

# gas as a marine fuel

Simultaneous Operations  
(SIMOPs) during LNG  
bunkering.

## safety

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## Disclaimer

While the advice given in this “Simultaneous Operations (SIMOPs) during LNG bunkering” has been developed using the best currently available information, it is intended solely as guidance to be used at the owner’s own risk.

## Acknowledgements

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# Foreword



The use of LNG as a fuel offers ship operators significant opportunities as environmental constraints evolve. However, LNG has different characteristics to other marine fuels. It is important that the effects of this are understood so that LNG is used safely and in a manner that is practicable for all parties involved in bunkering operations. This SGMF guidance provides stakeholders with a vital point of reference.

This document addresses the potential for interaction between LNG bunkering and other activities, with regard to the receiving vessel and the surrounding area. Activities carried out at the same time as bunkering are referred to as SIMultaneous OPERations (SIMOPS). They include both regular activities, such as cargo or passenger loading, and unplanned events.

The need to risk assess SIMOPS is not new, but the introduction of LNG bunkering creates a new context. This guidance has therefore concentrated on how to apply existing and well-tested techniques to LNG bunkering operations, and defines the roles and responsibilities of the various stakeholders involved. It provides a risk-based framework and can be applied to any bunkering arrangement, in any location.

As the demand for LNG fuel increases, and more facilities and personnel become involved, there is a clear need to inform and set expectations.

I have been involved in researching and assessing the hazards associated with oil and gas operations – including LNG – for nearly four decades. A common theme in accidents is a lack of proper assessment of the hazards and risks, particularly in environments where there are multiple activities happening simultaneously. If you don't assess the hazards properly, you can't control and mitigate the risks.

The framework described in this guidance is not prescriptive. Instead, it places the onus on stakeholders to assess and understand their operations and to control risks effectively. In this, I hope it encourages the management of SIMOPS in such a way that LNG's enviable safety record is maintained as the use of LNG as a marine fuel grows.

**Mike Johnson**

*DNV GL / Chairman, SGMF WG8 SIMOPS*

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# Abbreviations

**ALARP/ALARA** – As Low As Reasonably Practicable/As Low As Reasonably Achievable without incurring excessive cost

**API** – American Petroleum Institute

**ASME** – The American Society of Mechanical Engineers

**BAT/BACT** – Best Available Technology/ Best Available Control Technology. The environmental equivalent of ALARP

**BOG** – Boil-Off Gas. The vapour created by evaporation from the surface of a volume of LNG

**CCNR** – Central Commission for Navigation of the Rhine. The body that controls regulations on the major international inland waterways of Europe

**Competent Authority** – Any national, regional or local authority or authorities empowered, alone or together, to act as the regulatory body on LNG bunkering

**EN** – European (Standard) Norm

**ESD** – Emergency Shut-Down. A control system and associated components that when activated

stop operations in a controlled manner and return the system to a safe state

An ESD system may have several sequential stages, with the operation of each stage dependent on the potential consequences of the situation. During bunkering these stages are commonly designated ESD-1 and ESD-2:

- ESD-1 – where transfer of LNG to the bunkering vessel is stopped
- ESD-2 – where the transfer system is disconnected from the bunkering ship

In some ship types there may be additional definitions of the ESD system but these are outside the scope of this document

**GIIGNL** – Groupe International des Importateurs de Gaz Naturel Liquéfié. The industry group made up of the world's main LNG importers

**HAZID** – HAZard IDentification. There are a number of recognised methods for the formal identification of hazards. For example, a brainstorming exercise using checklists where the potential hazards in an



operation are identified and gathered in a risk register to be addressed and managed

**IAPH** – The International Association of Ports and Harbours

**IGF Code** – The International Code of Safety for Ships using Gases or other Low-Flashpoint Fuels

**IMCA** – The International Marine Contractors Association. An industry group made up of the world's main offshore, marine and underwater engineering contractors

**IMO** – The International Maritime Organization. The United Nation's maritime regulatory body

**ISM** – The International Safety Management Code published by the IMO

**ISO** – The International Organization for Standardization. An international standard-setting body composed of representatives from various national standards organizations

**LNG** – Liquefied Natural Gas. Natural gas that has been cooled

to the point where it is liquid at a stated pressure. GNL in French, Spanish and Italian (French Gaz Naturel Liquéfié)

### **Monitoring & Security Area**

– An area around the LNG transfer equipment that needs to be monitored as a precautionary measure to prevent interference with the transfer operation

