Te Uru Rākau New Zealand Forest Service

Te Kāwanatanga o Aotearoa
New Zealand Government

Te Ara Whakahou – Ahumahi Ngahere

Draft Industry Transformation Plan

Creating a high-value and resilient forestry and wood processing sector to underpin our low emissions future.

August 2022

Disclaimer

While every effort has been made to ensure the information in this publication is accurate, the Ministry for Primary Industries does not accept any responsibility or liability for any error of fact, omission, interpretation or opinion that may be present, nor for the consequences of any decisions based on this information.

This publication is also available on the Ministry for Primary Industries website at www.mpi.govt.nz/forestry/

Consultation process

We'd like your feedback

We're seeking feedback on this draft Forestry and Wood processing Industry Transformation Plan. We'd like your feedback on the overall document, including:

1. How well this Plan captures the key challenges and opportunities faced by the sector
2. Your views on our proposed vision for the future of the sector and the key objectives
3. The proposed actions to help transform the sector

We want to hear from anyone with an interest in the forestry and wood processing sector. This includes Māori, sector associations, workers, businesses, investors, landowners and farmers.

We'll use your feedback to inform the final Plan that we'll publish in late 2022. This Plan is being developed in partnership with Māori, government, industry and unions.

The draft Plan proposes actions to transform the sector

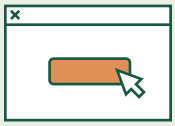
This draft Plan includes a proposed suite of actions to transform the sector over time, and to maximise the value the forestry and wood processing sector provides to New Zealand.

Once confirmed, an implementation roadmap will be developed. Some actions are already underway, some of the proposed actions are nearly ready for investment, and others require more work before they can start.

We're looking for opportunities to partner with Māori, industry, workers and key stakeholders to deliver these actions and others. We're also looking for ways the sector can lead actions and drive transformation.

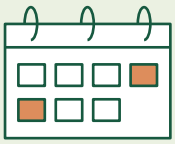
How to give us feedback

This draft Plan is out for public consultation between 19 August and 30 September. You can give us feedback by:



Submitting your feedback online
Fill out our online survey on our website (link below).

Emailing us your feedback
Email your submission to forestrywoodprocessingitp@mpi.govt.nz.



Attending one of our Road Show workshops
We'll be running workshops across the country to get feedback on the draft Plan. You can find information on when and where we will be running workshops on our website.

Our website has more information on this draft Plan and the consultation process

You can find more information on this Plan and the consultation process on our website www.mpi.govt.nz/forestry-industry-transformation-plan

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Foreword from the Minister of Forestry

Kia ora koutou

As Minister of Forestry, I am very proud to release the first draft Forestry and Wood Processing Industry Transformation Plan (the plan) for public consultation.

The future of forestry is bright, so it's important now more than ever that we maximise our opportunities to play a key role in our bioeconomy, and in growing our people and regions. The Plan sets out the pathway for unlocking the potential of New Zealand's forestry and wood processing sector to grow our economy, build resilience, drive innovation, and respond to climate change.

This Plan proposes initiatives aimed at increasing our onshore wood processing capacity and capability, maximising the value of our wood, and driving innovation through developing new industries, products, technologies and markets – both domestic and international.

New Zealand currently exports over 60 percent of harvested wood as logs for other countries to process and add value. In contrast, the 15 percent exported as value-added wood products return over 40 percent of total export revenue. This highlights that one of the main transformations of the Plan needs to be expanding our capability and capacity to process onshore more of the logs we harvest here. This will lift the quality of the timber passing through our ports, and boost our wood and wood products up the value chain.

Government is also investing in developing New Zealand's domestic woody biomass industry. Woody residues can power our transport, make plastics and pharmaceuticals, and replace high-emission materials in our buildings. Almost anything made from fossil fuels today, can be made from wood tomorrow.

Forestry and wood processing is operating in a challenging and dynamic environment. As with our other primary industries, the sector is dealing with the ongoing impacts and costs of COVID-19 on people, production and supply chains. Time and time again, this sector has demonstrated the resilience, strength and expertise needed to meet these challenges. We can always do better, which is why my vision for the industry is for us to be world leading in the way we use our forests and their products.

Through building partnerships between Government, businesses, organisations, and local communities and Māori, we can keep moving from a commodity resource producer to a high-value, high-tech, low-emissions economy. Te Uru Rākau – New Zealand Forest Service will be there to support us each step of the way.

While forestry and wood processing has been a foundation of New Zealand's economic, environmental and employment growth for generations, we need to keep doing things differently, lifting performance and our global and domestic brand, and being aspirational and innovative in the way we work.

I encourage everyone with an interest in forestry and wood processing to make their submission. Through your feedback, we can ensure the right pathways and actions are in place to make our sector and industries even stronger for the benefit of all New Zealanders.

Hon Stuart Nash
Minister of Forestry

Foreword from the Chair of the Industry Transformation Plan Advisory Group

Kororia nui ki te runga rawa ko ia te tīmatanga me te whakamutunga o ngā mea katoa. Rātou kua whetūrangitia mihia, tangihia, huri noa ki ngā mata korokoro, mata kuikui e hoea ana te waka nei, e hoe, e hoe, hoea rā! Te whakawhanake i te whenua me ngā rawa o Tāne te kaupapa e whārikingia kei mua i a tātou, he wero ki a tātou, kia mau, kia mau, kia ita!

The New Zealand forestry and wood processing sector is the best positioned of all industries in New Zealand to take advantage of the opportunities climate change presents, such as producing higher value products in New Zealand, supporting regional communities, and creating high paying sustainable employment. The forestry and wood processing sector is the sector that will underpin New Zealand's low-emissions economy.

We have the economic, environmental, social and cultural credentials. We must act, **Now!** Building on our current platform and transforming our sector to be even better than it is now is both a challenge and a wonderful opportunity.

This Forestry and Wood Processing Industry Transformation Plan has been developed though a far reaching and exhaustive process that has connected with an extensive group of people who have shared their ideas openly and willingly. We have welcomed everyone's input, including those representing Te Ao Māori, foresters, wood processors, wood marketers, environmentalists, government officials, industry consultants or union representatives. The diverse views have come together in a collaborative way to produce this draft Plan.

The development of this Plan has required a lot of goodwill from a lot of people. As we finalise and implement this Plan, we will leverage the relationships that have developed.

A transformation of the scale and size that we are embarking on will create a once in a generation opportunity that will benefit our people, our industry and indeed our country. It will require all of us to continue to challenge and test our ideas but more importantly to work together to take advantage of the transformational opportunities before us.

We already have great examples of world-class forests, world-class wood processing and world-class wood products. There is much more that we can do. The sector has a long track record of Government and private investors working alongside each other. If the Government didn't establish the first large scale plantations in New Zealand, we would not be where we are today. We must build on this partnership into the future.

We look forward to hearing your views on this draft Plan.

My thanks and gratitude to all who have contributed to this draft Plan, and in particular to all members of the Advisory Group and the Te Uru Rākau – New Zealand Forest Service officials.

Lees Seymour
Independent Chair

Forestry and Wood Processing Industry Transformation Plan Advisory Group

Executive summary

This draft Industry Transformation Plan (the Plan) is a consultation document that proposes a vision and actions to transform the forestry and wood processing sector. The aim of this transformation is to maximise the value the sector generates for New Zealand.

Our forests are a vast resource that could produce significantly greater value for New Zealand

Forests are New Zealand's largest renewable resource and are vital in our move toward a more circular, low-emissions economy. The materials, energy and wood products the sector produces are at the heart of the emerging bioeconomy.

The forestry and wood processing sector is a key contributor to the New Zealand economy and society. In 2021, the sector contributed $6.7 billion in export earnings and employed between 35,000 and 40,000 people in wood production, processing, and wider support industries. The diagram on page 10 shows a summary of the benefits the sector provides.

Over the last decade the number of logs harvested has doubled, while the capacity for processing wood domestically has stayed the same. This has led to a significant growth in the number of logs exported.

With its vast forestry resources New Zealand can be a world leading producer and exporter of high-value wood-fibre products. We need to process more wood fibre onshore and increase the production of higher-value wood products.

What we can make from wood, and the demand for wood products, is expanding

New technologies are changing what we can produce from wood fibre. Wood can be turned into engineered wood products to build tomorrow's high-rise buildings, replacing higher-emissions materials: biofuels can replace coal and fuel planes, ships, and cars; and advanced biochemicals and bioplastics can produce low carbon materials and chemicals.

There are strong export growth opportunities. As many countries seek to meet their climate change commitments, governments and industries are increasingly looking for sustainable low-emissions alternatives to replace materials derived from fossil-fuels. Global demand for sustainable wood fibre is forecast to quadruple by 2050 as countries seek to use wood and woody biomass to decarbonise their economies.

Nutraceuticals extracted from radiata pine bark by ENZO at Paeroa.

Priorities for industry transformation

The key aim of this Plan is for New Zealand to process more wood onshore and to use woody residues to grow the forest-based bioeconomy. Scaling up and modernising our wood processing capacity will require significant co-investment from industry and Government, improving our investment environment.

We need to strengthen the sector's long-term sustainability and resilience by diversifying our productive forests and using world-leading science and innovation. These developments will build our resilience to a changing climate, and increase the range of products we offer and markets we reach.

Strengthening social licence will be a key enabler of future growth. The sector needs to raise awareness of the benefits it provides and ensure the benefits of growth are distributed to workers, regional communities and Māori.

Implementing this Plan has the potential to significantly boost New Zealand's economic development, support reductions in emissions, and create high paying and decent jobs in the regions.

Our vision for industry transformation is summarised on the next page. The Plan identifies four priority areas, each with key objectives and supporting actions.

Transformation will require strong partnership

To achieve this vision, we need to make investing in the sector more appealing, create new products and solutions, and develop markets domestically and internationally.

Transformation will require Government, Māori, Industry, and the workforce to work together and to form new partnerships across and beyond existing supply chains.

As we finalise the Plan, we propose that a formal ITP partnership approach be established with key stakeholders and partners in the sector to support its implementation and the delivery of key actions going forward.

We will be working with stakeholders and partners during the consultation process to understand how this partnership can best work.

Our vision for industry transformation

Vision

The forestry and wood processing sector generates more value for New Zealand, is a key pillar of our regional communities, and underpins New Zealand's low-emissions economy.

Key change

Process more logs and residues onshore to reduce our emissions, increase our production of value-added wood products, and fuel the growing bioeconomy.

Priority areas and key objectives

Growing sustainable forests for our future

1 Improving the productivity of our forests

2 Diversify our productive forests to build sector resilience

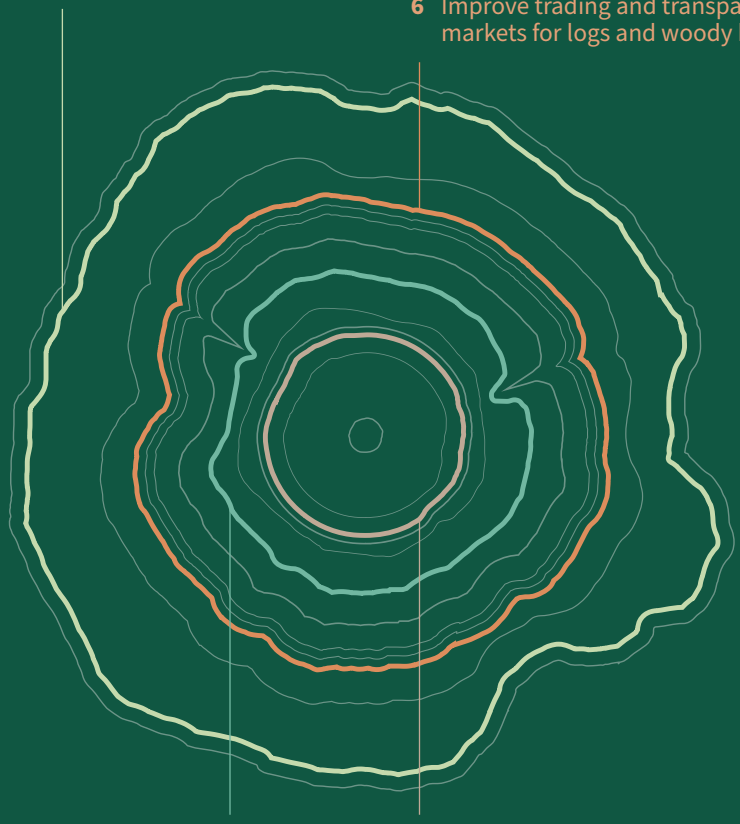
3 Increase use of woody biomass to produce high-value products and fuels

Modernising and expanding the wood processing sector

4 Grow investment to increase manufacturing of advanced wood-based products for building, biotech and fuels

5 Support sector co-location, collaboration and sustainability

6 Improve trading and transparency of markets for logs and woody biomass



Growing and diversifying domestic and export markets

7 Grow domestic demand for our wood products

8 Grow and diversify export markets

Improving system settings for a thriving sector

9 Support Māori aspirations in the sector

10 Create a strong and collaborative sector

11 Grow and attract the future workforce

12 Drive science and innovation across the sector

13 Provide sector insights to lift performance and innovation

Social, environmental and economic benefits of forestry & wood processing

Emission reductions

Forests absorb carbon, and wood-products store carbon, potentially replacing higher emissions alternatives.

Sustainability

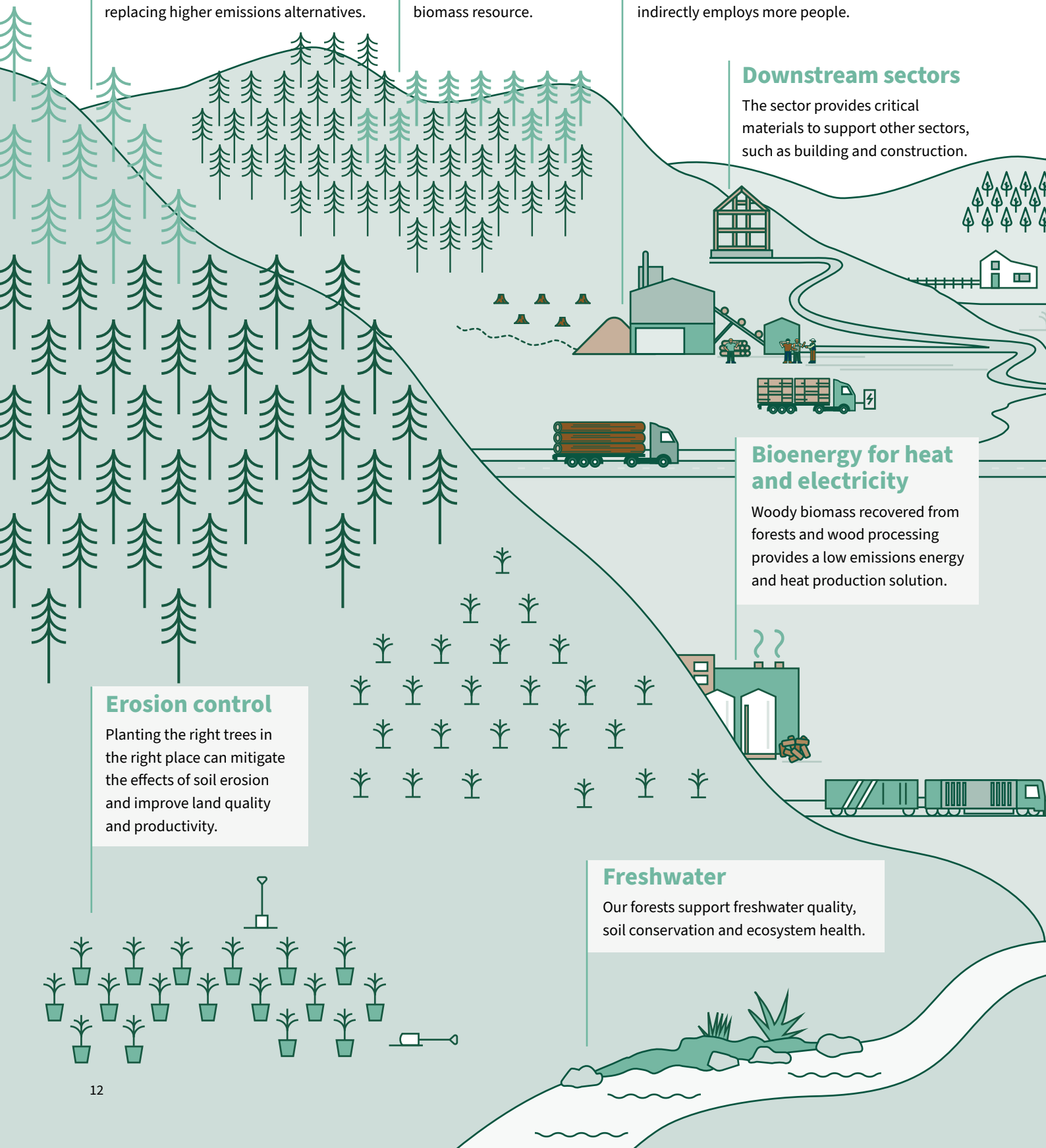
Forestry is New Zealand's largest renewable biomass resource.

Employment

The sector directly employees 40,000 across New Zealand, and indirectly employs more people.

Downstream sectors

The sector provides critical materials to support other sectors, such as building and construction.



Bioenergy for heat and electricity

Woody biomass recovered from forests and wood processing provides a low emissions energy and heat production solution.

Erosion control

Planting the right trees in the right place can mitigate the effects of soil erosion and improve land quality and productivity.

Freshwater

Our forests support freshwater quality, soil conservation and ecosystem health.

Current benefits

Emerging benefits

Supports regional communities

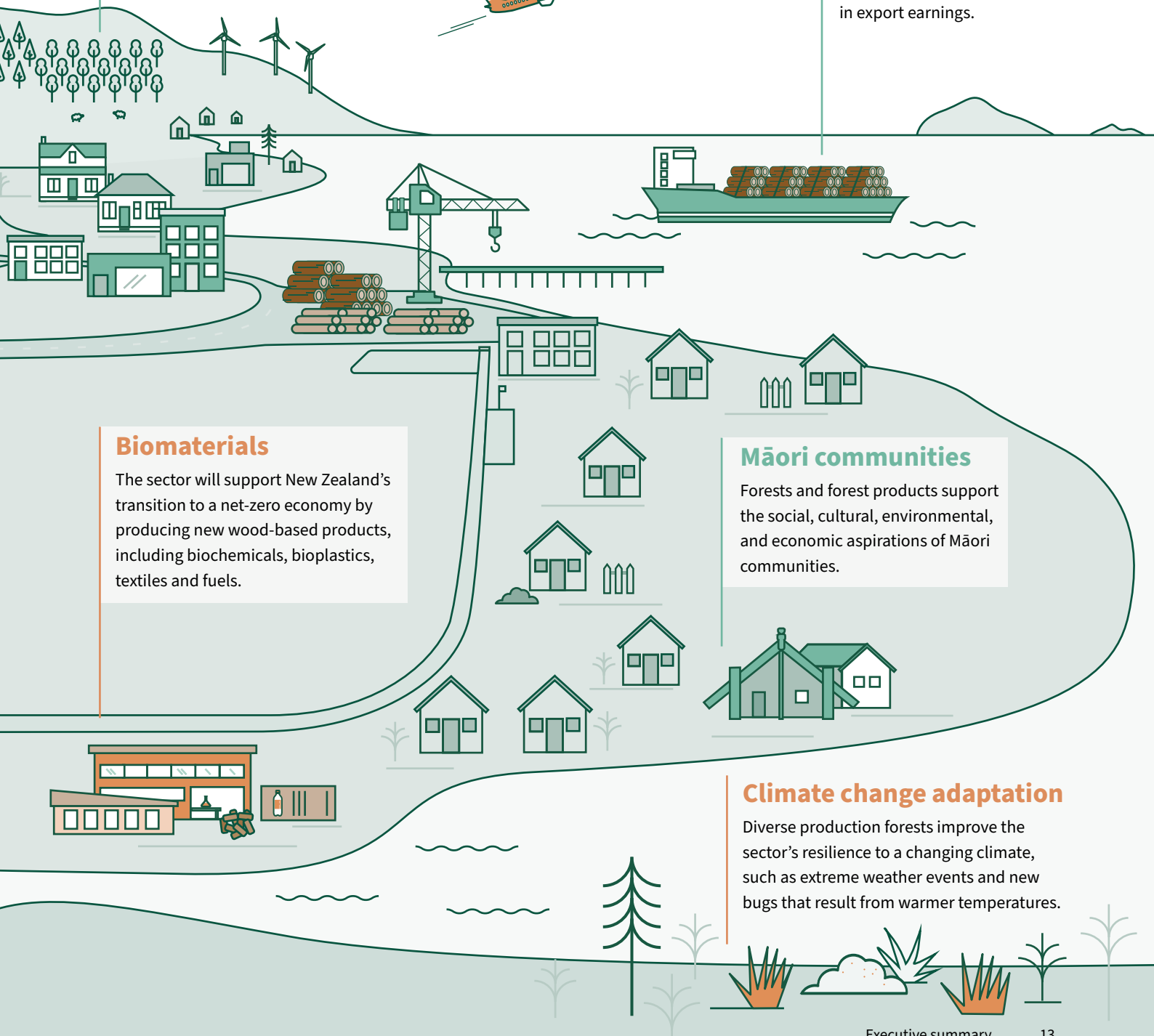
The sector supports regional New Zealand through jobs, places for leisure, and helps farmers diversity income by integrating trees into farms, which also improves soil protection and animal health.

Transport biofuels

Liquid biofuels provide a way to reduce emissions in sectors where electrification is unlikely to be viable, such as aviation and shipping.

Exports

The sector contributes $6–7 billion per annum in export earnings.



Biomaterials

The sector will support New Zealand's transition to a net-zero economy by producing new wood-based products, including biochemicals, bioplastics, textiles and fuels.

Māori communities

Forests and forest products support the social, cultural, environmental, and economic aspirations of Māori communities.

Climate change adaptation

Diverse production forests improve the sector's resilience to a changing climate, such as extreme weather events and new bugs that result from warmer temperatures.

Wider context and scope

Industry transformation plans support the Government's vision for a more productive and sustainable economy

The Government seeks to create a productive, low-emissions, high-wage, and resilient economy. To achieve this vision, the Government has committed to stronger industry policy. This means developing industry transformation plans in partnership with key sectors to catalyse innovation and transformation, and drive outcomes that benefit all New Zealanders.

Each plan sets long-term ambitious goals for transformation and an action plan or 'roadmap' for achieving that vision.

Government and industry are developing industry transformation plans across eight sectors, including the advanced manufacturing, agritech, digital technologies, construction, fisheries, food and beverage, tourism, and the forestry and wood processing sector.

The forestry and wood processing sector was prioritised as it will underpin our low-emissions and productive economy

The forestry and wood processing sector was chosen because it:

- has significant economic potential if it shifts from largely exporting logs to producing high-value wood products
- plays a significant role as New Zealand transitions to a net-zero economy.

New Zealand has a comparative advantage in forestry given how quickly radiata pine trees grow here. This advantage has led New Zealand to be the world's leading softwood exporter, with 60 percent of our logs exported. But we can do more onshore with our wood fibre.

The sector has great potential to process more of New Zealand's wood fibre, such as logs and residues, onshore. The benefits of onshore processing will generate greater economic, social and environmental value for New Zealand.

With the Government declaring a climate emergency, the forestry and wood processing sector is of growing strategic importance. Transitioning to a low-emissions and circular economy will require us to use the logs we harvest and the harvesting and processing residues to create low carbon and sustainable products and fuels.

We have partnered with Māori, industry, workers and key stakeholders to develop this plan

The Plan has been developed in partnership with the Forestry and Wood Processing Industry Transformation Plan Advisory Group. This group is made up of sector leaders, union representatives, and Māori leaders in the sector. This group has supported the development of the draft Plan and its suite of proposed actions designed to transform the sector.

We have also engaged with a range of wider sector stakeholders to help inform this Plan, including the Forestry Ministerial Advisory Group, the New Zealand Farm Foresters Association, the New Zealand Forest Owners Association, the Wood Processing and Manufacturing Association, the Bioenergy Association, the New Zealand Institute of Forestry, Ngā Pou a Tāne and the New Zealand Timber Industry Federation.

This Plan will support a wide range of government programmes

This Plan supports and aligns with a range of wider government programmes.

This Plan aligns with the Emissions Reduction Plan

This Plan broadly aligns with the Emissions Reduction Plan (ERP). Both plans seek to reduce emissions and accelerate the bioeconomy.

While the ERP focuses on reducing emissions across the New Zealand economy, this Plan specifically focuses on transforming the forestry and wood processing sector, which includes maximising the sector's contributions to our climate change targets.

This Plan supports the Fit for a Better World strategy

This Plan is key to delivering on the Fit for a Better World strategy, published by the Ministry for Primary Industries in 2020. The Fit for a Better World roadmap outlines a 10-year work programme to build a more sustainable, productive, and inclusive food and fibre sector.

This Plan aligns with other industry transformation plans

This Plan aligns with and supports the industry transformation plans for advanced manufacturing, digital technologies, and construction.

The Plan recognises Te Tiriti o Waitangi

This draft Plan provides an opportunity for the Crown and Māori to continue upholding the duties of working in partnership.

As part of the public consultation on the Plan, Te Uru Rākau – New Zealand Forest Service will further engage and partner with Māori. This engagement will ensure Māori views and aspirations are reflected in the Plan and that the proposed actions will create meaningful change and benefit Māori.

This draft Plan recognises the following duties regarding the Crown obligations under Te Tiriti o Waitangi.

- The principles of partnership, participation and protection underpin the relationship between the Government and Māori under Te Tiriti o Waitangi
- Partnership involves the Crown working with iwi, hapū, whānau, and Māori communities to develop strategies for how Māori can have a greater role in the forestry and wood processing sector
- Participation requires enabling Māori to have a voice at all levels across the sector
- Protection involves the government working to safeguard, and create a space for Māori cultural concepts, values and practices.

The scope of this Plan

The Plan includes our productive forests, wood processing, and the forest-based bioeconomy

This Plan focuses on transforming our productive forestry and wood processing sector to increase the benefits it provides to New Zealand, including rural communities. The sector is defined as the entire wood-based value chain, from forests to primary and secondary processing. This includes companies using wood fibre to create new products and fuels.

Productive forestry means any forest that has the potential for trees to be legally harvested and sold and used down the supply chain. This includes large-scale production forests, small wood lots, and trees integrated on farms.

Other forestry changes are out of scope

The Government is considering other changes to the forestry system. These proposals are part of separate consultation or legislative processes and are outside of the scope of this Plan.

These proposals include changes related to the following.

- **Resource management system:** The Government will seek views on National Direction to enable greater local control over the location and type of new forests this year. This work will also consider expanding the scope of the existing National Environment Standards for Plantation Forestry to better manage environmental effects of existing permanent exotic forests.
- **New Zealand Emissions Trading Scheme (NZ ETS):** The Government consulted this year on potential options for restrictions to exotic species being registered in the permanent forest category in the New Zealand Emissions Trading Scheme.
- **Changes to the Overseas Investment Act:** The Government is progressing changes relating to forestry investment by overseas persons.

We are working to ensure this Plan and other possible changes to the sector align.

The case for transforming New Zealand's forestry and wood processing sector

This Plan identifies opportunities for us to be more strategic and deliberate about how we use our valuable wood resources. New Zealand has a strong and high-performing forestry and wood processing sector – but we can get more value from our woody biomass and logs.

We need to process more of our logs and wood fibre onshore to improve social, economic, and climate outcomes

The proposed actions in this Plan aim to put forests and wood products at the heart of Aotearoa's future low-emissions and sustainable economy and our growing bioeconomy. Forests absorb carbon, and wood products can be used to replace higher emission alternatives.

We have an opportunity to process more of our logs and their by-products onshore into high-value products and fuels to improve social, economic, and climate outcomes for New Zealand.

Processing more wood fibre onshore will retain more jobs, lower carbon emissions and breathe life into New Zealand's regional communities.

