



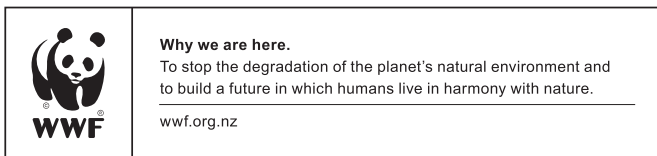
Report prepared for WWF-New Zealand

A VIEW TO THE SOUTH:
Potential Low Carbon Growth Opportunities
for the Southern Region Economy

Prepared by Dr Ganesh Nana, Fiona Stokes
August 2012


Acknowledgements

WWF-New Zealand gratefully acknowledges the The Lou and Iris Fisher Charitable Trust for their generous support of the preparation and publication of this report.



A View to the South: Potential Low Carbon Growth Opportunities for the Southern Region Economy

Prepared for WWF-New Zealand

Prepared by  Business and Economic Research Limited

Authors: Dr Ganesh Nana and Fiona Stokes

For further information please contact:

Business and Economic Research Limited (BERL)

Level 5, BERL House, PO Box 10 244, Wellington 6143, New Zealand.

Phone +64 4 931 9200

www.berl.co.nz

BERL ref #5268

Publication date: August 2012

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FOREWORD

by WWF-New Zealand

New Zealand's Southern Region, like every region in the country, faces important choices about its future in a rapidly changing world. How can the economic, social and environmental wellbeing of local people be advanced in the context of a challenging national and global climate?

There is a global imperative to improve our quality of life while reducing greenhouse gas emissions. There is international agreement to limit emissions in order to keep global warming below the dangerous level of 2 degrees. The New Zealand government has set a target of reducing emissions 50 per cent below 1990 levels by 2050.

With the target date less than 38 years away, it is essential to start planning now to avoid locking-in higher carbon infrastructure, and to promote sectors offering the potential for low carbon development.

Of particular importance for the Southern Region, and the nation as a whole, are proposals to mine and process lignite – a low energy form of coal. With around 3.5 billion tonnes of lignite currently accessible, burning it would release over 5 billion tonnes CO₂ into the atmosphere (equivalent to around 70 years of current emissions for the whole country). To process the lignite on an industrial scale – as is proposed – requires a high energy input and will also result in significant greenhouse gas emissions. Research by the Parliamentary Commissioner for the Environment suggests that these operations alone could increase New Zealand's emissions by up to 10 per cent per year¹.

WWF-New Zealand acknowledges that it is a difficult decision to leave these fossil fuel resources untouched and forego the potential employment and economic growth opportunities they could provide. However, choosing not to develop this resource does not mean forgoing all jobs and having no livelihoods. It means doing things differently.

WWF-New Zealand commissioned this report to investigate the potential for lower carbon forms of economic development in the Southern Region as a contribution to the debate over the region's future, and the wider debate over New Zealand's economic future. How can we thrive while reducing greenhouse gas emissions?

Within the scope of this project, it has not been possible to calculate the greenhouse gas emissions implications of the scenarios presented – much depends on operational detail.

Instead, the intention is to create a view of how much can be contributed to the Southern Region's economy from sectors with the known potential to provide economic development opportunities with relatively low carbon emissions.

WWF advocates for all sectors specified in this report, and all industries in New Zealand, to pursue best practice operations to limit greenhouse gas emissions and other environmental impacts.

We hope this report will be a tool for decision makers, business owners and citizens of the Southern Region – and will help the region make the best choices for the people of Southland, and the people of New Zealand, as we rise to meet the challenge of creating a safe and prosperous future.

¹ PCE. (2010). Lignite and climate change: the high cost of low grade coal. Wellington. Parliamentary Commissioner for the Environment. November 2010. <http://www.pce.parliament.nz/publications/all-publications/lignite-and-climate-change-the-high-cost-of-low-grade-coal/>

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1 Introduction

The Southern Region of the South Island is home to approximately 110,000 people. This area includes the Clutha, Gore and Southland Districts, and Invercargill City. Businesses and enterprises in this region provide employment for 55,300 Full-Time Equivalents and generate \$5.2 billion in Gross Domestic Product (GDP).

Currently, the region has a comparative advantage in primary processing and production. These are the 'core driver' industries of the area and provide direct and indirect employment for a large number of people.

Like all regions in New Zealand, the Southern Region wants to endorse investment, support diversified viable businesses and employment opportunities, and encourage population growth. To inform debate and aid decision-making on the future economic development choices available to the Southern Region, WWF-New Zealand commissioned BERL, a privately-owned company to provide practical economic research, analysis and advice. To do this, BERL modelled regional economic development scenarios towards 2026.

1.1 Project brief

This project explores outcomes, in broad employment and GDP terms, should the Southern Region choose to pursue opportunities to improve on the business as usual outcome of economic growth. BERL was tasked with modelling these opportunities based on the following criteria:

- Sectors that build on existing known competitive advantages in the region
- Sectors that take account of the region's significant land-based economy
- Sectors that have the potential, based on existing viable technology, to be relatively low carbon.

It was beyond the scope of this research to look in detail at all sectors of the Southern Region economy, or to predict the development of new relatively low carbon industries that have yet to gain a foothold in the Southern Region.

Regional economic development leads to economic growth and improved community well-being. It should be approached from an evidence base, and address identified issues or needs. Further, economic

development plans need to consider the future labour force in terms of training and qualifications, skills and experience, and productivity.

Based on BERL's understanding of regional economic development, this report summarises four scenarios that focus on areas the Southern Region has a comparative advantage in, and have the potential to provide economic development opportunities with relatively low carbon emissions. No region could be said to have an absolute advantage, but regions do have comparative advantages in particular sectors.

1.1.1 Economic modelling and scenario outcomes

The scenarios will describe various alternative futures that are neither predictions nor forecasts, but rather options of how the future might unfold. This project will focus on four scenarios. The modelled scenarios are:

1. Increased investment in plantation forest development and additional wood processing

The Southern Region has a well-established forestry industry. Under this scenario, the existing level of investment in plantation forests is lifted based on current owners expanding their holdings and new investment being attracted into the area. This encourages additional wood processing activity.

2. Increased investment in horticulture and additional and diversified crops

Under this scenario there is additional investment in existing and new horticulture crops and processes, and market research into customer needs. Existing markets expand in line with an increase in the volume and diversity of horticulture products on offer. Increased marketing activities will capture new markets.

3. Additional manufacturing undertaken, and productivity and scale lifted in engineering and construction trades

Under this scenario, the strengths of the existing engineering and construction trades industries are boosted with further innovations, research, and market supply chain developments. These developments are aimed at building links with manufacturers' requirements in other regions of New Zealand and beyond. Establishing a broader customer base for these sectors lifts the scale of their operations, and enables productivity and employment growth.

Table 1.1 Potential growth opportunities for the Southern Region

	Employment (FTEs)		Compared to BAU		GDP (real 2011\$m)		Compared to BAU	
	2011	2026	Number	%	2011	2026	Number	%
Base	55,310				5,195			
BAU		61,810				7,350		
Forestry		62,990	1,180	1.9		7,540	190	2.6
Engineering		62,630	820	1.3		7,460	110	1.5
Education		62,565	755	1.2		7,440	90	1.2
Hort/Crop		62,350	540	0.9		7,410	60	0.8

Source: BERL Calculations

4. Investment in education and training increases to meet growing skill requirements

Under this scenario, Southern Institute of Technology (SIT), local government and businesses work in a collaborative partnership to ensure the supply of skills and the necessary quantity of trained labour are available to meet any proposed regional economic development plans. Businesses increase their investment in education and training to meet growing skill requirements, while individuals invest in education and training to capitalise on labour market demands and wage growth.

The results of the modelled scenarios are shown in the table. However, it should be noted that each scenario is not mutually exclusive; the Southern Region could pursue economic development plans in more than one area.

The outcomes of the modelled scenarios focus on a measured change in employment (Full-Time Equivalents or FTEs) and Gross Domestic Product (GDP)¹ compared to a business as usual scenario.

Under the business as usual scenario, GDP steadily increases by 2.34 percent per annum, from \$5.2 billion in 2011 to \$7.3 billion in 2026². Over the same period, employment grows on average by 433 FTEs per annum to 2026, or approximately 0.7 percent per annum. This employment growth is fairly evenly distributed across industries and occupations.

The business as usual scenario assumes growth in line with recent historical averages, but allows for the ongoing influence of current international turmoil.

