NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Decomposition, forest residue, 50% moisture

Reference Flow: 1 kg of Residue, 50% moisture, decomposed, on forest floor

Brief Description: The decomposition of forest residue

Section I: Meta Data

Geographical Coverage: United States **Region:** N/A

Year Data Best Represents: N/A

Process Type: Auxiliary Process (AP)

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:

Moisture	*Moisture content of wet wood - estimate based on average conditions*
Wood_carbon	*Carbon content of dry wood - estimate based on average conditions*
Frac_soil	*Fraction of carbon from residue remaining in soil after 100 years.*
Frac_CH4	*Fraction of carbon to methane. If anaerobic conditions are present then*

some of the biomass carbon may take this route. Engineering estimate.

Tracked Input Flows:

None

Tracked Output Flows:

Residue, 50% moisture, decomposed, on forest floor [Waste] *Reference flow*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_O_Decomposition_Forest_Residue_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 decomposition of forest residue from logging operations. The reference flow of this unit process is: 1 kg of Residue, 50% moisture, decomposed, on forest floor.

Boundary and Description

Forest residue removes carbon dioxide from the air during its growth period. During logging operations some fraction of the biomass from the crown and stem of the tree will be removed. This fraction is considered forest residue. If the residue is left on the ground it will decompose over time, releasing some of the stored carbon back into the air as carbon dioxide. If the environment is very moist then some of the carbon may be released as methane through anaerobic decomposition.

Figure 1: Unit Process Scope and Boundary

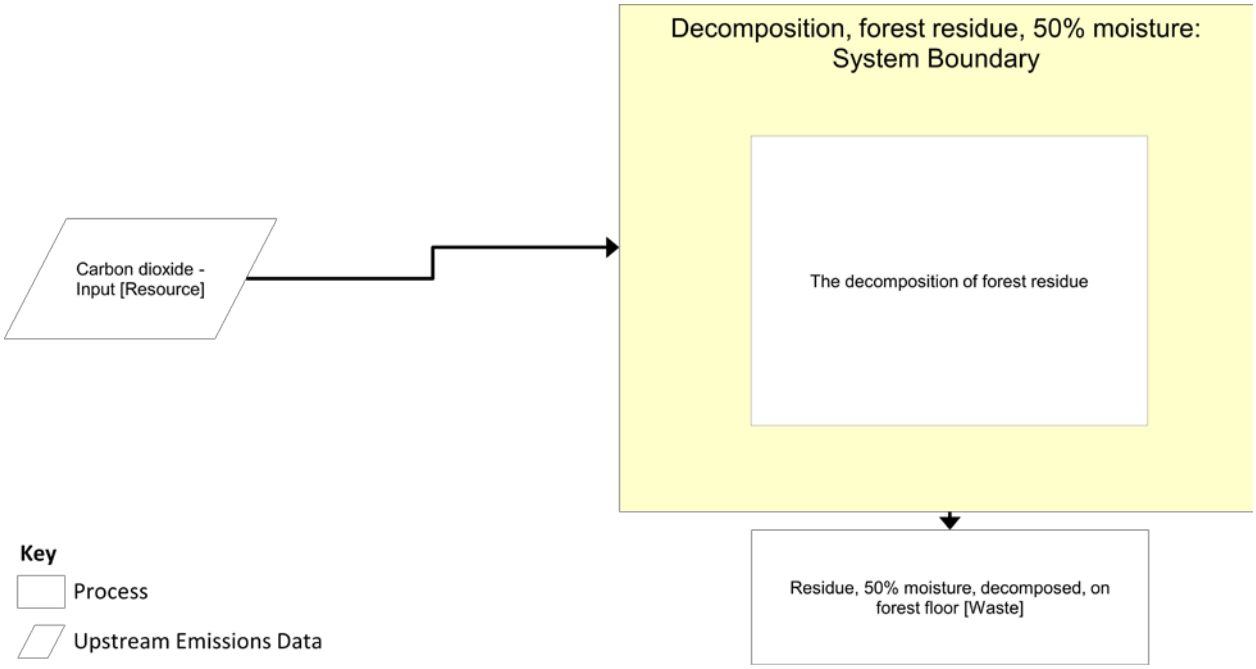

Table 1: Parameter Values

Variable	Value	Min	Max
Wood Moisture Content	0.5		
Wood Carbon Content	0.5		
Fraction Carbon to Soil	0.09	0	0.2
Fraction Carbon to Methane	0.005	0	0.1

Table 2: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
Carbon dioxide - Input [Resource]	9.17E-01	kg
Outputs		
Residue, 50% moisture, decomposed, on forest floor [Waste]	1.00E00	kg
Carbon dioxide [Inorganic emissions to air]	8.30E-01	kg
Methane [Organic emissions to air (group VOC)]	1.67E-03	kg

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

Embedded Unit Processes

None.

References

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

Palosuo 2008 — Palosuo, T. (2008). Soil carbon modelling as a tool for carbon balance studies in forestry. University of Helsinki, Helsinki. Retrieved from http://www.metla.fi/dissertationes/df61.pdf (Dissertationes Forestales 61)

Section III: Document Control Information

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