to increase its reach and effectiveness. Develop business cases and seek and secure any funding.		
Initiative 4 Support greater capital investment in advanced technologies	Initiative: Explore and propose options to incentivise and support capital investment in advanced technologies and processes including accelerated depreciation, business growth funds, investment grants and loans. Outcome sought: Increase the number of firms utilising advanced technologies and processes leading, in combination with targeted skills initiatives, to higher-skilled higher-wage jobs.	Complete an assessment of the benefits and costs of instruments to increase capital investment in manufacturing including accelerated depreciation, business growth funds, investment grants and loans. Develop concrete specific proposals.	Seek government approval for the proposals. Begin implementation.	Evaluate the use and impact of the initiatives and make adjustments as required.
Initiative 5 Improve access and visibility to finance & funding opportunities	Initiative: Expand or create a service for manufacturing firms to understand and connect to various financing and funding opportunities (both public and private). Outcome sought: Increase the number of firms utilising advanced technologies and processes leading, in combination with targeted skills initiatives, to higher-skilled higher-wage jobs.	Explore the best vehicle for this new service. This could be an expansion or modification on existing services (e.g. NZTE investment services) or a bespoke and separate pilot (e.g. MPI's Investment Ready pilot programme that connects primary industry projects with the wider funding and investment community through a commercial manager (The Factory)). Seek and secure funding.	Implement the new service	Evaluate the use and impact of the initiative and make adjustments as required.

Priority 3. Making innovation, R&D and science work for manufacturing				
<p>Initiative 6</p> <p>Map manufacturing support eco-systems</p>	<p>Initiative: Develop a resource that maps the current eco-systems that exist to support manufacturers. This can be tested through consultation and be in a format that provides visibility and ease of access for manufacturers.</p> <p>Outcome sought: To improve visibility across the sector of current eco-systems of support and improve connections and coordination.</p>	<p>Complete a map of the current eco-systems of support for manufacturing – to be tested through consultation.</p> <p>Develop a tool to make this eco-system map visible and easily accessible for manufacturers.</p>	<p>Implement the new service.</p>	<p>Evaluate the use and impact of the map and make adjustments as required.</p>
<p>Initiative 7</p> <p>Strengthen manufacturing ecosystems</p>	<p>Initiative: Deepen or establish manufacturing ecosystems based around appropriate clusters.</p> <p>Outcome sought: Obtain innovation and 'scale' benefits from healthy manufacturing ecosystems.</p>	<p>Develop a business case for preferred manufacturing ecosystem models including scope, cluster focus, location, medium (physical/virtual), and funding arrangements.</p> <p>Identify and secure funding.</p>	<p>Implement preferred model, as a pilot.</p>	<p>Evaluate the use and impact of the pilot and make adjustments as required.</p>
<p>Initiative 8</p> <p>Aotearoa New Zealand Centre for Manufacturing Excellence</p>	<p>Initiative: Prepare a Business Case for a potential Aotearoa New Zealand Centre for Manufacturing Excellence.</p> <p>Outcome sought: To make the future possibilities of manufacturing tangible and accessible to manufacturers while providing a focal point for ecosystems and a range of other ITP initiatives.</p>	<p>Conduct a global review of successful Manufacturing Technology Centres overseas to inform decisions on the potential scope, focus, location, medium (physical/virtual), and funding arrangements for an <i>Aotearoa New Zealand Centre for Manufacturing Excellence</i>.</p> <p>Seek industry views on a proposed model.</p> <p>If warranted, prepare a business case for an <i>Aotearoa New Zealand Manufacturing Centre for Manufacturing Excellence</i>.</p>	<p>Seek funding for this long-term investment in the manufacturing sector.</p> <p>Plan and commence implementation of this multi-year initiative.</p>	<p>Review progress and continue implementation of this multi-year initiative.</p>

