



## European Sustainable Shipping Forum 7th Plenary Meeting

Brussels, 24 January 2017

### Submission from ESSF sub-group on Marine LNG

#### EMSA Guidance on LNG Bunkering to Port Authorities and Administrations – Status Update

##### 1. Submission from:

ESSF sub-group on Marine LNG

##### 2. Introduction

The present document is submitted with the objective of informing the ESSF Plenary on the progress in the development of the **EMSA Guidance on LNG Bunkering to Port Authorities and Administrations**. The focus of the present document is on:

- EMSA Online Questionnaire – Outcomes of the online survey
- Workshop in EMSA (1-2DEC2016, Lisbon)
- **Discussion Papers on selected critical topics (Safety Distances, SIMOPS, Seveso requirements and Permitting)**
- Updated Project plan with outline of the steps ahead.

The following Annexes are included in support of the present document submission:

- Annex 1: Summary Report on the results of the **online survey** (EMSA Questionnaire on LNG Bunkering to Port Authorities/Administrations);
- Annex 2: **Outline Structure for the EMSA Guidance** on LNG Bunkering to Port Authorities/Administrations;
- Annex 3: **Discussion Papers used for the Workshop** in EMSA (1,2 DEC16)
  - *Small Scale LNG bunkering - SEVESO applicability*
  - *Safety Distances – Methods for calculation and Criteria*
  - *Permitting & Authorization – Multi-layer procedure – Single-Window approach*
  - *Simultaneous Operations – Suggested Procedure for SIMOPS approval*

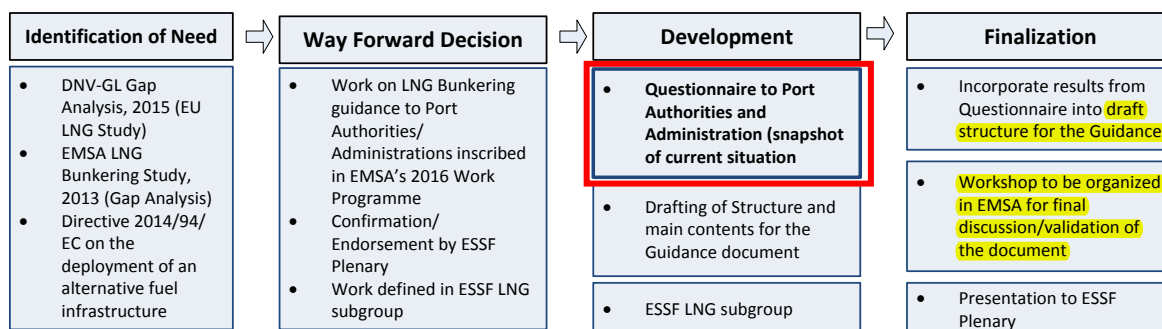
Collectively the Annexes provide information on the main actions/tasks that have been developed regarding the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations, in line with the agreed plan for the development of the document.

Finally, an update on the project plan timeline is submitted as part of the present submission, highlighting the need for an extended time to integrate the information from the online survey and the outcome of the Workshop.

### 3. Online Survey

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:



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-1 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 Annex-1)

**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 of the document is to build on the existing experience in Ports where LNG bunkering has taken its first steps towards implementation.

#### 4. EMSA Workshop

In order to report and discuss on 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.

EMSA invited 2 (two) participants from each EU Member State, one from the 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 Workshop Agenda is included in Annex 4 and both presentations and discussion points of the Workshop are available at <http://emsa.europa.eu/workshops-a-events/188-workshops.html>

The workshop was attended by 35 participants as per table provided below:

EU Member State	Organization/Competent Authority/Port Authority
Belgium	Department of Mobility and Public Works
Belgium	MBZ
Denmark	Danish Maritime Authority
Finland	Finnish Transport Safety Agency
France	Ministère de l'environnement, de l'énergie et de la mer
France	Port Of Le Havre Authorityies
France	Dunkirk-port authorities
Germany	Federal Ministry of Transport and Digital Infrastructure
Greece	Ministry of Maritime Affairs and Insular Policy
Latvia	Ministry of Transport
Lithuania	Klaipeda State Seaport Authority
Lithuania	SC KLAIPEDOS NAFTA
Malta	The Energy & Water Agency - OPM (Energy & Projects) Govt. of Malta
Malta	TRANSPORT MALTA
Norway	Norwegian Directorate for Civil Protection
Norway	Norwegian Directorate for Civil Protection
Norway	Norwegian Ministry of Transport and Communications
Norway	Norwegian Maritime Authority
Poland	Port of Gdynia Authority S.A.
Poland	Maritime Office in Szczecin
Portugal	IMT, I.P.
Portugal	APL
Portugal	Portos da Madeira
Portugal	Portos dos Açores
Portugal	DGAM
Spain	GENERAL DIRECTORATE MARINE MERCHANT. SPAIN
Sweden	Port of Gothenburg
Sweden	Swedish Transport Agency
The Netherlands	Ministry of Infrastructure and Environment
The Netherlands	Port of Rotterdam

In addition to the list of Workshop participants also Lloyds Register, SGMF and Shell have participated, delivering presentations with relevant input to the topics in discussion.

## 5. Discussion Papers – Agreed Principles

Having the results of the EMSA online questionnaire into account it was found that focused detailed discussion would be necessary in the particular aspects mentioned in 3.6.f. To support this discussion **4 (four) discussion papers (included as Annex-3) were prepared** and presented to the Workshop Members<sup>1</sup>:

- 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 – Single-Window approach*
- 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 in December 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 industry) in order to support harmonized safe LNG Bunkering operations.

