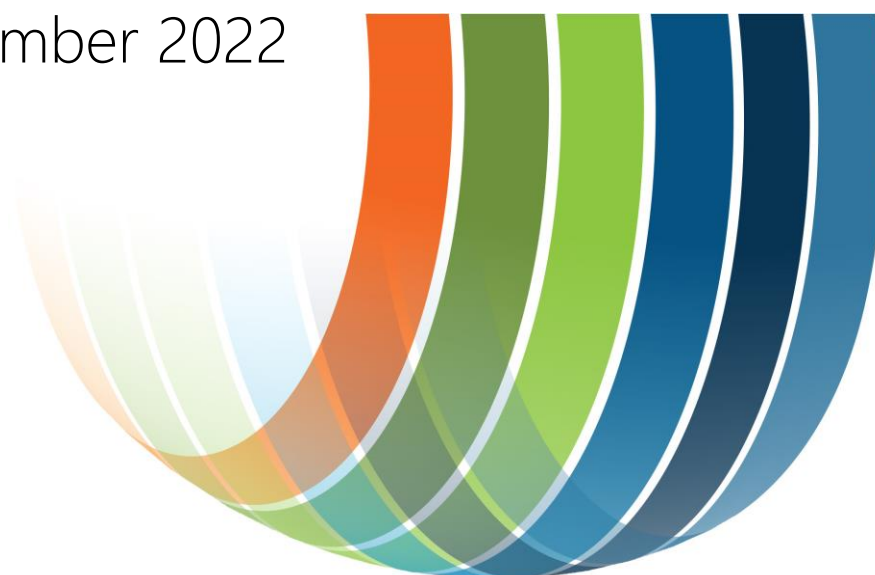


Economic Impact of proposed Waste to Energy facility

**For South Island Resource Recovery
Limited**

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Authorship

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Executive summary

Introduction

South Island Resource Recovery Limited (SIRRL) proposes to build a waste-to-energy facility in Waimate District. SIRRL commissioned Infometrics to assess how the proposed facility will affect the local economy, both through the construction stage and ongoing operation. We have undertaken an input-output multiplier analysis to model how the facility may potentially affect the Waimate District economy, as well as Waitaki and Timaru Districts.

Our approach

Our analysis is based on information provided by SIRRL on the magnitude and nature of their proposed construction and operational expenditure. We have not independently verified these inputs. We have used our regional input-output multiplier model to determine the potential direct, indirect and induced GDP and employment effects of construction and operation on the local economy. We have assumed that the effects will be distributed across Waimate, Timaru and Waitaki in proportion to the allocation of the construction and operation expenditures and the relative size of their local industries. Timaru and Waitaki are much larger than Waimate, and accordingly they get a greater share of the economic benefits of the proposed facility.

Waimate is small, interconnected to Timaru and Waitaki

Waimate is a small district with a population of 8,290 in 2021, making it the fifth smallest territorial authority in New Zealand. Although its population growth has been lagging the rest of New Zealand over the past decade, its employment growth has been strong. Waimate, Timaru and Waitaki are strongly interconnected, and 9.3% of working Waimate residents commute out of the district for work, the majority going to Timaru, and to a lesser extent Waitaki. Waimate's economy is highly concentrated in the primary sector, accounting for 41% of the district's jobs. The proposed facility would help the district to diversify, thereby improving its overall economic resilience and potentially reducing commuting.

Construction expenditure of \$242m

Construction of the proposed facility is expected to be worth \$242m for suppliers in New Zealand, manifesting as an increase in demand for the non-residential construction industry. We have modelled this as being spread over two years across Waimate, Timaru and Waitaki in proportion to their current share of employment in non-residential construction. This means that 6% of the construction impact goes to Waimate, 24% to Waitaki, and 70% to Timaru.

Construction supports 359 jobs per year

Construction of the facility is estimated to support 359 full time equivalent (FTE) jobs per year over the two-year construction period, the majority spread across contractors, subcontractors and suppliers. Most of these jobs are expected to accrue to Timaru and Waitaki businesses, as there is limited construction capacity within Waimate District.

Increased construction employment will boost household income, which creates an induced effect as workers spend some of their incomes locally. The induced effect is estimated to add 2 jobs per year in Waimate and 57 across Timaru and Waitaki over the period of construction of 2 years.

