



# NETL Life Cycle Inventory Data

## Process Documentation File

**Process Name:** Distribution combustion compressor drivers  
**Reference Flow:** 1 kg of natural gas  
**Brief Description:** Combustion of natural gas by compressor drivers during distribution

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### Section I: Meta Data

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**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:** 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 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:**

**7\_COMB\_CO2\_cd**

*[tonnes] CO2 emissions from distribution combustion by compressor drivers.*

**7\_NG\_deliv**

*[MCF] Annual natural gas delivered by distribution systems, volume*

**7\_NG\_deliv\_kg**

*[kg] Annual natural gas delivered by distribution systems, mass*

**NG\_combusted**

*[kg] Quantity of natural gas that is combusted by compressor drivers per unit of natural gas distributed. Formula uses an emission factor of 2.826 kg CO<sub>2</sub> per combustion of 1 kg of NG.*

### **NG\_transpipeline**

*[kg] Total natural gas from transmission pipelines, which is the sum of natural gas that is flared and natural gas processed.*

### **Tracked Input Flows:**

#### **Natural gas [Intermediate Flow]**

*[Intermediate flow] Natural gas input, delivered via transmission pipeline. This includes NG eventually delivered to consumer and NG combusted for compression energy.*

### **Tracked Output Flows:**

#### **Natural Gas [intermediate flow]**

*Reference flow*

#### **NG fuel [to combustion]**

*[kg] Quantity of natural gas that is combusted by compressor drivers per unit of natural gas distributed. Formula uses an emission factor of 2.826 kg CO<sub>2</sub> per combustion of 1 kg of NG.*

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## **Section II: Process Description**

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### **Associated Documentation**

This unit process is composed of this document and the data sheet (DS) *DS\_NG\_Distribution\_Combustion\_Compressors\_2018.01.xlsx*, which provides additional details regarding relevant calculations, data quality, and references.

### Goal and Scope

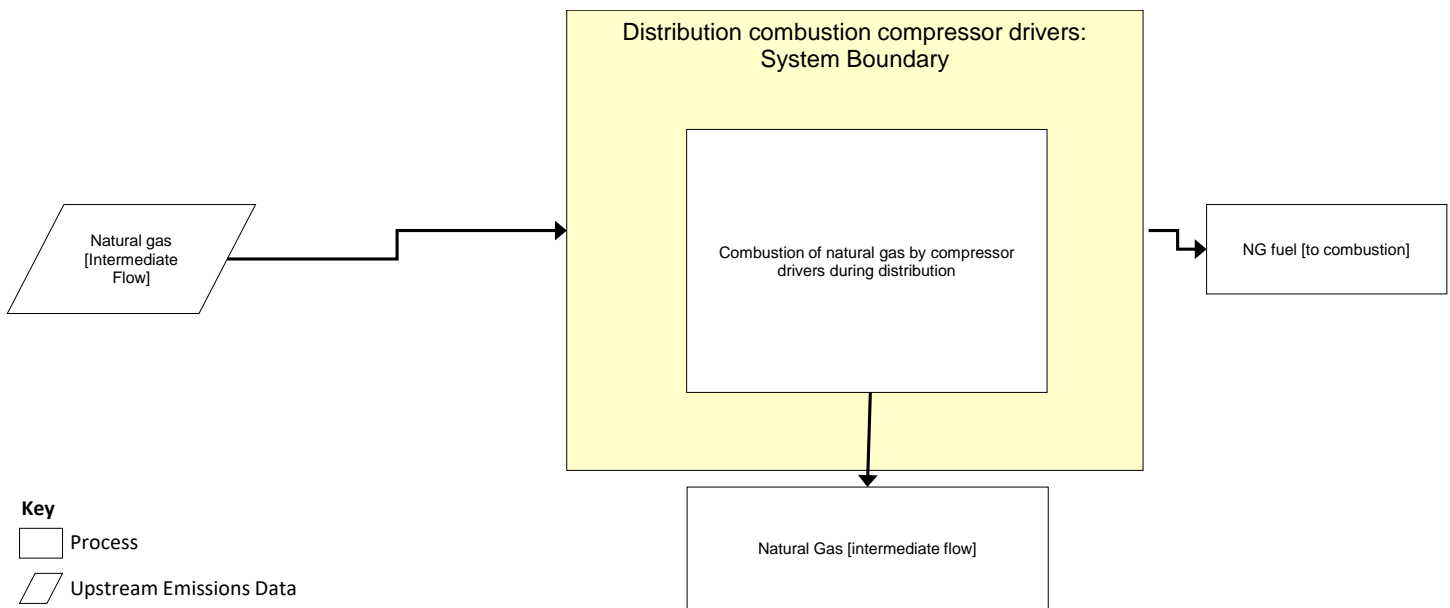
This unit process provides a summary of relevant input and output flows associated with the combustion of natural gas by compressor drivers during distribution. The reference flow of this unit process is: 1 kg of natural gas

### Boundary and Description

This unit process provides a summary of relevant input and output flows associated with the combustion of natural gas by compressor drivers during distribution. 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 distributed natural gas.

**Figure 1: Unit Process Scope and Boundary**



**Table 1** shows the input parameters, which includes the emission rates from distribution combustion as well as total natural gas delivered 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 distributed). The only output of this unit process is the reference flow.

**Table 1: Input Parameters**

Parameter	Expected Value	Low	High	Units	Description
Combustion activity					
7_COMB_CO2_cd	1.873E+03	7.578E+02	3.269E+03	tonnes	CO2 emissions from distribution combustion by compressor drivers.
7_NG_deliv	2.472E+08	2.122E+08	2.800E+08	MCF	Annual natural gas delivered by distribution systems, volume

**Table 2: Unit Process Input and Output Flows**

Flow Name	Expected	Low	High	Units (Per Reference Flow)
<b>Inputs</b>				
Natural gas [Resource]	1.00014E+00	1.00007E+00	1.00022E+00	kg NG
<b>Outputs</b>				
Natural Gas [intermediate flow]	1.00	1.00	1.00	kg NG
NG fuel [to combustion]	1.408E-04	6.635E-05	2.169E-04	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.

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**Section III: Document Control Information**

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**Date Created:** January 14, 2019

**Point of Contact:** Timothy Skone (NETL), Timothy.Skone@NETL.DOE.GOV

**Revision History:**

Original/no revisions

**How to Cite This Document:** This document should be cited as:

NETL (2018). NETL Life Cycle Inventory Data – Unit Process: Distribution combustion compressor drivers. U.S. Department of Energy, National Energy Technology Laboratory. Last Updated: October 2018 (version 01). [www.netl.doe.gov/LCA](http://www.netl.doe.gov/LCA) (<http://www.netl.doe.gov/LCA>)

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**Section IV: Disclaimer**

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