NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Diesel Tractor, 165 Horsepower, Construction

Reference Flow: 1 piece (pcs) of Diesel Tractor, 165 Horsepower

Brief Description: Based on manufacturer specifications for a John Deere Model 7830 165-horsepower (HP), 6-cylinder diesel tractor. Assumes tractor 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 tractor, assumes 85% recycled/recovery rate*

Tracked Output Flows:

Diesel Tractor, 165 Horsepower [Construction]	*Construction of a single Model 7830 John Deere, 165–HP, 6-cylinder diesel tractor*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and data sheet (DS) *DS_Stage1_C_Diesel_Tractor_165_HP_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 materials and weights of those materials necessary to construct a single 6-cylinder, diesel-powered, 165-HP tractor, to be used for the production and harvesting of biomass. The process is based on the reference flow of 1 piece of tractor, as described below and shown in **Figure 1.** The tractor 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 cultivation of biomass 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, short rotation woody crops (SRWC), DF_Stage1_C_Assembly_SRWC_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 tractor is based on manufacturer specifications for a John Deere 165-HP tractor. The cultivation and maintenance of biomass requires a tractor, which is used to pull implements such as a tiller for ground preparation, an automated seeder or tree planter for sowing, or a baler for harvesting, depending upon which biomass feedstock is being considered.

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

The total weight of a tractor is readily available, but reliable data for the material breakdown of tractor subcomponents were not. Therefore, the tractor 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 tractor. Total weight for one tractor is estimated to be approximately 8,172 kg (18,016 lbs) (John Deere 2009). Based on the assumption that the tractor 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

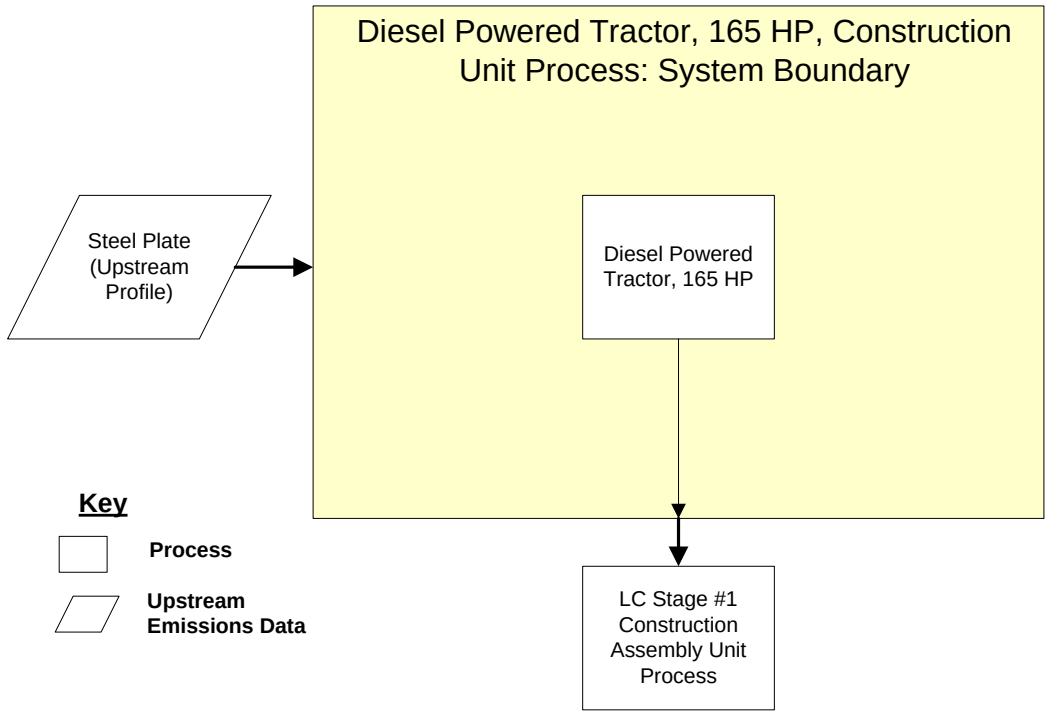

Table 1: Properties of the 165-HP Diesel Tractor

Total Weight of Single Tractor	Weight	Reference
One Tractor Weight, kg (lb)	8,172 (18,016)	John Deere 2009
Total Steel Plate in One Tractor, kg (lb)	8,172 (18,016)	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]	**8,172**	**kg**
Outputs		
Diesel Tractor, 165 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. *7830 Tractor (165PTOHP)*. Deere & Company. http://www.deere.com/specsapp/CustomerSpecificationServlet?sbu=Ag&pciModel=7830%20RW&displayModelName=7830%20Tractor%20(165%20PTO%20hp)&tM=FR&pNbr=7830%20RW (Accessed December 15, 2009).

Section III: Document Control Information

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