<p>Initiative 9</p> <p>Manufacturing perspectives feature in the current review of the research, science and innovation sectors</p>	<p>Initiative: The manufacturing sector contributes towards the Te Ara Paerangi - Future Pathways review of the research, science and innovation sector.</p> <p>Outcome Sought: To ensure the future of the research, science and innovation sector reflects the needs of the manufacturing sector.</p>	<p>Ensure coherence between ITP recommendations and manufacturing industry inputs into the Te Ara Paerangi - Future Pathways review.</p> <p>Workshop with sector leaders and government officials to discuss ongoing engagement opportunities.</p>	<p>Ensure coherence between ITP recommendations the Te Ara Paerangi - Future Pathways review/outcomes.</p>	<p>Ensure coherence between ITP recommendations the Te Ara Paerangi - Future Pathways review/outcomes.</p>
<p>Initiative 10</p> <p>Link science, research and innovation to commercial outcomes</p>	<p>Initiative: Grow the visibility of the New Zealand Product Accelerator, and any similar initiatives, to a wider range of manufacturers. Review and potentially adjust and expand these initiatives.</p> <p>Outcome Sought: To ensure that science research expertise is connected to solving commercial challenges for manufacturing.</p>	<p>Complete a review and provide visibility of all initiatives designed to make science, research and development support commercial manufacturing outcomes.</p> <p>Review and potentially adjust and expand these initiatives, including the New Zealand Product Accelerator.</p> <p>Seek and secure funding.</p>	<p>Implement the initiatives</p>	<p>Evaluate the use and impact of these initiatives and make adjustments as required</p>
<p>Priority 4. Attract and develop a diverse high-skilled high-wage workforce</p>				
<p>Initiative 11</p> <p>Skills system map and long-term workforce plan housed on an online workforce information platform</p>	<p>Initiative: Develop an online workforce information platform that houses the skills mapping exercise and long-term workforce plan. The platform will also provide and regularly update data on national and regional skills and workforce gaps and surpluses, including links to reports and insights developed by the Regional Skills Leadership Groups. This will be similar to the Workforce Information Platform that was developed in 2021 for the Construction and Infrastructure sectors.</p>	<p>Step one: skills system mapping Engage a facilitator to work with the manufacturing sector (employers and workers) and the vocational education system to develop the skills system map.</p> <p>Step two: Long-term workforce plan Led by Hanga-Aro-Rau in collaboration with industry, engage with employers and workers to develop the long-term workforce plan.</p> <p>Step three: Develop an online workforce information platform</p>	<p>Develop workforce information platform (funding dependent).</p> <p>Ongoing engagement with employers and workers to ensure the workforce information plan contains information relevant to them.</p>	<p>Review the skills system map and long-term workforce plan to ensure it remains relevant to the sector.</p> <p>Ongoing management of the online tool (funding dependent).</p>

	<p>Outcome sought: The sector has the information it needs to plan for its future skills and workforce needs and ensure the benefits from investment in advanced technologies and the shift to a net zero -carbon future are gained across all levels of the sector.</p>	<p>Commission a business case for developing an online information tool and seek and secure funding.</p>		
<p>Initiative 12 Individual Development Plans</p>	<p>Initiative: Develop guidance for Individual Development Plans across all levels of the sector (including lifting leadership and management capability), in collaboration with the Hanga-Aro-Rau and Te Pukenga. Develop mechanisms for apprentices and workers to be able to develop by working in different manufacturing firms through secondments and placements.</p> <p>Outcome sought: Upskilling all workers with pathways for achieving their career goals and ensuring that manufacturers maximise productivity, skills and wage gains from advanced technologies and processes.</p>	<p>Review existing guidance on developing Individual Development Plans and discuss with workers and employers to understand what would be most useful for them</p> <p>Connect with the Tertiary Education Commission's review of the Career System Strategy</p>	<p>Develop guidance specific to the manufacturing sector (at all levels), in collaboration with Hanga-Aro-Rau and Te Pukenga.</p>	<p>Ongoing implementation and refinement.</p>

<p>Initiative 13</p> <p>Improve digital and foundational skills</p>	<p>Initiative: In partnership with Hanga-Aro-Rau support the digital skill shift pilot programme as well as foundational skills training to increase their reach and effectiveness. Ensure that training is also available for factory floor leaders as well as business owners, directors and senior managers so that they support uptake of the training on offer to all workers.</p> <p>Outcome sought: Increase the skills of workers to ensure they are suitably trained to utilise new technology implemented at their workplace.</p>	<p>Ensure support for existing initiatives and implement any recommended expansion and amendments</p>	<p>Operationalise programme.</p>	<p>Review programme and implement any further recommended amendments.</p>
<p>Initiative 14</p> <p>Attraction Strategy increasing diversity</p>	<p>Initiative: Led by the manufacturing sector, but in collaboration with the Tertiary Education Commission, Ministry of Education, and Hanga-Aro-Rau, develop a comprehensive manufacturing attraction strategy for young people, students at all education levels (including university), educators, women and workers.</p> <p>The attraction strategy would need to be complemented with a suite of initiatives developed by business, workers and government to attract a larger more diverse workforce.</p>	<p>Commissioning research to understand what drives the mismatch between perceptions and realities of careers in manufacturing and how best to address them. This will be a benchmark for evaluation of success.</p> <p>Strategies used by other sectors will be examined including TEC involvement with the Construction sector. Once strategies are developed and funded they can be commenced.</p> <p>Consider and seek to implement to suite of other initiatives to attract a larger diverse workforce.</p>	<p>Implement the strategy in collaboration with the Tertiary Education Commission (Careers Strategy) and building on the work improving the perception of manufacturing (Initiative 1)</p>	<p>Ongoing implementation, review and refinement.</p>

