

Bioenergy Reference Project 6

Wood Processing Residues as Fuel



Scope

Where the supply of wood processing residues is insufficient to meet the fuel demand for a biomass fired energy plant other alternative fuel supplies will need to be considered. With an increase in the volumes of logs being harvested from New Zealand's plantation forests, there is an increasing quantity of biomass accumulating at landings and skid sites within our forests. This material can be readily used for fuel cost effectively provided factors affecting supply are appropriately evaluated and taken into account.

The following theoretical case study presents an assessment of the potential supply and cost of forest residues to a biomass fired energy facility in New Zealand.

Situation

The energy plant requires approximately 20,000 tonnes of forest residues to supplement other fuel supplies for an industrial heat plant.

The forests in the region are harvested at around age 25 years, log making occurs at the forest landings, some of the waste material from log making is recovered for an export chip facility so the amount of residue available for energy is less than that available for other areas in New Zealand.

How much forest biomass is available for fuel?

Key steps/issues to consider in determining the amount of biomass fuel that is available are:

- Determine the age class distribution of the forests within the area of interest taking into account any regional differences that may occur. This information is available from the National Forest Exotic Description published by the Ministry of Agriculture and Forestry.
- Determine the likely harvest areas based on typical rotation lengths for selected time periods or on an annual basis. This is calculated from the information obtained above. Several factors will need to be taken into account; logistics for harvesting the available logs, demand for wood, ownership of forest and expected returns.
- Determine the volume of wood that is likely to be harvested per hectare per year. This will depend on the forest regime, growth rates, and site conditions. These values can then be related to the various districts, which are included in the region of interest (see below).

Potential Harvest Volume By District (M³/Year).

	2000-2005	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030
District 1	476520	1420320	2046660	2796640	833140	2444970
District 2	50490	388960	619850	1249270	403370	882860
District 3	137830	284350	389510	1228040	815980	1254000
District 4	316690	981750	764720	291390	285780	678150

Assumes that the typical harvest volume is 550 m³/hectare.

- Knowing the potential harvest volume, then the residue volumes can be determined by assuming that some proportion of the total residue is readily available for fuel. In this case it was estimated at 4% (see below).

Potential Forest Residue Volume By District (M³/Year) In 5 Year Intervals.

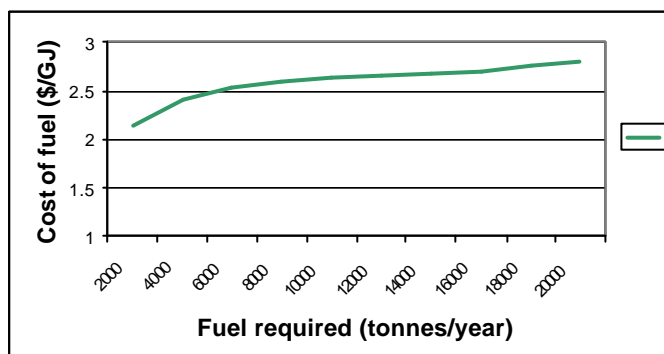
	2000-2005	2006-2010	2011-2015	2016-2020	2021-2025	2026-2030
District 1	19061	56813	81866	111866	33326	97799
District 2	2020	15558	24794	49971	16135	35314
District 3	5513	11374	15580	49122	32639	50160
District 4	12668	39270	30589	11656	11431	27126
Total	39261	123015	152830	222614	93531	210399

Cost of forest residues

There are many factors that will influence the delivered cost of residues to an energy plant. Key factors include:

- The way in which forest residues are collected, processed and transported from the forest. Often the cheapest approach is to load residues onto a truck, transport to the power plant, unload the truck and chip at the energy plant. Off-highway transport using semi-trailer trucks is often more economic.
- Assessment of the transport distance of fuel based on the supply of residues from the different districts and how that relates to the harvesting of forests in the different districts.
- The amount of forest residues required to meet the demand of the energy plant.

Using information from these analyses a supply cost curve was produced for the specific plant/project being considered (see below).



Delivered Cost Of Forest Residues For The Energy Plant During The Period 2002-2005.

Outcome

From a case specific analysis of the energy plant requirements and the nature of the forestry resources in the area, the supply of forest residues to a site can be predicted and costs determined. The cost of obtaining forest residues is likely to be more expensive compared to wood process residues, but they are increasingly competitive with fossil fuels.



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