

**Workshop on
LNG Bunkering to Port Authorities &
Administrations**

1 – 2.12.2016

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List of Abbreviations

EMSA	European Maritime Safety Agency
EU	European Union
GT	Gross Tonnage
IMO	International Maritime Organization
MARPOL	International Convention for the Prevention of Pollution from Ships
RO	Recognised Organisation
LNG	Liquefied Natural Gas
SIMOP	Simultaneous Operation
EC	European Commission
ISO	International Standardization Organization
IACS	International Association of Classification Societies
HAZID	Hazard Identification
PIC	Person in Charge
IAPH	International Association of Ports and Harbours
ESPO	European Sea Ports Organization
IGF	International Code of Safety for Ships using Gases or other Low-flashpoint Fuels

1. Introduction

The European Maritime Safety Agency (EMSA) has been established under Regulation (EC) 1406/2002 (as amended) of the European Parliament and of the Council for the purpose of ensuring a high, uniform and effective level of maritime safety, maritime security, prevention of and response to pollution caused by ships as well as response to marine pollution caused by oil and gas installations.

Articles 1 and 2 (d) of the amended Founding Regulation foresee that the Agency shall assist the Commission in the performance of tasks assigned in legislative acts of the Union, including the ones in the field of prevention of pollution caused by ships. To that end, EMSA works on the development of mechanisms to support the implementation and uniform enforcement of Directive 2014/94/EC on alternative fuels infrastructure and in particular the development of the EMSA LNG Bunkering Guidance for Port Authorities and Administrations.

The European Commission, DG MOVE, has, through its letter dated 25 August 2016, launched a call for a survey on LNG Bunkering to Port Authorities/Administrations and having informed Member States for a Workshop to be organized by EMSA for the discussion of the subject matter. In the said letter Member States were invited to address an online questionnaire which has been prepared by EMSA in two separate parts:

- **Part A** - on LNG Bunkering Planning & Preparation - <https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartA> - addressed to all port authorities / administrations either already with LNG bunkering experience or still envisaging for its effective implementation
- **Part B** - on LNG Bunkering Operations - <https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartB> - in principle, only directed to those port authorities / administrations which already have experience with actual LNG Bunkering Operations, on whichever mode.

In order to report and discuss the results of the online survey, discuss the draft EMSA Guidance on LNG Bunkering to Port Authorities and Administrations, and to facilitate harmonization and exchange of best practices in relation to these topics, EMSA has organized a Workshop on **1 and 2 December 2016**, having invited 2 (two) participants from each EU Member State, one from a **competent Port Authority** (preferably already involved in LNG bunkering or where LNG bunkering is planned) and one from the **competent authority responsible for the implementation of Directive 2014/94** (with respect to LNG for maritime transport)

The meeting was opened by Mr. Georgios Christofi, Head of Unit B.3 Environment and Capacity Building. Thirty five (35) participants have been present in the Workshop, including twelve (12) EU Member States, Norway and 3 (three) expert participants. The event allowed for the discussion and exchange of views about general issues on LNG Bunkering, Risk & Safety, including Risk Criteria, Safety Distances, Simultaneous Operations and Permitting, amongst other topics related to LNG Bunkering Operations.

The Workshop on LNG Bunkering to Port Authorities and Administrations has addressed in particular the results of the EMSA online survey, as mentioned above, with the highest possible focus given to those points where the survey has revealed that more needs to be done in order to support harmonization throughout the EU ports regarding their action and controls exercised as competent authorities in the frame of LNG bunkering.

The present document reports on the main subjects discussed during the Workshop, highlighting in particular the agreement reached

2. Background

2.1 LNG as an Alternative Fuel for Shipping

The present work on LNG as fuel, within the frame of specific EU legal instruments such as Directives 2014/94/EC or 2012/33/EC

LNG is today a technically feasible option as an alternative fuel for shipping. An increasing number of ships have adopted it, with 77 ships operating today worldwide and another 85 newbuilds confirmed in the global order book¹. The forecasts, despite the current lower fuel oil prices, still present an interesting uptake in all major ship types, with Europe holding currently a significantly large share of the ships in operation. Even though a significant uptake in North America is expected up to 2020, Europe's share of LNG fuelled ships in operation will still be highly expressive taking into account the ships currently on order.

The variety of possible engineering solutions for LNG fuel systems is today also increasing. Dual-Fuel engine technology; ship design; fuel tank containment systems; control & detection, amongst other, are some of the different areas where LNG fuelled vessels can differ from each other. The technological diversity however does, in all cases, introduce an increase in systems' complexity, and the low flashpoint nature of LNG highlights the Risk & safety concerns with a fuel that is not only physically so different from traditional oil fuels but that also brings additional operational challenges regarding its transport, delivery and use.

On the regulatory context, the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels (IGF Code), approved in its final draft version in June 2015, entered into force on the 1st January 2017. It contains mandatory provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using low-flashpoint fuels, focusing initially on LNG. The Code addresses all areas that need special consideration for the usage of low-flashpoint fuels, taking a goal-based approach, with goals and functional requirements specified for each section forming the basis for the design, construction and operation of ships using this type of fuel.

LNG bunkering operations are however characterized by the interaction of multiple stakeholders and different regulatory contexts. This poses a challenge on a number of different levels.

Whereas the IGF Code establishes technical and functional requirements for LNG bunkering equipment and operations, its focus is remarkably on the receiving vessel and on its design for safe LNG bunkering operations. The bunkering interface is of course required to incorporate these requirements and be in line with them, ensuring consistency with other relevant regulatory instruments such as the ADR Convention or the Seveso Directive. Some functional requirements for bunkering have been included in the draft IGF Code but are mostly related to the receiving vessel, leaving the organization for bunkering, from the port side, outside of scope. Some important concepts are however included in the IGF, remarkably in Chapter 18 where the "Person in Charge" (PIC) is defined, together with requirements on Check-lists and Communications, only to mention a few.

¹ Numbers taken from different online sources (www.lngforshipping.eu) valid for the end of 2016, considered relevant as context to the EMSA LNG Bunkering Workshop. More than the exact numbers, the relevance of statistics on LNG fuelled ships is to underline, in the particular frame of LNG bunkering, that further harmonized procedures are very important.

2.2 Standards & Guidance on LNG Bunkering

There are currently different standards and guidance on LNG bunkering, either developed or under development. ISO has issued the Guidelines for systems and installations for supply of LNG as fuel to ships (ISO/TS 18683:2015), early in 2015, and is currently working on the finalization of ISO/DIS 20519 Specification for bunkering of gas fuelled ships. The last document is expected to bring a substantial set of functional requirements for LNG bunkering equipment and operations, including aspects such as bunker connectors, hoses, risk assessment, communications, safety distances, amongst many other aspects.

SGMF, also early in 2015, has launched their SGMF LNG Bunkering Safety Guidelines, currently under revision, as the reflection of contribution from different industry stakeholders, with the objective to provide the LNG bunkering industry with the best practices in order to ensure that LNG fuelled ships are re-fuelled with high levels of safety, integrity and reliability. The LNG Bunkering Safety Guidelines include chapters on LNG Hazards (Leaks, Cryogenic, LNG Fire and Explosion), Safety Systems (Roles, People in Charge, Communications and Emergency Systems), Bunkering Procedures and Specific Safety Guidance for the different LNG bunkering modes.

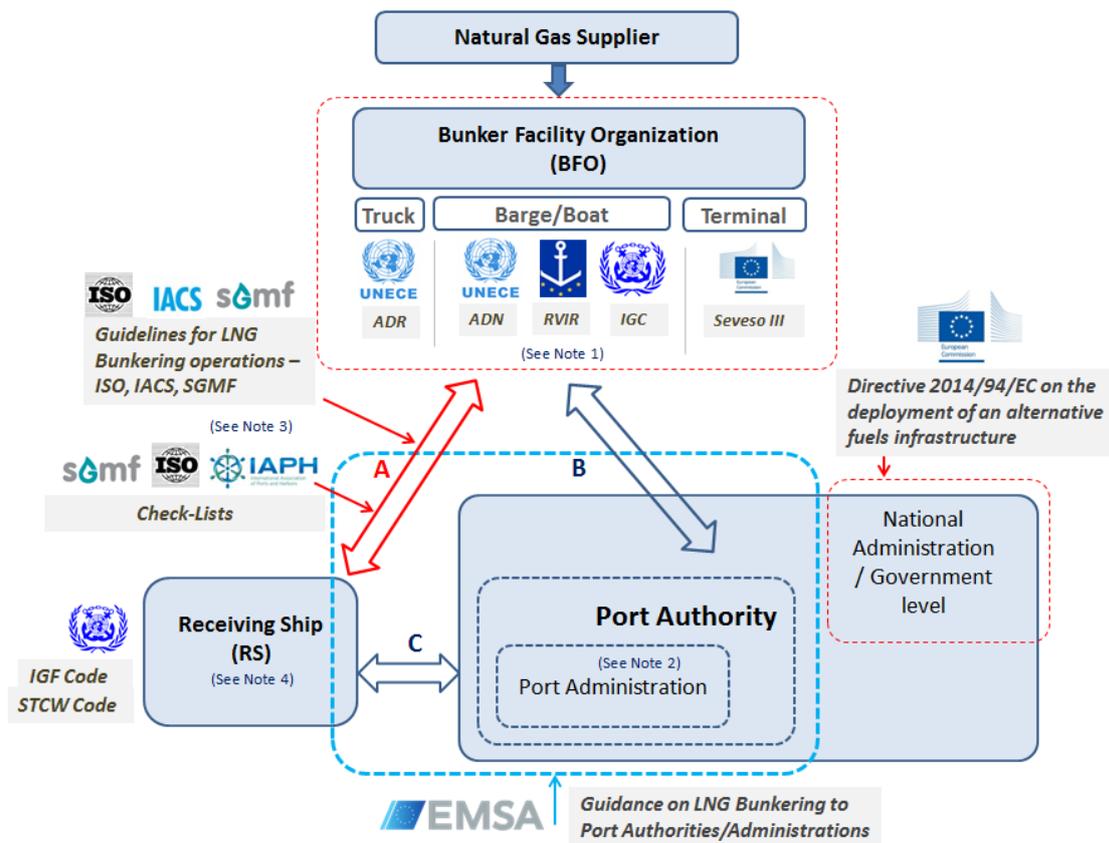
IACS, the International Association of Classification Societies, has recently published IACS Recommendation 142, LNG bunkering guidelines (Rec.142).

Finally, the International Association of Ports and Harbours (IAPH) has developed specific LNG bunker checklists (IAPH LNG Bunker Check-Lists) for known LNG bunkering scenarios: ship-to-ship, shore-to-ship and truck-to-ship. These check-lists include specific requirements relevant for all parties involved in the LNG bunkering operations and are already in place in some ports where LNG bunkering operations are undertaken.

Collectively, the above standards and guidelines represent the most significant set of references for LNG bunkering operations, today. Together with different national requirements and local/port regulations they are instruments for safe LNG bunkering operations, including provisions on risk & safety, bunkering/transfer equipment, training, bunkering procedures, amongst other aspects. Different bunkering modes are included and all stakeholders involved are featured with proposed good practice for safe operations addressing all parties. The receiving LNG-fuelled vessel, LNG bunker barge/vessel; LNG truck; Terminal Operators, Person-in-Charge (PIC); may all find specific requirements which are relevant either to the equipment used in LNG bunkering operations, or to the procedures established as basis for the operation. Despite some variations in terminology, all existing guidance mentioned above is consistent with a common 3-phase approach, dividing LNG bunkering into: 1) Pre-Bunkering; 2) Bunkering and 3) Post-Bunkering. An additional 4th phase can also be considered: the Planning (where feasibility, risk and other studies pertaining permitting and certification are developed).

The missing part, in the opinion of the ESSF and its subgroup of experts on LNG, is the guidance to Port Authorities/Administrations in the specific context of LNG bunkering planning, permitting and operations. Check-Lists and guidance, as mentioned above, give a good reference to the requirements for Ports to put in place; however this is only part of what is expected from competent port authorities. Byelaws, permitting, risk-based restrictions and tailor-made Emergency Response, amongst other aspects, are exclusive areas where Port Authorities/Administrations are given statutory powers to develop measures for good governance within the port area under their jurisdiction. Guidance to these competent authorities, on the different relevant aspects of LNG bunkering, is the objective of this work. The simple diagram presented in

figure 1, below, presents the complete frame for LNG Bunkering where a triangle is completed between Gas supplier, Receiving Vessel and Port (competent) Authority.



Notes:

1. Regulatory frame applicable to LNG bunker barges/boats/ships will depend on their area of operation. If below 500GT and not engaged in international voyages, in principle, IGC does not apply (unless enforced by national legislation). ADN agreement applies, to all LNG barges/boats/ships of contracting parties, engaged in the inland waterway transport of LNG.
2. Port Administration is, in the context of the EMSA Guidance, a holder of administrative responsibility; possibly with partial delegated authority (this can typically be the case of a private Port or of a landlord Port (mostly responsible for leasing the land). Different local, regional or national context should here be taken into account.
3. The Guidelines from ISO, IACS and SGMF offer guidance and establish requirements that cover Functional Requirements for LNG bunkering equipment, responsibilities of RS and BFO, Risk Assessment principles, amongst other aspects relevant for interaction (A) above.
4. Receiving Ship is assumed to be either an IGF Code vessel (if constructed, or converted to LNG fuel, after 1st January 2017). Before that date the IMO Interim Guidelines apply (Res. IMO MSC.285(86) *Interim guidelines on safety for natural gas-fuelled engine installations in ships (2009)*).

Figure 1 – LNG Bunkering frame/stakeholders

2.3 LNG Bunkering Infrastructure in the EU

Directive 2014/94/EC on the deployment of alternative fuels infrastructure, part of the EU Clean Power for Transport package establishes a comprehensive set of requirements for an inter-modal development of an alternative fuel infrastructure. As defined by Directive 2014/94/EC, availability of LNG in EU core ports is scheduled for 31 December 2025 (maritime ports) and 31 December 2030 (inland ports), with the same document establishing an obligation for EU Member States to develop appropriate standards containing detailed technical specifications for refuelling points for LNG for maritime and inland waterway transport.

In the context of the Directive, EU Member States are currently developing their National Policy Frameworks, in line with the provisions of Article 3 of the same instrument, to be notified to the

European Commission by 18 November 2016. Following the notification of these, down to the operational level and towards implementation, it is important that EU harmonization can be supported, not only by reference to higher level international documents, standards or guidelines, but also by having in place guidance to the lower level requirement definition, where local and port authorities are envisaged.

Despite the provisions of the Directive, LNG bunkering is, in fact, already taking place in several ports in Northern Europe, with first movers and pilot project initiatives where LNG fuelled vessels operation represent the largest share of the worldwide LNG fuelled fleet. Co-financing programs, such as the CEF, for studies, pilots and implementation works have been promoting and facilitating this development. It is now important to extract the main lessons learnt, specific experience-based advice and to address the most relevant challenges to harmonization, such as permitting procedures and training/qualification requirements for all those involved in the operation.

The Engineering solutions are already in place, demonstrated not only through the implementation of different LNG bunkering initiatives but also in several Feasibility Studies for prospective projects and ongoing implementation works. Not only it is possible to bunker LNG to a variety of different LNG fuelled vessels but also it is possible to do it safely and following a variety of different possible bunkering modes. The infrastructure is therefore expected to develop highlighting further the need to have a consistent minimum set of good practice references which, together with the existing standards and industry guidelines, can assist authorities in the different areas of LNG bunkering.

3. Workshop

The EMSA Workshop on LNG Bunkering to Port Authorities and Administrations has been undertaken, as planned, in Lisbon, on the 1st and 2nd of December 2016. It was planned as a support instrument in the development of the EMSA Guidance, and it can be seen in Figure 2, below, in the context of the whole process (identified in the red rectangle below).

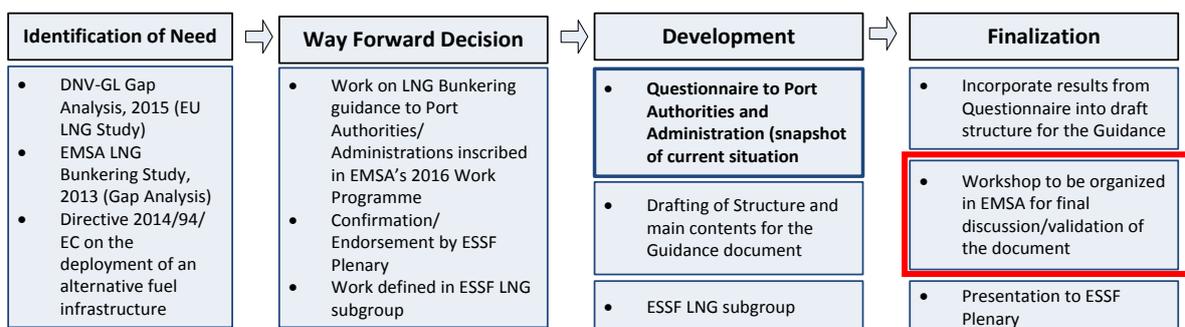


Figure 2 – EMSA Guidance on LNG Bunkering to Port Authorities & Administrations – the different stages of the project

Even though the Workshop is featured in the “Finalization” phase its contribution would end up being much necessary to the “Development” phase. This has been mainly due to the results of the online survey that have revealed the need for a wider discussion on some aspects found to be far from clear or harmonized. Safety Distances in LNG Bunkering is one of these aspects but not the only one. Simultaneous Operations, Permitting and Risk Criteria are also subjects where a Workshop meeting was found to be beneficial to discuss the different possibilities for the EMSA Guidance in these respective areas. How to add value in the form of “guidance” after the identified context in LNG Bunkering following the online survey? To answer this question the Workshop in December offered a unique possibility to have the wider discussion, to list options

for best practice and to discuss on the different merits of each option. In the context of different LNG Bunkering Guidelines² today, the EMSA Guidance has been agreed not to duplicate requirements and to be complementary to the existing references. Also in favour of this objective the Workshop allowed to have an initial check on the scope defined for the EMSA Guidance and a confirmation of the structure and contents previously endorsed by the ESSF Plenary, earlier in June 2016.

The Workshop agenda is included in Annex 5 and the organization of the Agenda follows closely the list of topics discussed as a result of the online survey results.

An introductory part, with a foreword and context presentation from the European Commission (DG-MOVE), followed by a report on the development status of the EMSA Guidance gave the Workshop participants a background and update on the current situation. The context given by the different EC initiatives, within the frame of LNG as fuel for shipping, was important to provide the necessary background information for the EMSA Guidance and to better understand why it is relevant to the promotion of LNG as an alternative fuel.

Apart from the Introductory part, which took less than half of the first morning, the Workshop was based on a balanced number of presentations and discussion sessions, where each presentation, either from EC/EMSA or from invited experts, was included with the objective of contributing to each discussion round. Presentations and discussion papers of the Workshop are available at the EMSA website: <http://emsa.europa.eu/workshops-a-events/188-workshops.html>

3.1 Discussion Papers

An important part in the design of the Workshop structure was the preparation of 4 (four) Discussion Papers, which reflected, amongst other information sources, the results of the EMSA online questionnaire. It was found that focused detailed discussion would be necessary in the particular aspects mentioned in the more controversial points, remarkably regarding Safety Distances and SIMOPS. The papers have represented the main instrument to allow the exchange of ideas and current best practice procedures followed by competent authorities today.

