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Calculations of greenhouse gas (GHG) emissions throughout the liquefied natural gas (LNG) chain

Part 1: General

~~*Calcul des émissions de GES dans la chaine GNL – Partie 1 : Généralités*~~

PROOF

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 9, *Production, transport and storage facilities for cryogenic liquefied gases*.

A list of all parts in the ISO 6338 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Natural gas will play a key role in the energy transition (e.g. by replacing coal to produce electricity) and the use of liquefied natural gas (LNG) to transport natural gas is expected to increase. The process of liquefying natural gas is energy-intensive. Gas producers are increasingly accountable for their greenhouse gas (GHG) emissions and the ambition to reduce them. Furthermore, there is an emerging marketing demand for GHG data to enable commercial mechanisms such as offsetting to be utilized.

There is no standardized and auditable methodology to calculate the carbon footprint of the whole LNG chain (including but not limited to the well, upstream treatment, transportation, liquefaction, shipping, regasification and end user distribution). Various standards indicate possible approaches but are inconsistent in their results or not easily applicable.

The ISO 6338 series covers each part of the LNG chain, starting with liquefaction.

Attention should be paid to activities that can occur in different parts (e.g. gas treatment and distribution upstream of the liquefaction plant).

NOTE It is not possible to make like-for-like comparisons, or define a certification scheme, for ~~oneblock~~one block only.

An example for e-methane is given in Annex C~~Annex D.~~

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Calculations of greenhouse gas (GHG) emissions throughout the liquefied natural gas (LNG) chain

Part 1: General

1 Scope

This document:

— provides the general part of the method to calculate the greenhouse gas (GHG) emissions throughout the liquefied natural gas (LNG) chain, a means to determine their carbon footprint;

— defines preferred units of measurement and necessary conversions;

— recommends instrumentation and estimation methods to monitor and report GHG emissions. Some emissions are measured; and some are estimated.

This document covers all facilities in the LNG chain. The facilities are considered "under operation", including emissions associated with initial start-up, maintenance, turnaround and restarts after maintenance or upset. The construction, commissioning, extension and decommissioning phases are excluded from this document but can be assessed separately.

This document covers all GHG emissions. These emissions spread across scope 1, scope 2 and scope 3 of the responsible organization. Scope 1, 2 and 3 are defined in this document. All emissions sources are covered including flaring, combustion, cold vents, process vents, fugitive leaks and emissions associated with imported energy.

This document describes the allocation of GHG emissions to LNG and other hydrocarbon products where other products are produced (e.g. LPG, domestic gas, condensates, sulfur).

This document does not cover specific requirements on natural gas production and transport to LNG plant, liquefaction, shipping and regasification.

This document is applicable to the LNG industry.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14044, *Environmental management — Life cycle assessment — Requirements and guidelines*

ISO 14064-1, *Greenhouse gases — Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*

API *Consistent Methodology for Estimating Greenhouse Gas Emissions from Liquefied Natural Gas (LNG) Operations*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14064-1 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
global warming potential
GWP
ratio of the time-integrated radiative forcing (warming effect) from the instantaneous release of 1 kg of the GHG relative to that from the release of 1 kg of CO_2

3.2
scope 1
direct greenhouse gas emissions
direct GHG emissions
emissions coming from sources that are owned or controlled by the facility

Note 1 to entry: This can be the emissions that are directly created by product fabrication or synthesis, for example, combustion fumes from a refinery.

3.~~37~~3
scope 2
indirect greenhouse gas emissions from purchased and consumed energy
indirect GHG emissions from purchased and consumed energy
emissions from the generation of imported electricity, steam, and heating/cooling consumed by the facility

Note 1 to entry: These emissions physically occur at the facility where electricity, steam and cooling or heating are generated but as a user of the energy, the consuming party is still responsible for the greenhouse gas emissions that are being created.

3.4
scope 3
other indirect greenhouse gas emissions
other indirect GHG emissions
emissions from sources that are not owned and not directly controlled by the facility ~~(3.1)~~

Note 1 to entry: However, they are related to the company's activities. This is usually considered to be the supply chain of the company, so emissions caused by vendors within the supply chain, outsourced activities, and employee travel and commute. In many industries, these emissions account for the biggest amount of GHG emissions. This is due to the fact that in today's economy, many tasks are outsourced and few companies own the entire value chain of their products.

3.5
quality assurance
QA
planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process

3.6
quality control
QC
planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process

4 Principles

4.1 General

The application of the principles specified in 4.2~~4.2~~ to 4.7~~4.7~~ is fundamental to guaranteeing that GHG calculations are a true and fair account.

4.2 Relevance

Use data, methods, criteria, and assumptions that are appropriate for the intended use of reported information. The quantification and reporting of GHG emissions shall include only information that users – both internal and external to the plant – need for their decision-making. This information shall thus fit the intended purpose of the GHG project and meet the expectations or requirements of its users. Data, methods, criteria, and assumptions that are misleading or that do not conform to this document are not relevant and shall not be included.

4.3 Completeness

Consider all relevant information that can affect the accounting and quantification of GHG reductions, and complete all requirements. All relevant information shall be included in the quantification of GHG emissions. A GHG monitoring plan shall also specify how all data relevant to quantifying GHG reductions will be collected.

4.4 Consistency

Use data, methods, criteria, and assumptions that allow meaningful and valid comparisons. The credible quantification of GHG emissions requires that methods and procedures be always in the same manner, that the same criteria and assumptions be used to evaluate significance and relevance, and that any data collected and reported be compatible enough to allow meaningful comparisons over time.

4.5 Transparency

Provide clear and sufficient information for reviewers to assess the credibility and reliability of GHG emissions claims. Transparency is critical for quantifying and reporting GHG reductions, particularly given the flexibility and policy-relevance of many GHG accounting. GHG information shall be compiled, analysed, and documented clearly and coherently so that reviewers can evaluate its credibility. Information relating to the GHG assessment boundary and the estimation of baseline emissions should be sufficient to enable reviewers to understand how all conclusions were reached.