¹ Gross Domestic Product (GDP) is defined as the total market value of all final goods and services produced in a country (or an economy) in a given year.

² As measured in 2011 values

This outcome assumes little in terms of proactive development of the region nor concerted efforts by industry or sector groups to explore and realise new opportunities for economic activity. However, all regions have large and small opportunities that could potentially lead to significant outcomes at variance to a business as usual scenario. These opportunities can only be realised through concerted effort, and/or investment.

The scenarios assume a realistic level of investment in the sectors analysed. In this context, investment effort covers a wide range of activities, including but not limited to, exploring science, innovation and research; new product developments and marketing activity; maintaining transport and communications infrastructure; strengthening community and social networks; and improving education, training, and skill levels. Further, this investment effort could be focussed on the needs or demands of particular industries or sectors, or more generally, applied to serve the needs of the Southern Region.

2 Alternative regional economic development

To allow for short to medium-term planning, BERL has set 2026 as an endpoint. This endpoint moves the focus beyond the current financial crisis and allows for investment in human and physical capital. Four modelled outcomes have been produced using the BERL Computable General Equilibrium (CGE) model. We term these modelled outcomes 'scenarios'.

Each modelled outcome has a different set of assumptions. These assumptions include macro-economic influences such as world prices and the ongoing demand for our export products. The size, composition and management of regional plantation forests and horticulture crops are considered, along with productivity improvements in the harvesting and manufacture of these products.

Population demographics, the availability of labour, and human capital requirements such as skills, training and qualifications are also considered as the model requires capital and labour.

2.1 Modelled scenarios

Economic data and information compiled on the Southern Region resulted in the selection of the following scenarios for modelling:

1. Increased investment in plantation forest development and additional wood processing
2. Increased investment in horticulture, and additional and diversified crops
3. Additional manufacturing undertaken, and productivity and scale lifted in the engineering and construction trades
4. Increased investment in education and training by businesses to meet growing skill requirements, and by individuals to capitalise on labour market demands and wage growth

All of the scenarios are compared to a business as usual scenario for 2026.

2.1.1 Business as usual scenario

A business as usual scenario is used as a benchmark to compare and measure the effects of assumed changes in economic activity or behaviour. In the Southern Region under the business as usual scenario, Gross Domestic Product (GDP) steadily increases by 2.34 percent per annum, from \$5.2 billion in 2011 to \$7.3 billion in 2026.³

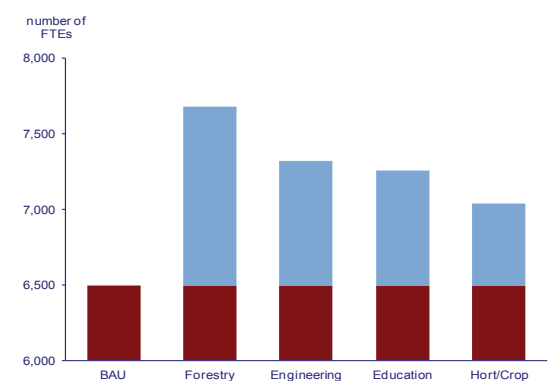
³ As measured in 2011 values.

Over the same period, employment grows on average by 433 Full-Time Equivalents (FTEs) per annum to 2026, or approximately 0.7 percent per annum. This employment growth is fairly evenly distributed across industries and occupations.

2.2 Summary of scenario results

The outcomes – or potential benefits or opportunity costs – of the modelled scenarios are illustrated through gains in employment and GDP. Figure 2.1 illustrates the difference from the business as usual scenario of additional employment generated under each of the scenarios. It also shows the gain in employment under the business as usual (BAU) scenario.

Figure 2.1 Potential employment changes, Southern Region, 2011-2026



In summary:

- Employment under the increased investment in plantation forest development and additional wood processing scenario results in the largest employment gain. Under this scenario, employment is 1.9 percent higher than under the business as usual scenario. This means there are an additional 1,180 FTEs in employment in the Southern Region in 2026 under this scenario compared to business as usual.
- Increased investment in horticulture, including additional crops and greater crop diversity, results in the smallest change in employment. However, this employment gain is still higher than that seen under the business as usual scenario. Here, there is an additional 540 FTEs in employment in the region in 2026 compared to the BAU scenario.

- A scenario that focuses on improved productivity and scale in the engineering and construction trades sectors, results in an additional 820 FTEs in employment in 2026 compared to the business as usual scenario. Under this scenario, overall employment in 2026 is 820 FTEs higher in the Southern Region compared to the BAU scenario.
- To meet the increased demand from Southern employers for specialised skills and training, employment in the education and training sector grows. In addition, as the population of the Southern Region grows, the demand for education grows along with employment opportunities in this sector. Overall, an additional 755 FTEs in employment in 2026 result from this scenario compared to the BAU scenario.

Each scenario is not mutually exclusive; the Southern Region could pursue potential low carbon economic development plans in more than one area, resulting in greater overall gains.

2.3 Investment in plantation forest development and additional wood processing

The Southern Region has a well-established forestry industry that is supported by transport infrastructure such as road networks and a port, and wood product manufacturers. To date, the area has been successful in attracting investment in existing and new plantation forests, sawmilling operations, and the remanufacturing of wood and wood products. This investment is largely due to wood processors being able to draw on a range of commercial forest species from local growers, to meet their timber requirements.

2.3.1 The Otago and Southland wood supply regions

The Southern Region encompasses parts of the Otago and Southland wood supply regions. Wood supply regions are determined by the Ministry for Primary Industries (MPI). These regions allow the MPI to produce wood availability forecasts. The forecasts are developed in association with major growers and are based on recently updated yield tables. The forecasts are supply-based but incorporate the long-term intentions of larger forest owners.

The Otago and Southland wood supply regions include the territorial authorities of Central Otago, Clutha, Dunedin City, Queenstown-Lakes, Waitaki, Gore, Invercargill City and Southland District.⁴ Together, this wood supply region has a Medium Density Fibreboard (MDF) plant, a mouldings facility, a veneer operation, and two stand-alone chip plants. There are approximately 26 major sawmills in the region. This means that more than three-quarters of the trees harvested from this area are processed in the area.

Six of the wood processing operations are located within 70 kilometres of the port at Bluff. The port handles exports of MDF, sawn timber, veneer, logs and wood chips. The principal destinations for these exports are the United States, Japan, Korea, Taiwan, Vietnam and China.

Wood in the Southern Region is principally sourced from planted exotic forests, with just one percent of the wood coming from natural forests that are sustainably managed.⁵ The principal planted exotic forests are Radiata Pine and Douglas Fir. However, the Otago and Southland wood supply regions have about 21,600 hectares of plantings in other species.⁶

- Eucalypts are the principal alternative species, and plantings total about 13,600 hectares. The majority of the plantings have been established in the Clutha and Southland Districts and are being grown on a short rotation basis for wood chip production. The region has 43 percent of all eucalypt plantings nationally.
- Approximately 1,100 hectares are planted in Cypresses, with the investment intention of this resource being high-value end uses such as furniture manufacturing.

Radiata Pine is typically harvested when the trees are between 28 and 30 years old, and is often used for mouldings, window frames, doors and furniture. Douglas Fir is predominantly used in structures and for furniture.

⁴ For the purposes of this study, the focus is on the Clutha, Gore and Southland Districts and Invercargill City.

⁵ Ministry of Agriculture and Forestry. (2008). Otago/Southland Forest Industry and Wood Availability Forecasts 2008. Ministry of Agriculture and Forestry: Wellington.

⁶ Ministry of Agriculture and Forestry. (2008). Otago/Southland Forest Industry and Wood Availability Forecasts 2008. Ministry of Agriculture and Forestry: Wellington.

2.3.2 Wood availability forecasts

Plantation forests in the Southern Region have a relatively young age profile due to an increase in new plantings over the last 15 to 20 years.⁷ This means, depending on the harvesting intentions of forest owners, there is the potential to increase harvest volumes in the area.

Currently, about 1.5 million cubic metres of wood is harvested from the Otago and Southland wood supply regions. Any growth in the harvesting of Radiata Pine will come from small-scale owners, while large-scale owners will influence harvesting decisions in regards to Douglas Fir. Based on the age profile of the trees, there is the potential for the harvest to increase to around 2.6 to 2.8 million cubic metres in the early 2020s.⁸ Post 2030 the harvest of Radiata Pine is projected to decline, but this decline may be counter balanced by an increase in the harvest of Douglas Fir.