To support this discussion the following Discussion Papers (included as Annex-4) were prepared and presented to the Workshop Members³:

- i. **Discussion paper 1.** *Small Scale LNG bunkering - SEVESO applicability*
- ii. **Discussion paper 2.** *Safety Distances – Methods for calculation and Criteria*
- iii. **Discussion paper 3.** *Permitting & Authorization – Multi-layer procedure –*
- iv. **Discussion paper 4.** *Simultaneous Operations – Suggested Procedure for SIMOPS approval*

Objectives for Discussion papers:

- i. Address main challenges for harmonization identified in the EMSA online questionnaire.
- ii. Identify options for best practice guidance to be included in EMSA document, in line and in context with all the developments in ISO, Industry/SGMF.
- iii. Prepare for the EMSA Workshop on the technical aspects that will be the centre for discussion with Member States.

During the EMSA Workshop it was possible to address the issues outlined in the Discussion Papers, on the common understanding that they represented, collectively an important collection of issues that should be addressed by competent authorities (in collaboration with operators and

² Reference is made to LNG Bunkering Guidelines and Standards from Industry (SGMF), IACS (Rec.142) and ISO20519 Specification for LNG Bunkering.

³ The same Discussion Papers had been discussed earlier in the 10th ESSF LNG sub-group session earlier in November, where good input was collected to a more substantial discussion at the Workshop.

industry) in order to support harmonized safe LNG Bunkering operations. The papers allowed the definition of fundamental principles that shall be respected by the EMSA Guidance on LNG Bunkering to Port Authorities/ Administrations. These principles are the main outcome of the Workshop as they allow the continuation of the work already with an indication of the preferred way forward by Workshop Participants.

3.2 Workshop Structure

The structure of the Workshop followed the outline, and objectives presented in table 1, where the short summary of each presentation, discussion round and exercise is listed. Presentations and Discussion papers worked together to provide Participants the best possible information to address the different relevant topics.

Table 1 – Structure of the Workshop – Workshop blocks and section objectives

Workshop block	Presentations	Objectives and Discussion
<u>INTRODUCTION</u>		
Introductory Part – EC/EMSA	EC LNG for shipping - EU policy with regard to use of LNG in maritime transport	Presentation from the EC with context and background relevant for LNG as an alternative fuel for shipping. The EMSA Guidance was here presented as part of the objective initiatives in the context of the Implementation of Directive 2014/94/EC on the deployment of an alternative fuels infrastructure.
	Development of the EMSA Guidance on LNG Bunkering to Port Authorities/ Administrations	Status-update presentation by EMSA on the development of the EMSA Guidance on LNG Bunkering to Port Authorities/ Administrations.
	Summary of Results from the EMSA LNG Bunkering online survey to Port Authorities/ Administrations	Results of the EMSA online Survey presented by EMSA. Identification of the main critical issues to discuss resulting from the online survey exercise.
	LNG Bunkering Challenges – The interface paradigm	General information on the current practice on LNG Bunkering. Presentation covered different LNG Bunkering modes, risk assessment elements, standardization; types of LNG fuelled ships, systems and equipment amongst other relevant aspects. In essence this presentation served as a technical background reference to assist as a starting point for discussions.
<u>PART 1 – Port Management in LNG Bunkering</u>		
PART 1 Port Management for LNG Bunkering	LNG Bunkering – Port Authority Perspective. LNG and Good Governance in Ports	Presentation from the Port of Rotterdam providing insight on the experience in the context of LNG Bunkering. The presentation was included to open the background motivation for the 1 st round of discussion, highly relevant in the context of LNG within the Port wider spatial planning and safety considerations. Safety Distances and other topics were covered in a good demonstration of best practices from a Port

		<p>Authority perspective.</p> <p>The Port of Rotterdam is today a reference in the context of the implementation of different sustainability solutions. In the particular point of LNG bunkering the Port has developed a considerable number of actions to facilitate different options.</p> <p>This experience, as reflected in the presentation, allowed providing the adequate motivation for the 1st Round of Discussion.</p>
Discussion Round 1	Discussion Paper 1 - Small Scale LNG bunkering - SEVESO requirements	<p><u>Discussion paper 1 included in Annex-4.</u></p> <p>The applicability of SEVESO requirements was here discussed in the light of different LNG bunkering options (mobile/temporary and fixed).</p> <p>The influence of different engineering options for delivery of LNG to a ship was discussed, in particular with regards to their influence in the particular context of SEVESO application.</p> <p>SEVESO requirements were outlined and their applicability in the LNG Bunkering context has, in general, been agreed to be restricted to fixed installations with more than 50tonnes.</p>
<u>PART 2 - LNG Bunkering Operation and Port Authority Procedures</u>		
PART 2 LNG Bunkering Operation and Port Authority Procedures	LNG Bunkering Guidance (existing guidance) IACS Recommendation 142 on LNG Bunkering SGMF Safety Guidelines for LNG Bunkering ISO/TS 18683:2015, ISO 20519	<p>SGMF, represented by Thomas Spencer (Lloyds Register) has delivered a presentation outlining the different references in the context of LNG Bunkering today.</p> <p>Particular relevance given to Industry and Class guidelines and recommendations.</p> <p>The EMSA Guidance development, as earlier agreed, pays careful consideration to the existing references from current standardization efforts (ISO 18683, ISO 20519), industry guidance (SGMF Guidelines) and Class recommendations (IACS Rec.142).</p> <p>A presentation on existing Guidelines, in itself, within the structure of the EMSA Workshop, served well the purpose of highlighting that no duplication of work, or even contradictory provisions, would be proposed.</p>
	LNG Operating Regulations – Port of Gothenburg	<p>Presentation of the document <i>LNG Operating Regulations</i> by the Port of Gothenburg. Example on how Port Authorities, in practice, develop their own regulating initiatives in the context of LNG as fuel. Guidance to all parts involved is necessary and the competent port authorities, in the context of their own jurisdiction, develop reference documents to be used for this purpose.</p> <p>The document, both structure and content wise</p>

		<p>provides an idea on the possible options that ports have today, with the drafting of their own regulations, reflecting more or less published industry guidance.</p> <p>Having good consideration for these initiatives is also fundamental for the development of the EMSA Guidance.</p> <p>Ports, including the good example of Gothenburgh, have taken the opportunity to contribute with significant elements to the EMSA online survey so that these could be taken into consideration in the definition of the EMSA Guidance., as a recollection of “best practices”.</p>
	LNG Bunkering – Planning, Preparing and Operations	<p>Shell delivered a presentation on the particular aspects of LNG Bunkering, from bunker service provider perspective.</p> <p>Different aspects of LNG Bunkering have been covered by the presentation, with an interesting section on SIMOPS that was found to be highly relevant for the 2nd Discussion Round.</p> <p>Relevant points mentioned by Shell have given the indication that harmonization in procedures for LNG Bunkering permitting, authorizations and different control measures by Port Authorities are of high relevance for the confidence in LNG from the operators.</p> <p>With Shell’s presentation it was possible to bring the Industry perspective to the Workshop, in particular to have the indication on the relevant points that, from an LNG bunker supplier, would be relevant to address in the EMSA Guidance.</p>
Discussion Round 2	Discussion Paper 4 – SIMOPs - Suggested Procedure for SIMOPs Authorization	<p><u>Discussion paper 4 included in Annex-4.</u></p> <p>SIMOPS are today an important point to tackle if harmonization in LNG bunkering, particularly in respect to Port Authorities.</p> <p>In order to enable competitive LNG operations, bunkering must be performed without unnecessary time loss and bunkering operations in parallel with passenger and cargo handling (SIMOPS), are important to make LNG an attractive alternative fuel option for operators.</p> <p>Risk-based approaches and the need to develop a standard SIMOPS operational procedure were discussed having in particular consideration for Shell’s contribution and EMSA’s proposal for a definition of a “SIMOPS Supervisory Role”, identified as a relevant element to ensure simultaneous overview of onboard and port direct and indirect activities with the potential to influence LNG Bunkering operations.</p>

<u>PART 3 - LNG Bunkering Safety</u>		
PART 3 LNG Bunkering Safety	LNG Bunkering Risk & Safety Elements	<p>Presentation delivered by EMSA with informative content in the context of LNG Risk & Safety.</p> <p>Identification of LNG related hazards, risk assessment methodologies, risk criteria, amongst other aspects relevant to the evaluation of LNG Bunkering Safety were outlined to serve as background for the 2nd morning of the Workshop.</p>
	LNG Bunkering Safety <i>LNG Bunkering – Setting Safety Distances</i>	<p>Presentation of the paper on Safety Distances by Dr. Paul Davies (Lloyd's Register) with a comprehensive and critical analysis of the different methodologies for calculation of Safety Distances. .</p> <p>The extent of safety distances was presented and how this can significantly change with assumed calculation parameters. The concept of safety distances to provide 'meaningful protection' was proposed and the challenge of providing practical distances that can be consistently determined across all ports and localities outlined. Different elements/parameters were reviewed leading to substantial reflections on the merit and applicability of the proposed deterministic methodology noted in ISO 18683.</p> <p>Consideration of environmental factors such as wind and weather, and other parameters were covered and consequence modelling results discussed. Also the presentation outlined reasons why the reference/example ISO safety distances are insufficient as a sole basis for a harmonized approach.</p>
Discussion Round 3	Discussion Paper 2 – Safety Distances	<p><u>Discussion paper 2 included in Annex-4.</u></p> <p>Safety Distances in LNG Bunkering operations were discussed, combining contribution from Lloyds Register and the Discussion Paper nr. 2, produced by EMSA.</p> <p>The objective was to identify a possible common ground to be reflected in the EMSA Guidance that could potentially be used as support to harmonization of the current situation.</p> <p>Deterministic vs. Probabilistic approaches, how to best account for different factors not currently reflected in ISO methods and the advantages/disadvantages of risk-based calculations where some of the aspects covered.</p>
LNG Bunkering Safety Exercise	Practical Exercise (HAZID for a generic LNG Bunkering scenario)	The objective was to allow the Workshop Participants to discuss safety related elements in a practical exercise.

		<p>A simulated LNG Bunkering Scenario was presented and given for discussion in 4 (four) separate groups. The simplified HAZID type of exercise required the particular application of Safety Distances and SIMOPS considerations.</p> <p>Participants had to judge and decide on the potential hazard scenarios and relevant mitigation measures, applying concepts discussed during the Workshop.</p> <p>More than the “tutorial” objective, the relevance of the exercise was more to the articulation of different concepts relevant to LNG Bunkering.</p>
<u>PART 4 - Permitting</u>		
PART 4 Permitting	<p>LNG Bunkering</p> <p>A practical perspective from a Maritime Administration – the Danish Experience</p>	<p>Presentation from the Danish Maritime Authority (DMA) that highlighted the relevance of the permitting procedure in the context of LNG Bunkering.</p> <p>DMA’s experience in LNG Bunkering processes provided an adequate and very relevant motivation for the discussion that followed on Permitting.</p>
Discussion Round 4	Discussion Paper 3 – Permitting, Multi-Layer Process	<p><u>Discussion paper 3 included in Annex-4.</u></p> <p>Permitting has been particularly identified as a topic deserving careful attention, especially after the analysis of results from the online survey.</p> <p>In different countries permitting procedures have been found to take very different routes, involving different competent authorities and following a path which is sometimes difficult to understand by all parts involved.</p> <p>Operators and Bunker suppliers have often identified permitting procedures as “complicated” and “cumbersome” leading to potentially unacceptable delays.</p> <p>It was the objective for this particular discussion round to identify a possible streamlined procedure and, potentially, to discuss the possible guidance best practice provision advising for a centralised data base approach.</p>

3.3 Introductory Part – EC/EMSA

The introductory part of the Workshop allowed the Participants to have an overview of the Background and current status of the development of the EMSA Guidance on LNG Bunkering to Port Authorities/ Administrations, including the important context scenario drawn by the European Commission, the results of the EMSA online survey and the identification of the main challenges ahead.

3.3.1 LNG for shipping - EU policy with regard to use of LNG in maritime transport

Agnieszka Zaplatka (European Commission – DG-MOVE) delivered a presentation on the different EU initiatives in support of the development of LNG as fuel for shipping.

The main policy instruments in the context of the support to alternative fuels in Transport have been outlined by the EC (**Clean Power for Transport package**):

- A Communication laying out a comprehensive European alternative fuels strategy [COM(2013)17],
- A Directive on the deployment of alternative fuels infrastructure [2014/94/EU];
- An accompanying Impact Assessment [SWD(2013)5];
- A Staff Working Document setting out the needs in terms of market conditions, regulations, codes and standards for a broad market uptake of LNG in the shipping sector [SWD(2013)4].

Directive 2014/94/EC on the deployment of an alternative fuels infrastructure is of particular relevance to the context of the Workshop. With the setting of different objectives, the availability of LNG in Maritime Ports⁴ is the one that is found to be of relevance for the EMSA Guidance in particular for addressing the relevant gaps and aspects related to the Port Authorities

Figure 2 – Objectives under the Alternative Fuels Infrastructure Directive (Directive 2014/94/EC)

	Coverage	Timings
Electricity in urban/suburban and other densely populated areas	Appropriate number of publically accessible points	by end 2020
CNG in urban/suburban and other densely populated areas	Appropriate number of points	by end 2020
CNG along the TEN-T core network	Appropriate number of points	by end 2025
Electricity at shore-side	Ports of the TEN-T core network and other ports	by end 2025
Hydrogen in the Member States who choose to develop it	Appropriate number of points	by end 2025
LNG at maritime ports	Ports of the TEN-T core network	by end 2025
LNG at inland ports	Ports of the TEN-T core network	by end 2030
Shore-side electricity	Ports of the TEN-T core network and other ports	by end 2025

The 18 November 2016 was the deadline for EU Member States to have submitted the National Policy Frameworks, including all the measures outlined to achieve the targets set by Directive 2014/94/EU. This was highlighted to all Workshop participants as an important milestone in the implementation of this relevant instrument.

In addition to the relevant legal instruments outlined by the EC, reference has been made to other initiatives also found to be relevant in the context of LNG as Fuel for Shipping. This was the case of the **EMSA Study on Standards and Rules for Bunkering of Gas-Fuelled Ships** (2012-2013), and of the **EC 2015 Study on the completion of an EU framework on LNG-fuelled ships and its relevant fuel provision infrastructure**.

⁴ LNG to be available in all EU maritime “core ports” by the end of 202 – for a view on a list of Maritime “Core Ports” please consult: http://ec.europa.eu/transport/sites/transport/files/modes/maritime/ports/doc/2014_list_of_329_ports_june.pdf

Collectively both studies have identified more than 30 (thirty) relevant gaps requiring to be addressed in the framework of LNG as fuel. LNG Bunkering Guidelines are mentioned in the context of a variety of different gaps. Whereas Industry Guidelines have recently developed to address different aspects of LNG Bunkering, a remarkable number of points are yet left to the definition of competent authorities (risk criteria, permitting, safety distances, verification and control procedures, authorization procedures, incident response). On all the points relevant for the action of the competent authorities the EMSA Guidance is intended to provide

Some relevant links have been provided within the context of the EMSA Study, EC Study and relevant Expert Groups dealing with LNG as fuel for the Maritime Transport:

- EMSA Study: <http://www.emsa.europa.eu/emsa-documents/latest/item/1714-study-on-standards-and-rules-for-bunkering-of-gas-fuelled-ships.html>
- [Lot 1: Analysis and evaluation of identified gaps and of the remaining aspects for completing an EU-wide framework for marine LNG distribution, bunkering and use](#)
- [Lot 2: Creating Awareness on LNG Risks and Opportunities](#)
- www.lngforshipping.eu (website created in the context of LOT2 study, containing a relevant amount of information that can be found relevant in the context of LNG Bunkering to Port Authorities.
- [Lot 3: Analysis of the LNG market development in the EU](#)
- **ESSF** - public info: <http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=2869>
- **STF** -Public info: https://ec.europa.eu/transport/themes/urban/cpt/stf_en

3.3.2 Development of the EMSA Guidance on LNG Bunkering to Port Authorities/ Administrations

The status of the development of the EMSA Guidance was presented to the Workshop participants summarizing the steps given and highlighting the relevance of the Workshop in the definition of the steps ahead.

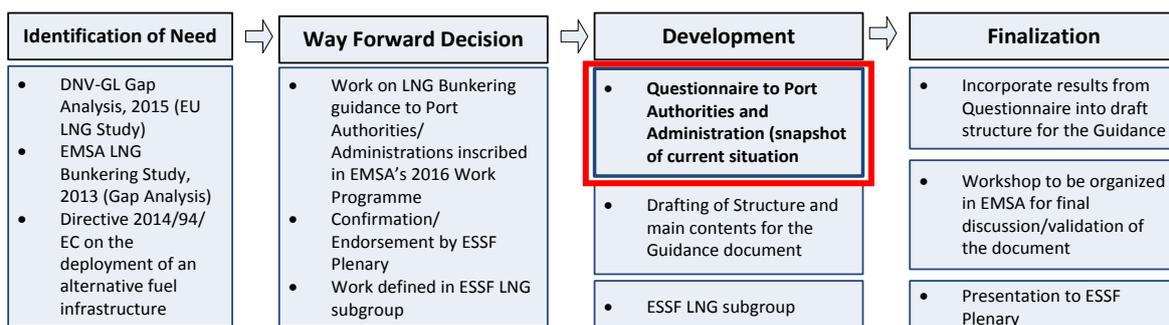
Annex-3 includes the current Table of Contents for the EMSA Guidance, as shared with Workshop participants as part of the Workshop advance information package, sent by email before the event

3.3.3 Online survey – Summary Results

One of the most relevant instruments in support of the drafting of the EMSA Guidance was the online survey published early September 2016. The questionnaire, divided into 2 (two) parts allowed EMSA to identify the particular aspects where harmonization was most needed.

The diagram below shows the EMSA Questionnaire as part of the relevant elements considered in the context of the EMSA Guidance development:

Figure 3 – EMSA Guidance development stages (Questionnaire in red square box)



The EMSA Questionnaire on LNG Bunkering for Port Authorities and Administrations was divided into 2 (two) different Sections:

- **Section “A”** – on LNG Bunkering Planning & Preparation - addressed to all Port Authorities / Administrations either already with LNG bunkering experience or still envisaging for its effective implementation
<https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartA>
- **Section “B”** – on LNG Bunkering Operations - in principle, only directed to those Port Authorities / Administrations which already have experience with actual LNG Bunkering Operations, on whichever mode (Ship-to-Ship/ Shore-to-Ship/Truck-to-Ship)
<https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartB>

Annex-2 includes the Summary report with an insight on the process and presentation of selected replies including relevant statistics. The need for further guidance to Port Authorities on the subject of LNG Bunkering has been underlined, reassuring the relevance of the ongoing work (see box top of next page).

3.6 - Do you agree with the need for guidance [1] to Port Authorities/Administrations, on the specific subject of LNG Bunkering for LNG fuelled vessels? Please provide your comments if any.

