NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Diesel Forage Harvester, 615 Horsepower, Construction

Reference Flow: 1 piece (pcs) of Diesel Forage Harvester, 615 Horsepower

Brief Description: Based on manufacturer specifications for a John Deere Model 7550 forest harvester, 615 horsepower (HP). Assumes harvester constructed entirely of steel plate with negligible amounts of other materials.

Section I: Meta Data

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

Year Data Best Represents: 2009

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:

Tracked Input Flows:

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

Tracked Output Flows:

Diesel Forage Harvester, 615 Horsepower [Construction]	*Construction of a single, 615- HP John Deere forage harvester*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and data sheet (DS) *DS_Stage1_C_Diesel_Forage_Harvester_615_HP_2010.01.xls*, which provides additional relevant details regarding calculations, data quality, and references.

Goal and Scope

The scope of this unit process encompasses the weight of materials necessary to construct a single 615-horsepower (HP), diesel-powered forage harvester, to be used during harvesting of biomass, specifically switchgrass. The process is based on the reference flow of 1 piece (pcs) of forage harvester, 615 horsepower, as described below, and as shown in **Figure 1.** The forage 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 Life Cycle (LC) Stage #1 to assist in harvesting biomass feedstocks. It is combined with other cultivation equipment construction unit processes in an individual assembly cultivation unit process for switchgrass, DF_Stage1_C_Assembly_SG_Cultivate_2010.01.xls. This assembly unit process quantifies 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 forage harvester is based on manufacturer specifications for a John Deere, 615-HP, diesel-powered forage harvester. The harvesting of switchgrass biomass requires a forage harvester. The forage harvester cuts biomass near ground level, and deposits the cut biomass on the ground prior to baling.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the forage harvester (e.g., emitted while assembling the components of a forage 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 forage 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 forage harvester constructed in this unit process is incorporated into the cultivation assembly process for LC Stage #1 for switchgrass.

The total weight of a forage harvester is readily available, but reliable data for the material breakdown of harvester subcomponents were not. Therefore, the forage 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 forage harvester. The manufacturer specifications for a 615-HP forage harvester show a weight of 25,530 lbs (11,580 kg). Based on the assumption that the forage harvester 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 detail regarding input and output flows, including calculation methods, is contained in the associated DS.

Figure 1: Unit Process Scope and Boundary

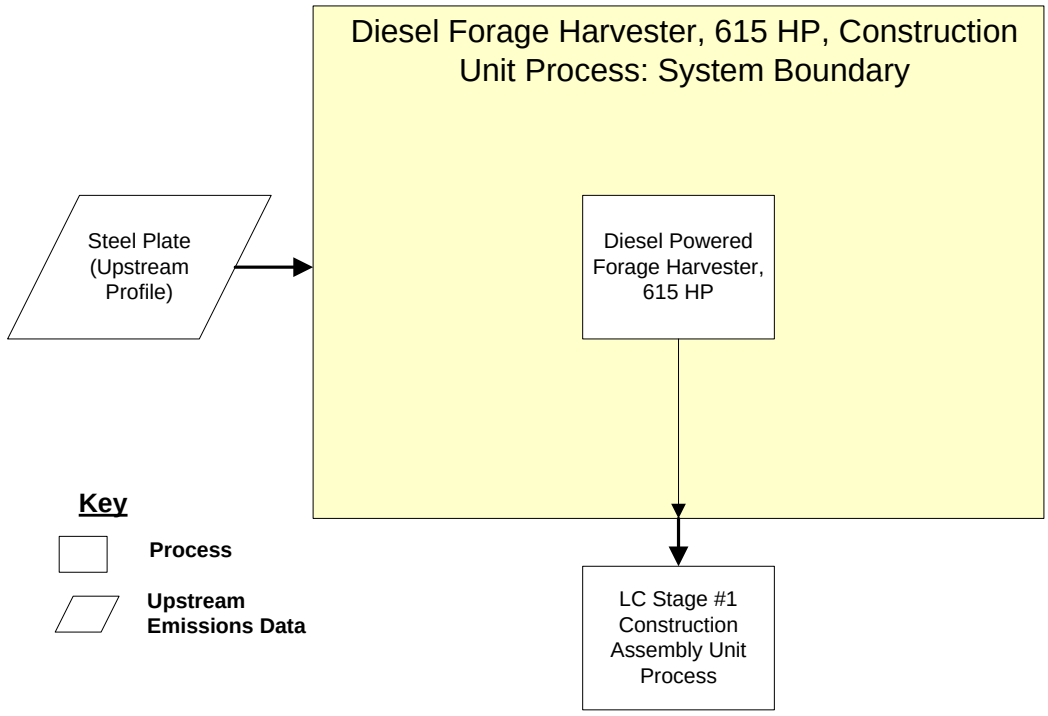

Table 1: Properties of the 615-HP Forage Harvester

Total Weight of Single Harvester	Weight	Reference
One Harvester Weight, kg (lbs)	11,580 (25,530)	John Deere 2009
Total Steel Plate in One Harvester, kg (lbs)	11,580 (25,530)	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]	**11,580**	**kg**
Outputs		
Diesel Forage Harvester, 615 Horsepower [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 2009 — John Deere. 2009. *7550 Forage Harvester*. Deere & Company. http://www.deere.com/specsapp/CustomerSpecificationServlet?sbu=Ag&pciModel=7550%20Z&displayModelName=7550%20Forage%20Harvester&tM=FR&pNbr=7550_Z (Accessed December 14, 2009).

Section III: Document Control Information

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