The wood availability forecasts for the Otago and Southland wood supply regions are based on all areas being replanted with a regeneration lag of one year. Mostly, this replanting is back into the same species and regime, with an exception in regards to some replanting into Douglas Fir.

2.3.3 Wood product manufacturing

A wide range of goods for local sale and export are processed in the Southern Region from locally harvested logs. In previous work completed by BERL for the Southern Wood Council (BERL, 2005), we estimated that 25 percent of the wood harvested in the area was exported as unprocessed logs; 30 percent was converted into timber; 30 to 35 percent was converted into other products; and 10 to 15 percent was disposed of as energy or waste.

Over the past 15 to 20 years, over \$250 million has been invested in new or additional wood processing capacity. This investment has diversified wood processing in the area and includes the development of remanufacturing facilities, a veneer operation, and a Medium Density Fibreboard (MDF) factory. With

this investment, approximately 75 to 80 percent of the annual harvest is processed in some form.

Investment has also been made in productivity improvements within the industry. For example, productivity has increased in a number of sawmills in the area due to improved scanning and sawing technologies. This technology has allowed smaller diameter and lower quality logs to be turned into sawn timber, and for more of each log to be turned into sawn timber. Wood processors have also considered productivity improvements in regards to adding value to sawn timber and remanufactured products.

2.3.4 Bioenergy programmes in forestry

The wood processing sector uses a high proportion of wood residues such as bark, sawdust, wood chips, and short lengths of timber. For example, an estimated 150,000 cubic metres of wood chips are consumed in the manufacture of MDF, and wood residues currently provide 50 to 55 percent of the industry's energy consumption. Woodchip machines can turn non-export grade logs into a woodchip fuel that goes into woodchip boilers and pellet burners for industrial and commercial energy.

These trends, regarding using wood residues, are forecast to continue with recent government initiatives around renewable energy.⁹ In addition, bioenergy production from harvest residues has been identified as a potential revenue stream for forest owners. The wood fibre collected from harvest sites could be used to supplement existing feed stocks, or be sold to processing operations that use residues as an energy source.

2.3.5 Modelled scenario and results

The constraints identified in the wood availability forecasts include availability of logging crews, transport capacity, and wood processing capacity. Under this scenario, these constraints were removed as wage growth and employment opportunities encourage people to undertake the appropriate training and work in the road transport and forestry and logging sectors.

In addition, under this scenario opportunities to sustainably grow the industry at a plantation and processing level are taken up including investment

⁷ Ministry of Agriculture and Forestry. (2008). Otago/Southland Forest Industry and Wood Availability Forecasts 2008. Ministry of Agriculture and Forestry: Wellington.

⁸ The age profile of the trees does not necessarily indicate when the forest will be harvested as some small-scale owners will harvest early for family or economic reasons, while others will delay harvesting to seek a higher log price.

⁹ Under the Forest Industry Development Agenda (FIDA), the Government has made \$2.8 million available to fund bioenergy programmes across New Zealand.

in additional wood processing capacity. These opportunities also include greater utilisation of forest residues, and the increased use of automated processing systems to improve productivity.

Under this scenario, the supply of Radiata Pine and Douglas Fir remains relatively static through to 2015 before substantial increasing through to 2020 and beyond. Under this scenario, processing expands post-2015 to meet the substantial increase in the harvest.

Potential employment growth

Under this scenario, employment is 1.9 percent higher than under the business as usual scenario. This means there are an additional 1,180 FTEs in employment in the Southern Region under this scenario compared to the business as usual situation.

In total, employment in the Southern Region has grown to 62,990 FTEs from 55,310 in 2011. Under this scenario, agriculture is still a major area of employment; however, there has been employment growth in wood and wood products processing along with forestry.

Employment in the forestry sector, under this scenario grows by 260 FTEs over the period, while employment in wood products increases by 390 FTEs. Employment in the transport sector also grows by approximately 185 FTEs while associated sectors such as building construction are also positively affected by the construction, and ongoing maintenance of an additional wood processing facility. Overall, there are 7,680 more FTEs in employment under this scenario.

As shown in Figure 2.2, sectors that are influenced by population growth such as health and education are also positively influenced by any potential increase in forestry and wood processing employment.

Potential growth in GDP

In this scenario GDP is 2.6 percent higher in 2026 than under the business as usual scenario. This results in an additional \$189 million being added to the economy. Figure 2.3 illustrates how this increase is distributed across the Southern Region economy.

Figure 2.2 Forestry scenario results, employment change, 2011-2026

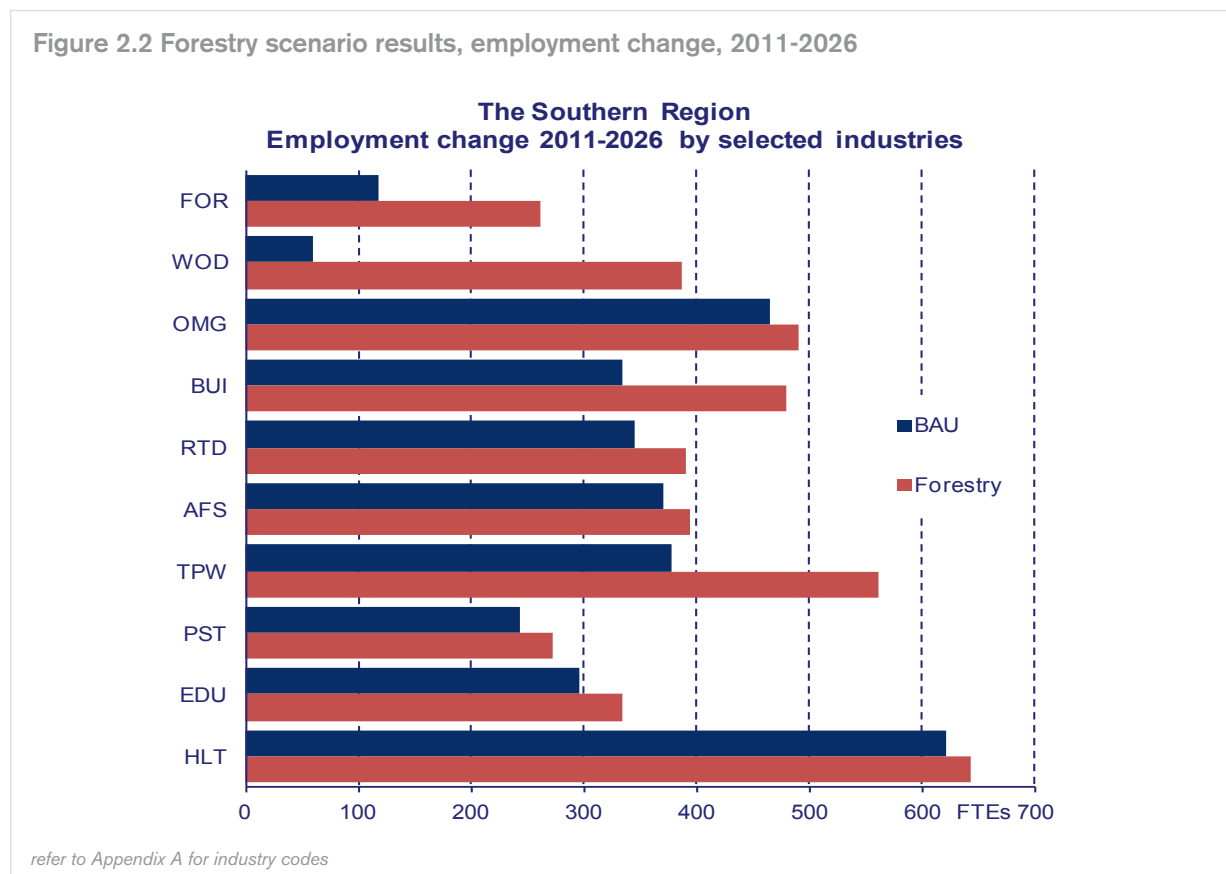
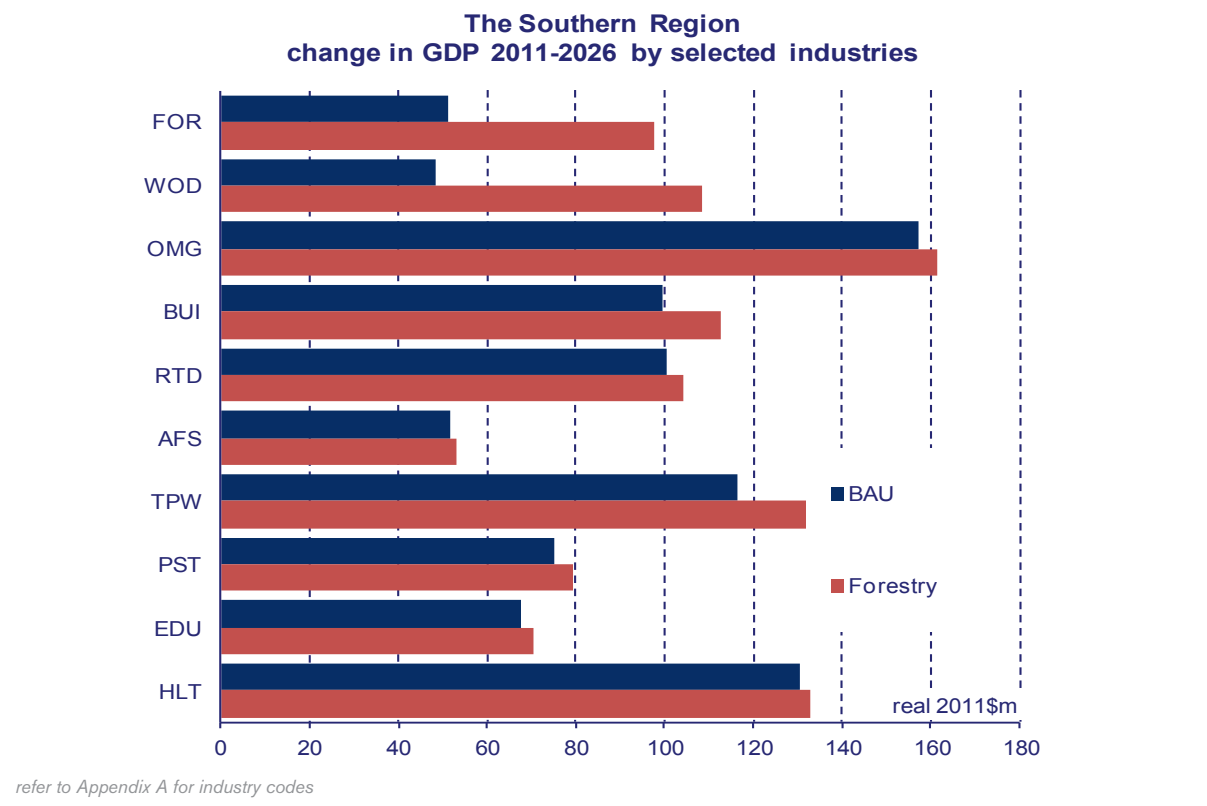