To drive our contribution to the global effort to limit warming to 1.5˚C, New Zealand has committed to reach net zero emissions by 2050 for all greenhouse gases, other than biogenic methane. 'Net zero' means that New Zealand sequesters the same or more carbon than the emissions it generates.

New Zealand is the world's largest exporter of softwood

New Zealand's production forests are an abundant and versatile resource. We have around 1.7 million hectares of productive forests. The Government's first Emissions Reduction Plan published earlier this year was clear that to achieve our climate change targets we needed to encourage native forests as long-term carbon sinks and grow our exotic productive forests estate.

New Zealand's forestry and wood processing sector is characterised by a high reliance on a single species of tree (radiata pine), a small number of export markets, a narrow range of products, and little new investment. New Zealand is the world's largest exporter of softwood logs. In 2021, we exported approximately 23 million cubic meters of unprocessed logs – around 60 percent of our total harvested volume of logs.

Growth in wood processing capacity has been minimal

New Zealand's overall wood processing capacity has remained roughly the same since 2000 and there has been little growth in the export of value-added wood products. While some modernisation has occurred in the sector, overall investment in the sector has declined, with the last investment in a greenfield sawmill in 2005.

Technology allows us to process more logs and creates higher value.

Harnessing the potential of a forest-based bioeconomy is key to unlocking our low emissions future. The bioeconomy involves the production of renewable biological resources and their conversion into food, feed, bio-based products, and bioenergy. Wood offers a low-carbon, renewable alternative to many emissions-intensive, non-renewable products we currently use throughout the economy.

Processing the logs we typically export has traditionally been cost prohibitive

Different parts of a tree (known as 'log grades') are used for different purposes and have different value. Wood quality and value diminishes the further up the tree you go, as this is the youngest part of the tree. The way a forest is planted and managed while it is growing influences the range of log grades the trees will produce.

Most sawmills in New Zealand use higher grades of log to produce appearance or structural timber. The logs we export tend to be of lower-quality grades. Turning lower-grade logs into high-value products has traditionally been cost prohibitive. Most mills in New Zealand cannot process these lower quality logs.

New technologies offer opportunities to cost effectively process these logs into high value products

New Zealand has an opportunity to process more lower-grade logs. New technologies, particularly automation and optimisation, and opportunities for engineered timber, are making processing lower grades of logs more economically viable.

Engineered wood products, such as plywood, GluLam or cross-laminated timber, are made by binding wood with adhesives to create wood products that look like wood but are designed to be stronger and more durable.

New Zealand has some examples of successful wood businesses – using engineering and innovation to supply high quality and sustainable wood products. We need to scale this up to ensure we get the most value from our logs.

Sequal: A New Zealand sawmill processing lower-grade logs through a 'mass customisation' model with advanced technology

Sequal, based in Kawerau, is currently the only large sawmill in New Zealand to process solely lower-grade logs. Sequal employs a 'mass customisation' business model that uses its own specialised software and a variable milling system to produce an unlimited range of sizes and specifications, meeting individual requirements of domestic and global customers. This contrasts with the traditional mass standardisation model where sawmills process higher-grade logs to produce a large volume of uniform product.

Having developed a system to deliver timber made specifically to a customer's needs in a 'just in time' model, Sequal reduces both costs and waste by minimising the need for reprocessing. Sequal's timber is used in a range of applications, including packaging, furniture, and remanufactured construction products. Demand for their products in some international markets is significantly higher than current capacity.

Sequal demonstrates that the 'mass customisation' model represents an opportunity for New Zealand wood processors to compete internationally. The combination of the business model and investment in advanced technology makes it possible to produce high-value timber products from lower-grade logs.

Forestry and wood processing will be the heart of our future low-emissions economy

The forestry and wood processing sector is a major contributor to New Zealand's climate change targets and, relative to other industries, the wood processing sector has a low-emissions profile. Many wood processing facilities are powered by geothermal energy, or energy generated using wood residues.

Wood products store carbon and contribute to our climate change targets

The carbon stored in wood products made from New Zealand's logs delays the emissions of the carbon that was sequestered by the tree – in some cases by decades. In longer-lived wood products, the carbon is released slowly as the product decays as carbon dioxide (CO_2).

This 'delayed emission' contributes to our climate change targets. In 2019, the carbon stored in wood products contributed around 9 million tonnes carbon dioxide equivalent (Mt CO_2-e) to our greenhouse gas inventory – around 11 percent of New Zealand's emissions in 2019.

Processing more wood fibre onshore will drive emissions reductions across the economy

Technological developments are expanding what we can make from wood fibre. Woody biomass can be turned into a range of high-value low-emissions products. These include:

- engineered wood products for construction and furniture
- solid biofuels like wood pellets and energy chip can replace coal and gas for heating
- liquid transport biofuels that replace fossil-fuel derived diesel, petrol, aviation and marine fuels
- biochemicals and biopharmaceuticals can replace plastics and other products relying on petrochemicals.

Woody biomass will be the core input into future biomanufacturing industries. Scaling up the production of low-emissions, high-value, wood-based products and fuels will enable other industries to decarbonise, such as transport, construction and industries reliant on coal.

Table 1 on the following page shows the emissions reduction potential from a variety of wood or wood-based products relative to comparator materials.

Climate changes, fires and diseases are some of the challenges to our forests' resilience.

Table 1: Emissions reduction potential of wood products relative to comparator[1]

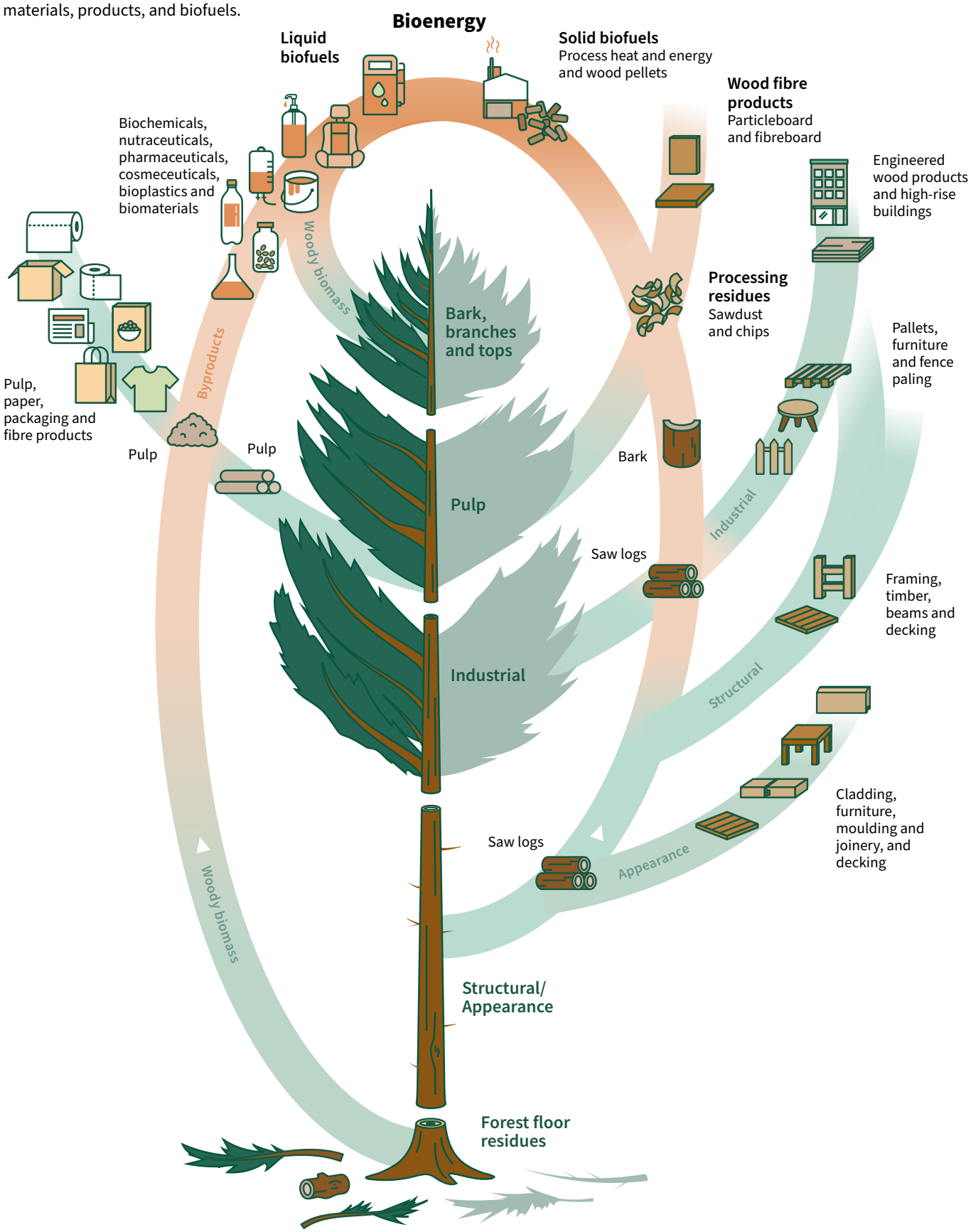
Product	Comparator	Emission reduction
Sawn timber	Steel	94%
Wood pellets	Hard coal	93%
Biocrude (Fast pyrolysis)	Light fuel oil	95%
Advanced Liquid Biofuels (Gasification Fischer-Tropsch)	Fossil diesel	83%

The diagram overleaf shows the wide range of products that can be made from wood, and how they relate to different parts of a tree.

1 Te Uru Rākau – New Zealand Forest Service (2022), Wood Fibre Futures Stage Two Report: Main Report, Wellington.

Products we can make out of a tree

Trees provide a sustainable and renewable source of wood fibre and residues to produce low-emissions materials, products, and biofuels.



Wood products can reduce emissions in the construction sector

In 2021, the construction sector was responsible for around 15 percent of New Zealand's emissions. There are opportunities to use more innovative wood products to displace more emissions-intensive materials in multi-residential and commercial medium to high-rise buildings.

Studies show that if we were to replace around half of current concrete and steel building construction in New Zealand with timber construction, it could reduce our national embodied CO_2 emissions by 500,000 tonnes each year. This figure only includes embodied emissions and excludes operational emissions. These studies also show that a further 500,000 tonnes of carbon could be stored in wood products as biogenic carbon.[2]

For the wood processing industry in New Zealand to supply this volume of product, it would need to process an additional 1.3 million cubic metres of logs.

Nelson Pine Industries – MDF and LVL processing plant.

NelsonPine® LVL / Nelson Airport: building a new airport from engineered timber

NelsonPine LVL is a structural engineered wood product manufactured by gluing together multiple layers of thin sheets of wood, bonded with an exterior structural strength adhesive. LVL provides a consistent, high-performance alternative to solid lumber and steel in structural uses.

Although it looks similar to conventional plywood, which switches the orientation of its stacked veneers, LVL veneers are stacked in parallel. This allows for greater flexibility and stress-flexing without breaking, and produces structural-grade sheets of timber that allow the finished product to be consistent in appearance.

LVL is available in a variety of sizes and lengths and can be used across residential, commercial, industrial, formwork, and scaffolding applications. An example of Nelson Pine's product is at Nelson Airport in a large-scale project that ordinarily would be constructed using steel and concrete. LVL has allowed the terminal's building materials to be sourced sustainably using New Zealand grown radiata pine. It demonstrates how wood can be used in large-scale construction.

2 Andy Buchanan, Carbon Footprint of New Zealand Buildings.

Biofuels provide a viable and cost-effective way to immediately reduce the use of fossil fuels

Biofuels provide the most immediate and available means to reduce emissions in some of our most hard-to-abate sectors, such as transport and process heat.

New Zealand uses around 2.8 million tonnes of coal every year. Biofuels offer a pathway to rapidly reduce our use of coal. Wood pellets, which are made from wood residues and are readily available, can replace coal with minimal infrastructure upgrades. Solid biofuel is also available in a less processed form than pellets, by chipping or shredding woody biomass.

Replacing coal with wood fuel from renewable sources will lower emissions, as the forests are replanted, and be the equivalent of removing 15–20 percent[3] of New Zealand's annual car emissions of greenhouse gases.

Fonterra: switching from coal to wood pellets

In 2020, Fonterra made a $12 million investment to convert its Te Awamutu milk processing site's 43-megawatt coal-fired boiler to an entirely sustainable, renewable source of energy – locally sourced wood pellets.

This is the largest conversion project of coal to biofuels in New Zealand to date. The move away from coal at the Te Awamutu site is part of Fonterra's plans to have net-zero emissions at its manufacturing sites by 2050. The Energy Efficiency Conservation Authority supported this project with co-funding of NZ$200,000 through the Technology Demonstration Fund.

By switching to wood pellets and modifying the boiler to do so, the boiler's thermal efficiency improved by approximately 4 percent and carbon emissions from the boiler have been cut by 98.4 percent.

This conversion resulted in a reduction of 89,000 tonnes of carbon dioxide each year based on the first year of operations using wood pellets. Sulphur dioxide emissions have also reduced.

3 Scion, 2021, Bio-coal for better burning bioenergy.

Liquid biofuels will play a key role in reducing transport emissions

Transport contributes over 21 percent of gross domestic greenhouse gas (GHG) emissions and is New Zealand's fastest growing source of emissions.

There are few alternatives to address emissions from the existing conventional vehicle fleet. Based on the Ministry of Transport's projections, EVs and the future possibility of hydrogen will not transition transport fast enough to help meet our 2030 and 2050 emission targets.

Biofuels can immediately bring down the carbon emissions of the conventional light vehicle fleet.[4] Otherwise, vehicles that enter the vehicle fleet today will continue to emit high amounts of carbon for another 20 years on average.

Biofuels offer a key advantage for the hard to abate sectors of transport and aviation, they are compatible with existing conventional vehicles and fuel infrastructure.

Air New Zealand: moving toward sustainable aviation fuels

Air New Zealand considers their largest mitigation opportunity to be sustainable aviation fuel (SAF), as electricity and hydrogen are not suitable for long-haul flights.

Air New Zealand and the Ministry of Business, Innovation and Employment are working with Te Uru Rākau – New Zealand Forest Service to explore the feasibility of a commercial scale SAF production plant in New Zealand.

SAF can be produced from organic residues, including those from forestry. SAF is critical to aviation decarbonisation and can reduce aviation emissions by more than 80 percent compared to conventional jet fuel. However, there is a shortage – currently less than 1 percent of aviation fuel supplied in the world is SAF.

Commercially producing SAF in New Zealand would help lower New Zealand's emissions, reduce waste, and create jobs and economic opportunities in our regional communities.

Air New Zealand, Z Energy and Scion estimate that domestic SAF production could, by 2050, generate 1,800 new permanent direct jobs, over 5,000 additional indirect jobs and another 6,400 temporary infrastructure development jobs.[5]

4 Biofuels are any fuel produced from biomass of plant or animal origin, such as, agricultural and forestry crops and residues, agricultural by-products, and organic waste. Internationally, the most common biofuels are bioethanol, which can be blended with petrol for use in cars, and conventional biodiesel.

5 Ministry for Business, Innovation and Employment (2021). Increasing the use of biofuels in transport: consultation paper on the Sustainable Biofuels Mandate.

Managing the supply, demand and use of woody biomass

Lowering New Zealand's emissions through reducing the use of fossil fuels is expected to rapidly grow the demand for woody biomass. Current sources of biomass are varied, but our biggest source is woody biomass, including residues from forests and sawmills.

This Plan proposes a strategic mapping of woody biomass supply and demand to enable deliberate direction for the use of this resource, given the likely competing demands. It proposes exploring how to maximise the value of the products made from woody biomass to support its most strategic use.

Due to past planting patterns, there could be a shortage of woody biomass by the mid-2030s based on forecast demand unless action to source additional biomass is undertaken. Opportunities to grow the supply of woody biomass include:

- growing domestic wood processing, which would increase the production of residues
- greater recovery of harvest residues (slash) from our productive forest
- growing new types of forests to produce additional volume of woody biomass for bioproducts
- diverting low-value logs from export to other higher value domestic uses.

Transformation will require significant new investment and changes across the supply chain

We need to encourage investment, realise economies of scale, and strengthen the workforce

Transforming the sector will require significant scaling and modernisation of our wood processing facilities and supporting infrastructure, and investment in workers and skills. Getting more value from our logs and achieving our goal of processing an additional 3.5 million cubes (m^3) of logs will require establishing around three to four modern large-scale mills (based on the size of our largest current mill) focused on processing lower-grade logs.

This will require significant new investment from industry, government and overseas investors. Attracting this scale of capital will require improvements to the investment environment. This includes tax and other financial incentives, use of co-location to lower costs and create economies of scale, and innovation in the types of products we make and the markets we serve.

The workforce will underpin transformation. The sector will need to attract new talent, and to train and retain existing workers. Achieving this will require ensuring pay and conditions in the sector are competitive and attractive.

Diversifying our products, markets and forests will build resilience and create new opportunities

We need to find new and more diverse markets for our wood products and use government procurement levers to drive sustained and long-term demand for higher value wood products to make investment more attractive.

The trees that we plant today will be the trees we harvest in 2050 and beyond. The sector can increase productivity and build resilience to climate change, market shocks, and supply chain issues by diversifying forest species and management practices.

Some long-standing sector challenges need to be addressed

Achieving sector transformation will require addressing some long-standing challenges in the sector. The key challenges this Plan seeks to tackle are:

- **Over-reliance on a single species** – 90 percent of production forests in New Zealand are radiata pine, where other types can add value and resilience to our land use and the products we can make.
- **Lost opportunity from uncaptured residues** – residues from harvesting and processing logs are not always effectively used for their highest value use.
- **Static wood processing capacity and low levels of new investment** – processing capacity on average has remained flat over the past 20 years.
- **Lack of international competitiveness for processed wood products** – 60 percent of the wood we harvest is exported as raw logs. There has been minimal growth in the export of value-add wood products.
- **Highly concentrated export markets** – 80–90 percent of our export logs go to China, which exposes the sector to risks of economic shocks and price volatility.
- **Certainty of supply** – short-term log supply contracts are common in the sector and create considerable uncertainty for mills seeking to attract investment and expand production.
- **Social licence challenges** – the forestry sector has a range of social licence challenges that impact its ability to operate. Work is needed to improve public perceptions of forestry.

Transformation requires a cohesive sector and strong social licence

Transforming the sector and solving some of these challenges will require a strong partnership between government, industry, workers, Māori and our science and research organisations.

There are opportunities for improving how the sector works together

The sector has several different associations with different membership bases. This creates challenges for coordination and funding of industry-good activities.

Sector issues, such as social licence and workforce challenges require a cohesive and unified sector to address them. More work is needed by the sector to understand and test new ways of working together.

Māori will be key partners as we seek to transform the sector

Māori are well positioned to contribute to and lead investment and innovation in forestry and wood processing. Māori own an estimated NZ $4.3 billion of assets in forestry and have ownership of more than 30 percent of land under plantation forestry as well as large areas of indigenous forest.

But there are also some challenges to overcome. For example, while Māori own a significant portion of the land under New Zealand's plantation estate, they often do not own the trees and forestry licences. Māori also make up a significant proportion of the wood processing workforce but are underrepresented at the ownership and leadership level.

Strengthening social licence will be a key enabler of future growth

The benefits of the sector need to be more widely communicated and understood. The sector needs to work together to tell its story, both domestically and globally.

The benefits of sector growth need to be shared widely, particularly with rural communities, Māori and workers. As the sector grows, new opportunities will develop for a range of stakeholders. For example, the opportunities for farm forestry will increase as the bioeconomy develops and new markets emerge. Integrating trees into farms can diversify farm revenue streams and improve environmental resilience.

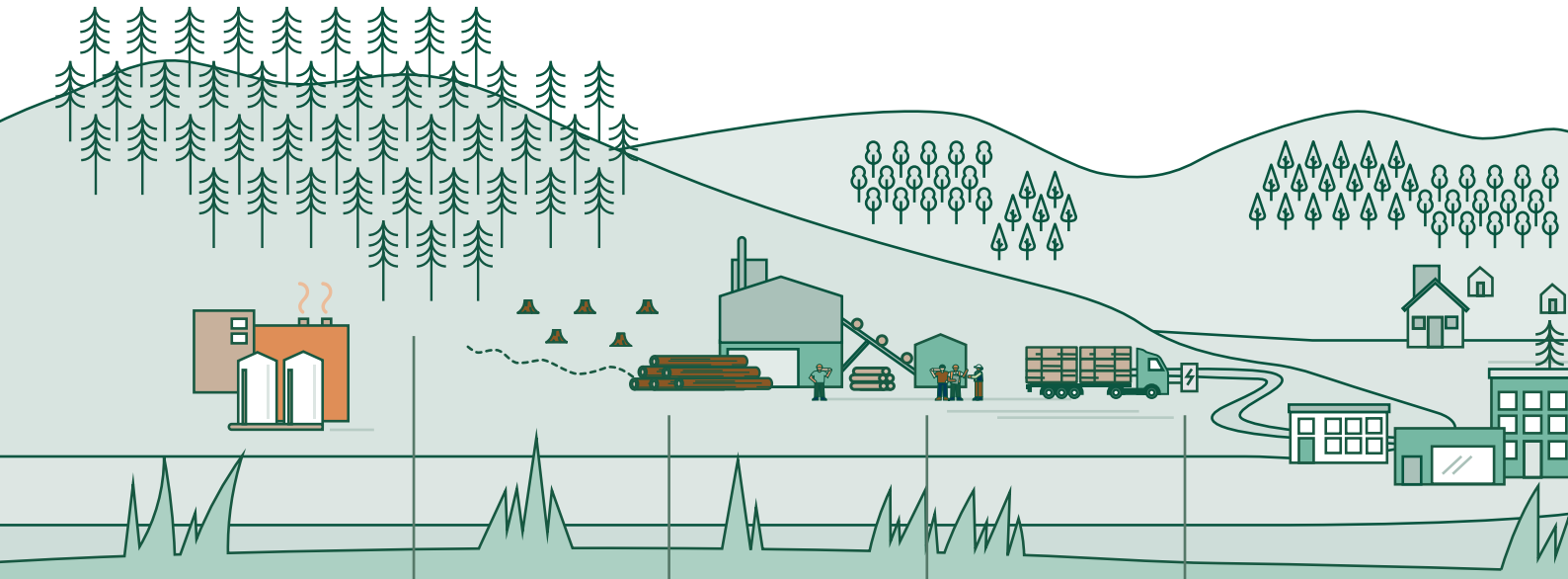
The recent increase in afforestation rates has resulted in concerns being raised by some rural communities and other sectors competing for land, such as the sheep and beef sector. These concerns often relate to the perceived wider economic and social impact of afforestation, particularly the impact on local jobs. Strengthening social licence, and ensuring the benefits of growth are both understood and widely distributed, will support greater regulatory certainty, and improve the investment environment.

A strong forestry and wood processing sector can support thriving rural communities, providing direct employment and diversifying land-use opportunities for farmers.

Our vision and goals for transformation

Vision for the sector

The forestry and wood processing sector generates more value for New Zealand, is a key pillar of our regional communities, and underpins New Zealand's low-emissions economy.



Outcomes

Is sustainable and supports biodiversity

New Zealand's forestry sector is the most economically and environmentally sustainable forest industry in the world.

Forest systems are adaptable and resilient to a changing climate and support indigenous species and biodiversity.

High productivity and value

New Zealand is an internationally competitive exporter of high-value wood and wood-based products.

The majority of our wood volume is processed domestically and sold as high-value products.

Thriving people and places

The sector has a diverse workforce that reflects New Zealand, and Māori are highly represented in leadership and ownership roles.

Forestry and wood processing towns and communities thrive with high wages, strong employment, and safe work.

Underpins a low-emissions economy

New Zealand uses more wood-based fuels and products, significantly reducing emissions.

Mass timber products for construction are affordable, accessible and the leading option for medium-rise and high-rise buildings. Using more wood in construction will also significantly reduce our emissions.

Goals for industry transformation

We propose five aspirational goals to measure the progress of this Plan. Each goal focuses on a key change this Plan seeks to bring about over time.

Transforming the forestry and wood processing sector requires changes across the sector and its supply chain. Some of the goals are mutually reinforcing – for example, growing export revenue and reducing emissions both depend on processing more wood fibre onshore.

The goals also interact in other ways. New Zealand's wood supply is finite but can grow or decline over time. This means that at any point in time increases in domestic demand for wood products will have an impact on the amount of wood products we can export and vice versa.

1 Carbon emissions reduce by 6.9 million tonnes by 2030, and by 54 million tonnes by 2050[6]

Current state

New Zealand produced 81 million tonnes of $C0_2$ equivalent (year ending March 2021).

Between now and 2030 New Zealand is expected to emit 653 million tonnes.

Between now and 2050 New Zealand is expected to produce 1.68 billion tonnes of $C0_2$ equivalent.

Goal

This goal aims for the sector to reduce New Zealand's emissions by providing low emissions materials and fuels. New Zealand currently consumes about 2.8 million tonnes of coal per year, and 3.8 billion litres of diesel.

Achieving this goal would require the sector to:

- provide the construction industry with 14 million m^3 of innovative wood products that can be used in new buildings
- use 16.4 million tonnes of wood fuel to replace 9.2 million tonnes of coal
- produce alternative fuels by using 49.3 million m^3 of woody biomass to replace 8.9 billion litres of fossil fuels with biofuels, including sustainable aviation fuel and drop-in renewable diesel.

2 Wood processing increases by 3.5 million m^3 (25%) by 2030

Current state

14.2 million m^3 of logs were processed in 2021.

Goal

This goal seeks to significantly scale up our domestic wood processing of underused lower grade logs and reduce the number of unprocessed logs we export.

6 2050 figures are used to reflect the exponential nature of carbon emissions reduction.

Achieving this goal would require:

- establishing new mills that process lower-grade logs
- increasing the capacity of New Zealand's existing primary processors by 25 percent. This means we would roughly need an additional three-and-a-half modern large-scale sawmills.

3 Export earnings from value-added wood products grow by $600[7] million by 2040

Current state

Export earnings from value-added wood products were NZ$2.5 billion in 2021, of which $1.3 billion was sawn timber and panels.

Goal

We want New Zealand to be a world leading exporter of high-value products made from wood. Strong export growth will support national and regional economic development.

To achieve this, we need to scale up domestic wood processing, produce high-value wood products and find markets for these products.

4 Use of wood products in construction increases by 25% by 2030

Current state

1.4 million m^3 of wood products were used in construction in 2021.

Goal

This goal aims to reduce the emissions of New Zealand's construction industry by replacing emissions-intensive building products with engineered wood products.

To achieve this goal, we would use up to 400,000 m^3 of low-emissions wood products by 2030. This replacement would use mostly cross laminated timber and laminated veneer lumber (LVL).

The types of buildings that would be made with more wood products[8] include:

Houses: light timber framing or mass timber ground floors.

Apartments: light timber framing or mass timber framing.

Office, education and commercial buildings: cross-laminated timber floors and exterior walls and mass timber framing methods, such as glulam or LVL.

Farm buildings, factories, or storage buildings: encouraging the use of LVL portal frames and LVL purlins.

5 Planting of alternative species (non-radiata) increases to 20% of all planting by 2030

Current state

Estimated at 10% alternative species in 2022.

Goal

This goal aims to increase the resilience and productivity of our forests.

Planting alternative species is key to improving the sector's resilience to climate change, and to biological and economic risks. It would also increase the wider environmental benefits gained from forestry, such as improved biodiversity, and expand the range of products we can manufacture from high-value timber and wood fibre.

To achieve this goal, we would need to work with the sector to understand and overcome the barriers to diversifying our productive forests. This diversification will be challenging seeing as existing infrastructure and supply chains are tailored to radiata pine.

7 Figure is in real terms, which means it is inflation adjusted.

8 While there is some opportunity to increase the use of timber foundations and mass timber floors in standalone houses, the biggest gain is likely to be in mid-rise multi-residential and non-residential buildings.

