

Wood Energy Summary Report for XXXXXXXXX

Lloyd McGinty recently visited XXXXXXXXX (16th Dec 2015) to investigate the opportunity of wood energy for their site. XXXXXXXXX operate a coal fired steam boiler for processing. The boiler is 30 years old and at end of life. Operations Manager XXXXX is investigating new boiler options for the site. This report provides a high level assessment on the potential of wood energy in comparison to diesel. All prices in the report exclude GST.

Current Energy Use

Fuel	Takitimu chip coal (Ohai)
Boiler 1	Scott Taylor vertical boiler (operational)
Boiler 2	Scott Anderson boiler (not in operation)
Fuel use	Approx. 2,250 GJ per annum (120 tonne coal)
Fuel cost	\$15,900 per annum \$7.10/GJ



Pic1. Scott Taylor vertical steam boiler

Wood energy analysis

Boiler efficiency and fuel use

Given the age and condition of the existing boiler I would estimate the current efficiency at 60% at best. In comparison to a new boiler which would reach 85% efficiency. Increased efficiency will see a reduction in fuel use. Based on the current fuel use and boiler efficiency, a new wood boiler would reduce fuel use by approx. 30% to 1,350 GJ (100t woodchip).

Fuel bunker condition and capacity

There are two boiler house options to consider. The fuel-bunker is the best option for fuel storage and is in good dry condition. The bunker has concrete sides and is approximately 9m³ which will be suitable for day storage only. This means the bulk storage of the wood fuel will need to be elsewhere and the day bunker would be refilled as required. XXXXXXXXX have machinery for doing this.

There are several options for bulk storage of woodchip fuel onsite including:

- Utilising existing covered storage
 - This store holds approximately 25m³ and is in poor condition as it is not weather tight. Receiving fuel deliveries directly into this bunker will be difficult without modification to the fuel receiving area.
- Utilising existing outdoor storage (not recommended because woodchips need to remain dry)
- Warehouse indoor storage
 - There is an area of 200m³ that may be available. This would be the preferred option if available as it will provide sufficient capacity to receive large volume deliveries (100m³) which reduces the delivered fuel price and is indoors and dry with good access.



Pic2. boiler house showing day store bunker

Boiler house

There are currently two boiler locations onsite. The best location for the new boiler is likely to be the boiler house closest to the processor as it has the best access. In addition, the proximity will reduce pipe losses as the other boiler house is further away. This also eliminates the risk of damage to the steam pipes from delivery trucks.

The pipework in the boiler house is poorly lagged in places and non-existent in others. This represents inefficiencies and heat loss so upgrading the lagging will reduce fuel use. Once a pipe is around 90°C it gives a payback under two years to insulate. The following table outlines heat loss savings for steam pipes on a per meter basis for 28mm and 100mm pipes.

Steam heat loss savings (28mm and 100mm pipes)

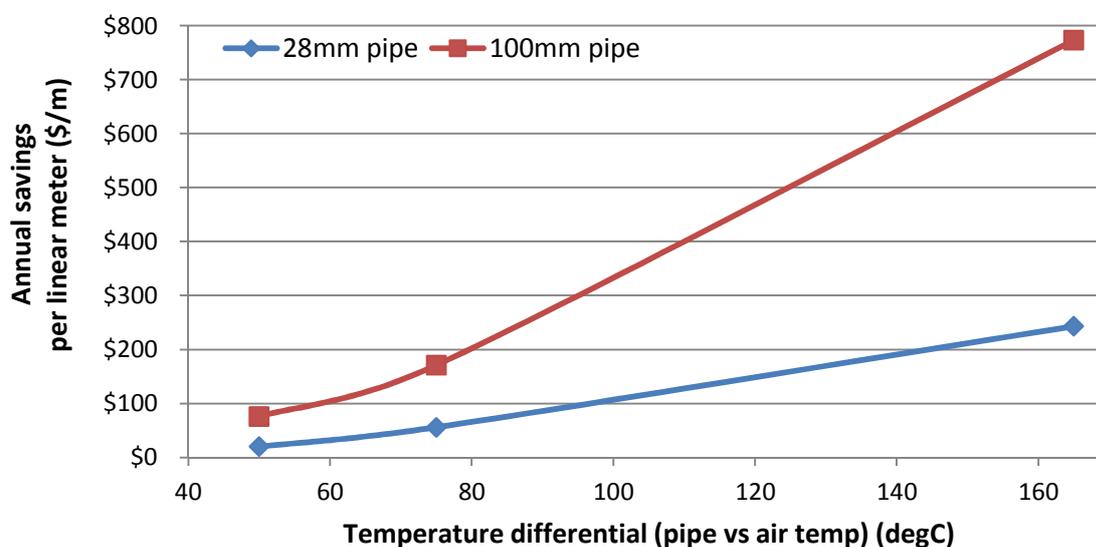


Fig1. Heat loss savings (Source: Ahika)

Fuel volumes

Based on the annual coal consumption for the 2014/15 period, and taking into account the improved efficiency from a new boiler, fuel volumes have been estimated for woodchip and diesel.

Approximately 410m³ of woodchip or 43,800L of diesel would be required to match the coal heat output (taking into account new boiler efficiency).

Fuel type	Dec-14	Aug-15	Sep-15	Oct-15	Nov-15	TOTAL
Actual coal purchased (tonne)	59.2	11.5	11.9	11.8	24.6	118.9
Est woodchip volumes (m ³)	206.0	40.0	41.3	41.1	85.6	414.0
Est diesel fuel (L)	21,845.7	4,237.7	4,378.0	4,355.9	9,080.9	43,898.2

Fuel prices- woodchip

Niagara provides a high quality chip that is a by-product of their remanufacturing plant. This is the same product used by McCallums Drycleaners and works well in a Scott boiler because of the small size and low moisture content. Pricing for the chip has been provided by Niagara and fuel properties are contained in Appendix A.