Construction boosts Waimate employment by 0.7%

In total, the effect of construction amounts to a 0.7% increase in total employment in Waimate, and a 1.0% increase across Timaru and Waitaki per year over the two-year construction period, compared to 2021 employment. For the construction industry, employment is expected to be 6.3% higher in Waimate and 5.9% higher across Timaru and Waitaki.

Construction adds \$93.9m per year to GDP

Construction of the facility is estimated to add \$93.9m (in 2021 prices) to the gross domestic product (GDP) of Waimate, Waitaki and Timaru annually over the two-year construction period. This includes a \$4.8m annual increase in Waimate and a \$89.1m annual increase across Timaru and Waitaki over the two-year construction period.

Operational expenditure of \$39.3m per year

Operation of the facility is expected to result in expenditure of \$39.3m per year, spread across cost of direct employment by SIRRL (\$7.4m), purchase of raw materials for repair and maintenance (\$3.8m), and contractors (\$28.1m).

Operation supports 165 jobs

Operation of the facility is estimated to support a total of 165 FTE jobs per year across Waimate, Timaru and Waitaki. Of the 165 jobs, 108 are estimated to be located in Waimate and 57 spread across Timaru and Waitaki.

Operation boosts Waimate employment by 3.2%

Operation of the facility is expected to increase employment in Waimate District by 3.6%, and employment across Timaru and Waitaki by 0.2%. The effect is most pronounced in the electricity, gas, water and waste services industry as it includes 100 jobs at the facility itself.

Employment boost across many services industries

Beyond the facility's direct employees, there is an appreciable increase in employment across transport, postal and warehousing, adding 18 jobs across Timaru and Waitaki, which reflects the contractors involved in logistics operations at the facility. Construction employment increases by two jobs in Waimate and 11 jobs across Timaru and Waitaki, associated with electrical contractors, landscapers, and other maintenance personnel contracted to maintain the facility. Demand for these industries spurs on additional demand for their suppliers, while increases in household incomes further raise demand for industries such as retail, administrative, food and other services.

Operation adds \$77.3m to GDP

Operation of the facility is estimated to contribute \$77.3m per year to the GDP of Waimate, Timaru and Waitaki districts. This is mainly driven by the direct effect on Waimate, with the facility estimated to add \$48.0m directly to Waimate's economy.

Greater GDP contribution than dairy product manufacturing

The estimated \$48.0m GDP contribution from operation of the facility would make it the third largest industry in the Waimate, ranking ahead of dairy product manufacturing (\$38.0m). The proposed facility would rank behind dairy cattle farming (\$126.5m) and sheep, beef cattle and grain farming (\$56.5m). This highlights that the economic contribution of operating the proposed plant is very significant for Waimate.

Scope to enhance local benefits

We have assumed that the impact of the facility's construction and operation will benefit the districts where suppliers are based. In construction, it is common for contractors to commute across districts for projects, so it is reasonable to expect a large proportion of the construction benefits to fall on Timaru and Waitaki. However, given the long-term nature of the facility's operation, contractors and their staff may relocate to Waimate. This would give rise to a greater economic benefit for Waimate (at the expense of Timaru and Waitaki or indeed other districts). This would help reduce Waimate residents commuting out of the district for work and potentially grow the district's population.

Introduction

South Island Resource Recovery Limited (SIRRL) proposes to build a waste-to-energy facility in Waimate District. SIRRL commissioned Infometrics to assess how the proposed facility will affect the local economy, both through the construction stage and ongoing operation. This report details our input-output multiplier analysis that models how the facility will affect the Waimate District economy, as well as Waitaki and Timaru Districts.

Key assumptions and limitations

Based on inputs from SIRRL

SIRRL provided us with their anticipated construction and operation expenditure, operational employment, and operational earnings before interest, taxation and depreciation and amortization (EBITDA). They have also given us an indication of the nature and likely location of their suppliers for construction and operational services. Our analysis relies on these inputs, and we have not independently verified them.

Timing

Based on information from SIRRL, we have assumed that construction will take place over a two-year period. If construction were to be spread over a longer time period, the economic impacts will be spread over a longer time and therefore would be smaller on an annual basis.

Our estimates for the economic impact plant operation are based on the plant operating at full capacity, and represent the annual impact in each year of operation. Advice from SIRRL suggests that the plant has a 30-year lifespan.

Input-Output multiplier approach

We use a regional input-output (IO) multiplier model to estimate the impact of the construction and operating phases of the proposed facility. The IO model is based on inter-industry relationships within an economy, mapping how economic activity in one industry flows through to other industries and ultimately households.

