TECHNICAL NOTE

TN - 33

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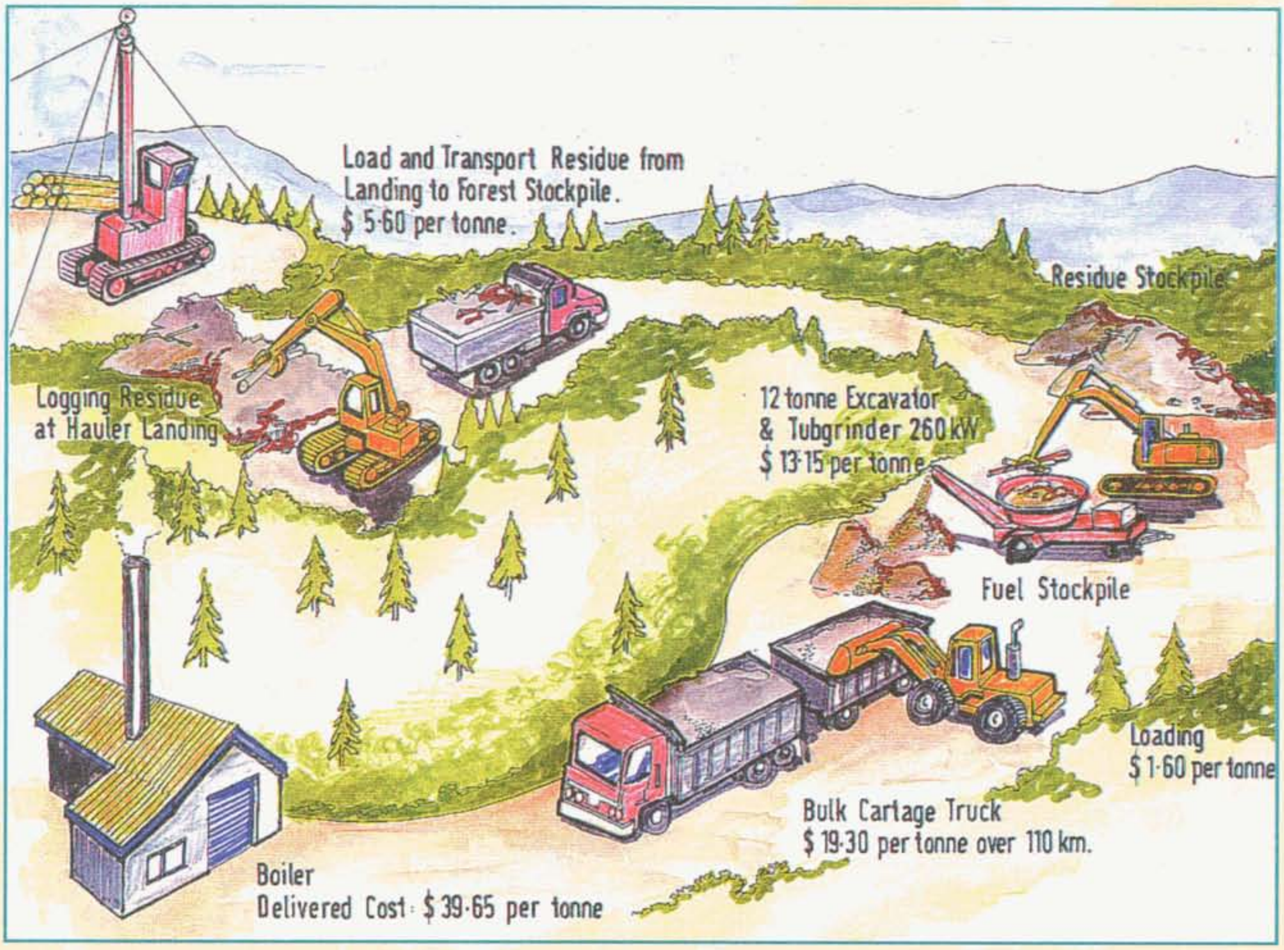
Utilisation of Logging Residue From a Hauler Landing

Peter Hall



Summary

A trial was carried out to evaluate the costs and effectiveness of a logging residue collection and processing system. Designed to produce boiler fuel, the system (Figure 1) comprised stockpiling of residue on a secondary landing, processing with a tubgrinder and transport of the fuel over a 110 km lead distance to a plant where the fuel was burnt in a boiler furnace. The total delivered cost was estimated as $39.65 per tonne. By modifying elements of the handling and processing system and incorporating the cost savings of these changes, it was estimated that the delivered cost would be reduced to $34.00 per tonne.

Liro limited

PO BOX 2244, ROTORUA, NEW ZEALAND
TELEPHONE: 07 348 7168 FAX: 07 346 2886
Email: peter@liro.fri.cri.nz

Introduction

The accumulations of logging residue at hauler landings, or "birds' nests" (Figures 2 and 3) are a by-product of delimbing and log-making large numbers of stems at one site. Current treatments such as burning, retrieving or placement on a flat site are costly.

To evaluate an alternative, a system for converting logging residue from landings into boiler fuel was trialled.

Figure 2 - Bird's nest at hauler landing

The objectives of the trial were to identify the costs and production rates of the system and to highlight ways to reduce unit costs.

Methods

The system consisted of moving residue from a hauler landing to a nearby disused landing with dump trucks. The residue was loaded on to the trucks with the logging crew's loader. The residue was then stockpiled.

A Toro Progrind 2000 (260 kW) tubgrinder (Figure 4) processed the residue into boiler fuel. This is a small to medium sized machine, and was fitted with swing hammers rather than fixed hammers as is the case with larger tubgrinders.

