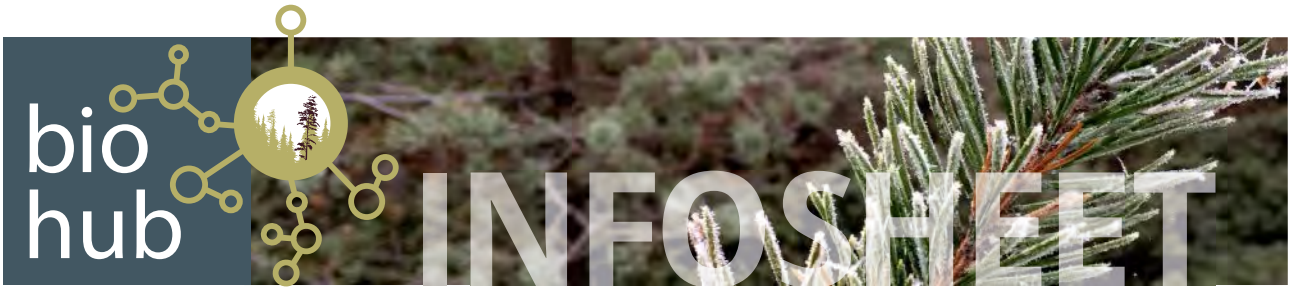


OCTOBER 2016 | # 1

Nordic Forest Biomass Terminals

Forest biomass procurement comprise several types of terminals where each is playing its own role in the whole supply chain from forest to industry. In order to use the common language when referring to different biomass terminals we have created the following info-sheet. From the forest industries perspective there are three terminal types which have been used for a relatively long time. Thus these types of terminals will develop as the bio-economy is gaining ground.

SATELLITE TERMINALS

These terminals are relatively large (ca. 10 ha) and allocated close to the abundant forest raw material pool and far away from the industries (Figure 3). In comparison to present terminal concepts (Transshipment Terminal) satellite terminal concept is relatively new and poorly described.

The main goal for these terminals is to increase long distance biomass supply efficiency. Satellite terminals often have rail road connection and they are situated close to well-maintained road network, in order to uti- lize transport modes of higher payloads such as trains and high-capacity-trucks, e.g. 74 t gross weight. One of such examples is the Stockaryd Terminal in Sweden.

Figure 1. *Preferred terminal stock level inventory performer at different terminal size classes.*

FEED-IN TERMINALS

These are located close to the end user of biomass, the industry (Figure 3). Their size depends on industry specific demand and they are commonly used when the industry does not have enough storage space at the industry site, or if there are some environmental restrictions.

In some cases these terminals can be used as buffer storages to balance differences between supply and demand. If high biomass quantities are handled, feed-in terminals are located close to good road network and / or railroad systems. Both Feed-In terminals and Satellite terminals are regarded as new terminal concepts in the bio-economy. The Nykvarn terminal is an example of a highly developed large scale feed-in terminal.