<u>Discussion Papers</u>	<u>Agreed Principles at the Workshop</u>
<b>Discussion paper 1.</b> <i>Small Scale LNG bunkering - SEVESO applicability</i>	<ul style="list-style-type: none"> <li>• SEVESO applicability <b>shall not</b> be addressed by the EMSA Guidance – From earlier discussion <b>there is no legal grounds to apply this to trucks, ships or any other type of mobile bunkering facilities (only to fixed installations)</b></li> <li>• Application of requirements <u>similar to those of SEVESO</u> for cases <b>where Bunkered LNG Quantities/Frequencies are such that the bunkering location can be considered a location handling hazardous substances.</b></li> <li>• Threshold values/Quantities/Frequencies – EMSA Guidance <b>should not provide indicative thresholds</b> – just indicate that <u>there shall be a function between the number of deliveries/quantities and the safety related requirements</u> for the Operator.</li> </ul>

<sup>1</sup> The same Discussion Papers had been discussed earlier in the 10<sup>th</sup> LNG sub-group session earlier in November, where good input was collected to a more substantial discussion at the Workshop.

<p><u>Discussion paper 2.</u>  <b>Safety Distances – Methods for calculation and Criteria</b></p>	<ul style="list-style-type: none"> <li>• The EMSA Guidance shall not discuss on the merits of the existing methodologies (ISO Technical Standard).</li> <li>• Port Authority shall be responsible for approval of Safety Zone.</li> <li>• Instead the EMSA Guidance shall inform on: <ul style="list-style-type: none"> <li>• Existing Methodologies and Industry Guidance</li> <li>• The necessary factors to take into account for the determination of Safety Distances: <ul style="list-style-type: none"> <li>✓ Environmental Factors (Wind and Temperature)</li> <li>✓ Release elevation</li> <li>✓ Bunker line Pressure</li> <li>✓ Transfer Rate</li> <li>✓ Trapped Volume</li> <li>✓ Possible Confined Space trapping</li> <li>✓ Other Factors (Physical Barriers, SIMOPS)</li> </ul> </li> </ul> </li> <li>• Advantages and Limitations of QRA approach to be highlighted</li> </ul>
<p><u>Discussion paper 3.</u>  <b>Permitting &amp; Authorization – Multi-layer procedure – Single-Window approach</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• As a Best Practice approach relevant International Standards on LNG Bunkering should be taken into consideration.</li> <li>• Information on the different Processes and Streamlining of procedures for LNG Bunkering Permit should be ensured.</li> <li>• A dedicated Focal Point is needed (Facilitation role to be ensured by the Focal Point)</li> <li>• MAIN PRINCIPLES TO DEVELOP: <b>Information, Transparency, Coordination, Communication</b></li> <li>• A Centralized Desk/ Single-Desk approach should be favoured, as a Best Practice for Permitting.</li> <li>• All layers of Authorization shall be linked.</li> </ul>
<p><u>Discussion paper 4.</u>  <b>Simultaneous Operations – Suggested Procedure for SIMOPS approval</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• During SIMOPS the important fundamental aspects to ensure are Shared Awareness, Alarm Dissemination, Communications, and Supervision.</li> <li>• 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). ??</li> <li>• Whenever onboard SIMOPS take place: The Receiving Ship/Master shall be responsible</li> </ul>

Person in charge

## 6. Project Plan Update

	Nov16	Dec16	Jan17	Feb17	Mar17	Apr17	May17	Jun17
ESSF LNG 10	●							
1st Workshop EMSA (1DEC)		●						
Preparation for Correspondence Work		■						
Revised Work – Status update (Plenary)			●					
Corrspondence Work			■					
1st Draft (15MAR) – ESSF LNG 11					●			
Correspondence Work					■			
<b>2nd Workshop EMSA (25MAY)</b>							●	
Plenary (Final Draft)								●

## **Annexes:**

### **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**

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

**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

Selected Results of the Online Questionnaire

### INTRODUCTION

The present document is drafted to support the submission to the 7<sup>th</sup> 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 1<sup>st</sup> September and the 14<sup>th</sup> 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”

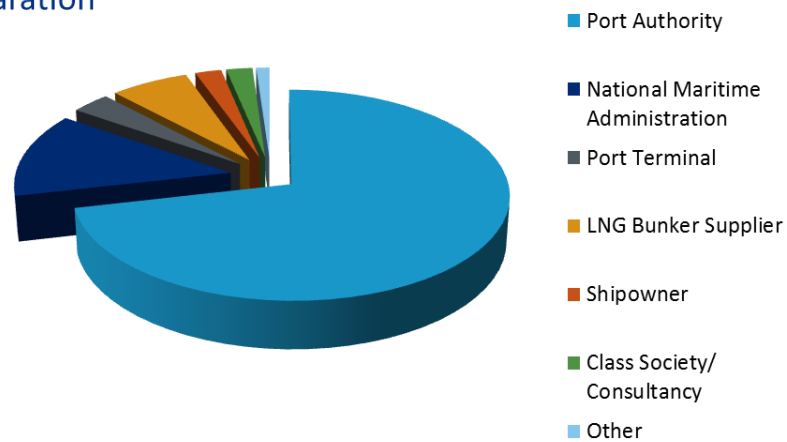
	Port Authority/Administration with experience with Actual LNG Bunkering Operations	Port Authority/Administration only involved in preparatory actions for deployment of LNG bunkering.	Port Authority/ Administration <b>only</b> involved in legislative developments (e.g. National Policy Frameworks)	<b>Other Stakeholders</b> (LNG Bunker providers, Shipowners, etc)
<b>Section “A”</b> – on LNG Bunkering Planning & Preparation				Have generally replied to those questions not strictly directed to Port Authorities
<b>Section “B”</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