Figure 2.3 Forestry scenario results, GDP change, 2011-2026



Under this scenario, GDP increases by 2.5 percent per annum from 2011 to 2026. GDP in the Southern Region is \$7.54 billion in 2026 under this scenario, compared to \$7.35 billion under the business as usual scenario. GDP per FTE is also noticeably higher under this scenario, having risen by 1.6 percent per annum from approximately \$92,930 in 2011, to \$119,630 in 2026.

2.4 Increased investment in horticulture and additional and diverse crops

The main grain crops grown in the Southern Region include barley, wheat and oats. The main vegetable crops include potatoes, carrots and parsnips, with some brassica crops such as cauliflower and brussel sprouts grown in the region. Crops such as swedes and kale are also grown for supplementary livestock fodder.

Crops for Southland is a non-profit organisation that has researched new crop opportunities in the Southern Region including nuts, medicinal herbs, and berry fruits. Their research has also considered the potential for bio-oil and bio-fuel crops. This scenario assumes these new crop opportunities are forthcoming, and that

growers are encouraged to diversify their crops from the main crops currently grown.

Venture Southland argues that “[t]opoclimate research has identified microclimates which allow land users to grow a wider range of crops and pastures, which in turn improves productivity.”¹⁰ Under this scenario, this research is assumed to be correct, and the opportunities that could be generated from this broader land use have been capitalised on.

2.4.1 The potential of hazelnuts

New Zealand’s hazelnut industry is still in its infancy, with the oldest commercial orchards only 12 to 14 years old. Hazelnut trees start to produce a marketable quantity of nuts by the age of six or seven years old; however, this is affected by orchard conditions and management practices.

Currently, the demand for New Zealand hazelnuts comes from cuisine and confectionary businesses. Most growers sell their hazelnuts in their shell to a

¹⁰ Venture Southland. Southland Regional Economic Profile. (www.southlandnz.com/Home/VentureSouthland/CorporateStrategies.aspx).

processing and marketing company, who then market and sell the product. Hazelnuts in their shell return, on average, \$3.50 to \$4.50 a kilogram to the grower.

The marketing and processing of hazelnuts is currently carried out by four small, independently-owned businesses, and a larger grower/shareholder owned company – The Hazelnut Company – marketing under the brand name HAZELZ. These businesses are all based in the South Island. They argue that as more products become available, consumer awareness and subsequent demand for local hazelnuts and hazelnut products will grow.¹¹

Current plantings are estimated at over 350,000 trees on blocks which average in size from around 300 to 3,000 trees. Plantings extend the length of the South Island; however, areas in the centre and on the east coast of the South Island are currently the most popular due to a climate that has a winter chill and consistently warm, dry summers.¹²

Hazelnuts are low maintenance and suit the climate of the Southern Region. In previous research, Venture Southland has argued that market signals indicate a strong demand for hazelnuts, and growers are working together and pooling resources to produce hazelnuts for high-end markets.¹³

The Sustainable Farming Fund funded a project on pollination of hazelnuts administered by the Ministry of Agriculture and Forestry (MAF) that proved local growers with some certainty when it comes to planning orchards and planting the correct pollinator trees.

2.4.2 Organic produce

The production of organic food products is growing in the Southern Region, with land being well suited to this method of low-impact farming. Organic sheep and meat production is gaining in market popularity and a niche market is emerging for sheep milk that is used in the production of specialty cheeses and dairy products.¹⁴

An agricultural report for the Clutha District noted a small but slowly increasing number of organic-style farmers across this District, particularly sheep and beef enterprises. It was noted that “[i]nterest in this method of farming style remains reasonably high as many farmers try non-traditional fertilizer along with their normal practice.”¹⁵ Currently, organic production in the Southern Region is concentrated in the areas of fruit and vegetable growing, honey, and dairy farming.

Under this scenario, we assume that the production of organic food products continues, and increases in size and scope. This is based on national targets, as well as growing local interest in this method of farming. Nationally, the organic sector has a target to reach \$1 billion in total sales during the period that this scenario is modelled.¹⁶ Statistics from MPI illustrate how organic food and beverage production has increased over the last five years, and how the value of these products has grown.¹⁷

2.4.3 Investment in science and innovation

Under this scenario, another key assumption is that local growers are working closely with science providers such as the Crown Research Institutes (CRIs) and tertiary education organisations. The focus of this research is to produce more food from less land, with a reduced environmental impact, fewer chemicals, carbon and water inputs. At this time, science and innovation is also assisting landowners and growers to identify alternative uses for their horticultural by-products.

Under this scenario, reducing the environmental impact of food products grows in importance for consumers and distributors. More growers use tools to increase the sustainability of vegetable production and minimise environmental impacts. These tools focus on efficient production systems and soil health.¹⁸

An example of research in this area is the Sustainable Land Use Research Initiative (SLURI). This is a

¹¹ Hazelz New Zealand. The Hazelnut Company, Product Specifications. (www.hazelnut.co.nz).

¹² Hazelnut Nurseries. (www.hazelnutnurseries.co.nz).

¹³ Venture Southland. Southland Regional Economic Profile. (www.southlandnz.com/Home/VentureSouthland/CorporateStrategies.aspx).

¹⁴ Venture Southland. Southland Regional Economic Profile. (www.southlandnz.com/Home/VentureSouthland/CorporateStrategies.aspx).

¹⁵ Clutha Agricultural Development Board. (2010). Agricultural Statistics for the Clutha District.

¹⁶ Ministry for Primary Industries. (2012). Organics. (www.mpi.govt.nz/agriculture/organics.aspx).

¹⁷ Ministry for Primary Industries. (2010). New Zealand Organic Report 2010. (www.mpi.govt.nz/portals/0/documents/agriculture/pastoral/organics/nz-organic-report-flier.pdf).