		Answers	Ratio
Yes. Further Guidance on LNG Bunkering to Port Authorities and Administrations is necessary.		79	85.87%
No. Existing Guidance is sufficient for LNG Bunkering, especially with regards to the action envisaged by Port Authorities and Administrations.		5	5.43%
Do not know (should you want to provide any comment, please use 3.7, below)		2	2.17%
No Answer		6	6.52%

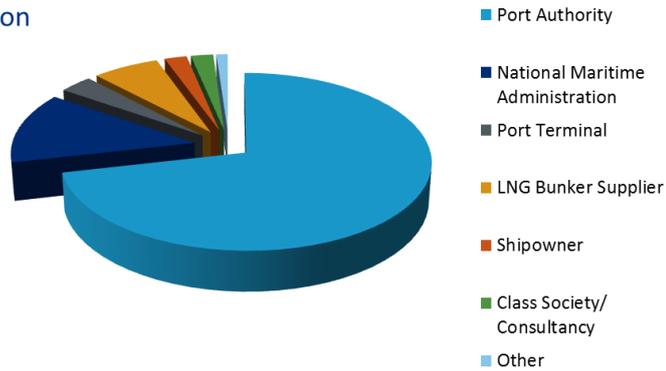
[1] Guidance here understood as a document containing a structured collection of good practice elements and advice of a non-binding nature. The objective for the document is to build on the existing experience in Ports where LNG bunkering has taken its first steps towards implementation.

A total number of 110 participants, for quite a long questionnaire, was a remarkable outcome that has been considered very positive.

A good part of the explanation for the good levels of participation has been the involvement and close cooperation of the ESSF Plenary, ESSF LNG sub-group, ESPO, IAPH, BPO and other organizations and associations who have distributed the links for the questionnaires through their partners and associate members.

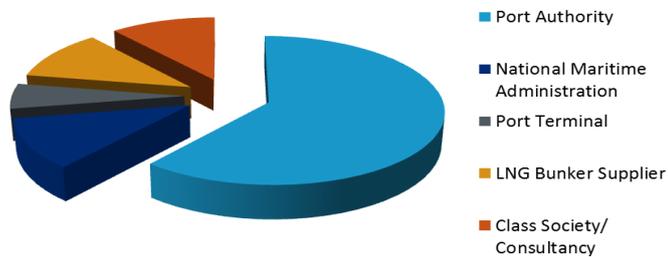
In addition to this, also the online/web-based nature of the questionnaire was found to be beneficial to exchange information, to pass the invitations for participation and, ultimately, has proved to favour participation by providing a “user-friendly” interface with the users.

Section A
Planning & Preparation



Questionnaire - Section A	
Port Authority	65
National Maritime Administration	12
Port Terminal	3
LNG Bunker Supplier	6
Shipowner	2
Class Society/ Consultancy	2
Other	1
Total	91

Section B
Operations



Questionnaire - Section B	
Port Authority	11
National Maritime Administration	2
Port Terminal	1
LNG Bunker Supplier	4
Class Society/ Consultancy	1
Other	0
Total	19

EMSA thanked all Workshop participants for their participation in the online survey, highlighting that the exercise has been a success due to everyone’s commitment and professional contribution.

3.3.4 LNG Bunkering Challenges – The interface paradigm

A presentation by EMSA has covered essential elements in the context of LNG Bunkering. Different LNG Bunkering modes have been addressed with a highlight devoted to the number of new different strategies and engineering solutions to deliver LNG as fuel to ships. Many of these solutions are suggested by EMSA for discussion by the Workshop participants.

The presentation included relevant elements that could not only set the scene for the continued discussions but also serve as a summary of challenges that would need to be addressed for a comprehensive approach to the harmonization problem.

Different LNG fuelled ships, a multiple number of LNG bunkering solutions, different risk calculation methodologies, and different risk evaluation criteria. Altogether, a significant number of different options contribute in a more or less obvious scale to an overall challenge for harmonization on LNG Bunkering, not only amongst different Port Authorities but, and remarkably so, to the Industry.

Standardization plays therefore a significant role, together with legal instruments such as the IGF Code, but, alone, will not be sufficient to ensure harmonization. Guidelines are another important key element to take into consideration.

Finally the presentation has outlined the main challenges, again, as a result of the contributions through the EMSA online survey

Safety Distances Methodologies for Calculation Deterministic VS Probabilistic	SIMOPS Definition of Simultaneous Operations – Authorization – Control	Risk Assessment Impartiality in the development of Risk Assessment Studies.
Risk Criteria Risk Criteria for LNG Bunkering Year Averaged?	Permitting Different approaches and requirements regarding permitting.	Enforcement How to implement an adequate/ reasonable inspection, verification?
Training Training BFO, Receiving Ship Crew, Wider Port Area.	Communications Fundamental challenge in all operations – Especially in LNG Bunkering	Early Detection Early detection of accidental release cannot be ensured only by sensors.

Figure 4 – Main Challenges in LNG Bunkering

- Challenges with LNG are addressed **currently** by high professional commitment from all parties involved
- A **significant amount of projects**, small scale LNG and LNG bunkering infrastructure **have already been developed**
- Industry **guidance** has been developed, addressing several important aspects of LNG bunkering
- There is **evidence** however that port authorities need further support in the development of a framework for their specific action

- The **interface paradigm** lies in the fact that transfer of LNG, as a cryogenic hazardous substance, presents different technical challenges but, above all, it requires an **adequate interaction and harmonization of different regulatory and guidance instruments**.

In the context of the above presentation one Workshop member has highlighted the relevance of Incident Reporting in the continuous development of experience-based knowledge and experience in LNG Bunkering. A note has been given to use the Guidance to incentivise Port Authorities and Administrations to report to the EMCIP all accidents/incidents and near misses occurred during the LNG bunkering operations on board and in the port areas. The same comment also underlined the need for much better statistic related frequencies than those actually used for the QRAs. The EMSA Guidance should, therefore, make a note recommending a best practice approach that should take incident reporting as a central aspect.

3.4 PART 1 - Port Management for LNG Bunkering

Part 1 of the Workshop had the objective to engage Workshop participants on the specific topic of SEVESO Directive applicability in the specific context of LNG Bunkering. Even though “Port Management for LNG Bunkering” is, indeed, a wider title, the applicability of SEVESO Directive integrates a variety of different considerations that are particularly relevant to Port Management, in particular with regards to spatial planning.

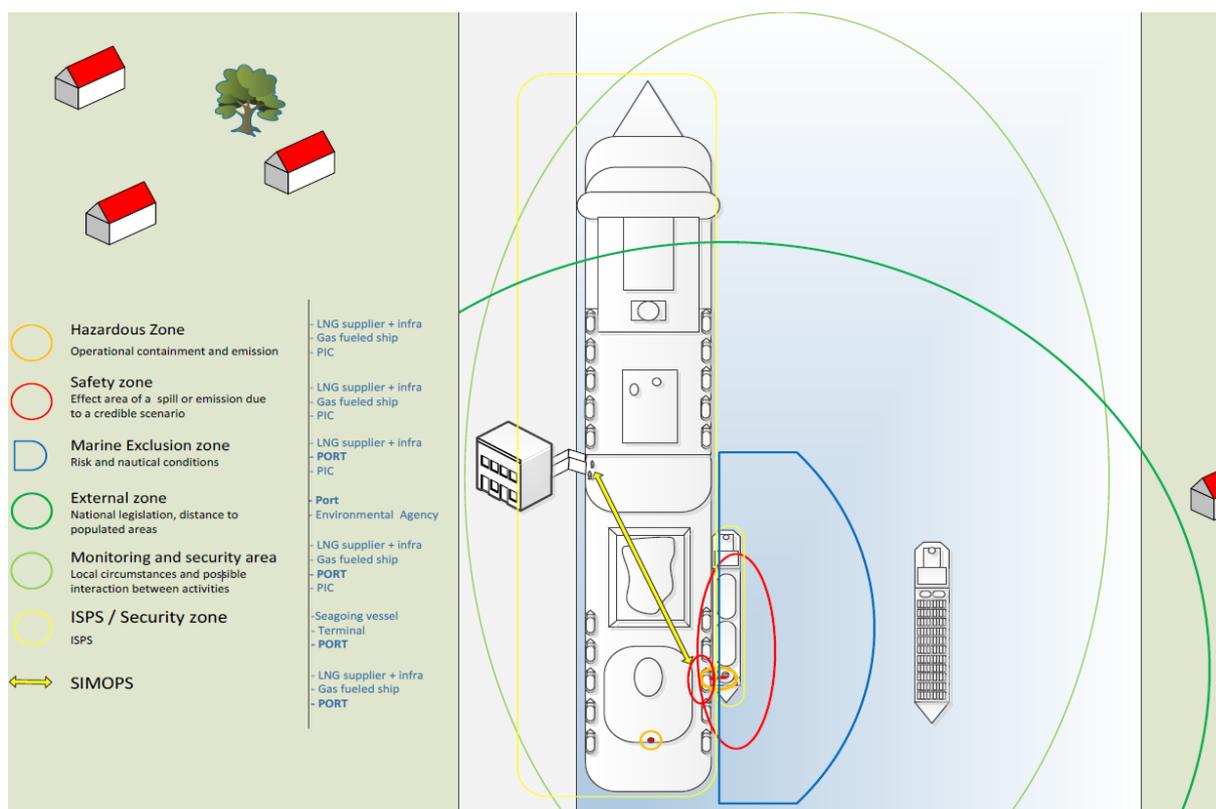
3.4.1 LNG Bunkering – Port Authority Perspective - LNG and Good Governance in Ports

Cees Boon (Port of Rotterdam) delivered a presentation entitled “LNG Guidance for Ports” where different topics have been covered from a Port Authority perspective. The complexity of the LNG Bunkering subject is covered for the particular case of Rotterdam.

Simultaneous Operations (SIMOPS) and Safety Distances were amongst the topics covered by Cees providing the Workshop Participants with a good comprehensive view of the particular challenges posed to Port management and good governance in the context of LNG Bunkering.

On Safety Distances, also as part of ongoing work at SGMF, Cees presentation brought to the Workshop a particularly relevant insight on the current terminology on “Control Zones” (see figure 5, below). The work is not yet public but it was agreed at the Workshop that the EMSA Guidance would pay careful attention to the work developed (or under development) by SGMF so as to avoid duplication of requirements or even mismatching of relevant terminology.

Figure 5 – Control Zones



Following the presentation by the Port of Rotterdam an interesting discussion has followed where the relevance of the control zones and, in particular of the harmonization in their calculation and implementation.

Several questions were identified that could/should be able to offer as much clarity as possible on who is responsible for determining and setting zones/distances. For example, in relation to the nomenclature used in Figure 5 above, the following questions could be conveniently addressed:

- **Hazardous Zone –**
 - a. Is this determined by the bunker supplier and ship operator using an established ISO standard (or similar) and simply accepted by the Port Authority?
 - b. Which criteria to be taken for acceptance?
 - c. Check list for verification of Hazardous Zone class materials/PPE?
- **Safety Zone –**
Is this determined by:
 - a. Port Authority with information provided by the bunker supplier and ship operator? OR
 - b. Bunker supplier and ship operator and then agreed with the Port Authority?
Is it based on an agreed industry (SGMF)/ISO approach to calculation?
 - c. Which criteria to be taken for acceptance by authorities?
- **Marine Exclusion Zone –**
 - a. Is this determined by the Port Authority? Other Competent Authority? How?
 - b. How is it enforced?

- **External Zone –**
 - a. If related to SEVESO, this zone is for land-use planning around major accident hazard installations. It is determined accounting for all qualifying hazardous activities and storage on the port. It is important to determine whether LNG Bunkering qualifies for the setting of such zone. In addition, does it only qualify if permanent bunkering storage is used?
 - b. This zone will, in principle, be determined differently by each member state – some risk-based, some consequence-based, and some member states may not set such a zone.
 - c. Who is responsible for determining and setting this zone? Such responsibility may be different across member states.
 - d. When must this zone be revised in response to increased bunkering (quantity, frequency, and/or duration) or changes to bunkering location?

- **ISPS / Security Zone –**
Presumably this is determined in accordance with the ISPS Code. Need to indicate in which terms this would be referred to in the LNG Bunkering Guidance.

The points outlined above, motivated by the discussion around and following Figure 5 should in principle be addressed by the EMSA LNG Guidance as they are ultimately paramount for harmonization

3.4.2 Discussion paper - Small Scale LNG bunkering - SEVESO requirements

Discussion paper prepared by EMSA (included as Annex-4)

3.4.3 Discussion Round 1 – Agreed Principles

Following Discussion Round 1, where the applicability of SEVESO Directive requirements was discussed to, the Workshop participants shared, in general, the understanding that the scope and applicability of the Directive would not allow its application to LNG bunkering solutions involving mobile units (such as trucks or barges).

Provisions of SEVESO III Article 2 c) clearly read that *the transport of dangerous substances and directly related intermediate temporary storage by road, rail, internal waterways, sea or air, outside the establishments covered by this Directive, including loading and unloading and transport to and from another means of transport at docks, wharves or marshalling yards.*

Situations where multiple LNG trucks are used (connected sometimes to a common manifold), standing barges, trucks delivering LNG through the whole stay of the ship alongside, amongst others were however agreed by the sub-group as situations that should deserve particular attention.

It is retained, and important to note, that the situation is of particular relevance only when LNG bunkering is taking place **outside SEVESO establishments. These can be ports, piers where LNG Bunkering may take place with multiple trucks on site but are not defined as SEVESO installations.**

From the “key agreed principles” at our Workshop it has been taken that, even though SEVESO is not applicable to truck LNG bunkering (and other mobile LNG bunkering facilities), similar provisions would be taken into account and applied as appropriate to the mobile units case. Following the discussion the Workshop participants have agreed on the following principles:

- SEVESO applicability **shall not** be addressed by the EMSA Guidance – From earlier discussion there is no legal grounds to apply this to trucks, ships or any other type of

mobile bunkering facilities, when outside SEVESO installations (only to fixed installations)

- Application of requirements similar to those of SEVESO for cases **where Bunkered LNG Quantities/Frequencies are such that the bunkering location can be considered a location handling hazardous substances.**
- Threshold values/Quantities/Frequencies – EMSA Guidance **should not provide indicative thresholds** – just indicate that there shall be a function between the number of deliveries/quantities and the safety related requirements for the Operator.

The agreed principles shall be respected in the development of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations.

Some comments from Workshop members were noted in the context of Part 1:

- The guidance needs to make very clear to which extent elements from SEVESO may be applicable to LNG Bunkering in a variety of different scenarios.
- It would be appropriate to check that the authorities regulating SEVESO are in agreement. For example, there could be cases where permanent storage would be preferable to many hundreds of mobile/truck bunker deliveries.
- It might be helpful to provide advice on what is considered 'fixed'. For example, are ISO containers residing on port for say 20 days per month 'mobile'?
- Specifically on the last agreed principle, above, Workshop members have questioned whether consistency between ports could be assured without some guidance on thresholds. This is an important point that may be revisited at a future Workshop.
- The large majority of the Workshop members have, in fact, expressed hesitation in the application of any SEVESO related provisions to LNG Bunkering scenarios involving mobile units (such as trucks or barges). Agreement was however reached on the need to pursue an equivalent level of safety that could be composed of similar provisions to those of the SEVESO directive, where applicable to LNG bunkering.

3.5 PART 2 - LNG Bunkering Operation and Port Authority Procedures

Part 1 of the Workshop had the objective to engage Workshop participants on the specific topic of Simultaneous Operations (SIMOPS).

3.5.1 LNG Bunkering Guidance (existing guidance)

Thomas Spencer (SGMF, LR) presented a comprehensive summary of the existing Industry Guidelines on LNG Bunkering covering:

- ISO/TS 18683 – Guidelines for systems and installations for supply of LNG as fuel to ships (January 2015)
- ISO 201519 – Specification for Bunkering of LNG fuelled vessels
- IAPH Check-Lists
- SGMF LNG Bunkering Guidelines
- IACS Recommendation nr. 142 (rec.142 on LNG Bunkering)

The presentation by Thomas Spencer allowed a good overview of the existing references to consider in the context of LNG Bunkering. The IACS recommendation and the updated SGMF bunkering guidelines include a list of suggested responsibilities that may be considered by the relevant Competent Authorities during the various stages of an LNG bunkering operation. .

A list of these relevant aspects was included in the presentation (as extracted from IACS Rec. 142):

Planning Stage

- Approval of the risk acceptance criteria,
- Overall responsibility for the good governance and framework for LNG bunker operations in the port,
- Applicability of an accreditation scheme for LNG bunker operators in the ports under their authority,
- Acceptability of the location of bunkering facilities, (bunkering may be limited to specific locations within the port/anchorage),
- Restrictions on bunkering operations such as simultaneous operations,
- Shore side contingency plans, emergency response systems,
- General procedures for traffic control and restrictions,
- Whether additional requirements should be applied.

During Bunkering Operations

- Accreditation of the BFO,
- Qualification of the PIC,
- Mooring of the receiving ship and bunker facility, industry standards may be referenced (e.g. OCIMF Effective Mooring 3rd Edition 2010),
- Immobilisation / braking of the tank truck,
- Establishment of a Safety zone / Security zone in way of the bunkering area,
- Simultaneous operations,
- Spatial planning and approval of bunker locations,
- Enforcement,
- Use of checklists,
- Environmental protection (Releases of NG, purging),
- Approval of safety and emergency response plans,
- Bunkering risk assessment, and
- Conditions in which LNG bunkering operations are allowed: weather conditions, sea state, wind speed and visibility.

3.5.2 LNG Operating Regulations – Port of Gothenburg

Captain Dan-Erik Anderson (Port of Gothenburgh) delivered a presentation on the recent issuing of the LNG Bunkering Regulation for the Port of Gothenburgh. The presentation covered the different aspects included in the Guidelines and particular attention has been dedicated to the recent Ship-to-Ship LNG bunkering operation outside the port of Gothenburgh.

Captain Dan-Erik presentation allowed a closer insight into a possibility for Ports: the development of their own LNG Bunkering regulations, giving the first step where and when, and regulating provisions are most needed. The challenge, even if industry guidelines are followed, is that harmonization may be more difficult to achieve posing challenges to both operators and competent authorities.

The example given and reported by the Port of Gothenburgh is, on both technical and operational levels, an important example that has illustrated the relevance of taking initiative, especially where technical solutions were brought for the very special STS case presented.

3.5.3 LNG Bunkering – Planning, Preparing and Operations

Stuart Carpenter (Shell) delivered a presentation entitled “LNG as a Marine fuel Bunkering & Permitting” where different aspects of LNG bunkering were covered from a service LNG bunker provider.

A variety of different problems have been presented where, from an LNG bunker provider perspective, further harmonization would be beneficial. These included, in particular, Permitting procedures and Simultaneous Operations (SIMOPS).

Shell Proposed to follow a deterministic process for Simultaneous Operations (SIMOPS) in line with Oil and Gas Operations (e.g. rig operations). This would allow, according to the justification presented (Based on IMCA SIMOPS Guidance):

- To follow a consistent approach based on deterministic factors not probabilistic due to insufficient data on the frequency of SIMOPS risk
- To identify clear implementable barriers to eliminate, reduce or mitigate identified risks

The suggestion for SIMOPS evaluation procedure by Shell, including a deterministic approach based on known controlled variables, where reference is made to IMCA SIMOPS Guidance has deserved good note during the Workshop. Also EMSA’s proposal for the way forward

3.5.4 Discussion Paper - SIMOPs - Suggested Procedure for SIMOPs Authorization

Discussion paper prepared by EMSA (included as Annex-4)

3.5.5 Discussion Round 2 – Agreed Principles

Following the discussion the Workshop participants have agreed on the following principles:

- SIMOPS definition shall make the distinction between the **different possible types of onboard, interface and shore operations** that may directly or indirectly have an impact on the LNG bunkering operation.
- During SIMOPS the important fundamental aspects to ensure are Shared Awareness, Alarm Dissemination, Communications, and Supervision.
- Whenever interface-shore SIMOPS take place: **The PIC shall not be responsible for the overview of all SIMOPS**. A SIMOPS Supervisor should be defined (additional role) – (Suggested the Receiving Ship).
- Whenever onboard SIMOPS take place: **The Receiving Ship/Master shall be responsible**

The agreed principles shall be respected in the development of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations.

