NETL Life Cycle Inventory Data
Process Documentation File

Process Name: LNG Regasification, Installation/Deinstallation

Reference Flow: 1 piece of LNG Regasification, Installation/Deinstallation

Brief Description: This process encompasses the installation/deinstallation of a LNG regasification facility.

Section I: Meta Data

Geographical Coverage: US **Region:** N/A

Year Data Best Represents: 2010

Process Type: Installation Process (IP)

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:

None

Tracked Input Flows:

Diesel	*[Technosphere] Amount of diesel required for the installation/deinstallation of a LNG regasification facility.*

Tracked Output Flows:

LNG Regasification, Installation/Deinstallation [Construction] *Reference flow*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage 1-5_I-D_LNG_Regasification_ Facility_2013.01.xlsx*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

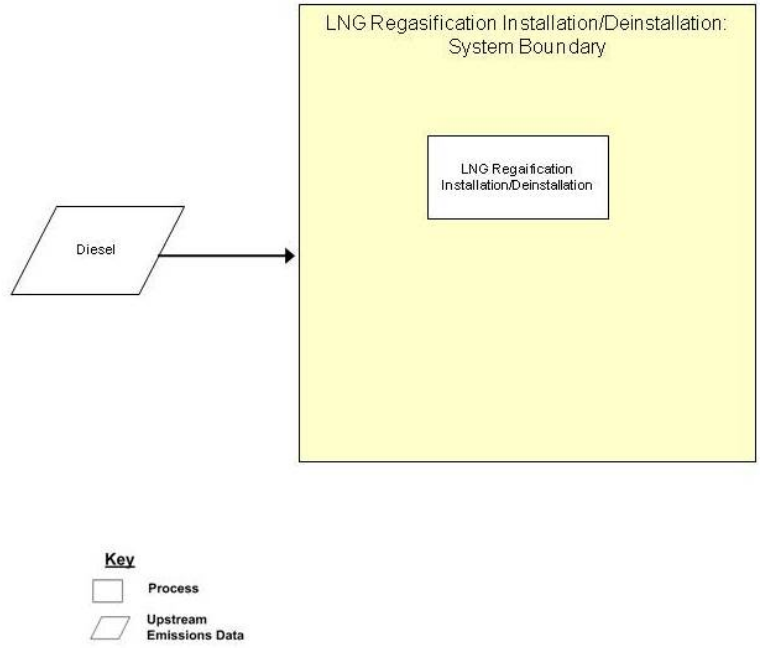
This unit process provides a summary of relevant input and output flows associated with the installation/deinstallation of a LNG regasification facility. The key input is diesel. Key outputs are air emissions from the installation/deinstallation of the regasification facility such as carbon dioxide, nitrogen oxides, and sulfur dioxide. The unit process is based on the reference flow of one piece of LNG regasification facility installation/deinstallation. The relevant flows of this unit process are described below and shown in **Figure 1**.

Boundary and Description

Figure 1 provides an overview of the boundary of this unit process. Upstream emissions for the acquisition of raw materials used for the installation/deinstallation of the regasification facility (e.g. diesel) are calculated outside the boundary of this unit process.

The activities for the installation of an LNG regasification terminal include the preparation of onshore and offshore areas. Onshore activities include those related to construction of the facility, pier rehabilitation, and pier dredging using land equipment (AES Corporation, 2007). Offshore activities include pier dredging using marine equipment. It is assumed that diesel consumption accounts for the majority of energy and emissions for the installation of the terminal.

Figure 1: Unit Process Scope and Boundary



The diesel consumption for the installation of the LNG terminal was calculated using an environmental impact statement (EIS) that listed the equipment, operating hours, horsepower, and diesel consumption for specific horsepower ranges for each installation activity (AES Corporation, 2007). The diesel consumption was shown on the basis of pounds of diesel per brake-specific horsepower-hour. The EIS also included the following air emissions: PM, NO_X, SO_2 based on a diesel sulfur content of 0.05 percent, CO, and unspecified HC (AES Corporation, 2007). The EIS did not include emissions of GHGs, NH_3, or Hg. Emission factors were applied to the calculated diesel consumption in order to calculate the emission of CO_2, N_2O, CH_4, NH_3, and Hg (EPA, 1994; Conaway, Mason et al., 2005; EIA, 2009b).

The EIS expressed the installation activities on the basis of the installation of an entire facility (AES Corporation, 2007). Using an assumed lifetime of 30 years and a daily production rate of 1.5 billion cubic feet of natural gas, this translates to a lifetime throughput of 3.13E+11 kilograms of natural gas (FERC, 2012).

Table 1: Unit Process Input and Output Flows

Flow Name	Value	Units (Per Reference Flow)
Inputs		
Diesel	1.20E+07	kg
Outputs		
LNG Regasification, Installation/Deinstallation	1.00E+00	piece
Mercury (+II) [Heavy metals to air]	1.87E-03	kg
Ammonia [Inorganic emissions to air]	1.62E+03	kg
Carbon dioxide [Inorganic emissions to air]	3.79E+07	kg
Carbon monoxide [Inorganic emissions to air]	1.84E+05	kg
Nitrogen oxides [Inorganic emissions to air]	4.19E+05	kg
Nitrous oxide (laughing gas) [Inorganic emissions to air]	9.58E+02	kg
Sulphur dioxide [Inorganic emissions to air]	8.04E+03	kg
VOC (unspecified) [Inorganic emissions to air]	2.16E+03	kg

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

Embedded Unit Processes

None.

References

AES Corporation. (2007). *Appellant's Consolidated Record Submission AES Sparrows Point FERC Application Volumes I and II, Table 9A-37a*. Office of General Counsel Coastal Zone Management Act Consistency Appeals

Federal Energy Regulatory Commission. (2012). *LNG Industry Activities.* Federal Energy Regulatory Commission. Retrieved April 30, 2012, from http://ferc.gov/industries/gas/indus-act/lng.asp

U.S. Environmental Protection Agency. (1994). *Development and Selection of Ammonia Emission Factors*. (EPA/600/SR-94/190). Research Triangle Park, NC: U.S. Environmental Protection Agency. Retrieved April 30, 2012, from http://www.sraproject.net/wp-content/uploads/2007/12/developmentandselectionofammoniaemissionfactors.pdf

Conaway, Christopher H., Mason, Robert P., Steding, Douglas J., et al. (2005). *Estimate of mercury emission from gasoline and diesel fuel consumption, San Francisco Bay area, California*. Atmospheric Environment 39 (1):101-105. http://www.sciencedirect.com/science/article/B6VH3-4DPC3KY-2/2/f5afa2357561d9a8485df82f60084a68

U.S. Environmental Protection Agency. (2009). *Natural Gas Annual 2007*. (DOE/EIA-0131(07)). Washington, DC: U.S. Energy Information Administration Retrieved

April 30, 2012, from
http://205.254.135.7/naturalgas/annual/archive/2007/pdf/nga07.pdf

Section III: Document Control Information

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