



NETL Life Cycle Inventory Data

Process Documentation File

Process Name: Disposal, wood product, in landfill
Reference Flow: 1 kg of Wood furniture, in landfill
Brief Description: This process covers the disposal of generic wood furniture in a municipal landfill

Section I: Meta Data

Geographical Coverage: United States **Region:** N/A
Year Data Best Represents: 2012
Process Type: Waste Treatment Process (WT)
Process Scope: Gate-to-Grave (End-of-Life) Process (GE)
Allocation Applied: No
Completeness: Individual Relevant Flows Captured

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 Other

Releases to Water: Inorganic Organic Emissions Other

Water Usage: Water Consumption Water Demand (throughput)

Releases to Soil: Inorganic Releases Organic Releases Other

Adjustable Process Parameters:

softwood *Fraction of incoming wood represented by softwood*
Collection_eff *Efficiency of methane collection at the landfill*

Tracked Input Flows:

Transport, refuse truck, diesel	<i>[Technosphere] Transportation of product from consumer to the landfill</i>
Diesel, combusted in industrial equipment	<i>[Technosphere] Transportation of product from consumer to the landfill</i>
Wood, to landfill, wet	<i>[Technosphere] Wood furniture with 10.4% moisture</i>

Tracked Output Flows:

Methane [Intermediate Product]	<i>Captured methane</i>
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Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *Stage5_O_Disposal_wood_product_in_landfill_2013.01.xlsx*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

This unit process provides a summary of relevant input and output flows associated with the transportation and disposal of a generic wood product in a municipal landfill. It includes methane and carbon dioxide produced from decomposition, and the use of captured methane for energy generation. Data on both hardwood and softwood are included, and the mix can be controlled by parameters. The reference flow of this unit process is: 1 kg of Wood furniture, in landfill

Boundary and Description

Wood products are disposed of as municipal solid waste. They are picked up curbside by collection vehicles, which transport them to a landfill. Diesel fuel is also used to manage the waste once it arrives at the landfill. Once the wood product has entered the landfill, anaerobic bacteria begin to degrade the material and produce carbon dioxide (CO₂) and methane. The CO₂ is released to the air and some fraction of the methane is collected. Once the methane is collected, it can be burned in a flare or used to generate

electricity. This unit process assumes that all of the collected methane is use beneficially. Most of the carbon in the wood is not released, however, and remains sequestered in the landfill.

Figure 1: Unit Process Scope and Boundary

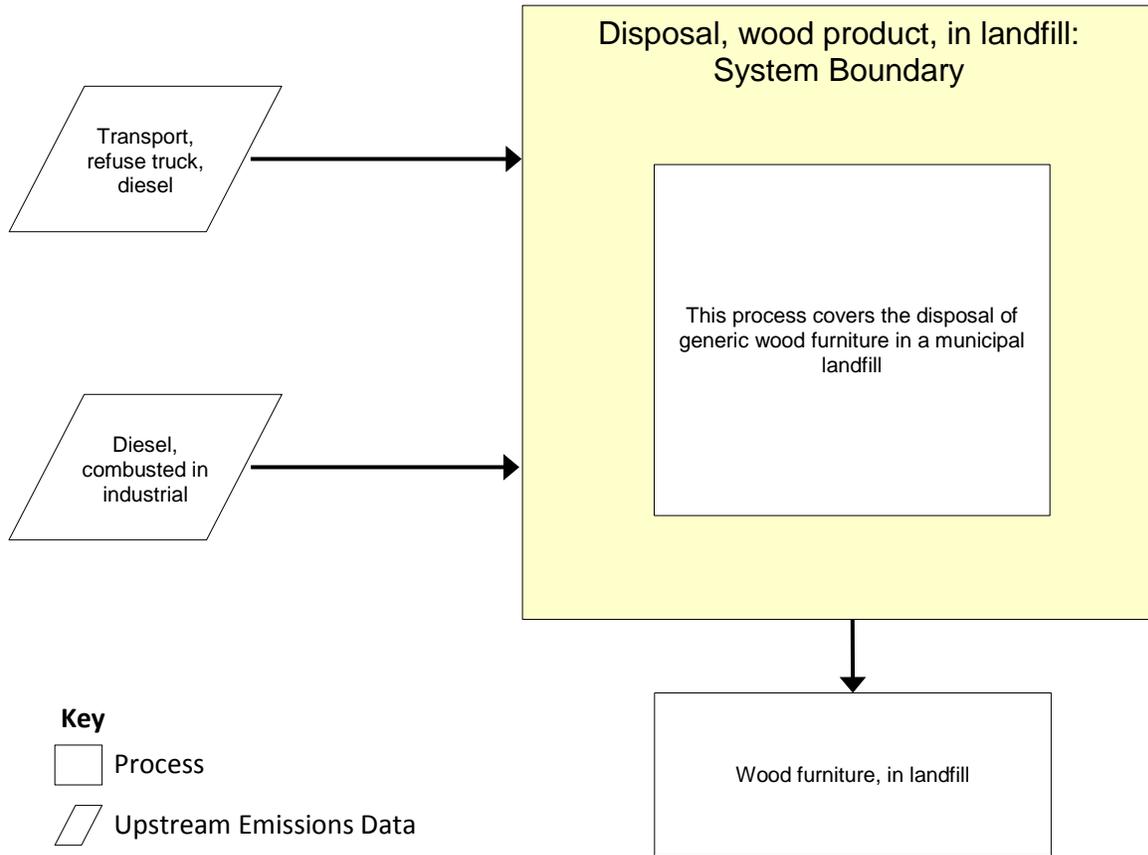


Table 1: Landfill Carbon Storage Parameters

Parameter Name	Value
Carbon fraction of dry hardwood	44.6%
Carbon fraction of dry softwood	44.7%
Hardwood carbon stored in landfill	92.2%
Softwood carbon stored in landfill	98.2%
Methane collection efficiency	90%

Table 2: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
Transport, refuse truck, diesel	0.20	t-km
Diesel, combusted in industrial equipment	5.84E-03	l
Wood, to landfill, wet	1.00	kg
Outputs		
Wood furniture, in landfill [Insert]	1.00	kg
Carbon dioxide [Inorganic emissions to air]	0.04	kg
Methane [Organic emissions to air (group VOC)]	1.29E-03	kg
Methane [Intermediate product]	0.01	kg

* **Bold face** clarifies that the value shown *does not* include upstream environmental flows.

Embedded Unit Processes

None.

References

U.S. EPA 2012

EPA. (2012). WARM Version 12 - Landfilling. U.S. Environmental Protection Agency, from <http://www.epa.gov/climatechange/waste/downloads/Landfilling.pdf>

Hardesty *et al.* 2012

"U.S. Life Cycle Inventory Database - Transport, refuse truck, diesel powered." (2012). National Renewable Energy Laboratory, 2012. Accessed November 19, 2012: <https://www.lcacommons.gov/nrel/search>

Wang *et al.* 2011

Wang, X., Padgett, J. M., Cruz, F. B. D. I., & Barlaz, M. A. (2011). Wood Biodegradation in Laboratory-Scale Landfills. *Environmental Science and Technology*, 45(16), 6864-6871.

Section III: Document Control Information

Date Created: January 17, 2013

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

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