NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Tree Harvester, 241 HP, Construction

Reference Flow: 1 piece (pcs) of Tree Harvester, 241 HP

Brief Description: This unit process quantifies the materials required for the construction of a single tree harvester, used for the harvesting of short rotation woody crop (SRWC) biomass at the harvesting site.

Section I: Meta Data

Geographical Coverage: US **Region:** N/A

Year Data Best Represents: 2011

Process Type: Manufacturing Process (MP)

Process Scope: Gate-to-Gate Process (GG)

Allocation Applied: No

Completeness: Individual Relevant Flows Recorded

Flows Aggregated in Data Set:

☒ Process ☐ Energy Use ☐ Energy P&D ☐ Material P&D

Relevant Output Flows Included in Data Set:

Releases to Air:	☐ Greenhouse Gases	☐ Criteria Air Pollutants	☐ Other
Releases to Water:	☐ Inorganic Emissions	☐ Organic Emissions	☐ Other
Water Usage:	☐ Water Consumption	☐ Water Demand (throughput)	
Releases to Soil:	☐ Inorganic Releases	☐ Organic Releases	☐ Other

Adjustable Process Parameters:

N/A

Tracked Input Flows:

Steel Plate, BF (85% Recovery Rate) [Metals]	*Steel plate from blast furnace used to construct harvester, assumes 85% recycled/recovery rate*

Tracked Output Flows:

Tree Harvester, 241 HP [Construction]	*Construction of a single John Deere 241 HP Tree Harvester*

Section II: Process Description

Associated Documentation

This unit process is comprised of this document, as well as the data sheet (DS) *DS_Stage1_C_Tree_Harvester_241HP_2012.01.xlsx*, which provides additional details regarding calculations, data quality, and references as relevant.

Goal and Scope

The scope of this process encompasses the materials and weights of those materials necessary to construct a single 51,260 lb, 241 HP tree harvester, to be used for the harvesting of short rotation woody crop (SRWC) biomass. The process is based on the reference flow of 1 piece of tree harvester, 51,260 lbs, 241 HP, as described below, and as shown in **Figure 1.** The harvester 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 LC Stage #1 to assist in the harvesting of short rotation woody crop (SRWC) biomass feedstocks. It is combined with other cultivation equipment construction unit processes in individual assembly cultivation unit processes for SRWC biomass, DS_Stage1_C_Land_Use_Direct_Indirect_2012.01.xlsx, DS_Stage1_C_Standard_Drum_Wood_Chipper_630HP_2012.01.xlsx, DS_Stage1_C_Grapple_Skidder_172HP_2012.01.xlsx, and DS_Stage1_C_Disc_Wood_Micro-Chipper_765HP_2012.01.xlsx. These assembly unit processes quantify the fraction of each piece of 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 is based on manufacturer specifications for a John Deere model 753JH, 51,260 lb 241 HP tree harvester. The harvester is used to collect short rotation woody crop (SRWC) biomass.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the harvester (e.g., that are emitted while putting together the components of a harvester, 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 (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 constructed in this unit process is incorporated into the cultivation assembly processes for LC Stage #1 for SRWC biomass.

The total weight of a harvester was readily available but reliable data for the material breakdown of harvester subcomponents was not. Therefore, the harvester 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. Total weight for one harvester is estimated to be approximately 23,250 kg (51,260 lbs) (John Deere 2011). Based on the assumption that the harvester is constructed entirely out of carbon steel, the total weight is assigned to this material. **Table 2** provides a summary of modeled input and output flows. Additional detail regarding input and output flows, including calculation methods, is contained in the associated DS sheet.

Figure 1: Unit Process Scope and Boundary

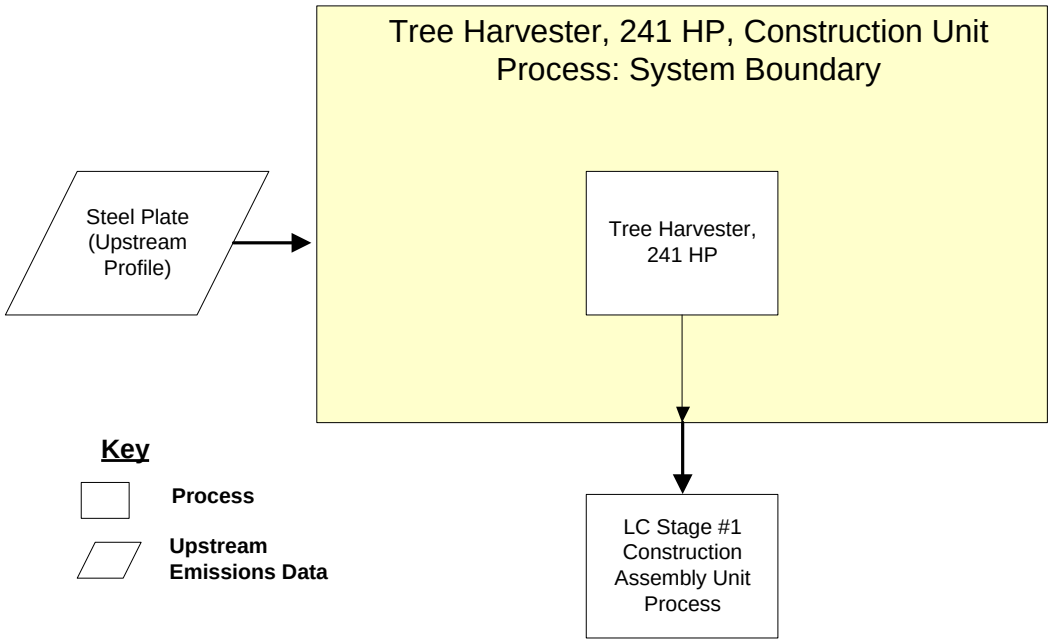

Table 1: Properties of the 241 HP Tree Harvester

Total Weight of Single Harvester	Weight	Reference
One Harvester Weight, kg (lbs)	23,250 (51,260)	John Deere 2011
Total Steel Plate in One Harvester, kg (lbs)	23,250 (51,260)	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]	**23,250**	**kg**
Outputs		
Tree Harvester, 241 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

John Deere 2011 — John Deere, 2011. JH Harvesters. http://www.deere.com/en_US/cfd/forestry/deere_forestry/media/pdfs/harvesters/tracked/DKA703JH.pdf (Accessed February 9, 2012).

Section III: Document Control Information

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