The opinion of one Workshop member has been noted, on the specific point of the discussion on the new supervisory role for SIMOPs operations. It defended that the Master should carry this role and that no additional roles should be incorporated in the process of bunkering operations, as this would simply be adding another unnecessary layer for communication and coordination.

This opinion, as noted, led to an important discussion that highlighted the importance of defining clearly what a “new role” could really mean in the context of the EMSA Guidance. The “new role” for SIMOPS supervision will not mean that a new person or an added Team Member is necessary for the operation. It will instead be the definition of a role, with a well-defined set of responsibilities that may fall with whoever is intended by the ship, bunker supplier or terminal, and informed to the Port Authority/Administration for the purpose of SIMOPs authorization.

The above noted is to be taken into consideration for the drafting of the EMSA Guidance.

3.6 PART 3 - LNG Bunkering Safety

Risk & Safety are, in fact, related to almost all the topics covered in the EMSA Workshop on LNG Bunkering to Port Authorities/Administrations. On Part 3 of the Workshop the main focus is however put on Safety Distances, especially on the calculation/determination of Safety Distances. Different calculation methodologies can today be used resulting in remarkably different distances being considered. This is considered as a particular challenge for harmonization that should, as a matter of principle, be addressed by the EMSA Guidance. Information has been received however, from some of the Workshop participants and invited Experts that SGMF is currently working on safety distances, and this highlights the need to agree common nomenclature and definitions as well as a consistent means of calculation. This was noted in particular for the development of the EMSA Guidance that will take into account any further developments from SGMF in view of avoiding duplication of requirements and mismatching of terminology.

3.6.1 LNG Bunkering Risk & Safety Elements

Informative presentation delivered by EMSA

3.6.2 LNG Bunkering Safety - LNG Bunkering – Setting Safety Distances

Presentation of a paper on Safety Distances by Dr. Paul Davies (Lloyds Register) with a comprehensive and critical analysis on the different methodologies currently available for Safety Distances Calculation.

How much and how safe is a calculated Safety Distance and, in the particular context of Safety Distances, what provides “meaningful protection” have been questions addressed by the presentation that would be highly relevant for the 3rd Discussion round.

Different elements were taken into consideration leading to substantial reflections on the merit and applicability of the deterministic methodologies noted in ISO 18683.

Consideration for environmental factors (i.e. weather) and other variables was given and, following specific consequence analytical modelling, reference to ISO safety distance examples was shown to be insufficient to inform a further harmonized approach.

Particular Conclusions extracted as outlined in Dr. Paul Davie’s presentation:

- **Dispersion of LNG release cloud is influenced by key parameters**
 - Release pressure, surface, elevation and orientation
 - Atmospheric stability and Wind Speed
- **Further investigation required to ensure safety zones afford meaningful protection and are practical and consistently determined**
 - Most appropriate release scenarios with respects to size and duration
 - Key parameters to be modelled, such as weather and release conditions
 - Appropriate calculation method and criteria

- **Safety zone extent cannot be simply related to “trapped volume” or transfer pressure**

3.6.3 Discussion Paper – Safety Distances

Discussion paper prepared by EMSA (included as Annex-4)

3.6.4 Discussion Round 3 – Agreed Principles

Following the discussion the Workshop participants have agreed on the following principles:

- The EMSA Guidance **shall not discuss on the merits of the existing methodologies** (ISO Technical Standard).
- Port Authority shall be **responsible for approval of Safety Zone**.
- Responsibility to determine the Safety Zone shall also be addressed by the EMSA Guidance, outlining the different options possible..Instead the EMSA Guidance shall **inform** on:
 - Existing Methodologies and Industry Guidance
 - The necessary factors to take into account for the determination of Safety Distances:
 - ✓ Environmental Factors (Wind Speed and Stability, Temperature)
 - ✓ Release elevation
 - ✓ Bunker line Pressure
 - ✓ Transfer Rate
 - ✓ Trapped Volume
 - ✓ Possible Confined Space trapping
 - ✓ Other Factors (Physical Barriers, SIMOPS)
- **Advantages and Limitations of QRA** approach to be highlighted

3.6.5 LNG Bunkering Safety Exercise - Practical Exercise (HAZID for a generic LNG Bunkering scenario)

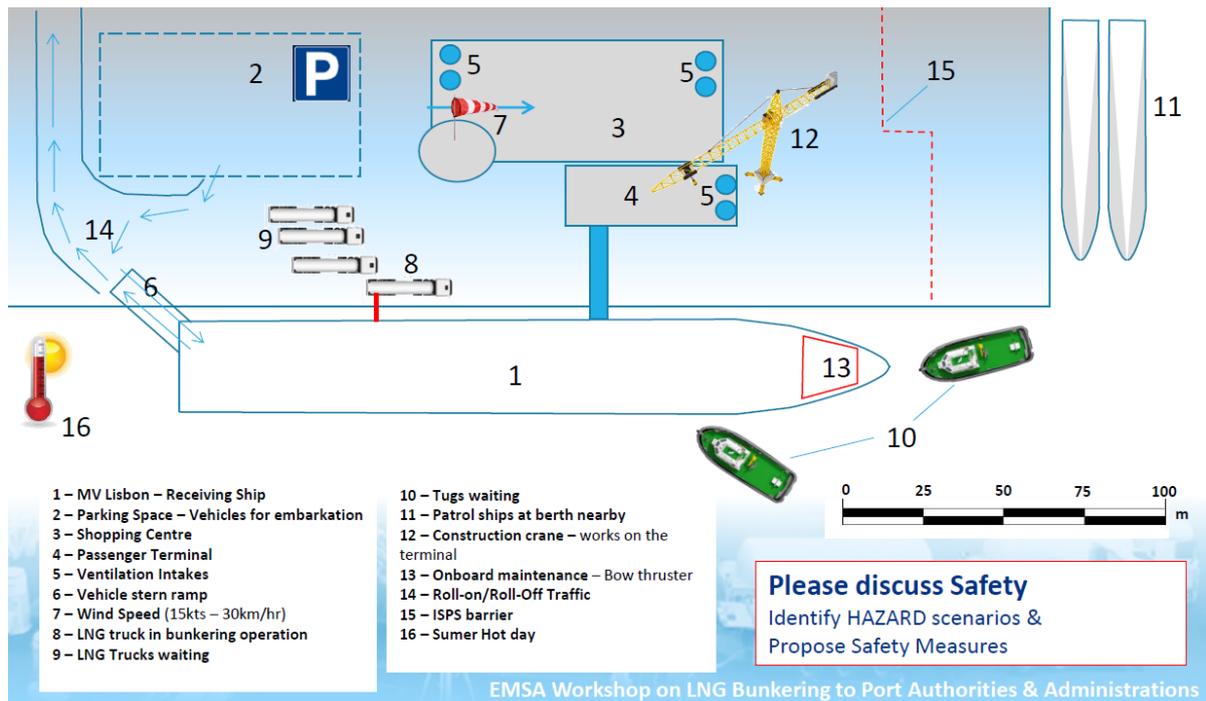
The LNG Bunkering Safety Exercise, in the context of the 1st EMSA Workshop on LNG Bunkering to Port Authorities/Administrations, allowed the integration of a variety of different safety related elements in a practical manner. The objective here was to allow the Workshop Participants to discuss safety related elements in a practical exercise.

A simulated LNG Bunkering Scenario was presented and given for discussion in 4 (four) separate groups. The simplified HAZID type of exercise required the particular application of Safety Distances and SIMOPS considerations.

Participants would have to judge and decide on the potential hazard scenarios and relevant mitigation measures, applying concepts discussed during the Workshop.

More than the “tutorial” objective, the relevance of the exercise was more to the articulation of different concepts relevant to LNG Bunkering.

Figure 6 – EMSA Workshop – LNG Safety Assessment exercise



Workshop participants have, in a very limited period of time (less than an hour) listed a comprehensive and extensive list of safety measures

3.7 PART 4 – Permitting

Development of LNG Bunkering activity requires different planning, environmental and safety permits to be requested and evaluated by different Competent Authorities. The permitting procedure for LNG small scale The EU LNG Study LOT1 and the recent replies to the EMSA online survey on LNG Bunkering have highlighted that a multitude of competent authorities are involved in different pathways for LNG Bunkering permitting. The average number of processes from the evidences collected is 4 (four).

Streamlined procedures and information to prospective permit requests are found not to be very clear and, in some cases, those willing to develop LNG Bunkering options have to work directly with authorities in the development of the respective national/port legislation for small scale LNG storage, operation and bunkering.

The objective for the last part of the Workshop was to discuss the possibility of developing an approach that would, in principle, set the essential elements for a harmonized approach to the subject of permitting for LNG Bunkering.

3.7.1 LNG Bunkering - A practical perspective from a Maritime Administration – the Danish Experience³

Mogens Schroder Bech (Danish Maritime Authority) delivered a presentation on DMA's experience in the context of LNG Bunkering

3.7.2 Discussion Paper – Permitting, Multi-Layer Process

Discussion paper prepared by EMSA (included as Annex-4)

3.7.3 Discussion Round 4 – Agreed Principles

Following the Discussion on Permitting procedures in LNG Bunkering:

- Permitting procedures will be a function of different National, Regional, Municipality, Port, and other requirements, on a country specific case. The EMSA Guidance shall not define a standard Permitting procedure.
- As a Best Practice approach relevant International Standards on LNG Bunkering should be taken into consideration.
- **Information** on the different Processes and Streamlining of procedures for LNG Bunkering Permit should be ensured.
- A dedicated Focal Point is needed (Facilitation role to be ensured by the Focal Point)
- MAIN PRINCIPLES TO DEVELOP: **Information, Transparency, Coordination, Communication**
- A **Centralized Desk/ Single-Desk** approach should be favoured, as a Best Practice for Permitting.
- **All layers of Authorization shall be linked.**

The agreed principles shall be respected in the development of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations.

4. Summary and Conclusions

4.1 Agreed Principles

Having covered the 4 (four) Discussion papers included in Annex 4 the Participants have agreed on a comprehensive number of principles already outlined in the Report and summarized in the Table below for easier reference.

Table 2 – Agreed principles following Workshop Discussion Rounds

<u>Discussion Papers</u>	<u>Agreed Principles at the Workshop</u>
<u>Discussion paper 1. Small Scale LNG bunkering - SEVESO applicability</u>	<ul style="list-style-type: none"> • SEVESO applicability <u>shall not</u> be addressed by the EMSA Guidance – From earlier discussion there are no legal grounds to apply this to trucks, ships or any other type of mobile bunkering facilities (<u>only to fixed installations</u>). Application of requirements <u>similar to those of SEVESO</u> for cases <u>where Bunkered LNG Quantities/Frequencies are such that the bunkering location can be considered a location handling hazardous substances.</u>

	<ul style="list-style-type: none"> Threshold values/Quantities/Frequencies – EMSA Guidance should not provide indicative thresholds – just indicate that <u>there shall be a function between the number of deliveries/quantities and the safety related requirements for the Operator.</u>
<p><u>Discussion paper</u> 2. Safety Distances – Methods for calculation and Criteria</p>	<ul style="list-style-type: none"> The EMSA Guidance shall not discuss on the merits of the existing methodologies (ISO Technical Standard). Port Authority shall be responsible for approval of Safety Zone. Responsibility to determine the Safety Zone shall also be addressed by the EMSA Guidance, outlining the different options possible. Instead the EMSA Guidance shall inform on: <ul style="list-style-type: none"> Existing Methodologies and Industry Guidance The necessary factors to take into account for the determination of Safety Distances: <ul style="list-style-type: none"> ✓ Environmental Factors (Wind speed and stability, Temperature) ✓ Release elevation ✓ Bunker line Pressure ✓ Transfer Rate ✓ Trapped Volume ✓ Possible Confined Space trapping ✓ Other Factors (Physical Barriers, SIMOPS) Advantages and Limitations of QRA approach to be highlighted
<p><u>Discussion paper</u> 3. Permitting & Authorization – Multi-layer procedure – Single-Window approach</p>	<ul style="list-style-type: none"> Permitting procedures will be a function of different National, Regional, Municipality, Port, and other requirements, on a country specific case. The EMSA Guidance shall not define a standard Permitting procedure. As a Best Practice approach relevant International Standards on LNG Bunkering should be taken into consideration. Information on the different Processes and Streamlining of procedures for LNG Bunkering Permit should be ensured. A dedicated Focal Point is needed (Facilitation role to be ensured by the Focal Point) MAIN PRINCIPLES TO DEVELOP: <u>Information, Transparency, Coordination, Communication</u> A <u>Centralized Desk/ Single-Desk</u> approach should be favoured, as a Best Practice for Permitting. <u>All layers of Authorization shall be linked.</u>
<p><u>Discussion paper</u> 4. Simultaneous Operations – Suggested Procedure for SIMOPS approval</p>	<ul style="list-style-type: none"> SIMOPS definition shall make the distinction between the <u>different possible types of onboard, interface and shore operations</u> that may directly or indirectly have an impact on the LNG bunkering operation. During SIMOPS the important fundamental aspects to ensure are Shared Awareness, Alarm Dissemination, Communications, and Supervision. Whenever interface-shore SIMOPS take place: The PIC shall not be responsible for the overview of all SIMOPS. A SIMOPS Supervisor should be defined (additional role) –

	<p>(Suggested the Receiving Ship).</p> <ul style="list-style-type: none"> Whenever onboard SIMOPS take place: The Receiving Ship/Master shall be responsible
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4.2 Correspondence Group

To support the development of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations the need for further Correspondence Work has been identified.

Unless expressing the intention not to participate, all EMSA Workshop participants are automatically considered members of the Correspondence Group.

Following the preparation of the first draft, expected to be finalized through the beginning of 2017, a number of correspondence work rounds should be expected to assist in the drafting work.

4.3 Timeline Ahead

In view of the continuation of the work on the EMSA Guidance the following timeline has been shared and agreed by the Workshop participants:

To be noted, in particular, the scheduling of a new Workshop for the beginning of June with the objective to approve the final text of the EMSA Guidance.

	Nov16	Dec16	Jan17	Feb17	Mar17	Apr17	May17	Jun17
ESSF LNG 10	●							
1st Workshop EMSA (1DEC)		●						
Preparation for Correspondence Work – Workshop Report		■						
Revised Work – Status update (Plenary)			●					
Correspondence Work			■					
1st Draft (15MAR) – ESSF LNG 11					●			
Correspondence Work					■			
2nd Workshop EMSA							●	
Plenary (Final Draft)								●

4.4 Conclusions

The participants welcomed the organization of the workshop by EMSA as a valuable experience for: stimulating discussion on LNG Bunkering; sharing knowledge and experience; identifying challenges and providing an overview of the current best practice in the context of the specific role of competent Port Authorities and Administrations.

The Workshop followed closely the conclusion of an online survey launched by EMSA, to which the large majority of the Workshop Participants have contributed. The summary of results from the online survey, and relevant statistics, has been presented and are included in the present report. The exercise allowed underlining the need for further guidance on LNG bunkering to Port Authorities and Administrations and, at the same time, to identify better the subject where further discussion would be needed in view of further harmonization.

The participants benefitted from presentations which covered the following topics and stimulated a further exchange: Safety Distances, LNG Guidelines (industry and port references), LNG Risk & Safety Elements, permitting. In addition representatives from different relevant stakeholders in the LNG Bunkering context have delivered presentations that helped conclude the evident need for further harmonization.

Four (04) discussion papers were sent to the participants before the meeting to facilitate an exchange of views on the relevant topics. The Discussion papers covered the four subjects where the online survey has revealed an increased number of divergent positions.

In general, the discussions were lively and provided a significant number of important elements for further consideration and analysis of the relevant topics. In addition, as an important outcome of the Workshop, the Participants were able to agree on a comprehensive list of principles to be followed in the EMSA Guidance on the particular subjects raised by the Discussion Papers:

- Applicability of SEVESO Directive requirements
- Safety Distances
- Simultaneous Operations (SIMOPS)
- Permitting

As a summary, there was general consensus on the need for further Correspondence Work in view of the forthcoming steps in the development of the EMSA Guidance. Correspondence support will be required for the exchange with the Workshop participants, 1st following the first draft and, 2nd, after the second draft, in preparation for the adoption and publication of the Guidance, expected for the end of June 2017. In addition to the necessary correspondence work a 2nd Workshop will be organized, due to take place on the beginning of June, with the objective of approving the final text of the EMSA Guidance.

Participation of Experts from the Industry (Shell, SGMF), Class (Lloyds register), Port Authorities (Rotterdam, Gothenburgh) and Maritime Administration (Denmark) have provided a comprehensive and valuable support to the Workshop, allowing the necessary discussions to be made in a “fertile” environment where experienced professionals have provided to the Workshop updated information and critical views on the relevant aspects discussed.

The Chair has confirmed that all input from the Workshop, in particular the “agreed principles, will be used in the development of the EMSA Guidance on LNG Bunkering to Port Authorities and Administrations. The correspondence work will be fundamental in the continuation of the work and is expected to start with the approval of the present report, and continue with the following 1st and 2nd draft versions of the document.

List of Annexes

ANNEX - 1

List of Workshop Participants

ANNEX - 1

EMSA Questionnaire on LNG Bunkering to Port Authorities and Administrations

Selected Results of the Online Questionnaire

ANNEX - 2

EMSA Guidance on LNG Bunkering to Port Authorities and Administrations

Outline Structure for the EMSA Guidance

ANNEX - 3

Discussion Papers

1. *Small Scale LNG bunkering - SEVESO applicability*
2. *Safety Distances – Methods for calculation and Criteria*
3. *Permitting & Authorization – Multi-layer procedure – Single-Window approach*
4. *Simultaneous Operations – Suggested Procedure for SIMOPS approval*

ANNEX - 4

Workshop Agenda

EMSA Workshop on LNG Bunkering to Port Authorities/Administrations

EMSA, Lisbon, 1 and 2 December 2016

List of Workshop Participants

List of Workshop participants

35 participants

12 EU Member States + Norway

Country	First Name	Last Name	Organization/Competent Authority
Belgium	Klaas	Van Cauwenberg	Department of Mobility and Public Works
Belgium	Paul	Schroé	MBZ nv
Denmark	Mogens Schrøder	Bech	Danish Maritime Authority
Finland	Sten	Sundberg	Finnish Transport Safety Agency
France	Guyot	Alexandre	Port Of Le Havre Authority
France	Sorel	Eric	Dunkirk-port authorities
Germany	Marina	Koester	Federal Ministry of Transport and Digital Infrastructure
Latvia	Aldis	Zarins	Ministry of Transport
Lithuania	Eduardas	Ringis	Klaipeda State Seaport Authority
Lithuania	Ramunas	Kregzdys	SC KLAIPEDOS NAFTA
Malta	Alexandra	Meli	The Energy & Water Agency - OPM (Energy & Projects) Govt. of Malta
Malta	Fritz	Farrugia	TRANSPORT MALTA
Norway	Heidi Margareth	Johansen	Norwegian Directorate for Civil Protection
Norway	Trond	Carlsen	Norwegian Directorate for Civil Protection
Norway	Annichen	Kiernan	Norwegian Ministry of Transport and Communications
Norway	Lasse	Karlsen	Norwegian Maritime Authority
Poland	Adam	Meller	Port of Gdynia Authority S.A.
Poland	Przemyslaw	Lenard	Maritime Office in Szczecin
Portugal	Leonor	Freitas	IMT, I.P.
Portugal	Rui	Barata	APL
Portugal	Rui	Lopes	Portos da Madeira
Portugal	Francisco	Bettencourt	Portos dos Açores
Portugal	João	Osório Beja	DGAM
Spain	Juan Andres	Lecertúa	GENERAL DIRECTORATE MARINE MERCHANT. SPAIN
Sweden	Dan-Erik	Andersson	Port of Gothenburg
Sweden	Saeed	Mohebbi	Swedish Transport Agency
The Netherlands	Niels	Lyklema	Ministry of Infrastructure and Environment
The Netherlands	Cees	Boon	Port of Rotterdam
United Kingdom	Stuart	Carpenter	Shell
United Kingdom	Paul	Davies	Lloyd's Register
United Kingdom	Thomas	Spencer	LR/ SGMF
EC	Agnieszka	Zaplatka	European Commission - DG Move
EC	Brigitte	Segers	European Commission - DG Move

ANNEX - 2

EMSA Questionnaire on LNG Bunkering to Port Authorities and Administrations Selected Results of the Online Questionnaire



EMSA Questionnaire on LNG Bunkering to Port Authorities and Administrations

INTRODUCTION

The present document is drafted to support the submission to the 7th Session of the ESSF Plenary providing the relevant figures, results and conclusions from the EMSA Questionnaire on LNG Bunkering to Port Authorities and Administrations.

