NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Baler, 3110 lbs, Tractor-Propelled, Construction

Reference Flow: 1 piece (pcs) of Baler, 3110 lbs, Tractor-Propelled

Brief Description: Based on manufacturer specifications for a John Deere model 348, 3110 lbs, tractor-propelled square baler used in harvesting switchgrass and corn stover. Quantifies the amount of steel plate needed to produce the baler.

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 used to construct baler, assumes 85% recycled/recovery rate*

Tracked Output Flows:

Baler, 3110 lbs, Tractor-Propelled [Construction]	*Construction of a single John Deere 3110 lb, tractor-propelled model 348 square baler*

Section II: Process Description

Associated Documentation

This unit process is comprised of this document, as well as the data sheet (DS) *DS_Stage1_C_Baler_3110_lbs_TractorPropelled_2009.01.xls*, 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 3,110 lb, tractor-propelled baler, to be used for the harvesting of corn stover and switchgrass biomass. The process is based on the reference flow of 1 piece of baler, 3,110 lbs, tractor-propelled, as described below, and as shown in **Figure 1.** The baler 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 corn stover and switchgrass feedstocks. It is combined with other cultivation equipment construction unit processes in individual assembly cultivation unit processes for switchgrass, DF_Stage1_C_Assembly_SG_Cultivate_2010.01.xls, and corn stover, DF_Stage1_C_Assembly_CS_Cultivate_2010.01.xls. 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 baler is based on manufacturer specifications for a John Deere model 348, 3,110 lb tractor-propelled square baler. The baler is used to collect the biomass after it has dried on the field. The baler can utilize the same tractor used in the other cultivation and maintenance operations.

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

The total weight of a baler was readily available but reliable data for the material breakdown of baler subcomponents was not. Therefore, the baler 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 baler. Total weight for one baler is estimated to be approximately 1,411 kg (3,110 lbs) (John Deere 2009). Based on the assumption that the baler 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

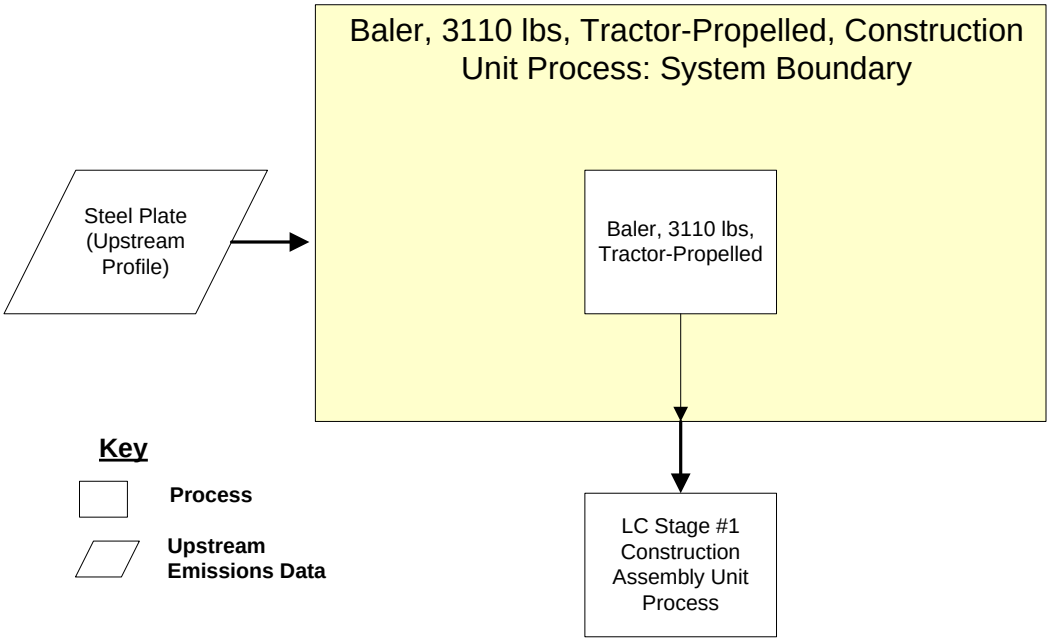

Table 1: Properties of the 165 HP Diesel Tractor

Total Weight of Single Baler	Weight	Reference
One Baler Weight, kg (lbs)	1,411 (3,110)	John Deere 2009
Total Steel Plate in One Baler, kg (lbs)	1,411 (3,110)	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]	**1,411**	**kg**
Outputs		
Baler, 3110 lbs, Tractor-Propelled [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. *348 Square Balers*. Deere & Company. http://www.deere.com/specsapp/CustomerSpecificationServlet?sbu=Ag&pciModel=0348%20E&displayModelName=348%20Square%20Balers&tM=FR&pNbr=0348%20E (Accessed December 14, 2009).

Section III: Document Control Information

Date Created: December 29, 2009

Point of Contact: Timothy Skone (NETL), Timothy.Skone@NETL.DOE.GOV

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