The tubgrinder was fed from the residue stockpile by a 12 tonne excavator with a logging grapple. The fuel was stockpiled as it was produced. It was then loaded into bulk cartage trucks (55 m^3, 19 tonne payload).

The fuel was then transported 110 km to a large timber processing facility where it was used as boiler fuel.

A sample of the fuel produced was analysed for moisture, bark and ash content as well as particle size.

Figure 3 - Residue slump

Results

Costs

The system and its component costs are shown in Figure 1.

The cost of loading the dump trucks, and transporting the residue from the landing to the stockpile, was estimated to be $5.60 per tonne.

The production rate of the tubgrinder was 15 tonnes per productive machine hour. The cost of the excavator and tubgrinding was estimated to be $13.15 per tonne.

The cost of loading and transport were estimated at $1.60 per tonne and $19.30 per tonne respectively.

The total delivered cost for the system as trialled was estimated to be $39.65 per tonne.

Figure 4 - Tubgrinder processing logging residue into boiler fuel

Fuel Characteristics

The residue being treated was a mixture of stem wood offcuts (slovens, broken heads) branches, bark and needles. Moisture content was 46% to 47%. The bulk density of the fuel was 422 kg/m^3.

The fuel was screened to assess particle size (Table 1)

Table 1 - Particle size distribution

Screen opening	% retained by weight
32	14
26	11
19	12
16	10
13	10
9	11
6	15
3	9
Pan	7

Bark content was 25% by green weight. The logging system used a mechanised processor. These systems tend to remove more bark than manual methods. Residue from a system with manual log making would probably have a lower bark content.

From samples measured during the production of the residue, the stem wood content was estimated to be 81% (includes bark), branches 17% and needles 2%. Of the stem wood, 29% was in pieces greater than 1m in length.

Discussion

Costs

These costs were regarded as high. The system could be refined to give a lower cost.

The trucks used to stockpile the residue could have been more productive if they had larger bins fitted.

A larger tubgrinder would have been better suited to the job. The one trialled had difficulty with the larger pieces of stem residue, slowing its production.

A larger tubgrinder, although more expensive to run, would be likely to give a lower unit cost as it would be able to process all the residue unhindered. However, a larger tubgrinder would also require a greater volume of fuel to keep it working at capacity, which would have to be considered when selecting equipment.

If 90 m^3 chip trucks (27 tonne payload) were used for the transport of the fuel to the point of use, the transport costs would have been lower.

The savings made by the above modifications were calculated. The total cost of the delivered fuel under the optimised system was estimated as $34.00 per tonne.

This cost may appear high but there are other factors which should be considered in determining the value of such an operation.

Firstly, in many cases logging residue at hauler landings is being treated in some manner. Typical costs being $1,500 to $2,000 per landing. This equates to a cost of approximately $3.5 to $4.5 per tonne of residue.

If this avoided cost is deducted from the total then the delivered cost in the trial would be approximately $35.65.

Secondly, the transport distance in this case was 110 km and transport costs were 49% of the total delivered cost (Figure 5). Shorter lead distances would give a much lower cost, for example the same system with a 70 km transport would have a delivered cost of $28.65 per tonne (transport was 38% of the total delivered cost).

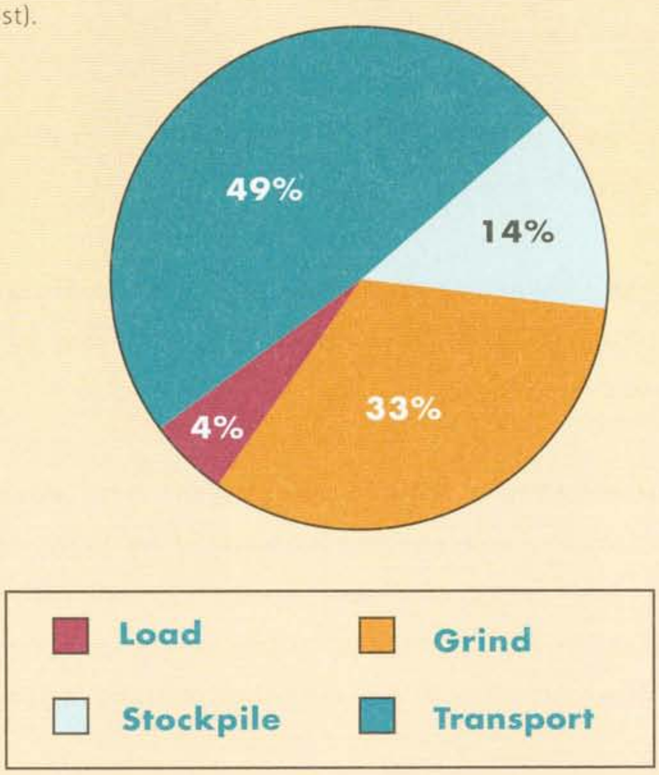


Figure 5 - % contribution to total cost by operation

Fuel characteristics

The processed residue as described above was burned in a furnace/boiler and made good boiler fuel. The dirt content was higher than the normal fuel burned and this caused some extra cleaning of the grate. However, conditions on the landing during the collection of the residue were particularly wet and muddy. If the residue harvesting was to become an integral part of the normal harvesting operation, it could be managed to reduce the dirt content.

General

There are a wide range of potential residue harvesting systems. Many forestry companies in New Zealand have situations that are different from the situation where this system was trialled. Tailoring a site specific system to each site is necessary to get a truly accurate figure for delivered costs. However, the above figures give a good indication of the likely level of costs that could be expected.

Acknowledgments

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The costs stated in this report were derived using the procedures shown in the Liro Limited Handbook, Business Management for Logging. They are indicative only and do not necessarily represent the actual cost of the operations.