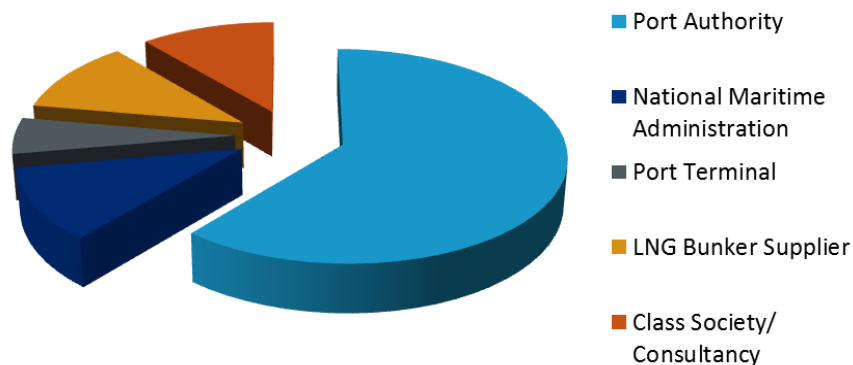
### Section A Planning & Preparation



#### 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
<b>Total</b>	<b>91</b>

## 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 checkbox at the top is checked, labeled "Save a backup on your local computer (disable if you are using a public/shared computer)".

On the left, a "Pages" table 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.

On the right, there are three main sections: "Views" with "Standard" and "Accessibility Mode" options; "Languages" with a dropdown menu set to "[EN] English"; and "Contact" with the email "ricardo.batista@emsa.europa.eu". Below these is a "Download PDF version" link.

At the bottom, there is a "Questionnaire on LNG Bunkering for Port Authorities and Administrations" section titled "Section 'A' - Planning & Preparation". It features a "Next" button and a "Save as Draft" button.





Numbered callouts (1-8) point to the following elements: 1. Sections keypad; 2. Navigation keypad; 3. Save as Draft button; 4. Backup checkbox; 5. Views section; 6. Language selector; 7. Contact information; 8. Download PDF version link.

At the bottom of the page, it states: "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**

		<b>Answers</b>	<b>Ratio</b>
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**

		<b>Answers</b>	<b>Ratio</b>
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**

		<b>Answers</b>	<b>Ratio</b>
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%

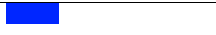


**4.5 - Is there agreed terminology in place for the persons involved in LNG Bunkering Operations, either directly in or overseeing the operation?**

		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?**


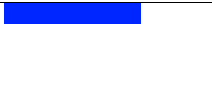

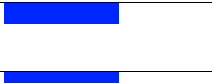

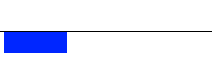
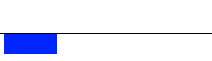

		Answers	Ratio
Yes		5	26.32%
No		10	52.63%
No Answer		4	21.05%

**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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- 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

## 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"> <li>• 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.</li> <li>• 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</li> <li>• <b>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.</b> 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 <b>Seveso III directive, already transposed into national legislation</b>, has just recently replaced Seveso II, with no implications for LNG small scale installations.</li> <li>• <b>SEVESO exempts transport of LNG, including its loading and offloading, where covered by other regulatory framework.</b></li> </ul>
Problem(s)	<p><b>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.</b></p>
Discussion	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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).</li> <li>• 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?</li> <li>• Are we in the presence of an area where further harmonization could be ensured?</li> </ul> <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.

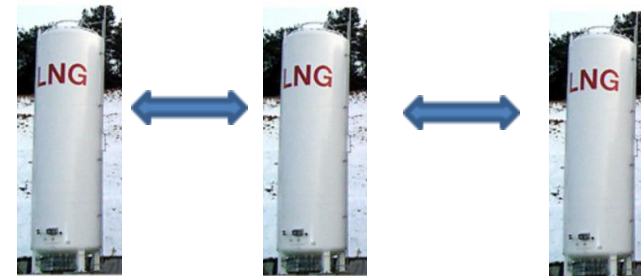
Plans exist to increase the capacity of these modular barges up to 40 tonnes capacity (or maybe more).



### 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.

### **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"> <li>A <b>safety zone</b> is required during bunkering of liquefied natural gas (LNG), as noted in guidelines and developing standards<sup>2</sup>. The purpose of the zone is <b>to set an area that is present during bunkering and within which only essential personnel are allowed and potential ignition sources are controlled</b>. 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.</li> <li>In addition to the safety zone, a <b>security zone</b> and <b>hazardous area</b> classification zone(s) are also required, with different objectives and subject to different criteria.</li> <li>All 3 (three) zones are illustrated in the Annex to this Discussion Paper.</li> <li>Calculation of Safety Distances is possible in the following ways:             <ol style="list-style-type: none"> <li><u>Safety Zone – Maximum Credible Release (Deterministic)</u></li> <li><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></li> <li><u>Safety Zone – <b>Quantitative Risk Assessment (QRA)</b> – (Probabilistic)</u> <ul style="list-style-type: none"> <li><u>with Severity Criteria</u></li> <li><u>with Likelihood Criteria</u></li> </ul> </li> </ol> </li> </ul>
Problem(s)	<ul style="list-style-type: none"> <li><b>Calculation of Safety Distances often leads to values that potentially deem impossible the bunkering operation for higher LNG bunkering flow rates/higher pressures.</b></li> <li><b>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.</b></li> <li><b>Maximum and Significant release scenarios distances presented in ISO Standards don't show the assumption for calculation.</b></li> <li><b>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 <b>attenuating risk for non-systematic and irregular operations.</b></b></li> <li><b>In Annex an example is included to illustrate the problematic presented with the calculation of Safety Distances.</b></li> </ul>

