



Wood secures family firm's independence

CASE STUDY

✓ Key features

- 3.5MW wood-fired Vekos boiler
- 5,500 kgs/hr at 10 bar, thermal efficiency approx. 80%
- 150m³ fuel store
- Fuel from a wide variety of sources
- Capex approx \$990,000

✓ Key benefits

- Reduced energy cost: \$4.44/GJ (versus \$6.10/GJ for coal, \$30/GJ for diesel/LPG)
- Payback 5.5 years
- 4200 tonnes of CO₂ emissions avoided/year
- 1,000 tonnes of landfill avoided/year.

✓ Sector relevance

- Industrial heat users

With its future at stake, a Christchurch manufacturer had to find a fuel that was not only economically viable long term but environmentally friendly as well. On both counts, one option stood head and shoulders above the rest – wood.

Background

New Zealand Foam Latex Limited is a mid-sized, family-owned business employing around 40 people. It's located in Woolston, an industrial area of Christchurch targeted by environmental watchdogs for its contribution to the city's pollution problems.

Established in the early 1950s, New Zealand Foam Latex is now Australasia's market leader for the moulded foam rubber used in cushions, pillows, mattress cores, comfort layers, invalid rings, inner soles and more.

"With that sort of history, everybody at some stage in their lives would have sat, slept, walked or relaxed on product from this plant," comments plant manager Dennis Marriott.

Defining issue

For many years, New Zealand Foam Latex had drawn steam for its manufacturing needs from Skellerup Industries, its former parent company co-located on a neighbouring property. But in mid-2007, Skellerup advised it would no longer produce the product lines requiring steam. After a long and comfortable relationship, New Zealand Foam Latex had 12 months to find its own solution.

Complicating the situation, stringent local emission rules meant any new solution would have to better the existing setup environmentally.



Wood chips ready for use.

It was a defining issue for the business. Steam is critical to producing foam. It is used directly to raise the latex to the required 100°C and also as a medium to generate the 112°C temperatures the drying ovens require.

“We live with steam and die without it,” says Dennis and news of Skellerup’s decision created huge uncertainties at all levels of the business. The costs of relocating were prohibitive and closure was a definite option if a viable onsite option couldn’t be found.

Skellerup’s boiler was too big for New Zealand Foam Latex’s needs and it also needed upgrading to meet higher emission standards – so the lease or purchase option they offered wasn’t economic. Dennis began reviewing the company’s options.

The choices

“The owners didn’t want a bar of coal. They just thought it was dirty. But I did look at it – just to get a benchmark.”

Christchurch is the hub for distributing and exporting West Coast coal and it proved relatively cheap as fuel. The energy cost worked out as little as \$6.10/GJ, depending on the grade of coal.

But coal is relatively high in ash and sulphur and produces high levels of particulates and sulphur dioxide when it is burned. This would be a real problem, particularly in an area where emissions are so tightly regulated. Electrostatic precipitators or bag houses could have reduced particulates but they were too capital-intensive.

Diesel or LPG were both definite possibilities. They’re relatively clean burning and their boilers are simple and inexpensive. But the fuel is relatively expensive at an energy cost of over \$30/GJ, outweighing the low capital cost.

When exploring wood as an option for the plant, the Energy Efficiency and Conservation Authority (EECA) supported Dennis with information to build the business case for wood energy.

“After reviewing the alternatives, wood stood out as being the most cost-effective,” says Dennis.

With negligible sulphur content and a 90% lower ash content than coal, wood is relatively clean-burning. Assuming the wood supply is dry enough, coal boilers can use it with minimal modification, keeping the capital cost low. Wood can also be a cheap fuel.

Security of supply

Supply was the key, and fortunately as demand from industry has grown so have the options.

“We found a local wood recycling company that could provide fuel at low cost,” says Dennis. “They had a lot of irons in the fire and that gave us confidence in their ability to ensure reliable supply.”

