SCION

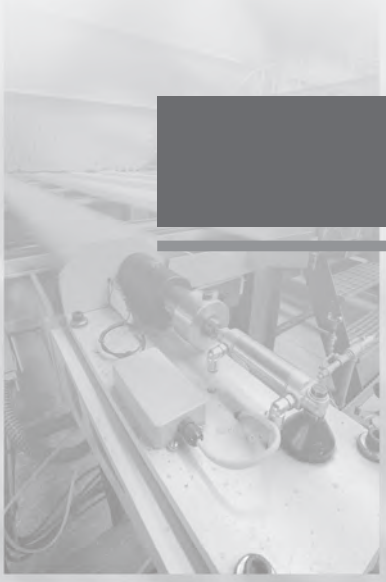
forests · products · innovation

Prosperity from Trees

Statement of Corporate Intent

2012 - 2017

www.scionresearch.com



SCION
forests · products · innovation

Prosperity from Trees

Statement of Corporate Intent
2012 - 2017

Published June 2012
Scion
49 Sala Street, Private Bag 3020
Rotorua 3046
New Zealand

This document is available on our website: www.scionresearch.com

ISSN 2230-4908 (Print)
ISSN 2230-4916 (Online)

Profile

New Zealand Forest Research Institute Limited – trading as Scion

Head Office: 49 Sala Street, Rotorua

Postal address: Private Bag 3020, Rotorua 3046

Web address: www.scionresearch.com

Ownership: Crown owned entity (established under the Crown Research Institutes Act 1992)

Governance: Shareholder-appointed Board: Chair, Tony Nowell; Deputy Chair, Alison Andrew; Directors, Peter Berg, Sheldon Drummond, Chris Insley, Michael Ludbrook, Brian Rhoades, Judith Stanway.

Executive Management: Chief Executive, Warren Parker; General Manager Research & Investments, Russell Burton; General Manager Manufacturing & Bioproducts, Elspeth MacRae; General Manager Forest Science, Brian Richardson; General Manager Sustainable Design, Trevor Stuthridge; General Manager People & Performance, Keri-Anne Tane; Chief Financial Officer and Company Secretary, Rob Trass; General Manager Business Development & Commercialisation (appointment pending).

Staff: 299 full-time-equivalent staff located at five sites: Rotorua (278), Wellington (3), Christchurch (17), Dunedin (1).

Shareholder funds: Total book value of $27,590 million at 30 June 2012

Vision: Prosperity from trees.

Core Purpose: To drive innovation and growth from New Zealand's forestry, wood product and wood-derived materials and other biomaterial sectors, to create economic value and contribute to beneficial environmental and social outcomes for New Zealand.

Values: Vital, innovative and collaborative.

Shareholdings

Company	Company type	Scion shareholding (%)
Future Forests Research Ltd	Subsidiary where the single share is held by Scion on behalf of the investors	100
Te Papa Tipu Properties Ltd	Land holding subsidiary	100
ATLAS Technology Ltd	A non operating subsidiary	100
Biopolymer Network Ltd	An incorporated joint venture	33.3
WQI Ltd (Solid Wood Innovation)	An MSI supported consortium in wood processing	5.95

Contents

page

Chair and CEO Introduction and Overview 4

1. Scion 6

2. Growing and Transforming the New Zealand Forest Industry 8

3. Scion's Science and Innovation Plan and Investment Priorities 15
   - Maximise the Value and Profitability of Commercial Forestry - IO1 22
   - Improve the Competitiveness of the Solid Wood Industry - IO2 24
   - Expand Opportunities in the Wood Fibre, Biopolymer & Biochemical Industries - IO3 26
   - Improve New Zealand's Forest Health & Preparedness for Biosecurity Incursions, Fire & Climate Change - IO4 28
   - Ensure the New Zealand Forest Industry's Licence to Operate Domestically & Internationally & Enhance Environmental Performance - IO5 30
   - Increase New Zealand's Energy Security Through the Expanded Utilisation of Forest Biomass for Energy - IO6 32

4. Scion's Supporting Strategy 34

5. Operating Indicators, Financial Performance & Reinvestment 38

6. Glossary 45

7. Appendices 53

Chair & CEO introduction and overview

Scion is pleased to present its Statement of Corporate Intent (SCI) for the five year period commencing July 2012. It sets out how Scion will work with the forest industry, Māori, Government and communities to achieve the national outcomes set out in its Statement of Core Purpose.

The forest industry is vitally important to New Zealand and has an exciting future, despite some current challenges in the wood manufacturing sector arising from the 2008 global financial crisis. Already the country's third largest exporter, it provides a leading and obvious opportunity to achieve export-led economic growth along with better environmental and social outcomes for New Zealanders. The forest industry's value chain incorporates forest production, solid wood and fibre processing, and the emerging renewable composite materials, energy and biochemical sectors. Collectively these sectors produce about $11 billion of earnings annually (not including environmental services such as carbon storage, a further $600-800 million per annum). Between 2001 and 2011, the sector on average contributed 3% per annum to GDP. Average revenue per fulltime forest industry worker in the Bay of Plenty exceed $215,000, and in some districts 40% of jobs are in forestry and forest-related companies.

The "New Zealand Forest and Wood Products Industry Strategic Action Plan" target is to increase exports from $4.5 billion in 2011 to $12 billion by 2022. The industry's confidence in meeting this target is underpinned by market demand, which is driven by world population growth, higher oil prices, meeting the climate change challenge, rapid technological innovation in renewable industrial products and energy, and increased wealth in rapidly developing economies such as India, China and Indonesia.

The "2012 New Zealand Forest Owners Science and Innovation Plan" identifies scope for $1 billion of additional exports from forest productivity gains, cost savings and other efficiencies in harvesting and logistics, and new revenue streams from current forest waste. Iwi, whose $2 billion forest estate asset continues to grow through Treaty Settlements and commercial initiatives, view forestry as a logical driver for tribal wealth generation, regional jobs and better environmental and cultural outcomes. For both central and local government, forestry is integral to New Zealand meeting its greenhouse gas emissions target, addressing erosion and flooding hazards and improving water quality and biodiversity.

These stakeholders' aspirations are fully consistent with Scion's Statement of Core Purpose (SCP) which is to:

1. Increase the value and productivity of the forestry, wood product and wood-derived materials and other biomaterial sectors to the New Zealand economy through improved forestry practices and production systems and increased diversification of New Zealand's biological industry base to meet current and future global market needs.

2. Protect and enhance market access and improve risk management in the forest industry.

3. Increase renewable energy production and energy security by growing New Zealand's ability to produce sustainable bioenergy and liquid biofuel products.

4. Enhance New Zealand's opportunity to benefit from forestry-based ecosystem services to improve both the global market position of industry and the environmental sustainability of forestry production in New Zealand.

This SCI sets out how Scion will work with firms, industry associations and public agencies to achieve these national outcomes. In addition to the planning documents referred to above, Scion has undertaken extensive consultation with forest industry leaders, iwi and central and local government representatives to confirm the research directions and investment priorities. Using this information, together with knowledge of the national and global operating environment, Scion is implementing a science and innovation programme to achieve six Intermediate Outcomes (IOs) over the next five years. These are to:

1. Maximise the value and profitability of commercial forestry.

2. Improve the competitiveness of the solid wood industry.

3. Expand opportunities in the wood fibre, pulp, biopolymer and biochemical Industries.

4. Improve New Zealand's forest health and preparedness for biosecurity incursions, fire and climate change.

5. Ensure New Zealand forest industry's licence to operate domestically and internationally and enhance environmental performance.

6. Increase New Zealand's energy security through the expanded utilisation of forest biomass for energy.

Scion's organisational strategy and business model is aligned to achieving these outcomes. This includes building strong partnerships with research users, strengthening research provider collaboration networks, investing in specialist equipment and pilot plant infrastructure, and developing talent and other capabilities to support earlier and faster technology transfer to users. Core Funding ($17.7 million in 2012-13) is invested to support achievement of impact measures through each of the IOs. About 55% of this will be for applied research. Scion will also reinvest $1.15 million of its surpluses in 2012/13 to improve industry engagement and technology transfer, improve the competitiveness of its infrastructure and support the development of the Māori economy through the forest industry.

With respect to financial performance, Scion expects to achieve revenues of $46.08 million and earnings before interest and tax and after reinvestment of $1.36 million for the 2012/13 year. This equates to a return on equity before reinvestment of 7.6% and 4.8% post investment. Factored into these and out-year projections are the subdued global economic recovery, impacts of the Christchurch rebuild and leaky home repairs on wood demand, growing momentum in developing the Māori economy and the forest industry taking greater responsibility to co-invest in research and development. Accordingly over the planning period, Scion expects to maintain strong underlying financial performance and capacity to invest in growth initiatives to support the forest industry realise its *'$12 billion of exports by 2022'*.

Tony Nowell
Chair

Warren Parker
Chief Executive

1. Scion

The New Zealand Forest Research Institute (now trading as Scion) was established as a Crown Research Institute (CRI) in 1992. It is wholly owned by the New Zealand Government and constituted as a limited liability company under the New Zealand Companies Act 1993. Scion is New Zealand's leading provider of science and technology to New Zealand forest-based companies.

In October 2010 Scion's Statement of Core Purpose (SCP) was adopted. This is to "drive innovation and growth from New Zealand's forestry, wood product and wood-derived materials and other biomaterial sectors, to create economic value and beneficial environmental and social outcomes for New Zealand"[1]. Scion is responsible, in partnership with firms, government and Māori, for achieving four national outcomes:

- Increase the value and productivity of these industry sectors to the New Zealand economy through improved forestry practices and production systems and increased diversification of New Zealand's biological industry base to meet current and future global market needs.
- Protect and enhance market access and improve risk management in the forest industry.
- Increase renewable energy production and energy security by growing New Zealand's ability to produce sustainable bioenergy and liquid biofuel products.
- Enhance New Zealand's opportunity to benefit from forestry-based ecosystem services to improve both the global market position of industry and the environmental sustainability of forestry production in New Zealand.

Scion's development from its origins in the early 20th century is intimately connected with the evolution of commercial forestry and its associated industries in New Zealand. For example, Scion, and its predecessors from the 1920s, developed the genetics of trees whose progeny now populate over 90% of the commercial forest estate. In the late 1950s, research into wood manufacturing and wood products commenced, and this led to the development of many technologies (e.g. drying, preservation, fibre production) that are now widely used by New Zealand's wood manufacturing companies. In 2000, Scion extended its focus to the development of renewable chemicals, materials and energy from forest resources and, later, into ecosystem services (such as payments for carbon storage) to further extend the portfolio of product options available from forests. These changes reflected the rapidly increasing international interest in developing replacements for petrochemicals and to enhance New Zealand's environmental resilience and security.

These achievements have built Scion's reputation as a world-leader in forest industry research and development. It has developed a distinct multi-disciplinary capability across the value chain from germplasm generation to the design and application of wood, fibre and other forest resources in commercial products and services. Scion also fulfils an important role in providing the evidence base for public policy on forestry.

Scion's business model

Scion's business model is centred on building long-term partnerships with firms and industry organisations along the forest-to-consumer value chain. This approach generates critical mass, supports efficient technology translation and leverages stakeholder expert knowledge to deliver new value to and solve problems for the New Zealand forest industry. As illustrated in Figure 1, the approach allows Scion to leverage its research capabilities, specialist infrastructure assets and research collaboration networks to assist the many firms that make up the industry to meet their customer needs, maximise economic value for New Zealand, and credibly operate within environmental limits. To further strengthen industry interactions, Scion has attracted a cluster of companies within its 114-hectare Rotorua Campus and Te Papa Tipu Innovation Park. These include two of New Zealand's largest forest management companies, several other forest and wood research organisations, education

[1] The full Statement of Core Purpose is available at www.scionresearch.com

and training organisations, two government departments (Ministry for Primary Industries and Department of Conservation), all of whom, like Scion, are aligned to creating greater value from New Zealand's forests. In total 27 companies related to the forest industry are based on Scion's Rotorua campus. Scion's other major site is within the School of Forestry at the University of Canterbury, Christchurch.

This SCI describes how this business model will be applied to support the forest industry meet its goals and, in so doing, enable Scion to achieve the national outcomes in its Statement of Core Purpose.

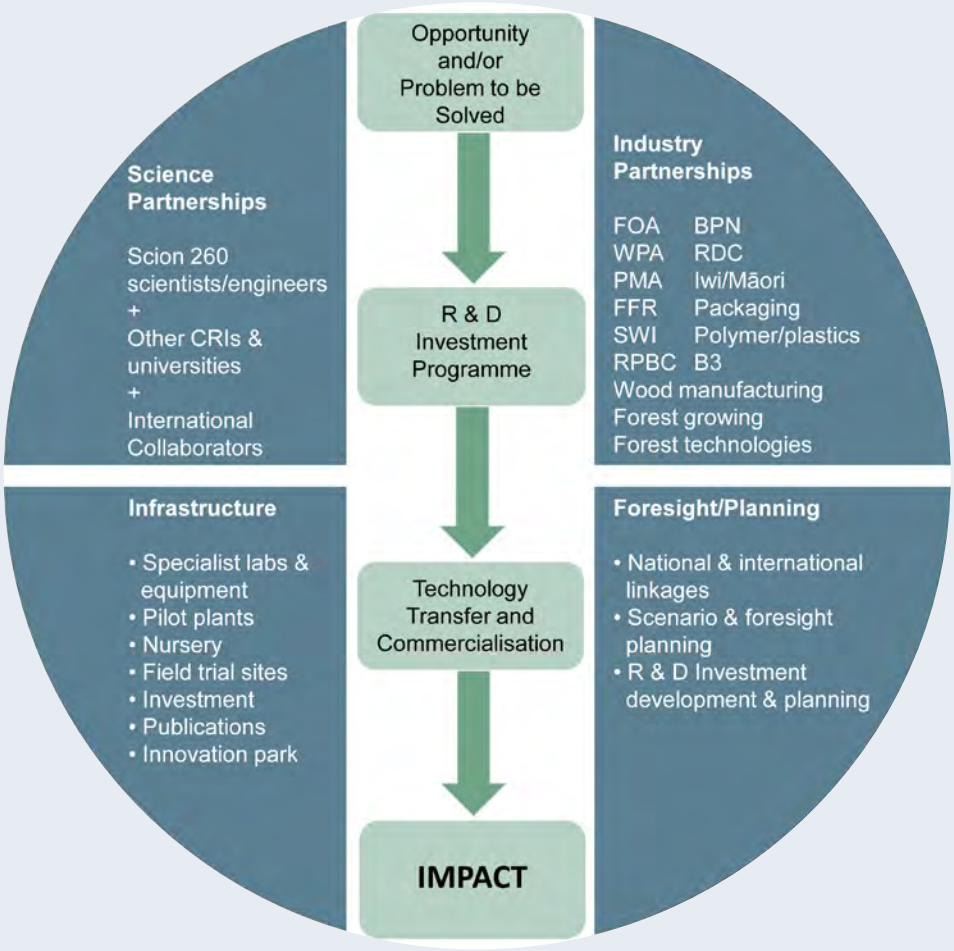


Figure 1: Scion's business model utilises industry partnership, research collaboration and specialist infrastructure to maximise its science quality and impact.

2. Growing and transforming the New Zealand forest industry

The New Zealand forest industry's target is to increase exports of wood based products to $12 billion ($4.8 billion in 2010/11) and the value of related forest technologies to at least $2 billion annually by 2022[2]. Concurrently, it will improve the resilience of the New Zealand infrastructure and environment by underpinning New Zealand energy security by creating at least another 24 PJ of energy, reduce land erosion hazards, and sequester 23.5 million tonnes of carbon per annum[3].

Forest growing, processing, design and construction companies within the forestry industry currently produce about $6.4 billion of sales per annum[4]. Adding sales from furniture manufacture, carbon, kilns and other parts of the forest value chain at least doubles this value[5] with exports of pulp, paper, wood manufactured products and logs being New Zealand's third largest merchandise export earner[6]. The forest industry generates high value per fulltime worker (on average about $215,000 of GDP/FTE in the Bay of Plenty[7] region) and about 4 to 6 'downstream' jobs per employee. This industry, comprising many small to medium and a few large firms, therefore has a powerful influence on wider community well-being, especially in smaller urban centres and rural districts.

Trees create value for New Zealand in many ways, both directly and indirectly. During its growth a tree stabilises land, enhances water and air quality, absorbs carbon and provides a back-drop to amenity activities such as recreation and eco-tourism. On maturity it can be disassembled to provide materials for construction, interiors and landscaping; fibre for packaging and paper; and a growing array of chemicals and energy products. In conjunction with this supply chain, companies produce furniture and other high value manufactured goods, and develop and supply technologies and machinery such as timber drying kilns, harvesting machines, biorefinery plant and process automation equipment.