<p>Initiative 14 Attraction Strategy (Continued)</p>	<p>Deepening understanding of Māori participation in the manufacturing sector to inform how we might target initiatives in the ITP, or identify additional actions, to support and encourage Māori success in manufacturing.</p> <p>Outcome sought: Increased number and diversity of workers in manufacturing.</p> <p>Note: this initiative overlaps in part with the actions under Initiative 1 to improve the perception and profile of New Zealand manufacturing.</p>	<p>Undertake deeper research to understand the Māori participation in the manufacturing sector, including details of employment (skills, subsectors, regions) and businesses (presence and performance) to inform ITP initiatives to support Māori success, building on Te Puni Kokiri analysis.</p> <p>Reviewing initiatives to attract young people at primary and secondary school level to manufacturing (e.g. Wonder Project, Fab Lab, review of curriculum and hard-tech and digital courses at schools, industry-led programs with schools, and efforts to raise awareness with school girls).</p> <p>Youth focused visits to see and experience manufacturing, linked with other initiatives such as the Centre of Excellence.</p> <p>Seek funding as required.</p>		
<p>Priority 5. Create a leading sustainable circular and net-zero emissions sector</p>				
<p>Initiative 15 Map emissions and waste profile</p>	<p>Initiative: Comprehensive investigation into the emissions and waste profile of New Zealand’s manufacturing sector as well as opportunities and barriers to decreasing waste and emissions.</p> <p>Outcome sought: Understand at a granular level the manufacturing sector’s emissions and waste profiles, and opportunities and barriers for reduction to inform ITP actions and initiatives.</p>	<p>Conduct a comprehensive investigation into the emissions and waste profile of the manufacturing sector – working across government, business and industry associations.</p> <p>Identify opportunities and barriers to decreasing waste and emissions.</p>	<p>Use this information to develop and inform concrete ITP actions.</p>	<p>Review and update the information.</p>