Our multiplier approach is described in more detail in Appendix 2. Multiplier analysis. All dollar figures referred to are in 2021 prices.

Direct, indirect and induced economic effects considered

We consider the direct, indirect and induced economic effects of plant construction and operation. Direct effects include the effect of SIRRL and their direct suppliers, such as people employed by SIRRL, or employed by SIRRL's contractors for construction of the facility. Indirect effects include the effect on suppliers of SIRRL's suppliers, for example, the effect on a mechanic who services vehicles for the construction company building the facility. Induced effects include the effect of changes in wage earnings – such as higher spending at local bars as a result of higher direct and indirect employment.

Effects spread around the region

As a relatively small district, Waimate is unable to service the needs of the proposed facility alone. Some specialist goods and services needed for construction and operation of the plant may not be available within the district. The magnitude of the construction likely exceeds spare capacity within Waimate's economy, so we would expect some of the construction contractors to come from outside the district, predominantly but not exclusively from neighbouring districts of Waitaki (including Oamaru) and Timaru.

The specific geographic distribution of these effects will not be known until SIRRL receives tenders and enters into contracts with suppliers. For goods and services which are understood to be available within the Waimate, Waitaki and Timaru District area, we have apportioned the effects based on the current share of employment in each area for the relevant direct supplying industry which is available from Infometric's Regional Economic Profile data bases. Expenditures sourced outside these three districts are ignored.

For example, Waimate accounts for 6% of employment in the building construction industry in 2021 across the Waimate, Waitaki and Timaru area. Therefore, we have assumed that 6% of the economic impacts from construction will take place in Waimate District.

Downstream impacts not modelled

We are aware of several proposed industries which may establish in Waimate to take advantage of by-products from the proposed waste-to-energy facility. We have not analysed the economic impact of these proposals, and if they were to eventuate, that would result in a greater economic impact than is stated in this report.

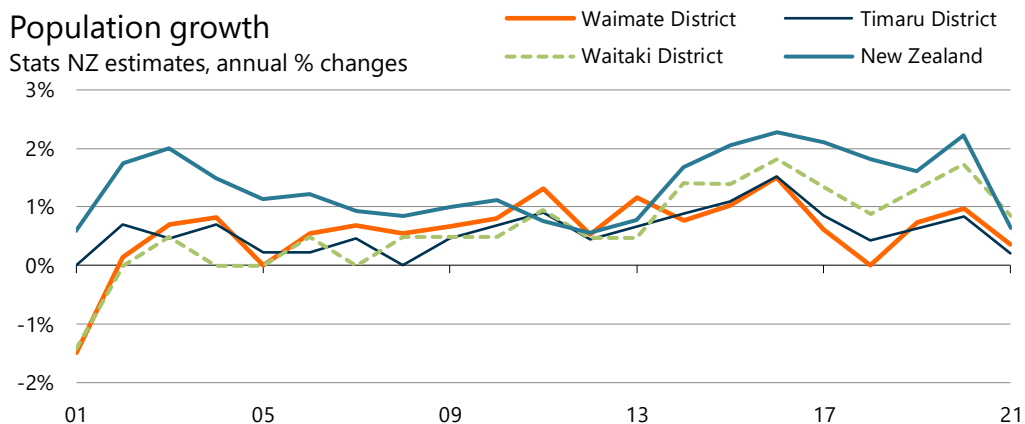
Local economic context

Small population, slower growth

Waimate has a relatively small population, with 8,290 residents in 2021 compared to 23,800 in Waitaki and 48,400 in Timaru. Waimate is the fifth smallest territorial authority in New Zealand.

Waimate's population has grown more slowly than the rest of New Zealand, with average growth of 0.8% per year in the past decade compared to 1.6% nationally (Chart 1). Timaru District also grew at 0.8% per annum over this period, and Waitaki grew faster at 1.2%.

Chart 1



High proportion of commuters

A relatively high proportion of Waimate residents commute out of the district for work. According to 2018 Census data, 9.3% of working Waimate residents commuted out of the district, the majority going to work in Timaru and a smaller number to Waitaki.

