NETL Life Cycle Inventory Data
Process Documentation File

Process Name: Natural Gas Extraction, Other Venting Point Sources

Reference Flow: 1 kg of Natural Gas Extracted

Brief Description: This unit process quantifies the mass of methane emitted as a result of other venting from point sources from unidentified natural gas extraction processes.

Section I: Meta Data

Geographical Coverage: United States **Region:** N/A

Year Data Best Represents: 2006

Process Type: Extraction Process (EP)

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:

Vent_rate	*[dimensionless] Adjustable parameter; fraction of extracted natural gas that is vented by an unidentified process; e.g. 0.01 = 1%.*

Tracked Input Flows:

Natural gas USA [Natural gas (resource)]	*Natural gas from nature*

Tracked Output Flows:

Natural Gas Produced	*Reference flow*
Vented gas [intermediate product]	*Intermediate product*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_Stage1_O_NG_Extraction_OtherVenting_PointSource_2011.01.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

This unit process accounts for natural gas that is vented by unidentified processes at a natural gas well. Unidentified processes include those that are not modeled separately in other unit processes in NETL's natural gas model. The reference flow of this unit process is 1 kg NG of extracted natural gas.

Boundary and Description

Routine emissions from natural gas extraction include gas that is released from wellhead and gathering equipment. These emissions are referred to as "other point source emissions." A portion of these emissions are flared while the balance is vented to the atmosphere. For conventional wells, 51 percent of other point source emissions are flared while for unconventional wells, a 15 percent flaring rate is used (EPA, 2011).

Data for the other point source emissions from natural gas extraction are based on EPA data that are based on 2006 production (EPA, 2011) and show the annual methane emissions for onshore and offshore wells. EPA's data were converted from an annual basis to a unit-of-production basis by dividing the methane emission rate by the natural gas production rate in 2006. In 2006 the U.S. extracted 19,950,828 MMCF of onshore natural gas and 3,584,190 MMCF of offshore natural gas (EIA, 2011).

Table 1 shows other point source emissions from onshore and offshore natural gas extraction and the corresponding emission factors.