Goals for transformation in the forestry & wood processing sector

The goals in this plan are interconnected and linked to our vision for a transformed sector that generates more value for New Zealand, is a key pillar of our regional communities, and underpins New Zealand's low-emissions economy.

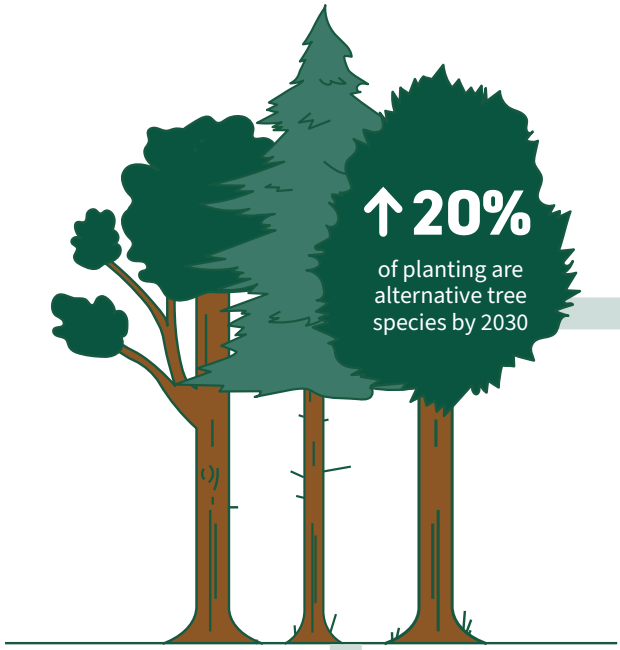
1 Carbon emissions reduce by

↓ 6.9M tonnes by 2030

↓ 54M tonnes by 2050

5 Planting of alternative species

Improve resilience, expand range of manufactured products, and enhance wider environmental benefits

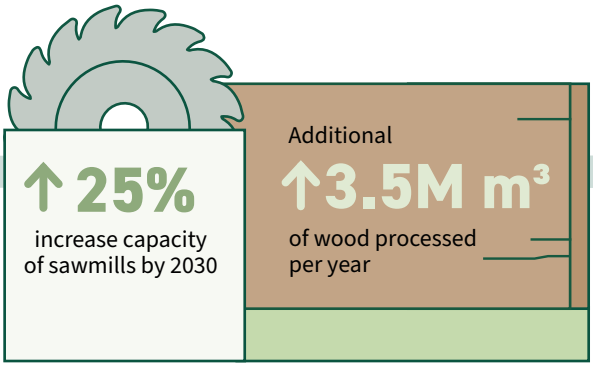


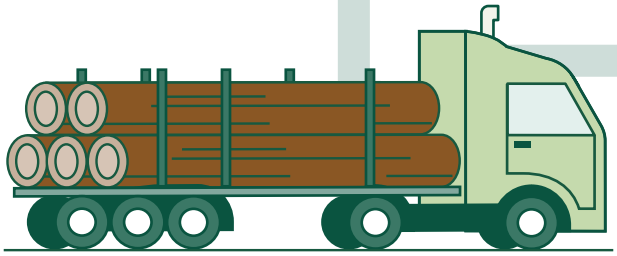
Carbon sequestration
Production forests sequester carbon and produce long lived wood products

Increase woody biomass supply
Increased woody biomass recovered from forest floor and harvesting residues, bioenergy managed forests and pulp logs

2 Domestic wood processing

Significant scaling up of capacity





Keep more logs for processing in New Zealand
60% of our logs are currently exported. With industry transformation, more logs will be kept in New Zealand for onshore processing

1 Decarbonisation of process heat

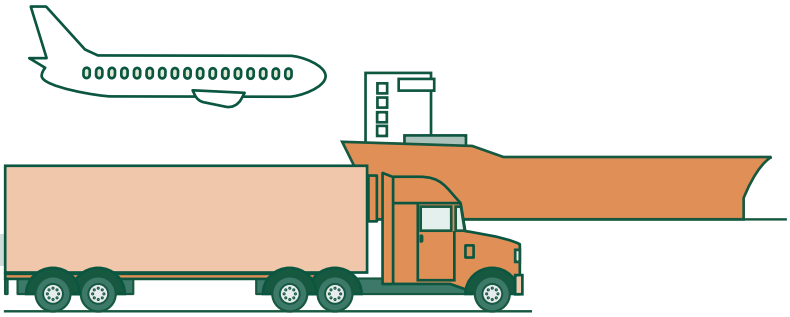
Replacing coal with solid biofuels

16.4M tonnes

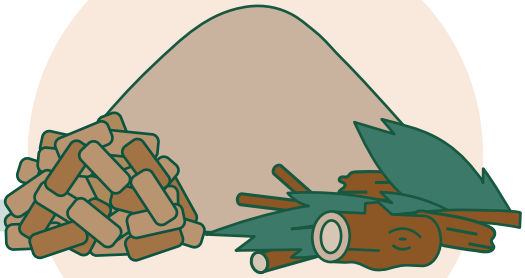
of wood pellets replace 9.2M tonnes of coal by 2050

1 Decarbonising transport

8.9B litres of liquid fuels made from 49.3M m3 of woody biomass to support decarbonisation in the transport sector, particularly for aviation, maritime and heavy road transport



1 Woody biomass



Processing more wood will increase residues

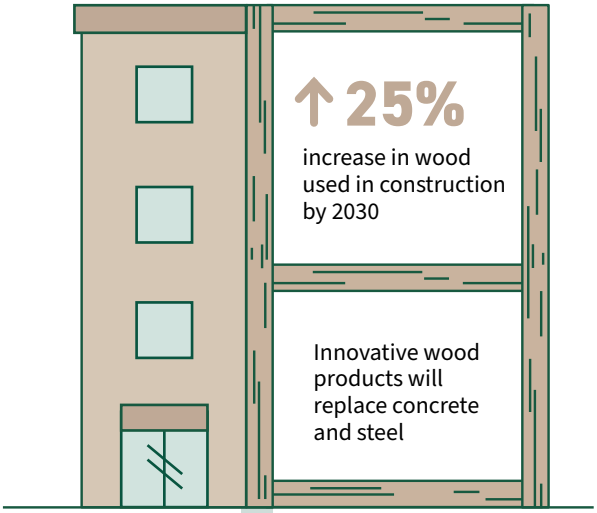
Additional

↑1.5M m³

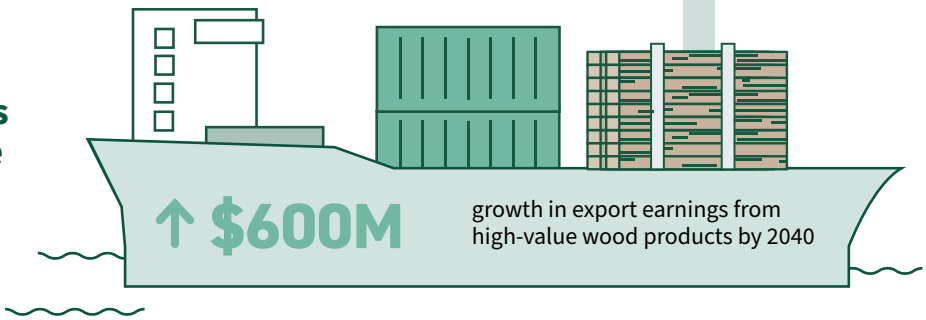
of wood-processing residues per annum, by 2040.

4 Using wood products in construction

Replace emissions-intensive building products with engineered wood products such as Laminated Veneer Lumber (LVL)



3 Grow exports of high-value products




BELL

An overview of the sector

In this section we set out the current state of the sector, including:

- our commercial forestry
- our wood processing
- the supply chain, from tree to wood product
- the demand for wood products
- our workforce.

Production forestry in New Zealand

New Zealand has 1.7 million hectares of commercial forests

New Zealand has around 9.9 million hectares (38 percent of the country) of land with forest cover in 2021, with around 1.7 million hectares planted for commercial purposes. Production forests are primarily on marginal quality land (Land Use Capability classification 6, 7, and 8).[9]

New Zealand's forestry industry is largely based around sustainably-managed plantation forests. About 90 percent of our plantation forests are radiata pine (pinus radiata). The remainder are Douglas fir (6 percent of plantation area), eucalypts, and other softwood and hardwood species.

Forestry is a long-term investment

Forestry is a long-term investment compared to other land uses. A typical radiata pine forest is harvested at 28 years of age. Before harvest, foresters make silviculture decisions that will impact the end volume or quality, including stocking rates, pruning, and thinning.

New Zealand also has about 25,000 hectares of natural native productive forests, with harvesting regulated under the Forest Act (1949). Native plantations can offer long-term carbon sinks, support biodiversity, and act as high-value timbers. These trees are slower growing and tend to be managed on longer rotations (50-years or more).

9 The land use capability (LUC) classification puts a classification onto different kinds of land according to its capacity to support long-term sustained production. The higher the number, the lower the quality of land.

Forests are an integral part of farms in New Zealand

New Zealand's small growers, such as farmers, private owners and those in syndicate and partnership blocks, currently represent 30 percent of the plantation estate and more than half of this area is in holdings of less than 40 hectares. Due to high planting rates in the 1990s, these forests are expected to make up 40 percent of harvest volumes in the next decade.

The Plan envisages that New Zealand's small growers, in particular the farm forestry community, will play an increasingly important role in the forestry supply chain, climate change, and New Zealand's move to a circular bioeconomy. There is significant potential across New Zealand for additional farm-level planting, which can be readily integrated into operations to sustain and help diversify farming properties and communities.

Farm forests offer unique habitats for plants and animals, reduce leaching of nutrients from soils, improve water quality, and limit erosion: all of which benefit on-farm performance. When managed sustainably, these trees can diversify on-farm revenue streams, and improve the financial resilience of farming operations.

While radiata pine is the mainstay of the small grower estate, there has been strong interest from small growers in trialling and establishing a broader range of commercial species, including cypresses, eucalypts, redwood, blackwood, other exotic species, and managed indigenous forests.

Ownership of our forests

Most productive forests in New Zealand are privately owned by a small number of companies. A small number of companies own a large proportion of our production forests – around 70 percent of productive forests by area are owned by 20 companies. Crown Forestry, which is Government run, operates around four percent of the estate.

Small woodlot owners (forest owners with less than 1,000 hectares) provide roughly 20 percent of the commercial forest area. Small woodlot owners are becoming increasingly important to our logs supply. They are expected to make up to 40 percent of harvest volumes in the next decade and are mostly New Zealand owned.

A significant amount of our commercial forests are also foreign-owned – around 57 percent of the total estate. The *Overseas Investment Act* governs overseas investments in forestry.

Forests are significant to Māori

Māori are intrinsically linked with the forests of New Zealand. During the creation of the world, Ranginui and Papatūānuku (the Sky Father and the Earth Mother) were joined together in a tight embrace but the world was filled with Te Pō (the Darkness). One of their children, Tāne Mahuta, God of the Forests, did not want to live in darkness any longer, so he pushed his parents apart and created Te Ao Mārama (the World of Light).

This tree symbolises the God of the Forest, Tāne Mahuta, holding his father, Ranginui, from his mother, Papatūānuku, apart so that the world could be covered in light.

The story of creation shows how important forests and the interdependency between te Taiao and the people are to Māori, from the creation of the world and throughout Māori history to the current day. Forests have provided and continue to provide shelter, food, water, social and cultural wellbeing, and other important life sustaining qualities for Māori. This whakapapa influences Māori forestry practices, encouraging sustainability.

Ngahere and whenua ngahere are significant taonga to Māori and represent an important part of Māori culture. They also play an important role in the Māori economy, providing a wide range of benefits to Māori communities, including jobs and opportunities for tourism and leisure.

Other concepts in Te Ao Māori that influence sustainable forestry practices include the concept of Māori as kaitiaki over their land. The kaitiaki responsibilities Māori have over their ngahere inform their aspirations for kaupapa-led forestry practices. This means Māori have a strong focus on longterm sustainability and biodiversity, and ensuring forestry provides wider benefits to Māori communities.

Māori in commercial forestry

Māori have significant interests in New Zealand's commercial forestry sector. Today Māori own $4.3 billion of assets in forestry and have ownership of more than 30 percent of land under plantation forestry as well as large areas of indigenous forest. Around 8,300 Māori work across the forestry and wood processing sector, making up 22 percent of the workforce.

Large-scale planting of production forests on Māori-owned land began in the 1960s. Many of these new forests were under Crown Forestry licences, with the Crown often paying rent below market rate, and a percentage of stumpage fees.[10]

Crown Forestry has gradually phased out forestry leases in favour of direct ownership or Joint Ventures with Māori. Around 355,000 ha of former Crown land has been transitioned to iwi owned, or to Joint Venture[11] agreements.

10 Forestry contractors pay 'stumpage fees', an amount of money per tree that they are entitled to fell.

11 Joint Ventures are forest investments between two parties, where typically one party provides the land and the other provides the means to establish and manage the forest.

Significant areas of land have also been returned to iwi as part of their settlement process. While a positive step, much of this land was already leased, meaning the economic potential of the land often goes to private companies or the Crown (at least for a period). The land can also often be lower quality, 'land locked', underutilised, or far from urban centres. Options for this type of land are narrow, but it is suitable for forestry.

Kaingaroa Forest (the second largest plantation forest in the southern hemisphere) is a prime example where the land is owned by the Central North Island (CNI) Iwi Collective, but the trees and the forestry lease is still largely held by a private company.

The New Zealand Emissions Trading Scheme has a key role in the sector

The New Zealand Emissions Trading Scheme (NZ ETS) plays a key role in the forestry and wood processing sector. The NZ ETS was set up in 2008 to reduce emissions in line with New Zealand's climate change targets by setting a price on carbon (NZUs).

Foresters with forests planted after 1989 who enter the NZ ETS are awarded NZUs for the carbon absorbed by their forests. To incentivise owners of forests planted before 1990 to remain in forest cover, the NZ ETS treats land conversion as an emission for which these owners must pay, and the cost of this is governed by the carbon price.

There are 350,000 hectares of forest land now registered in the NZ ETS and over 2,000 participants, with demand continuing to grow. Some landowners, however, have chosen not to enter their forests into the NZ ETS – around 2.7 million hectares of eligible post-1989 forest land is not registered in the ETS.

Strong carbon prices in the NZ ETS are proving an effective driver of afforestation, particularly exotic forests. Maximising the benefits of this afforestation requires supporting the right mix, level, and location of planting to provide wood, while maintaining the incentive for gross emissions reductions.

Lake Taupō Forest Trust: Crown and Iwi working together to support Māori ownership

In 1969, the Crown and the Lake Taupō Forest Trust signed a 70-year forestry lease over 30,000 hectares on the whenua of Ngāti Tūwharetoa.

Under the original lease, the Crown planted around 24,000 hectares of forest with planting completed in the mid-1980s. The Crown commenced harvesting in 1996, with the harvested areas replanted each year to create a second rotation crop.

The Crown has taken active steps to return forest ownership back to the Trust.

In 2000, the Crown and the Trust agreed to vary the terms of the lease from a two-rotation arrangement to a single-rotation lease with the Trust acquiring ownership of the second-rotation crop. The Crown progressively returned leased land to the Trust as the first rotation crop was harvested.

In 2021, the Trust marked a significant milestone: the harvest of the second rotation crop that were trees 100 percent owned by the Lake Taupō Forest Trust. The Trust is now the 21st largest forest owner in New Zealand, with its forest providing continuing employment and income for Ngāti Tūwharetoa. At the ceremony, Te Waa Logging – a family crew owned and operated by beneficial owners of Lake Taupō Forest Trust – felled five trees to mark the start of the Trust's harvest.

Our production forests

10.1M hectares
of forests in New Zealand, covering 38% of the land

8M hectares
of native forest

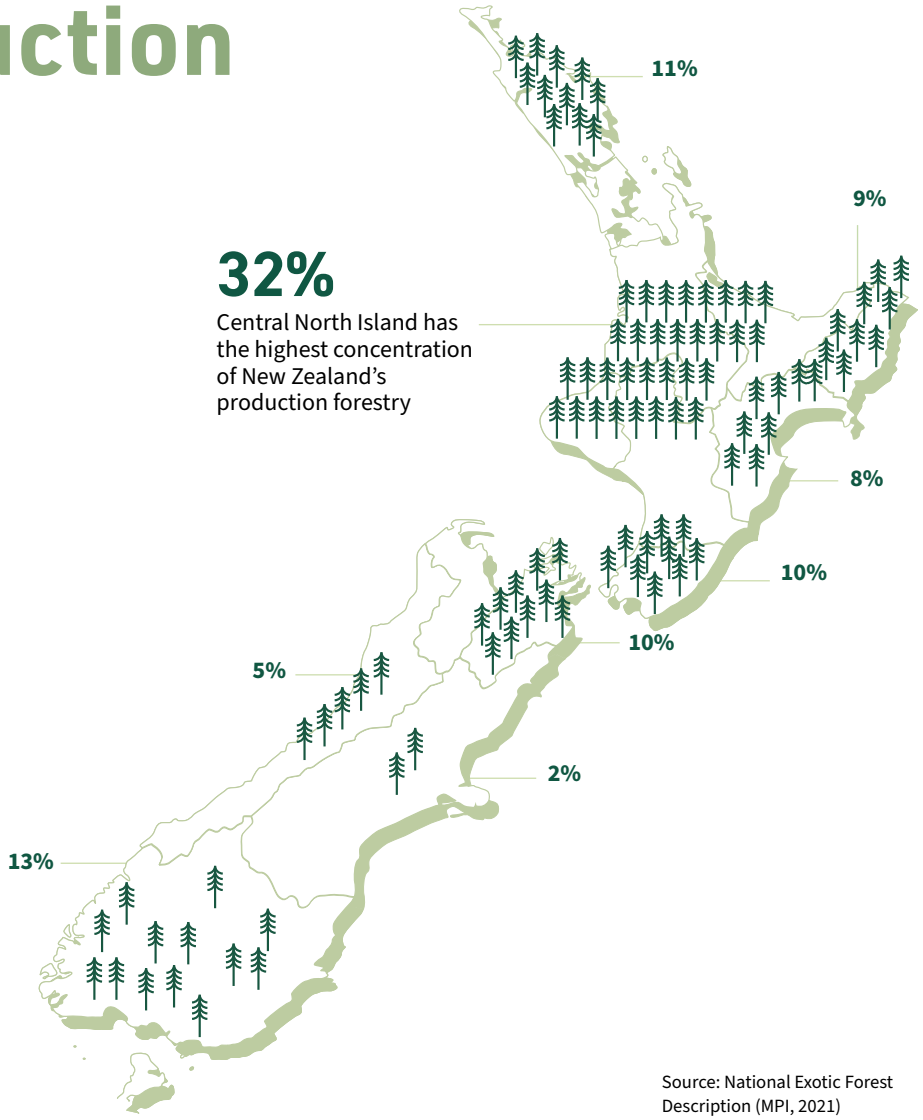
1.739M

hectares of planted production forest
This excludes non-production native and exotic forests that are part of parks, reserves, etc.

0.4M hectares
of reserves, areas near bodies of water and infrastructure

32%

Central North Island has the highest concentration of New Zealand's production forestry



Source: National Exotic Forest Description (MPI, 2021)

Tree species in production forests in New Zealand

90%

Radiata pine

Other species include: Douglas Fir, Eucalyptus, Cypresses, Redwoods, other exotic softwoods, and native tree species like tōtara.

Radiata pine (90%)
1,571,575 hectares

Douglas Fir (5.5%)
97,584 hectares

Other hardwoods (2.1%)
36,816 hectares

Other softwoods (1.9%)
33,997 hectares

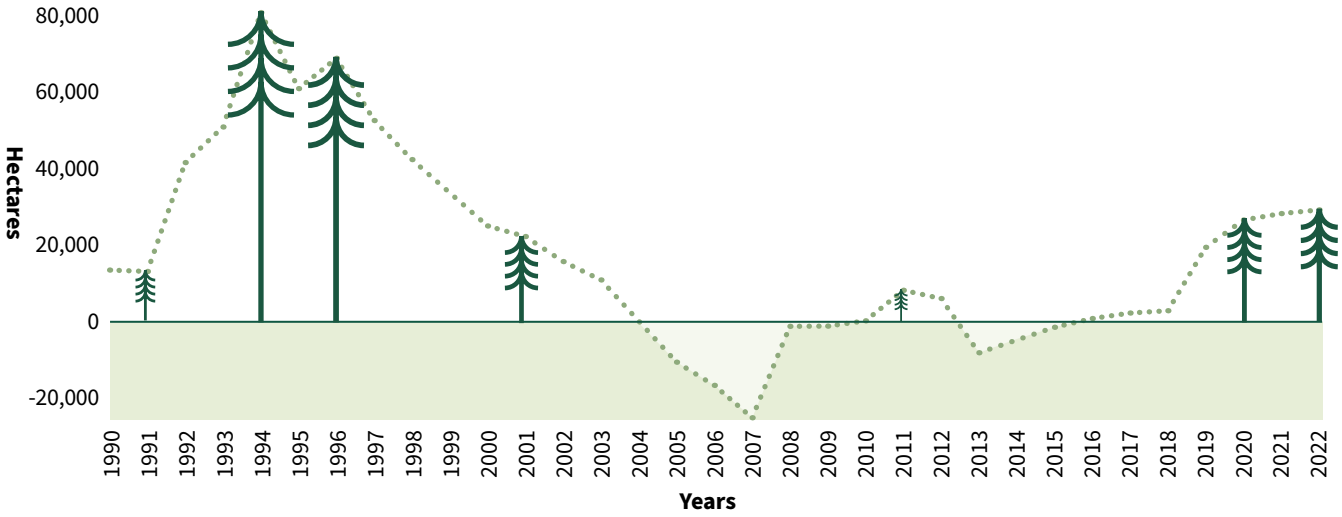
Source: National Exotic Forest Description (MPI, 2021)

Afforestation

The rate of planting new forests (afforestation) was the highest in the 1990's driven by high log prices, with 80,000 hectares of new forest planted in 1994.

Since then, there has been steady decrease in the afforestation rate until the last three years, where the carbon and log market have created another increase in the afforestation rate.

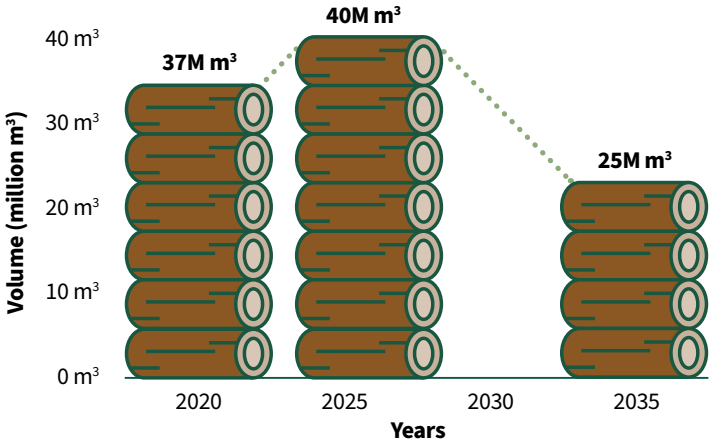
Source: National Exotic Forest Description (MPI, 2021)



Our wood harvest is forecast to decline

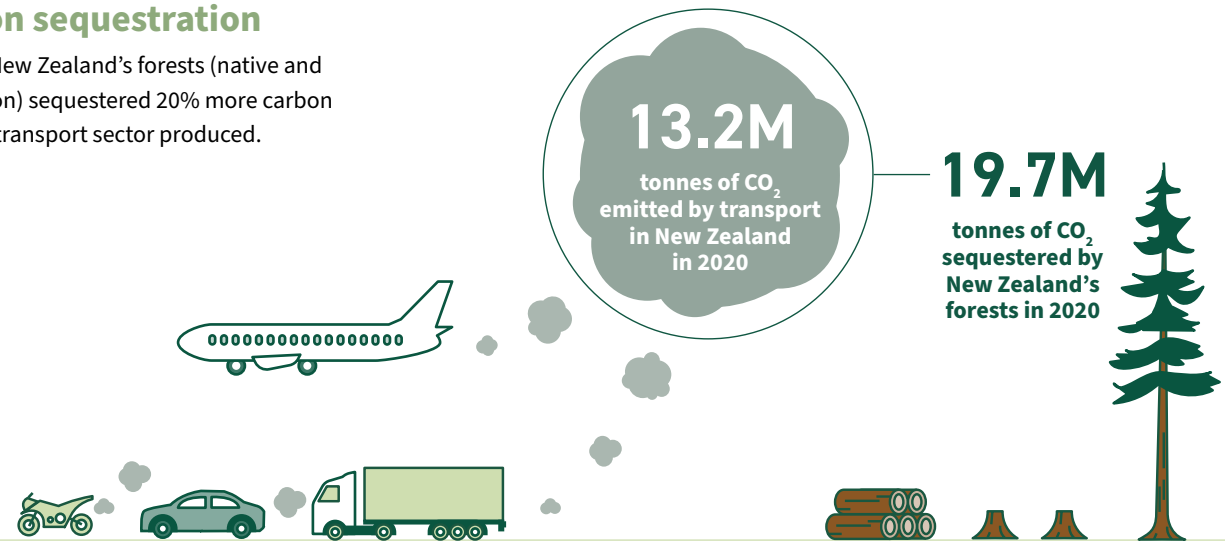
Harvesting is expected to peak at just under 40 million m^3 in 2025 and fall to about 25 million m^3 by 2034 due to the declining afforestation rates throughout the early 2000's.

Source: Wood Availability Forecasts (MPI, 2021)



Carbon sequestration

In 2020, New Zealand's forests (native and production) sequestered 20% more carbon than the transport sector produced.



Wood processing in New Zealand

New Zealand has around 90 sawmills in operation today

Sawmills are the first step in processing logs into products. Around 90 sawmills operate in New Zealand, ranging in type and size. In the year ending September 2019, New Zealand produced 4.4 million cubic metres of sawn timber.

There are currently four pulp mills in New Zealand. Pulp mills turn wood fibre, such as wood chip, into pulp, paper, paperboard, and other cellulose-based products. A range of other processing companies make posts, packaging, plywood, medium density fibreboard (MDF), and wood pallets using sawmill products and logs.

All wood processing in New Zealand is privately owned, with a mix of foreign and locally owned mills.

A small number of companies produce the bulk of New Zealand's sawn timber in large mills. Small sawmills continue to play a key role in suppling timber and employment in smaller rural communities.

Most wood processors are in the central North Island

Most of New Zealand's wood processors are in the central North Island. Otago and Southland have the second highest number of mills in New Zealand with mostly smaller sawmills.

Forests, sawmills, and secondary processors are typically located close to each other to increase efficiency, reduce costs (for things like transport and infrastructure), and share heat and energy.

Sawmills produce a range of products and residues

Sawmills produce their primary product (like structural sawn timber), and residue products.

Residues, such as sawdust, bark, or wood chip, are produced during sawmilling processes. Logs processed domestically result in 40 to 50 percent of the volume of the log being converted into residues. These residues may be consumed by the mill for energy, or on-sold to secondary processors.

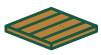
Residues from sawmilling are used in a range of products, historically in the pulp, paper and packaging sector or for MDF.

Residues are increasingly valuable, with demand for residues is growing as companies seek low emissions alternatives. For example, some dairy companies are using wood pellets, hog or chip fuel to replace coal in heating and industrial processes[12]. A wide range of other high-value products are coming to market.

Sawn timber is either sold straight to market, or to secondary processors. Secondary processors process the outputs of the mill into higher value products, such as those shown in the table below.

12 Wood fuel is generally chip, hog or densified into pellets or briquettes. Hog fuel is created by shredding or grinding forest residues. The characteristic of each type of fuel will determine that fuels suitability for specific designs of combustion boiler. Wood is processed by suppliers to meet the specified requirements of a customer's combustion plant. Wood pellets or briquettes are ideal for cofiring with coal or replacing coal in an existing boiler.