The New Zealand forest industry encompasses companies that:

- Grow and manage forests for economic, environmental and amenity purposes.
- Convert trees into multiple products including logs, timber for construction, and manufactured products (e.g. pulp, paper, panels and fit out, and furniture) and engineered products (e.g. laminated timber).
- Produce renewable chemicals (e.g. bio polymers & extractives), composite products (e.g. fibre plastic componentry), adhesives and coatings, packaging and energy (e.g. wood pellets, biofuels) from wood and forest resources.
- Manufacture machinery and equipment for forest management (e.g. harvesting) and forest resource processing (e.g. drying kilns, biorefining plant).
- Provide support services that supply systems to protect forests, treat timber, software, engineering and logistics.

Future Vision – an industry transformed

The forest industry, by the mid 2020s, will be very different from that of today as it responds to and supports a world where assets such as materials (for construction and consumer goods), energy, and water availability are scarcer and more highly valued than at present.

The cost and the availability of energy and water are already creating international concern as is the demand for petrochemical substitutes and security of food supply. With a world population expected to be about 9 billion (currently 7 billion)[8], by 2050, and having to adapt to a likely 1-2°C warmer and more hazardous climate, the above pressures on economies and their political stability is expected to grow.

[2] New Zealand Forest and Wood Products Industry Strategic Action Plan March 2012, www.woodco.org.nz
[3] Ministry for Environment 2012 New Zealand's Greenhouse Gas Inventory 1990-2010 www.mfe.govt.nz
[4] Wood Processing Science and Innovation Plan 2011, www.wpa.org.nz
[5] Based on Annual Enterprise Survey Data, New Zealand Department of Statistics (2009) including forestry, wood processing, paper manufacturing, wood buildings, furniture, kilns, forest machinery.
[6] New Zealand Forest and Wood Products Industry Strategic Action Plan March 2012, www.woodco.org.nz
[7] John Galbraith personal communication.
[8] World Population to 2300, United nations, Department of Economic and Social Affairs, Population Division www.un.org/esa/population/publications/.../WorldPop2300final.pdf

A transition to a new **bio-based** future is seen by many nations as the most effective response. In Europe, the Americas and Asia energy and food security are much more pressing issues than in New Zealand. Nations within these regions are planning for and transitioning to a new knowledge-based bioeconomy[9] future through the installation of biorefineries, land use change and prioritising 'green economy' research and development investment.

They are also strongly promoting the use of clean technologies (recycling, renewable energy, process efficiencies to reduce waste and eliminate emissions), industrial biotechnology[10] and the judicious use of genetic modification (such as for disease and drought tolerance) to find solutions to food, fibre and energy security and at the same time improve environmental protection.

New Zealand has excellent prospects to make large economic, environmental and social gains from these global changes through its extensive exotic plantation (1.7 million hectares, see insert), indigenous forests, wood and fibre processing infrastructure and, in global terms, relative abundance of water and renewable energy. Further, this development is complementary to, and can be integrated with, the advancement of New Zealand's food and advanced manufacturing industries, and climate change policy.

The forest industry therefore can play a significant role in helping New Zealand to meet its targets to **grow export revenue, create high wage jobs** and improve **environmental resilience** including reaching New Zealand's international greenhouse emissions reduction targets. It will also contribute to better social outcomes for New Zealanders, **build the manufacturing sector and strengthen the Māori economy** by adding to their current $2 billion forest asset base.

Global trends shaping the forest industry

Transitioning to renewable, low carbon substitutes for petroleum products: The potential for wood fibre to be converted into chemicals and polymers and thereby substitute for petrochemicals is now well recognised. The production of renewable polymers and composite materials from biomass is a rapidly growing global opportunity[11]. These materials, developed from renewable feedstocks, such as from forests, have properties comparable to non-renewable oil-based plastics. Global production of bioplastics, for example, is currently about 1 million tonnes per year (in a 200 million tonne per annum plastic market) but is growing at more than 10% per year. New Zealand has the ability to produce these plastics from trees and waste fibre from other biomass processing.

Meeting greenhouse gas emission reduction and forest conservation (biodiversity) targets: Through, for example, the United Nations sponsored REDD+ scheme (which, from a New Zealand perspective, will beneficially reduce log supply from tropical hardwood forests), land use change and the protection of biodiversity.

Ensuring energy security and safety: In the face of 'peak oil', higher exploration costs in environmentally sensitive zones (e.g. national parks, deep ocean) and political unrest in the major oil producing regions, leading economies are implementing energy security strategies. Also nuclear power plants, once foreseen as a lead option for improving energy intensity, are either closing or their construction is being delayed. These trends are particularly pressing for countries with a high dependence on imported energy, such as China, India, South Korea and Japan, which are important trading partners for New Zealand. The New Zealand Government's energy strategy seeks to generate 90% of electricity from renewable sources by 2025 and have a 50% reduction in greenhouse gas emissions by 2050[12]. Wood already provides some 7.2% of New Zealand's energy and, through technology advances in converting forest biomass to fuels, has the potential to increase its contribution to New Zealand's energy supply to 9% (a further 24 PJ over 2010 values).

New Zealand's commercial forests

New Zealand's 1.7 million hectares of commercial forests have a standing volume of 467 million m^3 of timber as at 1 April 2010. About 90% is radiata pine, 6% is Douglas-fir and the balance consists of cypresses (0.5%), eucalypts (1.4%), other exotic softwoods (1.4%) and exotic hardwoods (0.7%). The majority (91%) of forests are privately owned, with the balance owned by the Crown (3%), local government (3%), state owned enterprises (1%) and public companies (2%).

[9] The term 'bio-economy' includes all industries and branches of the economy that produce, manage or otherwise harness biological resources (and related services, supply or consumer industries), such as agriculture, food, fisheries and other marine resources, forestry. (Source: Orientation Paper; EU FP7 2013 Work Programme (draft), May 2012).

[10] Industrial biotechnology enables industries to deliver novel products which cannot be produced by conventional industrial methods; in addition it will make possible replacing chemical processes by more resource efficient biotechnological methods with reduced environmental impact (Source: ibid.).

[11] Bioplastic market expands despite recession: A Healthy Stretch 24 June 2009, ICIS Chemical Business

[12] www.med.govt.nz/energy-strategy

The "greening" of markets and businesses: According to 'Greening New Zealand's Growth[13]' "*The world is shifting towards greener forms of economic growth. People aspire to economic development and higher living standards – and they aspire also to environmental sustainability in all its forms. Greener growth means a shift to more sustainable, or greener, ways of operating and developing modern economies. A shift to greener products, services, technologies, practices and markets.*" This has implications for all manufacturing companies to focus on reducing their environmental footprint and use renewable materials such as timber, wood fibres and chemicals extracted from woody biomass to meet the growing demand for renewable, bio-based products.

New technologies such as genetic modification (GM), industrial biotechnology and information and communication technologies (ICT) are helping to address the challenge of achieving sustainable growth from finite natural capital: The application of these technologies is accelerating to optimise resources (e.g. water and nutrient efficiency), reduce chemical use (e.g. herbicides and pesticides) and incorporate valuable commercial traits faster than by conventional breeding (e.g. the volume and quality of plant yields). These technologies are gaining wider acceptance for use in commercial forestry. ICT, for example, is enabling precision management of production systems.

A growing need for affordable housing and resilient commercial building solutions: Demand continues to grow for improved and affordable housing in New Zealand and developing economies in Asia, India, the Middle East, Africa and South America. Timber is well proven as a construction material in earthquake prone regions. As outlined in the WoodCo Strategic Action Plan, there is the potential to substantially extend the application of timber and wood-derived materials into future houses.

New protocols and standards for packaging: New Zealand must also provide high quality packaging materials to enable our primary produce exports, such as those from horticulture and aquaculture, to meet the new global packaging protocols and satisfy the requirements of increasingly sophisticated consumers in high value international markets. Typically, packaging materials must be disposable (challenging some traditional packaging materials such as expanded polystyrene), but must also maintain the quality and safety of the transported material such as fruit, fish and dairy products. To address these needs, new packaging solutions are required, providing a dual benefit to New Zealand by developing new materials from our forest fibre resources and an essential technology platform to support our high-value food export industry. The Green Growth Strategy noted the necessity for New Zealand export companies to reduce the carbon footprint of their products in order to stay competitive[14]. Hence, substitution of expanded polystyrene with a compostable bio-based packaging material[15] derived from wood fibre (such as for moulded or extruded products[16] within the fast-moving consumer goods sector) presents a significant new manufacturing opportunity for New Zealand.

New Zealand forest industry growth plans

During 2011/12 the New Zealand forest industry organisations have reviewed and developed their growth and development strategies and associated science and innovation plans. These provide critical direction to Scion and the focus of this SCI. They include:

The New Zealand Forest and Forest Products Industry (WoodCo) Strategic Action Plan:[17] WoodCo's target is to grow wood-based products to $12 billion ($4.8 billion in 2010/11) and the value of forest technologies to at least $2 billion annually by 2022. This will be achieved by:

1. New Zealand wood becoming the preferred construction and finishing product in New Zealand and Australia.
2. Expanding exports of New Zealand wood into Asia, India, USA and Australia.
3. Delivering more value from the existing resource.
4. Transforming the use of wood in building systems.
5. Expanding new high-value fibre products and integrating new co-product value streams such as biochemicals, biofuel and other bioenergy options.
6. Developing new fibre-based packaging products to support New Zealand growing high-value food exports.

[13] Report of the Green Growth Advisory Group, C/- Ministry of Economic Development, December 2011, www.med.govt.nz
[14] Greening New Zealand's Growth Report of the Green Growth Advisory Group December 2011 Green Growth Advisory Secretariat, c/- Ministry of Economic Development
[15] www.biopolymernetwork.com
[16] www.woodforce.com
[17] New Zealand Forest and Wood Products Industry Strategic Action Plan March 2012, www.woodco.org.nz

"New Zealand's biological resources are its key global competitive advantage. Plantation forestry sustainably uses these resources to produce wood, energy and store carbon. Plantations designed for customer needs in the end market will provide the feedstock for a high-tech manufacturing industry based in NZ and exporting finished goods abroad."

New Zealand Forest Owners Association Science & Innovation Plan 2012.

The NZFOA Science and Innovation Plan[18] seeks to grow the forest growing sector by $3 billion by 2030. The key to this will be improved profitability through the doubling of productivity (biomass production) on a per hectare basis while also improving wood quality (uniformity and stiffness) and increasing tree resistance to pests and diseases.

The WPA/PMA Science and Innovation Plan[19] targets annual gains of $100 million per annum through increases in export revenue and improvements in manufacturing processes.

Scion further notes that:

1. While the trees that will be harvested over the next 20-30 years are already planted, there is a real opportunity now to influence the future genetic quality and diversity of New Zealand's forest estate species through replanting (and land use change) about 55,000 hectares annually.
2. Trees generate multiple sources of value and, due to the trends outlined above, the relativity between these is expected to change significantly over the next two decades (timber, carbon, fibre, energy, chemicals, land protection, land use optimisation, biodiversity, recreation, clean water, nutrient reduction).
3. Wood for construction purposes has superior environmental credentials to steel and concrete in a carbon-constrained world and also performs well in earthquake-prone zones.
4. New Zealand's proximity to the rapidly growing economies (China, India and the ASEAN block) provides real advantages in building new high volume and value markets.
5. Forestry strongly complements New Zealand's other primary production sectors (providing wind shelter, carbon, erosion and nutrient mitigation, sustainable packaging), and increased integration of land-use, genetic improvement and manufacturing would be beneficial.
6. A more prosperous future for the forestry industry requires integration along the value chain and the matching of feedstocks with end-uses.

These have been summarised by Future Forests Research Ltd as described in Figure 2 below.

[18] New Zealand Forest Owners Association Science and Innovation Plan 2012. www.nzfoa.org.nz
[19] www.wpa.org.nz

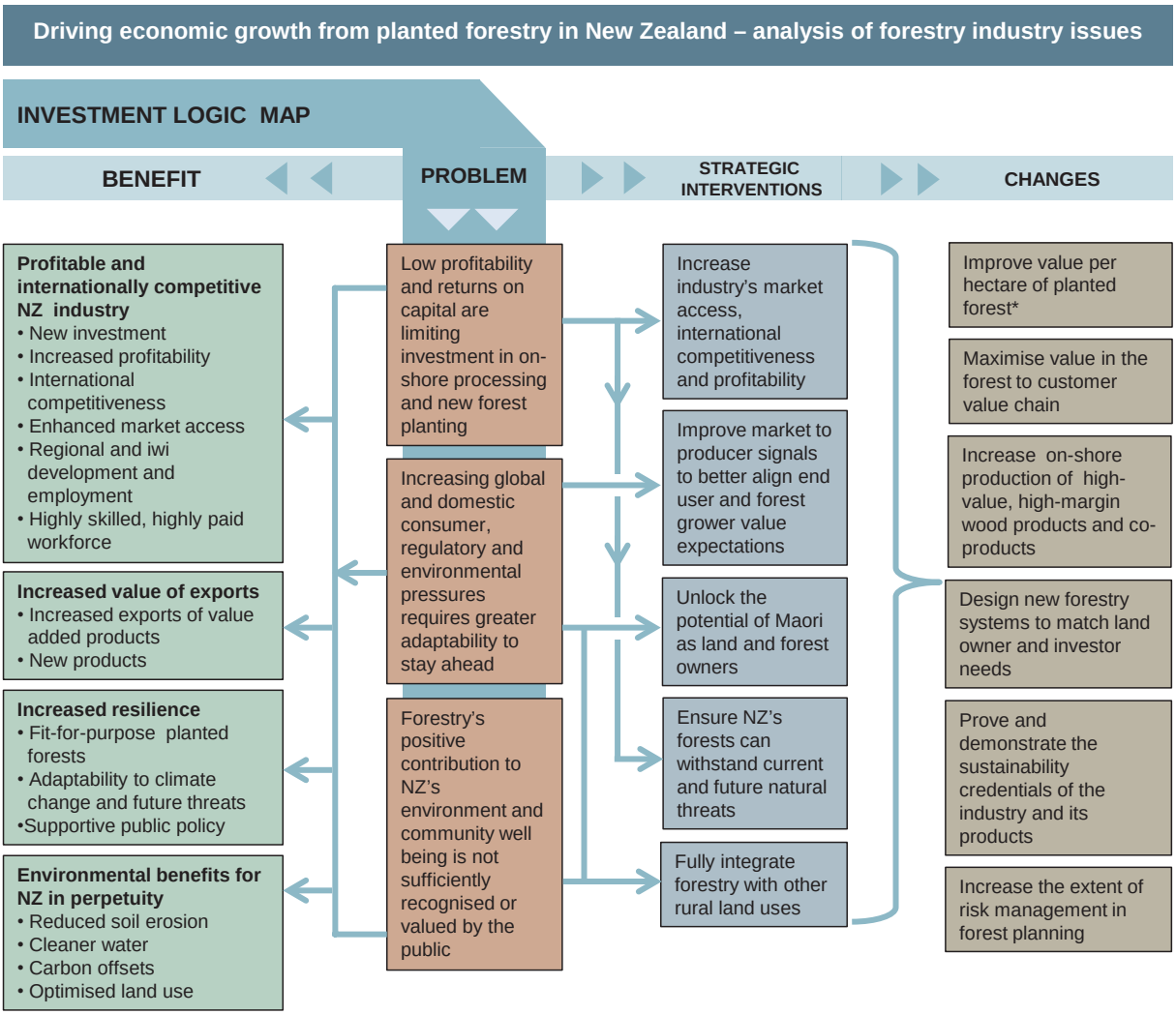


Figure 2: A summary overview of the forestry industry issues (developed by Future Forests Research Ltd)

New Zealand situation and outlook

Within New Zealand the forest industry must also consider:

- The subdued recovery from the global financial crisis, exchange rate volatility and tight fiscal constraints on government expenditure.
- A challenging domestic economic situation including the Christchurch earthquake and generationally low housing starts.
- Relative isolation from its international markets.
- International competitors with larger economies of scale (e.g. Chile, China, Canada).
- The need to recapitalise and modernise manufacturing plants.
- Export log prices impacting on on-shore wood and fibre processors.
- The urgent need for housing and commercial building solutions for the Christchurch and Japanese (and other nations) earthquake rebuilds and repairing 'leaky buildings'.
- The implementation of the Emissions Trading Scheme (ETS) and growth of carbon markets.
- Conclusion of Treaty of Waitangi settlements by 2014.
- Variable and generally poor public understanding of the role of forestry in the economy.

