



NETL Life Cycle Inventory Data

Process Documentation File

Process Name: Tractor-tanker transport
Reference Flow: 1 kg of cargo, tractor-tanker
Brief Description: Transport of an unspecified liquid cargo

Section I: Meta Data

Geographical Coverage: USA **Region:** N/A
Year Data Best Represents: 2011
Process Type: Transport Process (TP)
Process Scope: Gate-to-Gate Process (GG)
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:

distance_1way *[km] One way travel distance*
fuel_use_empty *[MJ/km] Fuel economy empty*
fuel_use_full *[MJ/km] Fuel economy at full capacity*
cargo_volume *[l] Volume of fluid to be transported
(min based on 1000 gal, max based on
9500 gal, default is 97% full)*
fluid_density *[kg/l] Density of fluid to be transported*

Tracked Input Flows:

cargo, tractor-tanker

[Technosphere] liquid cargo to be transported by tanker

diesel, combusted in engine

*[Technosphere] diesel used for transport***Tracked Output Flows:**

cargo, tractor-tanker [Insert]

Reference flow

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage24_O_TractorTanker_Transport_Class8b_2013.01.xlsx*, which provides additional details regarding relevant calculations, data quality, and references.

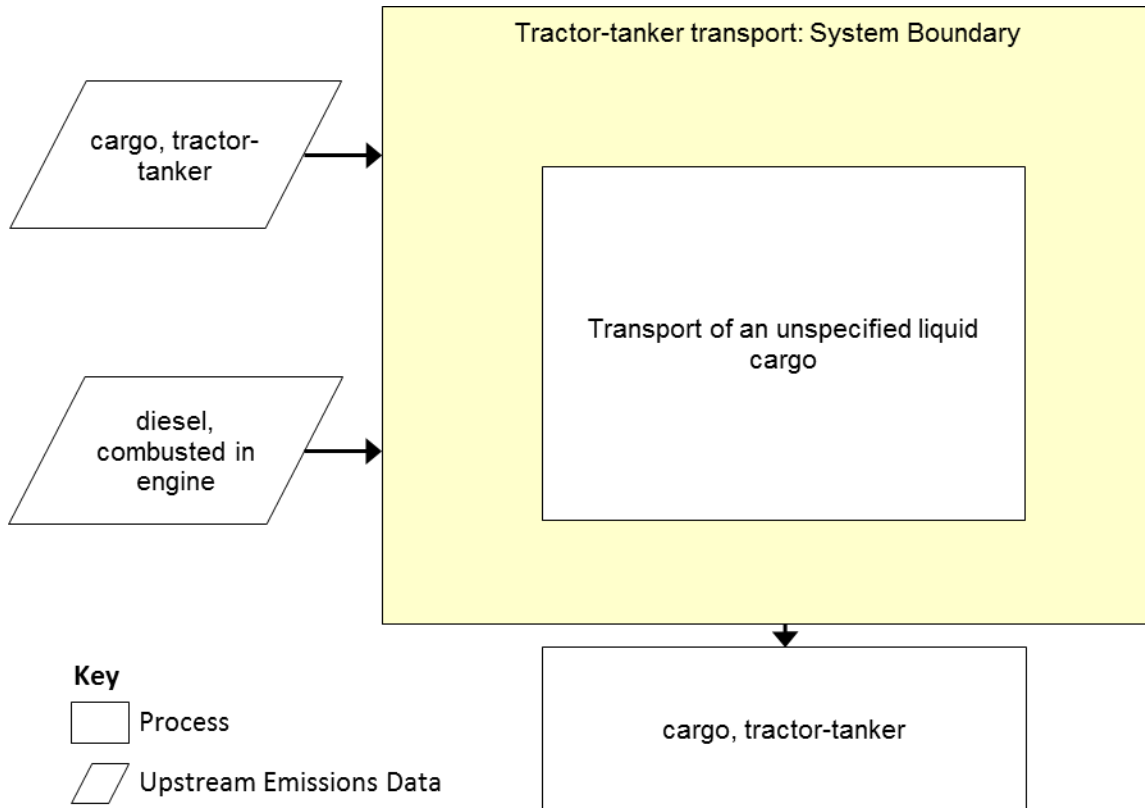
Goal and Scope

This unit process provides the fuel input to transport generic cargo a given distance by a tractor-tanker. The actual combustion of fuel occurs in an upstream process, and because this process is for generic cargo, it does not account for product losses, which are also to be accounted for in upstream processes as necessary. The reference flow of this unit process is: 1 kg of cargo, tractor-tanker.

Boundary and Description

The unit process is designed such that the type of cargo being transported and location of transport are irrelevant. This unit process assumes that the unspecified type of cargo is loaded into the tanker during a previous unit process. This unit process transports the unspecified cargo from one location to another.

Figure 1 provides an overview of the boundary of this unit process. As shown, upstream emissions associated with the production and combustion of fuel and processed cargo are accounted for outside of the boundary of this unit process. So, if the freighter is transporting cargo that will have emissions (e.g., crude transport with tank losses), then a process that accounts for those emissions will need to be connected upstream of this transport process.

Figure 1: Unit Process Scope and Boundary

The lower heating values are used for fuel energy content and are taken from the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Model and converted to mass basis using density data from the same source (ANL, 2013). The expected energy intensity of a full tanker is averaged for 2007-2011 data on Class 8 tractor-trailer fuel consumption in the Transportation Energy Data Book (ORNL, 2013). The unit process assumes that the fuel use burdens are applied to the cargo for the return trip of an empty tanker. The energy intensity of an empty tanker is from measured data of Class 8 tractor-trailers (ORNL, 2011). Additionally, this process assumes a linear relationship between the amount of cargo transported and the fuel intensity so that a partially full tanker will require less energy than a full tanker.

Table 1: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
cargo, tractor-tanker	1.00	kg
diesel, combusted in engine	7.81E-04	kg
Outputs		
cargo, tractor-tanker [Insert]	1.00	kg

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

Embedded Unit Processes

None.

References

- ANL 2013 Argonne National Laboratory. 2013. GREET.net 2013 v.1.10.9210. Argonne, IL: Argonne National Laboratory. Retrieved December 2, 2013 from <http://greet.es.anl.gov/main>
- ORNL 2013 Oak Ridge National Laboratory. 2013. Transportation Energy Data Book: Edition 32. Oak Ridge, TN: Oak Ridge National Laboratory. Retrieved December 2, 2013 from <http://cta.ornl.gov/data/download32.shtml>
- ORNL 2011 Oak Ridge National Laboratory. 2011. Class-8 Heavy Truck Duty Cycle Project Final Report. Oak Ridge, TN: Oak Ridge National Laboratory. Retrieved December 2, 2013 from http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2008-122.pdf



Section III: Document Control Information

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