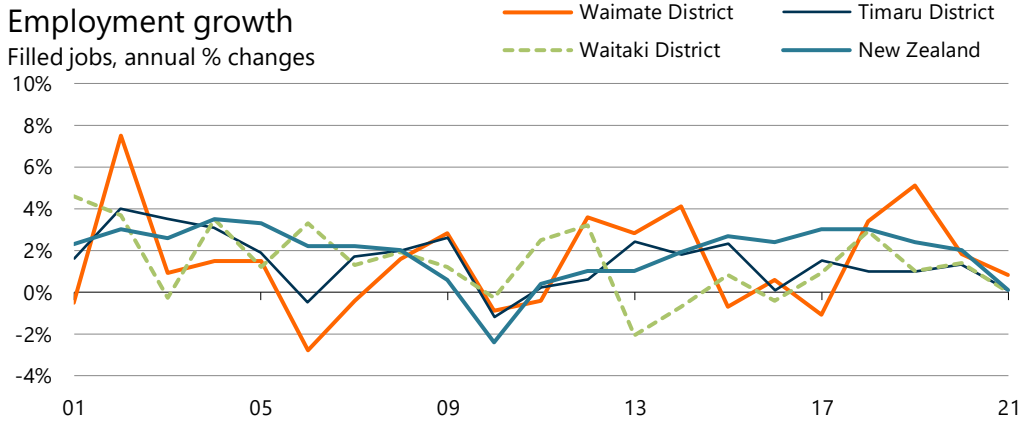
Conversely, very few Timaru or Waitaki residents commute out of district for work. In 2018, only 0.2% of working Timaru residents commuted out of the district, and 1.1% of working Waitaki residents.

Altogether, this suggests a relative lack of employment opportunities within Waimate, which the proposed facility will help to address.

Strong employment growth in Waimate

Employment in Waimate District grew by an average of 2.0% per annum over the past decade, exactly the same as the national growth rate (Chart 2). Timaru grew more slowly, at 1.2%, and Waitaki slower again at 0.7%.

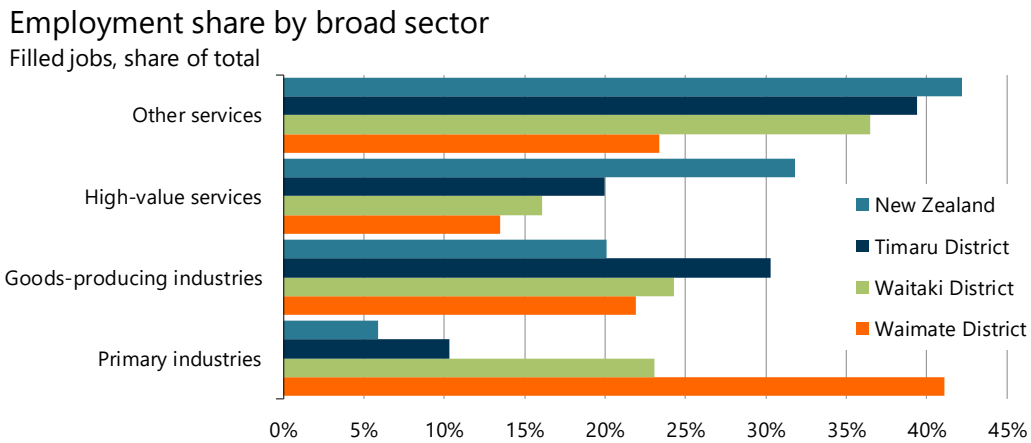
Chart 2



Primary-sector based economy

The three districts all have a greater concentration in the primary sector than the national economy (Chart 3). Nationally, the primary sector accounts for 6% of all employment, compared to 10% in Timaru, 23% in Waitaki and 41% in Waimate. With such a high employment concentration in the primary sector, Waimate stands to benefit the most from diversification into other sectors, as it would improve the district’s overall economic resilience.

Chart 3



Timaru district has a relatively large goods-producing sector, accounting for 30% of employment, which reflects the district’s substantial food manufacturing industries. This in turn has supported an ecosystem of contractors with industrial maintenance skills of relevance to the proposed facility.

Findings

Construction

Construction expenditure of \$242m

Construction of the facility is expected to be worth \$242m to suppliers in New Zealand, with the procurement of specialist equipment and contractors from overseas in addition to this, but ignored in our analysis. Locally supplied construction expenditure will manifest as increased demand for the non-residential building construction industry. In our modelling we have spread this impact across Waimate, Waitaki and Timaru based on their share of 2021 employment in non-residential building construction. This means that 6% of the construction impact goes to Waimate, 24% to Waitaki, and 70% to Timaru.