The questionnaire has taken the shape of an online survey, published between the 1st September and the 14th October, with extensions granted for some later contributions given until the beginning of November.

SCOPE & APPLICABILITY

The EMSA Questionnaire on LNG Bunkering for Port Authorities and Administrations was divided into 2 (two) different Sections:

- **Section “A”** – on LNG Bunkering Planning & Preparation - **addressed to all Port Authorities / Administrations either already with LNG bunkering experience or still envisaging for its effective implementation**
(<https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartA>)
- **Section “B”** – on LNG Bunkering Operations - in principle, only directed **to those Port Authorities / Administrations which already have experience with actual LNG Bunkering Operations**, on whichever mode (Ship-to-Ship/ Shore-to-Ship/Truck-to-Ship)
(<https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartB>)

The table below indicates who the Questionnaire applied to:

Table 1 – Applicability to the Questionnaires Sections “A” and “B”

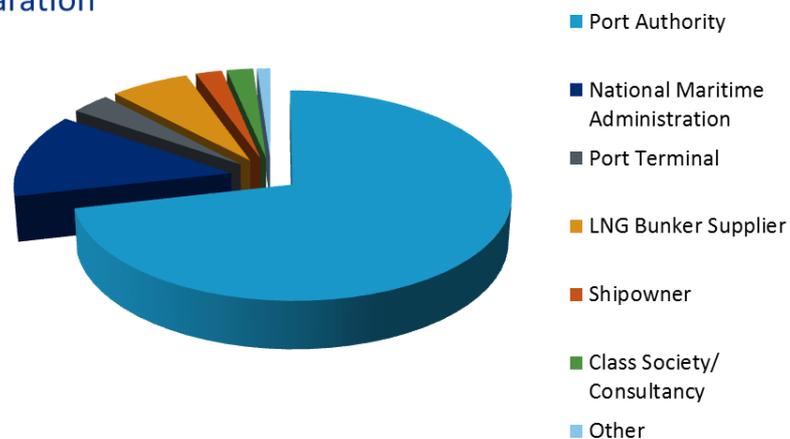
	Port Authority/Administration with experience with Actual LNG Bunkering Operations	Port Authority/Administration only involved in preparatory actions for deployment of LNG bunkering.	Port Authority/ Administration only involved in legislative developments (e.g. National Policy Frameworks)	Other Stakeholders (LNG Bunker providers, Shipowners, etc)
Section “A” – on LNG Bunkering Planning & Preparation				Have generally replied to those questions not strictly directed to Port Authorities
Section “B” – on LNG Bunkering Operations	 <u>Not to be done without replying to Section “A” first.</u>			

SUMMARY CONCLUSIONS

- Invitation for participation in the Online Survey sent in the beginning of September asking each EU Member State for the **identification of the responsible person, at Government level for implementation of Directive 2014/94/EC.**
- **110 Replies** (91 to Part A and 19 to Part B)
- Support in dissemination from the **ESSF LNG, ESSF Plenary, ESPO, IAPH**
- Analysis Concluded – Report of Results **soon to be Published**
- **EMSA Guidance** is now taking all results into Consideration.
- Areas of strongest spread in replies (i.e.):
 - PERMITTING
 - RISK ASSESSMENT and RISK MANAGEMENT
 - SIMULTANEOUS OPERATIONS
 - SAFETY DISTANCES
- **No specific Guidance** is followed by Ports. **Ports are developing own regulations** based on Industry Guidance.
- **Industry Guidance does not cover Authority-specific provisions**
- Management/Governance of Ports is **very varied** which also reflects in the development and distribution of responsibilities in LNG Bunkering.

PARTICIPATION

Section A Planning & Preparation

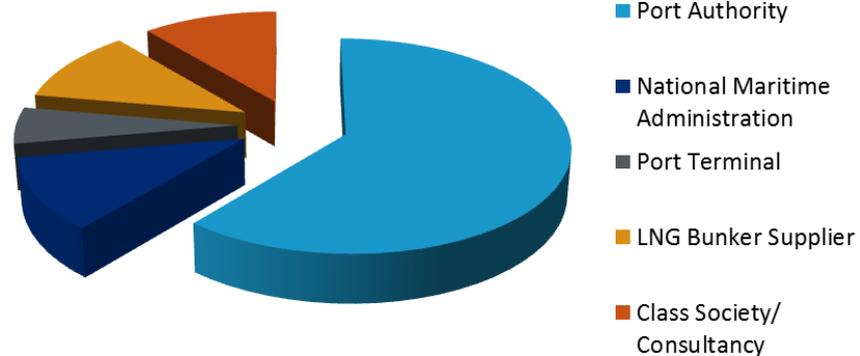


Questionnaire - Section A

Port Authority	65
National Maritime Administration	12
Port Terminal	3
LNG Bunker Supplier	6
Shipowner	2
Class Society/ Consultancy	2
Other	1

Total	91
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Section B Operations



Questionnaire - Section B	
Port Authority	11
National Maritime Administration	2
Port Terminal	1
LNG Bunker Supplier	4
Class Society/ Consultancy	1
Other	0
Total	19

A total number of 110 participants, for quite a long questionnaire, was a remarkable outcome that has been considered very positive.

A good part of the explanation for the good levels of participation has been the involvement and close cooperation of the ESSF Plenary, ESSF LNG sub-group, ESPO, IAPH, BPO and other organizations and Association who have distributed the links for the questionnaires through their partners and associate members.

In addition to this, also the online/web-based nature of the questionnaire was found to be beneficial to exchange information, to pass the invitations for participation and, ultimately, has proved to favour participation by providing a “user-friendly” interface with the users.

APPENDIX-A - STRUCTURE OF THE QUESTIONNAIRE INTERFACE SCREENS

The interface for the online survey for the EMSA Questionnaire on LNG Bunkering was developed in the EC web-based “EU Survey” <https://ec.europa.eu/eusurvey/>

The platform provided the necessary flexibility for a design architecture that was developed with the concern to be as “user-friendly” as possible. Being a substantially large questionnaire, even if divided into two separate parts

Figure 1, below shows the main elements in the Start Screen:

1. **Sections keypad** (links to different sections of the Questionnaire). The Sections keypad is kept throughout the questionnaire.
2. **Navigation keypad** (to move to next/previous Section)
3. **Save a Draft** (allows to Save the Questionnaire anytime. It can then be accessed and reply continued anytime later).
4. **Backup** (will allow a backup to be saved regularly to local computer).
5. **Views**. “Standard View” and “Accessibility View” available.
6. **Language Selector**.
7. **Contact**.
8. **PDF generator**.

The screenshot shows the start screen of the EMSA LNG Bunkering questionnaire. The page title is "EMSA Guidance on LNG Bunkering to Port Authorities and Administrations". A red box highlights a checkbox: "Save a backup on your local computer (disable if you are using a public/shared computer)". A "Pages" section lists 14 sections: Start, 1. Intro, 2. Background, 3. General, 4. Guidance, 5. Concepts, 6. Policy Frameworks, 7. Admin, 8. Training, 9. Feasibility, 10. Risk, 11. Location, 12. Permit, 13. Accreditation, 14. Contact ID, and End. A "Views" section offers "Standard" and "Accessibility Mode". A "Languages" section shows "[EN] English" selected. A "Contact" section displays "ricardo.batista@emsa.europa.eu". A "Download PDF version" link is present. A "Navigation keypad" at the bottom includes "Next" and "Save as Draft" buttons. The page features a banner image of an LNG tanker and the EMSA logo. The footer contains "EUSurvey is supported by the European Commission's ISA programme, which promotes interoperability solutions for European public administrations." and "FAQ | Support".

Figure 1 – Online Questionnaire - Elements in Start Screen

APPENDIX-B – REPLIES TO THE QUESTIONNAIRE – SECTION A

3.1 - Please indicate in the Matrix below which is the option that best defines your situation:
Port Authority

		Answers	Ratio
No experience with LNG Bunkering		22	23.91%
Some experience with LNG Bunkering (experience mostly in planning)		23	25%
Experienced in LNG Bunkering (actual operation/ approval)		16	17.39%
No Answer		31	33.7%

3.1 - Please indicate in the Matrix below which is the option that best defines your situation:
National Maritime Administration

		Answers	Ratio
No experience with LNG Bunkering		5	5.43%
Some experience with LNG Bunkering (experience mostly in planning)		4	4.35%
Experienced in LNG Bunkering (actual operation/ approval)		3	3.26%
No Answer		80	86.96%

3.1 - Please indicate in the Matrix below which is the option that best defines your situation:
Port Terminal

		Answers	Ratio
No experience with LNG Bunkering		0	0%
Some experience with LNG Bunkering (experience mostly in planning)		1	1.09%
Experienced in LNG Bunkering (actual operation/ approval)		0	0%
No Answer		91	98.91%

3.1 - Please indicate in the Matrix below which is the option that best defines your situation:**LNG Bunker Supplier**

		Answers	Ratio
No experience with LNG Bunkering		0	0%
Some experience with LNG Bunkering (experience mostly in planning)		2	2.17%
Experienced in LNG Bunkering (actual operation/ approval)		2	2.17%
No Answer		88	95.65%

3.1 - Please indicate in the Matrix below which is the option that best defines your situation:**Shipowner**

		Answers	Ratio
No experience with LNG Bunkering		0	0%
Some experience with LNG Bunkering (experience mostly in planning)		2	2.17%
Experienced in LNG Bunkering (actual operation/ approval)		0	0%
No Answer		90	97.83%

3.1 - Please indicate in the Matrix below which is the option that best defines your situation:**Class Society/ Consultancy**

		Answers	Ratio
No experience with LNG Bunkering		0	0%
Some experience with LNG Bunkering (experience mostly in planning)		0	0%
Experienced in LNG Bunkering (actual operation/ approval)		1	1.09%
No Answer		91	98.91%

3.1 - Please indicate in the Matrix below which is the option that best defines your situation:**Other**

		Answers	Ratio
No experience with LNG Bunkering		2	2.17%
Some experience with LNG Bunkering (experience mostly in planning)		1	1.09%
Experienced in LNG Bunkering (actual operation/ approval)		2	2.17%
No Answer		87	94.57%

3.2 - Please indicate from the list below the type of port management that best defines your model

		Answers	Ratio
Service Port/Public Service Port		49	53.26%
Function Port		6	6.52%
Landlord Port		27	29.35%
Private Port/Private Service Port		8	8.7%
No Answer		15	16.3%

3.3 - Is LNG Bunkering already being developed to take part within your Port?

		Answers	Ratio
Yes		37	40.22%
No		24	26.09%
No Answer		31	33.7%

3.4 - Which LNG Bunkering mode(s) are possible /implemented in your port?

		Answers	Ratio
Truck-to-Ship (TTS)		33	35.87%
Ship-to-Ship (STS)		23	25%

Port-to-Ship (PTS)		14	15.22%
Other		5	5.43%
No Answer		56	60.87%

3.6 - Do you agree with the need for guidance [1] to Port Authorities/Administrations, on the specific subject of LNG Bunkering for LNG fuelled vessels? Please provide your comments if any. [1] Guidance here understood as a document containing a structured collection of good practice elements and advice of a non-binding nature. The objective for the document is to build on the existing experience in Ports where LNG bunkering has taken its first steps towards implementation.

		Answers	Ratio
Yes. further Guidance on LNG Bunkering to Port Authorities and Administrations is necessary.		79	85.87%
No. Existing Guidance is sufficient for LNG Bunkering, especially with regards to the action envisaged by Port Authorities and Administrations.		5	5.43%
Do not know (should you want to provide any comment, please use 3.7, below)		2	2.17%
No Answer		6	6.52%

3.8 - Table 1, below, provides an indicative overview of a provisional Table of Contents for the EMSA Guidance on LNG Bunkering for Port Authorities and Administrations. 5 (five) Sections and 14 (fourteen) Chapters are considered, with the indication of the key contents that are to be featured under each Chapter. Please indicate whether the proposed structure and anticipated contents deserve your agreement.

		Answers	Ratio
Agreed. The provisional Table of Contents presented in Table 1, below, contains the relevant elements to be featured in the EMSA Guidance on LNG Bunkering for Port Authorities and Administrations		77	83.7%
Not Agreed. There are an excess of elements considered in the provisional table presented in Table 1.		2	2.17%
Not Agreed. Some elements are considered to be missing in the Table presented in Table 1.		6	6.52%
No Answer		11	11.96%

4.1 - Are there any instruments, in the form of written Guidelines/Guidance or other, used as references for LNG bunkering operations within your Port area/jurisdiction?

		Answers	Ratio
Yes		28	30.43%
No		49	53.26%
No Answer		15	16.3%

4.2 - Are there any instruments, in the form of written Guidelines/Guidance or other, used as references, specifically addressed to your action as an Authority/Administration, in the context of LNG bunkering?

		Answers	Ratio
Yes		27	29.35%
No		54	58.7%
No Answer		11	11.96%

4.3 - Are IAPH Check-Lists (<http://www.lngbunkering.org/lng/bunker-checklists>) included as part of the LNG bunkering guidance used in particular for your case?

		Answers	Ratio
Yes		30	32.61%
No		48	52.17%
No Answer		14	15.22%

4.5 - Is there agreed terminology in place for the persons involved in LNG Bunkering Operations, either directly in or overseeing the operation?

		Answers	Ratio
Yes		21	22.83%
No		51	55.43%
No Answer		20	21.74%

4.5 a) - Are these persons defined, along with the accurate description of their responsibilities?

		Answers	Ratio
Yes		13	14.13%
No		5	5.43%
No Answer		74	80.43%

5.1 - Is there an LNG Bunkering concept which is specific to your case?

		Answers	Ratio
Yes		24	26.09%
No		51	55.43%
No Answer		17	18.48%

6.3 - Are there any obligations/requirements for Ports to develop written Guidelines/Guidance on LNG Bunkering stemming from your country's national Policy Framework?

		Answers	Ratio
Yes		16	17.39%
No		52	56.52%
No Answer		24	26.09%

7.3 - Are Quality Management standards applied by the Port Authority/Administration?

		Answers	Ratio
Yes		33	35.87%
No		34	36.96%
No Answer		25	27.17%

8.6 - Would you consider relevant to have training records in format certificates, following standard templates that could be mutually recognized?

		Answers	Ratio
Yes		47	51.09%
No		21	22.83%
No Answer		24	26.09%

9.1 - Is a Feasibility Study required as part of the permitting process?

		Answers	Ratio
Yes		48	52.17%
No		21	22.83%
No Answer		23	25%

9.2 - Is the Port Authority/Administration, in any way, involved in the Feasibility Study?

		Answers	Ratio
Yes		46	50%
No		21	22.83%
No Answer		25	27.17%

9.3 - When looking to a Feasibility Study which aspects are considered to be of most interest?

		Answers	Ratio
Risk & Safety Aspects		68	73.91%
Location		54	58.7%
Demand Estimates		39	42.39%
Engineering/Technology		32	34.78%
Intermodal considerations		30	32.61%
No Answer		22	23.91%

10.1 -Guidance on Risk Assessment. Is there guidance in place on how to build the Risk Assessment for the approval of LNG bunkering installations and operations?

		Answers	Ratio
Yes		28	30.43%
No		45	48.91%
No Answer		19	20.65%

10.2 - Are there Risk Criteria established, particularly for LNG Bunkering?

		Answers	Ratio
Yes		27	29.35%
No		44	47.83%
No Answer		21	22.83%

10.4 - Are there ALARP (As Low as Reasonably Possible) levels defined?

		Answers	Ratio
Yes		13	14.13%
No		52	56.52%
No Answer		27	29.35%

10.5 - Is there a required methodology to be followed for the Risk Assessment?

		Answers	Ratio
Yes		24	26.09%
No		44	47.83%
No Answer		24	26.09%

10.9 - Is the Port Authority/Administration involved in the HAZID/HAZOP exercises for the prospective LNG Bunkering projects?

		Answers	Ratio
Yes		39	42.39%
No		31	33.7%
No Answer		22	23.91%

10.10 - The HAZID exercise has demonstrated to be a very valid instrument in the identification of potential LNG Bunkering related Hazards and further safeguards to be implemented for their mitigation. Please select, from the tick-boxes below, the relevant aspects that should be part of the complete HAZID exercise.

		Answers	Ratio
Literature review		34	36.96%
Workshop (with all stakeholders around a table)		44	47.83%
Workshop visit to the port site facilities.		34	36.96%
Risk Matrix (with agreed qualitative risk ranking)		45	48.91%
Scenarios Definition		45	48.91%
No Answer		36	39.13%

11.3 - Are there criteria for risk contours and other location-specific risk requirements?

		Answers	Ratio
Yes		32	34.78%
No		33	35.87%
No Answer		27	29.35%

12.3 - How many processes the permitting procedure consists of? (Please tick the applicable boxes below)

		Answers	Ratio
Planning Process		39	42.39%
Permission process		44	47.83%
Designation of Land		33	35.87%
Environmental Permit		39	42.39%
Building Permit		35	38.04%
Activity Permit		34	36.96%
Safety Permit		39	42.39%
No Answer		40	43.48%

12.8 - Is a SEVESO Safety Report required?

		Answers	Ratio
Yes		19	20.65%
No		17	18.48%
No Answer		56	60.87%

12.9 - Is Public Consultation required?

		Answers	Ratio
Yes		31	33.7%
No		17	18.48%
No Answer		44	47.83%

13.1 - Which aspects of LNG Bunkering are subject to certification?

		Answers	Ratio
LNG Bunker connectors		36	39.13%
Emergency Shutdown System (ESD)		32	34.78%
LNG Truck (Tank and vehicle)		36	39.13%
LNG Truck Driver and operator		30	32.61%
LNG Bunkering management plan		21	22.83%
LNG Bunkering technical files		21	22.83%
Personal Protective Equipment (PPE)		32	34.78%
Person in Charge (PIC)		24	26.09%
Other		8	8.7%
No Answer		48	52.17%

13.2 - Are all certifications involved in the LNG Bunkering procedure subject to accreditation in order to be allowed to be validated?

		Answers	Ratio
Yes		22	23.91%
No		16	17.39%
No Answer		54	58.7%

13.4 - Would you accept certifications of equipment, systems, procedures or personnel, if accredited by a National Accreditation Body (NAB) of a different country?