<p>Initiative 16</p> <p>Embed circular economy principles in the manufacturing sector</p>	<p>Initiative: Identify and implement actions to embed circular economy principles in the manufacturing sector, including design-led solutions, waste-minimisation and recycling. These could include:</p> <p>Placing circular economy principles (including design-led solutions, waste-minimisation and recycling) as key and accountable objectives of other ITP initiatives including the <i>Aotearoa New Zealand Centre for Manufacturing Excellence</i> (Initiative 8), support to deepen or establish manufacturing eco-systems and clusters (Initiative 7), and policies to support innovation and advanced technologies and processes (Initiatives 1-10).</p> <p>Placing manufacturing at the centre of eco-parks (Auckland Eco-Park and Nga Wha Eco Park).</p> <p>Consider mechanisms to support design-led waste minimisation in manufacturing.</p> <p>Consider expansion of initiatives such as the Plastics Innovation Fund to other manufacturing sub-sectors.</p> <p>Outcome sought: To implement a range of actions that embed circular economy principles in the manufacturing sector, including design-led solutions, waste-minimisation and recycling.</p>	<p>Identify, assess and prioritise actions to embed circular economy principles in the manufacturing sector – including those listed in the initiative.</p> <p>Seek sector agreement on actions to implement.</p> <p>Seek required funding.</p>	<p>Based on findings from year one, implement identified actions.</p>	<p>Evaluate the actions and make adjustments as needed.</p>
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<p>Initiative 17</p> <p>Net-zero emissions manufacturing</p>	<p>Initiative: Identify and implement actions needed for New Zealand to become a world-leading test-bed for net-zero carbon manufacturing. This could include:</p> <p>Creation of a virtual hub and easy access online tool designed to collate and make information on existing funds and support available for manufacturing firms' transitions to sustainable, circular and low-emissions manufacturing</p> <p>Create the right incentives coupled with support for the industry to become a test-bed for net-zero carbon manufacturing, including greater energy efficiency and reliance on renewable energy</p> <p>Placing net-zero carbon manufacturing at the centre of innovation eco-systems, the <i>Aotearoa New Zealand Centre for Manufacturing Excellence</i>, and policies to support innovation and advanced technologies and processes (Initiatives 1-10)</p> <p>Consider how the New Zealand Green Investment Fund might be used to support the manufacturing sector</p> <p>Mechanisms to help SMEs measure their emissions.</p> <p>Outcome sought: To implement a range of actions to enable the New Zealand to become a test-bed for net-zero emissions manufacturing.</p>	<p>Identify, assess and prioritise actions to achieve net-zero carbon manufacturing – including those listed in the initiative.</p> <p>Seek sector agreement on actions to implement.</p> <p>Seek required funding to commence pilot programs.</p>	<p>Based on findings from year one, implement identified actions.</p>	<p>Evaluate the actions and make adjustments as needed.</p>
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<p>Initiative 18</p> <p>Connect with global leaders in sustainable manufacturing</p>	<p>Initiative: Understand and connect with global leaders in sustainable manufacturing from business and government.</p> <p>Global scan of best practice including identifying leaders in sustainable manufacturing. Once best practice and leaders have been identified, work on connecting them with domestic manufacturers and policy makers to discuss and demonstrate what good looks like.</p> <p>Seek from NZTE, Callaghan and MFAT an understanding of manufacturing sustainability trends and policies in different countries.</p> <p>Outcome sought: New Zealand manufacturers and policy makers understand and connect with global best-practice examples of sustainable manufacturing to inspire and influence future actions.</p>	<p>Complete a global scan of best practice including identifying leaders in sustainable manufacturing.</p> <p>Develop a plan, including potential business case, for connecting leaders with domestic manufacturers and policy makers.</p> <p>Leverage NZ agencies able to provide global insights on manufacturing sustainability trends and policies.</p>	<p>Series of webinars and potential visits with global leaders.</p>	
<p>Priority 5. Enhance global connectivity and opportunities</p>				
<p>Initiative 19</p> <p>Trade missions, strategic relationships, and improved global insights</p>	<p>Initiative: Enhance manufacturing's global connections through a pipeline of trade missions, prioritised strategic relationships with key countries based on manufacturing, manufacturing-specific global-insights and support from New Zealand's network of overseas posts, leveraging the KEA network of leading manufacturers offshore, and industry-led sharing of successful global partnerships.</p>	<p>Establish pipeline of trade missions, including adding a manufacturing voice to upcoming Prime Minister-led Trade Missions.</p> <p>Commission network of posts to provide insights on key aspects of manufacturing.</p>	<p>Implement all actions in the initiative.</p>	<p>Review effectiveness.</p>

<p>Initiative 19</p> <p>Trade missions, strategic relationships, and improved global insights</p> <p>(Continued)</p>	<p>Outcome sought: To enhance and foster global connections and opportunities</p>	<p>An international comparison of New Zealand manufacturing with manufacturing sectors overseas to highlight areas of strength and also where New Zealand is behind. This would include study of other countries more advanced in their manufacturing industry policy implementation on what has been most successful.</p> <p>Establish which countries would be the best and most strategic for creating relationships with. For instance, manufacturing could be a focus at the next Australia New Zealand Leadership Forum.</p>		
<p>Initiative 20</p> <p>Study of the importance of global connections for New Zealand manufacturing</p>	<p>Initiative: A study of how global connections, including immigration, investment, and offshore experience assists the skill development of workers and competitiveness of New Zealand manufacturing firms.</p> <p>Outcome sought: The purpose of this study is to understand the benefits from global connections for New Zealand manufacturers and potential initiatives to enhance those connections.</p>	<p>Scope, commission and complete the report.</p>	<p>Assess how the findings might inform ITP initiatives going forwards.</p>	
<p>Initiative 21</p> <p>Global advanced manufacturing Study Tours</p>	<p>Initiative: Develop and then scale a programme of global advanced manufacturing study tours focused on a range of successful offshore manufacturing firms.</p>	<p>Create a business case for the program. Seek funding.</p>	<p>Run a first series of programs as a pilot.</p>	<p>Review effectiveness and expand if warranted.</p>

Initiative 21 Global advanced manufacturing Study Tours (Continued)	Outcome sought: Gain insights and experience from offshore manufacturers that have adopted advanced technologies and processes and sustainable practices.			
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Appendix Two: Steering Group, Working Group, Partnership Group Membership