Construction supports 359 jobs per year

Construction of the facility is estimated to support 359 full time equivalent (FTE) jobs in total across the two-year construction period (Table 1)

Together, the direct (113 jobs) and indirect (187 jobs) effects reflect the increase in activity associated with construction through contractors, subcontractors and suppliers. The majority of these jobs are expected to accrue to Timaru and Waitaki businesses, as there is limited construction industry capacity within Waimate District.

The increase in direct and indirect employment will raise incomes in the areas, which will in turn increase demand across a range of industries, known as the induced effect. For example, construction workers spending some of their earnings on lunches at local cafés. The induced effect is estimated to add two jobs to Waimate District and 57 jobs across Timaru and Waitaki.

Table 1

Employment impact during construction

Annual full-time equivalents (FTE)

	Waimate	Timaru and Waitaki	Total
Direct effect	8	105	113
Indirect effect	10	177	187
Induced effect	2	57	59
Total effect	19	339	359

We have assumed that the impacts of construction are spread evenly throughout the two-year construction period, however there may be peak periods with a greater employment effect, and conversely quieter periods with a lower employment effect.

Construction benefits a range of industries

Construction of the facility is expected to benefit a range of industries, most prominently the construction industry (Table 2). The construction process is estimated to support 19 jobs in Waimate District and 339 jobs across Timaru and Waimate, during the two-year

construction period. On an annual basis this represents a 6.3% increase in construction employment in Waimate and a 5.9% increase in construction employment across Timaru and Waitaki.

The manufacturing and transport industries benefit indirectly from construction as they supply goods and services to the construction industry. Manufacturing employment is estimated to increase by 0.4% in Waimate, and 0.5% across Timaru and Waitaki. Transport, postal and warehousing employment is estimated to increase by 0.3% in Waimate and 0.8% across Timaru and Waitaki.

The retail trade and accommodation food services mainly benefit through the induced effect. They are not significant suppliers to the construction industry, however, they benefit from increased levels of income in the area, as construction workers spend some of their increased earnings at retailers and food outlets in the area. Retail employment is estimated to increase 0.6% in Waimate and 0.7% across Timaru and Waitaki. Accommodation and food services employment is estimated to increase 0.4% in Waimate, and 0.6% across Timaru and Waitaki.

Overall, construction of the facility is estimated to increase employment in Waimate by 0.7%, and across Timaru and Waitaki by 1.0%, throughout the two-year construction period.

Table 2

Employment impact by industry during construction

Annual full-time equivalents (FTE), ranked by total impact
% change from 2021

	Waimate		Timaru and Waitaki	
	Total impact	Ann % change	Total impact	Ann % change
Construction	14	6.3%	204	5.9%
Manufacturing	2	0.4%	34	0.5%
Retail Trade	1	0.6%	20	0.7%
Transport, Postal and Warehousing	0	0.3%	14	0.8%
Accommodation and Food Services	0	0.4%	10	0.6%
Other Services	0	0.5%	10	0.9%
Wholesale Trade	0	1.0%	8	0.6%
Professional, Scientific and Technical Services	0	0.4%	7	0.5%
Education and Training	0	0.2%	6	0.3%
Health Care and Social Assistance	0	0.1%	6	0.2%
Administrative and Support Services	0	1.0%	5	0.6%
Agriculture, Forestry and Fishing	0	0.0%	5	0.1%
Electricity, Gas, Water and Waste Services	0	1.8%	3	0.7%
Financial and Insurance Services	0	0.5%	2	0.6%
Rental, Hiring and Real Estate Services	0	0.1%	2	0.4%
Arts and Recreation Services	0	0.2%	1	0.3%
Public Administration and Safety	0	0.1%	1	0.1%
Mining	0	0.0%	0	0.1%
Information Media and Telecommunications	0	0.3%	0	0.3%
Total effect	19	0.7%	339	1.0%

Construction adds \$93.9m per year to GDP

Construction of the facility is estimated to add \$93.9m per year to the gross domestic product (GDP) of Waimate, Timaru and Waitaki (Table 3) over the two year construction period. Together, the direct (\$17.4m) and indirect (\$58.0m) effects reflect the increase in activity associated with construction through contractors, subcontractors and suppliers. All GDP estimates in this report are in 2021 prices.

As with employment, the majority of the GDP increase from construction is expected to accrue to Timaru and Waitaki, reflecting the limited construction industry in Waimate. The latter's GDP is estimated to increase by \$4.8m per year during the construction period, with Timaru and Waitaki's collective GDP estimated to increase by \$89.1 m per year.