Figure 2. *Nykvarn feed-in terminal. Photo: Söderenergi AB.*

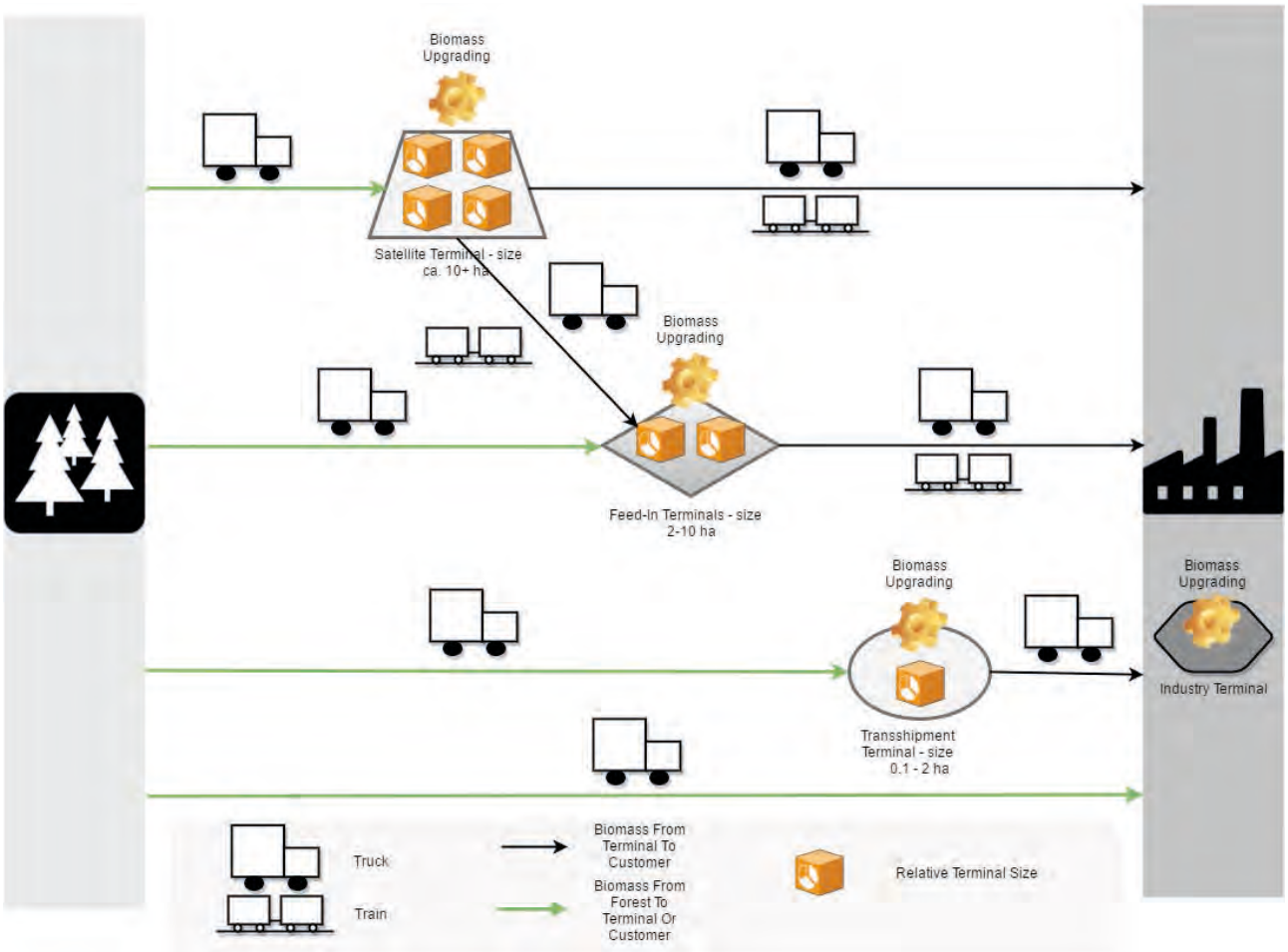
TRANSHIPMENT TERMINALS

These terminals are the most common terminal types in the Nordic forest industry and are considered as present or benchmark terminals. Even though these terminals usually are small regarding their capacity, a vast number of them are handling a significant share of the total biomass that passes terminals.

Transhipment terminals usually serve as buffer to even out variation in biomass supply due to seasonal, weather or other, usually foreseeable, factors. These small terminals are often filled during the season for low demand of biomass to be used during high demand. Therefore transhipment terminals are located close to good road networks which can be used all year around to secure supply (Figure 3).

To keep the investment costs low, it is common to use old gravel pits or another low value land to establish transhipment terminals. When considering the whole biomass supply chain these types of terminals should be avoided, if possible, due to increased overall supply costs. Domsjö Fabriker in Northern Sweden is an example of a large industry that utilizes a system of several small feed-in terminals.

Figure 2. Transhipment terminal in spring time, Northern Sweden.



FUEL UPGRADING TERMINALS

These terminals are similar to satellite and feed-in terminals regarding their potential to add value to the delivered biomass.

Fuel upgrading terminals are also considered as a "new" terminal type, as fuel upgrading at a terminal is not commonly practiced currently [6].

However, we would not classify it as a separate type of terminal but rather as an additional activity integrated into the presented terminals above (Figure 3).

As a report by VTT Technology [6] also points it out, utilizing natural drying of biomass during storage at a terminal can already be classified as fuel upgrading as the net calorific value increases.

INDUSTRY TERMINALS

These terminals are allocated at industry site and are run by the end customer themselves. The size of the terminals will be affected by several factors as: industry size, terminal capacity, environmental restrictions, transport infrastructure and availability of satellite and feed-in terminals in the supply chain.

BIOMASS LOGISTIC AND TRADE CENTRES (BLTCS)

The main role of these terminals is to deliver standardized biomass products on local and regional scale [1]. The biomass is sourced from the local suppliers, upgraded/improved at the terminal to e.g. fuel pel- lets then delivered to the customers such as e.g. single households and heat and power facilities. Since these terminals mainly deliver small quantities to each customer they also handle several high value products, for example, split and dried firewood, wood pellets for animal bedding and heat etc. BLTCs are becoming more common in the Central and South East Europe as well as in Finland [1].

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