While operating in this context the collective industry also has to seek ways to enable growth of the Māori economy and meet central and local government policy imperatives.

Growing the Māori economy through the forest industry: Māori currently have around $2 billion of assets in forestry[20] with about 500,000 hectares of pre-1990 forests. As Treaty settlements conclude, Māori ownership of land and forests will increase. However, they have challenges with:

1. Fragmentation of land ownership (circa 550,000 hectares of Māori land has no formal administration).

2. Remoteness from processing sites and associated transport costs.

3. Accessing working capital for forest establishment.

4. Managing intergenerational investment.

5. Implementation of the ETS.

6. Developing local employment opportunities for their people.

Some Māori forest owners wish to diversify species and, in some cases, re-establish land in species other than radiata pine (including, for example, kauri, totara and beech). This choice is driven by the desire to re-establish taonga species as part of their cultural reinvigoration, for carbon revenue and ngahere for traditional uses. They are also interested in creating multi-layered forests to generate several income streams (e.g. ginseng, honey, essential oils, wood and carbon).

In considering the use of forest resources, Māori also strongly want to incorporate Matauranga Māori (traditional knowledge) and increase the education and skills of iwi/hapu members. Science and innovation are seen as enablers of a strengthened future Māori economy. A number of iwi/Māori are currently pursuing the use of science, innovation and technology strategies to better understand the potential benefits for iwi economic, social, cultural and environmental outcomes.

As Māori increase their influence over land and forests they will play an influential role in shaping the future New Zealand forest industry. Accordingly, through forestry "*There is enormous potential for the Māori economy to lead aspects of growth in the New Zealand economy*"[21].

Central and local government: The Government's goal is to foster economic development that will deliver greater prosperity, security and opportunities to all New Zealanders. To meet these requirements, Scion works closely with:

- The Ministry for Primary Industries (MPI) which has the responsibility for forest and trade policy, implementation of the ETS and biosecurity and administers the Primary Growth Partnership (PGP).

- The Ministry for the Environment (MfE) which is responsible for environmental policy and regulation regarding forests (e.g. the national policy statements for forestry, water and biodiversity, the Land and Water Forum), climate change policy, aspects of local government and, through the Environmental Protection Agency (EPA), the HSNO Act which is central to the approval of Scion's genetic modification research.

- The Ministry of Business Innovation and Employment (MBIE) and New Zealand Trade and Enterprise (NZTE). The new MBIE will have responsibility for business growth, building and housing, timber and wood treatment standards, energy policy, development of key markets such as China and India, and science and innovation policy and implementation.

- The Department of Conservation (DoC) in forest conservation management, biodiversity protection, weed, fire and pest management.

- The Ministry of Foreign Affairs and Trade (MFAT) in addressing forest biosecurity risks, global standards and market access protocols, and access to international markets through science diplomacy.

Local government is focussed on supporting the Government's economic growth agenda through regional economic development plans, development of infrastructure, removal of 'red tape' and environmental protection. Local government is a significant owner of forests (3% of the national estate). The Bay of Plenty and Waikato Regional Councils' plans with regard to forestry are especially significant in the near term for Scion. For example, Scion has helped shape the Bay of Connections Strategy pertaining to forestry and energy development[22]. Improving water quality, whether for the Waikato River or Rotorua Lakes, is a significant challenge for these regions. Scion will continue to work closely with the local government sector to address these needs.

[20] The Asset Base, Income , Expenditure and GDP of the 2010 Māori Economy - Berl report to the Maori Economic Taskforce
[21] Māori Economic Development Panel – Te Puni Kokiri 2012.
[22] Bay of Connections Strategy

The Bay of Plenty Regional Council says "*the nitrogen entering Lake Rotorua needs to be reduced by approximately 320 tonnes a year*"[23] from the current nitrogen load of 755 tonnes/year. Forestry and other land use change, has a significant role in enabling this target to be met.

Shareholders' guidance

The Government has identified 'science and innovation' as the main driver of a modern, future-looking economy and one of the six 'planks' in its economic growth agenda. The Crown's priorities and principles for research and development, set out in its documented guidelines *Igniting Potential*[24], indicate how Scion should work with the forest industry to:

- Produce higher margins, industrial products, processes and technologies, as well as renewable industrial materials along with biosensing and bioprocessing technologies.
- Provide knowledge that helps New Zealand's economy develop within environmental limits and supports the sustainable development of industries.
- Improve the quality of urban and infrastructure development, increase national resilience to hazards and mitigate infrastructure risks.
- Accelerate the growth and development of a vibrant, high-value, technology-based products and services sector, including novel materials.

Shareholding Ministers expect Scion to clearly articulate how it will achieve its Statement of Core Purpose outcomes, allocate core funding, transfer technology with impact, and maintain financial viability.

Scion's response

With this context in mind, Scion has developed its science and innovation strategy to directly address the above challenges and support forest growing, wood and wood-derived products manufacturing companies, new investors and new companies entering this important industry to achieve growth and other performance targets. These are captured in the Scion Science and Innovation Plan, which is described in the following section.

[23]Te Rotorua nui a Kahumatamome - Improving water quality in Lake Rotorua, February 2012, Bay of Plenty Regional Council.
[24]www.msi.govt.nz

3. Scion's Science and Innovation Plan and investment priorities

Scion's strategy is designed to deliver the science and technology forestry, wood processing and forest technology companies need to realise the opportunities and meet the challenges described in Section 2. The key actions for New Zealand (see Figure 2, page 12) can be summarised as:

- **Forestry:** Increase the profitability of forestry as a land use and develop new forest production systems that meet the needs of new land owners and investors including Māori and concurrently, minimise the exposure of these forests to biosecurity, climate and fire risk.
- **Wood manufacturing:** Increase (by circa 20% compared to 2011) on-shore manufacturing through high value, high margin wood and wood fibre products and co-products from process residues.
- **Emerging renewable sector:** Foster the establishment and growth of firms to supply the growing markets for low environmental impact, renewable materials, chemicals and energy.
- **Value chain:** Demonstrate the sustainability credentials of the industry and its products to grow market access and ensure its social license to operate is maintained domestically; and improve the efficiency of the forest resources-to-customer value chains.

To achieve this, Scion will focus its efforts over the next five years on delivering six interrelated Intermediate Outcomes[25]:

IO1: Maximise the value and profitability of commercial forestry;

IO2: Improve the competitiveness of the solid wood manufacturing industry;

IO3: Expand opportunities in the wood fibre, pulp, biopolymer and biochemical industries;

IO4: Improve New Zealand's forest health and preparedness for biosecurity incursions fire and climate change;

IO5: Ensure New Zealand's licence to operate domestically and internationally and enhance environmental performance; and

IO6: Increase New Zealand's energy security through expanded utilisation of forest biomass for energy.

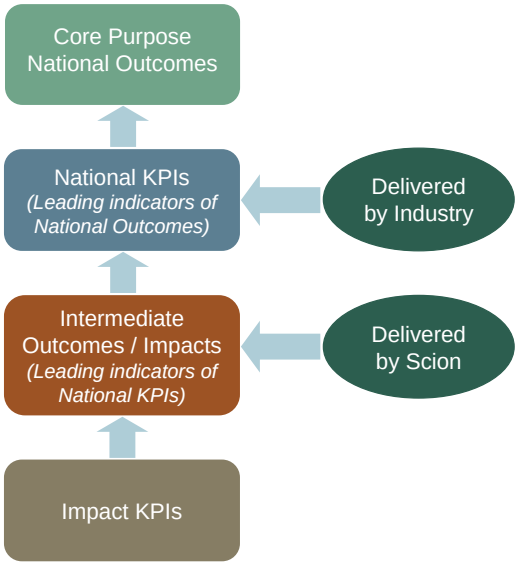


Figure 3: Hierachy of indicators and outcomes.

These are each described more fully in the following section. Their delivery, collectively as illustrated by Figure 5 (page 18), will achieve Scion's Statement of Core Purpose National Outcomes. In support of this Scion's strategy, mapped pictorially in Figure 4 and described more fully in Section 5, is designed to:

- Strengthen relationships with the forestry and wood, and wood-derived fibre manufacturing companies to ensure research effort is well aligned to their needs and can be absorbed rapidly by its participants.
- Assist the shapers of, and early investors in, the rapidly emerging 'future' forest industry e.g. biorefining, biomaterials and renewable energy.
- Work in partnership with Māori to support their aspirations and develop their economy.

[25]These are the science outcomes within Scion's control that lead to delivery of the industry targets.

- Build the best science and technology teams to deliver the Intermediate Outcomes (IOs) and ensure science quality and impact, and best use of knowledge for New Zealand benefit.

- Align Scion's investment (core purpose and internal) to efficiently achieve the IOs, support growth in industry co-investment and maintain the competitiveness of science infrastructure and capabilities.

- Develop Scion's people and culture to be customer-focussed and high-performing.

- Grow productivity through smart processes and systems and modernised workplace.

- Accelerate technology translation and commercialisation.

- Provide good stewardship of Scion's databases and collections of national significance for national good.

Strategic Advisory Panels to the Scion Board have been established to provide independent and expert perspectives on science quality, user impact and Māori and assist with strategy formulation. The terms of reference of these groups and their composition are described at www.scionresearch.com

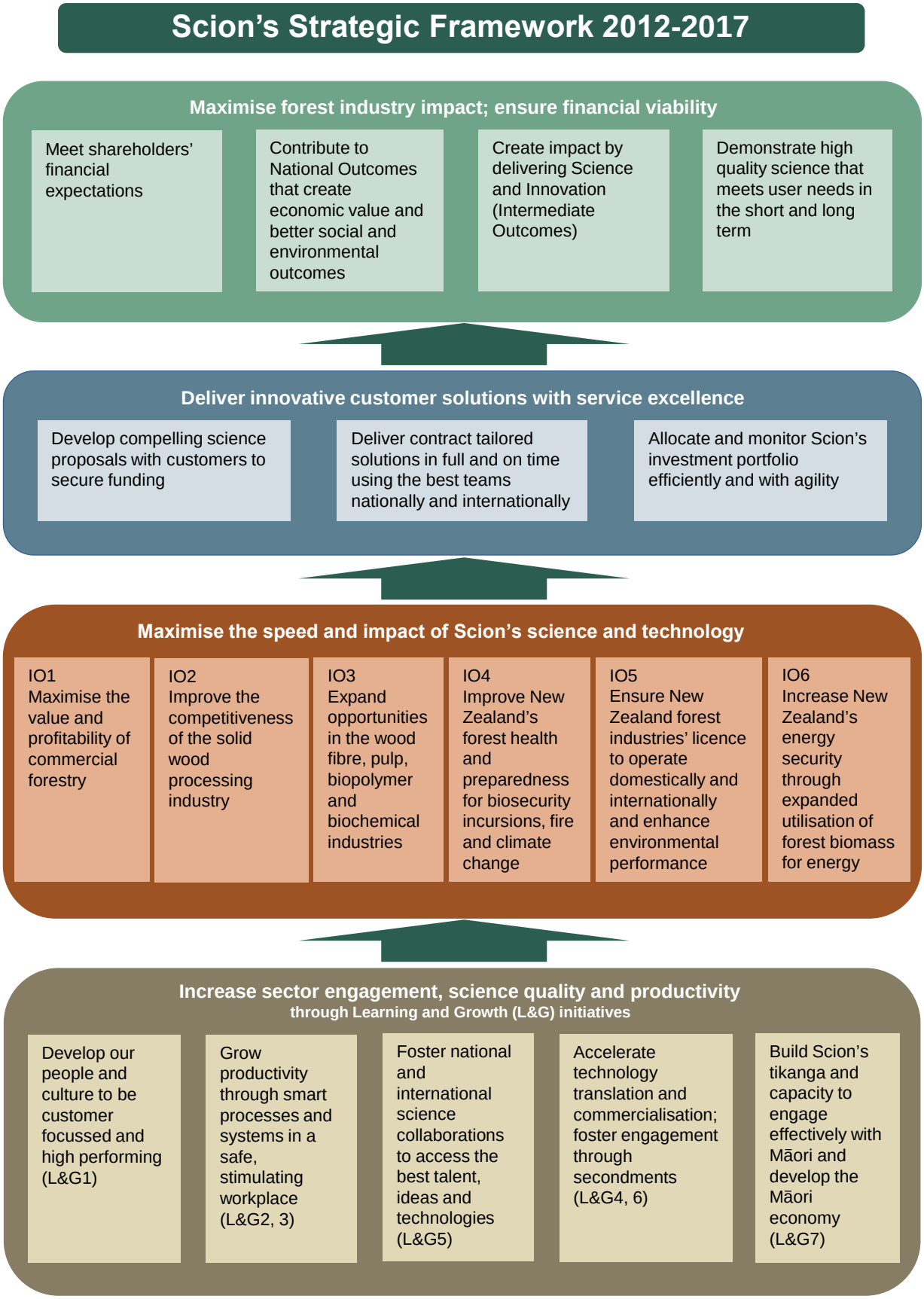


Figure 4: Scion's strategy mapped in a balanced scorecard format.

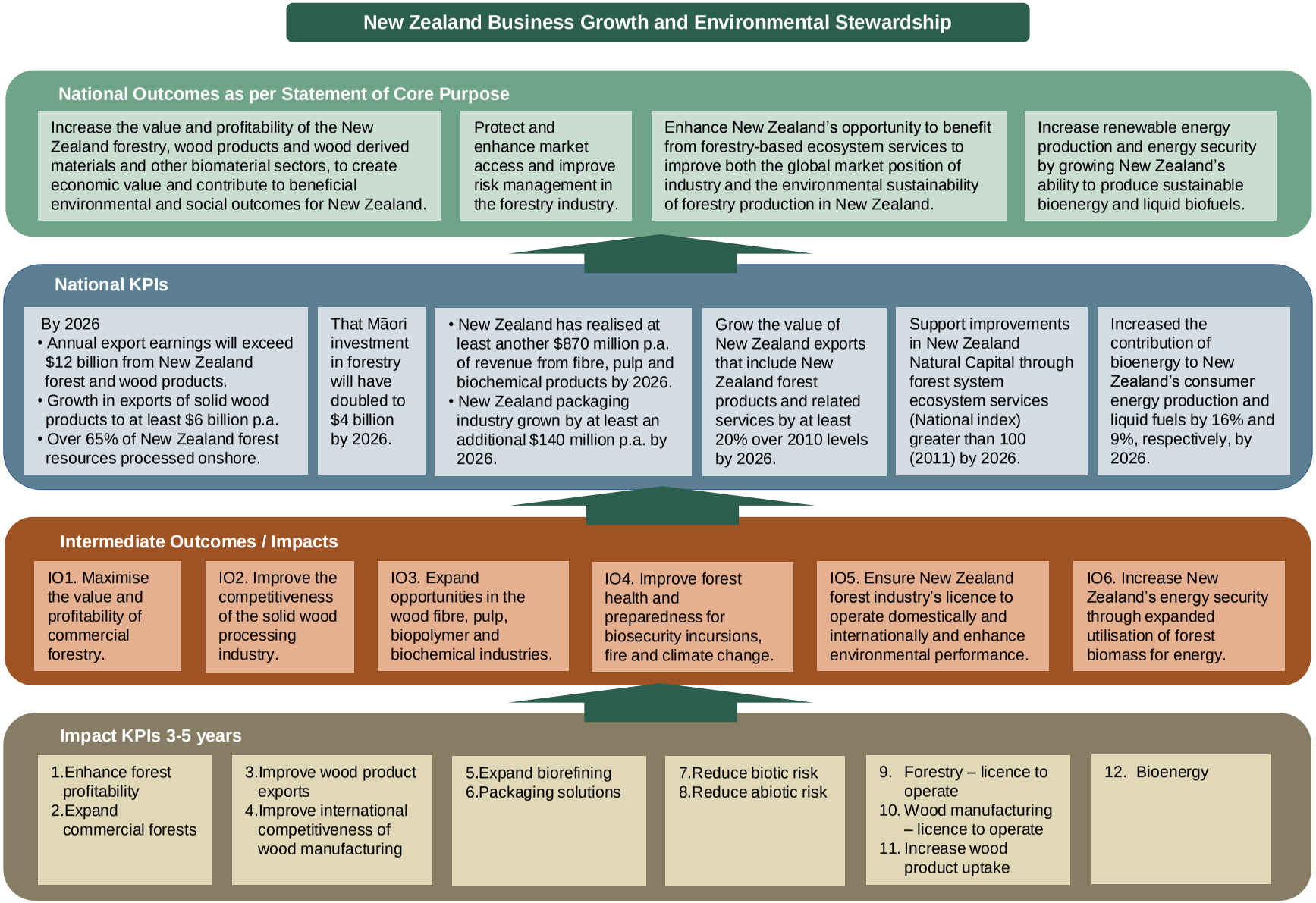


Figure 5: Scion's Science and Innovation Plan shows the inter-dependency between National and Intermediate Outcomes and performance measures (National and Impact KPIs respectively).