¹⁸ Plant and Food Research. (2011). Discover, Innovate, Grow: Annual Report. (www.plantandfood.co.nz/file/annual-report-discover-sep-2011.pdf).

collaborative research programme between Landcare Research Manaaki Whenua, Plant and Food Research, and AgResearch. It is a government funded research programme that focuses on maintaining and managing soils. This research programme is important for this scenario, as land management affects soil and stocks of soil organic matter, including soil carbon stocks.

2.4.4 Modelled scenario and results

Under this scenario, there is investment in existing and new horticulture crops and processes, and market research into customer needs. Existing markets have expanded due to an increase in the volume and diversity of horticulture products on offer, and new markets have developed with an increase in marketing activities. Employment in sectors that support horticulture, such as nursery production, as well as sectors that process horticulture products, are positively influenced by growth in the horticulture sector.

In this scenario we have focused on a working example of a particular crop, hazelnuts. Here, the number of orchards planned and hazelnut trees planted develops substantially. Secondary processing such as shelling, roasting, production of pastes, spreads and additional food combinations add significant value to the returns

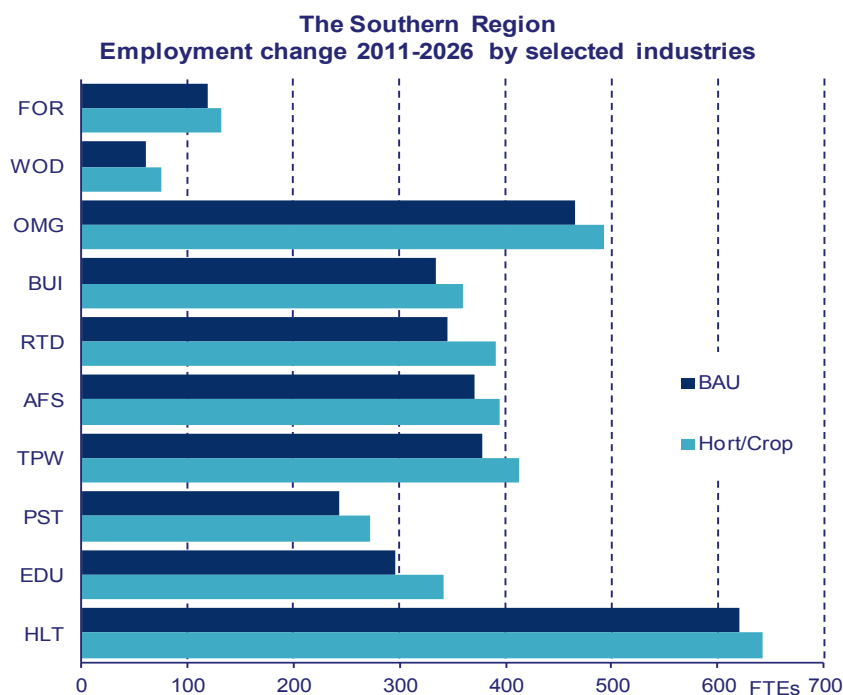
for hazelnut crops. Automated harvesting, processing and grading also reduce labour input costs. Under this scenario, more active marketing strategies continue to be developed by local growers and industry associations regionally and nationally.

CRIs have undertaken work on a selection of crops that could be managed in conjunction with timber production. They include ginseng, and a number of berry and nut species. Secondary crops could therefore supplement the revenue forest owners gather in the Southern Region during their rotation cycle. This is another working example that could be considered under this scenario.

Research into secondary crops argues that the financial advantages are three-fold: after an initial establishment period secondary crops provide landowners with an annual income; an additional crop improves operating cash flow; and a secondary source of income can reduce the financial uncertainty associated with long-term forestry investment.¹⁹

¹⁹ Ministry of Agriculture and Forestry. (2008). Otago/Southland Forest Industry and Wool Availability Forecasts 1008. Ministry of Agriculture and Forestry: Wellington

Figure 2.4 Horticulture scenario results, employment change, 2011-2026



refer to Appendix A for industry codes

Potential employment growth

Of the four scenarios modelled, increased investment in horticulture, including additional crops and greater crop diversity, results in the smallest change in employment. However, this employment gain is still higher than that seen under the business as usual scenario. Here, there is additional employment of 540 FTEs in 2026, compared to the business as usual scenario.

In total, employment in the Southern Region grows from 55,310 FTEs in 2011 to approximately 62,350 FTEs in 2026. Figure 2.4 illustrates how this change in employment is distributed across the various sectors.

Under this scenario, employment is 0.9 percent higher in 2026 than under the business as usual scenario. This employment increase is in sectors such as food processing, and other manufacturing (represented by OMG on the chart). For example, an additional 490 FTEs are employed in manufacturing between 2011 and 2026. The transport and warehousing sector is also positively affected by growth in the horticulture sector (represented by TPW on the chart), with an increase of 410 FTEs between 2011 and 2026.

Potential growth in GDP

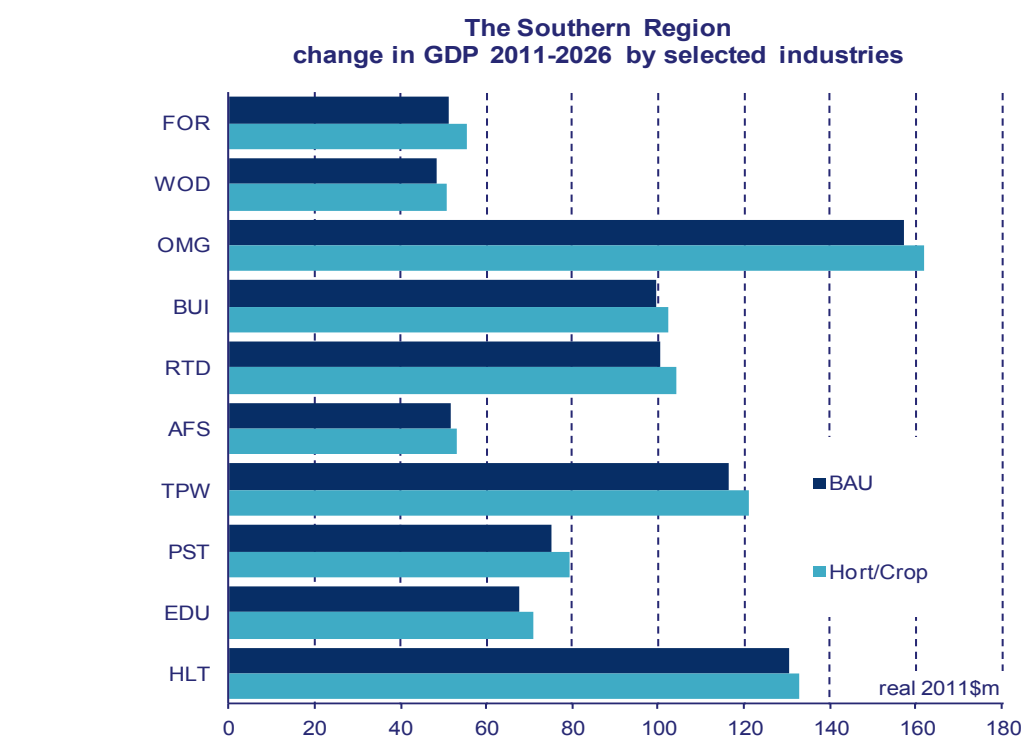
In this scenario GDP is 0.9 percent higher in 2026 than under the business as usual scenario. This results in an additional \$67 million being added to the economy. Figure 2.5 illustrates in what sectors of the Southern Region economy this increase is distributed across.

Under this scenario, GDP increases by 2.4 percent per annum from 2011 to 2026. GDP in the Southern Region is \$7.41 billion in 2026 under this scenario, compared to \$7.35 billion under the business as usual scenario. GDP per FTE is also noticeably higher under this scenario, having risen by 1.6 percent per annum from approximately \$92,930 in 2011, to \$118,900 in 2026.

2.5 Additional manufacturing undertaken, and productivity and scale in engineering lifted

One of the strengths of the Southern Region economy is the engineering and related construction businesses that currently service activity in the broader manufacturing and primary sectors. In particular, there were 710 FTEs employed in the Southern Region in 2011 in machinery, equipment, furniture, and other

Figure 2.5 Horticulture scenario results, GDP change, 2011-2026



refer to Appendix A for industry codes

manufacturing sub-sectors. The development of these activities is contingent on components, science, research and innovation to generate increasingly high value-added products and processes required by many sectors.