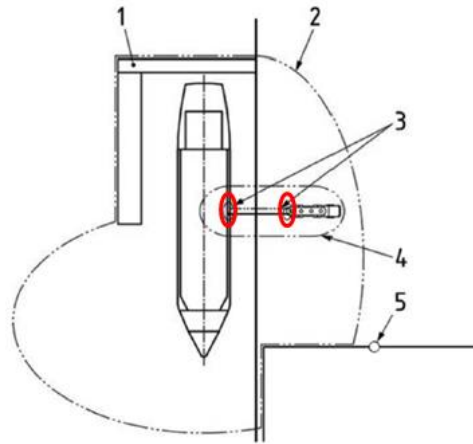
<sup>2</sup> The following standards and guidelines can be taken as reference:

- 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"><li>▪ Trapped volume minimization options</li><li>▪ Pressure during bunkering (minimization)</li><li>▪ Cold LNG vs Warm LNG ?????</li><li>▪ Possibilities to draft best practice guidance to suggest always optimization of bunker delivery temperatures (with associated minimization of bunker line pressures).</li><li>▪ Environmental operational elements (ambient temperature, wind speed and direction)</li><li>▪ Challenges in the definition of a risk based methodology (as presented in Annex)</li><li>▪ Need to define a uniform operation-based Risk Criteria, instead of the common yearly averaged criteria.</li></ul>
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▪ **Different Zones associated to LNG Bunkering**

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



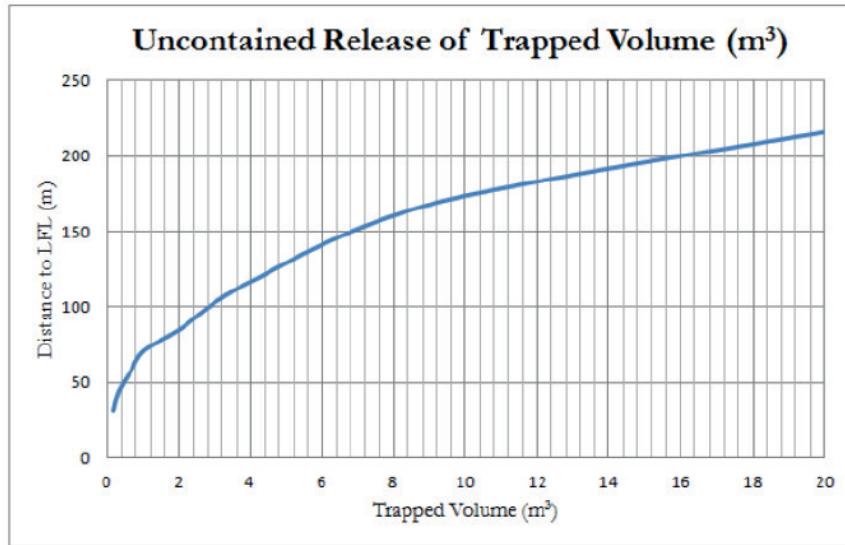
1. Physical Barrier
2. Security Zone
3. Hazardous Area Classification Zone
4. Safety Zone
5. ISPS Boundary (International Code for the Security of Ships and of Port Facilities)

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

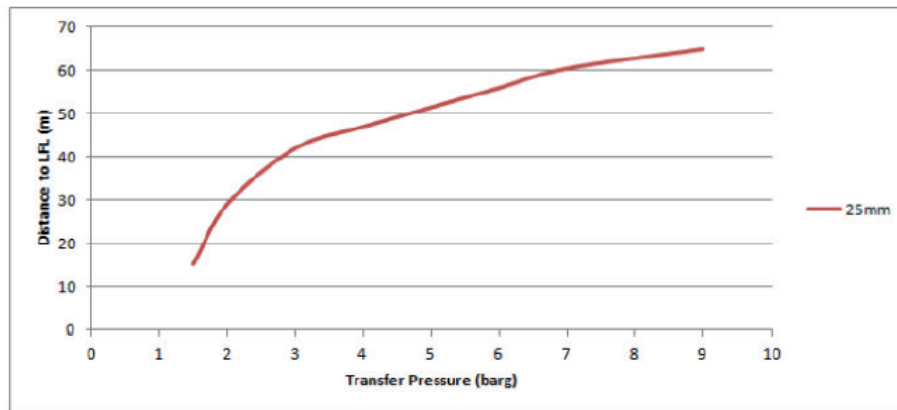
(Sources: A feasibility study for an LNG filling station infrastructure and test of recommendations, Authority Draft Feasibility Report, North European LNG Infrastructure Project, November 2011.)

Vessel type	Bunker quantity	Rate	Duration	Hose or arm diameter
Service vessels, tugboats, patrol boats and fishing boats	50 m <sup>3</sup>	60 m <sup>3</sup> /h	45 min	2x2" or 1x3"
Small RoRo and RoPax vessels	400 m <sup>3</sup>	400 m <sup>3</sup> /h	1 hr	2x4" or 1x6"
Large RoRo and RoPax vessels	800 m <sup>3</sup>	400 m <sup>3</sup> /h	2 hr	2x4" or 1x6"
Small cargo, container and freight vessels	2,000 – 3,000 m <sup>3</sup>	1,000 m <sup>3</sup> /h	2 to 3 hr	2x8" or 1x12"
Large freight vessels	4,000 m <sup>3</sup>	1,000 m <sup>3</sup> /h	4 hr	2x8" or 1x12"
Large tankers and container ships	10,000 m <sup>3</sup>	2,500 m <sup>3</sup> /h	4 hr	2x10"
Very large container ships and oil tankers	20,000 m <sup>3</sup>	3,000 m <sup>3</sup> /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: 1200m<sup>3</sup> (approximately 540ton)
- Transfer rate 400m<sup>3</sup>/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