Table 2: Examples of secondary wood products

 Engineered Wood Products	 Industrial products	 Panels	 Paper products	 Construction timber	 Mouldings
Sawn timber can be remanufactured into a new, higher strength engineered form. For example, cross-laminated timber (CLT).	Lower grade sawn timber can be used to make non-structural products, such as pallets	Residues can be reconstituted into new forms e.g. medium-density fibreboard (MDF).	Residues can be turned into pulp and paper.	Sawn timber frames, trusses and treated outdoor timbers	Sawn timber is planed and routed to create dressed and shaped products such as weatherboards and architraves.

Wood processing

Distribution of Radiata pine in New Zealand's production forestry, wood processing capacity, export ports and relative log delivery cost

Percentage of the total Radiata Pine estate

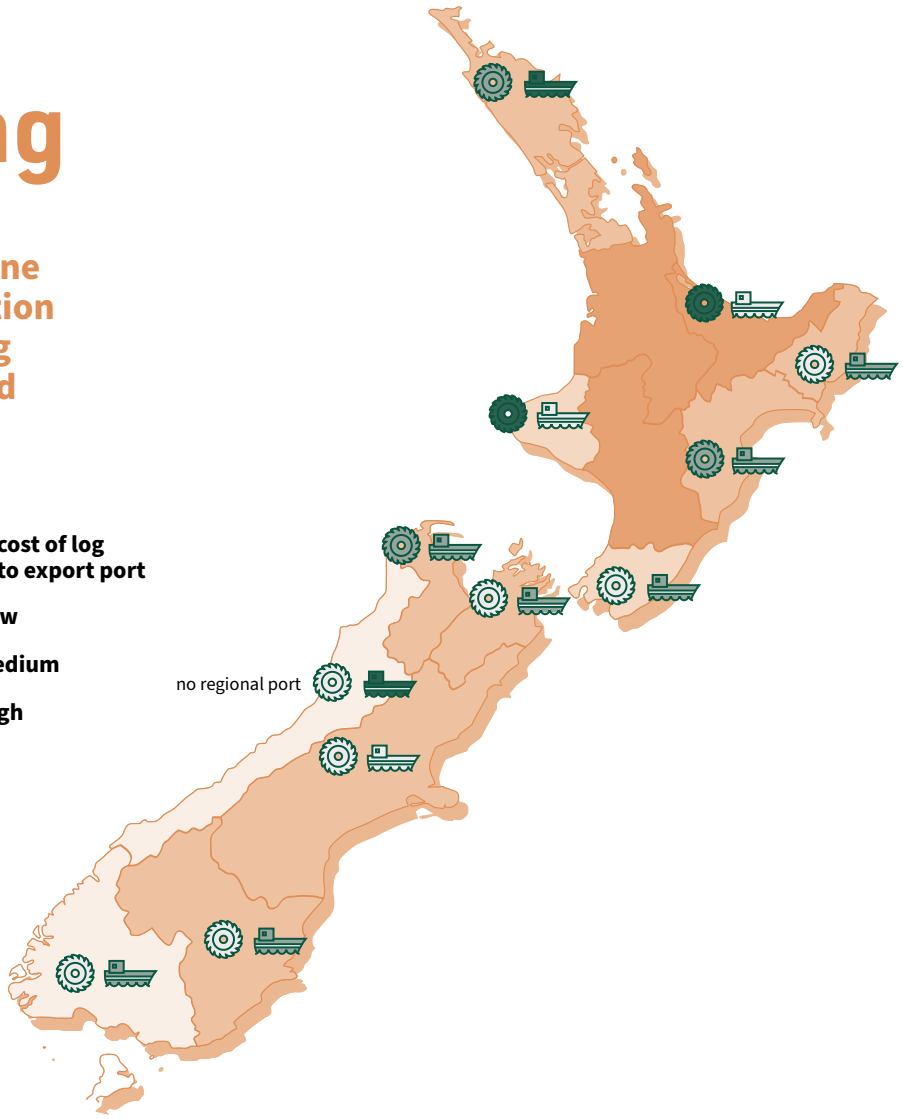
- 1–3%
- 4–6%
- 8–12%
- 35%

Relative cost of log delivery to export port

- **Low**
- **Medium**
- **High**

Wood processing capacity
Wood processing capacity volume of wood (m^3) able to be locally processed

- **Low** <1M m^3
- **Medium** 1–2M m^3
- **High** >2M m^3

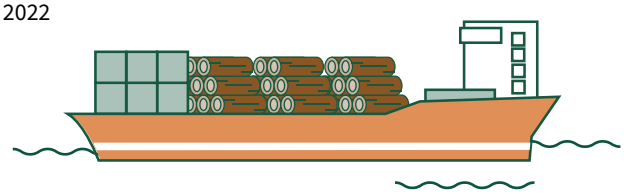


Source: Wood Fibre Futures, Stage 1 report, 2019

Log production

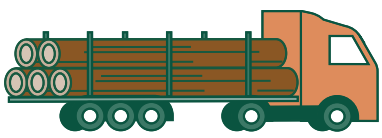
36M m^3
were produced in New Zealand for the year-ended March 2022

22M m^3



exported (predominantly lower grade)

14M m^3



processed onshore

90%
of logs are Radiata pine and include different log grades (e.g., saw, peeler, pulp and industrial logs)

Source: Stats NZ; MPI (2022)

Wood products' output

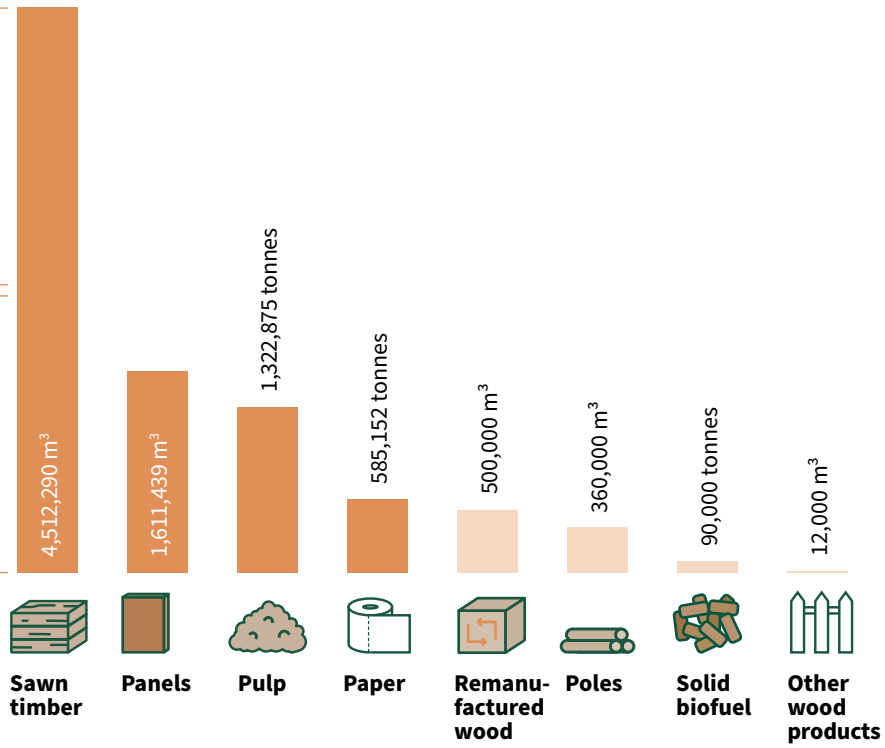
New Zealand produces over
8M m^3 of processed wood products

6

large sawmills produce
over half of New Zealand's
sawn timber

80+

smaller-sized sawmills
produce the other half
(50%) of sawn timber

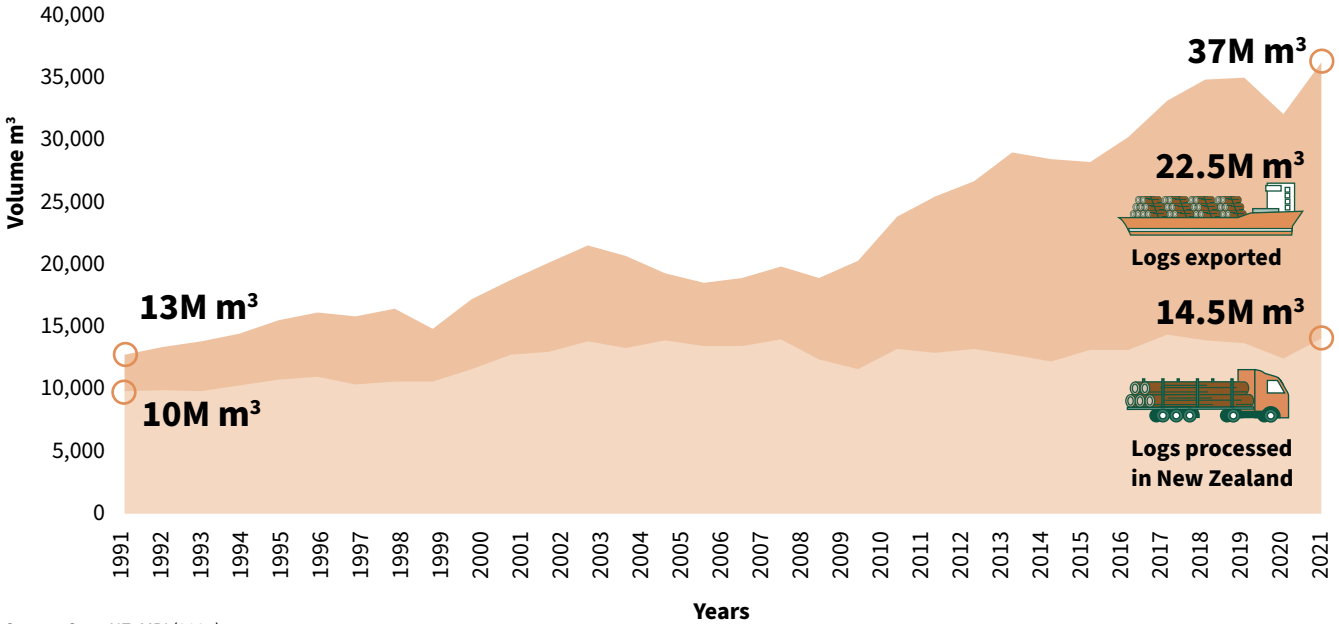


- Gross production – some of these products are used as an intermediate to produce other products
- Estimates based upon known manufacturing capacity rather than actual production

Source: MPI (2021)

Logs exported vs. processed onshore over time

Since 2000, forest harvest volume has roughly doubled from 15–20 million m^3 to over 36 million m^3, but processing capacity has remained roughly constant between 12–14.5 million m^3.



Source: Stats NZ; MPI (2021)

Forestry and wood processing supply chain

The forestry and wood processing sector is a complex system and value chain. The chain includes planting and harvesting forests, processing logs into various products, and further processing these products, or the residues from processing, into refined products.

Key components of the supply chain

The main components of the sector are the following.

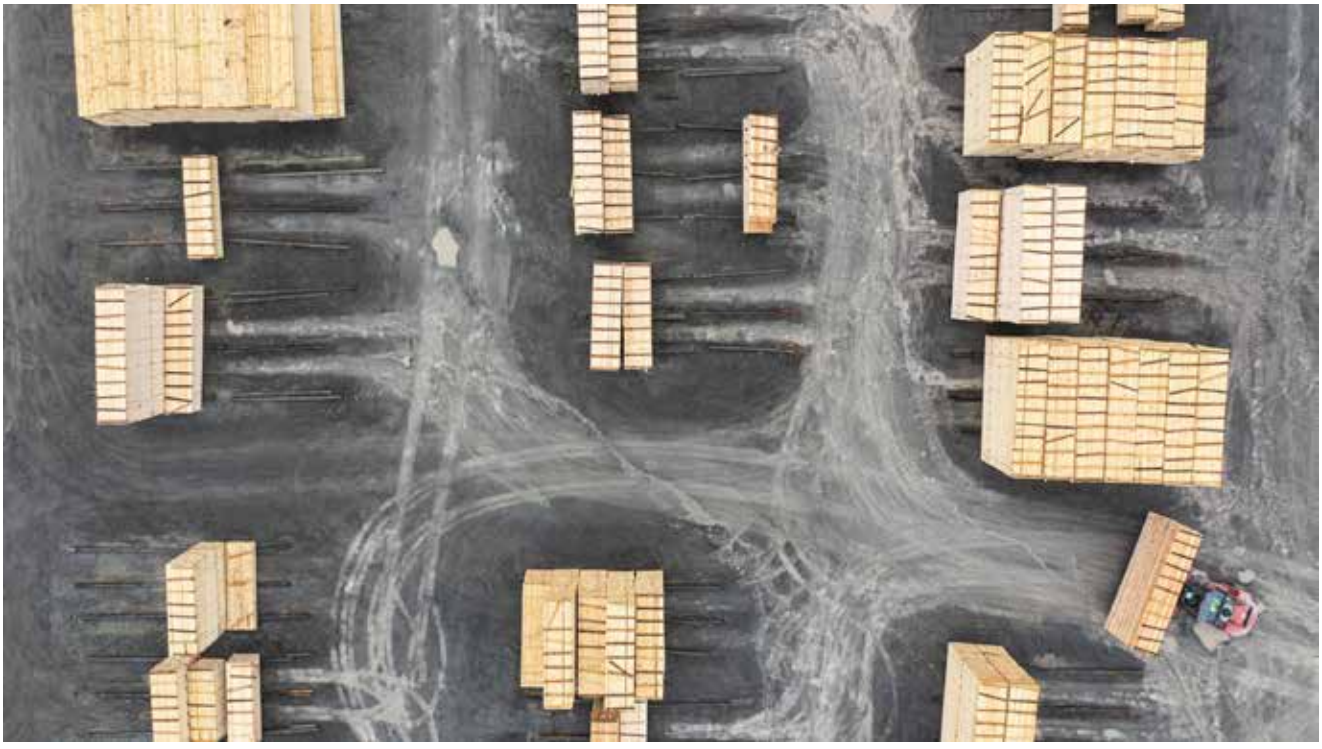
- **Breeding and nurseries:** this is where the best genetics are developed, and seedlings are grown.
- **Forest management:** this involves the planting, silviculture, and harvesting of productive forests. Most productive forests in New Zealand are made up of exotic trees. Logs harvested are either directly exported or processed domestically.
- **Primary processing:** this is the first stage of processing in the supply chain where raw logs are processed and includes sawmilling and remanufacturing of timber to value-added products such as glulam and mouldings. Primary processing creates products that are sold directly to market or products sold to secondary processors.
- **Secondary processing:** involves processing or refining the products or residues from primary processing. This includes panel production, pulping, the manufacture of paper, cardboard, paperboard, and exterior/interior building products.
- **The emerging bioeconomy:** processing creates residues, such as sawdust, bark or woodchips. Residues can be processed into solid biofuel which can be used to produce heat and electricity, or as feedstock to produce bio-based products such as char, gaseous and liquid biofuels, biochemicals and pharmaceuticals.

The figure on the next page provides an overview of the forestry and wood processing supply chain and highlights some of the bioeconomy opportunities.

Transport and logistics are a key part of the supply chain

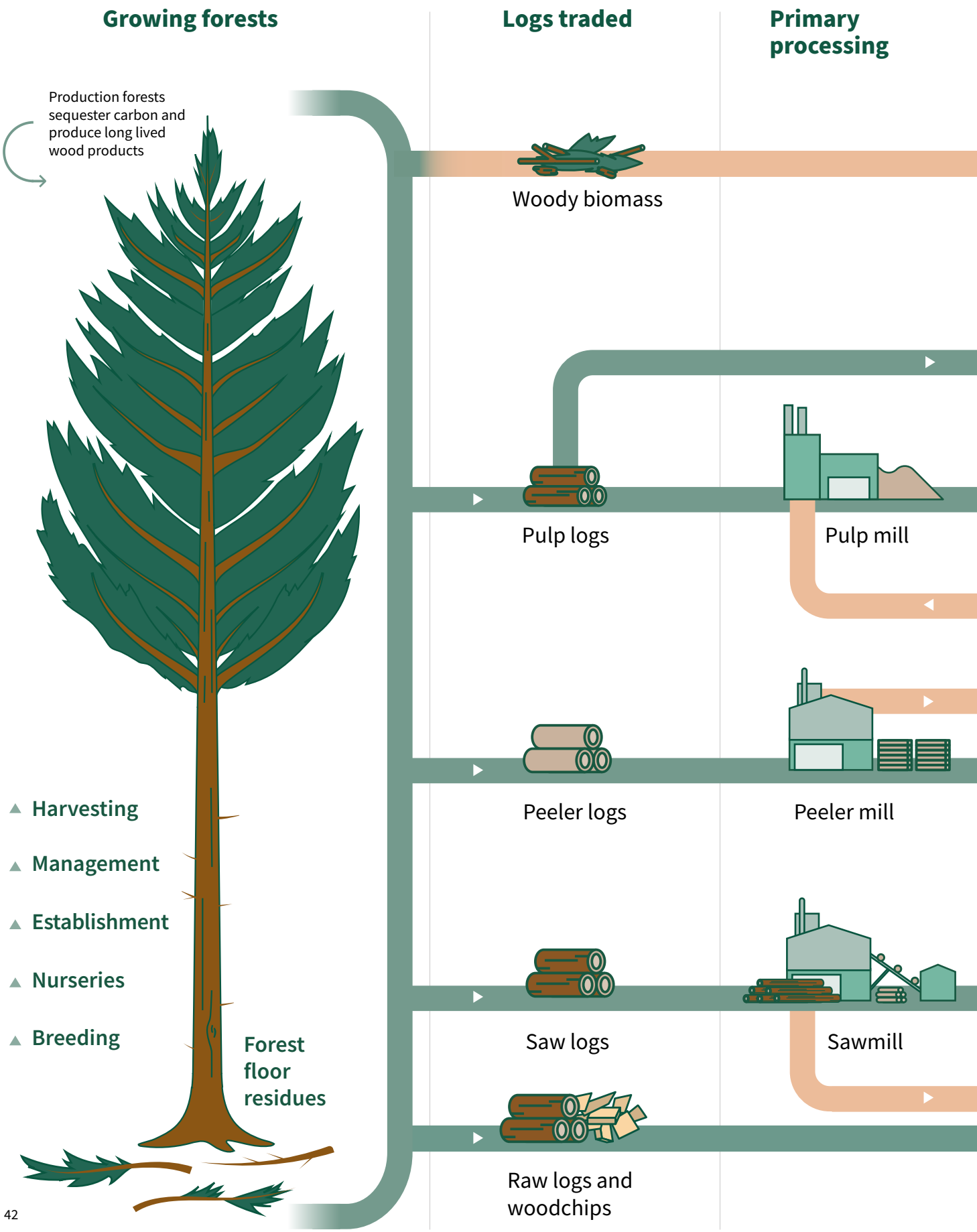
The transport and freight infrastructure system is a key enabler of the forestry and wood processing sector. This transport sector stores and transports logs, products, and residues from forest, to processor, to end market.

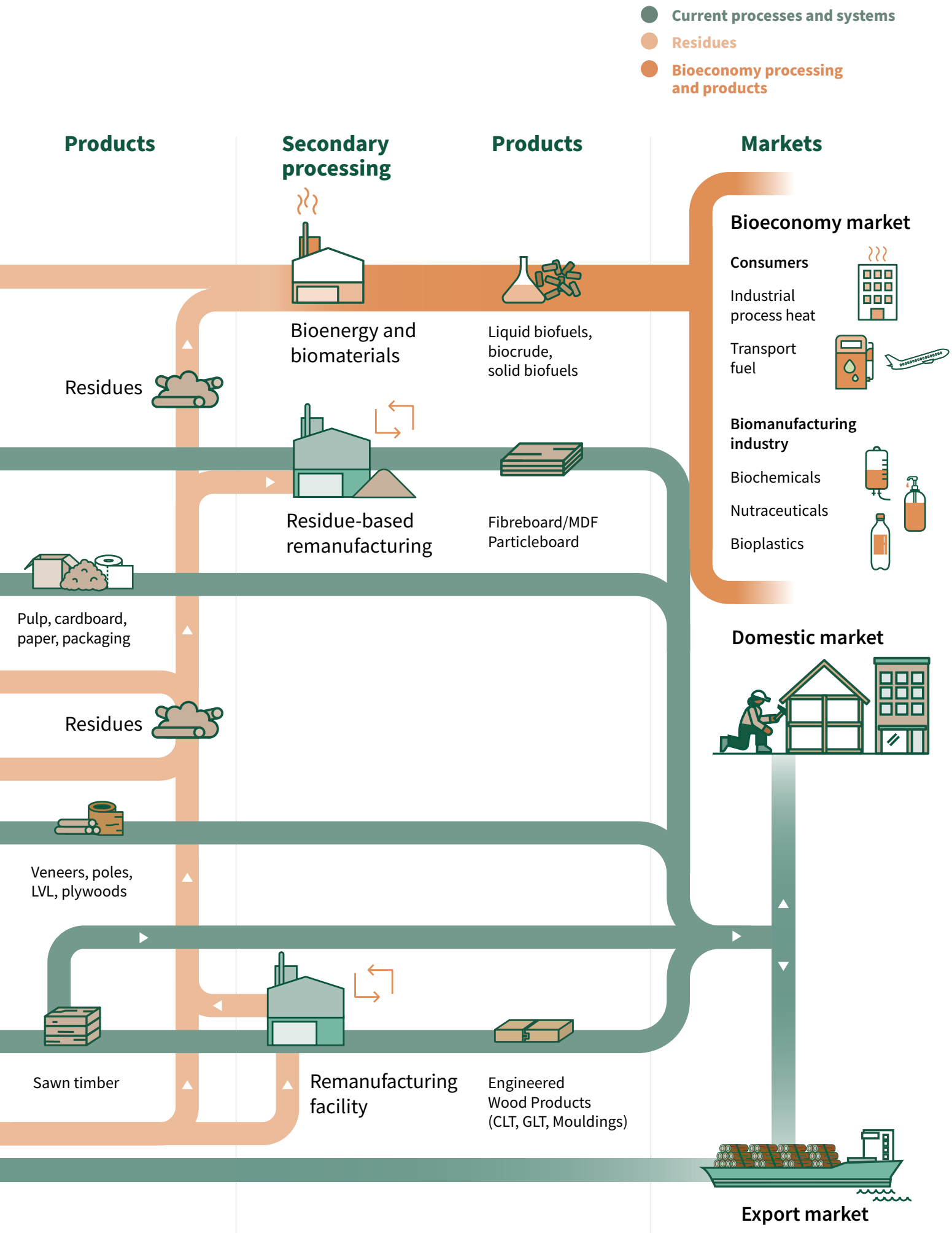
Transport is an important factor in business decisions and competitiveness due to New Zealand's rugged and often remote forest plantations, and our geographical location as an island nation. An efficient system that supports the supply chain in a timely, cost-effective manner is an important part of developing the competitiveness of businesses within the industry.



Forestry and wood processing system

The value chain of the sector is a complex system. From growing forests, to processing logs, and manufacturing a wide range of value-add wood products. Residues are used for the production of bioenergy and biomaterials that underpin the emerging bioeconomy.




Current processes and systems
Residues
Bioeconomy processing and products
Products
Secondary processing
Products
Markets
Bioeconomy market
Consumers
Industrial process heat
Transport fuel
Biomanufacturing industry
Biochemicals
Nutraceuticals
Bioplastics
Bioenergy and biomaterials
Liquid biofuels, biocrude, solid biofuels
Residues
Residue-based remanufacturing
Fibreboard/MDF Particleboard
Pulp, cardboard, paper, packaging
Domestic market
Residues
Veneers, poles, LVL, plywoods
Sawn timber
Remanufacturing facility
Engineered Wood Products (CLT, GLT, Mouldings)
Export market

Waipa Mill in the 1940s.

Historically, Government played a key role in establishing and growing the forestry and wood processing sector

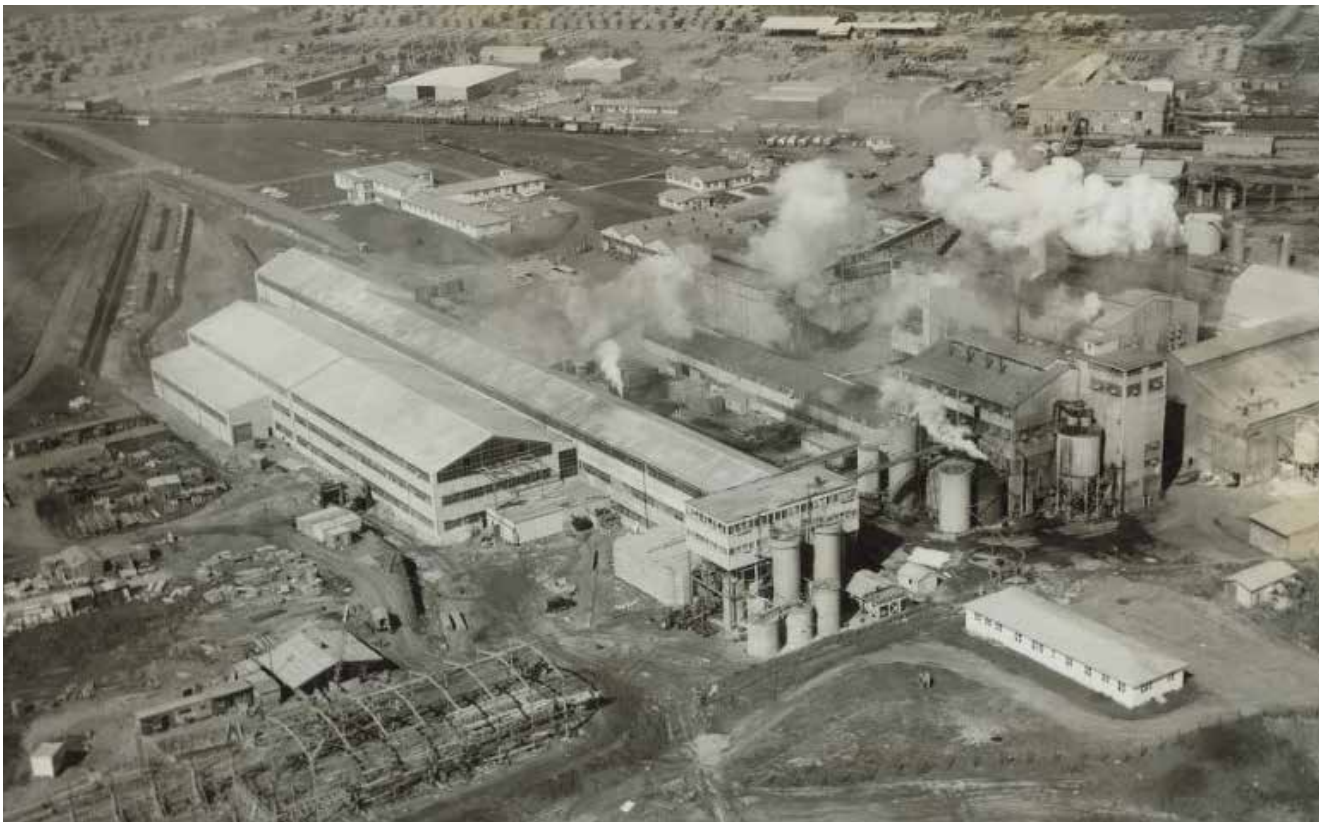
After European settlers began arriving in New Zealand in the 1800s, native timber processing quickly grew as an industry. Trade in products including ship masts and kauri gum made profitable exports. Large areas of forests were cleared for farming and agriculture.

By 1897, due to the slow growth of native species, the Government began an experimental tree planting programme in the Rotorua district and Kaingaroa Plains to learn which exotic species would survive in New Zealand conditions.

This was the beginning of New Zealand's productive forests industry. The key historical developments in the sector are summarised below. The history shows the critical role played by Government in catalysing innovation and partnering with the sector to drive growth, innovation and wider benefits to New Zealand.