Sources are a mix of Nelson forestry hoggings, residue from local timberyards, left-over pallets and demolition wood. The wood recyclers were also reclaiming dunnage from shipping.

“That was a really bright idea. For example, a few months ago they picked up 50 tonnes from a banana boat. That’s just more stuff that would otherwise have been simply smashed up and dumped.”

Hardware and investment

There was a good second-hand boiler available for sale in the area, one that had been designed with dual wood/coal capability. It was a Vekos 350, manufactured locally by Scott Engineering in Christchurch. Rated at 3.5 MW it produces 5,500 kgs/hr at 10 bar with a thermal efficiency of around 80%. It had even received a control system upgrade allowing it to run unattended, an important part of the New Zealand Foam Latex brief.

A fuel store was required for the installation. Wood is a low-density fuel that requires either more storage or more frequent deliveries than other fuels. Given the proximity of the supplier’s yard – about a kilometre away – New Zealand Foam Latex opted for a 150 m³ fuel store with effective storage of 45–50 m³, enough for a day and a half’s continuous operation.

Handling variable-sized wood fuel can create problems so New Zealand Foam Latex used a moving floor system that pushes the fuel towards a feed augur. From this augur the fuel moves through a rotary valve and is then blown pneumatically into the boiler.

The roof of the fuel store retracts so delivery trucks can back in and deposit wood directly over the moving floor.

Another investment was required to reduce particulate emissions below those of the original coal boiler New Zealand Foam Latex had shared with Skellerup – a regulatory requirement. A RotoClone ‘wet scrubber’ was imported from the United States for this task. New Zealand Foam Latex already had systems for processing liquid wastes so wet scrubbing offered the best solution in terms of capital and running costs.

“After reviewing the alternatives, wood stood out as being the most cost-effective.”



An employee checks the boiler.

Supply levels are monitored daily in a typically Kiwi but nonetheless very effective application of ‘just in time’ stock management principles.

“The guy who owns the recycler’s drives past our gate every morning on his way into work and checks the levels.”

Outcomes

The energy cost of the wood varies according to moisture content. “Generally ours is around the low 10% range,” says Dennis. At that level, New Zealand Foam Latex is paying around \$4.44/GJ – six or seven times less than diesel or LPG and over 25% cheaper than the cheapest alternative, coal.

Dennis estimates the new source has more than halved the fuel cost component per kilogram. “Even when you add in the other direct costs of having to install and run our own boiler – repairs and maintenance, waste discharges, water treatment, light, heat, power, depreciation and so on – we’ll still come out on the right side of the ledger.”

Other benefits

Using wood has reduced New Zealand Foam Latex’s CO₂ emissions by around 4,200 tonnes a year – equivalent to taking 1,300 cars off the road. This reduction puts New Zealand Foam Latex in a good position if an emissions trading scheme or carbon tax is introduced.

Burning wood has other benefits. Coal creates large amounts of toxic ash which must go to landfill. Wood produces 90% less ash and it is environmentally benign. And of course, used as a fuel it creates less waste. As Dennis comments, “apart from the benefits to the business, our wood burner alone is avoiding around 1,000 of the 20,000 tonnes of wood going to the local Kate Valley landfill. That has to be good for the community.”

Dennis points out there are still 19,000 tonnes that could be burned, something of a challenge other local companies are certainly interested in taking up.

“There’s an outfit across the road now burning about the same amount as us. A lot of other businesses have come round and had a look at how good and clean our wood burner is. They seem to be keen to get on board as well.”




EECA enables organisations to increase their domestic and international competitiveness by adopting energy efficiency and renewable energy practices.

We work with businesses to identify the opportunities for energy management that are available to them and help them develop energy management action plans to make the most of these opportunities.

Good energy management has many benefits for businesses, including lower costs, increased productivity, reduced greenhouse gas emissions and a positive effect on the brand.

We have a particular interest in:

- encouraging new or under-used technology that can make processes more efficient
- projects that reduce greenhouse gas emissions, and
- developing the wood fuel industry.

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