$$6'' = 0.1524\text{m}$$

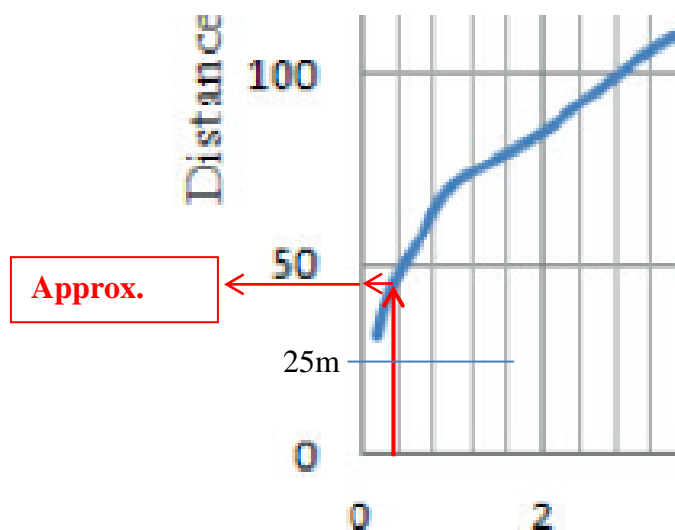
Calculation of trapped Volume

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

V<sub>t</sub> – Trapped volume  
D – Hose diameter  
L<sub>t</sub> – trapped length

$$V_t = 0.3648 \text{ m}^3$$

Going into the Graph 1:

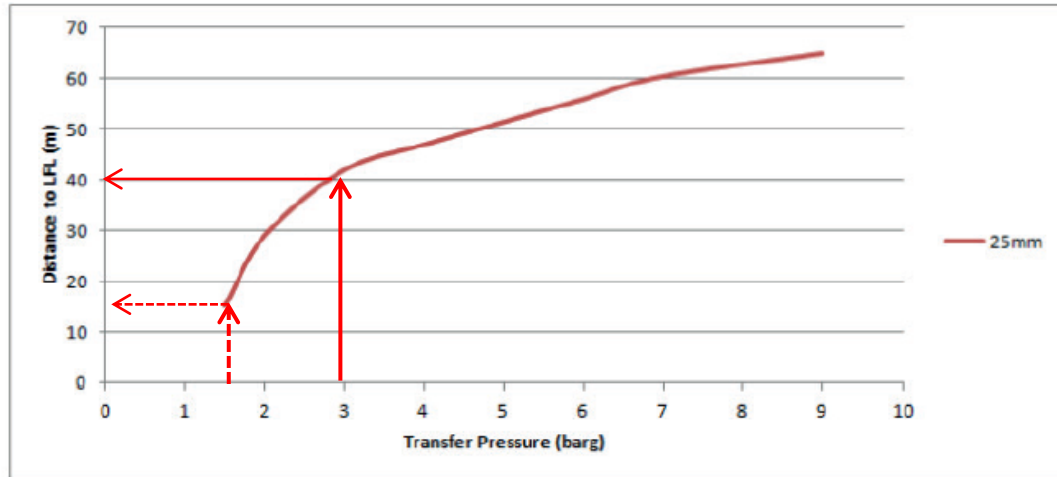


From a Maximum Credible Release the inventory of LNG trapped is considered for the calculations. A safety distance of 50m is determined.

**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  $-140^{\circ}\text{C}$  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 measures<sup>4</sup>.

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 zone during bunkering;**
  - .b **second party personnel (port and terminal operator, other ship crew) are continuously present**
  - .c **directly outside the safety zone during bunkering;**
  - .d **third-party personnel (passengers and other persons visiting the site) can be present, but will**
  - .e **not be continuously exposed to the risk;**
  - .f **third-party personnel continuously present (residential areas, schools hospitals) will be outside**
  - .g **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"> <li>▪ Allows to integrated different release scenarios, their consequences and likelihood of occurrence</li> <li>▪ <b>Possible to have lower Safety Distances</b>, accounting for safeguards that would otherwise not be considered by a deterministic approach.</li> </ul>	<ul style="list-style-type: none"> <li>▪ 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.</li> <li>▪ <b>Different Risk Assessment software</b> may present different calculation outputs.</li> <li>▪ 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)</li> </ul>

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"> <li>• Development of LNG Bunkering activity will require different planning, environmental and safety permits to be requested to, evaluated and given by different Competent Authorities.</li> <li>• The permitting procedure for LNG small scale storage and bunkering is significantly different in different EU Member States.</li> <li>• 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.</li> <li>• The average number of processes from the evidences collected is 4 (four).</li> <li>• 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.</li> <li>• 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.</li> </ul>
Problem(s)	<ul style="list-style-type: none"> <li>• <b>Different procedures for LNG Bunkering permitting are likely to create difficulties and delays in the effective necessary implementation of LNG bunkering solutions.</b></li> <li>• <b>Administrative complexities, present in all permitting processes, are not surprisingly also present in the case of LNG Bunkering.</b></li> <li>• <b>With the involvement of different Competent Authorities is often the Case that Entity “A” is not aware of the work processed by Entity “B”.</b></li> <li>• <b>The role of a “Facilitator” is often missing with due diligence often taken by the Applicant (Bunkering Operator).</b></li> <li>• <b>The “single permit” approach is not followed by all Member States.</b></li> </ul>
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](http://www.lngforshipping.eu))