Increased household incomes from the direct and indirect effect contribute towards higher demand for a range of industries across the area, driving a \$18.5m induced effect on GDP, predominantly in Timaru and Waitaki.

The impact of the construction stage on GDP by industry is detailed in Table 8 in Appendix 1. GDP impact by industry.

Table 3

GDP impact during construction

Annual GDP impact (\$m)

	Waimate	Timaru and Waitaki	Total	Total
Direct effect	1.1	16.3	17.4	17.4
Indirect effect	3.1	54.9	58.0	58.0
Induced effect	0.6	17.9	18.5	18.5
Total effect	4.8	89.1	93.9	93.9

Operation

Operational expenditure of \$39.3m per year

Operation of the facility is expected to result in expenditure of almost \$40m per year, spread across direct employment by SIRRL (\$7.4m), purchase of raw materials for repair and maintenance (\$3.8m), and contractors (\$28.1m). Direct employment is a benefit to Waimate District alone as the jobs are assumed to be based entirely in the district. Raw materials are expected to predominantly come from outside the local area, with 30% coming from Timaru and Waitaki, and none from Waimate. Contractors include logistics, electrical services, cleaning, water supply and landscaping. Contractors are expected to come from the local area, apportioned to each of the three districts based on the base industry share of employment in each contracting area. Of the total contracting expenditure, 3% is expected to come from Waimate, 21% from Waitaki and 75% from Timaru.

Operation supports 165 jobs

Operation of the facility is estimated to support a total of 165 jobs per year across Waimate, Timaru and Waitaki (Table 4). Of the 165 jobs, 108 are estimated to be located in Waimate and 57 spread across Timaru and Waitaki.

The direct effect amounts to 125 jobs, consisting of 100 jobs directly employed at the facility in Waimate, and 25 jobs for contractors spread across the three districts. The indirect effect includes jobs at subcontractors and suppliers, amounting to one job in Waimate and 20 jobs across Timaru and Waitaki.

Higher incomes in the area resulting from increased direct and indirect employment give rise to an induced effect, as households can afford to purchase more goods and

services. This amounts to an increase of six jobs in Waimate and 14 jobs across Timaru and Waitaki.

Table 4

Employment impact during operation

Annual full-time equivalents (FTE)

	Waimate	Timaru and Waitaki	Total
Direct effect	101	23	125
Indirect effect	1	20	21
Induced effect	6	14	20
Total effect	108	57	165

Operation benefits a range of industries

Operation of the facility is expected to benefit a range of industries, increasing employment in Waimate District by 3.6%, and employment across Timaru and Waitaki by 0.2% (Table 5).

The electricity, gas, water and waste services industry includes the proposed facility, so the 100 jobs directly employed at the facility accrue to that industry. The industry is currently very small in Waimate with only six jobs at present, so the addition of 100 jobs represents a very large percentage increase.

Beyond the facility's direct employees, there is an appreciable increase in employment across transport, postal and warehousing, adding 18 jobs across Timaru and Waitaki, which reflects the contractors involved in logistics operations at the facility. Construction employment increases by two jobs in Waimate and 11 jobs across Timaru and Waitaki, associated with electrical contractors, landscapers, and other maintenance personnel contracted to maintain the facility.

Broader employment increases are diffused across a broad range of industries in the area, reflecting the indirect and induced effect. As contractors to the facility increase their workloads, they will in turn have higher demand for goods purchased from their suppliers, for example, electrical contractors will purchase more goods from local electrical wholesalers – this is an indirect effect. Increases in employment associated directly with the plant and contractors, and indirectly with subcontractors and suppliers, will boost local incomes and in turn increase demand and employment across industries such as retail and accommodation and food services – an induced effect.

