



NETL Life Cycle Inventory Data

Process Documentation File

Process Name: Combustion of Kerosene
Reference Flow: 1 kg of Kerosene
Brief Description: This unit process includes the emissions associated with the combustion of kerosene

Section I: Meta Data

Geographical Coverage: United States **Region:** N/A
Year Data Best Represents: 2012
Process Type: Energy Conversion (EC)
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:

CH4 *[kg/kg kerosene] Methane emissions per kg of combusted kerosene*
CO *[kg/kg kerosene] Carbon monoxide emissions per kg of combusted kerosene*
CO2 *[kg/kg kerosene] Carbon dioxide emissions per kg of combusted kerosene*
HONO *[kg/kg kerosene] Nitrous acid emissions per kg of combusted kerosene*

N2O	<i>[kg/kg kerosene] Nitrous oxide emissions per kg of combusted kerosene</i>
NH3	<i>[kg/kg kerosene] Ammonia emissions per kg of combusted kerosene</i>
NO	<i>[kg/kg kerosene] Nitrogen Oxide emissions per kg of combusted kerosene</i>
NO2	<i>[kg/kg kerosene] Nitrogen dioxide emissions per kg of combusted kerosene</i>
NOX	<i>[kg/kg kerosene] Nitrogen oxides emissions per kg of combusted kerosene</i>
PM10_Great	<i>[kg/kg kerosene] Particulate matter greater than 10 microns emissions per kg of combusted kerosene</i>
PM2.5_PM10	<i>[kg/kg kerosene] Particulate matter between 2.5 and 10 microns emissions per kg of combusted kerosene</i>
BC	<i>[kg/kg kerosene] Black carbon less than 2.5 microns emissions per kg of combusted kerosene</i>
OC	<i>[kg/kg kerosene] Organic carbon less than 2.5 microns emissions per kg of combusted kerosene</i>
SO2	<i>[kg/kg kerosene] Sulfur dioxide emissions per kg of combusted kerosene</i>
SOX	<i>[kg/kg kerosene] Sulfur oxides emissions per kg of combusted kerosene</i>
TOC	<i>[kg/kg kerosene] Total organic carbon emissions per kg of combusted kerosene</i>
VOC	<i>[kg/kg kerosene] Volatile organic compound emissions per kg of combusted kerosene</i>

Tracked Input Flows:

Kerosene	<i>[Technosphere] Kerosene for combustion</i>
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Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *Stage3_Kerosene_Combustion.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 combustion of kerosene utilized for several downstream processes. The reference flow of this unit process is: 1 kg of Kerosene.

Boundary and Description

This unit process provides a summary of relevant input and output flows associated with the combustion of gasoline. There are several grouping scenarios that represent the type of engine, sector, and control. The electric generation or electric power sector includes the combustion of kerosene in a reciprocating or turbine engine for electricity only or combined heat and power (CHP) (EPA, 2014). The industrial sector includes the combustion of kerosene in a reciprocating or turbine engine for producing, processing, or assembling goods; i.e. manufacturing and mining (EPA, 2014). The aircraft scenario in this process consists of either freight or passenger (Elowainy *et al.*, 2012). Non-greenhouse gas (GHG) emissions for electric generation, industrial, and commercial scenarios were taken from the U.S. EPA's (United States Environmental Protection Agency) WebFIRE database (EPA, 2012), while GHG emissions for these scenarios were derived from EPA's 2011 GHG Emission Factors Hub (EPA, 2011). All aircraft scenario emissions were derived from Argonne National Laboratory's *Life-Cycle Analysis of Alternative Aviation Fuels in GREET* (Elgowainy *et al.*, 2012).

