

Wood Energy Basics

Wood is a clean, efficient and renewable form of energy which has been used in fires for thousands of years. Despite these simple beginnings, businesses and organisations are increasingly using wood for their commercial building and industrial heating requirements.

Part of its popularity in recent years is due to the fact that wood can be grown and used sustainably from local forest residues that would normally be left behind in the forest to rot. Wood energy is also carbon neutral as the carbon released by burning wood is equal to the carbon absorbed by trees during growth.

Types of wood

Wood energy comes in two main forms:

Wood pellets – Wood pellets are made from dried and compressed sawdust and wood shavings. They are a standardised, efficient and compact form of fuel and are well suited for use in automated feed systems. The main supply of pellets comes from the North Island (Taupo) and there are other smaller operations in the South Island namely Nelson and Timaru.



Wood residue – Wood residue is a by-product of timber harvesting and processing and comes in a variety of forms. The most common type of wood residue is woodchips and the main suppliers in Southland are Niagara and Findlaters. Woodchip becomes expensive to transport long distances so supply is usually located locally and within a 40-80km distance from the heat user.



Wood boilers

Wood pellets and chip can be burnt in purpose built highly efficient boilers. These boilers are made in Europe and are very sophisticated offering options such as remote operations and access, auto ignition and cleaning, optimised combustion and data logging. There are New Zealand boilers that are capable of burning wood fuels and these have been modified and redesigned based on coal boilers. New Zealand boilers do not have the features of their European competitors but this is also reflected in the cost. European boilers have greater combustion efficiency. The main European boilers are Binder, KOB, Hargassner, Polytechnik and Heizomat. New Zealand boiler manufacturers are Rayners, Fogerty and Taymac. Boilers are available in sizes from 100 kW to 2000+kW.

The capital cost of boiler plant varies according to the boiler capacity, the existing infrastructure such as storage bunkers and fuel delivery system and the complexity of the project. Some indicative total installation costs have been developed based on EECA

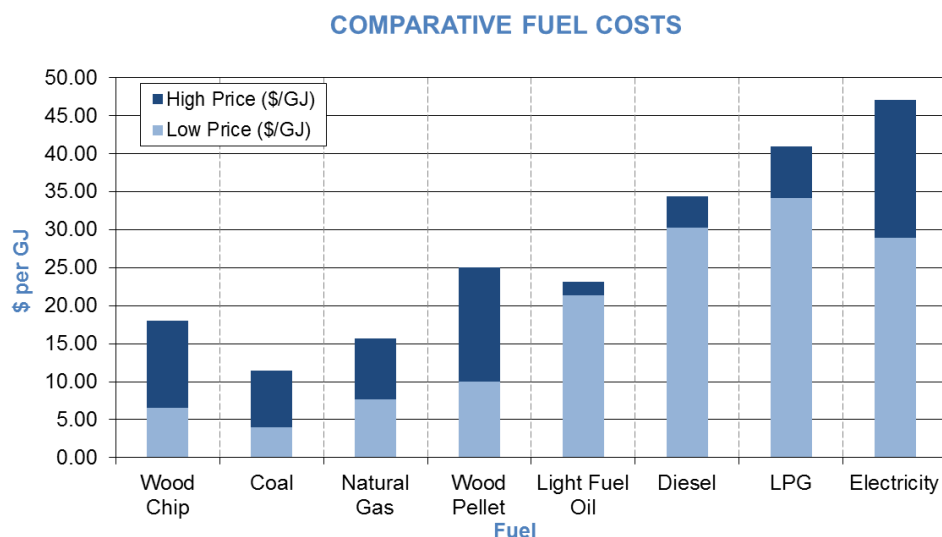
monitoring reports and studies undertaken and publicly available on their website. Please note these prices are indicative only and vary according to the complexity of the project and this can only be accurately determined by completing a feasibility study.

Indicative boiler installation costs		
Wood boiler capacity	Low	Hgh
100-400 kW	\$950/kW	\$2000/kW
500-900 kW	\$800/kW	\$1850/kW
1,000-2,000 kW	\$400/kW	\$1500/kW

The installation cost of wood boilers is much higher because of the extensive infrastructure for fuel delivery, storage and housing the system. Coal boilers require similar infrastructure and so the installation costs are likely to be similar. LPG, Diesel, LFO and Electric boilers have a much lower installation cost but higher ongoing operating costs compared to wood boilers.

The price of wood fuels and payback

In comparison to LPG, diesel and electricity, wood chip is a much cheaper fuel source. Woodchip is the next cheapest alternative to coal in the South Island as displayed in the following chart.



This pricing information is based on EECA monitoring and MBIE's Energy in New Zealand 2014 Commercial and Industrial Prices

Paybacks on wood boilers vary according to the energy use and fuel type. For LPG, Diesel, LFO and Electric boilers with year round demand for energy, the payback could range from 1.5-4.5 years. For seasonal energy use, such as schools, these paybacks would extend further. This would be determined in a detailed feasibility study.

The main components of a biomass heating system

The three main components to a biomass heating system are:

Fuel delivery and transfer area- Biomass fuel is typically delivered by a truck which would have to manoeuvre on site and then tip into a below ground fuel store or onto a mechanical conveyor. The fuel may also be blown into a fuel store.

Fuel storage- Biomass fuel storage comes in a variety of forms, such as:

- containerised fuel stores,
- walking floor tip areas,
- bunkers with tipping walls,
- above ground storage hoppers.

The fuel storage acts like a battery by storing the fuel for use at a later time. The fuel store needs careful consideration to limit the number of deliveries per month and to optimise the delivery volumes which can impact on the fuel price, bulk monthly deliveries will be much cheaper than small weekly deliveries and the price will reflect this.

Boiler and combustion- Biomass boilers are very efficient with low emissions. These boilers also have numerous safety features to prevent fuel burn-back into the fuel storage. Biomass boilers are fully automated and are able to ignite the fuel and remove their own ash.

Who else is using wood-fuel in Southland?

The use of wood boilers is steadily increasing in Southland and several organisations and businesses have already made this move. Recent businesses or organisations to convert to wood boilers are Donovan and Takitimu Primary (woodchip), Waihopai and West Gore Primary (woodchip), Splash Palace, Slinkskins and McCallum's Dry-cleaning. Sometimes the easiest way to get a better understanding of what's involved is to visit one of the sites. We would be happy to arrange this so please get in touch with your request.

Wood Energy South

The Energy Efficiency and Conservation Authority has partnered with Venture Southland to deliver Wood Energy South. The project aims to establish new heat plant in commercial and industrial processes, lower energy-related carbon emissions in Southland, improve air quality and demonstrate the cost and life cycle benefits of wood fuelled boilers.

Wood Energy South provides impartial free technical advice for interested organisations in Southland and funding for feasibility studies and capital grants are available. For more information please visit our website www.woodenergysouth.co.nz or contact our technical advisor Lloyd McGinty lloyd@venturesouthland.co.nz or (021) 202-2172.