Due to the presence of large-scale operations in the Southern Region, businesses in sectors other than primary production and processing have been attracted to this area. These businesses include companies offering business support services such as lawyers, accountants, and Information and Communication Technology (ICT) professionals, companies manufacturing plant, machinery and equipment, and companies providing repairs and maintenance services. In the Southern Region this employment is spread fairly evenly across the area and year-round, which encourages people to stay in smaller settlements.

Under this scenario, the strengths of the existing engineering and construction trades industries are boosted with further innovation and research, and developments in markets and supply chains. These developments are aimed at building links with manufacturers' requirements in other regions of New Zealand and beyond. Establishing a broader customer

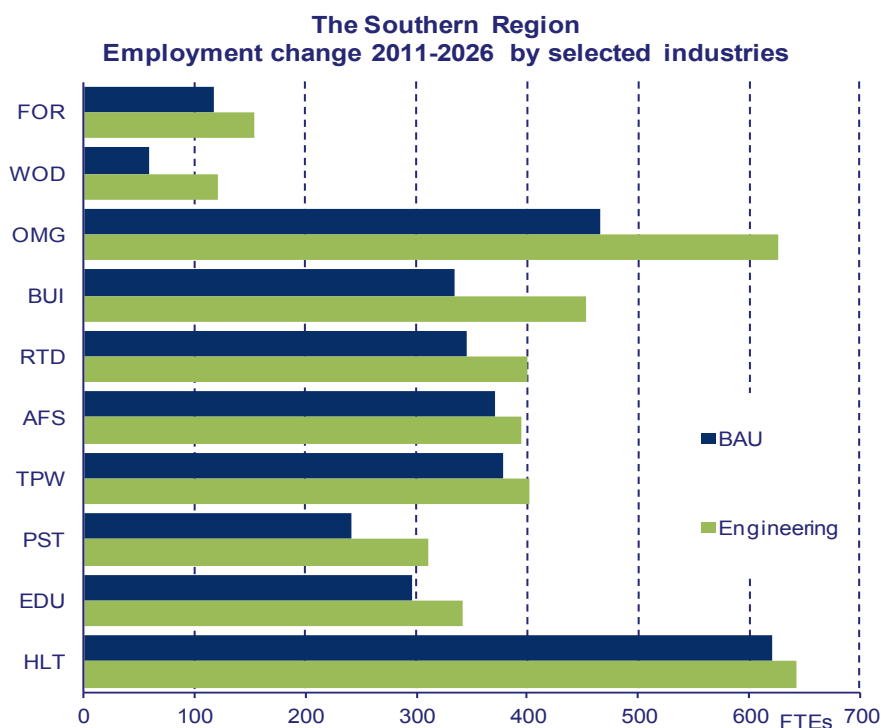
base for these sectors lifts the scale of their operations and enables productivity and employment growth.

This scenario also benefits from the indirect activity that is generated in supplier industries within the region. In particular, we examine the associated engineering and manufacturing sectors that employ people in occupations such as professionals, managers, technicians, trades workers, machinery operators and drivers. We also consider the induced activity that occurs with the presence of these businesses, such as the generation of wages and profits, and the positive impacts on skill levels and qualifications.

The development of sectors within New Zealand manufacturing remains a challenge for the nation, given strong competition from lower labour cost countries. However, manufacturing (in particular, machinery, equipment, furniture and other manufacturing sub-sectors) in the Southern Region continues to have a strong foundation.

The future for these sub-sectors will no doubt be closely related to the national development of higher-value, research and technology-driven components and services. This scenario sees the region's strengths

Figure 2.6 Engineering scenario results, employment change, 2011-2026



refer to Appendix A for industry codes

being the foundation to broaden its contribution to New Zealand's engineering and manufacturing effort.

2.5.1 Modelled scenario and results

Potential employment growth

Under this scenario, employment could be 820 FTEs higher in 2026 than under the business as usual situation. Overall, employment in this scenario grows by 0.8 percent per annum from 2011 to 2026, which is the employment of an additional 490 FTEs each year.

In 2026, approximately 62,630 FTEs are employed in the Southern Region. Under the business as usual scenario, total employment is lower at approximately 61,810 FTEs. Figure 2.6 illustrates employment changes across the various sectors between 2011 and 2026. Under this scenario, there is noticeable growth in the other manufacturing sector (represented by OMG on the chart), with an additional 500 FTEs in employment in 2026. This growth in employment also translates to this sector contributing an additional \$25 million to GDP in 2026 compared to the business as usual scenario.

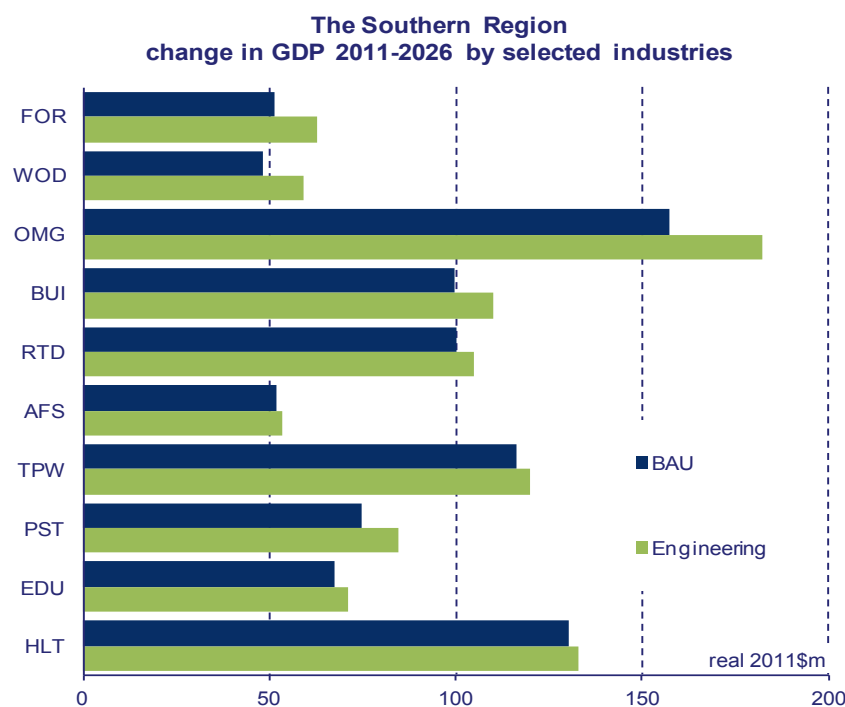
Towards 2026 there is an increase in the number of people employed in supplier industries such as engineering and construction trades businesses that service and support the broader economy. It also sees growth in occupations such as forestry and related workers, machinery and trades workers, transport drivers, and professionals such as physical scientists and engineers.

Employment growth in the engineering and construction trades services sectors has a direct and indirect positive effect on employment opportunities in other sectors such as business support services. The indirect effect is the result of the engineering and construction trades services businesses purchasing materials and services from supplier firms, who in turn make further purchases from their suppliers. In addition, people employed in the engineering and construction trades services sectors, and in the businesses supplying goods and services to these sectors, earn an income, which is then saved and/or spent on goods and services.

Potential growth in GDP

Under this scenario, GDP is 1.6 percent higher in 2026 than under the business as usual scenario.

Figure 2.7 Engineering scenario results, GDP change, 2011-2026



refer to Appendix A for industry codes

This means that GDP is \$115 million higher under this scenario, than under the business as usual situation.

Under this scenario, GDP increases by 2.4 percent per annum from 2011 to 2026. GDP in the Southern Region is \$7.46 billion in 2026 under this scenario, compared to \$7.35 billion under the business as usual scenario.

2.6 Increased investment in education and training to meet skill requirements

Education is a 'core driver' industry in the Southern Region. In its own right, the education industry contributes to regional GDP and employment. In 2011, this contribution was \$139 million in regional GDP and the employment of approximately 3,180 FTEs. In addition, education is a public service industry that supports skill development, productivity improvements, and associated increases in GDP per capita.

2.6.1 Economic impact of SIT on the Southern Region

The largest area of education employment in the Southern Region is tertiary education, and most of this activity centres on the Southern Institute of Technology (SIT). As an institute of technology, SIT provides vocational education and training, and is part of the polytechnic and institute of technology (ITP) level of tertiary training.

Approximately 13,860 domestic and 580 international students study at SIT. The main campus is located in Invercargill, and the largest student cohort is enrolled here. The Invercargill campus also has a large number of international students. Students can study at smaller campuses located in Queenstown, Gore and Christchurch, and have the option of undertaking distance learning programmes.