- **1910s – Government-led species trials:** the Royal Commission on Forestry concluded that native species would not regenerate quickly enough to meet future needs and recommended New Zealand plant extensive exotic forests. Several tree species were further trialled, and radiata pine was a recommended species
- **1920 – State Forest Service established:** the State Forest Service ran an extensive planting programme during the Depression, which supported employment and made the Crown the largest owner of the exotic forests in New Zealand.
- **1930s – the Forest Service pioneered technology for processing exotic timber:** the Forest Service pioneered the technology necessary for large-scale sawmilling of exotic timber.[13] The Crown built sawmills at Waipa and Rotorua as demonstration projects, which eventually led to private investment in new and larger mills.

13 Wayne McClintock; Nick Taylor (1983). Pines, pulp and people: a case study of New Zealand forestry towns.



An aerial view of Kinleith Mill in 1959.

- **1950s – Establishment of pulp and paper mills at Kawerau and Kinleith:** in 1952, to support the establishment of the Kawerau mill, the Government granted the operator of the mill the right to purchase up to 28 million cubic feet of timber per annum from the state-owned Kaingaroa Forest and financed the necessary infrastructure, such as the construction of port facilities at Mount Manganui.
- **1960s – Sector growth:** the establishment of the mills in Kawerau and Kinleith and other locations initiated a period of rapid growth in the sector and had a dramatic social and economic impact on regional New Zealand. The Kinleith mill employed more than 3,300 people at its peak.
- **1980s – Functional split and protection of most Crown-owned conservation estate:** following ongoing public protests, the New Zealand Forest Service was dissolved in 1987 and the State forest estate was divided between the Department of Conservation (to manage protected native forests) and the New Zealand Forestry Corporation (to manage plantation forests). Although logging of native forest continued on the West Coast until 1999, this split legislatively removed most of New Zealand's remaining native forests from the forestry sector.
- **1990s – Privatisation of state-run forests:** the New Zealand Forest Service controlled most of the productive forest estate from 1919 to 1987, where it controlled roughly 50 percent of commercial productive forestry. In the 1990s these forests were sold to the private sector.

Demand for wood products

Many key sectors in New Zealand rely on wood products to operate

In New Zealand, demand for wood products comes from many parts of the economy. These include wooden pallets for logistics and freight operations, and fencing posts and poles in agriculture.

The construction industry is a major consumer of wood products

Timber remains the material of choice for housing construction in New Zealand due to its versatility and properties that make it easy to use, our familiarity with building with timber, and its low emissions in production. Around 90 percent of standalone residential buildings are constructed using timber structural framing.

Approximately 2.7 million cubic metres of sawn timber was used in 2019 across New Zealand's building activity.[14] The construction boom has driven an increase in housing permits issued and demand for sawn timber. Future demand is highly uncertain and depends on a range of factors including building costs, immigration, and demand.

New Zealand has seen significant growth in the export of unprocessed logs to a small number of countries

Each year the export of logs and wood products adds $6 to $7 billion[15] to the economy in export revenue. The sector has experienced significant export growth over the last decade. Since 2000, the export of raw logs has quadrupled.

Over this time, the harvesting of New Zealand forests doubled, but our domestic wood processing capacity remained the same. This means the export of these logs was the only option available to some foresters. As our mills tend to only process the high-grade parts of the log, the export market was critical for selling all parts of our logs.

Our export growth has been concentrated in a small number of markets, particularly the Chinese market where our logs are often used for concrete boxing.

New Zealand also exports value-added wood products

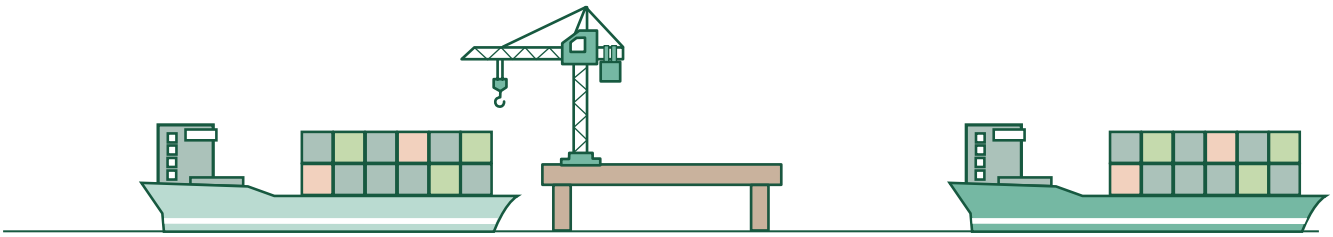
The export of value-added wood products has not seen the same level of growth – it has remained relatively constant. Value-added wood products have, however, provided strong export earnings for New Zealand, especially when considered by volume. Currently, value-added wood products make up just 15 percent of our forestry export volumes but generate over 40 percent of our forestry export revenue.

Some of New Zealand's largest wood processors supply value-added wood products to international markets. Many of our largest sawmills produce 'clearwood' – appearance-grade sawn timber from pruned logs that is used as weatherboards, internal wooden mouldings, and furniture. This wood is free of knots, so is sought after and generates a premium for these exporters. The United States is a strong market for these products.

14 BRANZ (2021). Estimates of wood demand in building construction 2021–2030.

15 Ministry for Primary Industries (2022). Situation and Outlook for the Primary Industries.

Products and markets

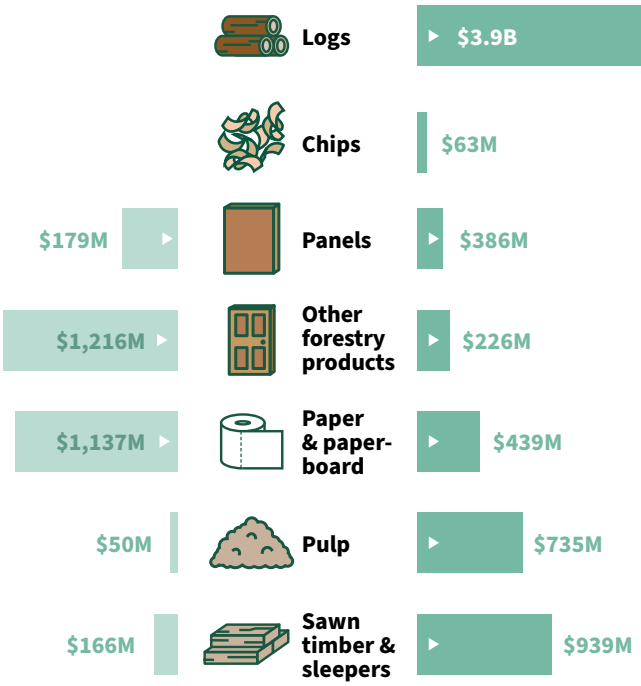


Value of imported wood products

New Zealand imports some wood products to supplement those produced locally, to support a range of specialty needs and industries.

Value of exported wood products

Forestry and Wood Processing is New Zealand's 4th largest export earner.



$1.5B

Manufactured wood products

Most of New Zealand's imported wood products are manufactured for use in the home

$3.9B

Logs

New Zealand currently exports over 60% of harvested wood as unprocessed logs (22M m^3)

$2.8B

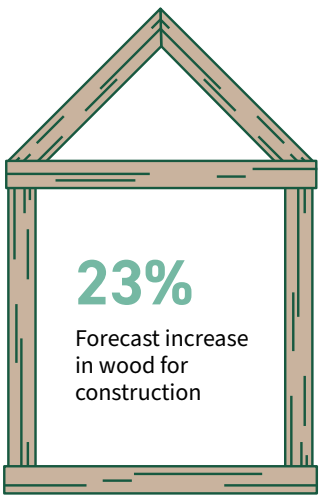
Wood products

Value-added wood products provide significant export earnings for New Zealand.

Source: Stats NZ; MPI (2022)

Use of wood in New Zealand's construction sector

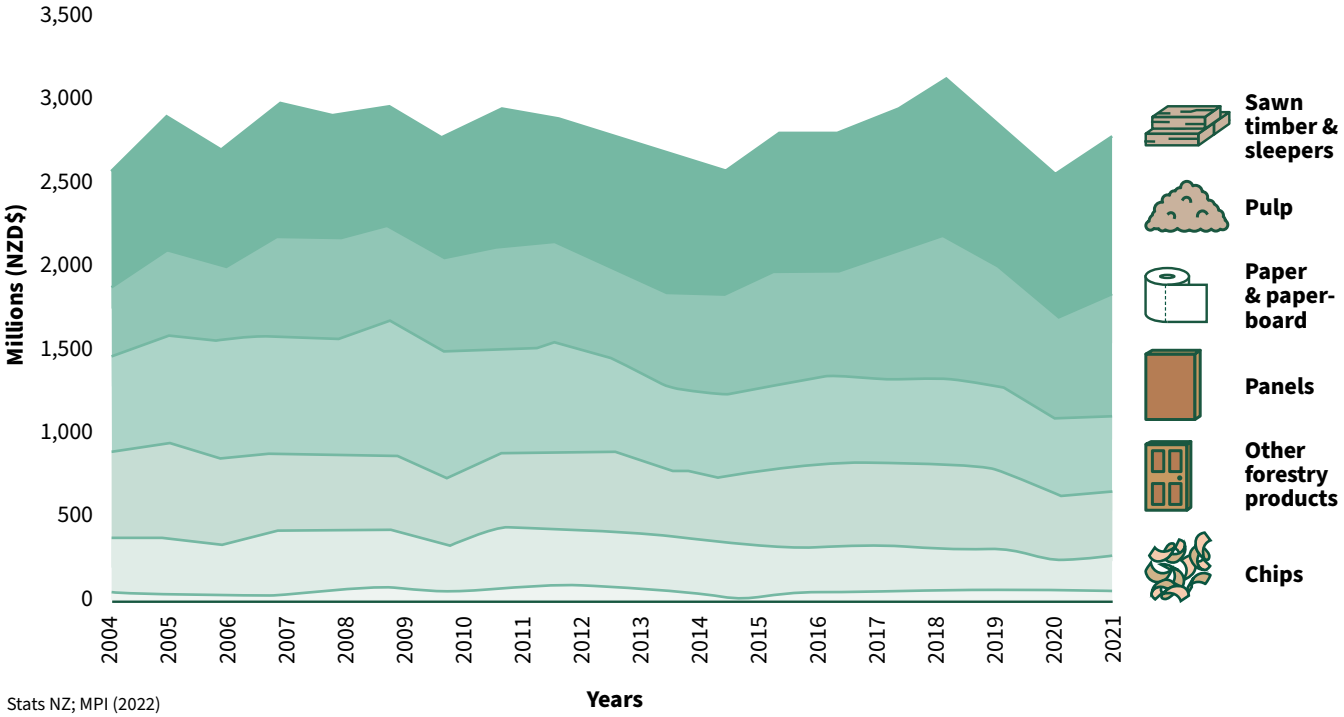
Wood is increasingly used as construction material – replacing concrete and steel (e.g., multi-storey buildings, mainframes, and roof structures).



Value of New Zealand's wood products' exports (2004–2021)

The export of value-added wood products has remained relatively constant.

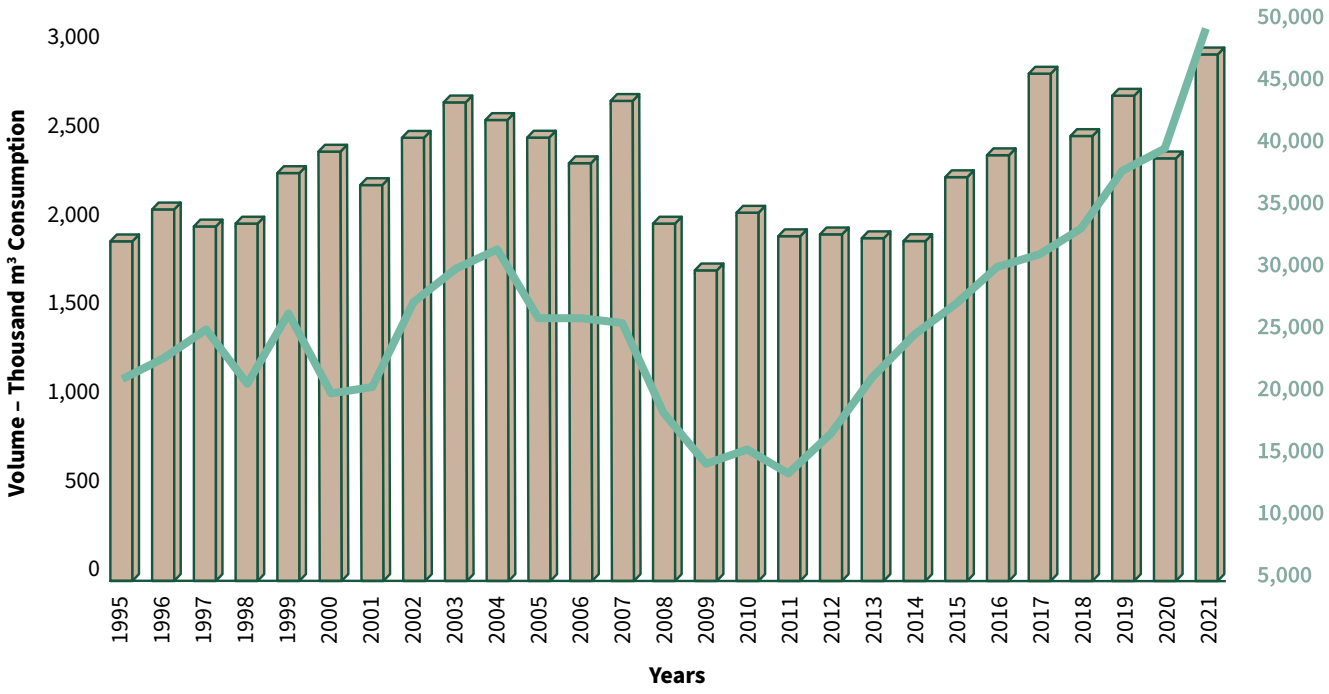
While value-added wood products make up just 15% of our forestry export volumes, they generate over 40% of New Zealand's forestry export revenue.



Stats NZ; MPI (2022)

New sawn timber demand and housing permits issued (1995–2021)

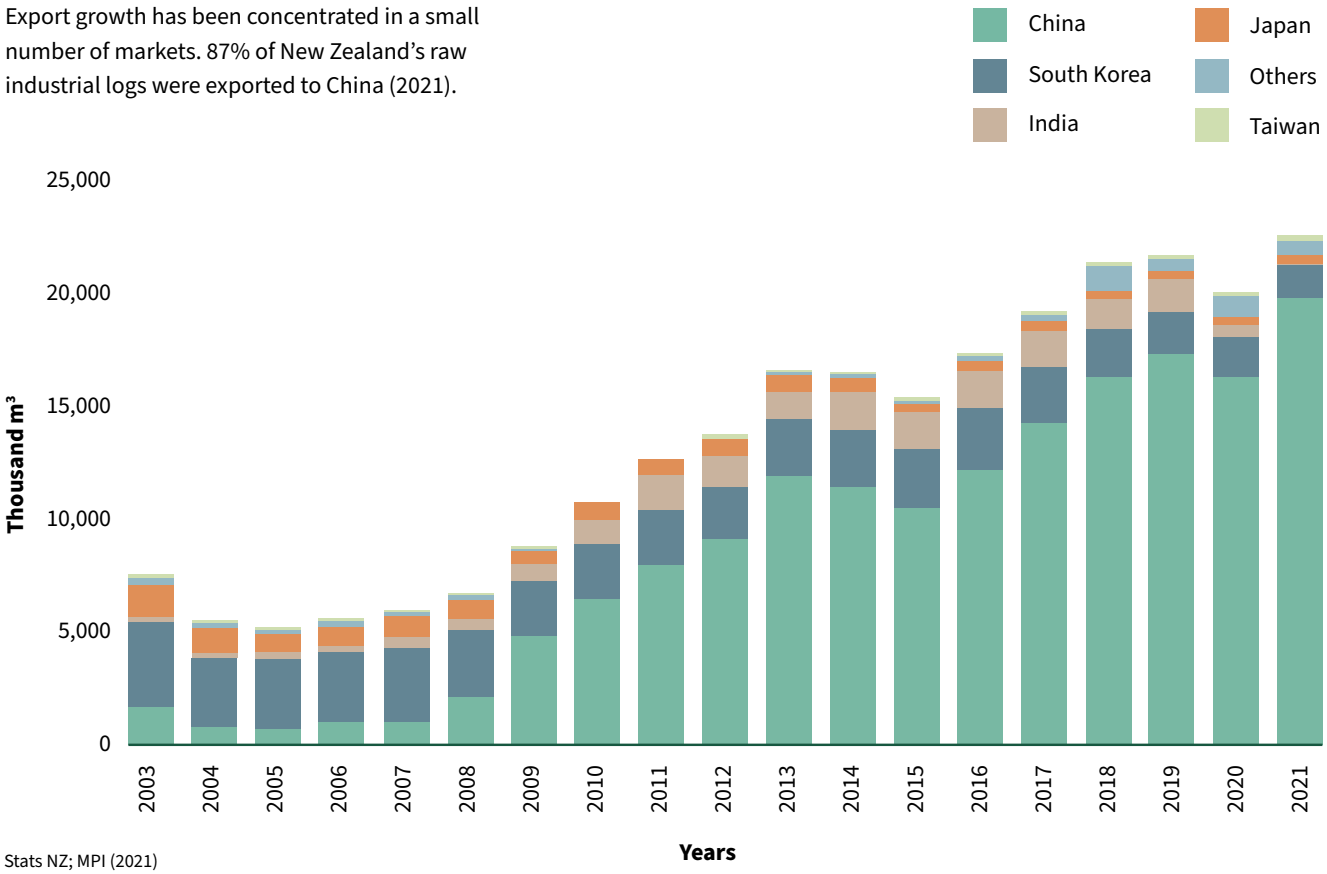
The construction industry is driving domestic demand for sawn timber as housing permits issued increased from 2012.



Source: Stats NZ; MPI (2021)

New Zealand log exports by destination

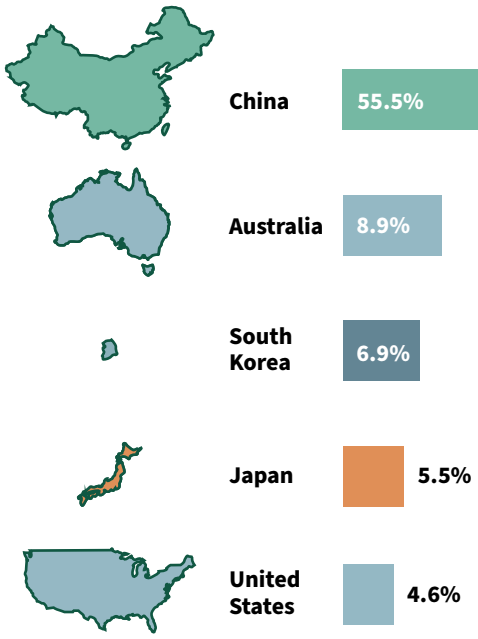
Export growth has been concentrated in a small number of markets. 87% of New Zealand's raw industrial logs were exported to China (2021).



Stats NZ; MPI (2021)

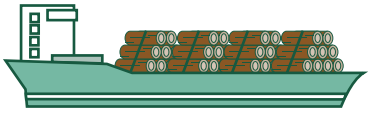
Top five export markets

81% of New Zealand's exports market is made up of five countries.



87%

of New Zealand export logs go to China



Source: Stats NZ; MPI (2022)

Health and safety and working conditions have improved in recent years.

Workforce

Today the sector employs approximately 41,000 people and is a key employer in regional New Zealand. It also supports employment in several associated industries.

Diversity remains a challenge for the sector

Diversity remains a challenge in the sector with the workforce identifying as 60 percent Pākehā, 22 percent Māori, and the remaining 18 percent consisting of Pasifika, Asian, and others. These diversity challenges are more pronounced at leadership level where most leadership positions are occupied by Pākehā men, with women, Māori and other ethnicities underrepresented.

The forestry and wood processing sector is also male dominated (82 percent), compared to the New Zealand labour force where the split is more equitable, with 48 percent female and 52 percent male. Recent trends are positive and indicate a growing number of women joining the sector. In 2016, 23 percent of new entrants to the sector were female.

We need to boost recruitment and retention of skilled workers

Like many sectors in New Zealand, this sector faces substantial challenges when recruiting and retaining a suitably skilled and qualified workforce.

Attraction challenges are driven by a range of factors including an aging workforce, rural depopulation, and perceptions of work in the sector as unsafe and physically demanding. Advances in safety and handling equipment in sawmilling has improved safety outcomes.

Individuals and organisations across the forestry and wood processing sector are taking steps to attract, train, and retain a workforce that is skilled, safe, and productive.

The Forestry and Wood Processing Workforce Action Plan (Action Plan) provides a framework to bring these steps together. This Action Plan was developed collaboratively by forestry and wood processing sector, government agencies, and First Union. The Action Plan is a living document that provides the flexibility to respond to the emerging workforce needs and will support the implementation of this Plan.

Health and safety will continue to be a strong focus of the sector

Healthy and Safety has been a traditional challenge for the sector. Significant strides in improving conditions for workers have been achieved in recent years through the Forestry Industry Safety Council (FISC) which has a goal of zero fatalities.

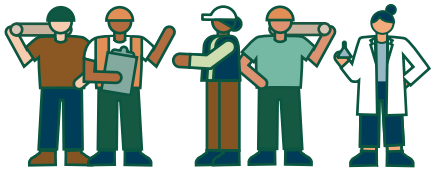
MPI is partnering with FISC to support Safetree certification, a safety and wellbeing standard ensuring all forestry contractors are working to the same industry safety specifications. MPI is also supporting FISC with the roll-out of a practical leadership programme, which aims to improve work, health, and safety outcomes for crews through improved communication and leadership.

People working in the sector

The sector has increased the number of jobs between 2012 and 2019, providing employment to over 40 thousand people.

Total people working in the sector

40,835

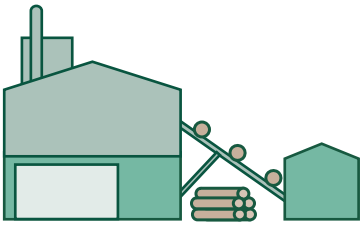


↑ 6.8% increase (2012–19)

People working in wood processing/ commercialisation

79%

32,260 people

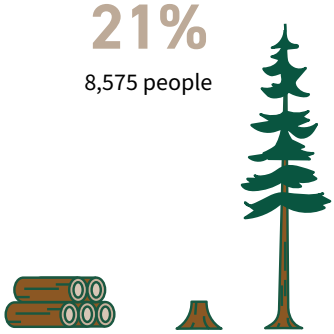


↑ 2.4% increase (2012–19)

People working in forestry

21%

8,575 people



↑ 8.1% increase (2012–19)

Only direct employment is included here. The sector provides further indirect jobs not included in these numbers.

Gender

The sector is male dominated (82%), but more women are joining the sector (e.g. in 2016, 23% of new entrants to the sector were female). Women working in the sector are more highly qualified and tend to occupy more science-related positions.

82%
Male

18%
Female

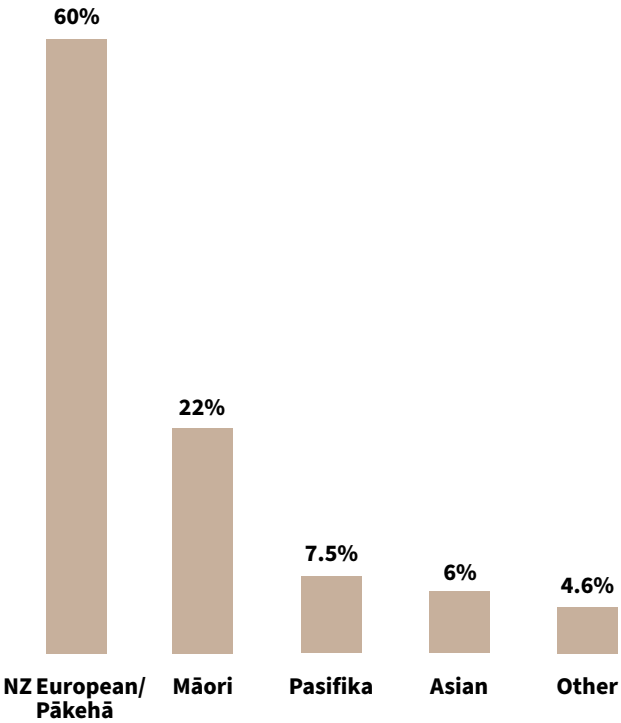
Median age

Employees	Self employed
41 years old	54 years old

The sector has an aging workforce, with a higher median age of 41, compared to the range of median ages (30–37) across other primary industries.

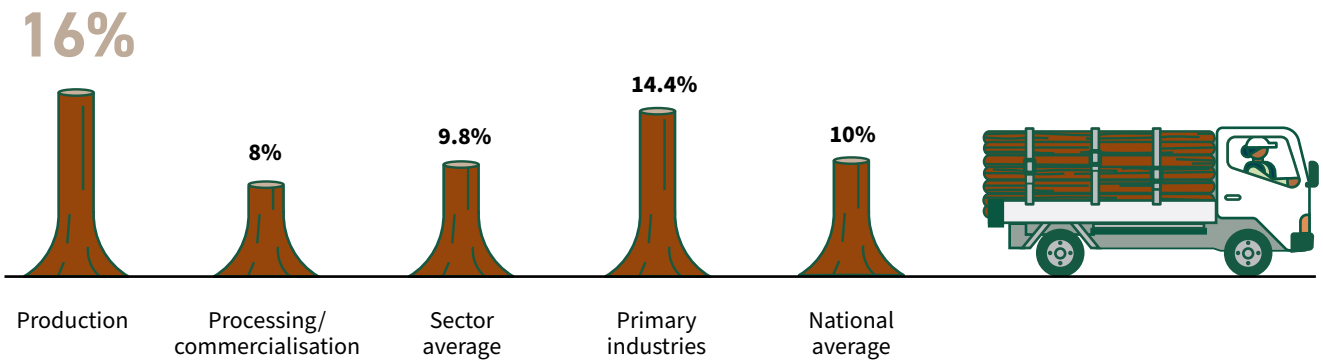
Ethnicity

Diversity remains a challenge in the sector, particularly at leadership level, where most positions are occupied by NZ European/Pākehā men.



Self-employment in forestry and wood processing

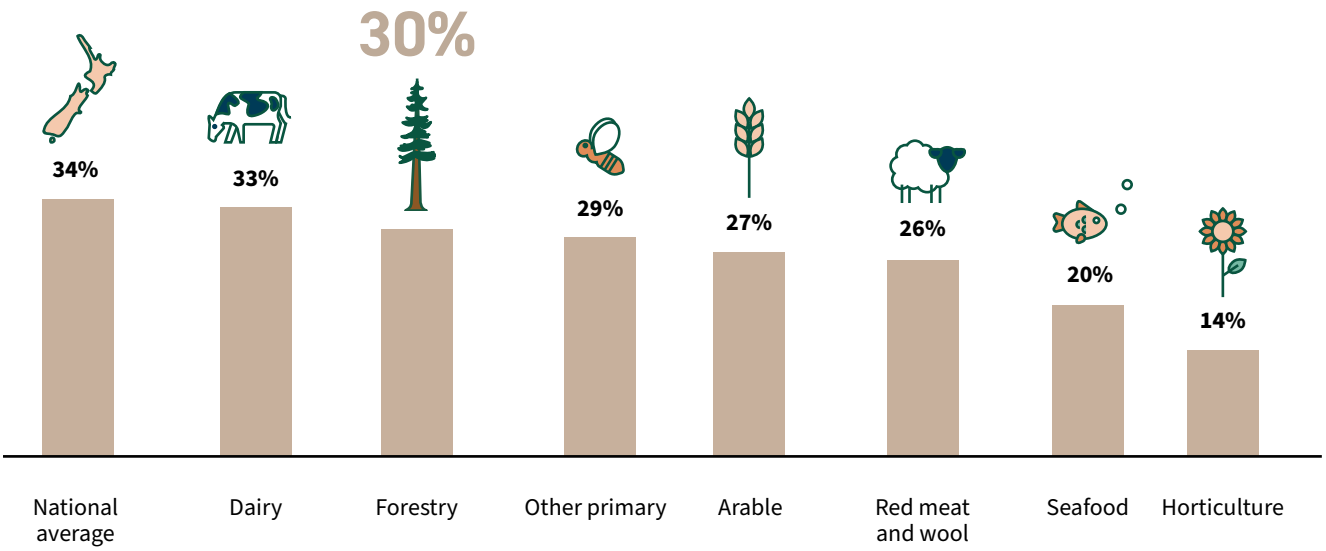
Within the sector, self-employment in forestry production (16%) is higher than across all primary industries (14.4%), and significantly higher than the national self-employment average (10%).



