



Wood energy industrial symbiosis

Wood processing clusters in regions with significant forestry resources co-located with other industries can make the best use of wood and energy supply and demand, and create jobs and prosperity.

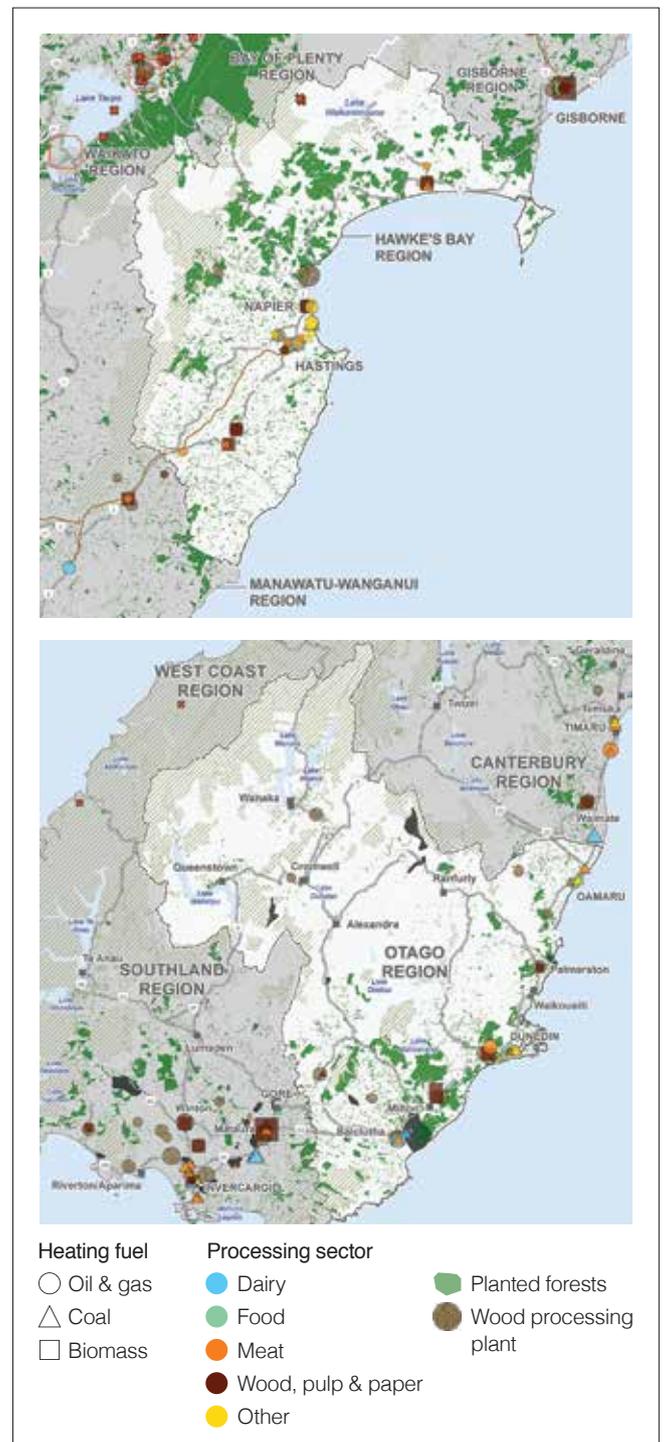


An ‘industrial symbiosis’ is a local collaboration where different industries provide, share and reuse materials, energy, water, and/or by-products to create shared value. Resources are used more efficiently by the group than by any individual company.

Kawerau with its geothermal energy, forestry resources and established processing industries is New Zealand’s best known industrial symbiosis example.

Opportunities for wood processing in Gisborne, Hawkes Bay, Ngawha (Northland) and Southland/Clutha have been identified using maps of forestry resources and heat demands, the Biomass Supply Model to estimate wood and harvest residue supply and the WoodScape model to calculate return on capital investment (ROCE).

The possibilities of establishing industrial clusters to reduce waste and greenhouse gas emissions, create jobs and contribute to New Zealand’s bottom line are substantial.



Gisborne

The greatest ROCE would be delivered by a wood processing cluster using currently exported raw logs to manufacture Optimised Engineered Lumber (OEL™), industrial plywood and oriented strand board (OSB).

Energy needs for the processing cluster could be supplied by a combined heat and power plant fueled by wood residues from processing and other biomass in the region. However, there is limited opportunity to combine the wood processing and heat and power plants with other heat users in Gisborne.

A wood processing cluster as described could create more than 1000 jobs and contribute \$500 plus million to GDP.