Table 5

Employment impact by industry during operation stage

Annual full-time equivalents (FTE), ranked by total impact

% change from 2021

	Waimate		Timaru and Waitaki	
	Total impact	% change	Total impact	% change
Electricity, Gas, Water and Waste Services	100	1919.7%	2	0.4%
Transport, Postal and Warehousing	0	0.2%	18	1.0%
Construction	2	0.7%	11	0.3%
Retail Trade	1	1.2%	4	0.1%
Administrative and Support Services	0	1.3%	4	0.5%
Other Services	1	1.0%	3	0.2%
Accommodation and Food Services	1	1.1%	2	0.1%
Manufacturing	0	0.1%	3	0.0%
Education and Training	1	0.5%	2	0.1%
Professional, Scientific and Technical Services	0	0.1%	2	0.1%
Health Care and Social Assistance	1	0.4%	1	0.0%
Wholesale Trade	0	0.4%	2	0.1%
Agriculture, Forestry and Fishing	0	0.0%	1	0.0%
Rental, Hiring and Real Estate Services	0	0.1%	1	0.1%
Financial and Insurance Services	0	0.4%	1	0.2%
Arts and Recreation Services	0	0.6%	0	0.1%
Public Administration and Safety	0	0.0%	0	0.0%
Information Media and Telecommunications	0	0.2%	0	0.1%
Mining	0	0.0%	0	0.0%
Total effect	108	3.6%	57	0.2%

Operation adds \$77.3m to GDP

Operation of the facility is estimated to contribute \$77.4m per year to the GDP of Waimate, Timaru and Waitaki districts (Table 6). This is mainly driven by the direct effect on Waimate, with the facility estimated to add \$48.0m directly to Waimate's economy. The facility's demand for contractors and suppliers is estimated to directly add \$15.1m to the GDP of Timaru and Waitaki together. This in turn supports an \$7.5m addition to Timaru and Waitaki's collective GDP, driven by consequential demand for sub-contractors and suppliers.

The direct and indirect effects on Waimate will increase household incomes, contributing to induced demand which adds \$2.0m to the Waimate economy in each year of operation. Increased GDP across Timaru and Waitaki is estimated to induce demand of \$4.4m across those economies, as a result of increased household incomes.

The impact of the operation stage on GDP by industry is detailed in Table 9 in Appendix 1. GDP impact by industry.

Table 6

GDP impact during operation

Annual GDP impact (\$m) in each year of operation

	Waimate	Timaru and Waitaki	Total
Direct effect	48.0	15.1	63.2
Indirect effect	0.2	7.5	7.8
Induced effect	2.0	4.4	6.4
Total effect	50.3	27.0	77.3

Greater GDP contribution than dairy product manufacturing

The proposed facility is estimated to contribute \$48.0m directly to Waimate's GDP (Table 7). This would make it the third largest industry in the district, ranking ahead of dairy product manufacturing (\$38.0m). The proposed facility would rank behind dairy cattle farming (\$126.5m) and sheep, beef cattle and grain farming (\$56.5m). This highlights that the economic contribution of operating the proposed plant is very significant for Waimate.

Table 7

GDP impact on Waimate during operation

Annual direct GDP impact (\$m), compared to 2021 GDP by industry

Based on 54-industry framework

Ranking	Industry	GDP
1	Dairy Cattle Farming	126.5
2	Sheep, Beef Cattle & Grain Farming	56.5
3	Waste to Energy facility	48.0
4	Dairy Product Manufacturing	38.0

Scope to enhance local benefits

The economic impact of construction of the facility, has been assumed to follow the distribution of employment by industry across Waimate, Waitaki and Timaru. Given the short-term nature of the construction phase, this is highly plausible, as contractors often commute into other districts to complete short-term projects.

However, the long-term nature of facility operations may encourage contractors and their staff to relocate to Waimate District. We have followed a conservative approach in this respect and have not assumed the contractors and suppliers from outside Waimate will relocate to the district. This means that Waimate may benefit from a greater share of the employment and GDP increase associated with operation of the facility, if contractors and suppliers relocate. Some of this may happen as a matter of course, and could be enhanced by SIRRL giving priority to local contractors or offering long-term contracts.

If this were to manifest, it would result in a greater economic impact for Waimate District (and conversely, a slightly smaller impact for Timaru and Waitaki). The Local economic context section highlights that Waimate has relatively large outflows of commuters, so having more jobs located within the district could help to reduce commuting and enable the district to capture a greater share of the economic activity of its residents. For example, residents working locally are more likely to frequent local hospitality outlets after work than those working outside of the district and commuting home.