		Answers	Ratio
Yes		30	32.61%
No		11	11.96%
No Answer		51	55.43%

13.8 - Is there a public list of accredited companies?

		Answers	Ratio
Yes		11	11.96%
No		24	26.09%
No Answer		57	61.96%

13.11 - Is an integrated LNG bunkering plan required involving all parties involved in the LNG bunkering operations?

		Answers	Ratio
Yes		31	33.7%
No		9	9.78%
No Answer		52	56.52%

13.11 a) - Please indicate (by ticking below where appropriate) which elements have to be demonstrated as part of that plan?

		Answers	Ratio
Emergency Response plan		36	39.13%
Safety Instructions and Procedures		37	40.22%
Training records		25	27.17%
Quantity/Quality elements/agreements		22	23.91%
Bunker Procedure		37	40.22%
Equipment Certificates		32	34.78%
Compatibility (essentially Connectors and ESD)		26	28.26%
Check-lists		32	34.78%
Other		8	8.7%
No Answer		53	57.61%

3.1 - You are about to start Section "B" of the EMSA Questionnaire on LNG Bunkering for Port Authorities/Administrations. Have you replied already to Section "A"?

		Answers	Ratio
Yes		16	84.21%
No		1	5.26%
No Answer		2	10.53%

4.1 - Are Operational Envelopes defined for LNG Bunkering Operations?

		Answers	Ratio
Yes		5	26.32%
No		10	52.63%
No Answer		4	21.05%

4.2 - Would you consider beneficial to have guidance on how to establish Operational Envelopes for LNG Bunkering?

		Answers	Ratio
Yes		14	73.68%
No		2	10.53%
No Answer		3	15.79%

4.4 - Which elements, from the list below, are considered in the definition of your Operational Envelopes? NOTE: Should you have no Operational Envelopes established please indicate those you consider of relevance for the purpose.

		Answers	Ratio
a. Weather - Wind		11	57.89%
b. Weather - Rain		3	15.79%

c. Weather - Air Temperature		2	10.53%
d. Weather - Stormy conditions (likelihood of thunderstorms)		13	68.42%
e. Weather - Icing Conditions.		3	15.79%
f. Nautical Traffic in the vicinity of the bunkering location		11	57.89%
g. Port Activity		11	57.89%
h. Tidal influence		7	36.84%
i. Other		6	31.58%
No Answer		5	26.32%

4.5 - Is a Risk Assessment used for the definition of your Operational Envelopes?

		Answers	Ratio
Yes		3	15.79%
No		2	10.53%
No Answer		14	73.68%

4.6 - Should a Risk Assessment be used for the definition of possible Operational Envelopes?

		Answers	Ratio
Yes		9	47.37%
No		1	5.26%
No Answer		9	47.37%

4.8 - Are there other Restrictions defined?

		Answers	Ratio
Yes		4	21.05%
No		11	57.89%
No Answer		4	21.05%

4.11 - Which elements, from the list below, could be included in the possible list of restrictions? NOTE: Should you have no Restrictions applicable to LNG Bunkering Operations please indicate those you consider of relevance for the purpose.

		Answers	Ratio
a. LNG Bunkering Equipment related		10	52.63%
b. LNG Truck related (waiting, transit or in operation)		7	36.84%
c. Storage related restrictions		4	21.05%
d. Electric equipment restrictions/prohibitions		11	57.89%
e. Procedural/behavioural restrictions		10	52.63%
f. Other		1	5.26%
No Answer		7	36.84%

5.2 - Are any of the references below used for the definition of the relevant Zones, to be controlled during LNG bunkering operations? Please tick the appropriate box(es).

		Answers	Ratio
ISO/TS 18683:2015 (15-Jan. 2015). Guidelines for systems and installations for supply of LNG as fuel to ships		9	47.37%
Society for Gas as a Marine Fuel (SGMF). (2015). Gas as a marine fuel, safety guidelines, Bunkering. Version 1.0, February 2015		9	47.37%
IACS Rec. 142 - LNG Bunkering Guidelines. Recommendation		8	42.11%
IEC 60079-10-1. (2015). Explosive atmospheres – Part 10-1: Classification of areas - Explosive gas atmospheres		8	42.11%
Other		9	47.37%
No Answer		5	26.32%

5.7 - Would the frequency of LNG bunkering, for a given ship, on a yearly basis, be a factor that you would consider for the definition of the size of the Safety Zone?

		Answers	Ratio
Yes		2	10.53%
No		11	57.89%
No Answer		6	31.58%

7.2 - Since the LNG Bunkering operation is, in fact, a sequence of different events (transport of LNG to port, transit in port, stand-by position of LNG to be delivered (truck or barge), LNG transfer to receiving ship, amongst other), please indicate which of the following moments LNG bunkering actions require Authorization:

		Answers	Ratio
LNG Bunkering operation - scheduling		7	36.84%
LNG Truck entrance to Port Area		6	31.58%
Authorization to approach receiving ship (following confirmation that all safety aspects are considered)		3	15.79%
Start LNG transfer		5	26.32%
Other		3	15.79%
No Answer		9	47.37%

7.10 - Does the authorization procedures take into account the different possible check-lists produced by the different parties involved?

		Answers	Ratio
Yes		5	26.32%
No		4	21.05%
No Answer		10	52.63%

8.2 - Is Emergency Preparedness & Response for LNG Bunkering, in your port, following the recommendations of a Risk Assessment?

		Answers	Ratio
Yes		7	36.84%
No		2	10.53%
No Answer		10	52.63%

8.4 - Even if recommendations of a Risk Assessment are not being used, would you consider this beneficial?.

		Answers	Ratio
Yes		2	10.53%
No		0	0%
No Answer		17	89.47%

8.6 - Are general emergency drills organized according to a specific plan?

		Answers	Ratio
Yes		5	26.32%
No		5	26.32%
No Answer		9	47.37%

8.7 - Do these drills focus on LNG bunkering particular aspects and actions?

		Answers	Ratio
Yes		2	10.53%
No		2	10.53%
No Answer		15	78.95%

8.8 - Which stakeholders are involved? (Please select from the boxes below which parties are involved in the drills/emergency exercised).

		Answers	Ratio
Port Authority		9	47.37%
Terminal Company (if Terminal considered within the Port Area)		8	42.11%
Local Civilian Authorities (Police, Municipal Fire Brigade, Ambulance service)		9	47.37%
Local municipal authorities		4	21.05%
Port Fire Brigade		6	31.58%
Other companies operating within the port area, directly or indirectly related to the LNG Bunkering.		7	36.84%
Bunker supplier		7	36.84%
Specific Ship Operator of LNG receiving vessel.		7	36.84%
Other		0	0%
No Answer		10	52.63%

8.11 - Are there shore side contingency and emergency plans in place?

		Answers	Ratio
Yes		10	52.63%
No		1	5.26%
No Answer		8	42.11%

8.13 - Does the port under your jurisdiction have a dedicated Fire Brigade specially trained for LNG hazards?

		Answers	Ratio
Yes		3	15.79%
No		7	36.84%
No Answer		9	47.37%

9.1 - Is there a formal procedure for incident reporting of LNG bunkering related incidents?

		Answers	Ratio
Yes		5	26.32%
No		4	21.05%
No Answer		10	52.63%

9.2 - Is there a specific form in place to report on LNG bunkering related incidents?

		Answers	Ratio
Yes		3	15.79%
No		6	31.58%
No Answer		10	52.63%

9.4 - Is reporting to EMCIP (European Maritime Casualty and Incident Platform) considered?

		Answers	Ratio
Yes		0	0%
No		5	26.32%
No Answer		14	73.68%

9.5 - Only when there is an investigation or in all cases?

		Answers	Ratio
Only when an Accident Investigation is carried out by the National Accident Investigation Body		0	0%
In all Cases		0	0%
No Answer		19	100%

9.6 - Are near-misses reported?

		Answers	Ratio
Yes		3	15.79%
No		3	15.79%
No Answer		13	68.42%

10.2 - Should any release event take place (apart from the immediate safety concerns) is there an established reporting procedure for environmental incident?

		Answers	Ratio
Yes		6	31.58%
No		5	26.32%
No Answer		8	42.11%

Please indicate below which LNG Bunkering mode(s) take place in your port.

		Answers	Ratio
Port-to-Ship (PTS)		5	26.32%
Ship-to-Ship (STS)		3	15.79%
Truck-to-Ship (TTS)		11	57.89%
No Answer		8	42.11%

11.2.2 - Is a Risk Assessment required for the definition of the STS LNG bunkering location?

		Answers	Ratio
Yes		2	10.53%
No		0	0%
No Answer		17	89.47%

11.2.6 - Apart from Flag statutory requirements are there any other requirements applicable to the LNG bunker vessel?

		Answers	Ratio
Yes		2	10.53%
No		0	0%
No Answer		17	89.47%

11.2.8 - Is there any intervention from you, as a Port Authority/Administration, in the confirmation of the mooring arrangements and access between ships and pier?

		Answers	Ratio
Yes		2	10.53%
No		0	0%
No Answer		17	89.47%

11.3.4 - Is the width of the safety zones dependent on the number of trucks involved in the TTS LNG bunkering procedure?

		Answers	Ratio
Yes		4	21.05%
No		6	31.58%
No Answer		9	47.37%

11.3.7 - Is TTS LNG bunkering directly to the receiving ship deck allowed?

		Answers	Ratio
Yes		6	31.58%
No		2	10.53%
No Answer		11	57.89%

EMSA Guidance on LNG Bunkering to Port Authorities and Administrations
Outline Structure for the EMSA Guidance



Guidance on LNG Bunkering to Port Authorities and Administrations

Date: 04-07-2016

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ANNEX - 4

Discussion Papers

1. *Small Scale LNG bunkering - SEVESO applicability*
2. *Safety Distances – Methods for calculation and Criteria*
3. *Permitting & Authorization – Multi-layer procedure*
4. *Simultaneous Operations – Suggested Procedure for SIMOPS approval*



DISCUSSION PAPER 1

LNG Bunkering – Small Scale LNG Bunkering Solutions in the context of SEVESO requirements

Relevant to EMSA Guidance Section nr. (see Outline Structure document)	8 (Permitting) and 9 (Accreditation of the Bunker Facility Operator)
Context	<ul style="list-style-type: none"> • An <u>increasing number of LNG bunkering and refuelling solutions</u> have been coming to light as operators look more and more to LNG as a viable cleaner fuel solution for shipping. • Permitting procedures throughout EU MS were identified to diverge significantly, especially with regards to the number of different competent authorities involved (this was identified in the EU LNG Study – LOT1, and has been confirmed • SEVESO Directive - All onshore establishments which hold more than 50 tonnes of LNG fall under the scope of the directive and need to establish a major accident prevention policy. In addition, operators of high tier establishments holding more than 200 tonnes of LNG (equivalent to 440 m3) need to establish a safety report before construction is commenced. The safety report must include identification and assessment of major hazards and necessary measures to prevent such accidents, a safety management system and an emergency plan. The Seveso III directive, already transposed into national legislation, has just recently replaced Seveso II, with no implications for LNG small scale installations. • SEVESO exempts transport of LNG, including its loading and offloading, where covered by other regulatory framework.
Problem(s)	<p>The development of different LNG bunkering solutions may lead to specific situations where no sufficient standardization exists for evaluation of risk, environmental impact and emergency response preparation.</p>
Discussion	<ul style="list-style-type: none"> • SEVESO III applicable requirements impose restrictions on Small Scale LNG Bunkering developments. This may be especially relevant for the cases where larger bunkering capacities are considered. • Operators have increasingly developed LNG bunkering solutions based on existing LNG bunkering (and temporary storage) modes that are covered by a regulatory framework other than SEVESO (ADR, ADN or other). • How can it be ensured that the different technical solutions for LNG Bunkering (see Annex) can represent equivalent levels of safety to those required by Seveso? Are the respective regulatory frames for trucks sufficiently adapted and prepared? • Are we in the presence of an area where further harmonization could be ensured? <p>The Group is invited to contribute for discussion with the objective of identifying a common baseline for guiding Port Authorities/Administrations on the best way to address safety of small scale LNG bunkering facilities</p>



Situation 1:

LNG truck “fuelling” a cruise vessel alongside at port. It is not a common bunkering situation we are witnessing here. It is actually the LNG truck feeding directly the LNG engine inside the ship, for power production at port. The truck is here presented with an LNG ISO Container of 40’, with an approximate LNG full load of 22 tonnes.

The operation lasts for the whole stay of the vessel at port, which can amount to 24 hours.



Situation 2:

Exactly the same context as Situation 1 but with a series of LNG 40’ ISO containers connected to main frame common manifold. The LNG is then provided as bunker fuel or, in some planned situations, as a shore-side fuel supply to a port diesel generator.



Situation 3:

LNG barge, with electrical production and supply to a cruise ship, alongside, at a nearby position (as shown above). The LNG barge is a mobile unit that needs a tug to be pushed and pulled around.

The total LNG fuel stored onboard for energy production amounts to 17 tonnes of LNG.

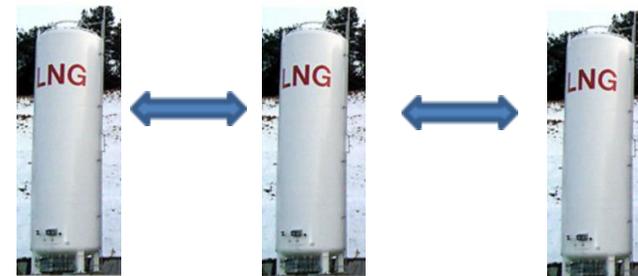
Plans exist to increase the capacity of these modular barges up to 40 tonnes capacity (or maybe more).



Situation 4:

Small scale LNG storage installations close to shore, within the port, for LNG refuelling of ships.

Around 120 (3x40) tonnes of LNG stored in fixed installation.



The same above tanks have now been separated by a given distance (let's say 50m), constituting 3 (three) separate LNG refuelling tanks.



Total LNG: 400 tonnes



Total LNG: 600 tonnes

Situation 5 (Small Scale storage and fixed location bunkering):

Small scale LNG facilities are the most likely development in the next few years as ships increase their intended autonomy on LNG fuel. Ships will develop the willingness to go further on LNG. More and more attention will be paid to integrate larger tanks onboard large intercontinental containerships. LNG bunker stations will have to follow. Truck units will not be sufficient for a time efficient call at port, as more quantities of LNG will be needed, and delivered in the shortest periods of time. This will impact directly the expected patterns for bunkering.

We have had, in EMSA, comments from many stakeholders in the industry expressing that SEVESO is seen as a big challenge to the initiative and development of small scale LNG storage and bunkering facilities.

EMSA, trying to provide guidance to Port Authorities on how to best address the permitting procedures for these installations, in the context of LNG Bunkering.



DISCUSSION PAPER 2

Safety Distances – Methods for calculation and Criteria

Relevant to EMSA Guidance Section nr.	7 (Risk), 10 (Pre-Bunkering) and 11 (Bunkering)
Context	<ul style="list-style-type: none"> • A safety zone is required during bunkering of liquefied natural gas (LNG), as noted in guidelines and developing standards⁵. The purpose of the zone is to set an area that is present during bunkering and within which only essential personnel are allowed and potential ignition sources are controlled. This further minimises the low likelihood of an LNG release and its possible ignition. It also helps protect individuals and property via physical separation should a release occur. • In addition to the safety zone, a security zone and hazardous area classification zone(s) are also required, with different objectives and subject to different criteria. • All 3 (three) zones are illustrated in the Annex to this Discussion Paper. • Calculation of Safety Distances is possible in the following ways: <ul style="list-style-type: none"> [1]. <u>Safety Zone – Maximum Credible Release (Deterministic)</u> [2]. <u>Safety Zone – Alternative Release Scenario (ISO example is for 25mm hole in bunker hose or instrument rupture – but other significant failure scenarios can be considered)</u> [3]. <u>Safety Zone – Quantitative Risk Assessment (QRA) – (Probabilistic)</u> <ul style="list-style-type: none"> ▪ <u>with Severity Criteria</u> ▪ <u>with Likelihood Criteria</u>
Problem(s)	<ul style="list-style-type: none"> • Calculation of Safety Distances often leads to values that potentially deem impossible the bunkering operation for higher LNG bunkering flow rates/higher pressures. • As some ships grow in terms of LNG bunkering demand, with more LNG quantities to be delivered per bunkering operation, the chosen approach to calculate the Safety Distance will have a very significant impact in the operational profile of the ship at port. • Maximum and Significant release scenarios distances presented in ISO Standards don't show the assumption for calculation. • As a way to allow for smaller Safety Distances, taking into account other factors apart from pressure, trapped volume or flow rates, a risk-based approach can be followed (QRA) based. Risk Criteria are however typically annual averaged. This may represent a problem attenuating risk for non-systematic and irregular operations. • In Annex an example is included to illustrate the problematic presented with the calculation of Safety Distances.

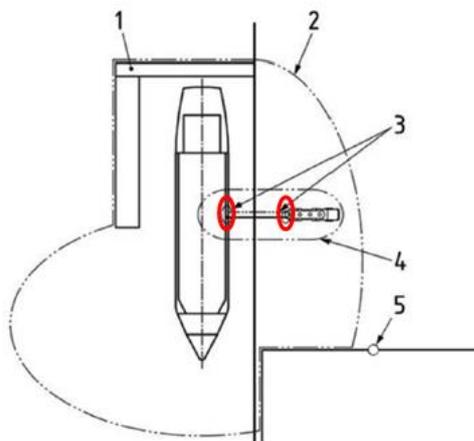
⁵ The following standards and guidelines can be taken as reference:

- ISO/TS 18683:2015. (15-Jan. 2015). Guidelines for systems and installations for supply of LNG as fuel to ships - Technical Specification
- Society for Gas as a Marine Fuel (SGMF). (2015). Gas as a marine fuel, safety guidelines, Bunkering. Version 1.0, February 2015.
- ISO/DIS 20519:2016. Ships and marine technology – Specification for bunkering of gas fuelled ships - International Standard.
- IACS Rec 142 – Recommendation on LNG Bunkering

Discussion	<p>The Group is invited to contribute for discussion with the objective of identifying a common baseline for guiding Port Authorities/Administrations on the best way to address calculation of Safety Distances and on how to best provide an approach to the determination of risk acceptance criteria for Severity or Likelihood based acceptance criteria.</p> <p>The Group is invited to take the following elements in consideration in the discussion:</p> <ul style="list-style-type: none">▪ Trapped volume minimization options▪ Pressure during bunkering (minimization)▪ Cold LNG vs Warm LNG▪ Possibilities to draft best practice guidance to suggest always optimization of bunker delivery temperatures (with associated minimization of bunker line pressures).▪ Environmental operational elements (ambient temperature, wind speed and direction)▪ Challenges in the definition of a risk based methodology (as presented in Annex)▪ Need to define a uniform operation-based Risk Criteria, instead of the common yearly averaged criteria.
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- **Different Zones associated to LNG Bunkering**

(Sources: ISO/TS 18683:2015, ISO/DIS 20519:2016)



1. Physical Barrier
2. Security Zone
3. Hazardous Area Classification Zone
4. Safety Zone
5. ISPS Boundary (International Code for the Security of Ships and of Port Facilities)

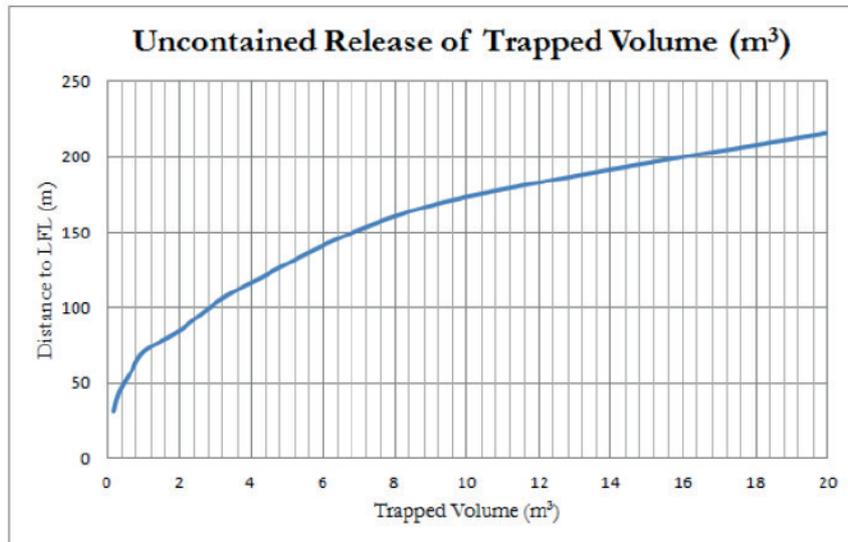
- **LNG bunkering rates and configurations for different vessel types**

(Sources: A feasibility study for an LNG filling station infrastructure and test of recommendations, Authority Draft Feasibility Report, North European LNG Infrastructure Project, November 2011.)