Achievement of Statement of Core Purpose outcomes

Scion's Science and Innovation Plan (Figure 5) describes the critical relationship between the National Outcomes and the Intermediate Outcomes (IOs) that will be delivered by Scion. The IOs are targeted at a 5-15 year horizon. Scion and its research partners provide the enabling tools, technologies and knowledge that will enable users to achieve the impacts for industry and thus Scion's Core Purpose National Outcomes. Each IO has 1-3 Impact measures (Key Performance Indicators (KPIs) that are to be achieved within a 3 to 5 year timeframe) by which progress towards IO achievement is gauged. The hierarchy is as described in Figure 2.

Core funding investment

In the 2012/13 year, Scion will receive $17.7 million from the Government to invest in science and innovation programmes that will contribute towards the achievement of its Statement of Core Purpose National Outcomes. These allocations are updated annually to reflect refreshed industry strategies, science progress and changes in the external operating environment.

Core Funding is focussed on:

- Ensuring Scion's capability is aligned with delivery of the Impact Measures (KPIs) for each Intermediate Outcome. The 12 Impact KPIs are summarised in the bottom row of Figure 5.
- Supporting activities where industry investment is unlikely until proof of concept is demonstrated and the risks are quantified.
- Growing industry co-investment through joint business cases.
- Improving the competitiveness of Scion's science capability and equipment.

The criteria for allocating core funding and other investment are outlined in Section 4 (page 34) and Section 5 (page 38), respectively.

Investment profile for intermediate outcomes/impacts

The source of investment into Scion's science and technology is mapped in Figure 6. Approximately 45% is for basic science, with the balance being for applied science. While investments are mapped explicitly to IOs, in practice, programmes interact and overlap (e.g. forest genetic improvement (IO1) supports the forest biosecurity programmes (IO4)).

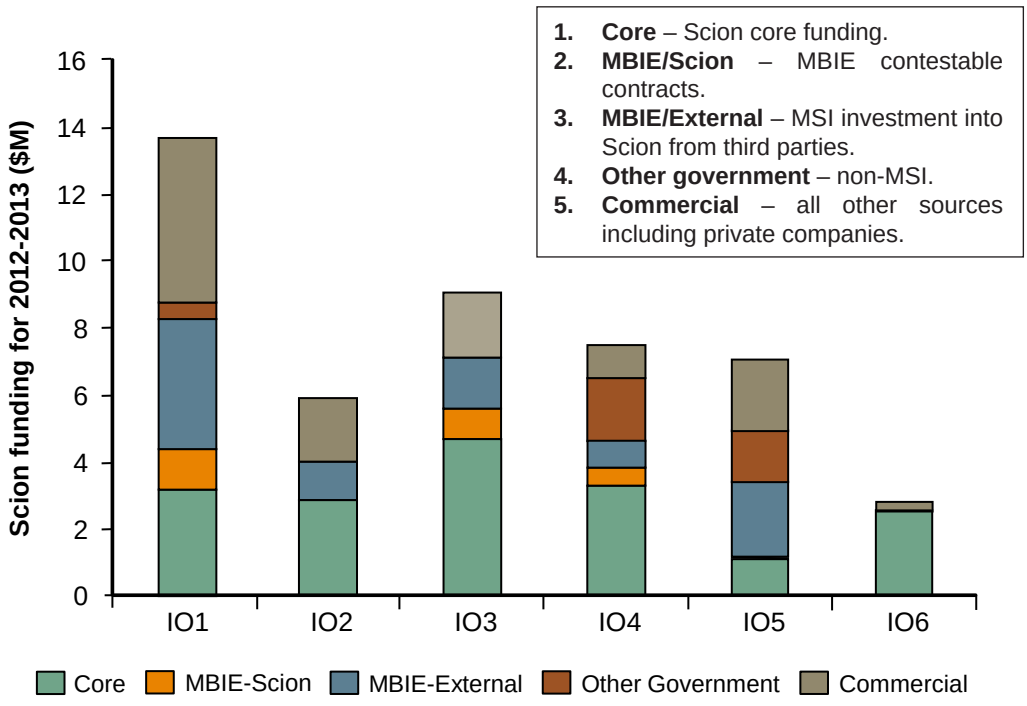


Figure 6: Allocation of core funding and other investment to IOs.

About one third of investment into Scion is focussed on improving the competitiveness of commercial forestry in New Zealand (IO1) with a large component of this sourced through the Government (e.g. MfE and MPI) as well as forest owners and managers. This area is supported by strong investment mechanisms within the industry.

While investment in IO2 at Scion is relatively small in comparison to the other IOs, Government and firms invest a further $4 million in this area through the STIC and Solid Wood Innovation (SWI consortia). About one third of the annual SWI investment is with Scion. In addition, the regulatory and value chain work is positioned within IO5 – Licence to Operate. Nevertheless, the level of industry investment is relatively low as this sector adapts to the substantial fall in new housing starts (domestically and offshore) and higher demand (and prices) for export logs. Scion is actively working with wood manufacturers to develop opportunities to strengthen investment into IO2.

Core funding for IO3 (fibre, pulp, biochemicals and other wood derived composite materials) supports the development of technology platforms for emerging industries and new products that will fit into existing mills and manufacturing plants.

Core funding investment into IO4 (forest health and preparedness for biosecurity incursions, fire risk and adapting to climate change) will increase in 2012/13 to support the forest owners' priority to develop tree germplasm with greater resistance to foliar diseases. Funding in IO4 also supports Scion's research capability in biosecurity, fire and climate change. Co-investment in these areas is from user-collaborative groups, Government (e.g. the Rural Fire Authority) and the Australian Bushfire Cooperative Research Centre.

The "Licence to Operate" (IO5) area underpins all aspects of forestry and wood-based manufacturing including packaging. It also includes the environmental credentials and ecosystems service value of forestry, developing tools to enhance environmental performance and provide authoritative advice to enable industry to operate credibly within environmental limits and expand access to international markets.

Investment to increase New Zealand's energy security (IO6) is closely aligned with New Zealand's energy strategy where Scion plays the lead role in developing commercially viable options for the production of renewable energy and biofuels from forest woody biomass in New Zealand. This research is strongly linked internationally to ensure gains from much larger offshore investments in bioenergy are able to be quickly adapted and adopted for New Zealand's benefit. Scion is also working closely with industry to secure Primary Growth Partnership and other investment into this area.

Science and Innovation Plan Intermediate Outcomes/Impacts

The six Intermediate Outcomes/Impacts are described in detail in the following pages, together with leading Key Performance Indicators.

Maximise the value and profitability of commercial forestry – I01

New Zealand is a world leader in sustainable wood production from managed (almost solely exotic) forests. However, the potential to increase forestry's contribution to the New Zealand economy is significant, through value enhancement (e.g. higher quality trees and biomass productivity), operational cost savings, carbon storage and the provision of other ecosystem services. For example the forest growing sector has identified that improving productivity (biomass growth rate) by a conservative target of 5 m^3/ha/annum could generate an additional $1 billion per annum in export receipts[26].

Forestry provides a viable land use option for many non-traditional forestry stakeholders, including regional councils and land owners seeking to maximise returns from their land. In addition, Māori own large areas of forest land and land suitable for forestry. The decisions Māori make over that land utilisation could well shape the future of forestry in New Zealand.

Intermediate Outcome / Impact 1 (I01):

Working closely with forestry companies, new investors in forests and companies involved along the forest-to-manufacturing supply chain, Scion will have:

By 2026, enabled the commercial forest estate to grow from its present 1.7 million hectares through increased land use competitiveness; a 50% increase in forest biomass productivity (Mean Annual Increment (MAI)) by 50% and at least $70 million per annum reduction in operational costs (over 2010 values).

Leading **Key Performance Indicators** for the above.

Impact KPI 1: By 2016, the commercial forestry companies will have improved their average profitability by at least 4% compound per year. This will be achieved by assisting the industry to increase biomass productivity (MAI) to at least their target of 30m^3/ha/annum (currently about 20m^3/ha); reducing supply chain costs from log harvest to customer delivery, and improving log quality and uniformity.

Impact KPI 2: By 2016, investment in new forests will have increased through the development of new forest systems (including capturing value from non-timber revenue such as top-soil conservation), that are applicable to a wide group of stakeholders, including Māori and non-industrial private forest owners. Examples will include mixed species stands, alternative silvicultural systems and options for commercial indigenous forestry.

Key supporting elements

By 2015 Scion will have developed new harvesting and supply chain options with the potential to save the forestry industry at least $50 million per annum over 2010 costs.

By 2016, through deployment of new germplasm and silvicultural practices for radiata pine forests, (supported by decision support systems and software packages) forest growers will have the potential to deliver on their target to enhance wood quality and uniformity and increased biomass productivity.

By 2016 the benefits of genetic modification research will have been demonstrated in field trials on radiata pine for traits sought after by forest growers.

By 2016, new genetically improved seed for eucalypts and new cypress hybrids will be available through commercial nurseries.

By 2016 Scion will have created a framework for passing market signals on product performance and ecosystem services back to forest managers to maximise their ability to create and capture value.

By 2016 new genetically improved seed for Douglas-fir (especially for wood stiffness), eucalypts and new cypress hybrids will be available to the forest industry through commercial nurseries.

By 2016 Scion will have developed new forest investment cases for increasing the social and economic development of regional New Zealand (e.g. East Coast/Hawkes Bay, Northland and Central North Island), and enhancing the diversification of commercial forests including through the use of indigenous forests.

The above will be achieved in close collaboration with:

Future Forests Research Ltd, Radiata Pine Breeding Company Ltd, numerous other forestry growers, tree development companies, such as ArborGen, iwi/Māori, regional government and with the New Zealand Forest Owners Association.

Scion will also work closely with government departments such as Ministry for Primary

[26]New Zealand Forest Owners Science and Innovation Plan 2012. www.nzfoa.org.nz

Industries and Ministry for the Environment to provide technical support for the development of public policy such as implementation of the Emissions Trading Scheme.

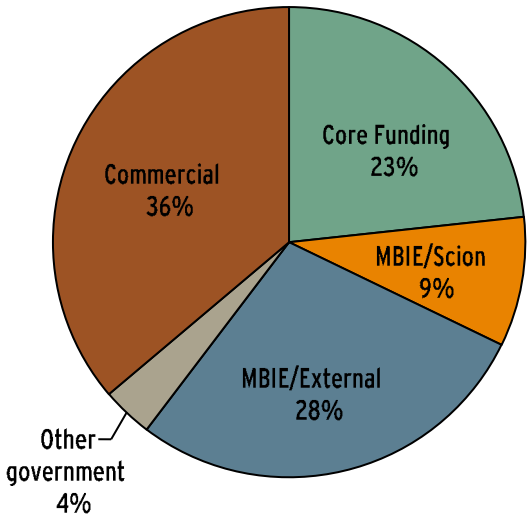
Scion's **science collaborators** in this area include (not exhaustively):

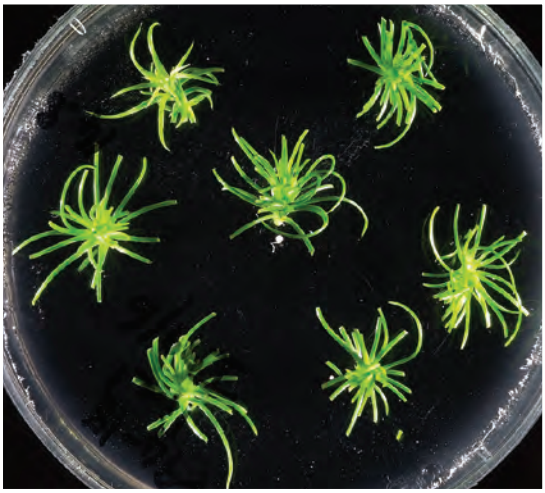
Landcare Research; Lincoln University; University of Canterbury; Waikato University; Plant and Food Research; Forest Research, UK; INRA and FCBA in France; British Columbia Ministry of Forestry, Canada; CSIRO – Plant Industry Australia; USDA Forest Service, USA; Pontificia Universidad Catolica de Chile, Chile; University of Freiburg Institute for Forest Growth, Germany.

Total investment 2012-13: $13.6 million

Distribution of investment: Core ($3.2m), MBIE/Scion ($1.2m), MBIE/External ($3.9m), other government ($0.5m) and commercial ($4.8m)

I01 – Commercial Forestry





Improve the competitiveness of the solid wood industry – IO2

Solid wood products currently generate some 50 to 80% of the value derived from a tree[27]. These products require minimal reprocessing and include building structural components (e.g. framing materials such as studs), appearance products (e.g. mouldings, interiors, flooring, cladding, furniture), glued products (e.g. parallel and cross-laminated lumber, finger-jointed lumber, plywood) and industrial products used in applications such as pallets and temporary construction.

New Zealand radiata pine clear wood (knot free) material used in appearance applications is well received in markets such as North America, Australia and parts of Asia and Europe. Radiata pine is also the dominant construction material used in New Zealand house framing (over 90% of all houses). However, over the last 20 years timber has lost market share in high volume and value, applications such as house cladding and flooring.

Timber species such as Douglas fir, eucalypts and cypresses have a small market presence in New Zealand as do indigenous timbers (e.g. red beech, rimu, kauri and tawa) in applications such as furniture and souvenirs. In addition, cedar and tropical hardwoods are imported into New Zealand for specialist applications owing to their special qualities such as durability, hardness or appearance.

Intermediate Outcome / Impact 2 (IO2):

Working closely with solid wood manufacturing companies, Scion will:

By 2026, have supported the industry in achieving 6% year-on-year growth in the export of wood products to an estimated target value of at least $6 billion per annum.

Leading **Key Performance Indicators** for the above:

Impact KPI 3: By 2016, Scion will have supported the industry in achieving its export growth target of a 6% per annum increase over 2012 values and helped implement strategies to maintain this growth rate.

Impact KPI 4: By 2016, Scion will have supported wood manufacturing companies to enhance the international competitiveness of their operations by delivering on average a 2.5% savings per annum on operating costs over 2011 values.

Key supporting elements

By 2014, Scion will have supported wood manufacturing companies in achieving product development efficiencies through improved knowledge transfer on future export market needs and demonstrating the required design elements for those markets.

By 2015, Scion will have demonstrated the potential to maximise recoverable yield, minimise waste, and manage variability between and within radiata pine logs by conceptualising and prototyping at least one new-to-market engineered wood product and manufacturing process.

By 2016, Scion will have demonstrated to a pre-commercial stage at least one new engineered wood product with demonstrated potential to produce high margins and compete in high value market segments.

By 2016, Scion will have supported industry needs in preservation and drying by developing at least one pre-commercial, environmentally-friendly solution to New Zealand softwood durability, appearance and stability that allows it to complete competitively in the international tropical hardwoods market.

The above will be achieved in close collaboration with:

Wood manufacturing companies, such as PanPac, Juken Nissho Limited, Taranakipine, and Access Pacific; new companies emerging in this area, including furniture and specialist wood products companies; Solid Wood Innovation; New Zealand Wood Processors Association and the New Zealand Pine Manufacturers Association.

Scion will also work closely with government departments, such as Ministry of Business Innovation and Employment (specifically around housing and building related matters) and New Zealand Trade and Enterprise (specifically around supporting export growth and investment for the solid wood processing industry).

Scion's **science collaborators** in this area include (not exhaustively):

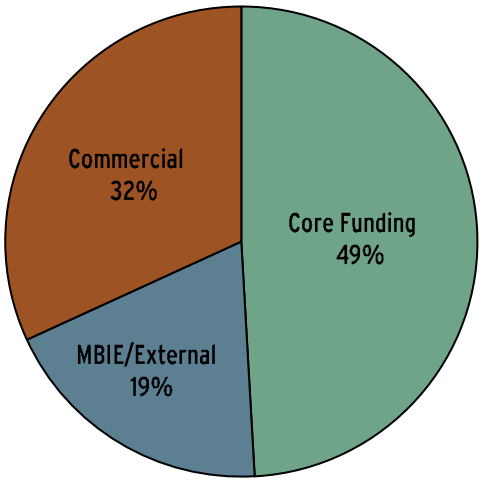
Industrial Research Ltd; EU Cost Actions; AUT; Massey University, University of Wurzburg, Germany; Forest and Wood Products Australia (FWPA).

