bio hub INFOSHEET

OCTOBER 2017 | # 9

Cross-loading at a Biomass Terminal

In a forest biomass supply chain raw materials may pass through a terminal where the load is discharged and further loaded, i.e. cross-loaded, to another vehicle that can carry a higher load. The benefit of using these transhipment terminals is collecting small loads into bigger loads and transporting them further with a vehicle having cheaper transportation costs and smaller environmental impact but the disadvantage is increased material handling cost.

BACKGROUND

In a forest biomass supply chain raw materials are transported in-terrain and on road from forest to industry. The material may also pass through a terminal where the load is discharged and further loaded, i.e. cross-loaded, to another vehicle that can carry a higher load, from a truck to a train for example (Fig. 1). The benefit of using these transhipment terminals is collecting small loads into bigger loads and transporting them further with a vehicle having cheaper transportation costs and smaller environmental impact but the disadvantage is increased material handling cost brought about by unloading and loading of the material. Material may be stored between discharging and loading for some time but preferably cross-loading is performed directly from the first vehicle to the next one to save material handling cost and storage space, and to prevent the material deterioration. Cross-loading can also be performed at the destination if the first cross-loaded vehicle can't drive to the mill site. This second cross-loading may be performed from train to truck or from train to ship, for example.

Figure 1. *Cross-loading of pulpwood from truck to train. (Photo: Kalvis Kons).*

Cross-loading takes place when material is discharged and loaded as it is when arriving to a terminal. Cross-loading can then basically take place in a satellite terminal, in a feed-in terminal or in transhipment terminals, as defined in [1]. However, fuel upgrading terminals and biomass logistics and trading centres (see [1]) can also be used as passing through terminals where part of the material is not processed. These terminals would then act as multi-purpose biomass terminals.

CROSS-LOADING OF ROUNDWOOD

A few years ago the highest rating for a truck combination in Sweden and Finland was 60 tons, which is a normal size for a truck combination nowadays too. Lately, large size truck combinations have been introduced as the rating has been increased to 74 tons in Sweden, and to 76 tons in Finland. With an exceptional permit, a truck of 90 tons can be used in Sweden [2]. The highest weight of a truck combination used with an exceptional permit in Finland is 104 tons [3]. Studies have shown the benefits of large size trucks in decreasing transportation costs (see [4], for example). These longer and heavier vehicles can operate on a limited amount of roads because roads and bridges are typically designed and built for normal sized trucks. Large size trucks can't operate in small forest roads with limited carrying capacity and small turnaround space and normal size trucks has to be used to transport biomass from forest to a terminal where it is cross-loaded to a large size truck which transports roundwood further to a mill site.

The transportation of roundwood by truck is the cheapest alternative only if the distance is short, 100-150 km depending on the case. For longer distances transportation by train is more cost effective. Therefore, cross-loading from truck to train is common practise in Finland and Sweden.

Combined vehicles are used to transport daily consumer products to Northern Finland but these trucks are typically empty when driven back to South. To utilize these empty trucks in roundwood transportation, a detachable and foldable frame has been developed in Finland. The frame is filled with roundwood in the field and lifted to a container by using a big forklift. A video of this frame and its use is available in [5] (in Finnish). This kind of arrangement enables very versatile cross-loading.

Waterways can be utilized in roundwood transportation too. Roundwood is imported by sea transportation to Finland and Sweden from Baltics and Russia. Cross-loading from ship to trucks is performed using big cranes (Fig. 2). Imported roundwood is transported to the mill site only at short distances. In inland transportation, waterway transporting by boat or barge or by floating is a cost effective alternative for trucks due to larger transportation capacity. Cross-loading is needed in this case to load roundwood from truck to other means of transport, performed in water.

Figure 2. Cross-loading from ship to truck is performed using cranes. (Photo: Kalvis Kons)

CROSS-LOADING OF WOOD CHIPS

It may be cost effective to transport wood chips long distances using trains, ships or barge [6-8]. Wood can be chipped in a terminal and loaded straight to the train or ship, or it can be cross-loaded from a truck to a train or a ship in a terminal.

Chips can be transported cost effectively in intermodal containers [8, 9]. In that case, cross-loading is easy because containers can be cross-loaded quickly by forklift.

AUTHOR

Mikko Karjalainen
Natural Resources Institute Finland (LUKE)
mikko.karjalainen@luke.fi
2017.10.18

References:

[1] Kons K. 2016. Nordic forest biomass terminals. BioHub info sheet. Available: www.biofuelregion.se

[2] Volvo Trucks Magazine. A 90-tonne truck at the Polar Circle.
URL: http://mag.volvotrucks.com/global/global/article/?art=4008&ref=1

[3] Finnish Forest Association. Largest lorry in Western Europe to start operating in Finnish Lapland.
URL: http://www.smy.fi/en/artikkeli/largest-lorry-in-western-europe-to-start-operating-in-finnish-lapland/

[4] Laitila J., Asikainen A., Ranta T. 2016. Cost analysis of transporting forest chips and forest industry by-products with large truck-trailers in Finland. Biomass and Bioenergy, 90, pp. 252–261.

[5] Shäfer H. 2017. Video: Ivalon-rekka vie ruokaa mennessään, tuo puuta tullessaan. URL: http://www.maaseudun tulevaisuus.fi/mets%C3%A4/video-ivalon-rekka-vie-ruokaa-menness%C3%A4%C3%A4n-tuo-puuta-tullessaan-1.185377

[6] Karttunen K., Väätäinen K., Asikainen A., Ranta T. 2012. The operational efficiency of waterway transport of forest chips on Finland's Lake Saimaa. Silva Fennica, 46(3), pp. 395–413.

[7] Enström J. 2015. Possibilities for coastal maritime transport of forest fuel in Sweden. Skogforsk Arbetsrapport 874.

[8] Enström J., Winberg P. 2009. Systemtransporter av skogsbränsle på järnväg. Skogforsk Arbetsrapport 678.

[9] Karttunen K., Lättilä L., Korpinen O.-J., Ranta T. 2013. Cost-efficiency of intermodal container supply chain for forest chips. Silva Fennica, 47(4), 24 p.

EUROPEAN UNION Interreg Botnia-Atlantica European Regional Development Fund
Österbottens förbund Pohjanmaan liitto
REGION VÄSTERBOTTEN
Landstinget Västernorrland