Appendix 1. GDP impact by industry

Table 8

GDP impact by industry during construction

Annual GDP (\$m), ranked by total impact
% change from 2021

	Waimate		Timaru and Waitaki	
	Total impact	% change	Total impact	% change
Construction	2.8	17.8%	43	14.7%
Manufacturing	0.5	1.1%	11	1.6%
Rental, Hiring and Real Estate Services	0.4	1.2%	8	3.8%
Wholesale Trade	0.2	3.9%	5	3.0%
Professional, Scientific and Technical Services	0.2	1.6%	4	2.4%
Retail Trade	0.1	1.4%	4	1.6%
Electricity, Gas, Water and Waste Services	0.1	5.8%	2	1.0%
Transport, Postal and Warehousing	0.1	0.4%	2	0.9%
Financial and Insurance Services	0.1	1.6%	2	2.0%
Other Services	0.1	1.3%	1	2.4%
Health Care and Social Assistance	0.0	0.3%	1	0.5%
Agriculture, Forestry and Fishing	0.1	0.0%	1	0.2%
Administrative and Support Services	0.0	4.2%	1	2.6%
Accommodation and Food Services	0.0	0.9%	1	1.1%
Education and Training	0.0	0.3%	1	0.5%
Information Media and Telecommunications	0.0	1.8%	0	1.1%
Public Administration and Safety	0.0	0.2%	0	0.4%
Arts and Recreation Services	0.0	0.4%	0	0.7%
Mining	0.0	0.0%	0	0.0%
Total effect	4.8	1.2%	89.1	2.1%

Table 9

GDP impact by industry during operation

Annual GDP (\$m), ranked by total impact

% change from 2021

	Waimate		Timaru and Waitaki	
	Total impact	% change	Total impact	% change
Electricity, Gas, Water and Waste Services	47.6	793.9%	2	1.0%
Manufacturing	0.1	0.1%	9	4.2%
Retail Trade	0.3	1.4%	4	8.4%
Transport, Postal and Warehousing	0.2	0.1%	3	1.2%
Accommodation and Food Services	1.0	0.9%	2	1.1%
Other Services	0.1	0.2%	1	0.8%
Wholesale Trade	0.1	0.1%	1	0.6%
Professional, Scientific and Technical Services	0.1	0.0%	1	0.1%
Education and Training	0.2	0.2%	1	0.3%
Health Care and Social Assistance	0.1	0.3%	1	0.7%
Administrative and Support Services	0.1	0.1%	0	0.6%
Agriculture, Forestry and Fishing	0.1	0.1%	0	0.1%
Electricity, Gas, Water and Waste Services	0.1	0.1%	0	0.3%
Financial and Insurance Services	0.0	0.0%	0	0.0%
Rental, Hiring and Real Estate Services	0.1	0.0%	0	0.1%
Arts and Recreation Services	0.1	0.0%	0	0.0%
Public Administration and Safety	0.0	0.2%	0	0.4%
Mining	0.0	0.0%	0	0.1%
Information Media and Telecommunications	0.0	0.1%	0	0.2%
Total effect	50.3	1.5%	27.0	0.6%

Appendix 2. Multiplier analysis

We use input-output (I-O) multiplier analysis to estimate the impact land use changes. The IO model is based on inter-industry relationships within an economy, understanding how economic activity in one industry flows through to other industries and ultimately households.

For earnings and employment, we also apply marginal output-employment ratios based on econometrically estimated employment-output elasticities because when faced with changes in demand at the margin, some businesses may continue to operate with the same level of employment.

Our IO model uses regional multipliers estimated by Infometrics for each territorial authority in New Zealand. These are derived from the 2020 New Zealand Input-Output from Stats NZ – the latest table available.

The IO model estimates the direct, indirect and induced effects of the project.

Direct effect. This is the effect associated with increased spending directly in each industry associated with the project. For example, employees hired to operate the plant represent a direct effect on employment in Waimate. Because the plant is located in Waimate, the direct effects only take place in Waimate. For our purposes, we also include the first round effect, i.e., the direct suppliers to the proposed facility

Indirect effect. The indirect effects are the second and further rounds of economic effects associated with the direct effect. For example, workers hired by the suppliers of

the construction contractors building the plant represent an indirect effect on employment in Waimate. Similarly, suppliers to the logistics firms of the proposed facility represent indirect effects. The indirect effect capture all demand effects of suppliers of suppliers in Waimate as well as Timaru and Waitaki.

Induced effect. The induced effect arises from additional spending due to changes in employment. For example, if workers hired to operate the plant spend some of their earnings at a local bar, the increase in activity at the local bar represents an induced effect. The induced effect includes effects on businesses in Waimate as well as Timaru and Waitaki

Total effect. The total effect is the sum of direct, indirect and induced effects.

The various effects outlined above are measured in terms of value added (or GDP) and employment (full time equivalents or FTE).