[27]Forest Owners Association Facts and Figures 2010/11

Total investment 2012-13: $5.9 million

Distribution of investment: Core ($2.9m), MBIE/Scion ($0), MBIE/External ($1.1m), other government ($0) and commercial ($1.9m)

I02 - Solid Wood Processing and Products



Expand opportunities in the wood fibre, pulp, biopolymer, and biochemical industries – IO3

The recent WoodCo Strategic Action Plan identified the potential for an additional $870 million per annum of revenue associated with new fibre and biochemical products. Further, they noted the potential for the packaging industry to grow by at least $140 million per annum (derived from new fibre-based packaging solutions alone). The New Zealand packaging industry has continued to grow during the global financial crisis. Food and beverage products account for a significant share of the demand for packaging in New Zealand, both for domestic and export consumption. Plastics account for more than 53% of this industry.

Globally, all products in the natural fibre and biochemical production sector are in rapid growth mode. For example, bioplastics have achieved growth of at least 10% and up to 23% annually; biochemicals production has increased by 5-12%; and wood fibre composites have increased their market share by at least 10%.

Internationally, renewable materials and products developed from hardwoods and softwoods are in significant demand.

Radiata pine is a feedstock well-suited to the above bio-based industries and has the potential to contribute successfully to the growing global bio-economy. It has excellent fibre characteristics and contains useful chemical extractives. In addition, turning radiata pine into sugar syrups and functional lignin creates new feedstock opportunities for materials that can be developed into packaging, composite panels, resins such as for bioadhesives and new biopolymer materials.

Intermediate Outcome / Impact 3 (IO3):

Working closely with pulp and paper companies, panel manufacturers, and current and emerging manufacturers using bio-based materials to create new products, Scion will:

By 2026, have supported existing and new industries to establish new bio-based manufacturing capacity for export and domestic markets worth at least $1 billion per annum more than 2011 values.

Leading **Key Performance Indicators** for the above:

Impact KPI 5: By 2016 Scion will have supported the emerging biorefining industry to grow processing capacity or revenues by at least 10% per annum through development of new products.

Impact KPI 6: By 2016 Scion will have supported the packaging and composite products industries to grow the value of exports by at least 5% per annum in real terms.

Key supporting elements

By 2013 Scion will have supported the Biopolymer Network Ltd to commercialise their biofoam technology and at least one product based on indigenous materials of interest to Māori.

By 2013 at least one new added-value product derived from lignin will have been demonstrated and verified by a third party.

By 2014 a chemical co-product from forest resources will have been manufactured at pilot scale with a commercial partner and/or a new plastic product with NZ-biobased content taken to proof-of-concept prototype stage and undergoing evaluation by a commercial investor.

By 2014 at least one manufacturer will be commercially evaluating a new packaging application developed through Scion.

By 2016 through de-risking opportunities such as pilot plant demonstration, Scion will have supported the New Zealand pulp, paper and composite product companies to capture new value from productivity enhancements and new products.

By 2016 a New Zealand company will have commenced commercial production of a new fibre-based composite for application in manufactured products.

The above will be achieved in close collaboration with:

New Zealand manufacturing and product development companies, such as CHH Pulp and Paper, Revolution Fibres, Clariant, Alto, Adept, Global Pine, Lignotech, Zespri and Fonterra; Biopolymer Network Ltd; new companies emerging in this area, including plastics, chemicals, composites and packaging companies; global companies such as Sonae Indústria, Ferrero, and CanFor; company associations such as the NZ Packaging Council and the NZ Furniture and Cabinet Makers Association; NZBio and investor groupings.

Scion will also work closely with government

departments, such as Ministry of Business Innovation and Employment, specifically around trade and enterprise, food and beverage strategies and international Knowledge-based Bio-economy (KBBE) initiatives.

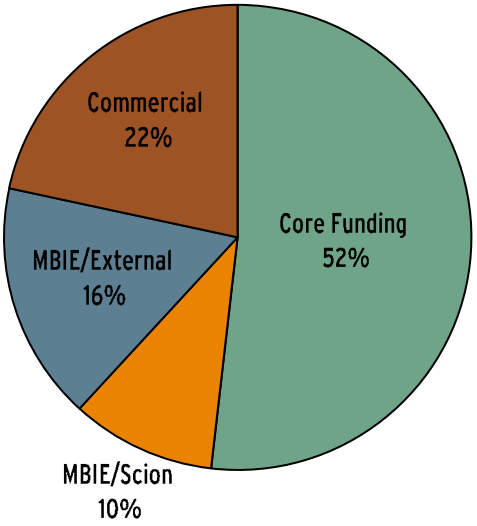
Scion's **science collaborators** in this area include (not exhaustively):

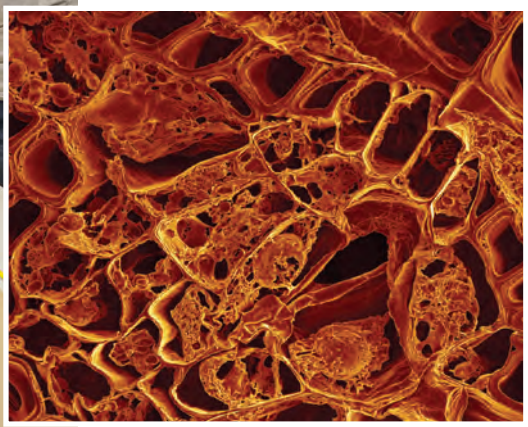
KBBE twinning programmes; EU Cost Actions; Massey University; AgResearch; Plant and Food Research; Victoria University of Wellington; University of Auckland Materials Accelerator; VTT, Finland; Innventia AB, Sweden; JBEI, USDA, and Great Lakes Bioenergy Centre, USA; University of British Columbia, Canada; CSIRO, Australia; and the European Plant Science Organisation (EPSO).

Total investment 2012-13: $9.1 million

Distribution of investment: Core ($4.7m); MBIE/Scion ($0.9m); MBIE/External ($1.5m); other government ($0); and commercial ($2m)

103 - Wood Fibre, Pulp, Biopolymer and Biochemical Products





Improve New Zealand's forest health and preparedness for biosecurity incursions, fire and climate change – IO4

New Zealand forests are subject to a range of biotic (insects and pathogens) and abiotic (fire and wind) risks. Climate change is expected to increase the susceptibility of our forests to these risks and increase their intensity and frequency. Scion must support the forestry sector and rural fire authorities to sustain a high level of preparedness to manage these risks and thereby sustain and expand market access to enable export revenue targets for forest products and services to be met. These initiatives will provide opportunity for New Zealand to positively influence trade phytosanitary protocols and generate income from the licensing and/or sales of forest protection technologies.

Intermediate Outcome / Impact 4 (IO4):

Working closely with forest growing companies and key stakeholder groups, Scion will:

By 2026, ensure New Zealand forestry growing and wood products companies can meet their export revenue targets by minimising the risk of new pests (insects, pathogens, weeds) establishment in New Zealand and reducing the impact of establishing pests, fire and wind.

Leading **Key Performance Indicators** for the above:

Impact KPI 7: By 2016 increased export earnings from New Zealand's forest resources will be enabled by reducing the risk of new forest pests (insects, diseases, weeds) establishing in New Zealand, and by minimising the impacts of already established pests. This will be achieved by: (i) biosecurity agencies using tools developed to identify and reduce the threat posed by high risk pathways, and to detect and eradicate new pests; and (ii) providing forestry companies with resistant germplasm and new chemical, biological or silvicultural treatments for effective pest management.

Impact KPI 8: By 2017 Scion will have protected New Zealand's forest export revenues by improving the resilience of New Zealand forested and rural landscapes. This will be achieved by providing appropriate agencies and companies with tools, across the spectrum of reduction, readiness, response and recovery, that help to minimise the impact of abiotic risks (fire, wind, extreme rainfall) in a changing environment (e.g. climate change).

Key supporting elements

By 2014 the biosecurity risks associated with commercial plantings of indigenous trees will have been identified and evaluated and a research strategy to address those risks agreed with key stakeholders, such as Māori and Future Forests Research Ltd.

By 2015 Scion's capability and capacity in risk analysis and risk management will have been enhanced by developing linkages and formal collaborations with leading international risk analysis research groups in these fields.

By 2016 the cross-sectoral research group 'Better Border Biosecurity' will have delivered at least one research result (i.e. improved modelling tools or application techniques) for more effective treatments during incursion activities. This will drive a regulatory or policy change that will close a pest pathway or increase the probability of pest eradication.

By 2016 Scion will have delivered radiata pine germplasm with improved resistance to at least one foliar disease.

By 2016 at least two tools that reduce the impact of significant forest pests will have been adopted by stakeholders (Forest Biosecurity Committee, Ministry for Primary Industries, Future Forests Research Ltd) by aligning research investment with their priorities.

By 2016 rural fire stakeholders, through the Rural Fire Research Advisory Committee, will have (i) adopted new fire behaviour models or model enhancements; (ii) agreed requirements for supporting the sustainable use of fire as a land management tool; (iii) adopted communication and engagement strategies to enhance community preparedness for rural fire; and (iv) adopted improved data collection systems that lead to both enhanced fire fighter safety and intelligence for fire fighting decision making.

By 2016 at least one climate change adaptation or mitigation strategy will have been adopted by forest growers or incorporated into government policy.

By 2016 improved protocols for managing risk of wind damage will have been adopted by the forest industry.

The above will be achieved in close collaboration with:

New Zealand Forest Owners Association Forest Biosecurity Committee; forestry companies and growers, the Radiata Pine Breeding Company Ltd; Future Forests Research Ltd; Farm Forestry Association, iwi/Māori; Better Border Biosecurity joint venture (Agresearch, Plant and Food Research, Lincoln Core); and the Rural Fire Research Advisory Committee.

Scion will also work closely with government departments such as Ministry for Primary Industries and the Department of Conservation.

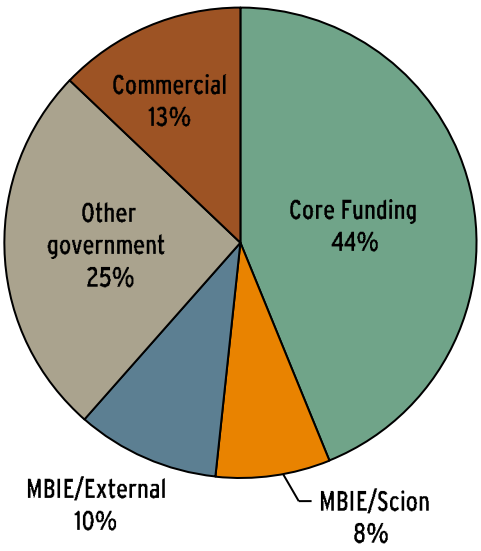
Scion's **science collaborators** in this area include (not exhaustively):

NIWA; Lincoln University; Massey University; Landcare Research; Plant and Food Research; Forest Research, UK; USDA Forest Service, USA; INRA, France; SLU, Sweden: and University of Tasmania, Australia.

Total investment 2012-13: *$7.5 million*

Distribution of investment: Core ($3.3m), MBIE/ Scion ($0.6m), MBIE/External ($0.7m), other government ($1.9m) and commercial ($1m)

104 - Risk and Adaptation



Ensure the New Zealand forest industry's licence to operate domestically and internationally and enhance environmental performance – IO5

To meet the export revenue growth targets of New Zealand's forest and wood products companies requires, at the **minimum**, that such companies meet or better national and international product specification and environmental performance codes of practice, standards and market demands. Strong market intelligence is also needed to ensure the earliest possible uptake of opportunities to remain internationally competitive and increase differentiation in the market place. These explicit licence to operate requirements have been identified within the Woodco Strategic Action Plan.

These may include such widely diverse aspects as (i) complying with international protocols, such as Forest Stewardship Council; (ii) providing New Zealand food exporters with the lowest carbon footprint packaging products; (iii) rapid uptake of technologies that reduce waste, energy and reduce water use; (iv) adoption of step-change technologies, such as use of genetic engineering; and (v) developing protocols that permit safe and rapid adoption of new innovations.

Intermediate Outcome / Impact 5 (IO5):

Working closely with forest growers, wood manufacturers, bio-based product manufacturing and sales companies, and other key stakeholder groups, Scion will:

By 2026, enable the forest growing, wood-derived products and manufacturing companies to meet their export revenue growth targets through the application of tools, technologies and regulatory compliance frameworks that support New Zealand companies to meet domestic and international market criteria.

Leading **Key Performance Indicators** for the above:

Impact KPI 9: By 2016 Scion will have provided tools and technologies to New Zealand's forestry growing companies that enable them to keep abreast of, and implement, international protocols for sustainable forest management and environmental certification in order to maintain access to high-value markets, meet best practice for the minimisation of environmental impacts and allow informed choice over the role of genetic engineering.

Impact KPI 10: By 2016 Scion will have provided tools and technologies that enable New Zealand wood and wood fibre manufacturing companies to meet international environmental performance criteria for BATEA (Best Available Technology - Economically Achievable) and provide economic benefits of at least $50 million per annum through reductions in water, chemical and energy use.

Impact KPI 11: By 2016 Scion will have provided robust technical information to support standards development and systems innovation by the wood- and bio-based product manufacturing sectors that increases acceptability and uptake of New Zealand products in domestic and international markets.

Key supporting elements

By 2014 Scion will have created an industry-led technical and market intelligence collaboration to accelerate the uptake of innovative building solutions that meet existing (or influence changes in) standards and target emergent value chain optimisation opportunities for increased use of wood in the New Zealand and export markets.

By 2015 Scion will have supported the forest growing companies and other providers to develop alternatives to methyl bromide and thereby enhance acceptance of New Zealand forest products in international markets.

By 2015 Scion will have delivered a commercial solution to the conversion of liquid and/or solid organic-rich waste streams into recoverable products and provided technical support to maintain BATEA wastewater treatment and solid waste disposal practices for wood and wood fibre manufacturing companies, and industrial and domestic organic waste and wastewater generators.

By 2016 Scion will have consolidated the evidence portfolio that supports sustainable management and environmental certification of New Zealand commercial forests.

By 2016 Scion will have furthered informed debate over the role and merits of genetic engineering in the future of forestry in New Zealand.

By 2016 Scion will have enabled the development and harmonisation of Codes of Practice, Certification Schemes and Standards, which are applied to New Zealand wood and wood fibre products, other bio-based products, and packaging, to take advantage of emerging export markets.

The above will be achieved in close collaboration with:

Future Forests Research Ltd; STIMBR; iwi/Māori; Rotorua District Council and other waste management stakeholders; New Zealand solid wood, wood fibre, and pulp and paper manufacturing companies; New Zealand packaging companies; New Zealand Forest Owners Association; Wood Processors Association; New Zealand Pine Manufacturers Association and New Zealand Packaging Council.

Scion will also work closely with government departments such as the Ministry for Primary Industries, Ministry for the Environment, and the Ministry of Business, Innovation and Employment (in particular Trade and Enterprise and Housing), Ministry of Foreign Affairs and Trade to ensure alignment between trade policies, regulations and standards and the technical and environmental performance specifications of industry products and processes.

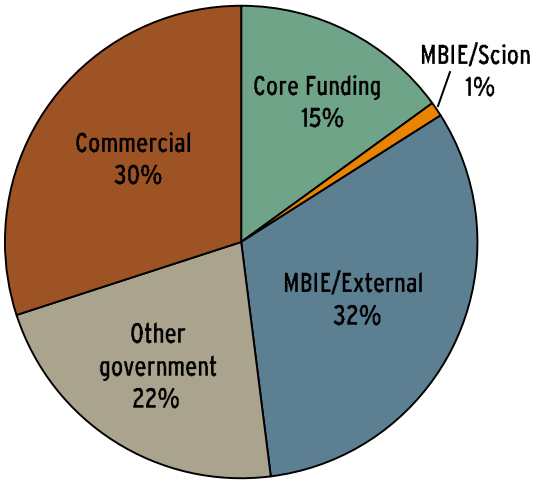
Scion's **science collaborators** in this area include (not exhaustively):

NIWA; University of Waikato; University of Auckland; BRANZ; AUT; MSI Biowastes programme (Cawthron Institute, ESR, Landcare Research and Scion); consulting engineers, including AWT NZ Ltd, SKM, and Transfield Worley; Massey University; EU standards research programmes; NEN, Netherlands; CSIRO, Australia; University of Toronto, Canada; NSERC Strategic Network on Value Chain Optimisation, Canada.