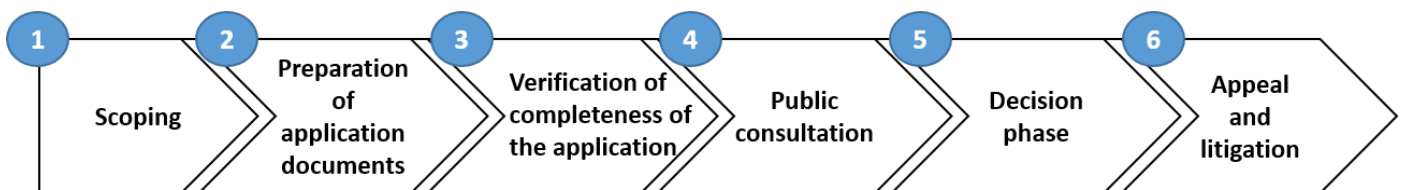
Permitting is a key aspect in the development of LNG infrastructure. The current average duration of permitting procedures for energy infrastructure projects, from submission of application document to issuing of the permit is typically 4 years<sup>3</sup>. Public opposition to the project (via the mandatory 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 steps<sup>4</sup>:



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

<sup>3</sup> 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

<sup>4</sup> 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

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

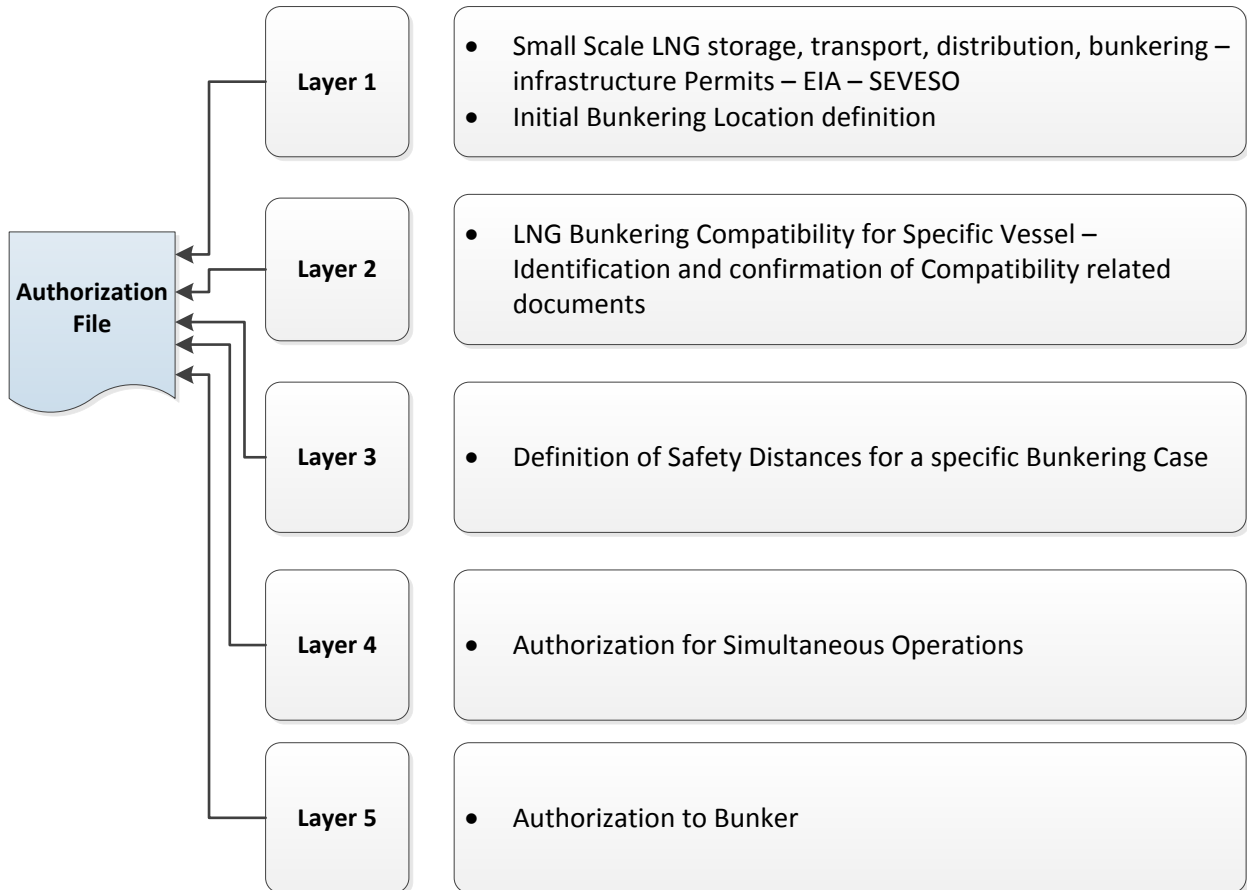
(Source: EU LNG Study LOT 1 - LOT 1: Analysis and evaluation of identified gaps and of the remaining aspects for completing an EU-wide framework for marine LNG distribution, bunkering and use)

