TECHNICAL NOTE
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LANDING RESIDUE TO BOILER FUEL - USING A WASTEPRO HOG

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Figure 1 - Wastepro hog being loaded with logging landing residue and producing boiler fuel

Summary

A Wastepro hog was trialled for processing landing residue into boiler fuel. The machine proved to be capable of processing virtually all the waste presented to it at a rate of 28 green tonnes per hour.

Two loaders were required to retrieve residue from the landing surrounds, feed it into the hog and load trucks.

On truck costs were estimated to be $14.85 per green tonne. Delivered cost depends on and varies with transport distance. In the trial, the transport distance was only 5 km and the total delivered cost was $17.50 per green tonne. At a transport distance of 50 km, the total delivered cost was estimated at $23.85 per green tonne.

This system would be suitable for salvaging logging residue for boiler fuel from ground-based logging operations.

Introduction

Recently there has been considerable attention focused on residue at hauler landings and methods for treating or disposing of this material. This is primarily because of the potential risk of bird's nest collapse.

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However, ground-based logging systems still harvest the greater proportion of area logged, and although this will not be the case in the future, ground-based systems will still be a significant factor in forest harvesting and therefore in landing residues. From an utilisation standpoint, residues at ground-based processing landings are more readily available.

For example, residues from ground-based logging in the Central North Island / Bay of Plenty are estimated to be as much as 225,000 thousand tonnes per year. Currently, this material is not being utilised.

There are few, if any, negative environmental impacts from salvaging this material.

Liro Limited has previously looked at a mobile tub grinder for processing stockpiled logging residue (Liro Limited Technical Note TN-33).

More recently, Liro Limited had the opportunity to evaluate a Wastepro hog producing boiler fuel from logging residue.

Work Methods

The logging residue was processed directly from the existing heaps surrounding the landing.

The residue was lifted out of the heaps by either a rubber tyred front end loader or an excavator and then fed into the Wastepro hog. The residue was comminuted into boiler fuel and stockpiled. The hogged residue was then loaded into trucks and transported to a nearby pulp and paper mill where it was tipped into the boiler fuel heap. The transport distance was 5 to 6 kilometres

The Wastepro is a large machine (375 kW engine) weighing 35 tonnes and measuring 13 metres in length in a 4 axle semi-trailer configuration. Material of up to 70 cm diameter can be fed into the hog.

A variety of machines were used to feed the residue into the hog during the trial. However, the use of a 15 tonne excavator with a log grapple and a 90 kW rubber tyred front end loader (RTFEL) with a high tipping bucket was deemed to be the optimal combination based on trial observations.

The Wastepro is mobile and was moved from skid to skid taking the machine to the residue, rather than bringing the residue to the machine as in the past study (i.e. the tubgrinder, TN-33).

Production and Transport Costs

As the residue was collected from where it had been dumped, there is no collection or stockpiling costs attached to it.

The system, of the Wastepro, excavator and RTFEL, to salvage the material from the landing surround and convert it into hog fuel was estimated to cost $13.25 per tonne.

The cost to load the fuel into trucks for transport to the mill boiler was estimated at $1.60. This gives an on truck cost of $14.85.

The transport distance to the mill in this case was 5 km which, using chip vans, would have cost $2.65 per tonne, giving a total delivered cost of $17.50. This is an unusually low transport distance and Table 1 gives a range of delivered costs based on the processing cost above and varying transport costs.

Table 1 - delivered fuel cost by transport distance

Transport distance, km	Transport cost, $ per tonne	Process and load cost	Total delivered cost, $ per tonne	Transport cost as % of total delivered cost
5	2.65	14.85	17.5	15
10	3.10	14.85	17.95	17
15	3.46	14.85	18.31	19
20	3.87	14.85	18.72	21
25	4.50	14.85	19.35	23
30	5.40	14.85	20.25	27
35	6.30	14.85	21.15	30
40	7.20	14.85	22.05	33
45	8.10	14.85	22.95	35
50	9.00	14.85	23.85	38

Note: the transport distances in the table are relatively low, and relate to the situation where a large processing plant, such as a pulp mill, is adjacent to a significant area of forest.

Total delivered costs for longer transport distances would be approximately:

75 km - $29.95 per tonne (45% of total delivered cost is transport)

100 km - $34.45 per tonne (52% of total delivered cost is transport)

Fuel Characteristics

The fuel produced was a mix of stem wood, bark, needles, cones and dirt, with the predominant material being stem wood. Bark content was approximately 12%. Needle content was very low. Due to the age of the residue, most of the needles had fallen off.

The residue had aged and dried after harvest, although weather conditions during much of the trial were wet. Moisture content was 46% (wet basis). The density of the material after hogging was 400 kg per m^3, or 2.5 m^3 of hogged material per tonne.

Discussion

The system described here differs from those previously studied as it is being used in areas which have been logged by ground-based harvesting systems. Previous studies have focused on utilising residue from hauler landings as it can cause potential problems for forest managers, and occurs in greater quantities relative to the harvest volume. It is also more difficult to access as a resource as hauler landings are restricted in size and work space during harvest. If the material is not removed (at a cost) during harvest, it often becomes inaccessible.

In ground-based operations, the residue is often readily accessible around the edges of the landing and can be fed directly into the processor by an excavator or RTFEL. This means the processor goes from landing to landing after harvesting is completed, with up to a day's processing available at each landing

In areas such as the Bay of Plenty, which have high levels of ground-based logging, often within 50 km of large processing plants, the use of a system similar to the one described here should be able to deliver an acceptable quality boiler fuel to its point of use at less than $24.00 per green tonne. The system described in TN-33 would have a cost of $29.35 per tonne over the same transport distance.

The system used by this operation with the Wastepro has a lower on-truck cost than the stockpile-process system described in TN-33. This is due to reduced material handling costs as stockpiling of the residue is not required. The stockpile-process system is best suited to hauler operations where residue often becomes irretrievable if it is not removed from the skid site. The system of moving the processor from landing to landing is suited to situations where the piles of residue are accessible after the logging operation is completed.

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The costs stated in this Technical Note 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 operation.