



NETL Life Cycle Inventory Data

Process Documentation File

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_C_Treeplanter_4500_lbs_TractorPropelled_2009.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this unit process covers the materials required for the construction of a single tractor-propelled treeplanter needed to plant saplings for short rotation woody crop (SRWC) biomass production, under Life Cycle (LC) Stage #1. The process is based on the reference flow of 1 piece of treeplanter, 4,500 lbs, tractor-propelled, as described below and shown in **Figure 1**. The treeplanter 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 unit process is combined with other cultivation equipment construction unit processes in an assembly unit process for SRWC, *DF_Stage1_C_Assembly_SRWC_Cultivate_2010.01.doc*. 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 treeplanter is based on manufacturer specifications for a C & G tractor-propelled treeplanter, weighing 4,500 lbs, with dimensions of 7 feet 10 inches (width) by 12 feet 6 inches (length) by 7 feet 2 inches (height). The treeplanter is designed to be hitched to a tractor of at least 85 horsepower, and plants a single row of saplings into a pre-cut furrow. During operation, the treeplanter is pulled back and forth across a field to plant SRWC seedlings, row by row. A single person sits inside the treeplanter, feeding saplings or seedlings into the mechanism during the planting process.

Figure 1 provides an overview of the boundary of this unit process. Emissions related to the physical assembly of the treeplanter (e.g., emitted while putting together the components, 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 treeplanter (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 treeplanter constructed in this unit process is incorporated into the construction assembly process for LC Stage #1.

The total weight of the treeplanter is readily available, but reliable data for the material breakdown of treeplanter subcomponents were not. Therefore, the treeplanter 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 treeplanter. Total weight for one treeplanter is estimated to be 2,041 kg (4,500 lbs) (C&G 2004). **Table 2** provides a summary of modeled input and output flows. Additional details regarding input and output flows, including calculation methods, are contained in the associated DS sheet.

Figure 1: Unit Process Scope and Boundary

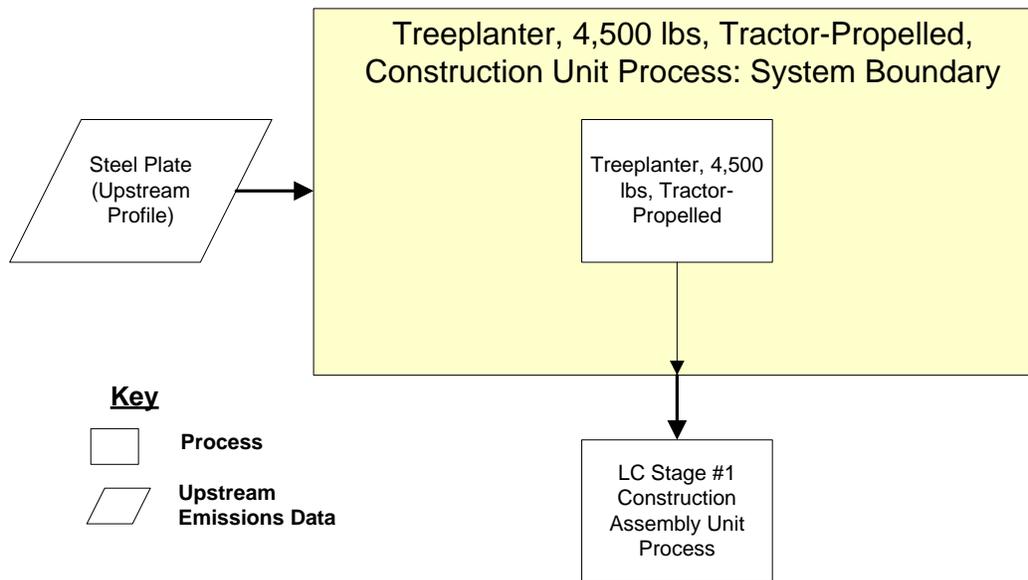


Table 1: Properties of the Tractor-Propelled Treeplanter

Item	Description	Weight, kg (lb)	Reference
Treeplanter	Tractor-propelled, semi-automated treeplanter	2,041 (4,500)	C&G, 2004
Treeplanter	Amount of steel plate to construct a single treeplanter	2,041 (4,500)	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]	2,041	kg
Outputs		
Treeplanter, 4500 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

C & G 2004

C & G. 2004. *Tree Planting from C & G. 2005 through 2008*. <http://www.treeplanters.org/page4.htm> (Accessed May 28, 2009).

Section III: Document Control Information

Date Created: May 30, 2009

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

Revision History:

Original/no revisions

How to Cite This Document: This document should be cited as:

NETL (2009). *NETL Life Cycle Inventory Data – Unit Process: Treeplanter, 4500 lbs, Tractor-Propelled, Construction*. U.S. Department of Energy, National Energy Technology Laboratory. Last Updated: December 2009 (version 01). www.netl.doe.gov/energy-analyses (<http://www.netl.doe.gov/energy-analyses>)

Section IV: Disclaimer

Neither the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) nor any person acting on behalf of these organizations:

- A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this document, or that the use of any information, apparatus, method, or process disclosed in this document may not infringe on privately owned rights; or

- B. Assumes any liability with this report as to its use, or damages resulting from the use of any information. Apparatus, method, or process disclosed in this document.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by NETL. The views and opinions of the authors expressed herein do not necessarily state or reflect those of NETL.