Total investment 2012-13: $7 million

Distribution of investment: Core ($1.1m), MBIE/Scion ($0.1m), MBIE/External ($2.2m), other government ($1.5m) and commercial ($2.1m)

IO5 - Licence to Operate



Increase New Zealand's energy security through the expanded utilisation of forest biomass for energy – I06

The New Zealand Government's Energy Strategy[28] has four priorities: (i) developing renewable energy resources; (ii) reducing green house gas emissions; (iii) efficient use of energy; and (iv) ensuring secure and affordable energy. The strategy notes that economic growth will be created through the environmentally responsible development and efficient use of the country's diverse energy resources and by increasing opportunities for energy exports.

The realisation of more energy from wood and wood residues as an energy source meets many of the Government's broader strategic targets, such as a 50% reduction in greenhouse emissions from 1990 levels by 2050[29].

Wood is already a significant part of New Zealand's energy landscape. In 2010, it produced approximately 59 PJ (7.2%) of New Zealand's total energy consumption (816 PJ per annum[30]). The recently released WoodCo Strategic Action Plan[31] specifically seeks an additional $45 million in pulp and paper industry profitability by 2022 through wood-to-energy opportunities and sets a target of "one demonstration-scale liquid bioenergy plant at an existing processing site by 2022", which could generate revenues of $30 million per annum. Opportunities also exist to recover the energy content of the high volumes of organic wastes generated from this and other primary industries.

Intermediate Outcome / Impact 6 (I06):

Working closely with wood manufacturing industries, energy companies and new investors, and leading international developers of renewable energy technologies, Scion will:

By 2026, bioenergy's contribution to New Zealand's primary energy supply has increased to 9% (an increase of 24 PJ over 2010 values), including 350 million litres of liquid biofuels.

Leading **Key Performance Indicators** for the above:

Impact KPI 12: By 2014 Scion (in collaboration with appropriate industry and international researchers) will have enabled at least one commercial partner to adapt and test to pilot scale a bioenergy technology concept with a demonstrated commercial niche in New Zealand and supported additional actions to take this technology to commercial readiness.

Key supporting elements

By 2012 Scion will have established a portfolio of options and techno-economic assessments including adaptation and use of the Canadian Biopathways methodology, for biomass-to-energy processes that meet New Zealand criteria for use of wood as a renewable energy resource.

By 2013 Scion will have supported at least one industry partner in the technical and commercial development of their priority biomass-to-energy products options.

By 2014 Scion will have secured IP protection on a suite of proprietary liquid and solid biofuels technology concepts for next generation bioenergy production from woody biomass and organic wastes.

Ongoing, Scion will sustain national and international connections with the renewable energy community, including leadership of a New Zealand Advanced Biofuels Research Network, and will be organising at least one bioenergy-related workshop/conference per year.

The above will be achieved in close collaboration with:

Bioenergy Association of New Zealand (BANZ) and its member companies; National Energy Research Institute (NERI); Wood Processors Association; appropriate commercialisation companies, such as Z-Energy, Norske Skog, CHH Pulp and Paper; Red Stag/EROS Capital, and Air New Zealand; International Energy Association (IEA).

Scion will also work closely with Government departments, especially Ministry for Primary Industries and the Ministry of Business, Innovation and Employment (in particular Trade and Enterprise) to facilitate government and commercial investment in large-scale bioenergy production and ensure alignment between renewable energy policies, regulations and standards and the technical and environmental performance specifications of next generation biofuels derived from New Zealand wood resources.

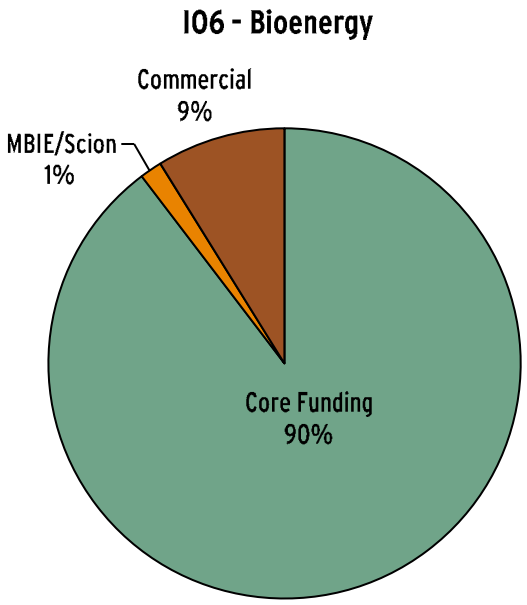
[28] www.med.govt.nz/energy-strategy
[29] www.mfe.govt.nz/issues/climate/emissions-target-2020/
[30] New Zealand energy datafile MED, 2009; www.med.govt.nz.
[31] New Zealand Forest and Wood Products Industry Strategic Action Plan www.woodco.org.nz/strategic-plans

Scion's **science collaborators** in this area include (not exhaustively):

Advanced Biofuels Research Network (comprises all key biofuels researchers in New Zealand CRIs, universities and commercial research companies); JBEI, National Renewable Energy Laboratory and University of Michigan, USA; FP Innovations and University of Toronto, Canada.

Total investment in 2012/13: $2.9 million

Distribution of investment: Core ($2.5), MBIE/Scion ($0.1m), MBIE/External ($0), other government ($0) and commercial ($0.3m)



4. Scion's supporting strategy

In this section, the elements of Scion's strategy (presented in Figure 4, page 17) are outlined.

Nurture existing and form new partnerships with users

Forest growing/managing: Scion has a close working relationship with forest growing companies, through the New Zealand Forest Owners Association (NZFOA) and its sub-committees such as their Forest Biosecurity Committee (FBC), the industry's research and investment groups - Future Forests Research Ltd (FFR) and the Radiata Pine Breeding Company Ltd (RPBC). The relationship with the National Rural Fire Authority Research Advisory Committee, comprising the National Rural Fire Authority, the New Zealand Fire Service, NZFOA, Department of Conservation, New Zealand Defence Force, Federated Farmers and Local Government NZ, is also important. Scion has worked with all of these groups to ensure its research is aligned to their needs and grow co-investment.

Solid and engineered wood manufacturing: Solid Wood Innovation (SWI) and STIC are major investors for this part of the industry. SWI programmes are mostly focussed on improving process efficiency, wood preservation, timber drying and segregation technologies particularly for companies focussed on appearance wood products. STIC's focus is on developing multi-storey timber buildings using engineered wood solutions, and Scion intends to grow this relationship. Scion is a major participant in and provider for the SWI programmes. Scion also works with companies individually to solve problems, develop proprietary products and assist with standards compliance.

Wood fibre, pulp and composite materials manufacturers: The fibre and pulp companies are some of the largest manufacturing operations in New Zealand. They are capital intensive and typically work on cycles of investment and consolidation. Currently they are embracing the opportunity to build stronger co-product streams to expand energy production and/or produce chemical by-products. Similarly companies involved in producing specialised packaging products or fast-moving consumer goods are now exploring product diversification and exploiting market demand for bio-derived materials. Scion works individually and collectively with these companies to support their development plans and help de-risk the adoption of new technology and maximise value capture. User-advisory groups have been implemented for the biochemicals and packaging sectors to provide strategic input into research and assist work prioritisation.

Forest technology manufacturing: These include a large number of small-to-medium enterprises who both support other parts of the forest-to-market value chain and are exporters of technology-intensive products in their own right. These include kiln manufacturers, harvest equipment manufacturers, software and expert system developers and wood treatment systems. Scion works closely with all these companies because they are a critically important part of innovation and technology transfer.

Packaging and new materials: These are also typically small-to-medium enterprises. Packaging companies use a vast range of materials, including wood fibre, in development packaging solutions for their customers. With increasing international market pressure to reduce the environmental impact of packaging materials the drivers for new sustainable packaging solutions is very high. A similar trend in other materials (e.g. those dominated by petrochemicals) is also opening up opportunities for firms involved in providing plastics and chemicals for a range of consumer goods. Scion is working with several end-users and their material suppliers to develop new materials from forest resources to strengthen their market offerings.

Government departments: The Ministry for Primary Industries, Ministry for the Environment, Department of Conservation, New Zealand Trade and Enterprise and the Ministry of Business Innovation and Employment, which includes building and housing activities, are important stakeholders and customers for Scion (see Section 3 for details on research areas).

Māori and Matauranga Maōri: In 2011/12 Scion developed, in consultation with Māori, a plan[32] to direct its efforts in building the Māori economy by utilising their forest, land and other assets. Nga Rangatira rōpu was established to advise the Scion Board and review plan progress. During the past year Scion significantly increased its direct involvement with Māori through the development of joint research proposals, increasing staff knowledge of te reo and tikanga and the direct engagement of Māori entities in Scion's core programmes.

[32] Te Papa Tipu Maōri Plan www.scionresearch.com

Foster collaboration to form best research teams

Scion collaborates extensively nationally and internationally to form the best possible teams to deliver its science and innovation outcomes. Major collaborators in delivery of Scion's Intermediate Outcomes are described in Section 4. International science investment is also sought to supplement New Zealand's science and innovation expenditure and access innovations that can be quickly adopted and/or adapted into the New Zealand context.

Accelerate technology translation and commercialisation

Technology transfer is enabled through:

- Workshops and training materials;
- User guides and software systems;
- Commercialisation of products and services, typically in conjunction with firms;
- Secondments of staff into firms; and
- Incorporation into NZQA learning units with groups such as the Forest Industries Training and Education Council (FITEC) and degree programmes such as those with the Waiariki Institute of Technology.

Uptake of Intellectual Property (IP) developed by Scion is a critical part of achieving technology transfer and delivering impact. Supported by preseed funding Scion has built an IP portfolio that has played a critical role in development of a number of technologies over the last 3 years. Among others, these include the wood-fibre/polymer dice which is now being commercialised by Sonae Indústria, the development of the TERAX™ process (now being piloted with the Rotorua District Council) and a Cable Harvesting Decision Tool with GBS Ltd. Scion will focus on early partnering to more rapidly effect commercialisation and grow revenues that will be reinvested back into strengthening technology development for the benefit of New Zealand.

Effectively allocate and monitor Scion investment (core purpose and internal)

With the introduction of core funding from July 2011, Scion modified its investment management processes to reflect the significant value of funds involved and the role of the Board in its strategic allocation[33]. Key elements include:

- Allocations are made to science programmes, each of which contributes to the delivery of at least one Impact KPI and at least one IO.
- Investment will be based on the contribution of the science, the balance of research and risk across the six Intermediate Outcomes/Impacts and meeting special requirements such as the stewardship of critical capability or databases and collections.
- Programmes are funded in accordance with the research plan but not for more than 7 years.
- Between 5 to 15% of Scion's investment will be refreshed each year to provide for new opportunities, emerging science, collaborations and capability building.
- The investment process and monitoring of portfolio 'health' is managed by Scion's Research and Investments Office in conjunction with the Science General Managers, and, through the CEO, accountable directly to the Scion Board.
- Programmes are performance checked quarterly and formally reviewed triennially by the Strategic Advisory Science and User Panels, in addition to internal annual science reviews.

Develop a customer-focussed and high-performance culture

Scion's "People, Performance and Culture (PPC) Plan 2011-16" outlines the people and cultural requirements necessary for Scion to achieve its Statement of Core Purpose. The plan specifies actions to deliver outcomes to:

- Build a high performance culture aligned to Scion's values: vital, collaborative and innovative.
- Develop organisational leadership and capability through workforce capability planning and tailored learning and development programmes.
- Attract, recruit and retain top talent.
- Ensure workplace safety and legislative compliance.
- Develop Scion's tikanga and capacity to engage effectively with Māori.
- Align remuneration and reward to the achievement of the KPIs.

[33] Further information on the investment principles, annual cycle and criteria are described at www.scionresearch.com.

- Implement systems and administration support to achieve organisational efficiency and consistency in people management.

Grow productivity through smart processes and systems

A comprehensive plan is in place to enhance Scion's facilities, information technology (IT) systems and equipment as follows:

Facilities: A 10-year infrastructure development plan, adopted in 2010 and comprehensively reviewed and updated in 2012, is designed to bring laboratory, office facilities and IT up to the standards required for a 21st century research organisation, addressing deferred maintenance and building new plant and equipment to enhance the uptake of Scion's technologies. This process will involve the modernisation and refurbishment of laboratory, office facilities and infrastructure and development of containment facilities consistent with the Environmental Protection Agency specifications to support extension of biological material development and enhancement.

Systems: Completion of the IT-based financial and human resource management systems and application of IT systems to improve data management and local, national and international collaboration.

Science equipment: Construction of bio-refinery pilot plant facilities to support Intermediate Outcomes/Impacts 3 and 6, in particular. Scion will be seeking industry co-investment in the plant as part of its plan to support the scale-up of technologies for industry adoption.

Final allocation of funds, including the re-investment of surpluses, will be subject to Board approval of the final business cases for each initiative.

Improve accessibility to Scion's databases and collections

Scion has stewardship of the following resources of national significance:

Database/Collection	Description
National Forest Herbarium and Database	This nationally significant database and collection specialises in plants significant to plantation and indigenous forestry in New Zealand and includes a wide range of native and amenity species. This is the only database and collection held by Scion that was supported by the Research Infrastructure (Backbone) Investment Fund.
National Forestry Library	The National Forestry Library contains publications, in a variety of formats, relating to forestry and wood processing research over the last 75 years. It represents the collected published heritage of forestry and related industries in New Zealand.
Permanent Sample Plot Database	An internationally unique database of sites that are used to measure growth and development of plantation forest trees across New Zealand.
National Wood Performance Archive	Over 70 years of records of wood durability and performance across four sites in New Zealand.
National Forest Insect Collection	An internationally registered collection of identified forest insects in New Zealand.
National Forest Culture Collection	An internationally registered living collection of fungi (and bacteria).
National Forest Mycological Herbarium	An internationally registered collection of dried specimens of fungi and plant material containing fungi.
The Wood Fibre Refining Facility	This is a small-scale industrial facility capable of processing wood to produce fibre and pulp. It is used extensively to test operational scenarios for New Zealand's pulp and fibre production companies. It is the largest such test operation in the Southern Hemisphere.

These will continue to be maintained to a high standard enabling public access and re-use of the data. In addition, a plan is being implemented to improve public access to and reuse of forestry data generated and/or held by Scion.

Annual Operating Plan

Scion collaborates extensively nationally and internationally to form the best possible teams to deliver its science and innovation outcomes. Major collaborators in delivery of Scion's Intermediate Outcomes are described in Section 4. International science investment is also sought to supplement New Zealand's science and innovation expenditure and access innovations that can be quickly adopted and/or adapted into the New Zealand context.

Pan-CRI shared services

Scion participates in several pan-CRI initiatives intended to improve effectiveness of delivery on our core purpose and greater efficiency with consequent cost savings. Joint action, as well as benchmarking and implementation of best practice across participants, are key elements.

The pan-CRI procurement forum, formed in 2009, currently delivers measurable savings of $3 million **annually** across its eight members. This forum complements the all-of-government procurement reforms. Scion also participates in the pan-CRI insurance collective. In addition, a wide-ranging review of functional services, such as information technology, has begun to identify where pan-CRI sharing can add further value and reduce costs. We have completed an initial pan-CRI study of human resource policies and practices, and initiated stage two of this programme to identify specific actions.

5. Operating indicators, financial performance and reinvestment

In this Section, Scion's financial projections through to 2017 are presented and the financial and non-financial performance indicators are described. Scion will report progress quarterly against these indicators, along with its achievements in delivering impact factor KPIs for each Intermediate Outcome outlined in Section 5.

In addition, the areas and rationale for reinvestment of surplus to support Scion's strategy learning and growth initiatives (see Section 4, Figure 4) and, by way of a waterfall chart, their respective and collective impact on Scion's return on equity.