There are 40m³ and 100m³ delivery options available via truck and truck/trailer respectively. Prices for delivery have been provided from Kennington on a backload rate which requires several days to arrange. The price difference between the two options is \$830 per annum in favour of the larger deliveries.

[Table removed]

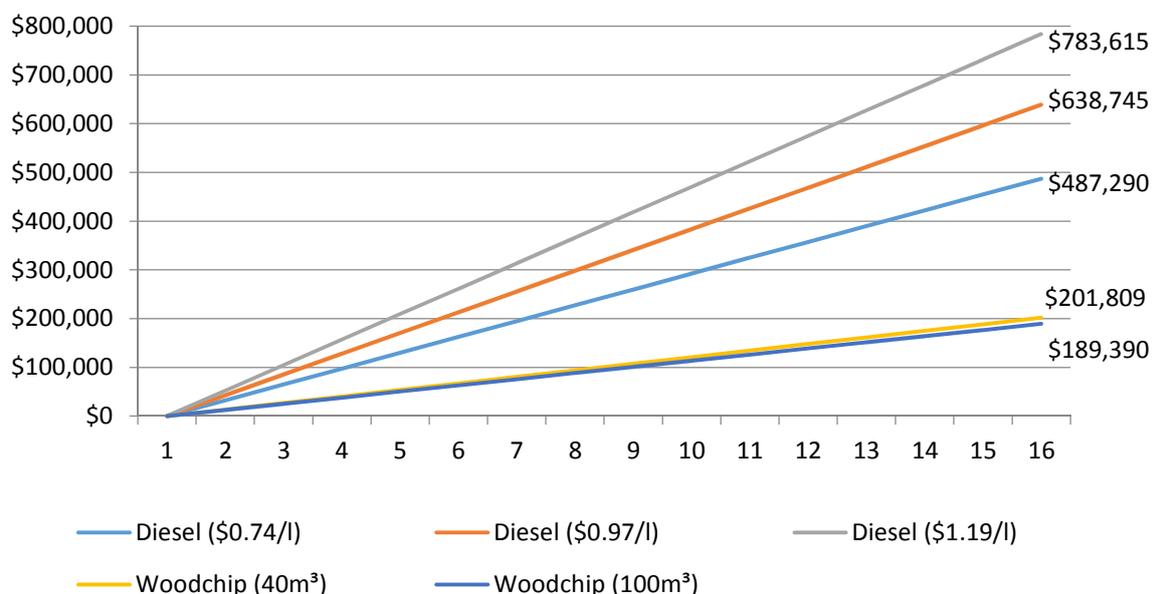
Fuel prices- diesel

XXXXXXXXXX current fuel price is \$0.97 per litre. For this analysis, sensitivity will also include \$0.74/l and \$1.19/l as requested. Current price is highlighted in grey in the following table.

Diesel pricing		\$0.74/l	\$0.97/l	\$1.19/l
Annual consumption (l)	43,900			
Annual fuel cost (\$)		\$32,486	\$42,583	\$52,241

Extrapolating these fuel prices over a 15 year period without taking into account maintenance costs and inflation shows a vast difference between diesel and woodchip operating costs. Assuming the most and least expensive fuel options for woodchip and diesel respectively, the woodchip option is cheaper by more than \$280,000.

Cumulative fuel costs over 15 years



Air discharge consent

XXXXXXXXXX have an existing air discharge consent which expires in 2031. While there are some conditions relating to dust, the majority relate to the boiler so will become obsolete. It is unclear if this consent would apply if the current coal boiler was retained as an emergency back-up. A new consent may be easier than changing the existing consent.

Condition 6a, of the consent, outlines a concentration of PM10 particles in the flue stack at 250mg/m³. This same emissions condition is likely to apply for the new boiler too. Combustion Mechanical will have a better understanding of the likely emissions from the new boiler but this limit should be easily met with emissions controls.

Capital cost

The capital costs for the boiler is being provided by XXXXXXXXX and was not available at the time for finalising this report but will be added later.

Summary

The following key bullet points outline our findings:

- Woodchip would certainly be feasible for the site and the best location is directly next to the processor.
- Annual woodchip consumption is estimated at 415m³. There are two delivery options available using 40m³ and 100m³ trucks. The annual saving of the larger delivery truck is approx. \$830.
- The fuel storage bunker can hold approx. 9m³ of woodchip and will be useful as a day hopper but a new storage shed is required for the bulk storage. Several options are available onsite as discussed.
- The annual woodfuel cost will be lower than current coal costs because the efficiency of the new boiler is much higher meaning less fuel is required for the similar heat output.
- The initial cost of a new diesel boiler is likely to be much less than a woodchip boiler but the ongoing costs are much higher. Over 15 years, diesel operating costs are twice or triple that of woodchip.
- A new consent may be required for the boiler project.
- Funding is available from Wood Energy South for detailed feasibility and capital projects as outlined below.

Funding options

Wood Energy South has funding available if XXXXXXXXX wishes to investigate further. The funding will meet up to 75% of the feasibility study costs (to a maximum of \$15,000). Wood Energy South also has capital grants available and this project may qualify for a 40% contribution towards the capital cost, up to a maximum of \$100,000.

Wood Energy South provides independent technical advisory support and can assist with the following:

- Site visits to assess the suitability of wood fuels for your school
- Non-partisan advice on boiler and fuel options
- Assistance with funding applications
- Resources
- Tour of wood boiler plant and fuel supply chain
- Support with wood fuel pricing
- Pre-feasibility reports for businesses

For more information please get in touch with:

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