Summary

Nowadays, due to emission reduction of green house gases, security of energy supply and socio-economic development and sustainable management of natural resources, more and more countries have set ambitious targets for the development of biomass markets. At some level, all forms of biomass can be considered as potentially convertible into an appropriate form of energy and fuel. Consequently, there are more countries that could benefit from the expanded plan of global biomass trade.

In fact, the EU has an imbalance between local bio-energy production and the expected demand. Therefore, the import of biomass goods from other continents to the EU would be unavoidable and on a large-scale. Based on this potential scenario, a biomass terminal would be necessary in this region. Rotterdam port as a pearl in the mainland of the EU region, every year there are millions of tons of cargoes and containers arriving and departing from this harbour; in the meantime, it has developed traffic connections with other countries by the way of inland waterways, highway and railway. By measuring all these advantages of Rotterdam port, it is a preferred place to build up a biomass terminal in the future.

The objective of this thesis is to design this biomass terminal in the port of Rotterdam, in which imported biomass capacity (including transhipment volume) is about 20 to 40 million tons per year. Thereof, the percentage of direct transhipment biomass is 20% of yearly throughput. The total amount of dry bulk is about 40% and liquid bulk is about 60%. As for the inland transport, for dry bulk, inland barge, highway, railway and belt could be chosen; for liquid bulk, they can be distributed by the way of inland barge, highway and railway (See Figure 1.1).

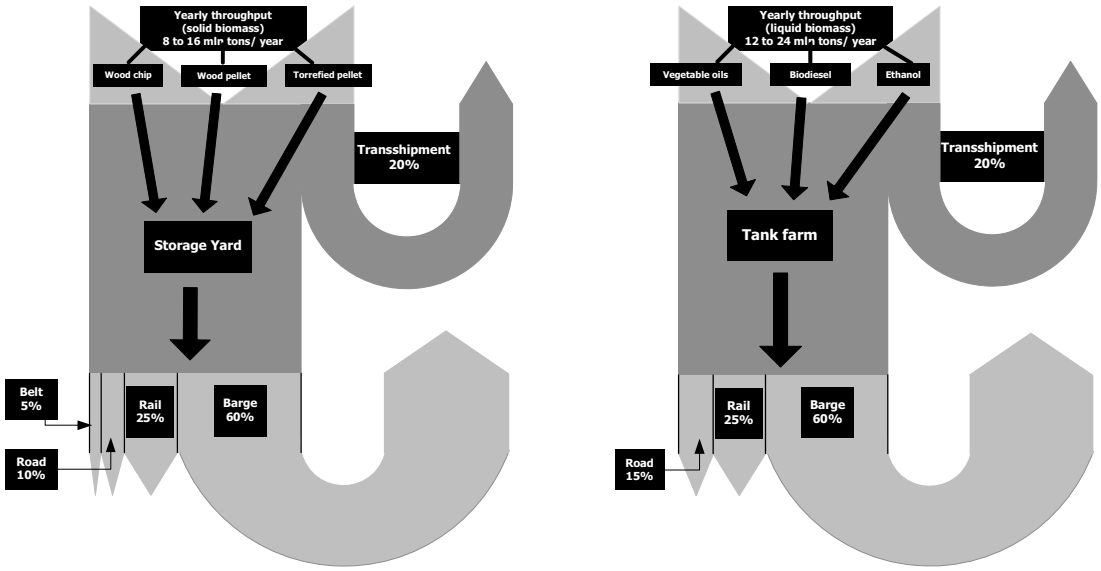

Figure 1.1: Brief scheme of terminal material flow

The mainbody of this report is separated into background information of biomass and bulk terminals, design assumptions and requirements as well as the conceptual design of the terminal. According to the related literature and research, the definition of biomass would be given and the handled biomass goods would be selected specialized for this terminal. And then the general layout and duty of various facilities of the terminals are known before the selection of the key elements of the terminal can be done. Due to the important function of the storage facilities, the first part of the conceptual design is about the storage and then the main area of the terminal could be decided. Nextly, the final layout of quayside needs to be elected from the three different concepts. Due to four criteria, the 'finger' jetty combined with quaywall is the final choice for the waterside constructions. Therefore, when other correlative facilities, such as rail tracks and conveyor system, are designed, the final layout of the whole terminal is done in the end (See Figure 1.2).

However, due to the practical natural conditions and operational situations, the detailed design for this terminal would be a little different with the conceptural design. As a large-scale bulk terminal with a throughput of 40 mln tons/year, the operational processes of the terminal are more complex and cannot be predicted. Generally, simulations of all these processes are necessary to measure the suitablities and cooperations of different elements, in order to make the actual design of the terminal more precisely.

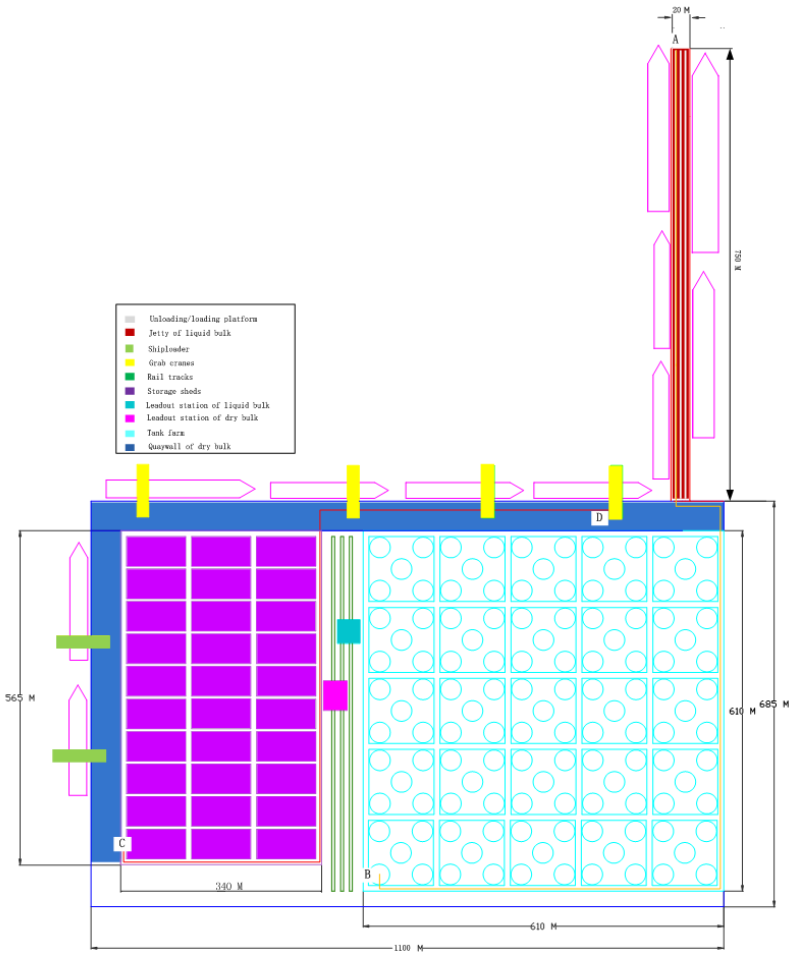

Figure 1.2: The final layout of the biomass terminal