Scion Group (New Zealand Forest Research Institute Limited)
Projected Income Statement for the five years ended 30 June 2017

	30/06/2012 $000	30/06/2013 $000	30/06/2014 $000	30/06/2015 $000	30/06/2016 $000	30/06/2017 $000
Revenue						
Commercial	23,623	25,264	26,525	28,761	30,930	33,077
Crown	20,853	20,810	20,810	20,810	21,227	21,878
Total Revenue	44,476	46,075	47,335	49,571	52,157	54,955
Operating Expenditure						
Personnel	23,861	25,320	26,029	27,122	28,478	29,902
Other Operating Costs	17,279	17,660	18,127	18,902	19,903	20,956
Total Operating Expenditure	41,141	42,980	44,156	46,025	48,381	50,858
Scion margin	**3,335**	**3,095**	**3,179**	**3,546**	**3,776**	**4,097**
Loss on disposal of Fixed Assets	-6	0	0	0	0	0
Restructuring Costs	-94	-98	-100	-100	-100	-100
EBIT-R*	**3,235**	**2,996**	**3,079**	**3,446**	**3,676**	**3,997**
Reinvestment	-1,098	-1,150	-1,200	-1,250	-1,250	-1,250
EBIT	**2,137**	**1,846**	**1,879**	**2,196**	**2,426**	**2,747**
Net Interest Income/(Expense)	235	58	33	27	30	38
Profit before tax	**2,372**	**1,904**	**1,912**	**2,223**	**2,456**	**2,785**
Tax	-725	-546	-554	-645	-712	-808
Group Profit after Tax	**1,647**	**1,358**	**1,357**	**1,579**	**1,744**	**1,977**
Share of after tax profit from Assoc. Coys	0	0	0	0	0	0
Profit attributable to Shareholders	**1,647**	**1,358**	**1,357**	**1,579**	**1,744**	**1,977**

Scion Group (New Zealand Forest Research Institute Limited)
Projected Consolidated Statement of Cashflows for the five years ended 30 June 2017

	30/06/2012 $000	30/06/2013 $000	30/06/2014 $000	30/06/2015 $000	30/06/2016 $000	30/06/2017 $000
Cashflow from Operating Activities						
Cash received from operations						
Crown	20,852	20,810	20,810	20,810	21,227	21,878
Other Clients	23,346	25,245	26,421	28,655	30,823	32,967
Interest	246	107	33	27	30	38
Total cash received from operations	**44,444**	**46,162**	**47,265**	**49,492**	**52,079**	**54,883**
Cash disbursed on operations						
Personnel	24,272	26,076	26,044	27,134	28,488	29,909
Suppliers	15,526	14,761	15,844	16,519	17,358	18,239
Interest on debt	2	0	0	0	0	0
Taxation	308	365	793	615	690	776
Total Cash disbursed on operations	**40,108**	**41,202**	**42,681**	**44,268**	**46,535**	**48,923**
Projected Net Cashflows from Operations	**4,336**	**4,960**	**4,584**	**5,225**	**5,544**	**5,960**
Cashflow from Investment Activities						
Sale of investment	14	0	0	0	0	0
Purchase of fixed assets	-9,164	-5,437	-4,450	-4,950	-5,000	-5,500
Purchase of intangibles	-336	-120	-350	-350	-350	-350
Net Cash Received/(Disbursed) from Investing Activities	**-9,486**	**-5,557**	**-4,800**	**-5,300**	**-5,350**	**-5,850**
Cashflow from Financing Activities						
Increase in term debt	0	0	0	0	0	0
Repayment of term debt	0	0	0	0	0	0
Capital Increase	0	0	0	0	0	0
Dividend paid	0	0	0	0	0	0
Total Cash Disbursed on Financing Activities	**0**	**0**	**0**	**0**	**0**	**0**
Net Increase (decrease) in cash	**-5,150**	**-597**	**-216**	**-75**	**194**	**110**
Exchange Rate effect	**0**	**0**	**0**	**0**	**0**	**0**
Opening cash balance	6,762	1,612	1,015	798	723	917
Closing Cash Balance	**1,612**	**1,015**	**798**	**723**	**917**	**1,027**

Scion Group (New Zealand Forest Research Institute Limited)
Projected Consolidated Balance Sheet as at 30 June 2013, 2014, 2015, 2016, 2017

	30/06/2012 $000	30/06/2013 $000	30/06/2014 $000	30/06/2015 $000	30/06/2016 $000	30/06/2017 $000
Current Assets						
Short term investments and cash	1,612	1,016	798	723	917	1,027
Debtors	5,186	5,173	5,277	5,382	5,490	5,600
Prepayments	586	545	545	545	545	545
Inventory	176	176	176	176	176	176
Total Current Assets	**7,560**	**6,909**	**6,796**	**6,826**	**7,127**	**7,347**
Less Current Liabilities						
Creditors	2,154	3,087	3,241	3,403	3,573	3,752
Personnel liabilities	3,169	2,854	2,940	3,028	3,119	3,213
Income in Advance	1,575	1,579	1,579	1,579	1,579	1,579
Provision for tax	242	424	185	215	237	269
Total Current Liabilities	**7,140**	**7,943**	**7,944**	**8,225**	**8,508**	**8,812**
Net Working Capital	**420**	**-1,034**	**-1,149**	**-1,399**	**-1,381**	**-1,465**
Investments						
Investments in subsidiaries & associates/Intangible Assets	188	188	188	188	188	188
Intangible Assets	672	578	703	818	922	1,015
Total Investments	**860**	**766**	**890**	**1,005**	**1,110**	**1,203**
Fixed Assets						
Fixed Assets	29,643	32,549	33,896	35,610	37,231	39,199
Biological Assets	797	797	797	797	797	797
Total Fixed Assets	**30,440**	**33,346**	**34,693**	**36,407**	**38,028**	**39,996**
Term Liabilities						
Provision for Staff Liabilities	1,756	1,756	1,756	1,756	1,756	1,756
Deferred tax liability	2,374	2,374	2,374	2,374	2,374	2,374
Term Debt	0	0	0	0	0	0
Total Term Liabilities	**4,130**	**4,130**	**4,130**	**4,130**	**4,130**	**4,130**
Projected Total Net Assets	**27,590**	**28,948**	**30,305**	**31,884**	**33,627**	**35,604**
Represented by						
Share Capital	17,516	17,516	17,516	17,516	17,516	17,516
Capital Increase	0	0	0	0	0	0
Retained earnings b'fwd	8,373	10,020	11,378	12,735	14,314	16,058
Revaluation Reserve	54	54	54	54	54	54
Dividend	0	0	0	0	0	0
Current profit (loss)	1,647	1,358	1,357	1,579	1,744	1,977
Projected Closing Shareholders Funds	**27,590**	**28,948**	**30,305**	**31,884**	**33,627**	**35,604**
Shareholders funds to total assets	**0.71**	**0.71**	**0.72**	**0.72**	**0.73**	**0.73**

Scion Group (New Zealand Forest Research Institute Limited)
Performance Targets for the five years ended 30 June 2017

	Forecast	Target	Target	Target	Target	Target
Efficiency:	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Operating margin	10.5%	10.9%	11.0%	11.4%	11.6%	11.9%
Operating margin per FTE	$15,215	$16,051	$16,658	$17,851	$18,622	$19,654
Risk:	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Quick ratio	1.22:1	0.97:1	0.95:1	0.92:1	0.92:1	0.92:1
Interest coverage	N/A	N/A	N/A	N/A	N/A	N/A
Operating margin volatility	20.2%	8.2%	6.6%	8.1%	10.2%	10.9%
Forecasting risk	0.9%	(0.1)%	(1.5)%	0.5%	0.3%	(0.0)%
Growth/Investment:	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Before Reinvestment	9.0%	7.6%	7.4%	7.9%	8.0%	8.2%
Adjusted return on equity	6.2%	4.8%	4.6%	5.1%	5.3%	5.7%
Revenue growth	2.6%	3.6%	2.7%	4.7%	5.2%	5.4%
Capital renewal	3.7x	1.8x	1.4x	1.5x	1.5x	1.5x

Non-financial indicators

Category	Measure	Report
End-user collaboration	Relevant funding partners and other end-users that have a high level of confidence in Scion's ability to set research priorities, and the effectiveness of the collaboration or partnership	Annual survey agreed between MSI and Scion
	Total dollar value of co-funding revenue (in cash), and dollar value subcontracted out to other organisations from CRI, non CRI Government, TEO, firms , overseas and other per annum over three years	Quarterly
	Formal collaborations with Māori	Report
Research collaboration	National and international research providers that have a high level of confidence in the CRI's ability to form the best teams to deliver on the CRI's outcomes	Annual survey agreed between MSI and Scion
	Number and percentage of joint scientific peer-reviewed publications and IP outputs with other New Zealand or international research institutions per annum	Quarterly
Technology and knowledge transfer	Total number and percentage of licensing deals of CRI-derived IP (including technologies, products and services) with New Zealand and international partners per annum	Quarterly
	Percentage of relevant end-users who have adopted knowledge and/or technology from CRIs	Annual survey agreed between MSI and Scion
	Percentage change in the number of requests and enquiries for the CRI's publicly available collections	Quarterly
	Commissioned reports accepted by users	Annual
	Website statistics	Annual
Science quality	Total number of international awards, invitations to participate on international committees, and editorial boards for the CRI's published papers per annum.	Annually
	Average number of citations per CRI published paper.	Quarterly
	Proportion of published papers in the top 25 international journals relevant to the scope of the CRI (as outlined in the SCP) per annum.	Annually
	H-index	45

Reinvestment of surpluses to support strategy and growth initiatives

A range of initiatives outside the scope of 'business as usual' and critical to fulfilling Scion's strategy have been identified which meet the required eligibility criteria. These are:

- Enhancing user engagement.
- Building the Māori economy.
- Strengthening of Scion's capacity to transfer technology with impact.
- Accelerating the commercialisation of Scion's technology pipeline.
- Development of science and technology capability to meet nationally important needs in the 'lead areas' identified in Scion's Statement of Core Purpose.

Business investment cases are presented for rigorous Board review as part of the annual refreshing of Scion's strategy, preparation of the Annual Operating Plan and the updating of the five year Statement of Corporate Intent.

The following areas for reinvestment of surpluses are proposed for 2012/13 (and, as shown in Figure 8, in some cases several of the out years):

- Implementing information and communication technology systems to support increased end-user engagement, access to data and its re-use and supporting organisational productivity.
- Upgrading the Rotorua campus infrastructure including laboratory facilities and remedying deferred maintenance.
- Supporting implementation of Scion's Māori plan, Vision Matauranga and building of the Māori economy.
- Improving the speed of technology transfer and uptake.
- Supporting secondments of researchers into industry to build first-hand knowledge of user needs and operations.
- Developing a customer-focussed culture and organisational leadership to support industry engagement.

	2013			2014			2015			2016			2017		
Reinvestment project ('000)	**Capex**	**EBIT**	**RoE**	**Capex**	**EBIT**	**RoE**	**Capex**	**EBIT**	**RoE**	**Capex**	**EBIT**	**RoE**	**Capex**	**EBIT**	**RoE**
L&G 1 - Develop a customer focussed culture		130	(0.4%)		130	(0.4%)			0.0%			0.0%			0.0%
L&G 2 - Grow productivity through smart systems	50	530	(1.8%)		557	(1.8%)	230	204	(0.6%)			0.0%			0.0%
L&G 3 - Provide, a safe modern workplace	150	245	(0.8%)		250	(0.8%)		250	(0.8%)			0.0%			0.0%
L&G 4 - Business development & commercialisation		130	(0.4%)			0.0%			0.0%			0.0%			0.0%
L&G 5 - International Collaboration (Core Funded)		0	0.0%			0.0%			0.0%			0.0%			0.0%
L&G 6 - Industry Secondments		60	(0.2%)			0.0%			0.0%			0.0%			0.0%
L&G 7 - Engage with Maori; build Maori economy		55	(0.2%)			0.0%			0.0%			0.0%			0.0%
Future initiatives - Opex			0.0%		263	(0.8%)		796	(2.5%)		1250	(3.7%)		1250	(3.5%)
- Capex			0.0%			0.0%			0.0%			0.0%			0.0%
Total reinvestment	200	1,150	(3.9%)	0	1,200	(3.9%)	230	1,250	(3.9%)	0	1,250	(3.7%)	0	1,250	(3.5%)
Tax		-322	1.1%		-336	1.1%		-350	1.1%		-350	1.0%		-350	1.0%
Profit Impact of Reinvestment		**828**	**(2.8%)**		**864**	**(2.8%)**		**900**	**(2.8%)**		**900**	**(2.6%)**		**900**	**(2.5%)**
Initial Target ROE			7.6%			7.4%			7.9%			8.0%			8.2%
Revised ROE Target after impact of Reinvestment			4.8%			4.6%			5.1%			5.3%			5.7%

Figure 8: Summary of strategic learning and growth (L&G) initiatives 2013-17, underlying (target) ROE and tailored rate of return.

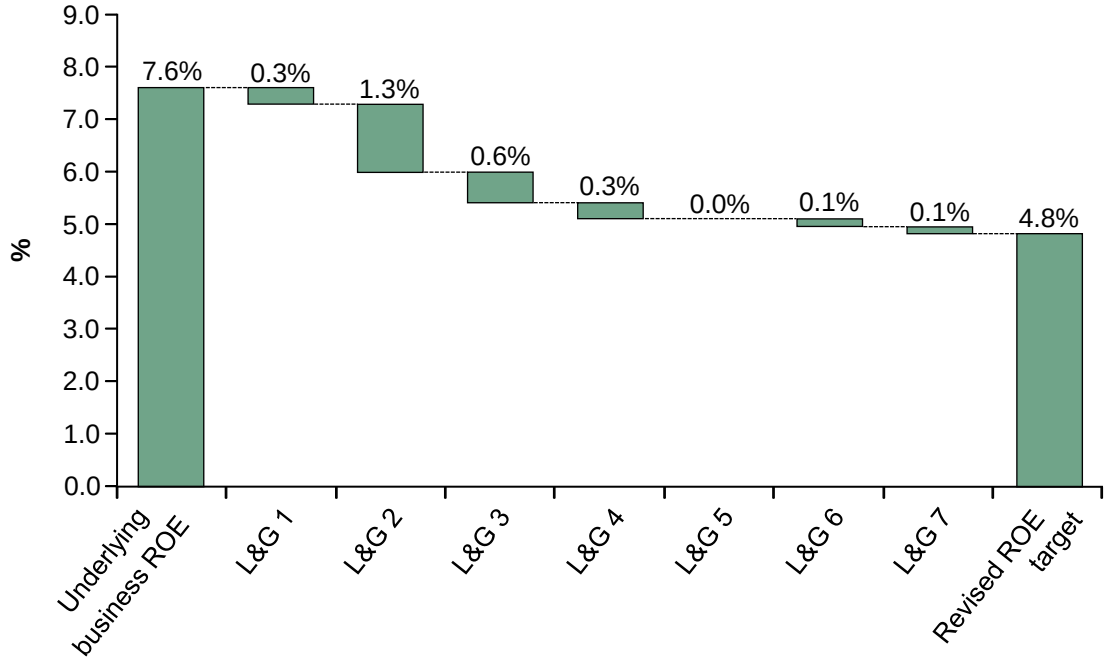


Figure 9: Waterfall chart showing respective impact of reinvestment initiatives of the return on equity (ROE).

6. Glossary

Biomass	A renewable energy source - biological material from living or recently living organisms, e.g. trees.
Bioplastics	Plastics derived from renewable biomass sources.
Biopolymers	Polymers produced from renewable biomass sources.
Biorefinery	A facility that integrates biomass conversion processes and equipment to produce any combination of fuels, power, heat, wood products/fibres and chemicals from biomass.
Composites	Products produced through mixing different materials, e.g. medium density fibreboard.
Hapū	Section of a large tribe; clan; secondary tribe
Impact Key Performance Indicators (KPI)	Underpinning each Intermediate Outcome are Key Performance Indicators (achieved within a 3 to 5 year timeframe) to gauge progress towards achieving the Intermediate Outcomes / Impacts.
Intermediate Outcomes / Impacts (IO)	Science outcomes delivered by Scion.
Iwi	Tribe; nation; people
Matauranga	Knowledge
Mean Annual Increment	The annual increase in tree volume per hectare per year.
National Outcomes	The national impacts as stated in a CRI's Statement of Core Purpose
Ngahere	Forest
Phytosanitary	Relates to the health of plants usually in the context of demonstrating freedom from pests.
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries.
Solid wood	This includes timber and engineered wood products such as laminated timber, laminated veneers and finger-jointed wood (also called engineered wood products).
Rōpu	Society; group; company of people
Taonga	Property; treasure; artefact; relic; anything highly prized
Te reo	Voice; language
Tikanga	Customs and traditions

Appendix 1 – Scion's business policies

Scion aims to remain a high quality, financially viable research organisation with an exemplary international reputation, while providing relevant outputs to the highest standards of professionalism and maintaining prudent business practices.

Below is a brief summary of Scion's business policies. Further details can be found at www.scionresearch.com.

Statutory requirements policy

Scion will operate in accordance with relevant legislative requirements, including the Crown Research Institutes Act 1992, Companies Act 1993, and the Crown Entities Act 2004. In doing so, Scion will undertake business according to the following commitments.