The provision of vocational education and training by SIT at their Invercargill campus generates economic activity in Invercargill City. Students spend their money in a variety of industries in Invercargill, outside of education and course related costs. For example, there is expenditure on food – not only in supermarkets but in the hospitality industry – and expenditure on accommodation. Students may live in student accommodation such as halls of residence, home stays or flat with friends. Students may also rent their own homes. As well as students spending money in Invercargill, SIT staff spend and save their income and SIT spends money to operate as an education provider.

In addition, the presence of SIT students and staff generates indirect benefits such as social and community well-being. For example the presence of domestic and international students at SIT in Invercargill may create greater cultural diversity in the community. Their presence may also increase awareness among potential domestic and international visitors of Invercargill and the Southland Region, and what this area has to offer.

Overall, students studying at SIT make a positive contribution to Invercargill City, the Southland Region, and the New Zealand economy in terms of output, GDP and employment, and their qualifications and training has a positive impact on skills and productivity, and lifting the wider skill base.²⁰

2.6.2 Modelled scenario and results

As part of the economic growth agenda, the Government argues that the tertiary education sector plays a core role in advancing New Zealand economic and social development. It does this by providing high quality education to prepare and maintain a workforce that has relevant skills.²¹

The Southern Region labour market is comprised of the stock of current skills, and the flows in and out of the labour force. The stock of skills consists of the Working Age Population that makes up the potential skills supply. Into this stock of skills there are four main flows – young people leaving school, older workers retiring, migrants arriving into the region, and people leaving the region and New Zealand on a permanent or long-term basis.

These stocks and flows illustrate how integrated the labour market is. They also show that it is not just school leavers and the education system that impact on the supply of skills, it is also important to attract people to the region and retain those who currently live here.

The flow of qualified people into the Southern Region labour market has been assisted by the 'Zero Fees' scheme at SIT. This scheme has allowed more local people to access tertiary education and training, and encouraged people from outside of the area to study in

²⁰ For further information see, BERL. (2011). An Economic Impact Assessment of the Southern Institute of Technology. BERL : Wellington.

²¹ The Tertiary Education Commission. (2012). Statement of Intent 2012/13 to 2014/15. Tertiary Education Commission: Wellington.

the Southern Region. To maintain the current resident population and attract migrants, the Southern Region needs to identify and build factors that pull people to the area.

Under this scenario, the Zero Fees scheme at SIT has been identified as one such pull factor, and SIT is working closely with local government and businesses to further support the competitive advantages of regional industry and businesses. Locally available training is promoted, and greater awareness of these courses and programmes arises. In addition, new course and programmes are developed in collaborative-type arrangements to provide training opportunities that are not currently available in the Southern Region.

The relevance and currency of these courses and programmes further encourages employers to invest in ongoing professional development for their staff. It also encourages graduates to stay and work, as their

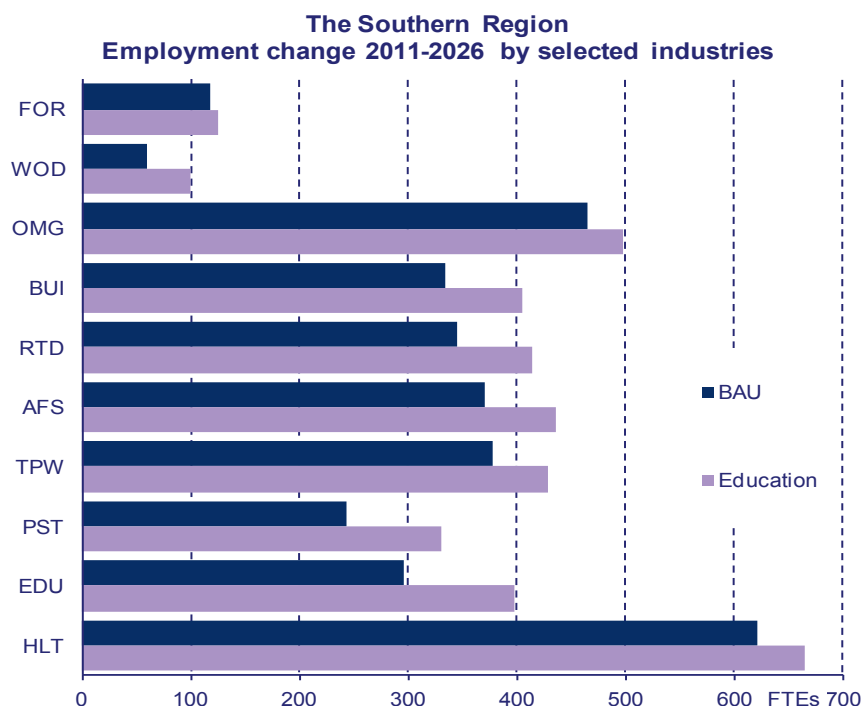
skills and training matches current vacancies.²² Under this scenario the strategic direction of SIT, as outlined in their investment plan and subsequent course and programme offerings, is aligned to meet regional economic development plans and strategies.

Under this scenario a wide variety of qualifications are completed by SIT students. For example, SIT offers short courses and specialist training for employers interested in up-skilling their workforce. Training such as this lifts the skill base of individuals, improves their ability to complete tasks through specialisation, and improves productivity by increasing comparative advantage.

Under this scenario, the wider benefits and flow-on effects of tertiary education are felt by members of the community. These effects have been highlighted

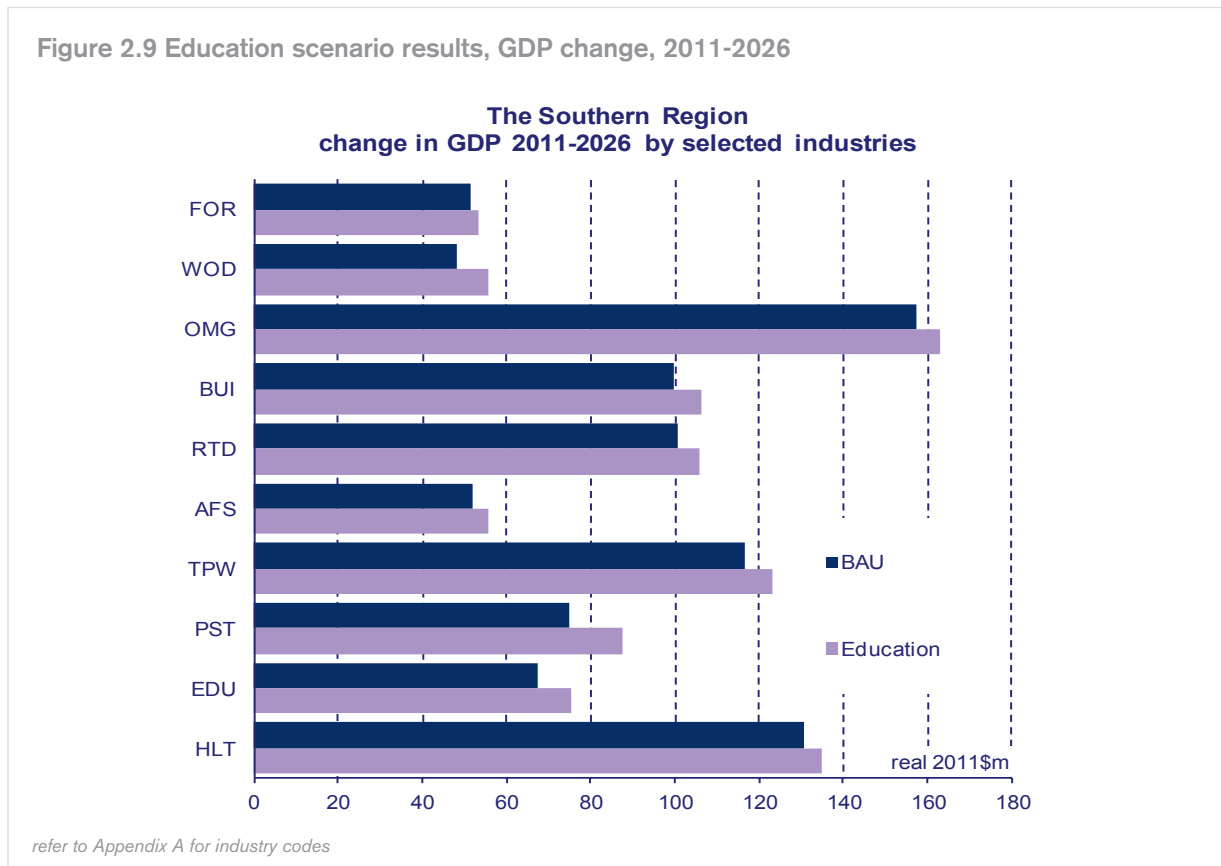
²² In perceptions studies commissioned by Venture Southland, the *Secondary and Tertiary Student Perception Study – Southern Institute of Technology 2008*, push factors were identified in relation to education and employment. These included that Southland jobs had lower wages, and that there were less opportunities for graduates and those with specialist fields. MartinJenkins. (2008). Southland Workforce Strategy – May 2008. Venture Southland: Invercargill. (www.southlandnz.com).

