



Pricing of different biomass fuels

A common question that those considering biomass fuelled heat applications for the first time often ask is - How can I establish the price of solid biofuel which I will have to pay if I install a biomass fuelled boiler?

The price of biomass fuel will depend on so many variables that even if a price were established at a location it could be very different the next day.

Solid biofuels are not all the same

Solid biofuel is no different than any other purchased product and so investigation of availability and price needs to be done in exactly the same way. The price of any product will change over time according to a wide range of factors including the availability and cost of raw materials, competition, delivery constraints etc etc.

Solid biofuel is produced from a wide range of sources of biomass and these will change over time as some sources are used up and new sources established. These will also change according to the locality of the facility.

Biomass as sourced will usually require some treatment before it is a fuel suitable for combustion in specific heat plant. Once treated it is often referred to as solid biofuel (or wood fuel as wood is the most common source of biomass for producing solid biofuels). The degree of treatment will depend on the type and design of the boiler. Some boilers will take a wide range of fuels while others are designed only for a specific fuel – eg wood pellets. The degree of treatment will affect the price of the fuel so two different boilers next to each other may face very different fuel prices, even from the same supplier.

Sources of biomass will change over time

A stationary heat facility usually has an economic life of around 30 years so over that time biomass is going to be sourced from many different locations, each with their different cost structure.

Biomass can be sourced from wood harvest or process residues, agricultural herbaceous crop residues, or solid waste.

Each biomass resource has different characteristics which affect its use as a fuel.

Biomass is the only renewable resource which we can create more of by planting trees or crops so needs to be approached as a managed resource. We can grow quick growing annual plants such as *hemp* or *miscanthus*, 15 year cycle trees such as *eucalyptus*, and longer rotation crops such as *pinus radiata*.

As a managed resource it can be grown on the 6-9% of a farm which is not highly productively used as three row perpetual shelterbelts, managed erosion control, managed riparian planting, and woodlots on the sides of gullies or steep slopes.

Extraction of biomass from managed plantation forests can be prunings and thinnings during the growth phase or as slash and branches, offcuts, and poor logs not able to fetch a higher price. The cost of biomass recovery depends on the terrain and distance from an access road.

Comparison with other fuels

Pricing of biomass fuel will also be affected by the price and availability of other fuels in that locality. The price of all fuels in most areas of New Zealand are now very competitive as can be seen from Table 1.

Table 1: Indicative national average fuel price

Fuel	Price (\$/GJ)		Carbon charge \$/GJ (\$50/t CO _{2-e})	Carbon charge \$/GJ (\$100/t CO _{2-e})	Fuel Emissions Factor (tCO _{2-e} /GJ _{fuel})
	Low	High			
Natural gas	8.0	16.0	2.65	5.3	0.053
coal - Sub-bituminous	8.5	12.0	5.0	10	0.1
Coal - Lignite	4.0	8.0	4.75	9.5	0.095
Wood – forest residues	7.0	11.0	0.1	0.2	0.002
Wood - chip	9.0	15.0	0.1	0.2	0.002
Wood - pellets	15.0	25.0	0.1	0.2	0.002
Electricity (0.150 tCO _{2-e} /MWh)	20.0	36.0	2.1	4.2	0.042
Electricity (0.05 tCO _{2-e} /MWh)			0.7	1.4	0.014

The fuel prices shown in Table 1 are 2020 prices when the price of carbon was around \$25/tonne. To show the cost increases which can be expected as the NZ Emissions Trading scheme unit prices increase to first \$50/ tCO_{2-e} and then \$100/ tCO_{2-e}. In mid 2021 the unit prices have already increased to \$47/ tCO_{2-e}.

To compare the price of different fuel the carbon charge should be added to the indicated price range. This may be that cheapest Natural gas \$(8.0 + 2.65)/GJ is similar in price to the most expensive forest residues \$(11.0 + 0.1)/GJ.

When comparing say chip to pellets in a specific locality there is often an overlap of prices as shown in table 1 where the most expensive chip (\$15/GJ) may be a similar price to the cheapest pellets (\$15/GJ).

How to establish a price profile

Establishing a contract price for solid biofuel requires the same approach as for establishing a contract price for any other input to a business. Key is the development of strong relationships with potential suppliers so that there is a clear understanding of what they can offer, the quantity and the price. That information needs to be within the context of the fuel supply market in the area where the fuel is to be supplied. It also should be with regard to long term supply – beyond just the next contract.

Solid biofuel suppliers are aggregators of biomass from a wide range of sources and many will have backup contracts with their biomass supplier. The backup biomass supplier may be a forest owner, a collective of farmers, or wood processor.

The best information will be only obtained from talking to solid biofuel suppliers in the area of the facility. Talk to at least three of them as each will be sourcing the biomass from different locations and these will change differently over time. Also price will also depend of whether they just signed up another big contract which may have just committed a source for a long period.

Solid biofuel supply is a managed market so as a buyer your procurement staff must always keep an eye on the market, new entrants and suppliers having trouble to meet contractual requirements. Keep information on all of your potential biofuel suppliers so that you are well informed on market prices.

How to manage price risk

The solid biofuel market needs to be recognised as one which needs constant attention because you are dealing with a renewable resource which is always changing. It is also a market where you can do a lot yourself to manage risk. The extreme is that you can grow your own biomass.

Like the supply of other inputs to your business having strategic and contingency plans is critical. If you have planned for every risk then you can manage it. Know the market and its participants. Think long term and plan for long term. Some biomass is cropped only every 30 years while some is an annual crop. Don't have all your eggs in one basket.

To provide price certainty look to longer term contracts. A supplier may hedge the biofuel price by backing up the contract with a long term contract to a biomass source such as to a forest owner specific forest.

Establishing partnering arrangements with a supplier will ensure that they are fully informed of your needs and intentions and you can assist by giving them confidence to invest in adequate equipment etc to deliver the fuel you will need and when. Better still have a good on-going relationship with at least three suppliers so that you are always in a good position to deal with a fuel supply emergency or a change in the market.

Some heat plant owners improve their negotiating ability by having some plantings of their own that they can draw on in emergency or point to when negotiating to show that they are not beholden to the supplier but have other options. Some of these plantings are on vacant land they own surrounding the facility.

Markets work most effectively if all parties have good information. Work collectively with other biomass users in the area so that you can show the supply market what the aggregate demand for biomass in the area will be over each of the next 30 years. Suppliers can then plan ahead to ensure that they are able to supply biomass when needed.

Because biomass supply is a local activity and not dependent on large energy utilities create a Regional Biomass Demand/Supply Cluster and hold regular meetings to share information. The cluster can be the focus for collating market information, dissemination of the information and hosting a forum for networking. These clusters can often be supported by your Regional Economic Development Agency. Use the Cluster to meet with forest owners and land owners.

Publish and disseminate widely the aggregate demand information so that land owners will be encouraged to plant trees etc with the prospect of a future income. Farm forestry is a very undeveloped opportunity yet 6-9% of a farm is not highly productively used. These are the shelterbelts, woodlot, riparian planting, erosion control and steep slopes that every farm has. If farmers are encouraged to think of these areas as a possible future source of income they will plant with a view to future extraction. [Refer TNSB31]

Except for solar and on-site wind power for electricity, biomass for heat energy is more manageable by you than any other source of mainstream energy. You can supply 100% of your needs by recognising that as a local energy source you have options.