NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Processing combustion

Reference Flow: 1 kg of natural gas

Brief Description: Combustion of natural gas for energy generation at natural gas processing facilities

Section I: Meta Data

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

Year Data Best Represents: 2016

Process Type: Basic Process (BP)

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

Allocation Applied: Yes

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 Pollutants	☐ Other
Releases to Water:	☐ Inorganic Emissions	☐ Organic Emissions	☐ Other
Water Usage:	☐ Water Consumption	☐ Water Demand (throughput)	
Releases to Soil:	☐ Inorganic Releases	☐ Organic Releases	☐ Other

Adjustable Process Parameters:

3_NG_subpartC

[scf] Natural gas combusted at a processing facility

3_NG_processed

[MCF] Annual natural gas processed at a processing facility

3_NGL_processed

[bbl] Annual natural gas liquids processed at a processing facility

3_NG_equiv_mcf

[MCF] Annual natural gas and natural gas liquids processed at a processing facility, converted to equivalent energy of natural gas and then converted to units of volume.

NG_combusted

[kg] Quantity of natural gas that is combusted for energy per unit of natural gas processed

NG_gathered

[kg] Total natural gas from gathering and boosting. Equals natural gas that is combusted at the processing facility and processed natural gas that exits the processing facility.

Tracked Input Flows:

Natural gas [Intermediate Flow]

[Intermediate flow] Natural gas from gathering and boosting.

Tracked Output Flows:

Natural Gas [intermediate flow]

Reference flow

NG fuel [to combustion]

[intermediate flow] Quantity of natural gas that is combusted for energy per unit of natural gas processed

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_NG_Processing_Combustion_2018.01.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 natural gas for energy generation at natural gas processing facilities. The reference flow of this unit process is: 1 kg of natural gas

Boundary and Description

This unit process provides a summary of relevant input and output flows associated with the combustion of natural gas for energy generation at natural gas processing facilities. The reference flow of this unit process is: 1 kg of natural gas

Figure 1 shows input and output flows of the unit process. The reference flow is 1 kg of processed natural gas.

Figure 1: Unit Process Scope and Boundary

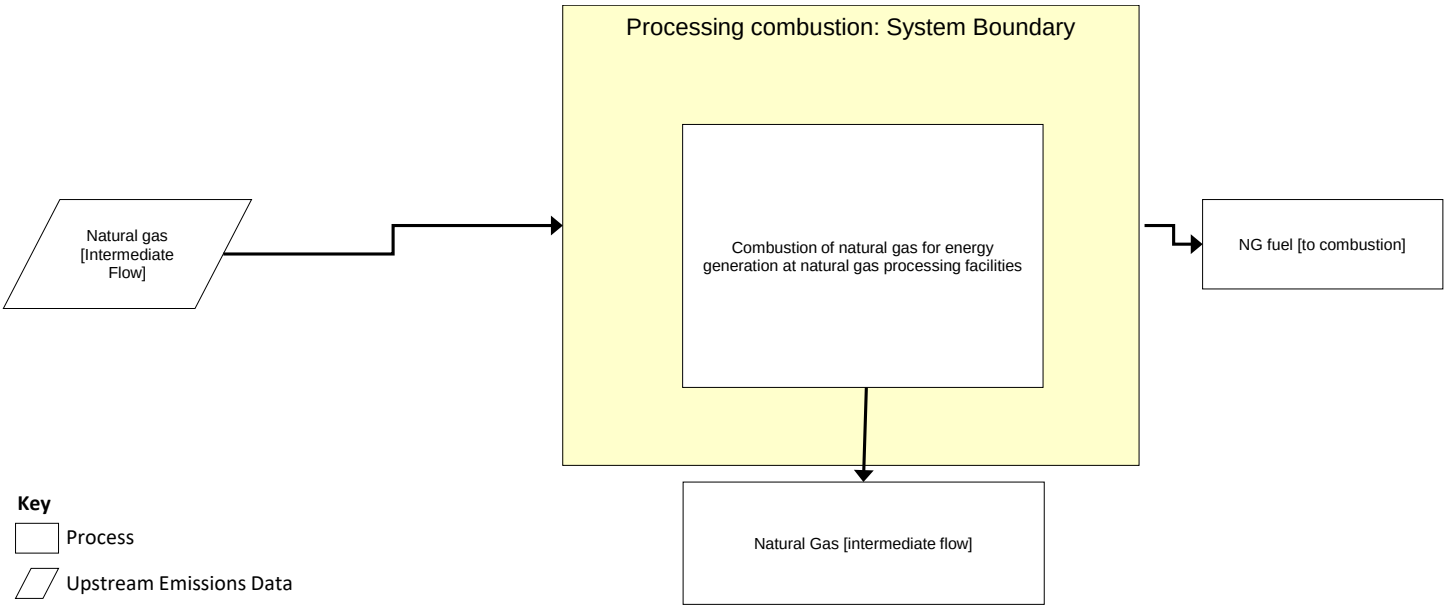

Table 1 shows the input parameters, which include the annual volume of natural gas combusted as well as total natural gas processed annually. The natural gas volumes are based on EPA's Greenhouse Gas Reporting Program (GHGRP) (EPA, 2016a). The low, expected, and high bounds represent the variability in the underlying data and were developed via throughput-weighted statistical bootstrapping. The bootstrapping technique allows computation of the confidence intervals around average activity factors. The DS file has a parameter scenario (PS) worksheet with 27 scenarios that match the scenarios for the onshore production unit processes, but at this stage in the supply chain, the average U.S. is the only supply chain scenario that is modeled. After natural gas is gathered, the remaining supply chain stages model it as a commodity for which the energy requirements and emissions are the same for all sources of natural gas.

Table 2 shows the output values for natural gas resource and venting flows for Appalachian production scenario. Inputs comprise natural gas combustion emissions and diesel combustion emissions. The input for natural gas combustion should be linked to a unit process that accounts for emissions only, not the quantity of natural gas actually combusted; the quantity of natural gas combusted is accounted for within the boundaries of this unit process. The input for diesel combustion should be linked to a unit process that accounts for both the quantity of diesel combusted and the emissions from diesel combustion. The natural gas resource input accounts for total natural gas consumed by the unit process plus the reference flow of the unit process (1 kg of natural gas processed). The only output of this unit process is the reference flow.

Table 1: Input Parameters

Parameter	Expected Value	Low	High	Units	Description
Combustion activity					
3_NG_subpartC	7.725E+08	6.473E+08	9.102E+08	scf	Natural gas combusted at a processing facility
3_NG_processed	3.360E+07	2.840E+07	3.880E+07	MCF	Annual natural gas processed at a processing facility
3_NGL_processed	0.000E+00	0.000E+00	0.000E+00	bbl	Annual natural gas liquids processed at a processing facility

Table 2: Unit Process Input and Output Flows

Flow Name	Expected	Low	High	Units (Per Reference Flow)
Inputs				
Natural gas [Resource]	1.023E+00	1.023E+00	1.023E+00	kg NG
Outputs				
Natural Gas [intermediate flow]	1.00	1.00	1.00	kg NG
NG fuel [to combustion]	2.299E-02	2.279E-02	2.346E-02	kg NG

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

Note: Inventory items not included are assumed to be zero based on best engineering judgment or assumed to be zero because no data was available to categorize them for this unit process at the time of its creation.

Embedded Unit Processes

None.

References

EPA. 2016a. Greenhouse Gas Reporting Program. Environmental Protection Agency. https://www.epa.gov/enviro/greenhouse-gas-customized-search. Accessed August 22, 2018.

Section III: Document Control Information

Date Created: January 14, 2019

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