**NFPA** – The National Fire Protection Association. A US-based standards body for fire, electrical and related hazards

**NGO** – Non-Governmental Organisation. A not-for-profit organisation independent of governments or international governmental organisations

**OCIMF** – The Oil Companies International Marine Forum. An association representing operators of oil tankers and terminals, dealing with safety and environmental issues and specifically associated with mooring and berthing guidelines

**PIC** – Person In Charge. The person responsible for the management of an operation such as bunkering

# Abbreviations

**POAC** – Person in Overall Control. The person responsible for the management of the LNG bunkering process and any SIMOPs being undertaken through one or more PICs

**PPE** – Personal Protective Equipment

**QRA** – Quantitative Risk Assessment. A formalised, numerical risk assessment method for calculating a risk level for comparison with defined risk criteria

**Safety Zone** – A three-dimensional envelope of distances inside which the majority of leak events occur and where, in exceptional circumstances, there is a recognised potential to harm life or damage equipment/ infrastructure in the event of a leak of gas and/or LNG

**SGMF** – The Society for Gas as

a Marine Fuel. An international organisation providing guidance on the safe and responsible use of low flashpoint fuels in a marine context

**SIGTTO** – The Society of International Gas Tanker and Terminal Operators. An organisation representing operators of gas tankers and import and export terminals, covering all liquefied gases in bulk

**SIMOP** – SIMultaneous Operation. Defined in this document as “LNG bunkering plus one, or more, other activities and/or operations conducted at the same time where their interaction may adversely impact safety, ship integrity and/or the environment”

**SMS** – Safety Management System, as defined by the ISM Code





# 1. Purpose and Scope

## 1.1. Aim

This document aims to provide guidance on how to determine which other ship and port operations may be conducted safely while an LNG-fuelled ship is being bunkered. The operations occurring around the bunkering activity are often referred to as SIMultaneous OPERations, or SIMOPs.

The need for SIMOPs assessment is not new. It was established in the offshore oil and gas industry – for example, by the International Marine Contractors Association (IMCA) – and is now common practice on all types of ships. In this document, SGMF is not creating new rules for SIMOPs but is building on existing good practice so that it can be applied more easily to LNG/gas-fuelled ships and bunkering locations.

LNG is a boiling liquid at fuel storage conditions and normally there is a gas phase associated with the liquid. It presents different hazards compared with bunker oil so there is a need to manage these appropriately during bunkering. As a consequence, at this early stage of the industry there is a need for more detailed guidance and procedures to reflect the different hazard profile of LNG. The Society for Gas as a Marine Fuel (SGMF) has applied the latest thinking in this guidance to assist ships, ports, and bunkering facility owners and operators to achieve good practice and to encourage consistency.

This document:

- identifies the additional risks that SIMOPs might generate
- examines strategies to reduce SIMOPs risks
- reviews risk assessment and decision-making techniques involved in allowing SIMOPs
- provides an overview of the documentation likely to be necessary to justify SIMOPs taking place

For most combinations of gas-fuelled vessels, bunkering infrastructure and ports it should be possible to identify operations, both routine and

more occasional, that may need to be carried out at the same time as LNG bunkering. This analysis should also be able to identify risks and restrictions to allow the development of SIMOPs plans, transportable without major modification across a range of locations.

## **1.2. Supporting Documentation**

These guidelines were created collaboratively by industry members of SGMF. The guidance assumes that receiving ships and LNG supply facilities are designed according to the relevant and applicable codes, regulations and guidelines. These include those published by the International Maritime Organization (IMO), ISO, API, ASME, EN and NFPA standards-making bodies, Classification Societies, and international industry bodies such as SGMF, SIGTTO and OCIMF.

International, national or local regulating bodies will define the minimum safety requirements. Competent authorities will enforce the regulations and will define procedures for compliance. The applicable regulations should be clearly identified and known by all parties involved in LNG bunkering before operations begin and should be reviewed in the planning stage of bunkering.

Besides the statutory regulations, the participants in LNG bunkering operations must anticipate and comply with company and terminal policy, procedures and good practice guidelines.

## **1.3. Bunkering Types and Activities**

These guidelines address the following operational scenarios:

- ship-to-ship bunkering
- truck-to-ship bunkering
- shore-based terminal-to-ship bunkering
- portable LNG tanks used as fuel tanks

More details of each are provided in the SGMF publication “FP07-1 – gas as a marine fuel, safety guidelines, bunkering”.



the society for gas as a marine fuel

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