Source: Food and Fibre Workforce Snapshot (MPI, 2022)

Forestry retention rates

30% of the forestry sector new entrants remain employed within forestry after three years (2013–2016), below the national average of new entrant retention (34%). This rate excludes retention within wood-processing employees.



Source: MPI (2019)

Action plan for transformation

We welcome your feedback on the draft actions

This draft Plan is a consultation document. It includes a proposed suite of actions to transform the sector. We want to hear your thoughts on these draft actions and how they could be implemented.

The final Plan will be published after we've considered your feedback. This will feature a roadmap for how the actions will transform the sector, including who will implement the action and when, and how it will be funded.

The actions will need to be implemented over time. Some actions are already underway, and some are investment ready. Other actions will be developed over time as we need more information before concrete proposals can be developed and agreed by government, the sector, and other stakeholders.

Some actions are interdependent and will only be effective once another action has been implemented.

The actions are organised into four priority areas

This Plan is based around four priority areas to support the transformation of the whole sector. For each focus area we propose key objectives we want to achieve. Under each objective we propose supporting actions.

The diagram overleaf summarises the priority areas and key objectives. The actions are explained under each objective throughout this section of the document, and we summarise them in a table at the end of this section.

Growing sustainable forests for our future

1 Improving the productivity of our forests

2 Diversify our productive forests to build sector resilience

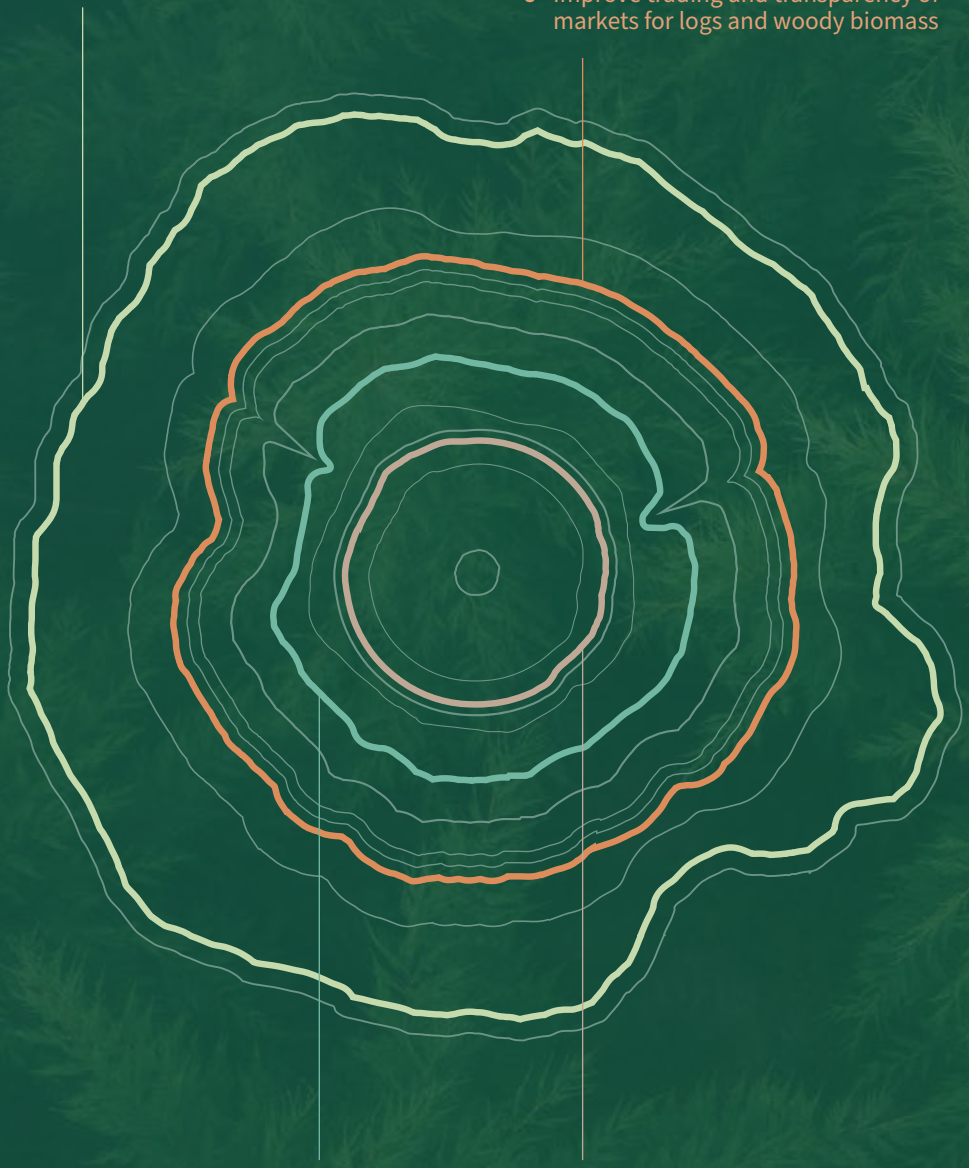
3 Increase use of woody biomass to produce high-value products and fuels

Modernising and expanding the wood processing sector

4 Grow investment to increase manufacturing of advanced wood-based products for building, biotech and fuels

5 Support sector co-location, collaboration and sustainability

6 Improve trading and transparency of markets for logs and woody biomass



Growing and diversifying domestic and export markets

7 Grow domestic demand for our wood products

8 Grow and diversify export markets

Improving system settings for a thriving sector

9 Support Māori aspirations in the sector

10 Create a strong and collaborative sector

11 Grow and attract the future workforce

12 Drive science and innovation across the sector

13 Provide sector insights to lift performance and innovation

Growing sustainable forests for our future

This priority area proposes several actions to increase productivity, employment and resilience in the forestry sector. This includes the trees we plant and how the trees are managed and harvested.

Delivering on these proposed actions will ensure that we can meet the growing demand for wood products and create better economic, social and environmental outcomes from our forests.

Objectives

1 Improving the productivity of our forests

Forest growing has, to date, been mostly focused on volume. New technologies are creating opportunities to add value, improve safety, and support better coordination between forest managers.

Supporting coordination and aggregation of small woodlots

Small woodlot owners and Māori are key suppliers of logs and biomass in New Zealand. However, many Māori and small woodlot foresters have not met their potential due to lack of scale.

Supporting these forest owners with tools to work together will benefit foresters and wood processors as both gain greater certainty of price and supply. Some of the key opportunities include working together to plan harvest flows, share machinery, achieve economies of scale, and exercise greater bargaining power.

Increasing automation and digitalisation in forest management

This Plan proposes actions to increase the uptake and adoption of new technologies to add value, increase productivity, and improve safety.

The forestry cycle is becoming more automated across the world. Some examples include the following:

- New mechanical tools and machines can help improve safety and productivity in nurseries, planting, pruning, thinning and harvesting, and deliver higher quality logs
- Drones are creating advances in data and automation for nurseries, forest inventory, and even harvesting. In the future, such tools could allow activities like selective tree cuts on steep, remote areas without endangering people
- New harvesting heads on excavators can help prevent stem breakage and reduce wood wastage
- Log sorting that uses artificial intelligence can remove bottlenecks in the harvesting process.

Domestic innovation along with strong international connections with leading jurisdictions will be crucial to ensuring New Zealand adopts world-leading technology.

On the left: Grand fir, Northland.

Automation can offer a solution to declining rates of pruned logs

Value-adding silviculture, such as pruning and thinning, have declined over recent years due to older technology, market forces, and labour shortages. Wood processors are concerned about the impact this decline will have on the amount of high-value timber that will be available over the next decade.

New mechanical and automated technology can offer a possible solution by lowering the costs of these value-adding processes and reducing reliance on labour.

Using genetics to improve our forests

Tree breeding and genetic development programmes are fundamental to improving productivity and developing the sector's long-term sustainability and resilience. Sustained investment in genetic research and development will be vital along with measures to ensure that all growers have fair access to the best genetic stock.

The Radiata Pine Breeding Company plays a key role in the sector. The company runs a critical breeding program that improves the genetic traits of radiata pine for its shareholding companies. Supporting forest grower access to the latest genetic research and future market development will be vital to innovation and resilience.

Any genetic development around native species must honour the role of the Wai 262 claim[16] and Government's ongoing response to it[17]. Wai 262 is a wide-ranging Waitangi Tribunal claim and relates to the ownership and use of Māori knowledge, cultural expressions, and indigenous species of flora and fauna and products made from them.

16 Waitangi Tribunal, Ministry of Justice (2011). Ko Aotearoa Tēnei, Te Taumata Tuatahi.

17 Te Puni Kōkiri (2019). Wai 262 – Te Pae Tawhiti: The role of the Crown and Māori in making decisions about taonga and mātauranga Māori.

Actions	Outcomes
1.1 Increase forestry benefits to Māori and small woodlot owners through aggregation Work with the sector, Māori, and small woodlot foresters to stimulate aggregation through: • improving data and information sharing • supporting the development of aggregation pilots and business cases • reducing barriers such as tax settings • improving the purchasing environment for multiple small blocks.	Small scale forestry performance increases and attracts investment. Log supply is more predictable due to aggregation initiatives.
1.2 Develop harvesting and logistics using automation and robotics The Government and industry co-invest to: • develop new automated technology in harvesting and sorting logistics • identify the skills necessary to operate new machinery, and • promote, commercialise, and deploy new technologies.	The sector can: • commercialise new products • use new automated technologies and processes • grow the high-tech forestry machinery sector • improve the labour market with a more targeted and diverse workforce.
1.3 Invest in precision silviculture practices The Government and industry co-invest to improve forest management by developing mechanisation, automation, digital technology, and robotics for silviculture (nurseries, planting, thinning, and pruning).	The program lifts productivity, log quality and sustainable forest management to mitigate labour issues, and improve health and safety outcomes.
1.4 Improve breeding and genetics of forestry species Explore options to improve breeding and genetics to enhance resilience and productivity, while honouring the Wai 262 decision. This will include: • assessing the current state of genetic stock • identifying opportunities to increase access, boost research and advance development • mitigate wilding risk.	Foresters use the most resilient and productive genetic stock when planting. Forests are more productive, resilient, and sustainable. They also generate fewer environmental issues such as wildings. Genetic research initiatives honour mātauranga Māori and advance the Wai 262 kaupapa.

2 Diversify our productive forests to build sector resilience

The productive forestry sector has a high focus on clear-fell forestry systems and radiata pine forestry, which makes up 90 percent of the commercial estate. Our high reliance on radiata pine and a single management regime limits the products and benefits forests can offer. It also exposes the sector to climate change and market risks.

Diversifying our forests will help us adapt to climate change

Climate change is causing more extreme weather events, such as extended droughts, more frequent high-magnitude fires, increased windstorms, and wider biological damage to New Zealand's forests.

Very high and extreme fire risk days are predicted to increase, with the length of the average fire season increasing by about 70 percent by 2040[18]. The International Panel for Climate Change said in its recent report [19] that the productivity of radiata pine in New Zealand due to higher CO_2 is projected to increase by 19 percent by 2040, but greater wind damage and increased pathogens to trees is expected.

Pests such as mountain pine and spruce bark beetle outbreaks have caused major losses in North America and Europe, and necessitated governments to support adaptation with replanting different species and improved stand management techniques.

Diversification will bring new opportunities, products and markets

Diversifying our forest species and forest management practices offers significant opportunities for growth and building the sector's resilience.

New opportunities will come from using new species and management regimes. These include developing high value carbon-neutral products beyond traditional radiata pine products.

Modern breeds of cypresses and eucalypts are disease-resistant and offer incredible visual and natural durability properties for high-value wood products and nutraceuticals. Douglas fir is the structural species of choice in many other countries.

Eucalypts and other hardwoods can be used for bioproducts and can be grown on rotations of 2–16 years depending on the species. These "biomass forests" can produce 20 times the amount of energy per year compared to the residues from a conventional forest and are valuable for use in high-value bioplastics and packaging.

Farm foresters growing pine and eucalypt species adjacent to their paddock.

18 Michael S Watt, Miko U F Kirschbaum, John R Moore, H Grant Pearce, Lindsay S Bulman, Eckehard G Brockerhoff, Nathanael Melia; New Zealand, Forestry: An International Journal of Forest Research (4 August 2018). Assessment of multiple climate change effects on plantation forests.

19 Judy Lawrence. International Panel on Climate Change 2022 Sixth Assessment Report (1 October 2021). Chapter 11: Australasia.

Certain native and exotic species such as tōtara and redwoods are conducive to continuous canopy harvesting models. These models can help enhance wider environmental and community benefits, such as recreation and carbon sequestration.

Planting these different species will require changes across the supply chain, such as lowering seedling costs, genetic research, and developing new processing infrastructure, products and markets.

Alternative forests management practices provide potential benefits

Continuous canopy forestry is an alternative to clear-felling rotational forestry. Only individual trees or small groups are harvested, and it can promote the management of mixed species and ages in a stand. Countries around the world implement this form of forestry to produce high-value timber and reduce the footprint of harvesting.

Continuous canopy forestry allows a forest to be continually productive and carbon-positive. This method can generate regular employment and maintain other standing forest benefits, such as recreation, biodiversity, erosion control, or flood mitigation. Opportunities exist for encouraging greater use of this type of harvesting practice in New Zealand.

Forests offer a wide range of economic opportunities

As forests grow, there are emerging opportunities to support the development and commercialisation of parallel revenue streams for forests owners and realise greater economic, social and cultural value for regional communities and Māori. Examples of these opportunities include tourism and recreation (such as mountain biking and hunting) and a range of non-wood forest products, such as kai, mushrooms, kōura, essential oils, and ginseng.

The Crown can drive the use of new forestry systems

The Crown has significant forest holdings and a long-term investment horizon. This Plan proposes evaluating the potential for the Crown to advance and demonstrate new opportunities in forestry, focusing on diversifying tree species and management regimes.

Horowai Forest – Kerikeri, Northland: continuous canopy forestry for high-value wood products

Horowai Forest is a 200-hectare family-owned enterprise near Kerikeri. It consists of four types of plantation forestry of equal size (50 hectares each): radiata pine, stringybark eucalypts, cypress, and an indigenous reversion conservation area.

The forest is being managed under a continuous cover regime and is set up to produce sawn specialty timber and high-value products. As radiata pine trees mature, they will be felled and progressively replaced with high-value exotic species. Cypress and stringybark eucalypts are forecast to produce greater returns than radiata pine and are better suited for continuous cover harvesting.

The key challenges for Horowai Forest include manual harvesting, limited efficiency of small-scale sawmilling technology, and competing with low cost wood products from overseas where there is a risk of illegal and unsustainable harvest.

The advantages are that:

- the operation is vertically integrated (from growing the forest to milling the wood and producing wood products),
- it offers higher employment for the investment, and
- it has sufficient scale to generate niche markets.

Actions	Outcomes
2.1 Develop a diversification programme for productive forests Develop a Productive Forest Diversification Programme including: • Developing a strategic approach to diversifying productive forests to guide future policy, research, investment, education, promotion and risk management activities • Accelerating research and development into the best alternative species, management, non-wood forestry opportunities and markets • Sawmilling and processing opportunities • Planning for climate change adaptation and mitigation • Setting up a continuous canopy forestry working group • Enabling changes to NZ ETS look-up tables to more accurately reflect carbon stock changes and incentivise improved management	New Zealand's productive forests are more diverse and sustainable. Our forests are more resilient and produce better returns for growers, while processors are able to offer more products for the bioeconomy and high-value timbers. Forest growers are adapting for and mitigating risks from the changing climate, while managing forests for a wider range of opportunities and benefits.
2.2 Develop investment cases for key alternative species The government partners with industry to fund investment cases and feasibility studies at regional scale.	Landowners and investors are better informed about the economic viability of alternative forests species.
2.3 Develop a productive native forestry sector by investing in nursery technology Lower the costs of indigenous forestry by establishing a large-scale, efficient indigenous nursery supply chain.	Improved seedling availability at lower cost to establish carbon-positive native forest estate. Increase in the supply of sustainable and high-value timber. Over time, improved nursery technology should improve the supply and price of seedlings for alternative species (native and exotic).
2.4 Explore the role of the Crown for investing in the diversification of productive forests Scope the potential for the Government to invest in diversifying our productive forests using alternative species and management regimes.	The Crown strategically maximises wider benefits from forestry, and: • supports regional employment and forestry expertise • accelerates the bioeconomy, including carbon sequestration, high-value timbers, non-clearfell regimes, non-wood forest products, farm-forest integration, and recreation.

3 Increase use of woody biomass to produce high-value products and fuels

The demand for biomass is forecast to grow quickly over the next decade as businesses increasingly look to adopt sustainable alternatives to non-renewable products. These alternatives include biofuels, bio-chemicals, nutraceuticals and biopharmaceuticals.

Modelling undertaken by Te Uru Rākau – New Zealand Forest Service shows that the use of biomass by large industrial manufacturers is forecast to put significant pressure on demand, and lead to a shortfall in supply in the 2030s.

Increased demand can be met by using the residues from harvesting (slash from forest floors), growing domestic wood processing (which would result in more processing residues), diversion of low value logs from export (where higher value use can be obtained by domestic processing) and by planting biomass forests in strategic locations to meet regional demand.

These opportunities to grow supply would be enhanced with a greater regional approach to demand and supply analysis, including greater availability of information on supply and demand.

Recovering harvest and processing residues

Approximately 3.5 million tonnes of harvest residues remain in production forests each year. Of this, Scion estimates that approximately 1.6 million tonnes could be recovered from landing sites, which could be used to produce 11 million GJ per annum. This is enough to decarbonise the entire dairy sector.

The recovery of biomass needs to occur sustainably so that it doesn't create risks to nutrient recycling in the forests. For example, some residues need to be left on the forest floor to return valuable nutrients for the next generation of trees. More work is needed to determine best practice for harvesting residue recovery.

Lowering the extraction and transport costs of harvesting residues will be key to increasing the use of forestry residues. A range of options are being considered. For example, Scion is exploring the concept of 'distributed manufacturing', which involves placing processing units closer to the forestry resource.

Slash left behind at forestry landing site.

Biomass forests provide an opportunity to drive decarbonisation

Meeting growing demand for woody biomass will also involve planting new types of forests, such as 'biomass forests'. This forestry optimises fast-growth, energy content, or other high-value tree properties, which enable new decarbonised products in the bioeconomy.

There are a range of suitable species for these types of forests, including eucalypts, willows, or pines. But further research is needed to understand the forest systems best suited for biofuels and high-value bioproducts.

There may also be opportunities to optimise how we process, transport, store and utilise biomass to ensure the highest energy returns. Further research and improved practices could potentially lift our efficiency and sustainability.

Certainty of supply is critical for attracting investment in biomass processing

The current lack of certainty of woody biomass supply is a key deterrent to new investment in bioprocessing. We need to better understand best recovery practices, the location, and the amount of biomass available so we can strategically manage this valuable resource and inform investment decisions for processing biomass.

A bioeconomy strategy is being developed by the Ministry of Business Innovation and Employment. This strategy will lead the work in this area to understand the sector's supply and demand, and consider how to address issues of strategic use.

The use of woody biomass needs to be sustainable

High demand for woody biomass may result in some perverse outcomes unless it is well managed. Land-use change to create biomass feedstocks has in some cases overseas contributed to deforestation, biodiversity loss and competition for land traditionally used to produce food.

It is important that high demand does not create perverse outcomes such as using higher grades of logs for biofuel production. It is important we maximise the strategic use, value, and life span of our logs and woody biomass resources.

GreenChem: Using willows to create high-value bioproducts while treating sewage

GreenChem is a biotech start-up near Palmerston North that is developing new technologies to produce high-value biomaterials made from different hardwoods planted on sewage treatment sites. Some of GreenChem's innovative products include bioplastics used for luxury car seats.

To secure a feedstock to make these products, they use certain self-coppicing willows which withdraw toxic minerals from sewage sites. These trees are harvested every 2-3 years. Self-coppicing is the process of cutting trees down so they can naturally regenerate instead of manually planting new trees. There is potential to extend the range of species used for this and similar processes.

GreenChem's work will draw on a relatively small catchment area. There will be potential to collaborate with farmers, who are interested in diversifying their production for areas as small as 5 to 10 hectares.

Actions	Outcomes
3.1 Research and develop sustainable recovery practices of forest residues Research and develop best practices and technologies for removing woody biomass from forestry operations that are ecologically sustainable and cost-effective.	The sector recovers biomass residues from forestry operations using the best environmental practices. An increased supply of woody biomass meets future demand for biofuels and bioproducts and provides additional revenue to forest owners and operators.
3.2 Map biomass supply and demand Conduct a nationwide mapping exercise of woody biomass supply and demand by region and support better matching between suppliers and users.	Information is available on the sources and volumes of available woody biomass, which enables government and industry to strategically plan for using this resource.
3.3 Increase woody biomass supply The Government will plant 10,000 hectares of forest, including alternative species. Forests will be managed for biomass to meet growing demand. This will include research on the best species and management regimes for growing forests for energy and bioproducts.	Ensuring an adequate supply of woody biomass will encourage investment in wood processing and the processing of woody biomass. It will also support New Zealand's transition to a low-emissions economy by replacing higher emissions fuels and products.
3.4 Optimise energy value from wood fibre Advance research and develop guidance on how to optimise the energy value from wood fibre residues.	New Zealand's bioenergy supply chain optimises how it stores, dries, transports, and utilises biomass residues to maximise energy output and using biofuels as a substitute for fossil fuels.

Modernising and expanding the wood processing sector

Since 2000, the number of logs we harvest has doubled. Despite this significant increase domestic sawmilling capacity has remained largely unchanged, while the export of raw logs has quadrupled to around 60 percent of our harvested logs.

This priority area proposes a range of actions to grow and modernise wood processing in New Zealand, so we can get more value from our logs and produce more residues.

Objectives

4 Grow investment to increase manufacturing of advanced wood-based products for building, biotech and fuels

Significant investment is needed to modernise the wood processing sector

Expanding and modernising the wood processing sector will require significant new capital investment. New investment is required to:

- upgrade processing technology and adopting advanced manufacturing technologies at scale
- increase research and development, innovation in processing and new products
- lift the performance of our secondary processors such as pulp and paper
- cultivate new bioeconomy ventures.

Small and medium sized mills across the country make an important contribution to regional New Zealand. These mills, alongside large mills, will also benefit from additional investment to ensure they remain competitive and can take advantage of emerging opportunities.

We need to address the key factors that inhibit investment

Research indicates that the following key factors inhibit investment in the sector and constrain our international competitiveness:

- costs, risks, and delays associated with establishing new wood processing infrastructure (for example resource consents, access to equipment)
- long-term uncertainty and short-term volatility of the price and supply of logs and biomass
- high operational and input costs, and supply chain inefficiencies (particularly for transport and energy)[20]
- challenges developing and accessing overseas markets
- structurally higher capital costs relative to other developed countries[21]
- other countries having more favourable tax settings, financial incentives, and policies that support using wood in construction.

20 While logs are the primary input, the sector utilises a range of other inputs such as fibre (including recycled paper in some cases), labour, electricity, and gas.

21 OECD (2022), Financing SMEs and Entrepreneurs 2022: An OECD Scoreboard, OECD Publishing, Paris, https://doi.org/10.1787/e9073a0f-en

Growing domestic wood processing will require addressing these barriers to investment.

Key opportunities to improve the investment environment

New Zealand is one of many countries seeking to attract investment in forestry and wood processing. New Zealand has a strong legislative system and low corruption, and is regularly ranked high in terms of ease of doing business.

However, to support the long-term development of the sector, our underlying settings (tax arrangements, planning, and regulatory processes) and the supporting supply chains need to be reliable, predictable, and internationally competitive.

Some key opportunities for improving the investment environment include:

- improving tax and financial settings to ensure New Zealand's wood processing investment environment is internationally competitive
- competitive access to finance and capital markets and increased private sector investment
- releasing information on wood availability and the costs and requirements to establish key processing plants in New Zealand
- using clustering to achieve economies of scale for smaller processors and offtake opportunities
- ensuring that planning and consenting processes are expedient, effective and provide certainty for investors
- supporting Māori to access and utilise capital and finance.

Emissions pricing plays an important role in incentivising production

The Government is considering how emissions pricing in the New Zealand economy can support our climate change targets. There are opportunities to consider how to price emissions, or recognise delayed emissions, associated with producing and consuming wood products and other building materials.

One risk of emissions pricing is 'emissions leakage', where firms either:

- shift their production to countries with weaker climate policy to avoid or reduce the emissions price they face
- lose market share to imports from countries with no or weak emissions pricing.

The risk of emissions leakage is currently managed through the allocation of New Zealand Units (NZUs) in the NZ ETS (a process called 'Industrial Allocation'). NZUs are allocated to firms undertaking eligible industrial activities considered at risk of emissions leakage.

This is relevant to the forestry and wood processing sector as some steel and concrete imports, which compete with wood products, are in some cases not subject to emissions pricing. Additionally, locally made steel and concrete products receive industrial allocation which provides these emissions intensive products with an advantage over less emissions intensive domestic-made wood products ineligible for allocations.

In the Emissions Reduction Plan, the Government committed to looking at how we manage the risk of emissions leakage. One possible alternative is a carbon border adjustment mechanism, similar to that currently being explored by the European Union.

Exploring options to recognise the value of delayed emissions from carbon stored in wood

Wood products store carbon, which delay emissions of carbon dioxide from a harvested forest, potentially for significant periods of time. This 'delayed emission' is accounted for within New Zealand's greenhouse gas inventory. Logs processed in New Zealand tend to be turned into longer-lived wood products than those processed offshore. These longer-lived wood products store carbon for longer.

There are opportunities to recognise this carbon benefit to:

- incentivise greater production of long-lived wood products in New Zealand; and, as a result
- increase the carbon stored in wood products.

There are different options to recognise the carbon stored in harvested wood products, including either a type of fund, an NZ ETS scheme, or voluntary carbon markets[22]. Further investigation of these options is required to enable Government and industry to make an informed decision about this opportunity. Investigation will include looking into the design considerations, benefits, costs and wider implications of implementing various options.

The Industry Transformation Plan Advisory Group strongly supported changes to the NZ ETS to enable NZUs to be awarded to wood processors to recognise the carbon stored in wood products.

The commercial sector will play a key role in catalysing transformation

The forestry and wood processing sector needs to engage with the financial sector to raise understanding of wood processing, and of awareness of the climate-friendly and productive investment opportunities available. Sharing information on the growing innovations within the bioeconomy will help increase understanding of the potential to manage climate-related risks and deliver social benefits, while providing strong economic returns.

22 Evaluation of the climate benefits of the use of harvested wood products in the construction sector and assessment of remuneration schemes, Publications Office of the EU, 2021.

