NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Harvester, 300-Bushel Capacity, 6 Cylinder, Construction

Reference Flow: 1 piece (pcs) of Harvester, 300-Bushel Capacity, 6 Cylinder

Brief Description: Harvester based on manufacturer specifications for a John Deere Model 9770 STS Combine, 300-bushel capacity, and a John Deere Model 612c Stalkmaster corn header. Assumes combine and corn header constructed entirely of steel plate.

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 harvester, assumes 85% recycled/recovery rate*

Tracked Output Flows:

Harvester, 300-Bushel Capacity, 6 Cylinder [Construction]	*Construction of a single 300-bushel-capacity harvester*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Harvester_300_Bushel_Capacity_2009.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this unit process encompasses the weight of materials necessary to construct a single 300-bushel-capacity harvester, to be used for harvesting corn biomass. The harvester consists of a corn header and a combine, which powers the corn header. The process is based on the reference flow of 1 piece (pcs) of harvester, 300-bushel capacity, as described below, and as shown in **Figure 1.** The harvester is assumed to be constructed entirely of steel, and 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 corn biomass. It is combined with other cultivation equipment construction unit processes in an individual assembly cultivation unit process for corn stover, DF_Stage1_C_Assembly_CS_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 harvester is based on manufacturer specifications for a John Deere model 9770 STS combine, 300-bushel capacity, 6-cylinder engine, and a John Deere 612c Stalkmaster corn header, which is powered by the combine. The corn header cuts corn stalks from the ground and sends them to the combine. The combine separates the corn grain from the corn stover and lays the stover back down onto the field to dry before it is collected by a baler.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the harvester (e.g., emitted while assembling 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 corn stover.

The total weight of a harvester was readily available, but reliable data for the material breakdown of harvester subcomponents was not. Therefore, the harvester is 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. The manufacturer specifications for a corn header show a weight of 9,359 lbs (4,245 kg) (John Deere 2009a); specifications for a combine give a weight of 32,765 lbs (14,862 kg) (John Deere 2009b). Adding the weights of these two components gives a total weight of 42,124 lbs (19,107 kg) for the harvester. Based on the assumption that the 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

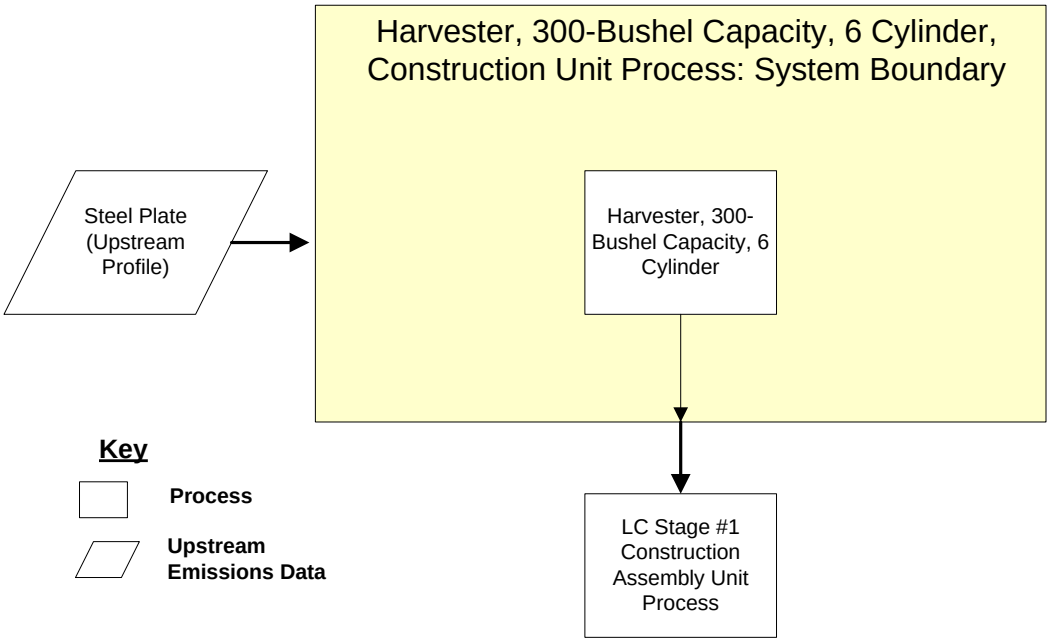

Table 1: Properties of the 300-Bushel Capacity Harvester

Total Weight of Single Harvester	Weight	Reference
One Corn Header Weight, kg (lbs)	4,245 (9,359)	John Deere 2009a
One Combine Weight, kg (lbs)	14,862 (32,765)	John Deere 2009b
Total Steel Plate in One Harvester, kg (lbs)	19,107 (42,124)	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]	**19,107**	**kg**
Outputs		
Harvester, 300-Bushel Capacity, 6 Cylinder [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 2009a — John Deere. 2009. *612c Stalkmaster Corn Head*. Deere & Company. http://www.deere.com/specsapp/CustomerSpecificationServlet?sbu=Ag&pciModel=612CCH&displayModelName=612C%20StalkMaster%26%238482%3b%20Corn%20Head&tM=FR&pNbr=612CCH (Accessed December 14, 2009).

John Deere 2009b — John Deere. 2009. *9770 STS Combine*. Deere & Company. http://www.deere.com/specsapp/CustomerSpecificationServlet?sbu=Ag&pciModel=9770SH&displayModelName=9770%20STS&tM=FR&pNbr=9770SH (Accessed December 14, 2009).

Section III: Document Control Information

Date Created: December 30, 2009

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Original/no revisions

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