Figure 1: Unit Process Scope and Boundary

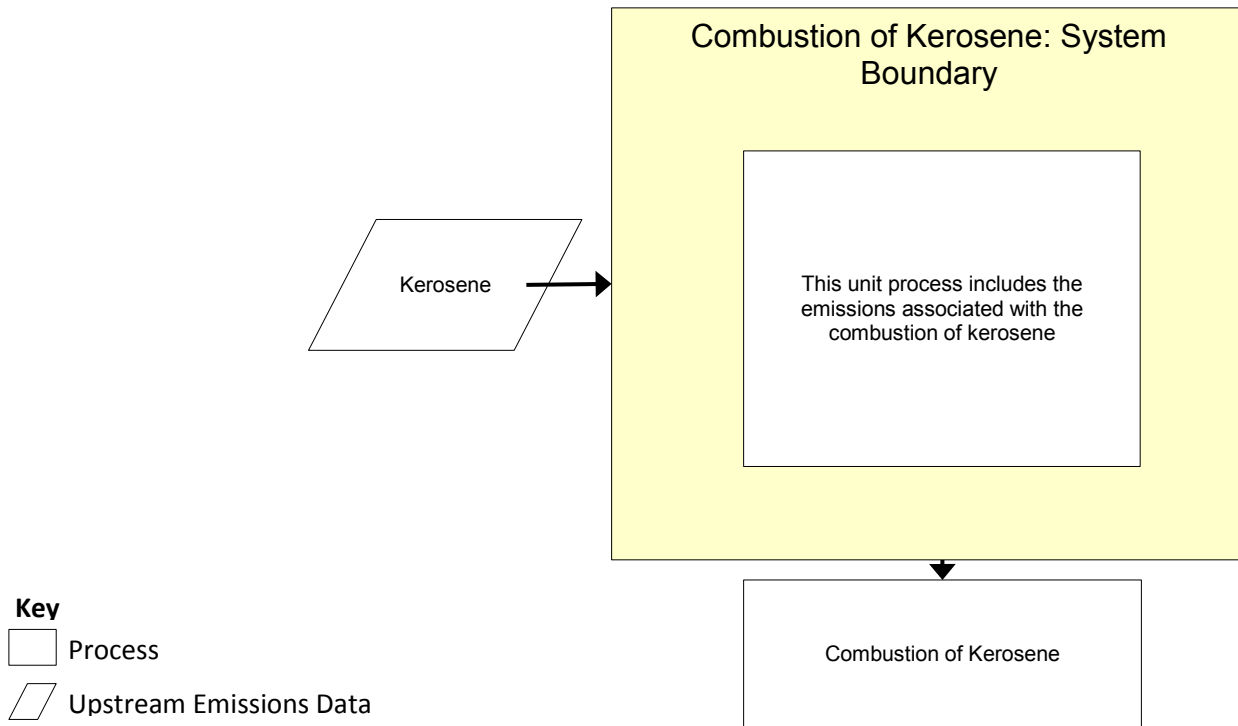


Table 1: Unit Process Input and Output Flows – Aircraft, Passenger

Flow Name	Value	Units (Per Reference Flow)
Inputs		
Energy (Kerosene) [Fuels]	1.00	kg
Outputs		
Jet/Kero Combustion, Aircraft, Passenger [Refinery Product]	1.00E+00	kg
Methane [Organic emissions to air]	5.34E-06	kg
Carbon monoxide [Inorganic emissions to air]	5.06E-03	kg
Carbon dioxide [Inorganic emissions to air]	4.14E-01	kg
Nitrous acid [Inorganic emissions to air]	1.83E-04	kg
Nitrous oxide (laughing gas) [Inorganic emissions to air]	6.76E-05	kg
Ammonia [Inorganic emissions to air]	0.00E+00	kg
Nitrogen monoxide [Inorganic emissions to air]	1.30E-02	kg
Nitrogen dioxide [Inorganic emissions to air]	1.35E-03	kg
Nitrogen oxides [Inorganic emissions to air]	0.00E+00	kg
Dust (> PM10) [Particles to air]	0.00E+00	kg
Dust (PM2,5 - PM10) [Particles to air]	0.00E+00	kg
Dust (PM2.5) [Particles to air]	1.90E-04	kg
Black carbon [Particles to air]	2.47E-05	kg
Organic carbon [Other emissions to air]	1.19E-04	kg
Sulphur dioxide [Inorganic emissions to air]	0.00E+00	kg
Sulphur oxide [Inorganic emissions to air]	3.71E-04	kg
TOC, Total Organic Carbon [unspecified]	0.00E+00	kg
NM VOC (unspecified) [Group NM VOC to air]	5.66E-04	kg

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

Embedded Unit Processes

None.

References

EPA (2014)

U.S. Energy Information Administration (2014). Definitions of EIA Distillate Categories and Fuels Contained in the Distillate Grouping. EIA. Washington, DC.
http://www.eia.gov/dnav/pet/tbldefs/pet_cons_821dsta_tbldef2.asp. Last Accessed: March 25, 2014

Elowainy *et al.* (2012)

A. Elgowainy, J. Han, M. Wang, N. Carter, R. Stratton, J. Hileman, A. Malwitz, and S. Balasubramanian (2012). Life-Cycle Analysis of

EPA (2012)

Alternative Aviation Fuels in GREET. Argonne National Laboratory. Lemont, IL.
U.S. Environmental Protection Agency (2012). WebFIRE. EPA. Washington, DC.
<http://cfpub.epa.gov/webfire/> Last Accessed: March 23, 2014



Section III: Document Control Information

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Original/no revisions

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