Actions	Outcomes
4.1 Government investment to grow wood processing capacity The Government will explore funding options to catalyse and accelerate investment in primary wood processing capacity to increase the output of long-lived harvested wood products and boost residue supplies to secondary processing.	Wood processing businesses have access to increased investment in domestic advanced wood and bioeconomy processing equipment and plants lifting productivity and diversifying the sector. The sector accelerates New Zealand's transition to a low-emissions economy by having the right assets to produce high-value low-carbon products.
4.2 Improve financial incentives The Government will consider what is the appropriate mix of financial incentives and measures to spur industry investment in advanced wood processing and bio-product plants and technologies and ways to reduce the cost and risk of investment. This includes accelerated depreciation, business growth funds, investment grants and loans, and finance sector risk weightings.	Wood processing and bioeconomy businesses have an internationally competitive investment environment and greater access to domestic and international investment capital.
4.3 Investigate feasibility of a scheme to recognise carbon in harvested wood The Government will work with the sector to investigate and shortlist regulatory and non-regulatory options for establishing a scheme to recognise the carbon stored in harvested wood products. This would include commissioning research to assess the feasibility, benefits, costs, risks and distributional impacts of the shortlisted options.	Government and the sector work together to identify the best options for recognising the delayed emissions from harvested wood products. Government and industry have an evidence base to inform future decision making and investment on government or industry schemes.
4.4 Investigate long-term options to address emissions leakage The Government will look at the long-term direction of how we manage the risk of emissions leakage in New Zealand in a manner that aligns with New Zealand's climate and trade goals. Analysis will focus on options to address emissions leakage from the cement sector, in the first instance. A range of options will be explored, including the option of a carbon border adjustment mechanism.	New Zealand develops an understanding of the most appropriate mechanism to mitigate emissions leakage, to enable policy decisions that align with international climate ambition and New Zealand's trade goals.

Actions	Outcomes
4.5 **Provide information to support investment** The Government will work with local government and industry organisations to support investors to access information and insights critical to investment decision making. As part of this the government will commission and publish investment cases for wood processing, biofuel facilities, and alternative and innovative wood products, such as biofuels, biopharmaceuticals, and engineered timber products.	Investors have access to greater information on input availability and business cases for investing in wood processing and bioeconomy processing plants, reducing the cost and risk of investment.
4.6 **Attract and facilitate new investment in the bioeconomy and advanced processing** The Government will explore ways to attract and facilitate new investment in advanced wood processing and bioeconomy manufacturing to accelerate deployment of capital.	Wood processing and bioeconomy businesses receive support to establish or develop new manufacturing operations
4.7 **Facilitate planning and consenting processes** Help facilitate planning and resource consenting process for new wood processing infrastructure.	Wood processing and bioeconomy businesses receive support to obtain appropriate planning and resource consents.
4.8 **Industry engagement with the finance sector** Forestry and wood processing sector to increase engagement with the finance sector to raise awareness of climate-friendly and productive investment opportunities and ensure mitigations to climate-related risks are well understood.	Greater financial sector investment in productive and sustainable forestry and wood processing sector opportunities.

5 Support sector co-location, collaboration and sustainability

There are strong interdependencies between wood processing and 'connected' industrial processing, such as the use of residues. Encouraging greater co-location of facilities to create wood processing hubs will capture benefits from improved efficiency and productivity. It will also maximise competitiveness and opportunities for innovation.

Overseas examples have shown that government has a key role in supporting co-location and collaboration. This can include co-funding feasibility studies, fast-tracking consenting processes and providing co-funding for initiatives that foster collaboration. All of New Zealand's major forestry regions have potential to benefit from a clustering approach to benefit from their individual strengths and local resource.

Key benefits of co-location and collaboration

Co-location and collaboration between firms are features of many overseas operations. New Zealand has opportunities to grow the number of 'hubs' and support collaborative networks.

Strategic co-location offers decarbonisation opportunities for wood processors to:

- optimise the flow of residues and chemicals between different types of processing (e.g., from sawmill residues to pulp, paper, and biofuel production)
- create long term contracts to buy/sell a product or volume of output
- enable businesses to share a sustainable energy source
- minimise transport costs for the supply of forestry resources used as inputs.

Wider sector collaboration can also reduce operational costs through economies of scale, shared infrastructure and services and improved contracting of logs and woody biomass. An example of this is a group of wood processors working with neighbouring forest owners to plan and coordinate harvest schedules to reduce operational costs, reduce waste and increase returns.

Industrial Symbiosis Kawerau: the original forestry and wood processing cluster[23]

Industrial Symbiosis Kawerau is based on a collaboration formed in the 1950s between wood and fibre processing, geothermal energy, industrial engineering, service businesses, Māori business groups, the Kawerau District Council and central government agencies and science institutions.

In 2021 Industrial Symbiosis Kawerau was incorporated as a society. The society's objective is to raise the prosperity and resilience of the local community through initiatives that retain a skilled workforce in Kawerau and ensure improved social outcomes.

Kawerau is a well-established wood processing centre and home to the world's largest application of geothermal energy for direct industrial use. Its potential application for the production of hydrogen will also be economically significant for the area and the sustainability of associated industry. Kawerau is strategically located with established road and rail transport infrastructure as well as plans for an inland container terminal, all of which directly link to the Port of Tauranga.

The geographic proximity of Kawerau's businesses enables the exchange of materials, energy, water, by-products, services, knowledge, intellectual property, social capital, and networks.

23 Industrial Symbiosis Kawerau (ISK) (2021). Submission on He Pou A Rangi Climate Change Commission 2021 Draft Advice for Consultation.

These exchanges reduce resource costs, increase revenues, and create new business opportunities.

This approach improves the viability and competitive advantage of the businesses involved and supports smarter use of resources, residues, and by-products to eliminate waste. The approach supports new commercial opportunities, job creation, and better environmental outcomes, with opportunities to grow this collaborative model.

Enhancing circularity in the value chain can improve biomass availability while maintaining a sustainable feedstock

Implementing the principles of a circular economy will be important in New Zealand's ability to meet climate change goals[24]. For the sector, this means determining how we maximise the value and length of time of wood in the value chain.

For example, many international jurisdictions encourage or incentivise industry to follow the principles of 'cascading'. Cascading refers to creating a hierarchy of use for wood, where the highest value products are targeted first, maintained in the economy for as long as possible through reuse or recycling, before being repurposed for energy or another 'end of life' product. Cascading:

- maintains sustainability of the resource
- maximises emissions benefits by delaying carbon release from wood for as long as possible
- prevents undesirable land-use change outcomes
- minimises market distortions.

New Zealand needs more options for recycling and reusing wood in construction

New Zealand currently has limited options for recycling or reusing building waste from new-builds or demolition. New Zealand has a relatively high percentage of treated wood in its wood-based building and demolition waste.

This presents several issues to consider when evaluating how this material is used and considering investment opportunities.

Internationally, wood-based building and demolition material has been recycled for many years. Construction products can be either reused in original forms (beams and planks used as beams and planks), or remanufactured into new products, such as glue laminated beams. New developments in this area include the manufacture of wood wool-based insulation material, using woody demolition waste, and the recycling of used MDF to produce new MDF.

Tairāwhiti Wood Cluster: supporting the region to grow processing capacity

Given the region's significant forest resource, Trust Tairāwhiti has been working with the local sector to establish a hub for wood processing, wood products, marketing, distribution, training and research.[25]

The cluster concept is still in development, already there has been significant investment into wood processing in the region, including support from Government. This investment has enabled the establishment of state-of-the-art Wood Engineering Technology (WET)[26].

WET uses state of the digital and automated production techniques and innovative design, to convert lowgrade logs into Optimised Engineered Lumber (OELTM). Trust Tairāwhiti continues to explore further clustering opportunities for the local industry including future expansion plans at WET.

24 Ministry for the Environment (2022). Emissions Reduction Plan 2022.

25 Trust Tairāwhiti (2020). Investment Opportunity Wood Processing in Tairāwhiti.

26 Ministry for Business, Innovation and Employment (2019). Wood Cluster/Centre of Excellence Application to the PGF.

Actions	Outcomes
5.1 **Manufacturing cluster facilitation programme** Establish a national cluster facilitation team to work with industry, education and research institutions, and Economic Development Agencies (local government) to support the establishment of advanced wood processing and bioeconomy clusters across New Zealand.	The sector and regions are supported by a strategic approach to developing wood processing and bioeconomy innovation ecosystems in regions. This support lifts innovation, productivity and sustainability, and generates more employment.
5.2 **Support the development of regional manufacturing clusters** The Government will partner with the sector to explore, assess, and deliver advanced wood processing manufacturing clusters. This will include supporting feasibility studies and business cases, infrastructure, access to land, consenting barriers and technical advice.	Wood processing and bioeconomy businesses and regions have support to establish new clusters or develop existing clusters. These clusters allow them to access benefits of symbiotic co-location and improved innovation ecosystems.
5.3 **Support innovation and commercialisation** Explore opportunities to support commercialisation of bioeconomy technologies and successful uptake of low carbon products such as bio-pilot facilities and networks.	Increased commercialisation of bioeconomy research driving growth and innovation in the sector.
5.4 **Enhance circularity of the value chain** • Explore options to enhance circularity of the value chain, including opportunities to give effect to the cascading principle. • Invest in sorting and processing infrastructure for construction and demolition waste. • The Government will explore regulations to establish obligations for separating construction and demolition materials. This can include the remanufacture into new timber products or use for biofuels.	Wood is maintained in the economy for as long as possible through reuse, recycling and remanufacturing, particularly products used in the construction industry. Bbiofuels or bioproducts are produced in a way that manages the supply needs of the industry and New Zealand's decarbonisation targets, while minimising impacts on the environment and land use. Used wood from building and construction is recovered and recycled to produce biofuels and other bioproducts to support the bioeconomy, instead of going to the landfill.

6 Improve trading and transparency of markets for logs and woody biomass

Effective markets require information on biomass pricing and availability

Log and woody biomass buyers, sellers, and investors will benefit from better access to up-to-date supply and pricing information. Current forecasts provide quality information on standing forest stocks. However, these forecasts could provide more current detail on predicted harvest volumes, grades and pricing.

Greater transparency and sharing of real time market information would enable greater use of hedge and price-smoothing contracts. This plan will support developing transparent trading arrangements that enable processors to access logs and woody biomass efficiently and facilitate investment.

Supporting industry to move toward long-term supply agreements

Predictable long-term supply of logs is critical for attracting investment in wood processing. Currently many supply contracts are short-term, which inhibits long term investment. This is driven in part by fluctuations of prices of export logs. While price variability is expected, long-term contracts would improve investment decision making by providing greater certainty about key input costs.

Forest owners, and in particular small lot owners, tend to prefer short term contracts due to strong prices in the export market. There is opportunity to coordinate small woodlots and develop supply agreements with domestic processors that support good returns for forest owners alongside greater surety of supply for wood processing investors.

Actions	Outcomes
6.1 **Improve market transparency** Develop tools to ensure log and biomass trading is well informed and transparent. For example, region-specific log price indices, long-term forecasts of uncommitted wood availability, and trade conditions.	Growers, processors and end-users have the necessary information to support long-term agreements. They can better use tools, such as hedge and price-smoothing contracts, to ensure consistent supplies of raw material and less volatile costs. This will enable more strategic business decisions.
6.2 **Support long-term trading contracts** The Government will partner with the sector to develop log and biomass market trading arrangements through an iterative process to co-create improved trading arrangements.	Identify actions to make it easier for buyers and sellers to form contracts.

Growing and diversifying domestic and export markets

Growing our onshore wood processing capacity and utilising more parts of our logs will require us to find new and diverse markets for our wood products, both domestically and internationally.

The over exposure of our log exports to a single market creates risk. Recent drops in demand and price from China for New Zealand's logs has affected many in our domestic industry. This priority area proposes a range of actions to grow and diversity our export markets and lift our economic resilience. Expanding the range of products we produce and markets we sell into will:

- increase certainty for investors
- create a more resilient sector
- add more value to our exports
- support the decarbonisation of the New Zealand economy.

Objectives

Grow domestic demand for our wood products

Increasing the use of wood in construction

In 2021, the construction sector was responsible for around 15 percent of New Zealand's annual emissions, and the sector's emissions have increased by 66 percent in the past decade.[27]

Wood will play a big role in the shift to a lower-emissions construction sector due to its ability to store carbon over the life of a building and displace more carbon-intensive materials. The Climate Change Commission recommended that timber could displace more emissions-intensive materials in construction and lower the embodied carbon of buildings. The actions in this Plan aim to support this outcome.

The Government's *Building for Climate Change Programme*[28] seeks to increase the energy efficiency of buildings during operation and to lower embodied carbon emissions across the life of the building. The Building for Climate Change Programme will look at the materials used, construction processes, construction waste and end-of-life disposal.

Lifting capability and ensuring building standards allow for innovative wood product use

In 2019, 40 percent of new builds were multi-unit dwellings[29]. Significant scope exists for using more innovative wood products in multi-residential and commercial medium to high-rise buildings. Understanding and addressing the financial and technical barriers is critical for supporting greater uptake.

Supporting the construction sector to lift its capability is key for increasing wood-based construction. Design and construction professionals are less familiar with how to incorporate innovative wood products into building designs and their relative costs, benefits and risks.

Continuously improving our building and product standards and appraisals is key to ensuring the construction sector can use alternative timbers and innovative wood products. Continuous improvement is also critical for reducing the cost and risk of investing in alternative forests, innovative wood products, and encouraging greater demand for wood in construction.

27 Construction Sector Accord (2021). Environmental challenges, opportunities and transitions for construction in Aotearoa New Zealand.

28 For more information about the Building for Climate Change Programme, visit https://www.building.govt.nz/getting-started/building-for-climate-change/

29 Construction Sector Accord (2021). Environmental challenges, opportunities and transitions for construction in Aotearoa New Zealand.

Mid-Rise Wood Construction and Clearwater Quays Apartments – showing New Zealand the future of wooden buildings

The Mid-Rise Wood Construction partnership between the Ministry for Primary Industries and Red Stag aims to encourage the use of New Zealand-produced engineered mass-timber materials and prefabrication as an alternative to other more emissions-intensive construction in mid-rise buildings.

The Clearwater Quays apartments in Christchurch have been constructed under this partnership and demonstrate how these engineered timber materials can be used in mid-rise buildings. The apartments, designed by Pacific Environments, combine cross-laminated timber (CLT), glulam and panelised timber framing to produce a cost-effective, resilient, sustainable and beautiful building.

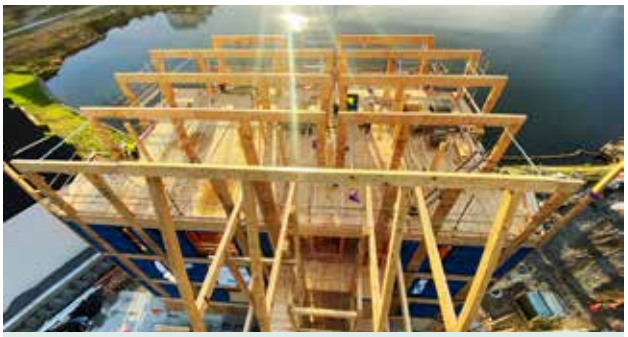
The programme also seeks to share knowledge of mid-rise wood construction options across the design and construction sector and demonstrate the benefits of mass engineered timber. Ultimately, this would lead to more construction of timber buildings in New Zealand.

Table 3: Clearwater Quays reference building – comparison of mass timber construction to other materials

Factors	Mass timber	Steel and concrete	Concrete only
Carbon Kg CO_2 equivalent	-82.6 thousand	+792.3 thousand	+831.6 thousand
Construction weeks	Baseline	+10	+10
Cost (including time cost of money)	$10.6 million	$11.1 million	$11.3 million

Source: Logic Group Quantity Surveyors

Building using the mass timber option was faster and cheaper than the alternatives because it was properly designed to use wood in the most efficient and low-waste ways.



Timber Design Centre: Growing and sharing knowledge of the use of innovative timbers

The Timber Design Centre was launched in March 2022 and is a service to promote and facilitate the use of timber in New Zealand buildings. The establishment of the initiative was funded by Te Uru Rākau – New Zealand Forest Service. The Centre is being led by a consortium consisting of Scion (Crown Research Institute), the Wood Processors and Manufacturers Association, New Zealand Timber Design Society, and BRANZ.

The Centre will provide information on timber design guidance, research and development, and specialist technical advice to increase and speed up the use of timber in buildings. It will foster connections across the forestry and construction sectors, and be an independent forum to develop local expertise, knowledge, techniques and skills on all aspects of using engineered timber in our buildings.

By overcoming barriers to using timber in design and construction, New Zealand can replace emissions intensive materials with wood. This replacement would lower carbon emissions, and support New Zealand's drive to greater environmental sustainability.

Visit www.timberdesigncentre.co.nz for more information.

Improving the implementation of the Government's low carbon procurement guidelines will lower emissions

The Government has introduced low carbon procurement requirements that aim to lower the whole of life embodied emissions associated with government construction projects. This has the potential to increase the use of innovative wood products as a low-carbon alternative, growing the demand for wood products.

There are opportunities for the government and the sector to partner to ensure government agencies are using cost-effective and innovative low-carbon wood products and building solutions in their projects.

Growing demand for bioproducts

Growing at-scale demand for bioproducts will be key to attracting investment, growing the forests-based bioeconomy, and lower emissions. Initiatives, such as the Sustainable Biofuels Obligations, will increase demand for biofuels.

The Government is developing a Circular Economy and Bioeconomy Strategy. This will include a framework to help guide the use of our bioresources, and a programme to accelerate sustainable and secure supply and uptake of bioenergy. This work will look at opportunities to grow demand for bioproducts.

Actions	Outcomes
7.1 Support the Timber Design Centre Continue to support the Timber Design Centre to address the barriers for greater use of timber and engineered wood solutions in building projects.	Engineers, architects, designers, quantity surveyors, builders, and manufacturers specify and use more wood in building design and construction.
7.2 Address technical barriers for innovative wood products, such as standards Identify and address regulation, standards and product appraisal barriers that limit the use of alternative timbers and innovative wood products in building and construction.	Engineers, designers, builders, and manufacturers can easily specify and use a wider range of wood products in building design and construction. This will reduce the costs and risks of building with alternative timber and innovative wood products.
7.3 Explore funding support for mass timber Explore funding options to support increased use of mass timber in construction and options to reduce financial barriers to low emissions building.	The construction and wood processing sectors produce and use more innovative mass timber products in construction
7.4 Accelerate low carbon procurement and support implementation The Timber Design Centre will convene a reference group to help reduce barriers to government procuring buildings that use wood, and better utilise industry expertise in planning, design, and construction.	Government procurement processes favour materials with low emissions, enable collaboration, and drive efficiencies across the construction value chain. Government procurement supports research, development, demonstration, and commercialisation of innovative wood products and building methods.
7.5 Grow demand for bioproducts Explore options to accelerate the bioeconomy, by: • raising consumer awareness • stimulating demand for bioproducts • addressing barriers to uptake.	People use bioproducts wherever possible, to reduce reliance on oil-based products. Confidence in supply and demand for these products increases, which leads to more investment, production, and uptake.

8 Grow and diversify export markets

Declining harvest volumes reinforce the need to diversify our export products and markets

Recent growth in our export earnings from forestry has been driven by the export of large volumes of unprocessed logs – around 60 percent of our total harvest.

New Zealand's log harvest volumes are forecast to fall by around 35 percent in the next 15 years[30].

Without any wider changes to our export markets and products, this decline in harvest volume will result in a decline in export earnings from forestry.

Log exports will continue to play a role in our sector for many years to come. But growing our export earnings over the next decade will depend on our ability to shift from exporting a high volume of unprocessed logs to a focus on value-add wood products across a range of markets.

Exporting processed wood products would lower overall emissions

On average, New Zealand has been exporting around 1.8 million tonnes of logs per month. This is the equivalent of approximately 45 log ships. These ships will consume around 2,800 tonnes of fuel on a round trip from New Zealand to China.

Approximately 50 percent of the weight of logs is water. So every month, New Zealand exports 900,000 tonnes of water encapsulated in logs and uses 126,000 tonnes of fuel to take it to market.

If those same logs were locally processed into sawn timber and medium density fibreboard, the final product would weigh half the weight of unprocessed logs and require only 21 ships to export. This would reduce fuel consumption by 67,200 tonnes per month.

Developing our understanding of key markets is critical to selling value-added products

Developing a stronger understanding of overseas markets and consumer preferences will be vital for targeted and successful product development, marketing, and campaigns.

Growing international markets will require a stronger presence in key offshore markets. Given the projected shortfall of structural timber in Australia we propose this be the initial focus.

Selling the story of the sector to the world can increase demand for our wood products

New Zealand's forestry and wood processing sector could benefit from a unified and proactive marketing approach on the international stage to build our competitiveness.

Evidence shows that international competitors, such as Finland ('Wood from Finland') invest in telling the story of their industry and products to international markets[31].

Government and industry need to work together to support exporters to tell the sector's story and the advantages of sustainable wood products from New Zealand. Telling this story well has the potential to increase demand for our wood products and solutions and attract potential investors to New Zealand.

This story needs to align with the transformation of the sector and adapt over time as the sector evolves. As we scale up the processing of high-value wood products and New Zealand's forests-based bioeconomy the story of the sector will change.

30 The most likely scenario in the 2021-2050 Wood Availability Forecast shows the national harvest volumes rising to around 39 million cubic metres in 2025, before dropping to a low of 25 million cubic metres in 2034.

31 Indufor (2022). Precompetitive Approaches.

The Canadian wood products industry: a history of proactively developing international markets to grow and diversify wood product exports

Canada, one of the world's leading exporters of high-value wood products, invests significantly in growing its export markets. There is a history, dating back to the 1970s, of the Canadian federal and provincial governments cooperating with industry and working together to grow exports by carrying out proactive work in international markets.

Initial work was carried out in Japan to help advance housing quality – Canada was invited to help develop building codes and technologies, including introducing a building system that could utilise Canadian wood. To this day, over 3 million North American style lightwood frames have been built in Japan that would trace their ancestry to the initial market development programme.

Canada Wood Group (CWG) is the latest cross-industry organisation dedicated to leading the diversification and expansion of export market opportunities for Canadian wood product manufacturers in overseas markets. It also offers a brand that Canada's exporting firms can leverage.

CWG has a significant footprint, with offices in China, Japan, South Korea and Europe. Activities include helping to remove regulatory barriers, delivering educational and promotional missions, trade fairs, market studies and demonstration projects. Carpenters are often included in these offices to provide technical mentoring to in-market building firms on how to build with wood.

On top of significant programmes in Japan and China, CWG has more recently carried out work in South Korea that has:

- reduced regulatory barriers for Canadian pressure-treated wood and Oriented Strand Board
- partnered with Chungnam National University to develop a wood wall workshop for architects and engineers
- created a 'Regulatory barriers initiative' to help support faster adoption of wood-framed construction
- organised a 12-day technical trade mission in Vancouver for 17 Korean construction professionals to learn about advanced wood building systems
- partnered with the Korean Wood Construction Association to launch an enhanced 5-star wood housing certification programme.

Results

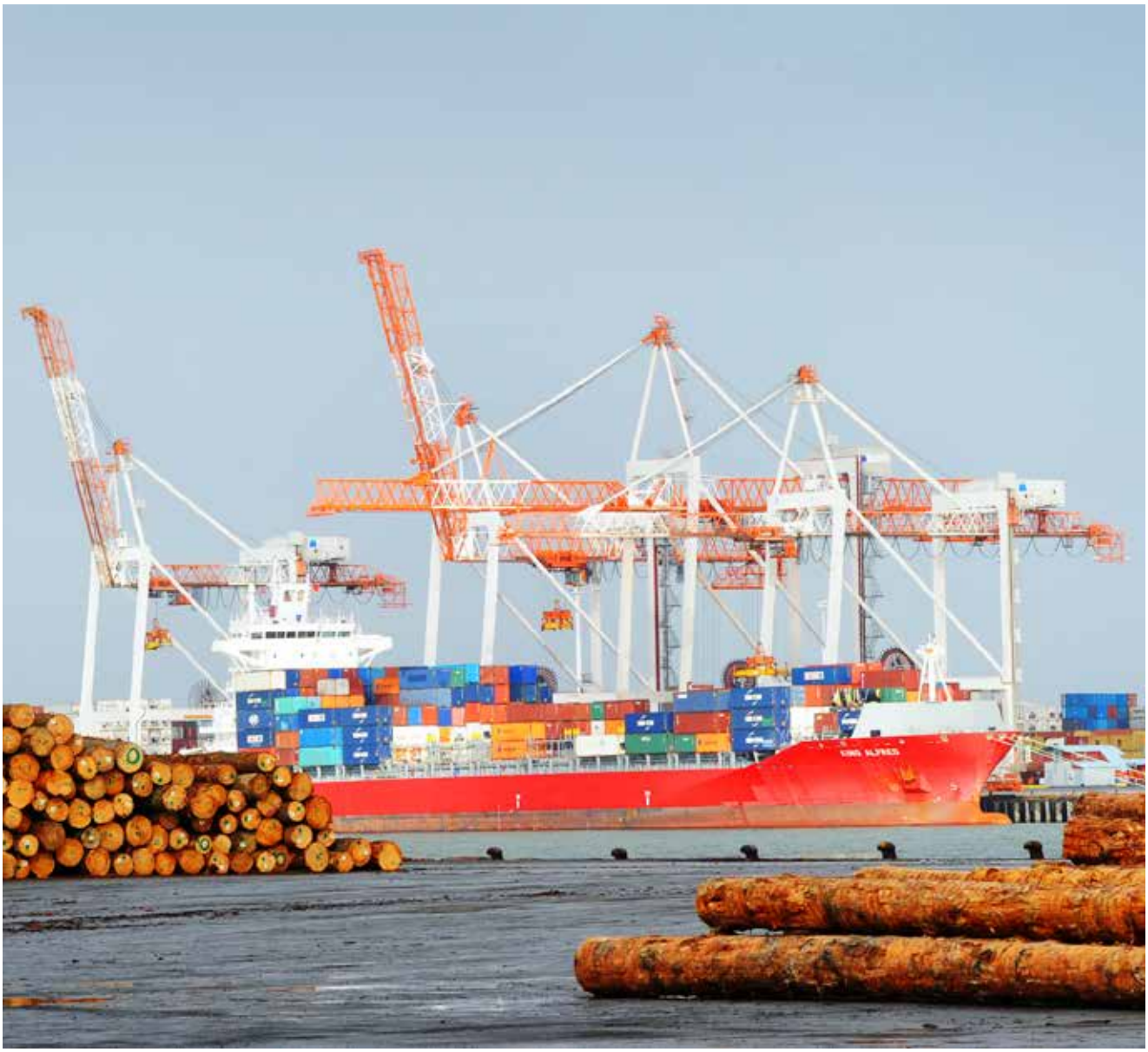
- 34 new clients or demonstration projects using Canadian wood
- 128,000 Korean houses built with Canadian framing timber
- 254 5-star certified houses built with Canadian framing timber
- 13 'Super E' (high-performance, energy-efficient) projects completed in Korea.

Supporting access to global markets is essential to growing exports

Tariff and 'non-tariff' barriers can impact exporter competitiveness. Tariffs put in place at the border by importers often mean it's more expensive for a country to import value-added products, making imports less attractive.

Non-tariff barriers such as regulatory or technical requirements in markets may restrict how New Zealand's wood products are imported or used. For example, some countries may have building codes or product standards that mean the properties of New Zealand radiata pine are not permitted in buildings in that country.

New Zealand generally already carries out significant work on minimising trade and technical barriers, for example in developing free trade agreements to reduce tariffs, as well as developing joint standards and getting radiata pine accepted in building codes. Further work to minimise technical barriers could help deliver the goals of industry transformation.