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**

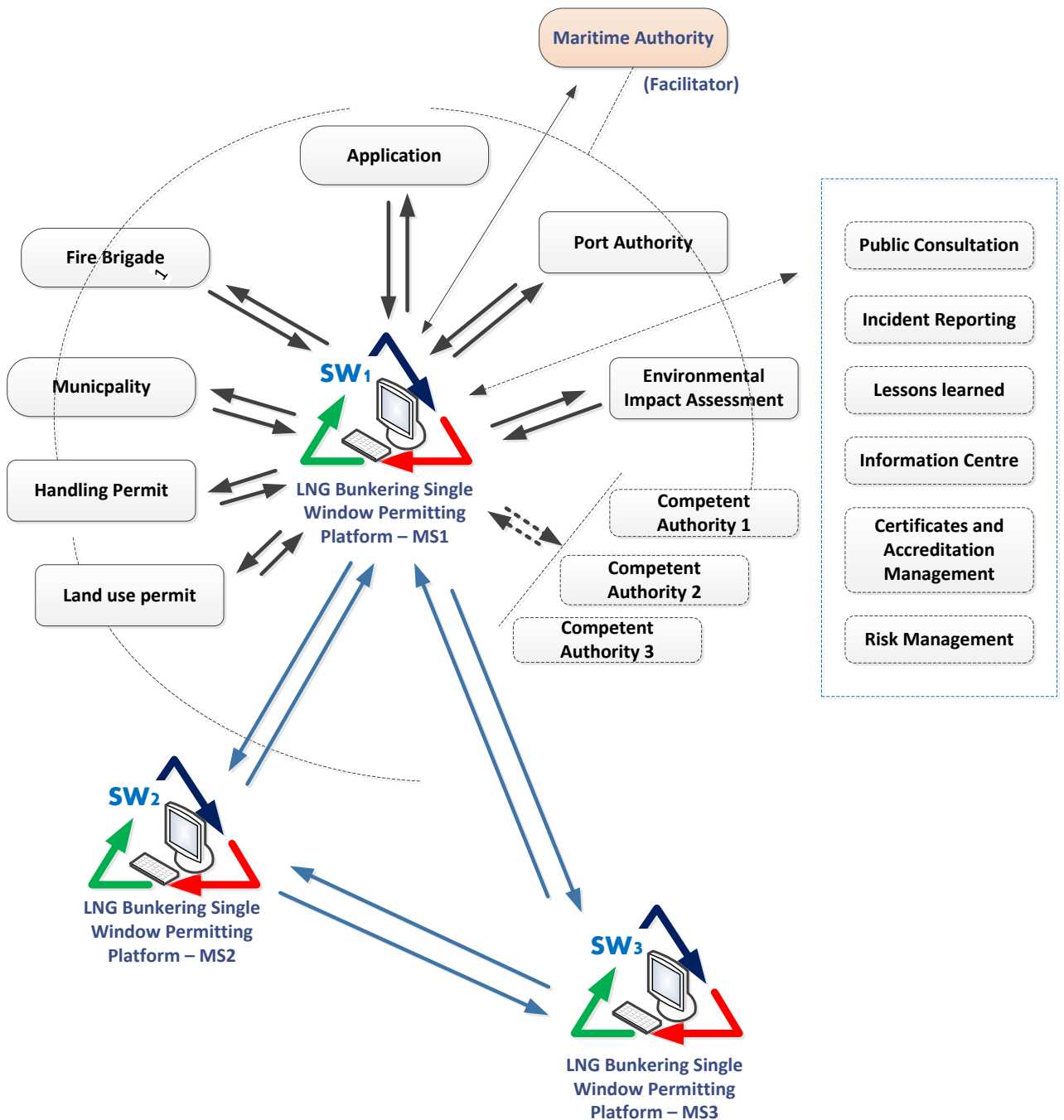
EMSA Guidance on LNG Bunkering to Port Authorities/Administrations will propose a multi-layer or multi-level authorization file for the purpose of centralization of information and acknowledging the fact that “compatibility” is a critical issue in LNG Bunkering that needs to be well accounted for by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

**Multi-Layer Permit-Authorization Procedure**



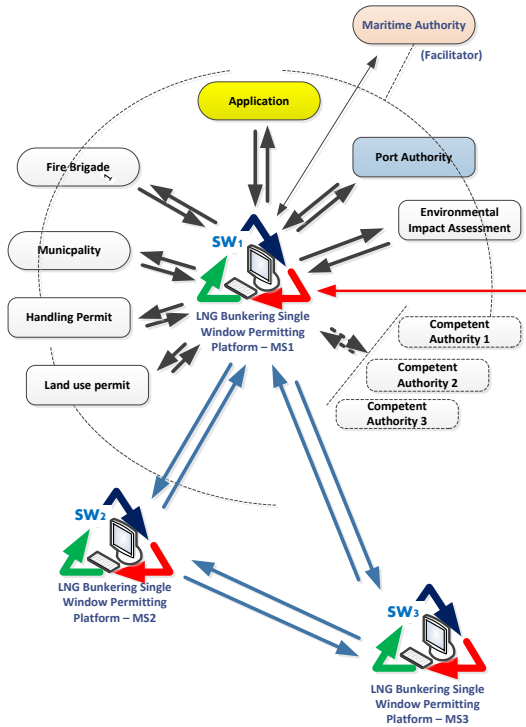
**CONCEPT 2:**

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”.

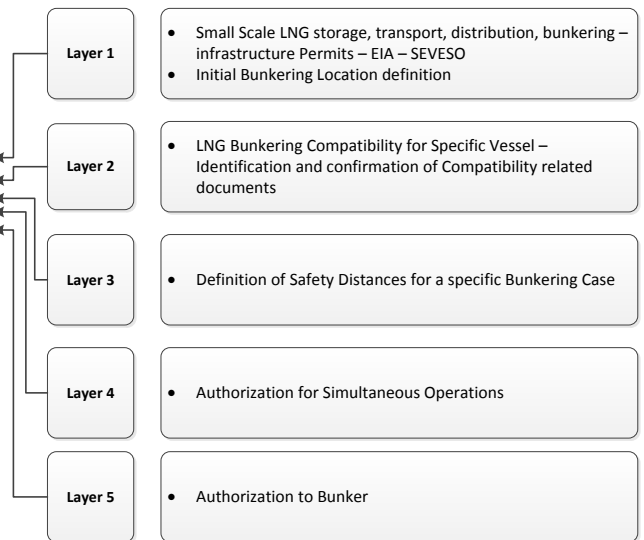


## CONCEPT 1 + 2: Multi-Layer procedure

Authorization File would include all the information relevant to one single Bunkering operation, even though all relevant information, also from Permitting, would be included in the file