Advanced Manufacturing Steering Group			
Rachel Mackintosh (Co-Chair: Union)	Vice-President – New Zealand Council of Trade Unions Te Kauae Kaimahi (NZCTU) and Assistant National Secretary – E tū		
Brett O’Riley (Co-Chair: Business)	Chief Executive – Employers & Manufacturers Association		
Paul Stocks (Co-Chair: Government)	Deputy Chief Executive, Labour, Science and Enterprise – Ministry of Business, Innovation and Employment.		
Rachel Barker	Chief Executive – Plastics New Zealand		
Sue Bradley	General Manager – Beca		
Dr Troy Coyle	Chief Executive – HERA and Co-Chair – Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council		
Renata Hakiwai	Managing Director – HTK Group Ltd and Co-Chair – Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council		
Ces Herring	Union delegate – First Union		
Edwin Ikani	Union delegate – E tū		
Andy Niccol	General Manager – Fisher & Paykel Healthcare		
Paul Ravlich	Chief Executive – Siemens New Zealand		
Lavina Rickard	Team leader – Sanford Limited and Deputy Convenor – E tū’s Food and Manufacturing Industry Council		
Mark Taylor	Director – New Zealand Product Accelerator		
Advanced Manufacturing Working Groups			
Grow innovation and investment	Attract and develop a skilled workforce	Create a leading sustainable and low-emissions sector	Enhance global connectivity and opportunities
Sue Bradley Beca	Lavina Rickard Sanford Ltd	Rachel Barker Plastics New Zealand	Paul Ravlich Siemens New Zealand
Dr Troy Coyle, Heavy Engineering Research Association; Hanga-Aro-Rau Manufacturing, Engineering & Logistics Workforce Development Council	Renata Hakiwai HTK Group Ltd; Hanga-Aro-Rau Manufacturing, Engineering & Logistics Workforce Development Council	Dr Troy Coyle Heavy Engineering Research Association; Hanga-Aro-Rau Manufacturing, Engineering & Logistics Workforce Development Council	Andy Niccol Fisher and Paykel Healthcare
Sarah Ramsay United Machinists	Dieter Adam The Manufacturers Network	Mike Burrell Sustainable Business Council	Catherine Beard Export NZ
Daniel Peach NZ Steel	Dion Orbell Buckley Systems	Aidan Hill, Autex Industries	Jim McColl, Southern Spars
Imche Fourie Outset Ventures	Pam Roa Longveld	Kirstine Hulse Bremworth	Michael Sievwright Trimax Mowing Systems
David Turner Sequal	Nick Henry NZ CTU	Scott Morrison Fletcher Steel	Nick Coubray Howick Ltd
Nikk King NZ Controls Ltd	Sam Huggard E tū	Richard Shirtcliffe Noho	Ed Miller, First Union
Steve Wilson Talbot Technologies	Gemma Goldsmith Tertiary Education Commission	Aubrey Wilkinson Rail & Maritime Transport Union	Chris Flatt New Zealand Dairy Workers Union
Annie Newman E tū	Richard Laverty Te Puni Kōkiri	Jen Natoli E tū	Dan Taylor New Zealand Trade and Enterprise
Ross Teppett NZ Council of Trade Unions	Phil Wise Ministry of Education	Roderick Boys Ministry for the Environment	Sam O’Connor Ministry of Foreign Affairs and Trade
Simon Wakeman MBIE	Amanda Wheeler Competenz	Francesca Eggleton MBIE	
Richard Quin Callaghan Innovation			
Programme Director			
Hunter Nottage	Director, Economic Development and Transitions - Ministry of Business, Innovation and Employment		

Partnership Group: Alan McDonald (EMA), Barry Robinson (Maintenance and Engineers Society of NZ), Barry Williams (Douglas Pharmaceuticals), Catherine Taiapa (Armatec), Ceri Macleod (SOREC), Ceri Rowland (Douglas Pharmaceuticals), Cloe Vining (Waste Minimisation – Porirua City Council), George Hollingsworth (NZCTU), James Neale (Maintenance and Engineers Society of NZ), John Hamilton (Canterbury Employers Chamber of Commerce), John Lynch (Inex), Jon Tanner (Wood Processing and Manufacturers

Association), Malcom Fraser (I4 Accelerator), Mark Malpass (Steel and Tube), Mat Rowe (Outset Ventures), Mathew Vandy (Competenz), Mohammed Hikmet (Ohmio), Nathan Berg (University of Otago), Nick Collins (Metals NZ), Norman Evans (SOREC), Olaf Diegel (The University of Auckland), Oliver Hill (Hewlett-Packard), Pam Ford (Auckland NZ), Richard Wagstaff (NZCTU), Rick Osborne (Metals NZ), Ruth White (Greater East Tamaki Business Association), Samantha McNaughton (Competenz), Scott Fisher (Offsite NZ), Sean McElroy (Gerard Roofs), Stephen Macaulay (Wood Processing and Manufacturers Association), Tim Lynch (Monocrane), and Warwick Downing (RAM 3D).

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