Figure 1: Unit Process Scope and Boundary

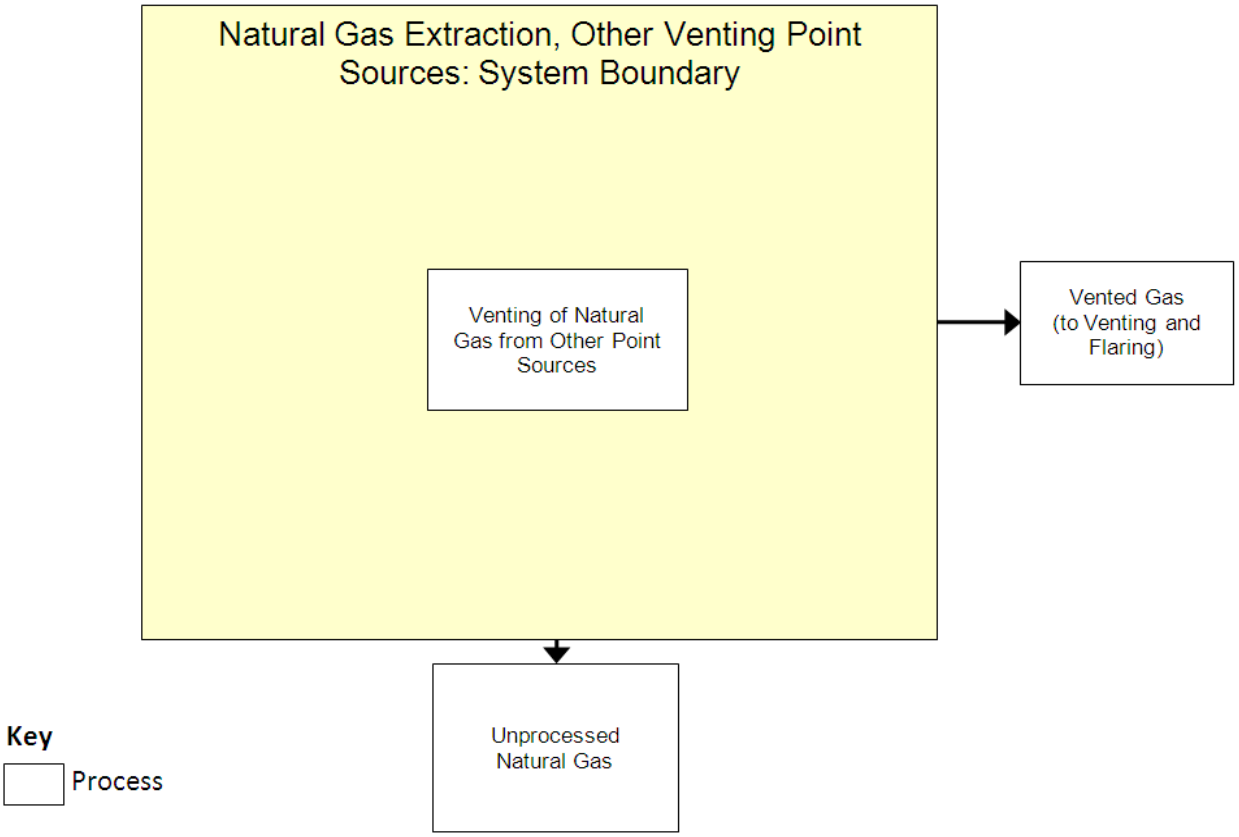

Table 1: Other Point Source Emissions from Natural Gas Extraction

Onshore Extraction Activity	Value	Units
Normal Fugitives, Heaters	1,463	MMCF/yr
Blowdowns, Vessel	31	MMCF/yr
Total Emissions	1,494	MMCF/yr
Onshore Natural Gas Extraction Rate	19,950,828	MMCF/yr
Emission Factor	7.49E-05	kg CH_4/kg NG
Offshore Extraction Activity	**Value**	**Units**
Boiler/heater/burner	0.8	MMCF/yr
Diesel or gasoline engine	0.01	MMCF/yr
Mud Degassing	8	MMCF/yr
Storage Tanks	7	MMCF/yr
Variable Exhaust Nozzle (VEN) Gas	124	MMCF/yr
Total Emissions	140	MMCF/yr
Offshore Natural Gas Extraction Rate	3,584,190	MMCF/yr
Emission Factor	3.90E-05	kg CH_4/kg NG

Table 2: Unit Process Input and Output Flows

Flow Name	Onshore Extraction	Offshore Extraction	Units (Per Reference Flow)
Inputs			
Natural gas USA [Natural gas (resource)]	7.49E-05	3.90E-05	kg
Outputs			
Natural Gas Produced	**1.00**	**1.00**	**kg**
Vented gas [intermediate product]	**7.49E-05**	**3.90E-05**	**kg**

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

Embedded Unit Processes

None.

References

API. (2009). Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry. Retrieved from http://www.api.org/ehs/climate/new/upload/2009_GHG_COMPENDIUM.pdf

EIA. (2011). Natural Gas Gross Withdrawals and Production. U.S. Energy Information Administration. Retrieved April 5, 2011, from http://www.eia.doe.gov/dnav/ng/ng_prod_sum_a_EPG0_VRN_mmcf_a.htm

EPA. (2011). Background Technical Support Document - Petroleum and Natural Gas Industry.Washington, D.C.

Section III: Document Control Information

Date Created: January 3, 2013

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 (2011). NETL Life Cycle Inventory Data – Natural Gas Extraction, Other Venting Point Sources. U.S. Department of Energy, National Energy Technology Laboratory. Last Updated: May 2011 (version 01). www.netl.doe.gov/energy-analyses (http://www.netl.doe.gov/energy-analyses)

Section IV: Disclaimer

Neither the U.S. Department of Energy (DOE) National Energy Technology Laboratory (NETL) nor any person acting on behalf of these organizations:

A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this document, or that the use of any information, apparatus, method, or process disclosed in this document may not infringe on privately owned rights; or

B. Assumes any liability with this report as to its use, or damages resulting from the use of any information, apparatus, method, or process disclosed in this document.

Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by NETL. The views and opinions of the authors expressed herein do not necessarily state or reflect those of NETL.