Vessel type	Bunker quantity	Rate	Duration	Hose or arm diameter
Service vessels, tugboats, patrol boats and fishing boats	50 m ³	60 m ³ /h	45 min	2x2" or 1x3"
Small RoRo and RoPax vessels	400 m ³	400 m ³ /h	1 hr	2x4" or 1x6"
Large RoRo and RoPax vessels	800 m ³	400 m ³ /h	2 hr	2x4" or 1x6"
Small cargo, container and freight vessels	2,000 – 3,000 m ³	1,000 m ³ /h	2 to 3 hr	2x8" or 1x12"
Large freight vessels	4,000 m ³	1,000 m ³ /h	4 hr	2x8" or 1x12"
Large tankers and container ships	10,000 m ³	2,500 m ³ /h	4 hr	2x10"
Very large container ships and oil tankers	20,000 m ³	3,000 m ³ /h	7 hr	2x12"

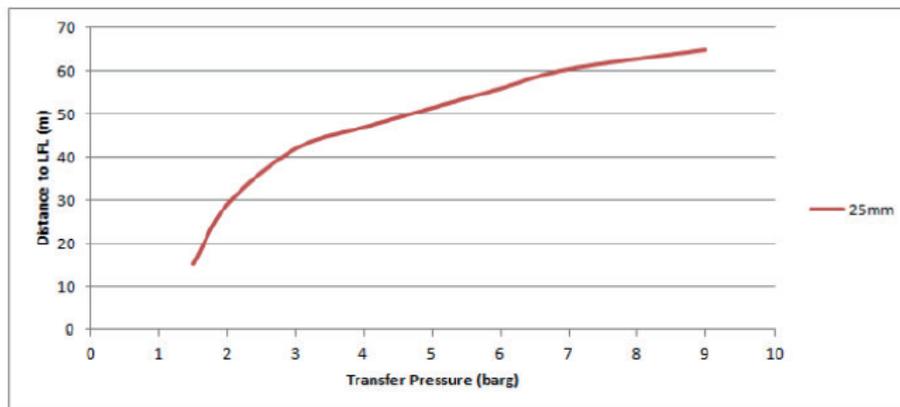
▪ **Graph 1 - Distances to LFL as a function of the release volume**

(Sources: ISO/TS 18683:2015, ISO/DIS 20519:2016)



▪ **Graph 2 - Distances to LFL as a function of the system pressure (accounting for a 25mm hole)**

(Sources: ISO/TS 18683:2015, ISO/DIS 20519:2016)



Example (ISO Calculations):

LNG Bunkering requested by a 2500TEU LNG fuelled containership

- Loa=200m, B=24m (Bunkering station 40m aft amidships)
- requested quantity: 1200m³ (approximately 540ton)
- Transfer rate 400m³/hr – 3hrs filling – 3 ½ hrs bunkering operation
- Request for bunkering via LNG Barge, from the outer side, whilst the ship is alongside.
- Transfer hose 6"
- Transfer pressure 3barg (temp approx. -145C)
- Length between ESD valves: 20m (not uncommon)

Which Safety Distance to consider?

MAXIMUM CREDIBLE RELEASE (using Distances to LFL as a function of the release volume)

(REF: ISO/TS 18683:2015; ANNEX B)

Inches to SI

6" = 0.1524m

Calculation of trapped Volume

$$Vt = \left(\frac{\pi D^2}{4} \right) \times Lt$$

Vt – Trapped volume

D – Hose diameter

Lt – trapped length

Vt = 0.3648 m³

Going into the **Graph 1**:

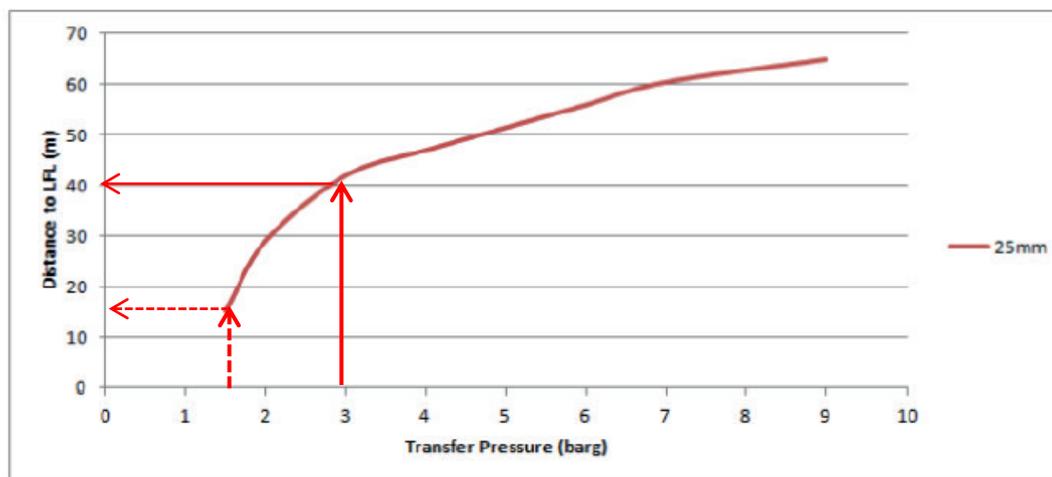


From a Maximum Credible Release the inventory of LNG trapped is considered for the calculations. A safety distance of **50m** is determined.

MAXIMUM CREDIBLE RELEASE (Distances to LFL as a function of the system pressure - accounting for a 25mm hole)

(REF: ISO/TS 18683:2015; ANNEX B)

Going into the **Graph 2**



For 3 barg (gauge pressure) the indicated distance is of **40m** (20% lower than the distance calculated before)

Should the temperature of the delivered LNG be actually higher than -140°C the pressure can actually increase up to values above 6 barg (representing a distance of more than 50m).

On the contrary, should the pressure be of 1.5 barg the indicative distance would be even lower, in the order of **15m**.

Further to the above, the size of the hole can also be varied and the relative distance to LFL can be even smaller.

Only by the two different deterministic approaches above it can be clearly seen that there is the need to:

- Further understand the underlying assumptions of the LFL curves in ISO standards.
- Agree on a uniform harmonized approach to the determination of Safety Distances.

RISK BASED APPROACH

(REF: ISO/TS 18683:2015; ANNEX B)

As an option to the use of deterministic approach to the calculation of Safety Distances a Risk based approach is also possible, as explained in ISO/TS 18683. **By using a risk based approach it is possible to integrate a representative set of potential releases; the consequences of each release; and the likelihood with which these releases occur.** This approach provides increased understanding of the releases that contribute most to the risk, and this is useful in identifying and testing the suitability of prevention and mitigation measures⁴.

A risk based approach would be based on a QRA (Quantitative Risk Assessment) determination of Safety distances, based on the elements indicated above and would be, from a risk description perspective, the most case-sensitive approach to follow reflecting the particular individual elements for each operation.

The elements outlined in ISO/TS 18683:2015 (Annex B) should be considered:

The potential advantage of using a QRA methodology is in being able to potentially define a smaller safety distance than the one calculated by the deterministic method.

A smaller safety zone may in fact be accepted provided that it can be demonstrated by the QRA that risk acceptance criteria can be met for first, second, and third-party personnel. The following elements are extracted from ISO 18683 and 20519 (Annex B)

- The risk assessment should address all release scenarios as identified in the HAZID and reflect validated (or conservative failure data).
- The risk assessment can recognize implemented, “hard-wired” safeguards based on conservative assumptions.
- The modelling of the release and dispersion need to take into account the following:
 - .a *hole size reflecting the installed equipment and validated failure data;*
NOTE *If validated failure data is not available, conservative assumptions have to be made.*
 - .b *outflow conditions;*
 - .c *evaporation/flashing of LNG reflecting LNG properties and heat transfer from ground/water;*
 - .d *heavy gas dispersion;*
 - .e *weather/wind conditions;*
 - .f *properties of the LNG, reflecting release conditions*
 - .g
- Ignition probabilities shall reflect installations and operations and be applied with reference to IEC 600079-10 for the following:
 - .a *hazardous areas (Zone 1 or Zone 2);*
 - .b *inside the safety zone (Zone 2);*
 - .c *outside the safety zone*
- The risk assessment shall normally assume that the following:
 - .a *first party personnel (crew and bunkering personnel) are continuously present in the safety*
 - .b *zone during bunkering;*
 - .c *second party personnel (port and terminal operator, other ship crew) are continuously present*
 - .d *directly outside the safety zone during bunkering;*
 - .e *third-party personnel (passengers and other persons visiting the site) can be present, but will*
 - .f *not be continuously exposed to the risk;*
 - .g *third-party personnel continuously present (residential areas, schools hospitals) will be outside*
 - .h *the risk contour for third-party acceptance*
- The risk assessment shall assess all hazard scenarios identified in the HAZID and, as a minimum, assess flash fires, jet fires, and pool fires.
- The impact on personnel shall primarily assess the initial events. Escalating events will be delayed and the impact should consider the efficiency of evacuation and emergency preparedness.
- The risk assessment should consider the risk exposure for first, second, and third-party personnel. If the risk is acceptable in accordance with the acceptance criteria (as agreed with authorities), the smaller safety zone is acceptable.

The need for further discussion comes from the year averaging that is typically used in the definition of risk criteria (either SEVERITY or LIKELIHOOD based).

SEVERITY

Relevant criteria include **annual individual risk of fatality** and **annual societal risk**.

LIKELIHOOD

Criteria can be expressed in terms of **Annual likelihood that gas is present**

Advantages and Challenges for the Risk Based approach:

Advantages	Challenges
<ul style="list-style-type: none"> ▪ Allows to integrate different release scenarios, their consequences and likelihood of occurrence ▪ Possible to have lower Safety Distances, accounting for safeguards that would otherwise not be considered by a deterministic approach. 	<ul style="list-style-type: none"> ▪ Non-harmonized set of national risk criteria for both individual and societal risks. This may pose a problem, especially considering that the objective of harmonized regulations should also support a level-playingfield in the market. ▪ Different Risk Assessment software may present different calculation outputs. ▪ Annual Averaged Risk Calculations may “hide” the true Risk figures for infrequent and short duration LNG bunkering operations (this is valid for both societal/individual risk and likelihood calculations, i.e. valid for both Severity and Likelihood of occurrence)

From the Advantages/Challenges above it is possible to highlight the relevant factors that should be taken into consideration for discussion:

- Possibility of defining specific Risk Criteria for severity or likelihood **per operation**.
- How to define a common basis for the agreement on common risk criteria (per operation)?

LNG Bunkering – Permitting & Authorization –

Multi-layer procedure

Relevant to EMSA Guidance Section nr. (see Outline Structure document)	8 (Permitting and Authorization) and 10 (Pre-Bunkering)
Context	<ul style="list-style-type: none"> • Development of LNG Bunkering activity will require different planning, environmental and safety permits to be requested to, evaluated and given by different Competent Authorities. • The permitting procedure for LNG small scale storage and bunkering is significantly different in different EU Member States. • The EU LNG Study LOT1 and the recent replies to the EMSA online survey on LNG Bunkering have highlighted that a multitude of competent authorities are involved in different pathways for LNG Bunkering permitting. • The average number of processes from the evidences collected is 4 (four). • Streamlined procedures and information to prospective permit requests is found not to be very clear and, in some cases, those willing to develop LNG Bunkering options have to work directly with authorities in the development of the respective national/port legislation for small scale LNG storage, operation and bunkering. • The National Single Window pilot-project is running in EMSA with a tool being developed and implemented that allows for reporting formalities to be submitted, shared and stored in a common network database. Current reporting formalities do not include LNG Bunkering but can be accommodated in a near future.
Problem(s)	<ul style="list-style-type: none"> • Different procedures for LNG Bunkering permitting are likely to create difficulties and delays in the effective necessary implementation of LNG bunkering solutions. • Administrative complexities, present in all permitting processes, are not surprisingly also present in the case of LNG Bunkering. • With the involvement of different Competent Authorities is often the Case that Entity “A” is not aware of the work processed by Entity “B”. • The role of a “Facilitator” is often missing with due diligence often taken by the Applicant (Bunkering Operator). • The “single permit” approach is not followed by all Member States.
Discussion	<p>Following the LOT1 study recommendations and the results from the EMSA online survey, Permitting is surely a subject that not only needs to be addressed by the EMSA Guidance but also merits the discussion on which approach, and possible support measures, should be included as advice on Good Practice to Port Authorities/Administrations.</p> <p>A link between permitting/licensing, from Planning phase, and the Authorizations for the LNG Bunkering given option should be established. The multi-layered concept presented tries to reflect the need for a link between all pieces of the permitting, the compatibility assessment and, ultimately, all the elements possibly leading to the necessary authorizations for Bunkering</p>

The Group is invited to contribute for discussion with the objective of identifying a common baseline for guiding Port Authorities/Administrations on the best way to address safety of small scale LNG bunkering facilities.

Please note that 3 Concepts are presented for open discussion:

1. Multi-Layer Permitting/Authorization procedure.
2. “Single-Window” LNG Bunkering Permitting/Authorization Concept
3. Concept 1 and 2 working together

The discussion will acknowledge different approaches at National and Port level and identify the main common goals to allow both permitting procedure to be as **lean and practical** as possible and authorization as **safeguarded** as possible.

Permitting process (information)

(Source: www.lngforshipping.eu)

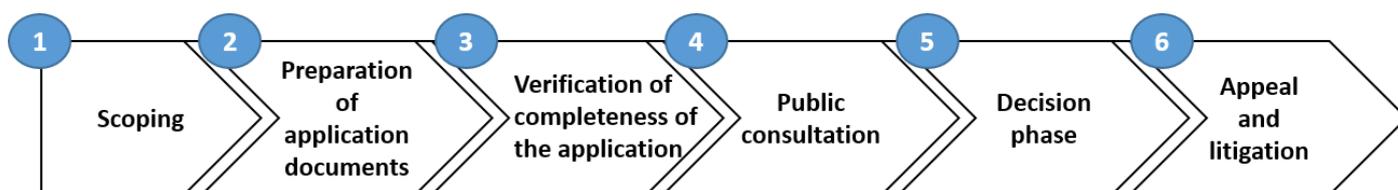
Permitting is a key aspect in the development of LNG infrastructure. The current average duration of permitting procedures for energy infrastructure projects, from submission of application document to issuing of the permit is typically 4 years⁶. Public opposition to the project (via the mandatory stakeholder dialogue) is often the main reason for delay/failure of the process.

The permitting processes in the different European countries for small-scale LNG infrastructure (i.e. LNG bunker station, LNG satellite plants, ...) differ regarding the number of permits/processes in the permitting procedure, number of authorities responsible to deliver the permitting procedures, documents to be produced and delivered, timing, etc.

Two EU directives strongly influence the permitting process for LNG bunkering facilities at national level, i.e. the EIA Directive and the Seveso Directive. The permitting process/requirements differ between countries, but there is strong similarity in the type of permits required at a national level. Often required permits are:

- Environmental permit
- Permit to store dangerous goods
- Handling of dangerous goods permit
- Building permit

The average number of processes required in countries analysed to obtain all the required permits for the construction and operation of a project is 3 or more. A typical permit procedure consists of following steps⁷:



- Scoping: process of determining the content of the matters to be covered in the environmental information to be submitted to the competent authority
- Preparation of application documents: the developer prepares the application documents based on the list of requirements
- Verification of completeness of the application: ensure that application documents cover the scoping and enable a proper assessment of all potential impacts of the project
- Public consultation: formal dialogue is established between responsible authorities, stakeholders and project developers
- Decision phase: goal of this phase is to decide whether to issue a permit or not
- Appeal and litigation: after a permit has been issued, stakeholders may appeal

The differences of the permitting processes of EU member states was one of the aspects covered by DNV-GL analysis and evaluation of identified gaps and of the remaining aspects for completing an EU-wide

⁶ Permitting procedures for energy infrastructure projects in the EU: evaluation and legal recommendations, Roland Berger Strategy Consultants, Final report, EC DG Energy, July 31, 2011

⁷ Permitting procedures for energy infrastructure projects in the EU: evaluation and legal recommendations, Roland Berger Strategy Consultants, Final report, EC DG Energy, July 31, 2011

framework for marine LNG distribution, bunkering and use, mandated by the European Commission's Directorate-General for Transport und Mobility (DG MOVE).

