NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Gasoline vehicle travel

Reference Flow: 1 mile of vehicle travel

Brief Description: Fuel consumption and GHG emissions for 1 mile of gasoline vehicle travel

Section I: Meta Data

Geographical Coverage: United States **Region:** National

Year Data Best Represents: 2013

Process Type: Transport Process (TP)

Process Scope: Gate-to-Gate Process (GG)

Allocation Applied: No

Completeness: All 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:

mpg	*[miles/gal] Fuel efficiency of vehicle*
EF_CO2	*[kg/gal] CO_2 emissions per gallon of gasoline combusted*
density	*[kg/gal] Mass density of a gallon of gasoline. Conventional gasoline has density of 6.16 lb/gal*

Tracked Input Flows:

Gasoline	*[Technosphere] Gasoline*

Tracked Output Flows:

Vehicle travel	*Reference flow*
Carbon dioxide [Inorganic emissions to air]	*Emission to air*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage5_O_Gasoline_vehicle_travel_2031.01.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 fuel consumption and emissions for 1 mile of gasoline vehicle travel. GHG emissions are the only type of combustion emission accounted for because this unit process was developed for a GHG-only project. The reference flow of this unit process is 1 mile of vehicle travel.

Boundary and Description

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This unit process factors the fuel efficiency (miles per gallon) by a CO_2 emission factor for gasoline combustion to calculate the CO_2 emissions from 1 vehicle-mile of travel for a gasoline vehicle. This calculation also required the use of a density factor to convert the CO_2 emission factor from a volumetric (gallon) to mass (kg) basis because the unit process pulls gasoline as an input in terms of mass, not volume.

Other types of GHG emissions (e.g., methane and nitrous oxide) are not produced in significant quantities from gasoline combustion in a passenger vehicle and are thus not included in this unit process.

The fuel efficiency is parameterized with 22 miles per gallon as the default value (Sivak, M & Schoettle, B.). The CO_2 emission factor is 8.91 kg CO_2 per gallon of combusted gasoline (EPA, 2013). The density of gasoline is 2.79 kg per gallon (NETL, 2008).

Figure 1: Unit Process Scope and Boundary

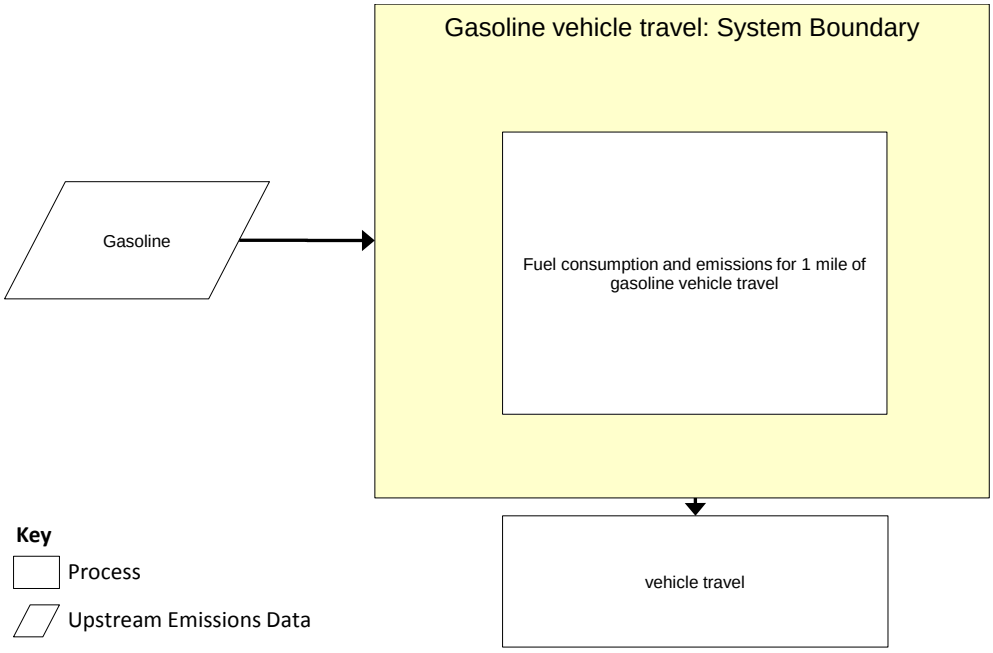

Table 1: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
Gasoline	1.24E-01	kg/mile
Outputs		
Vehicle travel	1.00	mile
Carbon dioxide [Inorganic emissions to air]	3.96E-01	kg

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

Embedded Unit Processes

None.

References

EIA, 2011. EPA, 2013. Voluntary Reporting of Greenhouse Gases Program. U.S. Department of Energy, Energy Information Administration. January 31, 2011. Retrieved at http://www.eia.gov/oiaf/1605/coefficients.html#tbl2 on March 21, 2013.

NETL, 2008 NETL, 2008. Development of Baseline Data and Analysis of Life Cycle Greenhouse Gas Emissions of Petroleum-Based Fuels. U.S. Department of Energy, National Energy Technology LaboratoryPittsburgh, PA. Retrievied from http://www.netl.doe.gov/energy-analyses/pubs/NETL%20LCA%20Petroleum-based%20Fuels%20Nov%202008.pdf on March 21, 2013.

Sivak, M & Schoettle, B. University of Michigan, 2013. Average Sales-Weighted Fuel-Economy Rating (Window Sticker) of Purchased New Vehicles for October 2007 through October 2013. University of Michigan, Transportation Research Institute. Ann Arbor, MI. Retrieved from http://www.umich.edu/~umtriswt/EDI_sales-weighted-mpg.html

Section III: Document Control Information

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