

Little Sisters of the Poor Home and Hospital – switching to wood energy for energy efficient, cost-effective heating

Since 1904, the Little Sisters of the Poor (LSP) has run its home and hospital providing care facilities for the elderly. Constant hot water and heating are vital, and changing to a wood chip boiler ensured a reliable supply of both at significantly reduced costs.

Providing quality care for the elderly

The Little Sisters of the Poor, a Catholic Order, was founded to cater for the needs of the elderly. Its large site in Dunedin has 36 residential rooms, 20 convent bedrooms and 28 hospital rooms. Also on site are a chapel, kitchen and laundry. All bedrooms need to be at a set temperature 24 hours a day, and a constant supply of hot water is required.

The need for change

For 30 years the LSP used a diesel-fired boiler and a coal-fired steam boiler. The resource consent for the latter expired in 2009. An LPG boiler was installed to heat the buildings as an interim measure. With the existing boilers reaching the end of their economic life, it was necessary to look at alternative options which would provide reduced operating costs.

After extensive research, it was found that a wood chip boiler would be the most cost-effective solution. It offered low running costs, and the potential of a grant towards the project cost; and wood chip fuel was readily available as a local, renewable energy resource.

How it works

The new wood chip boiler is a low temperature hot water (LTHW) 300kW wood biomass system which provides a constant supply of heating and hot water. The wood chip fuel is supplied by Energy for Industry (Efi) from their nearby Naseby forest and delivered to site. The main contractor for the project, Living Energy, invoices the LSP on an energy content basis taking into account the moisture content of the fuel.

The fuel transfer system combines a tipping trough and vertical auger to deliver wood chip fuel into the bunker. The fuel transfer system has a delivery capacity of 50m³/h. The bunker has a capacity of 150m³ which allows for approximately two weeks' supply.

The boiler is a 300kW (RRK 200-350) Binder manufactured in Austria. It is a low pressure hot water boiler providing heat to the accumulator tank. The flow and return temperatures are 84°C and 78°C respectively. The boiler uses a moving grate system and ash is automatically transferred to a metal holding bin.

The 15,000l accumulator tank was purpose built for the project in New Zealand. The tank allowed LSP to install a smaller boiler as it 'smooths out' the demand from the hospital. It also enables the boiler to run at its optimum setting, maximising efficiency.

Installation

The project ran smoothly and the entire installation took approximately 4 weeks.

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| • Installation and positioning of main plant | 3-4 days |
| • Boiler fitting and electrical | 2-3 weeks |
| • Commission and tuning | 1 week |



✓ Key features

- Binder 300kW wood biomass boiler
- 15,000l hot water accumulator tank
- Monitor and control operation via remote desktop
- Storage of wood chips on site in 120m³ bunker
- Installation time, 4 weeks

✓ Key benefits

- Average energy cost saving of \$12,510 per month
- Estimated payback period of 2.7 years
- Reduction of carbon emissions by 490 tonnes per year
- Wood chip supply plentiful, local and cost effective versus rising costs of other fuels
- Easier system operation
- No additional staff or hours required

✓ Sector relevance

- Hospitals
- Rest homes

Challenges encountered

There were inevitable teething problems with the changeover, but these were easily resolved with the LSP and main project contractor working closely together. For example, a new bunker had to be built as the existing coal one could not be modified to accommodate the new wood chip fuel. The installation of a variable speed drive controller on the horizontal motor on the auger prevented the vertical motor from cutting out. The decision to award the tank supply contract to a New Zealand company resulted in a delay of several weeks - however, this had no impact on the budget or delivery deadline. Moreover, the driveway needed modification to allow for access by the wood chip delivery truck.

Conversion results

Based on the monitoring report completed by Transitionz Group, a payback period of 2.7 years is expected. On average, energy savings of \$12,510/month have been achieved over a three month period.

Based on average monthly energy use of 680GJ (188,950kWh), the new boiler project will reduce carbon emissions by 490 tonnes per year.

The new system is easy to operate and maintain. It is thermostatically controlled to provide heat and hot water 24 hours a day, seven days a week. Wood chip is a clean product to handle, with no after-burn. Maintenance staff are delighted with the conversion.

Ease of operation

Maintenance Officer John Van Turnhout commented: "The system was quite daunting at first, but once we read the manual and got to know how it operated, it was easy. The computer tells us when the system needs to be serviced and if there are any problems. We are able to control the water and heating temperature via the computer and I can even access the system from home. It really is a clever, user-friendly operation and virtually takes care of itself."

LSP perspective

"We have already seen the tremendous benefits from a cost-saving and energy-efficiency perspective of the new wood boiler. We are proud to have a modern boiler which improves the care we provide to our elderly residents. Long gone are the days of shovelling coal from the bunker when there was a blockage. Now the system self-feeds fuel into the boiler. It's clean, efficient and reliable. We were also able to use the existing radiators and retain the LPG boiler as a back-up." John Van Turnhout, Maintenance Officer, LSP.

Key personnel

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See also:

A change for the better at Ross Home – converting from LPG to wood chip.

APRIL 2011/EEC1911



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The boiler at LSP



Fuel storage bunker