



NETL Life Cycle Inventory Data

Process Documentation File

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Tree_Harvester_Chipper_440_HP_2010.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this process encompasses the weight of materials necessary to construct a single, 440 horsepower (HP) harvester chipper, to be used for the harvesting and chipping of small trees under the short rotation woody crop (SRWC) biomass pathway. The process is based on the reference flow of 1 piece of tree harvester chipper, 440 HP, as described below and shown in **Figure 1**. The harvester chipper is assumed to be constructed entirely of steel; other materials are assumed to be negligible. By default, all steel within this study was assumed to be steel plate, based on available GaBi profiles, unless other steel types were specified per available data, or a higher grade of steel would be required, per NETL engineering judgment. Therefore, all steel considered in this unit process was assumed to be steel plate.

This process is used during Life Cycle (LC) Stage #1 to assist in the harvesting of biomass feedstocks, specifically SRWC. It is combined with other relevant equipment for LC Stage #1 of this pathway in an individual assembly unit process for SRWC harvesting, *DF_Stage1_C_Assembly_SRWC_Harvest_2010.01.doc*. This assembly unit process quantifies the fraction of each piece of harvesting equipment needed under LC Stage #1 to produce 1 kg of biomass ready for transport (LC Stage #2) to the energy conversion facility (LC Stage #3).

Boundary and Description

Construction of the harvester chipper is based on specifications for an experimental tree harvester developed for the harvesting and preliminary preparation of small trees for biofuel production. The experimental harvester chipper was developed by university researchers at North Carolina State University for plantation thinning in tree farming, clearing between tree rows, and for forest management in support of biofuels production. During SRWC harvesting, the harvester chipper removes small trees near ground level, automatically chips them, and temporarily stores the chips in a hopper.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the harvester chipper (e.g., emitted while putting together the components of a harvester chipper, including transport of those components) are not considered in this study. Upstream emissions from the production of raw materials

used for the construction of the harvester chipper (e.g., steel plate) are calculated outside the boundary of this unit process, based on proprietary profiles available within the GaBi model. As shown in Figure 1 and discussed above, the harvester chipper constructed in this unit process is incorporated into the harvesting assembly process for LC Stage #1 for SRWC.

The total weight of the harvester chipper was readily available, but reliable data for the material breakdown of harvester chipper subcomponents were not. Therefore, the harvester chipper was assumed to be composed entirely of steel plate (Steel plate, BF (85% Recovery Rate) [Metals]).

Table 1 shows relevant properties and assumptions used to calculate the amount of steel plate contained in a single harvester chipper. Total weight for one harvester chipper is estimated to be approximately 25,400 kg (56,000 lbs) (Next Energy News 2007). Based on the assumption that the harvester chipper is constructed entirely out of steel plate, the total weight is assigned to this material. **Table 2** provides a summary of modeled input and output flows. Additional details regarding input and output flows, including calculation methods, are contained in the associated DS.

Figure 1: Unit Process Scope and Boundary

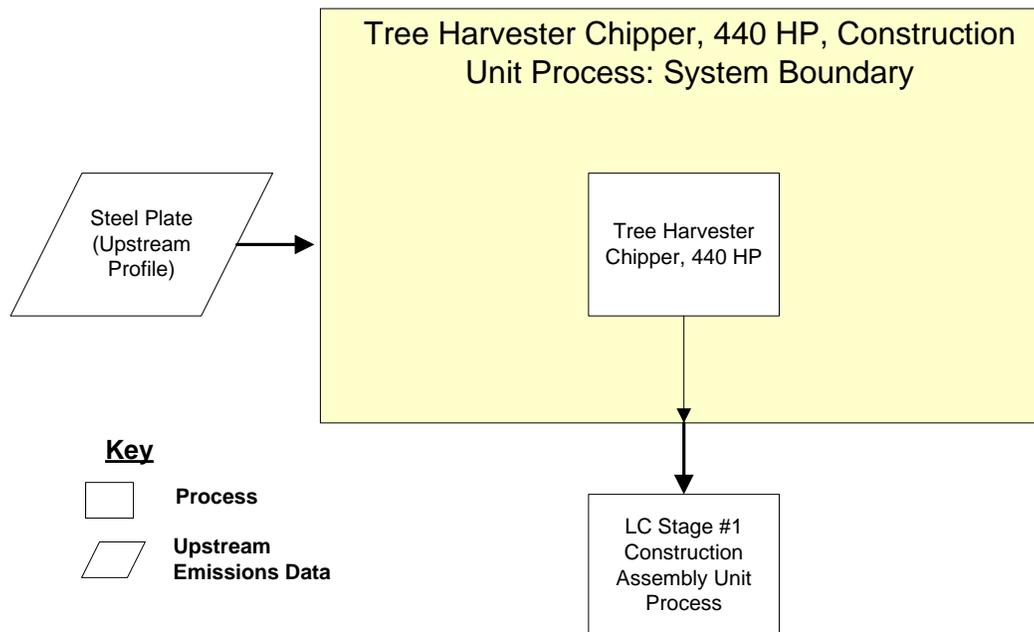


Table 1: Properties of the 440-HP Tree Harvester Chipper

Total Weight of Single Harvester Chipper	Weight	Reference
One Harvester Chipper Weight, kg (lbs)	25,401 (56,000)	Next Energy News 2007
Total Steel Plate in Harvester Chipper, kg (lbs)	25,401 (56,000)	NETL Engineering Judgment

Table 2: Unit Process Input and Output Flows

Flow Name*	Value	Units (Per Reference Flow)
Inputs		
Steel Plate, BF (85% Recovery Rate) [Metals]	25,401.2	kg
Outputs		
Tree Harvester Chipper, 440 HP [Construction]	1	piece

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows. Upstream environmental flows were added during the modeling process using GaBi modeling software, as shown in Figure 1.

Embedded Unit Processes

None

References

Next Energy News 2007 Next Energy News. 2007. *Biomass Harvester Eats Trees to Make Bio-Diesel*. Next Energy News. <http://www.nextenergynews.com/news1/next-energy-news12.21a.html> (Accessed May 28, 2009).

Section III: Document Control Information

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