Hawkes Bay

Industrial coal is transported to the Hawkes Bay to fire industrial plants at Awatoto near Napier and further up the coast in Wairoa.

The volume of logs exported from the Port of Napier could support square sawn log production, an OEL™ plant, a sawmill producing lumber for cross laminated timber (CLT) and possibly a small OSB mill. Residues from processing would be sufficient to meet the heat and power demands of the new plants and replace coal heating at the nearby Awatoto wool scouring plant.

In Wairoa, there is sufficient wood to expand wood processing to include OEL. Residues from wood processing combined with in-forest residues from the district would be able to meet the heat demands of the local meat processing plant and eliminate the need for coal.

The Awatoto cluster could create up to 1,500 jobs, contribute \$500 million to New Zealand's GDP and reduce greenhouse gas (GHG) emissions by 15,000 tonnes a year. Around 300 jobs could be created at Wairoa, \$160 million added to GDP, plus GHG emissions could be reduced by 30,000 tonnes a year.

Southland and South Otago (Clutha District)

Southland has abundant lignite and coal that fuel a number of dairy and meat processing plants.

Southland and the Clutha District have increasing supplies of Douglas-fir. Radiata pine supplies currently meet the local processing capacity but longer term, less radiata pine will be available, possibly replaced by Douglas-fir in sawmilling. There is potential to expand wood processing with an integrated heat supply based on unused log supply. Excess heat could also be provided to dairy factories and freezing works at several locations in the wider area.

A processing cluster near Balclutha consisting of a sawmill providing feedstock for CLT and remanufacturing, plus an OEL™ plant would provide enough processing residues to replace coal at either the Stirling dairy plant or the Finegand meat works. Alternatively, the processing residues together with forest and other biomass residues, could replace LPG as an energy source at the Clydevale dairy plant.

The Balclutha scenario could create around 1,300 jobs, add \$270 million to GDP and remove up to 22,000 tonnes of GHG emissions a year.

Ngawha, Northland

Ngawha is the only site outside of the central North Island with industrially exploitable geothermal resources.

Northland has surplus saw log supply long-term. There is also potential for afforesting a further 22,000 ha that would add to future supply. The forestry resource is sufficient to support expanded wood processing.

A wood processing cluster based at Ngawha could manufacture OEL™, plywood and OSB. When geothermal energy is used to provide heat and power, the residues from all three processes could further be processed to extract terpenes, then manufactured into wood pellets.

A wood processing cluster based around the Ngawha geothermal resource could create more than 1000 jobs and add \$400 million to New Zealand's GDP.



Front left – laminated timber; front right – oriented strandboard (OSB™); rear – oriented engineered laminate (OEL™), a patented technology that uses thin strips of finger-jointed wood laminated together.

Discussion

Each case study area is forecast to have log surpluses that are currently exported unprocessed. Energy sources differ from region to region, as does the presence of other large manufacturing plants, which affects wood processing options and opportunities to co-locate with other industries. For example, while the opportunity in Gisborne is largely standalone wood-processing powered by forestry and processing residues, in Hawkes Bay and Southland, residues from wood processing clusters can be used to replace fossil fuels used by other nearby industries.

The wood processing clusters with the highest ROCEs include sawmills, OEL™, plywood, OSB, CLT and remanufactured timber. While the capital investment needed for each cluster may be of the order of \$200 million, each cluster creates 1,000 or more direct or indirect jobs and adds hundreds of millions to New Zealand's GDP. And where fossil fuels are replaced, the country's GHG emissions are reduced.

Looking at other regions in New Zealand, opportunities for industrial symbiosis around the Marsden Point oil refinery and Golden Bay Cement/Portland in Northland warrant further investigation. There are also opportunities to replace fossil fuels with biomass in Blenheim, Nelson, Hokitika, Greymouth and Canterbury.

Conclusion

Growing on-shore processing will be necessary if New Zealand wants to achieve a 10-fold increase in GDP from forests and related manufacturing. Co-locating manufacturing that takes advantage of, and shares, resources makes economic and environmental sense. Where these clusters are located at or near sites that use coal or gas for process heat there is the potential for reductions in GHG emissions. Wood processing clusters will create jobs and wealth in the regions and increase people's overall quality of life.

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See <http://www.scionresearch.com/science/bioenergy/towards-biorefining> for more information.



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About Scion

Scion is the Crown research institute that specialises in research, science and technology development for forestry, wood and wood-derived materials, and other bio-material sectors.

Scion's purpose is to create economic value across the entire forestry value chain, and contribute to beneficial environmental and social outcomes for New Zealand.



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