NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Seeder, 21900 lbs, Tractor-Propelled, Construction

Reference Flow: 1 piece (pcs) of Seeder, 21900 lbs, Tractor-Propelled

Brief Description: Based on manufacturer specifications for a John Deere Model 1990 central commodity system (CCS) air drill and a John Deere Model 1870 air hoe drill, which make up the seeder. Assumes seeder 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 seeder, assumes 85% recycled/recovery rate*

Tracked Output Flows:

Seeder, 21900 lbs, Tractor-Propelled [Construction]	*Construction of a single, 21,900lb, tractor-propelled, seeder unit*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Seeder_21900_lbs_TractorPropelled_2009.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this process encompasses the weight of materials necessary to construct a single, 21,900-lb, tractor-propelled seeder, to be used for seeding fields during biomass cultivation (specifically, corn stover and switchgrass). The process is based on the reference flow of 1 piece (pcs) of seeder, 21,900 lbs, tractor-propelled, as described below and shown in **Figure 1.** The seeder 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 seed planting for the cultivation 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 seeder is based on manufacturer specifications for a John Deere Model 1870 air hoe drill and a John Deere Model 1990 central commodity system (CCS) air drill. The seeder requires these pieces to prepare holes for seeds to be planted in and for the seeds themselves to be planted. The seeder is tractor-propelled, and it is assumed that the same tractor used for other pieces of cultivation equipment can also be used to pull the seeder; therefore, an additional tractor was not constructed.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the seeder (e.g., emitted while assembling the components of a seeder, 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 seeder (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 seeder 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 seeder was readily available, but reliable data for the material breakdown of seeder subcomponents were not. Therefore, the seeder 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 seeder. The manufacturer specifications for the seeder show a weight of 17,280 lbs (7,838 kg) for the Model 1870 air hoe drill (John Deere 2009a) and 21,900 lbs (9,934 kg) for the Model 1990 CCS air drill (John Deere 2009b). These weights were summed for a total weight of 39,180 lbs (17,772 kg) for the seeder. Based on the assumption that the seeder 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

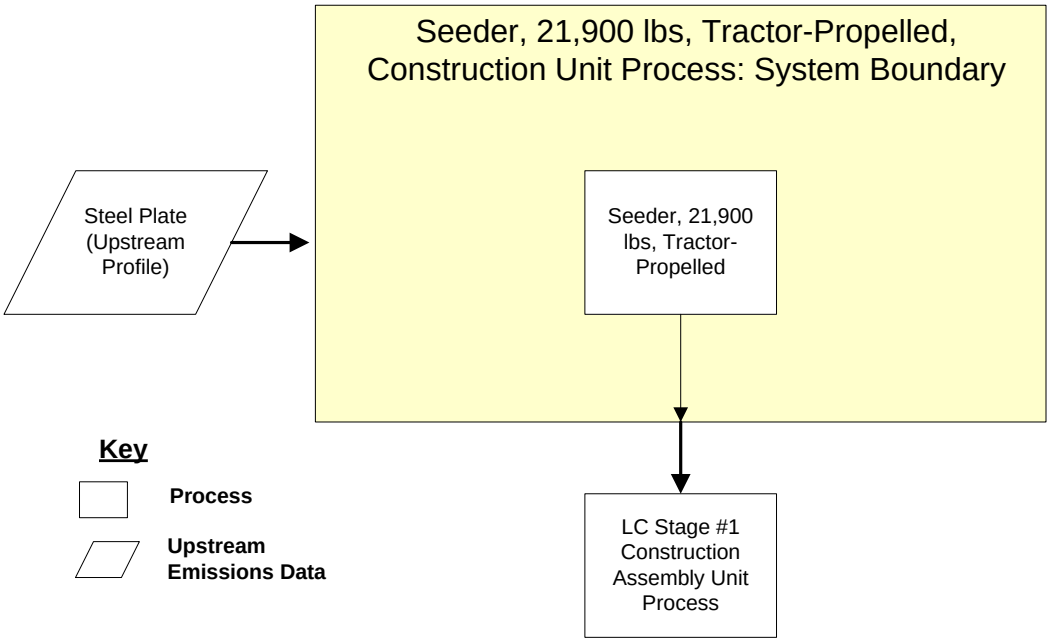

Table 1: Properties of the Tractor-Propelled Seeder

Total Weight of Single Seeder	Weight	Reference
John Deere Model 1870 Air Hoe Drill Weight, kg (lbs)	7,838 (17,280)	John Deere 2009a
John Deere Model 1990 CCS Air Drill Weight, kg (lbs)	9,934 (21,900)	John Deere 2009b
Total Steel Plate in One Seeder, kg (lbs)	17,772 (39,180)	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]	**17,771**	**kg**
Outputs		
Seeder, 21900 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 2009a — John Deere. 2009. *1870 Conserva Pak*. Deere & Company. http://www.deere.com/specsapp/CustomerSpecificationServlet?sbu=Ag&pciModel=1870XH&displayModelName=1870%20Conserva%20Pak%26%238482%3b&tM=FR&pNbr=1870XH (Accessed December 14, 2009).

John Deere 2009b — John Deere. 2009. *1990 CCS - Dual Rank*. Deere & Company. http://www.deere.com/specsapp/CustomerSpecificationServlet?sbu=Ag&pciModel=1990DH&displayModelName=1990%20CCS%20 (Accessed December 14, 2009).

Section III: Document Control Information

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Original/no revisions

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