Figure 2.8 Education scenario results, employment change, 2011-2026



refer to Appendix A for industry codes

Figure 2.9 Education scenario results, GDP change, 2011-2026



through research undertaken by the Department of Labour and Ministry of Education. This research has shown that the attainment of higher education is associated with higher earnings, increased chances of being in stable employment, and improved health and other positive social outcomes.

Potential employment growth

Overall, employment is 1.2 percent higher under this scenario compared to the business as usual scenario. This means approximately 755 additional FTEs are in employment in 2026 under this scenario, than under the business as usual scenario.

On a per annum basis, employment under this scenario grows by 0.8 percent out to 2026. This translates to approximately 480 new jobs per year, and an additional 7,252 FTEs in employment in 2026.

In Figure 2.8, these employment changes are shown across the various sectors in the Southern Region. This figure illustrates how under this scenario human capital has grown and the resident population has the appropriate skills, training and education to seize the employment opportunities that have arisen.

Productivity improvements noted under this scenario also positively impact on employment in the health and other services sector. Compared to the business as usual scenario employment opportunities for health professionals, nurses, and health associate professionals are higher due to resident population growth. Health professionals include occupations such as doctors, surgeons and dentists while health associate professionals include podiatrists, optometrists and audiologists.

Under this scenario, household consumption increases as a result of a lift in productivity that occurs with additional training and education. There is also an increase in the consumption (or purchase) by households of other services, which positively impacts on employment in these industries. People employed in occupations within the other services industries also benefit from higher average wages as a result of higher consumption of these goods and services. The other services industry includes people involved in repairs, maintenance and cleaning such as mechanics and drycleaners, as well as personal care services such as hairdressers and beauticians.

Under this scenario the growing demand for education and training increases the need for teachers and

trainers at all levels of the education system. There is also the opportunity to increase the export of education service from the area.

Potential growth in GDP

Under this scenario, GDP is 1.2 percent higher in 2026 compared to the business as usual scenario. This will result in an additional \$91 million being added to regional GDP by 2026, in real 2011 values, than under the business as usual scenario.

GDP under this scenario is \$7.44 billion in 2026, due to growing by 2.4 percent per annum between 2011 and 2026. The total increase in GDP between 2011 and 2026 is therefore \$2.24 billion.

A skills challenge report issued by the Department of Labour argues that towards 2019 there will be a strong demand for people with high-level vocational qualifications (such as certificates and diplomas at level 4 and above).²³ The impact on GDP witnessed under this scenario supports this research. However, in this scenario, and the other scenarios modelled, labour availability is not a constraint.

To realise the potential opportunities that these four scenarios illustrate requires an appropriate composition of skills and experience to be available in the labour force over the next 15 years. Under this scenario, SIT, local government and businesses work in a collaborative partnership to ensure the supply of skills and the necessary quantity of trained labour are available to meet any proposed regional economic development plans. This scenario therefore illustrates the need for the Southern Region to consider the future labour force in terms of skills, experience and productivity, and make prior investments in education and training.

²³ Department of Labour. (2011). Skills Challenge Report – New Zealand's Skill Challenges over the next 10 years. Department of Labour: Wellington. (www.dol.govt.nz/publications/research/skills-challenge/skill-challenge_01.asp).

3 Concluding comments

The scenarios modelled in this research have focused on industries that the Southern Region already has comparative advantages in. However, each scenario also has its own unique challenges in terms of securing significant investment capital and/or attracting innovative and talented individuals and entrepreneurs. Despite the challenges, the gains illustrated in each of the scenarios are significant. Drawing on the existing strengths of the Southern Region, and diversifying activities consistent with these strengths, leads to outcomes above the business as usual situation.

The forestry scenario builds on the existing primary resource base already present in the region. This scenario also includes lifting the role of processing in this sector, which in turn calls for investment in physical infrastructure as well as human capital.

The horticulture scenario also builds on the land resource base in the region, but looks to the opportunities for more diverse land use and, consequently, products within the farming sector. This would likely require investment in science, research, and innovation, and market development to explore such opportunities.

The engineering and construction trades scenario builds on the strength of component suppliers already present in the manufacturing sector in the Southern Region. Again, investment in productivity gains and market development, along with ongoing investment in plant and equipment for scale, and human capital for knowledge, will be necessary.

The education scenario builds on the strength and reputation of education providers in the Southern Region. This opportunity should be aligned with national tertiary strategies for institutions to provide quality higher-level vocational and academic training. If so, this scenario provides the opportunity for education to expand its provisions in line with that of a growing regional economy and population. In turn, this scenario could contribute to population and economic growth in the region by attracting more students from outside of the region as well as the country.

None of these scenarios are mutually exclusive. The challenges in terms of investment in physical and human capital, research, and marketing, highlight the various opportunities that may be strategically pursued in the Southern Region. Of critical importance is an alignment of policies at a central, regional and local government level to facilitate such investment.

While this research does not specify what these policies should be, what it does show is that there are multiple (and significant) opportunities in the Southern Region for investment and employment in sectors.

The wider regional economic development role and strategies of local and regional government agencies should ensure that their efforts do not hinder the potential development of these opportunities. Indeed, their efforts should work towards the realisation of such opportunities.

Finally we do not argue that any of these scenarios are the preferred option. Rather, given the resources and skills endowed to the Southern Region, there is undoubtedly a range of opportunities that could be pursued.

The combination of global, political, environmental, and economic influences will inevitably continue to press for constraints in carbon emissions. Whether these constraints are imposed through price, trading, or regulatory mechanisms, the challenge for the future is to ensure economic activity responds appropriately. As global and political influences push economic activity to further improve the efficiency of its resource use, this analysis shows that there remain options and opportunities to continue creating jobs and prosperity in the Southern Region.

4 Appendix A: Acronyms

FOR	Forestry
WOD	Wood and Wood Products Manufacturing
OMG	Other Manufacturing
BUI	Building Construction
RTD	Retail Trade
AFS	Accommodation and Food Services
TPW	Transport, Postal Services and Warehousing
PST	Professional, Scientific and Technical Services
EDU	Education and Training
HLT	Health Care and Social Assistance

5 Appendix B: Glossary

Computable General Equilibrium (CGE) Model

A computable general equilibrium (CGE) model is a conventional tool of economic analysis that mimics the workings of an economy. It reflects the inter-relationships between producers and consumers, and their responses to changes in prices and costs. The model is a representation of the 'production' or 'real' side of an economy, where production includes the provision of goods and services sought by consumers.

The BERL CGE model includes 75 industries, 40 types of labour and 25 types of exports. The CGE model is used to simulate the effect of a range of comparative scenarios. The scenarios are caused by different assumptions about the economic environment or influences such as productivity, government policy, world prices and/or world demand.

Economic development

Economic development is the increase in the standard of living in a nation's population with sustained growth from a simple, low-income economy to a modern, high-income economy. Also, if the local quality of life could be improved, economic development would be enhanced. Economic development includes the process and policies by which a nation improves the economic, political, and social well-being of its people.

Gross Domestic Product

The total market value of all final goods and services produced in a country (or an economy) in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports. GDP can be calculated from three different dimensions: the production account through the value added of individual industries or enterprises; the expenditure on final demand; and the income of sectors.

Human capital

Personal attributes that are productive in an economic context. Human capital often refers to formal educational attainment, with the implication that education is an investment where the returns are in the form of wage, salary, or other compensation. These are normally measured and conceived of as private returns to the individual but can also be social returns.

6 Appendix C: Biography

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**BERL House
108 The Terrace
Wellington
New Zealand**

**phone: +64 4 931 9200
fax: +64 4 931 9202
e-mail: info@berl.co.nz
web-site: www.berl.co.nz**