Actions	Outcomes
8.1 **Create and sell our forestry and wood product story** The Government and the sector will co-develop an enduring marketing programme to deliver a sector-wide marketing story that showcases the value of New Zealand's sustainable forestry and wood on the global stage. This includes developing marketing resources for use by forestry and wood processing businesses. The story should evolve and continue to be promoted over time as the sector evolves and productivity lifts.	Overseas markets are more aware of the positive characteristics of New Zealand wood products. And exporters can leverage New Zealand's brand to achieve higher prices. Increase in demand for New Zealand forest and wood product exports in a larger range of markets also increases our revenues and more market resilience.
8.2 **Establish offshore in-market presence** The Government and the sector will co-fund market development staff in our key export markets to improve market access and success for forestry products. This will include: • working to align local wood standards • building market demand • gathering market intelligence on inflows and outflows of logs and wood products.	Targeted growth of export markets that exporters have access to with fewer barriers or challenges – leads to increased revenues and more market resilience. The sector benefits from enhanced understanding of overseas markets, log and product flow, and international consumer preferences to support growth.
8.3 **Reduce non-tariff barriers to key markets** The Government will work with industry sector to reduce non-tariff barriers that currently limit export of manufactured wood products to key export markets and improve market access.	Strong demand in overseas markets for wood products produced in New Zealand.

Improving system settings for a thriving sector

Strong sector growth requires getting system settings right. The key foundations for a thriving sector include having a skilled workforce, well-supported innovation across the sector, strong and collaborative industry bodies, and Māori representation.

This priority area proposes a range of actions to ensure we get the system settings for the forestry and wood processing sector right to catalyse future growth and innovation.

Objectives

9 Support Māori aspirations in the sector

Industry transformation will support better outcomes for Māori

Industry transformation at scale, and the broader suite of actions in this Plan, aim to have a positive effect on Māori communities. Many Māori communities in regional New Zealand are strongly connected with the forestry and the wood processing sector. Industry transformation seeks to achieve better opportunities, wages and working conditions for Māori.

Māori aspirations in the sector

Māori aspirations in the forestry and wood processing sector vary by iwi and hapū. Some may wish to take advantage of large-scale business opportunities, others will be more focused on smaller enterprises.

Social, cultural, environmental and economic impacts are often key focus points for Māori businesses, alongside economic considerations. Māori businesses are often focused on long-term or intergenerational timeframes, with a focus on the opportunities the whenua or ngahere might provide for future generations.

Understanding the key challenges Māori face

Māori often face challenges to fully realising the benefits and opportunities in the forestry and wood processing sector. For example:

- Māori often own the land underneath plantation forests, but not the trees themselves
- Māori make up a large portion of the processing workforce but are underrepresented in ownership or leadership positions
- Māori have a reduced ability to borrow against Māori land
- Māori have limited ownership of the supply chain beyond forestry, such as in wood processing, secondary processing, or in export businesses.

Land that's returned to Māori often has existing leases, which means that iwi own the land but not the forests above. This presents a barrier to Māori aspirations in the sector and limits their ability to develop their land.

The Tōtara Industry Pilot: exploring continuous canopy management

The Tōtara Industry Pilot has been a two-year study to explore the opportunities that continuous canopy management of regenerating stands of tōtara could bring for landowners and the industry.

The partners of this project include: Taitokerau Māori Forests Inc, Scion, Te Uru Rākau – New Zealand Forest Service, Tāne's Tree Trust and Northland Inc, Ministry for Business Innovation and Employment, and the Northland Regional Council.

The partners believe that native forestry can bring together all the advantages of conservation, timber production, environmental, socio-economic and cultural enrichment.

The goal is to showcase a regional industry based on sustainably managed tōtara as part of a holistic ecosystem, to regain its historic high value, shift landowners' views on tōtara as beneficial for the environment and a commercially viable forestry endeavour.

A successful tōtara industry will see sustainable production from a continuous canopy forest regime and encourage the planting of new areas, increasing the area of native forest on private land.

The Tōtara Industry Pilot initiative aligns with the values of kaitiakitanga by:

- creating appropriate land-use options with regenerating tōtara
- increasing the well-being and benefiting local communities
- ensuring that local narratives are part of the value provided
- strengthening mātauranga Māori alongside the application of science
- building resilience for the future, and
- providing a better future for our mokopuna.

Improving Māori access to capital

Māori would benefit from greater access to capital to fulfil their aspirations for expanding and creating businesses.

Land returned under Treaty Settlement processes is generally collectively owned. This creates challenges accessing capital as banks often cannot use this land as collateral against loans. Also, banks may not be well equipped to provide financial advice to Māori entities seeking loans.

The Reserve Bank of New Zealand is working to help increase Māori access to capital by focusing on Māori-owned land and businesses, and their aspirations for them. They are working with Māori businesses such as Post-Settlement Governance Entities (PSGEs), trusts, Māori governance entities, and landowners.

Separately, the New Zealand Trade and Enterprise Māori Investment Team supports Māori companies, PSGE's, and land trusts in securing capital. This can come in the form of helping them secure debt funding, connect them with private capital, and facilitating collaboration with other Māori entities that may not be as capital constrained.

Education and training are key to supporting Māori aspirations in the sector

There are opportunities to upskill Māori across the sector and to grow the number of Māori in leadership and ownership positions. We need to ensure Māori workers have access to on-the-job training and tertiary education opportunities.

Actions	Outcomes
9.1 Strengthen voice of Māori Support greater Māori participation and representation in the forestry and wood processing sector. This includes: • supporting the establishment of a representative body of Māori Forestry experts • supporting the greater use of Mātauranga Māori to drive research and innovation.	Māori views and interests are strongly represented in the sector and Māori have stronger partnerships with the Crown. Innovation is driven through the use of Mātauranga Māori in research and development.
9.2 Support Māori forestry and wood processing leaders Develop future Māori forestry and wood processing leaders through a potential dedicated government-funded food and fibre Māori leadership programme, such as the Māori Primary Sector Leadership Programme led out of MPI (further explained in section 11).	Māori are supported to grow their cohort of leaders across the food and fibre sector. This work is delivered as part of the Māori economic primary sector strategy and grow leaders in the forestry and wood processing sector.
9.3 Support Māori land-owners and communities to develop future forest and wood products initiatives • Develop options to enable Māori access to finance/capital to develop their forestry assets. • Explore options to increase Māori participation in the forestry and wood processing sector, as well as participation in the new bioeconomy.	Māori businesses, landowners and communities can expand the Māori forestry economy and fully develop their land and businesses to grow their economic opportunities. This extends across all parts of the value chain, creating jobs for Māori and improving the wellbeing of their communities.

10 Create a strong and collaborative sector

Industry transformation will require a strong, collaborative and cohesive sector

Fostering greater collaboration and alignment across the forestry and wood processing supply chain, along with and stronger partnership between Government and Māori is a prerequisite for industry transformation. There is a missed opportunity by not speaking with "one voice" about common interests and objectives, such as co-investment in research and development and improving the sector's social licence.

A cohesive voice presents a unique opportunity to support the implementation of this Plan. Drawing on the experience of the Forest Growers Levy Trust, it is important to recognise that it will take time to build consensus on the path forward and gain commitment by industry bodies, Government, and Māori.

The benefits of greater collaboration across the supply chain include an improved ability to:

- partner effectively with government, Māori and other sectors on research and development
- drive planning and preparedness for future skills and management requirements
- understand and address changing societal expectations, such as best practice environmental management standards, and
- support public education and the promotion of wood fibre, such as the use of wood in construction.

Growing industry-good activities

Government will support the sector to explore organising and undertaking industry-good activities, such as developing new funding arrangements.

Improving social licence

Improving public perceptions of the forestry and wood processing sector is a critical part of supporting the sector's growth. Recent improvements in areas such as health and safety have helped improve the sector's social licence, but the sector recognises it needs to do more.

Some of the concerns today include land-use change, plant-and-leave carbon forests, foreign ownership of plantations, negative environmental impacts of pine trees, pest and wilding issues, fire risks, sediment or slash runoff, and landscape degradation from harvesting[32].

Work is needed to help people understand the benefits of forestry and wood processing, how the sector works, and the value of its products. The sector must ensure that growth benefits wider communities and the environments they live in.

32 Tim Payne, New Zealand Journal of Forestry (2021). Forestry mythbusting – myths, misperceptions, impacts and solutions.

Actions	Outcomes
10.1 Implement this Plan in partnership with the sector The sector and Government will partner together to implement and oversee the delivery of this Plan, including considering appropriate governance and working group arrangements.	Implementation of this Plan is well resourced and governed. Government, industry, Māori and workers are represented in the ongoing governance and delivery arrangements to implement the Plan.
10.2 Collaborate to invest in 'industry good' Support industry to build consensus on industry-good priorities and how this can be delivered, including consideration of funding arrangements.	Industry-good activities are well resourced and reflect the needs of stakeholders, and industry is able to co-invest with government and businesses to support positive industry transformation at all stages of the forestry and wood processing supply chain.
10.3 Support the industry to maintain and build social licence Continue to support industry to build social licence through marketing and information.	The sector is seeing the benefits of their investment, with people feeling more positive toward productive forestry and farmers are capitalising on the benefits of varied land-use.

11 Grow and attract the future workforce

Workers are central to our vision for transforming the sector. This means decent, safe work, and access to training and support through transitions. While the Government has invested significantly in reducing barriers to education and improving skills, more needs to be done.

Improving working conditions and pay will attract and grow a highly skilled workforce

To attract a wider range of workers from more diverse backgrounds, the sector needs to improve pay and working conditions. This includes providing competitive wages, continuing to improve health and safety, and offering decent career opportunities and benefits such as ongoing education and flexible working arrangements.

Innovative types of training, such as the use of micro-credentials, will be key to developing a more productive and higher skilled workforce as the pace of technological changes.

We need to strengthen leadership training and development opportunities across the sector, including for Māori. We're starting to see an increase in the number of Māori leaders in the sector but further work is needed.

One example of work that we are doing to develop more Māori leaders in the sector is the development of a Māori Primary Sector Leadership Programme that has come out of work done by Ngā Pouwhiro Taimatua, MPI's Māori primary sector leaders forum.

Refreshing the Forestry and Wood Processing Workforce Action Plan

The Forestry and Wood Processing Workforce Action Plan is a living document, providing flexibility to respond to emerging needs to build an appropriately skilled and sustainable workforce. Global trends in technology, sustainable development and movement towards a bioeconomy are driving a need for new job opportunities in expanding areas of work which are supplementary to more traditional roles.

Effort across the sector is underway to address retention of new employees, better working conditions, and provide improved training that can mitigate short and medium term gaps. This will likely benefit Māori workers, who tend to face disproportionate safety, health, and wellbeing risks, and are less likely to receive training.

Government and industry will work together to:

- close the disparity between low-, mid- and high-income earners in the sector
- increase female participation
- improve outcomes for the nearly 70 percent of Māori in the agriculture workforce that tend to be working at the low-skilled and lower-income end of the sector.

Supporting a just transition

Significant drivers of change for the sector and its workers include things such as technological innovation, changing geo-politics, trading patterns, and climate change. We need to understand, plan, and actively manage change so that the sector and workers can make the most of the opportunities that arise and minimise harm.

Actions	Outcomes
11.1 Conduct a skills forecast The Government will complete a forecast of skills needed in the food and fibre sectors, including scenarios for forestry and wood processing.	A report that identifies future skills needs and gaps for the forestry, wood processing and the bioeconomy to inform further actions from the Government and Industry.
11.2 Refresh the Forestry and Wood Processing Workforce Action Plan Refresh the Forestry and Wood Processing Workforce Action Plan to respond to new workforce challenges driven by this Plan. This includes: • growing a future workforce to meet demand and leverage new technologies, supported by education resources and improved business and employment practices identifying actions to boost talent recruitment and retention.	Workers have the opportunity to upskill and benefit from improved business and employment practices. Businesses will benefit from a more stable, ready, and educated workforce.
11.3 Support a just transition Support the development and implementation of a Forestry and Wood Processing Just Transition plan to identify what is needed to support a just transition for workers, businesses, communities, and Māori that are engaged in forestry and wood processing.	Workers and their unions, businesses, communities, Māori and government have a clear plan for how they can work together to understand, plan and successfully navigate change in the forestry and wood processing sector.
11.4 Develop tertiary pathways for innovative wood engineering and architecture Work with tertiary institutions to integrate education on timber design education into engineering and architecture syllabuses. This includes dedicated postgraduate qualifications in wood engineering and biochemical engineering.	Increased supply of skilled domestic workers to participate in and grow opportunities for timber engineering, and advanced wood and bio-manufacturing.
11.5 Develop a Future Forestry Leader qualification Develop a higher level (Level 5) qualification that uses online and on-the-job training to develop people for positions in leadership or management in the forestry sector.	Employees progress to higher levels of training and are better prepared to take on leadership and management roles.

12 Drive science and innovation across the sector

Science and innovation can drive productivity and growth in the sector

This Plan aims to increase innovation across the forest and wood processing value chain – from science, research and development, commercialisation, through to marketing and after-sales support. This includes supporting the development and adoption of new technologies, processes and engineered wood solutions.

There is huge potential for research and innovation to drive productivity and growth in the sector. There are a range of options to drive innovation in the sector, some include:

- providing support and financial incentives to entrepreneurs and businesses that are exploring new innovations or undertaking research and development
- improving access to larger innovation facilities to provide scaling up opportunities
- better understanding and addressing the skills and leadership capability needed to drive innovation
- increasing technology transfer and absorption by increasing international visits and cross-sector collaboration with leading companies or jurisdictions.

The MPavillion in Melbourne Australia's Royal Botanic Gardens, showcases Abodo's 'Vulcan' eco-timber screening. Engineered from thermally modified New Zealand timber, this product is a high performance natural exterior timber, with the dimensional stability to cope with notoriously hot Victorian summers. Abodo create this product for both the New Zealand and export markets as a renewable alternative to Cedar rainscreen, battens, louvres and beams.

Abodo: An innovative approach to meeting international customer needs

Radiata pine is traditionally treated with chemicals to increase its durability. However, a New Zealand-owned company, Abodo, is using heat to produce chemical-free clearwood timber products, such as those used in cladding and decking.

By applying its thermal modification technology Abodo transforms a relatively non-durable resource into a lightweight, durable product. By applying a heating process Abodo has been able to improve the wood's durability properties without chemicals, creating a safe, innovative alternative to chemically treated timber. It also creates a new visual appearance by turning the wood a dark, chocolate brown colour.

Significant demand from international markets for a sustainably sourced, chemical-free, attractive clearwood product sees Abodo exporting 85 percent of the volume of wood it produces to over 30 countries globally. Abodo demonstrates one of the ways New Zealand's wood processing industry can innovatively add value to our forest resource and compete on the global stage.

We need to improve access to science and innovation facilities across the sector

Many smaller less established firms struggle to access science and innovation services available to them[33]. Work is needed to better foster connections between firms and science and innovation partners.

Work is also needed to help bridge the gap between technology at the lab scale and the pre-commercial demonstration scale, which is needed to de-risk investment. This is a significant issue for New Zealand firms.

Work to develop the industry good collaboration as outlined in action 10.2 will likely support science and innovation in the sector. Strong industry collaboration can improve information sharing and enable the setting and funding of shared science and research priorities.

Worker making high-value bioproducts.

33 Analysis of Access to Innovation Facilities, David Moore, Vladimir Bulatovic, Peter MacIntyre, Kelvin Woock, Lockie Woon and Ben Barton 23 December 2021.

Actions	Outcomes
12.1 Support innovation and commercialisation Support research and innovation parties and the sector to improve uptake of domestic and international research and innovation. This will also support international innovative partnerships and the commercialisation journey.	Forestry and wood processing firms are leading the world in adopting new technology, and are taking their innovations out to the world.
12.2 Boost access to innovation facilities Emerging and growing enterprises have access to appropriate scale-up facilities to enable the sector to achieve economies of scale, as well as the bio-pilot action listed in action 5.3.	The ability to access appropriate scale-up and de-risking facilities for advanced manufacturing significantly increases.

13 Provide sector insights to lift performance and innovation

Establishing planning and advisory services

Through Te Uru Rākau – the New Zealand Forest Service, the Government has invested in creating new planning and advisory services that will be a key supporting mechanism of this Plan.

The planning and advisory services will be based at the community level but will have the breadth and expertise of national teams to offer a service to the sector that is bespoke to their situation and requirements.

The service will:

- work alongside existing forest advisers to complement the services they already provide
- extend the tools and resources needed to support future generations of foresters
- build the data to enable informed investment decisions
- enable projections on future demand by volume, species, and regional differences
- support the introduction of new technologies.

The services will encourage more people to become forestry participants through better accessibility to trusted advice and information. Using data, the services will help provide information to enable the sector to match supply to demand, particularly to support innovation in the growing bioeconomy.

The services will develop products and services to allow Māori landowners and forest participants to engage and realise value, increase sector resilience, and assure forestry advice and information is accessible to all.

Improving the information available to foresters and processors

The planning and advisory services will work with the sector to improve the data available to allow informed decision making. This includes greater visibility of the location, species and age-class of trees available to the market.

Better information is needed to allow greater analysis of the impact of changing infrastructure, logistics, environmental, and market factors. Better information will strengthen planning at the national and regional levels. The planning and advisory services will seek to analyse current and future data to inform all participants in the sector of the factors that will allow better planning for future growth of the sector.

Additionally, the services will coordinate and commission research such as determining the sequestration rates of different tree species or establishing the economic viability of alternative species.

Helping inform transport planning on the needs of the forestry and wood processing sector

Freight and infrastructure capability, particularly at the regional level, will play an important role in a transformed industry. New Zealand has some of the highest transport costs in the world when getting logs to sawmills, which impacts the competitiveness of these sawmills. A cost-effective transport system will be critical to transporting woody biomass and enabling the growth of bioeconomy businesses. The competitiveness of our exporters is most directly influenced by the logistical costs of supply end-users, particularly given New Zealand's distance from most export markets.

Advancing our understanding of the transport system across New Zealand and its regions will play an important role when recommending where improvements could enable increased value-add processing.

Preventing the import or export of illegally sourced timber

A rising volume and diversity of imports has increased the risk of New Zealand becoming a conduit for the illegal timber trade due to a lack of mandatory assurance measures. Addressing this will require greater assurances that timber imported or traded in New Zealand and for export has been legally harvested.

The Government is enacting a legislative framework that:

- prevents the import of timber sourced from illegally harvested forests
- supports and enhances market access for forestry exports, and
- facilitates participation of small forest owners in commercial supply chains.

Regulating log traders and forestry advisors

Log traders and forestry advisers must be registered to operate. This registration is designed to give the public confidence in the services, ensuring a greater level of transparency and that there is better data available. This registration will also require individuals to adhere to a code of ethics, designed to ensure that no matter where you are in New Zealand, the level of service is consistent.

Actions

Outcomes

13.1 Enhance MPI's forestry-based advisory services

Provide better planning and advisory services to support afforestation and ensure that the right forests are in the right place for the right purpose. This will include:

- Supporting current and potential forest growers by providing advice across the full cycle of establishing, managing and harvesting forests.
- Developing national and regional plans to increase understanding of demand and supply, the forest estate, regional infrastructure, and the processing capacity needed for growing productive forestry and domestic manufacturing.
- Developing insights and advice on regional transport capability, supply chain improvements, and associated infrastructure requirements, to enable Te Uru Rākau – New Zealand Forest Service to represent the sector's interests across government transport-related work and investment.
- Providing advice on diversifying forestry regimes, including alternative species.
- Helping forest owners make informed decisions about planting and management based on the long-term impacts of climate change.

Landowners, foresters, iwi/Māori, local government, and organisations that wish to introduce trees into their landscape have good access to generic and specialist advisory services.

The planning and advisory services help people understand what trees to plant, where to plant them, how to remediate erosion issues and, for farmers, how to make the most of riparian planting and on farm forestry.

This service will also enable greater certainty for wood processors, by connecting foresters and sawmills.

13.2 Regulate Log Traders and Forestry Advisers

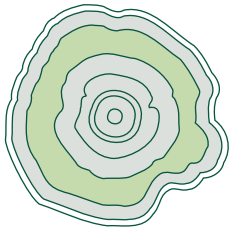
The Government will establish and implement a regulatory system to require log traders and forestry advisers to register under the Forests Act 1949.

Land owners will have confidence that they will receive transparent and professional log trading and forestry advice.

People have access to a transparent complaints process that further ensures confidence in the regulatory system.

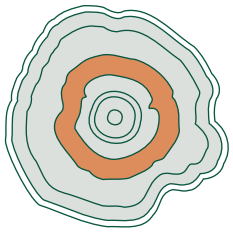
Actions	Outcomes
13.3 Build better insights into log and biomass availability Improve data collection, information and insights on current and future forecasted supply and availability of logs and woody biomass and demand by wood processors and bioeconomy businesses.	Sector is able to access greater information about current and future supply of logs and woody biomass feedstocks, enabling better harvest management decisions and better information for wood processors and bioeconomy ventures on future supply.
13.4 Expand market intelligence Create a centralised market intelligence capability across the supply chain within government by the end of 2023.	Wood processers have access to market and investment intelligence, enabling more considered export and investment decisions.
13.5 Legal harvest system The Government will establish a national legal harvest assurance system that: • reflects New Zealand's commitment to reduce the global trade of illegally harvested timber • ensures the legal harvest of New Zealand's imported and domestic timber products • brings New Zealand more in line with the systems our key trading partners are introducing.	Introduce a legislative framework to establish the Legal Harvest System so that importers, log buyers, first stage log processors, and exporters will be required to have due diligence systems to mitigate the potential risk of dealing in illegally harvested timber and timber products.

Summary of ITP actions



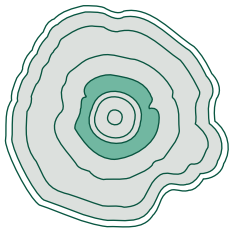
Priority area: Growing sustainable forests for our future

1	**Improving the productivity of our forests**
1.1	Increase forestry benefits to Māori and small woodlot owners through aggregation
1.2	Develop harvesting and logistics using automation and robotics
1.3	Invest in precision silviculture practices
1.4	Improve breeding and genetics of forestry species
2	**Diversify our productive forests to build sector resilience**
2.1	Develop a diversification programme for productive forests
2.2	Develop investment cases for key alternative species
2.3	Develop a productive native forestry sector by investing in nursery technology
2.4	Explore the role of the Crown for investing in the diversification of productive forests
3	**Increase use of woody biomass to produce high-value products and fuels**
3.1	Research and develop sustainable recovery practices of forest residues
3.2	Map biomass supply and demand
3.3	Increase woody biomass supply
3.4	Optimise energy value from wood fibre



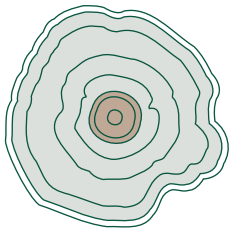
Priority area: Modernising and expanding the wood processing sector

4	**Grow investment to increase manufacturing of advanced wood-based products for building, biotech and fuels**
4.1	Government investment to grow wood processing capacity
4.2	Improve financial incentives
4.3	Investigate feasibility of a scheme to recognise carbon in harvested wood
4.4	Investigate long-term options to address emissions leakage
4.5	Provide information to support investment
4.6	Attract and facilitate new investment in the bioeconomy and advanced processing
4.7	Facilitate planning and consenting processes
4.8	Industry engagement with the finance sector
5	**Support sector co-location, collaboration and sustainability**
5.1	Manufacturing cluster facilitation programme
5.2	Support the development of regional manufacturing clusters
5.3	Support innovation and commercialisation
5.4	Enhance circularity of the value chain
6	**Improve trading and transparency of markets for logs and woody biomass**
6.1	Improve market transparency
6.2	Support long-term trading contracts



Priority area: Growing and diversifying domestic and export markets

7	**Grow domestic demand for our wood products**
7.1	Support the Timber Design Centre
7.2	Address technical barriers for innovative wood products, such as standards
7.3	Explore funding support for mass timber
7.4	Accelerate low carbon procurement and support implementation
7.5	Grow demand for bioproducts
8	**Grow and diversify export markets**
8.1	Create and sell our forestry and wood product story
8.2	Establish offshore in-market presence
8.3	Reduce non-tariff barriers to key markets



Priority area: Improving system settings for a thriving sector

9	**Support Māori aspirations in the sector**
9.1	Strengthen voice of Māori
9.2	Support Māori forestry and wood processing leaders
9.3	Support Māori land-owners and communities to develop future forest and wood products initiatives
10	**Create a strong and collaborative sector**
10.1	Implement this Plan in partnership with the sector
10.2	Collaborate to invest in 'industry good'
10.3	Support the industry to maintain and build social licence
11	**Grow and attract the future workforce**
11.1	Conduct a skills forecast
11.2	Refresh the Forestry and Wood Processing Workforce Action Plan
11.3	Support a just transition
11.4	Develop tertiary pathways for innovative wood engineering and architecture
11.5	Develop a Future Forestry Leader qualification
12	**Drive science and innovation across the sector**
12.1	Support innovation and commercialisation
12.2	Boost access to innovation facilities

13	**Provide sector insights to lift performance and innovation**
13.1	Enhance MPI's forestry-based advisory services
13.2	Regulate Log Traders and Forestry Advisers
13.3	Build better insights into log and biomass availability
13.4	Expand market intelligence
13.5	Legal harvest system

Next steps

The final Industry Transformation Plan will include a roadmap for sector transformation

Creating a high-value and resilient forestry and wood processing sector is a long-term process. It will require sustained effort and action by all contributors to the sector.

This draft Plan is a consultation document, where we seek your feedback on our proposed vision and initial suite of actions to transform the sector. Your feedback will help inform the final Plan, which we are aiming to publish later this year.

The implementation of the Plan will be in partnership with the sector and key stakeholders

Delivery of the Plan will require industry, workers, Māori and Government to work in partnership and share expertise.

Many of the actions proposed at this stage in the draft Plan are government-led. Going forward it will be pivotal that transformation is driven by stakeholders across the whole sector.

We invite you to highlight key initiatives that you are working on or planning to take that will support the outcomes of the ITP.

The final Plan will include more detail on implementation and will be updated over time

The actions in the draft Plan include a mix of short, medium and long-term actions.

Some actions are 'investment ready' and can be quickly implemented, whereas others require more work and sector consultation.

The final Plan will include a clear roadmap for how the proposed actions will be delivered, when, and by who. It will also include more information on how actions will be funded.

The Plan will be updated over time as context changes and key actions are progressed.

Glossary

Afforestation	The process of planting trees on land that that does not already have forest on it.
Bioeconomy	The production of renewable biological resources and the conversion of these resources and waste streams into value-added products, such as food, feed, bio-based products and bioenergy.
Circular bioeconomy	The intersection of the bioeconomy and circular economy.
Circular economy	The economic space where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised.
Deforestation	The permanent removal of trees to make room for something besides forest.
Ecosystem services	Ecosystem services are categorised as 'provisioning', such as food, timber and freshwater; 'regulating', such as air quality, climate and pest regulation; 'cultural' such as recreation and sense of belonging; and 'supporting', such as soil quality and natural habitat resistance to weeds.
Forest system	New Zealand's trees and forests and all of those with an interest in them.
Forestry sector	Individuals, groups, organisations, or representative bodies involved in any economic activity that mostly depends on the production of goods and services from forests. Including, but not limited to, forest owners (private and commercial), investors, forest management companies and contractors, nurseries, processors, manufacturers, and exporters.
Kaitiaki	Guardian, steward, caregiver, trustee.
Kaitiakitanga	Guardianship, stewardship, trusteeship.
Kaupapa	Topic, policy, plan, purpose.
Mātauranga Māori	Māori knowledge – the body of knowledge originating from Māori ancestors, including Māori worldview and perspectives, Māori creativity and cultural practices.
Ngahere	Forest, bush.
Sequestration	The process whereby trees remove CO_2 from the atmosphere and store it through photosynthesis.
Taonga	Cultural treasure.
Te Ao Māori	Māori worldview – the view of the world through Māori eyes.
Te Taiao	Nature, the natural world.

Whakapapa	Genealogy, genealogical table, lineage, descent – reciting whakapapa was, and is still, an important skill. It reflects the importance of genealogies in Māori society in terms of leadership, land and fishing rights, kinship and status.
Whenua	Land, country, ground, nation.

Te Uru Rākau New Zealand Forest Service

Te Kāwanatanga o Aotearoa
New Zealand Government