Policy on acquisitions, mergers and divestments

Scion will strive to continuously add value to its activities and improve the net worth of the company and its shareholders. It will ensure that all new investments within core business, expansions of core business and diversification away from core business, will ordinarily provide shareholders with additional economic value commensurate with the risks involved. Scion will seek shareholder consent where the value of the proposed acquisition or divestment is greater than 30% of the total assets (taken as a whole) or $5 million whichever is the lesser.

Business strategies

In order to achieve its Statement of Core Purpose, Scion will:

- Adopt a 'customer centric' approach to develop strong long-term partnerships with key stakeholders in the firms, representative bodies, iwi and government agencies working with and supporting the forest industry.
- Establish collaborative relationships with research providers both within New Zealand and overseas to enhance the impact and quality of Scion's science.
- Build public understanding of the implications of our science and the economic, social and environmental value it creates.
- Seek early commercial investment to support the development and uptake of Scion invented technologies.
- Reinvest operating surpluses to develop Scion's research capabilities, infrastructure, collaborations and to accelerate the rate of innovation along the wood-fibre value chain.

Human resources policies

Scion aims to be a good employer. It will recruit people whose competencies match the requirements to achieve its strategy and vision. The organisation's policies and procedures aim to ensure equal opportunity for all, that people are developed to their full potential, achieve an appropriate 'work-life' balance and that there is compliance with employment, health and safety and associated legislation. Scion will remunerate staff on the basis of performance and the company's ability to pay through a combination of organisational and individual merit based payments. A competency-based appraisal system and objective performance output measures will be applied to assess both individual and team performance.

Intellectual property policies

The primary goal of the Intellectual Property (IP) management policies is to ensure that the interests of both the Crown and Scion and any client IP with which Scion is entrusted are protected, that knowledge and expertise are managed appropriately, the health of the IP portfolio is monitored continuously, and technological innovations are commercialised effectively.

Risk policy

Scion has risk management and compliance processes in place and operating effectively across the organisation. The risk management framework identifies, classifies, reports on and mitigates business risk. Risk reporting is undertaken on a quarterly basis to the Scion Board or as a risk arises.

Accounting policies

Scion will manage cash prudently and ensure that any surplus cash is invested within delegations approved by the Board. New Zealand equivalents to International Financial Reporting Standards approved by the New Zealand Institute of

Chartered Accountants for the measurement and reporting of profit and financial position have been adopted by Scion. (Refer to Appendix 2.)

Dividend policy

The Scion Board will detail in a submission to Shareholding Ministers, within three months of the end of each financial year:

- The amount of dividend (if any) recommended to be distributed to the shareholders.
- The percentage of tax-paid profits that the dividend represents.
- The rationale and analysis used to determine the amount of any dividend.

Treatment of land claims

Scion monitors the progress of, and will seek to provide input as appropriate into, land claims or other matters affecting the land occupied by Scion in Rotorua.

Two land claims affecting the Rotorua campus currently exist:

- Ngati Whakaue – covering the total site.
- Ngati Wahiao – covering the southern end of the site.

Appendix 2 – Statement of accounting policies

Reporting entity

New Zealand Forest Research Institute Limited is a Crown Research Institute registered under the Companies Act 1993. The registered office is Te Papa Tipu Innovation Park, 49 Sala Street, Rotorua. The group consists of New Zealand Forest Research Institute Limited and its subsidiaries.

New Zealand Forest Research Institute Limited (the company) is a reporting entity for the purposes of the Financial Reporting Act 1993. It is domiciled and incorporated in New Zealand and is wholly owned by the Crown.

The financial statements of New Zealand Forest Research Institute Limited for the year were authorised for issue in accordance with a resolution of the directors on the date as set out on the Statement of Financial Position.

The activities of New Zealand Forest Research Institute Limited include a range of research and development programmes aimed at using plant-based renewable resources and waste streams to create new materials, energy sources and environmentally sustainable products and processes.

New Zealand Forest Research Institute Limited trades as Scion and these names have identical meaning in this report.

1.1 Summary of significant accounting policies

a) Basis of preparation

The financial statements have been prepared in accordance with generally accepted accounting practice in New Zealand (NZ GAAP) and the requirements of the Companies Act 1993 and the Financial Reporting Act 1993. The financial statements have also been prepared on a historical cost basis, except for forestry assets and certain heritage assets that have been measured at fair value.

The financial statements are presented in New Zealand dollars and all values are rounded to the nearest thousand dollars ($000).

b) Statement of compliance

The financial statements have been prepared in accordance with NZ GAAP. They comply with New Zealand equivalents to International Financial Reporting Standards, and other applicable Financial Reporting Standards, as appropriate for profit-oriented entities. The financial statements comply with International Financial Reporting Standards (IFRS).

c) Basis of consolidation

The consolidated financial statements include the parent company and its subsidiaries. All intercompany transactions and unrealised profits and losses between the group of companies are eliminated from the financial statements on consolidation. In the parent company financial statements, investments in subsidiaries are stated at cost less any impairment charges.

d) Associate companies

These are companies in which the group holds substantial shareholdings but does not have control and in whose commercial and financial policy decisions it participates.

Associate companies have been reflected in the consolidated financial statements on an equity accounting basis which shows the group's share of surpluses in the Consolidated Statement of Comprehensive Income and its share of post acquisition increases or decreases in net assets, in the Consolidated Statement of Financial Position.

e) Intangible assets

Intangible assets acquired separately are capitalised at cost and from a business combination are capitalised at fair value as at the date of acquisition. Following initial recognition, the cost model is applied to the class of intangible assets.

The useful lives of these intangible assets are assessed to be either finite or indefinite.

Where amortisation is charged on assets with finite lives, this expense is recognised in profit and loss.

Intangible assets created within the business are not capitalised and expenditure is charged to profit and loss in the year in which the expenditure is incurred.

Intangible assets are tested for impairment where an indicator of impairment exists, and in the case of indefinite life intangibles, annually, either individually or at the cash generating unit level. Useful lives are also examined on an annual basis and adjustments, where applicable, are made on a prospective basis.

A summary of the policies applied to the group's capitalised intangible assets is as follows:

	Software
Useful lives	Finite
Method used	4 years – Straight line
Type	Acquired
Impairment test/ Recoverable amount testing	Amortisation method reviewed at each financial year-end; Reviewed annually for indicators of impairment

Gains or losses arising from derecognition of an intangible asset are measured as the difference between the net disposal proceeds and the carrying amount of the asset and are recognised in the profit and loss when derecognised.

f) Biological assets

Biological assets consist entirely of tree plantations which are measured at fair value less any point of sale costs. Gains and losses arising on initial recognition or change in fair value, less estimated point of sale costs, are included in profit and loss in the period in which they arise.

The fair value of tree plantations is determined by an independent valuer.

The valuation method for immature trees is the net present value of future net harvest revenue less estimated costs of owning, protecting, tending and managing trees. For mature trees fair value is deemed to be the net harvest revenue value.

g) Property, plant and equipment

All items of property, plant and equipment are valued at the cost of purchase from the Crown as at 1 July 1992 adjusted for subsequent additions at cost, disposals and depreciation.

Plant and equipment are recorded at cost less accumulated depreciation. Land and capital work in progress are recorded at cost. Some library books have been identified as heritage assets and are recorded at fair value as determined by an independent valuer. Valuations are obtained every five years or more often where circumstances indicate that a significant change in fair value has occurred.

Expenditure incurred on property, plant and equipment is capitalised where such expenditure will increase or enhance the future benefits provided by the asset. Expenditure incurred to maintain future benefits is classified as repairs and maintenance.

When an item of property, plant and equipment is disposed of the difference between the net disposal proceeds and the carrying amount is recognised as a gain, or loss, in profit and loss.

Depreciation is provided for using the straight-line method to allocate the historical cost, less an estimated residual value, over the estimated useful life of the asset.

The useful lives of the major classes of assets have been calculated as follows:

- Buildings and Land Improvements 40–60 years
- Plant and Equipment 4–15 years
- Furniture and Fittings 10 years
- Motor Vehicles 3–7 years
- Library Books 20 years

h) Recoverable amount of non-current assets

At each reporting date, the group assesses whether there is any indication that an asset may be impaired. Where an indicator of impairment exists, the group makes a formal estimate of recoverable amount. Where the carrying amount of an asset exceeds its recoverable amount the asset is considered impaired and is written down to its recoverable amount.

Recoverable amount is the greater of fair value less costs to sell and value in use. It is determined for an individual asset, however, if the asset's value in use cannot be estimated to be close to its fair value less costs to sell, and it does not generate cash inflows that are largely independent of those from other assets or groups of assets, it is determined for the cash-generating unit to which the asset belongs.

In assessing value in use, the estimated future

cash flows are discounted to their present value using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the asset.

i) Trade receivables

Trade receivables are initially recognised at fair value and subsequently valued at amortised cost less impairment allowance.

Collectability of trade receivables is reviewed on an ongoing basis. Debts that are known to be uncollectible are written off when identified. An allowance for doubtful debts is raised when there is objective evidence that it is probable the group will not be able to collect the debt. Financial difficulties and payment defaults without explanation are considered objective evidence of impairment.

j) Inventories

Consumable stores are valued at the lower of cost, on a weighted average price of stock on hand, and net realisable value.

Nursery stocks are valued at lower of cost or net realisable value. Changes in net realisable value are recognised in the profit and loss account in the period in which they occur.

k) Research costs

Research costs are expensed in the period incurred.

l) Provisions and employee benefits

Provisions are recognised when the group has a present obligation (legal or constructive) as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation.

Provisions are measured at the present value of management's best estimate of the expenditure required to settle the present obligation at the Statement of Financial Position date using a discounted cash flow methodology.

(i) Wages, salaries and annual leave
The liability for wages, salaries and annual leave recognised in the Statement of Financial Position is the amount expected to be paid at balance date. Provision has been made for benefits accruing to employees for annual leave in accordance with the provisions of employment contracts in place at balance date.

(ii) Long service leave
The liability for long service leave is recognised and measured as the present value of expected future payments to be made in respect of services provided by employees up to the reporting date using the projected unit credit method. Consideration is given to expected future wage and salary levels, experience of employee departures, and periods of service. Expected future payments are discounted using market yields at the reporting date on national government bonds with terms to maturity and currencies that match, as closely as possible, the estimated future cash outflows.

(iii) Defined benefit plan
The defined benefit plan is unfunded. The cost of providing benefits under the defined benefit plan is determined using the projected unit credit actuarial valuation method. Actuarial gains and losses are recognised in the profit and loss account in the period in which they arise.

The defined benefit liability recognised in the Statement of Financial Position represents the present value of the defined benefit obligations.

Long service leave and retirement leave provisions are based on an actuarial valuation.

m) Leases

Group as a lessee
Operating lease payments, where the lessors effectively retain substantially all the risks and benefits associated with ownership of the leased items, are included as an expense in the profit and loss in equal instalments over the lease term.

Group as a lessor
Leases in which the group retains substantially all the risks and benefits of ownership of the leased asset are classified as operating leases. Initial direct costs incurred in negotiating an operating lease are expensed as incurred.

n) Cash and cash equivalents

Cash and short-term deposits in the Statement

of Financial Position comprise cash at bank and in hand and short-term deposits with an original maturity of six months or less.

For the purposes of the Statement of Cash Flows, cash and cash equivalents consist of cash and cash equivalents as defined above, net of outstanding bank overdrafts.

o) Goods and Services Tax (GST)

The financial statements are prepared on a GST exclusive basis.

p) Foreign currencies

Functional and presentation currency
Both the functional and presentation currency of New Zealand Forest Research Institute Limited and its subsidiaries is New Zealand dollars.

Transactions and balances
Transactions in foreign currencies are initially recorded in the functional currency by applying the exchange rates ruling at the date of the transaction. Monetary assets and liabilities denominated in foreign currencies are retranslated at the rate of exchange ruling at the Statement of Financial Position date.

Non-monetary items that are measured in terms of historical cost in a foreign currency are translated using the exchange rate as at the date of the initial transaction. Non-monetary items measured at fair value in a foreign currency are translated using the exchange rates at the date when the fair value was determined.

q) Revenue recognition

Research revenue
Research revenue from both Government and commercial sources is recorded when earned based on the percentage of work completed. Percentage of work completed is based on management judgement, after considering costs incurred and other contracted commitments. Work completed but not invoiced is recorded as accrued revenue while work invoiced but not completed is recorded as revenue in advance.

Government revenue includes revenue received from the Ministry of Science and Innovation in the form of core funding, Public Good Science and Technology Investment, and Preseed Accelerator Fund programmes. Funding includes both devolved and milestone related programmes. Government revenue has only been recognised after all appropriate conditions have been met.

Sale of goods
Revenue is recognised when the significant risks and rewards of ownership of the goods have passed to the buyer. Risk and reward are considered passed to the buyer at the time of delivery.

Interest revenue
Interest revenue is recognised when earned based on applicable interest rates applied to the group's cash deposit balances.

r) Taxation

The income tax expense charged to the profit and loss includes both the current year's provision and the income tax effects of temporary differences calculated using the liability method.

Tax effect accounting is applied on a comprehensive basis to all temporary differences. A debit balance in the deferred tax account, arising from temporary differences or income tax benefits from income tax losses, is only recognised if it is probable there will be taxable profits available in the future against which the deferred tax asset can be utilised.

Subsequent realisation of the tax benefit is subject to the requirements of income tax legislation being met.

s) Borrowing costs

Borrowing costs are recognised as an expense when incurred except for those borrowing costs determined as directly attributable to the acquisition, construction or production of a qualifying asset (i.e. an asset that necessarily takes a substantial period of time to get ready for its intended use or sale).

t) Interest-bearing loans and borrowings

All loans and borrowings are initially recognised at the fair value of the consideration received net of issue costs associated with the borrowing.

After initial recognition, interest-bearing loans and borrowings are subsequently measured at amortised cost using the effective interest method. Amortised cost is calculated by taking into account any issue costs, and any discount or premium on settlement.

For the purpose of valuing bank borrowings, the bank interest rate is taken as the discount rate. As such the bank borrowings are carried at the value of the debt with the bank.

u) Trade and other payables

Trade and other payables are carried at amortised cost and due to their short term nature they are not discounted. They represent liabilities for goods and services provided to the group prior to the end of the financial year that are unpaid and arise when the group becomes obliged to make future payments in respect of the purchase of these goods and services. The amounts are unsecured and are usually paid within 60 days of recognition.

v) Derivative financial instruments and hedging

The group uses derivative financial instruments such as forward currency contracts to hedge its risks associated with foreign currency fluctuations. These derivative financial instruments are initially recognised at fair value on the date on which a derivative contract is entered into and are subsequently remeasured to fair value.

Derivatives are carried as assets when their fair value is positive and as liabilities when their fair value is negative.

Derivative assets and liabilities held for the purpose of trading are classified as current in the statement of financial position. Derivative assets and liabilities are classed as non-current when the remaining maturity is more than 12 months, or current when the remaining maturity is less than 12 months.

The fair values of forward currency contracts are calculated by reference to current forward exchange rates for contracts with similar maturity profiles.

Any gains and losses arising from changes in the fair value of derivatives, except for those that qualify as cash flow hedges, are taken directly to profit or loss for the year. The group does not apply hedge accounting.

1.2 Significant accounting judgements, estimates and assumptions

a) Revenue recognition

Revenue is recognised based on the percentage of work completed on a project basis. Percentage of work completed is based on management judgement after considering such things as hours completed, costs incurred, milestones achieved and actual results to date.

b) Heritage assets

The group holds several heritage assets which have significant value due to being both rare, and having importance to the nation. Where a heritage cost can be measured reliably they are revalued at least every five years and included as part of property plant and equipment.

Due to the nature of some heritage assets, management does not believe they can be valued reliably. These assets have been identified as disclosed. Details of heritage assets can be found in note 10 and 21.

c) Biological assets

The group's biological assets consist of tree plantations. These are valued at the net present value of future net harvest revenue less estimated costs of owning, protecting, tending and managing trees. The valuation process includes several judgements and estimations around discount rates, future costs, and future prices. Management used the experience of a registered forestry valuer to reduce the risk of misstatement resulting from these judgements and estimates.

d) Defined benefit scheme

The group operates an unfunded defined benefit plan. Significant assumptions used involving the plan include the discount rate and future salary increases as set out in the notes to the financial statements. Management used the experience of a registered actuary to reduce the risk of misstatement resulting from these judgements and estimates.

SCION

forests · products · innovation

www.scionresearch.com