Mandatory permit for LNG storage facilities in a selection of ECA countries

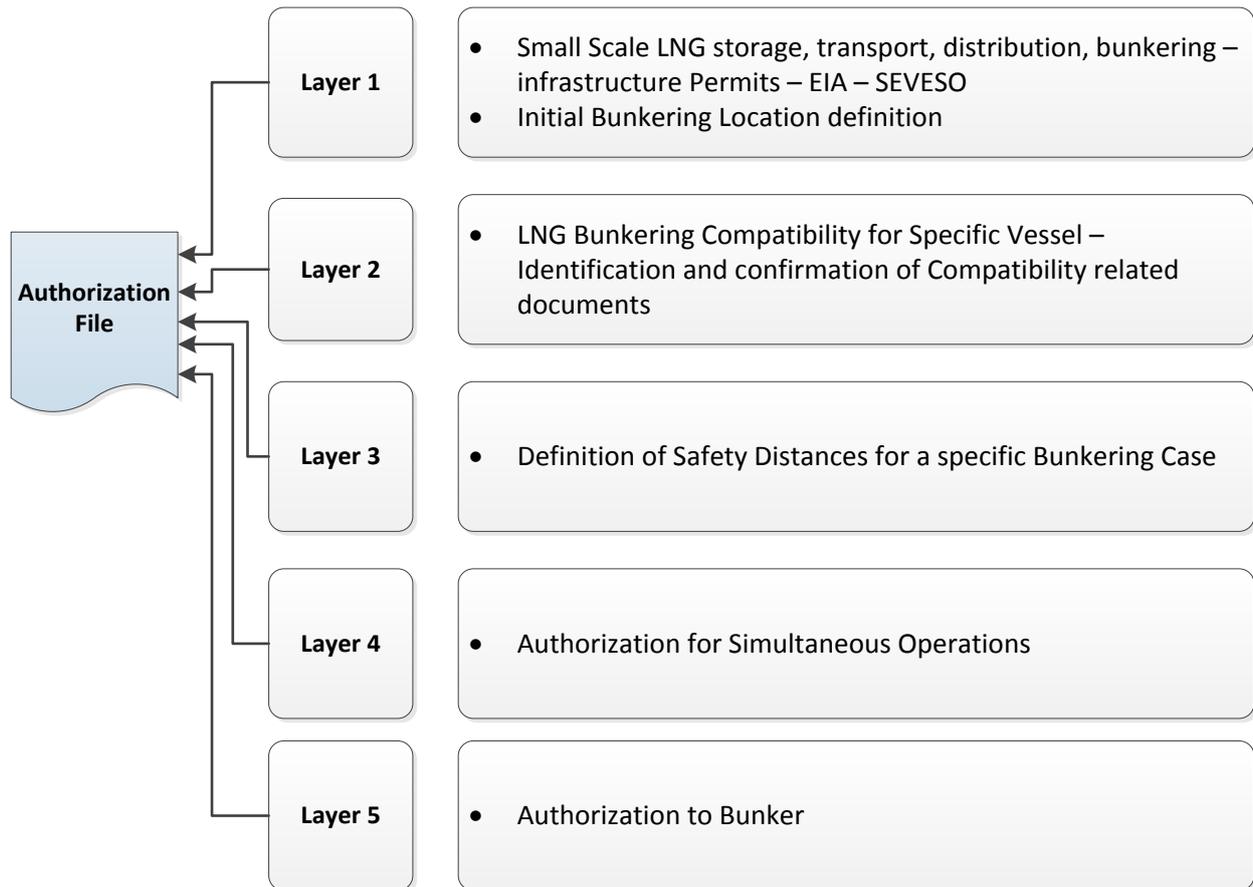
(Source: EU LNG Study LOT 1 - *LOT 1: Analysis and evaluation of identified gaps and of the remaining aspects for completing an EU-wide framework for marine LNG distribution, bunkering and use*)

Country	Environmental permit	Storage Permit	Handling Permit	Building Permit	Note
Belgium	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	'All-in-one Permit for Physical Aspects' (<i>Omgevingsvergunning</i>)
Denmark	<input checked="" type="checkbox"/> (> 50t)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	to be included in municipal planning (if EIA required)
Finland	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
France	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Germany	<input checked="" type="checkbox"/> (part of the building permit)	<input checked="" type="checkbox"/> (part of the building permit)	<input checked="" type="checkbox"/> (part of the building permit)	<input checked="" type="checkbox"/>	spatial planning process
Netherlands	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	<input checked="" type="checkbox"/> ('All-in-one Permit for Physical Aspects')	'All-in-one Permit for Physical Aspects' (<i>Omgevingsvergunning</i>)
Poland	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
United Kingdom	<input checked="" type="checkbox"/> (part of the planning permit)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	

CONCEPT 1: Multi-Layered Permitting and Authorization Procedure

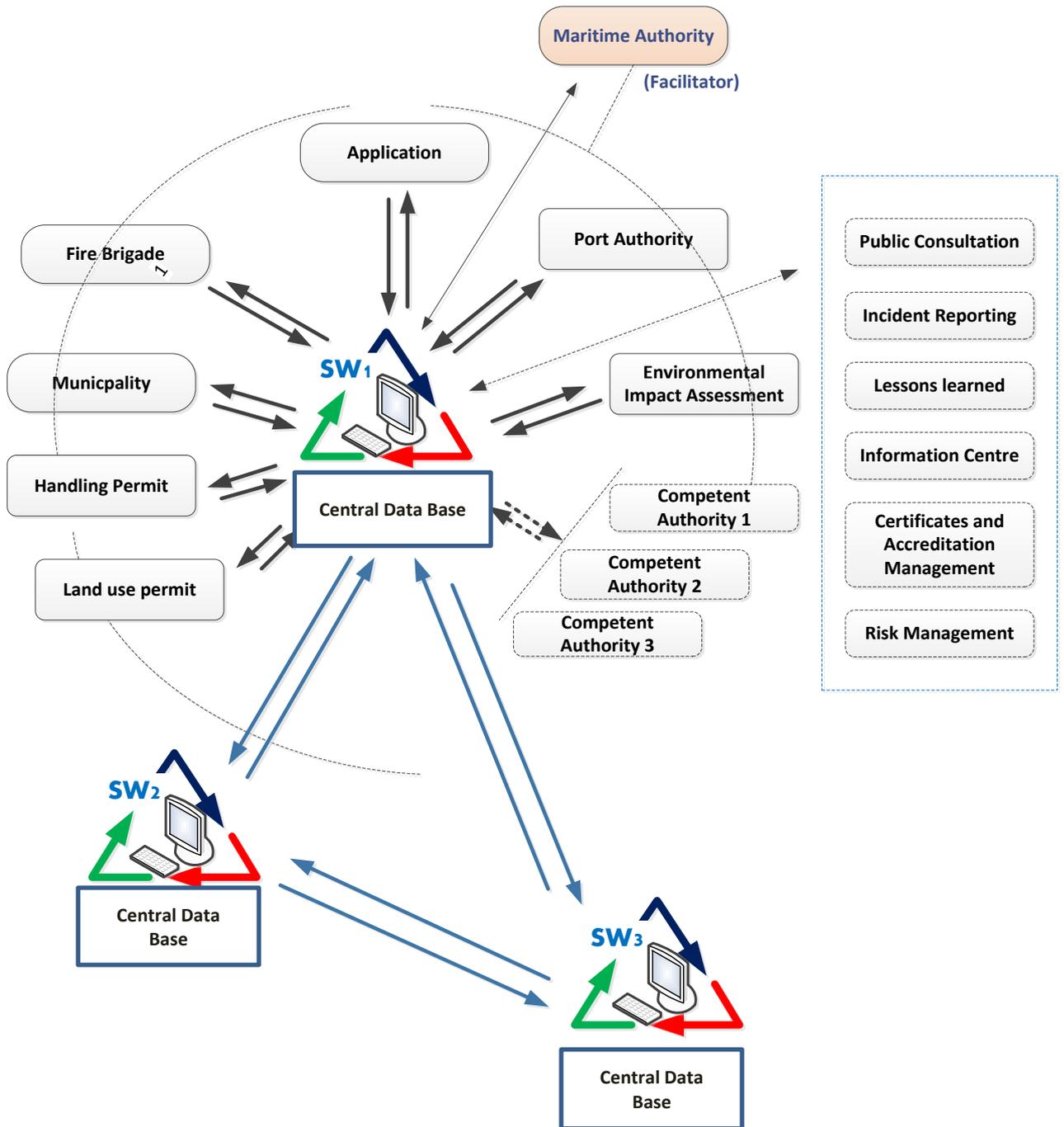
EMSA Guidance on LNG Bunkering to Port Authorities/Administrations will propose a multi-layer or multi-level authorization file for the purpose of centralization of information and acknowledging the fact that “compatibility” is a critical issue in LNG Bunkering that needs to be well accounted for by competent authorities, remarkably by Port Authorities.

Multi-Layer Permit-Authorization Procedure



CONCEPT 2:

LNG Bunkering Single Window is a “best practice” concept suggested for inclusion in the EMSA Guidance as a possible tool to be developed to assist Port Authorities and other relevant Competent Authorities in having a complete, immediate and accurate overview of the “status of permit”.



CONCEPT 1 + 2: Multi-Layer procedure



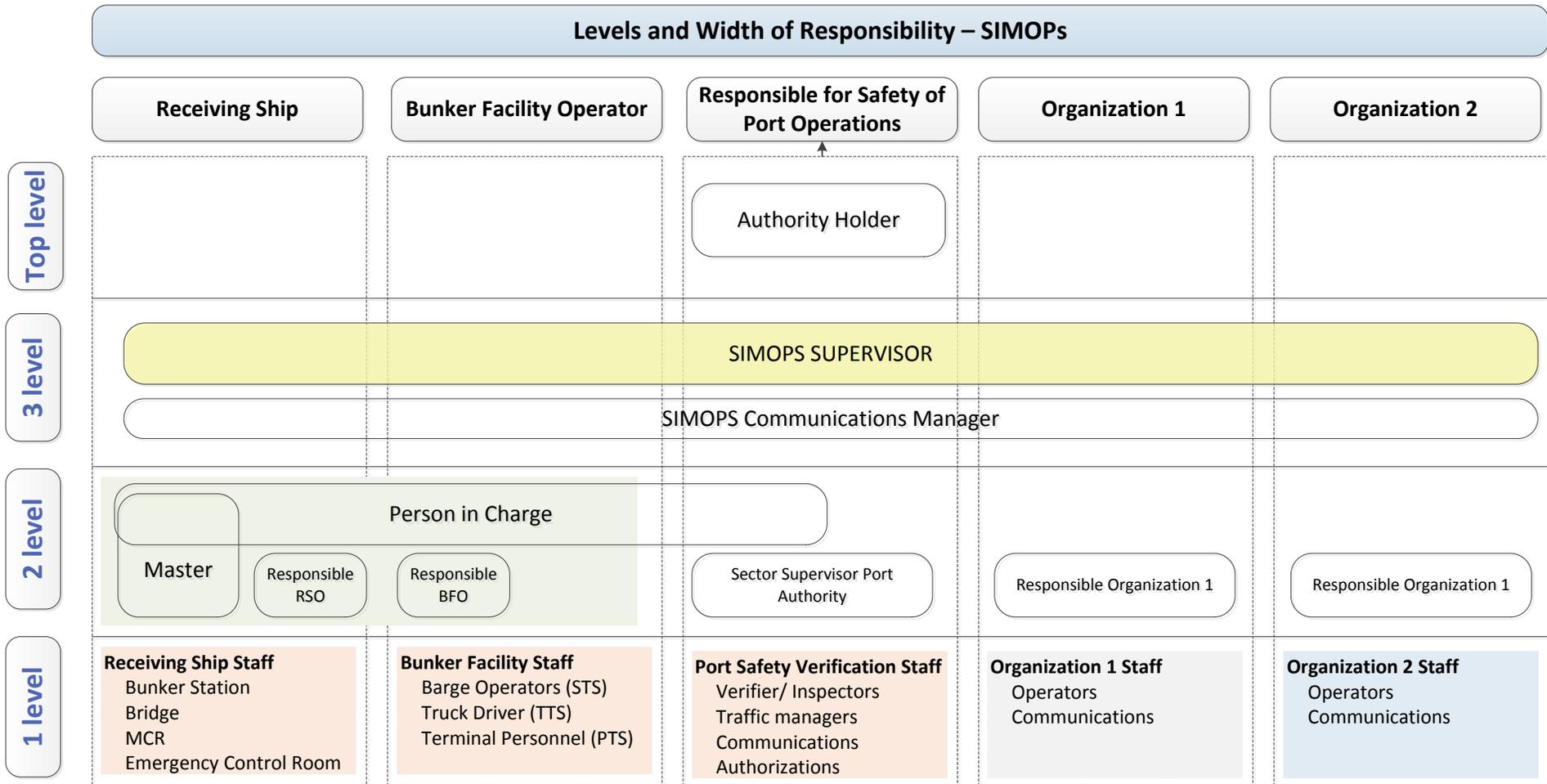
DISCUSSION PAPER 4

LNG Bunkering – SIMOPs – Suggested Procedure for Authorization

Relevant to EMSA Guidance Section nr.	7 (Risk), 8 (Permitting and Authorization), 10 (Pre-Bunkering), 11 (Bunkering)
Context	<ul style="list-style-type: none"> • Simultaneous Operations (SIMOPs) are a concept which has deserved significant attention from the Offshore Oil&Gas industry, in a context other than LNG Bunkering. • <u>SIMOPs are considered all those that take place at the same time as LNG Bunkering, within the established Safety Zone or that may impact adversely over that safety zone.</u> • SIMOPs in the context of LNG Bunkering are today, together with Safety Distances one of the subjects that is considered by the majority of stakeholders involved in LNG Bunkering as a potential “showstopper”. • Resulting from the analysis of the replies to the EMSA survey it can be understood that the majority of Port Authorities do not and will not authorize SIMOPs with LNG bunkering, without however specifying any boundaries in
Problem(s)	<ul style="list-style-type: none"> • As LNG fuel adoption grows in number of ships and in individual ship fuel storage capacities the SIMOPs problem becomes even more important to address. • For some ship operating profiles (remarkably containerships) the problem is even more relevant. • Risk associated to SIMOPs is highly local and context-sensitive and therefore difficult to evaluate in any standard prescriptive manner. • Indication of QRA for SIMOPs is often mentioned, but this is a (situation, site, ship)-specific analysis
Discussion	<p>In order to enable competitive LNG operations, bunkering must be performed without unnecessary time loss and bunkering operations in parallel with passenger and cargo handling (SIMOPs), are important to make LNG an attractive alternative fuel option for ferries.</p> <p>The need for SIMOPs is a common problem addressed in other industry areas such as Oil and Gas. From the experience in SIMOPs in other areas it is identified that the following two functions are commonly seen in different structures/organizations:</p> <ul style="list-style-type: none"> • SIMOPs Supervisor • Communications Manager <p>EMSA, in the Context of LNG Bunkering Guidance to Port Authorities and Administrations is proposing a PROCEDURE and ORGANIZATION/RESPONSIBILITIES for SIMOPs to be possibly considered by Port Authorities.</p> <p>The Group is invited to take into account the elements provided in ANNEX and contribute for discussion with the objective of identifying a common baseline for guiding Port Authorities/Administrations on the best way to address safety of small scale LNG bunkering facilities.</p>

LNG Bunkering SIMOPs Evaluation Procedure

	SIMOP MoU	SIMOPS preparation	Pre-SIMOPS	SIMOPs Execution	SIMOPs Evaluation			
what	<ul style="list-style-type: none"> MoU between all interested parties in SIMOP operations 	<ul style="list-style-type: none"> Concept of Operation Risk Assessment Technical Aspects defined 	<ul style="list-style-type: none"> Verification of the Conditions agreed in the MoU 	<p>SIMOPS take place within the defined boundaries agreed and certified by the Port Authority.</p>	<ul style="list-style-type: none"> Identification and Reporting of Incidents and Near Misses Identification of points to Improve 			
How	<ul style="list-style-type: none"> Public notice for interested parties to participate in SIMOP MoU 	<ul style="list-style-type: none"> Technical File and Risk Assessment with all recommendations and actions submitted to Port Authority 	<ul style="list-style-type: none"> The SIMOPS SUPERVISOR verifies all parties preparation for Operations. 	<p>LNG Bunkering Operation + Other Simultaneous Ops - SIMOPS SUPERVISOR - COMMUNICATIONS</p>	<ul style="list-style-type: none"> Listing and reporting to centralized data base Post SIMOP Report 			
who	<ul style="list-style-type: none"> PORT AUTHORITY PORT ADMINISTRATION 	<ul style="list-style-type: none"> All REGISTERED PARTIES (TERMINAL, SHIP Operator, Bunker Supplier, Container Handling) 	<ul style="list-style-type: none"> SIMOPS only possible if ALL conditions can be verified. Only accredited parties can take part. 	<ul style="list-style-type: none"> RECEIVING SHIP BUNKER SUPPLIER TERMINAL PORT AUTHORITY (SIMOPS SUPERVISOR) 	<ul style="list-style-type: none"> SIMOPS SUPERVISOR All other parties contribute 			



EMSA Workshop on LNG Bunkering to Port Authorities/Administrations - AGENDA
EMSA, Lisbon, 1 and 2 December 2016

Agenda: EMSA Workshop on LNG Bunkering Guidance to Port Authorities/ Administrations

Location: Meeting Room -1/11

Thursday, 01 December 2016

Time	Agenda Item	Speakers
08:30 – 09:00	Registration	
09:00 – 09:15	Welcome & Introduction	G. Christofi (Head of Unit B.3 – Environment & Capacity Building, EMSA)
09:15 – 10:00	LNG for shipping - EU policy with regard to use of LNG in maritime transport	Agnieszka Zaplatka (DG-MOVE, D1)
10:00 – 11:00	Development of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations Summary of Results from the EMSA LNG Bunkering online survey to Port Authorities/Administrations ⁸ LNG Bunkering Challenges – The interface paradigm.	Ricardo Batista (EMSA)
11:00 – 11:15	Coffee break	
	Port Management for LNG Bunkering	
11:15 – 11:45	LNG Bunkering – Port Authority Perspective. LNG and Good Governance in Ports	Cees Boon (Port of Rotterdam)
11:45 – 12:45	Discussion Round 1 <ul style="list-style-type: none"> • <i>Discussion Paper 1 - Small Scale LNG bunkering - SEVESO requirements</i> • Discussion on the relevant aspects of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations. 	
12:45 – 14:00	Lunch break	
	LNG Bunkering Operation and Port Authority Procedures	
14:00 – 14:30	LNG Bunkering Guidance (existing guidance) IACS Recommendation 142 on LNG Bunkering SGMF Safety Guidelines for LNG Bunkering ISO/TS 18683:2015, ISO 20519	Thomas Spencer (Society for Gas as a Marine Fuel, SGMF, LR)

⁸ Questionnaire (for background reference) available at :

Part A <https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartA>

Part B <https://ec.europa.eu/eusurvey/runner/LNGBunkeringSurvey2016PartB>

Time	Agenda Item	Speakers
14:30 – 15:00	LNG Operating Regulations – Port of Gothenburg	Capt. Dan Erik Andersson (Port of Gothenburg)
15:00 – 15:40	LNG Bunkering – Planning, Preparing and Operations	Stuart Carpenter (Shell)
15:40 – 15:50	Coffee break	
15:50 – 16:50	Discussion Round 2 <ul style="list-style-type: none"> • <u>Discussion Paper 4 – SIMOPs - Suggested Procedure for SIMOPs Authorization</u> • Discussion on the relevant aspects of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations. 	
16:50 – 17:00	Conclusions of the first day	

Friday, 02 December 2016

Time	Agenda Item	Speakers
	LNG Bunkering Safety	
09:00 – 09:30	LNG Bunkering Risk & Safety Elements	Ricardo Batista (EMSA)
09:30 – 10:00	LNG Bunkering Safety LNG Bunkering – Setting Safety Distances	Dr. Paul Davies (Lloyd's Register Marine & Offshore (LR))
10:00 – 11:00	Discussion Round 3 <ul style="list-style-type: none"> • <u>Discussion Paper 2 – Safety Distances</u> • Discussion on the relevant aspects of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations. 	
11:00 – 11:15	Coffee break	
11:15 – 12:15	LNG Bunkering Safety Exercise Practical Exercise (HAZID for a generic LNG Bunkering scenario)	Work Session for discussion of practical LNG Bunkering Safety
12:15 – 12:45	LNG Bunkering Safety Exercise Practical Exercise (HAZID for a generic LNG Bunkering scenario) <u>Discussion of Results</u>	
12:45 – 14:00	Lunch break	
	Permitting	
14:00 – 14:30	LNG Bunkering A practical perspective from a Maritime Administration – the Danish Experience	Mogens Schrøder Bech (Danish Maritime Authority)
14:30 – 15:30	Discussion Round 4 <ul style="list-style-type: none"> • <u>Discussion Paper 3 – Permitting, Multi-Layer Process, Single-Window</u> 	

Time	Agenda Item	Speakers
	<ul style="list-style-type: none">• Discussion on the relevant aspects of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations.	
15:30 – 15:45	Coffee Break	
15:45 – 16:00	Conclusion of the Workshop Wrap-up and listing of main issues to follow-up	

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