

Summary

This literature study investigates and determines the important material properties and potential threats regarding the storage and handling of biomass. The important parameters that are found are different for solid than for liquid biomass and are therefore divided into two categories. The material properties and potential threats that are found for solid biomass are the moisture content, dry matter loss, self heating tendency and health hazards. For liquid biomass these are the viscosity, flash point, auto ignition, stability and cloud and pour point. The next step is to determine possible storage systems for the two main categories. For solid biomass these are open air storage, roofed storage and closed storage. Tank storage is actually the only suitable storage system for liquid biomass.

After the determination of the most important parameters and possible storage solutions, the most dominant biomass types for both solid and liquid are determined, together with their most likely storage solution.

The three most dominant solid biomass types are wood pellets, wood chips and torrefied pellets. The first most dominant biomass type is wood pellets, because they are already widely produced and traded. The most likely storage solution for wood pellets would be indoor storage with monitoring equipment for moisture content and temperature. The second most important biomass is wood chips, which mainly comes from forest residue. Even though they have quite a low energy content and a high moisture content they are transported and traded on large scale. Their most likely storage option is covered windrows with a moisture-permeable cover. The third most dominant solid biomass type is torrefied pellets. Torrefied pellets are quite a new commodity but are very promising for the near future. Their high volumetric energy density and hydrophobic nature makes them ideal for trading, transport and storing. They are also very suitable for co-firing and are easy to handle with existing systems as they are also pellets. The most likely storage system for torrefied pellets would be open air storage, since they are hydrophobic.

For liquid biomass there are also three dominant types namely, biodiesel, ethanol and pyrolysis oil. Biodiesel has been produced for a long time, its process is well understood and the trade and production has grown fast over the last few years. Its properties make it easy, with minor changes to the system, to use it in regular diesel powered engines. For ethanol, which is the second dominant type, the same three arguments are applicable. The third most dominant type would be pyrolysis oil, this is also quite a new commodity and no commercial plants have been operated. Nevertheless it is an important biomass type, because it can be made in several different ways and from many different types of feedstock, each with their pros and cons. When a standard for pyrolysis oils is made, the trading and production becomes clearer, which in its turn can help the sales of pyrolysis oil. For all three types of liquid biomass the most obvious storage solution is tank storage. However some provisions might be necessary, but those are dependent on the type of liquid biomass and the materials used.

From this study can be concluded that the most important aspects for solid and liquid biomass should always be well known before selecting, installing and operating a biomass storage and handling facility.