### Multi-Layer Permit-Authorization Procedure



## DISCUSSION PAPER 4

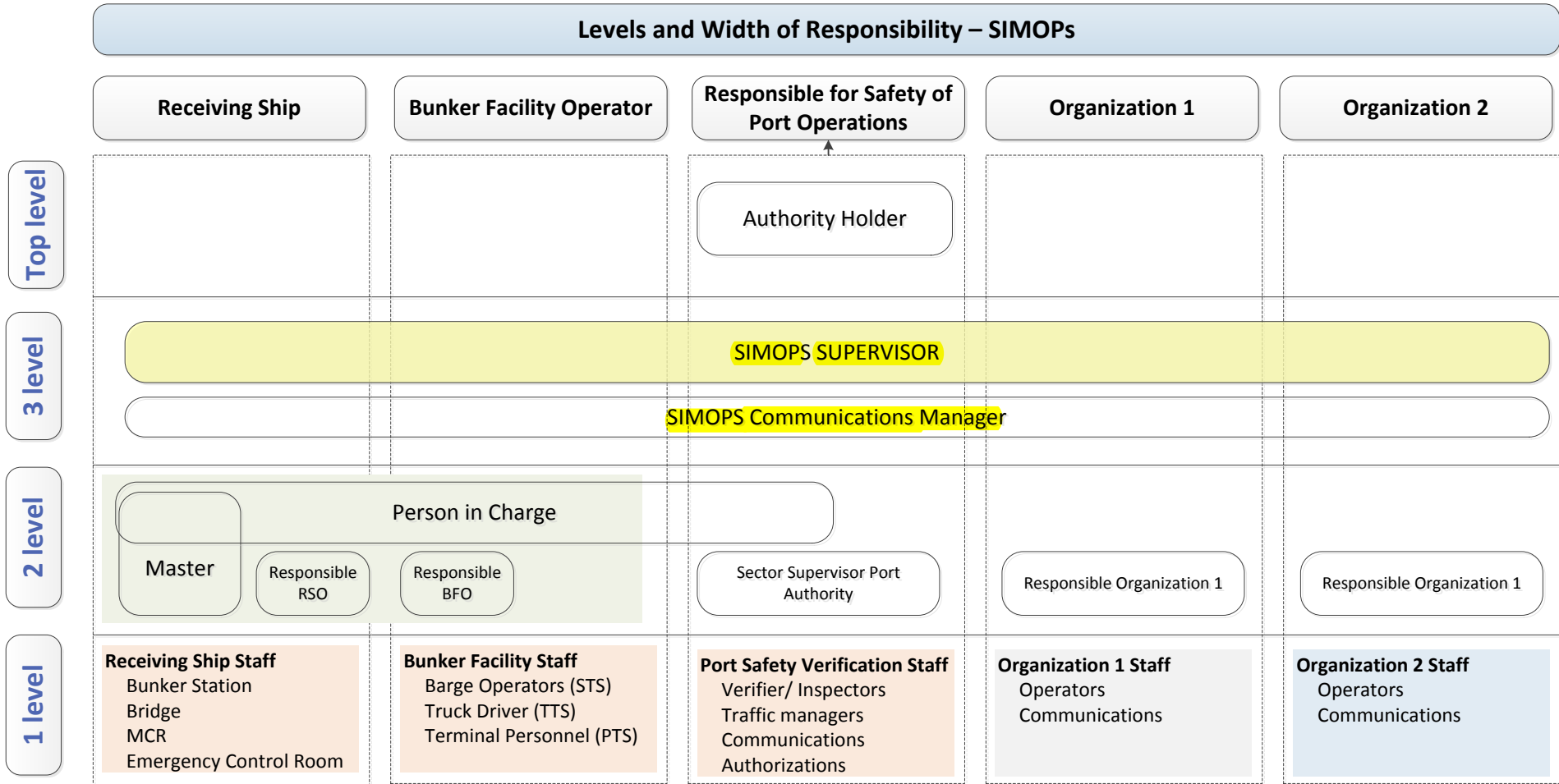
### LNG Bunkering – SIMOPs – Suggested Procedure for Authorization

Relevant to EMSA Guidance Section nr.	7 (Risk), 8 (Permitting and Authorization), 10 (Pre-Bunkering), 11 (Bunkering)
Context	<ul style="list-style-type: none"> <li>• Simultaneous Operations (SIMOPs) are a concept which has deserved significant attention from the Offshore Oil&amp;Gas industry, in a context other than LNG Bunkering.</li> <li>• <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></li> <li>• 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 <u>a potential “showstopper”</u>.</li> <li>• Resulting from the analysis of the replies to the EMSA survey it can be understood that <u>the majority of Port Authorities do not and will not authorize SIMOPs with LNG bunkering, without however specifying any boundaries in</u></li> </ul>
Problem(s)	<ul style="list-style-type: none"> <li>• <b>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.</b></li> <li>• <b>For some ship operating profiles (remarkably <u>containerships</u>) the problem is even more relevant.</b></li> <li>• <b>Risk associated to SIMOPs is highly local and context-sensitive and therefore difficult to evaluate in any standard prescriptive manner.</b></li> <li>• <b>Indication of QRA for SIMOPs is often mentioned, but this is a (situation, site, ship)-specific analysis</b></li> </ul>
Discussion	<p>In order to enable competitive LNG operations, bunkering must be performed without unnecessary time loss and <u>bunkering operations in parallel with passenger and cargo handling (SIMOPs), are important to make LNG an attractive alternative fuel option for ferries.</u></p> <p>The need for <u>SIMOPs is a common problem addressed in other industry areas such as Oil and Gas.</u> From the experience in SIMOPs in other areas it is identified that the following <u>two functions</u> are commonly seen in different structures/organizations:</p> <ul style="list-style-type: none"> <li>• <u>SIMOPS Supervisor</u></li> <li>• <u>Communications Manager</u></li> </ul> <p>EMSA, in the Context of LNG Bunkering Guidance to Port Authorities and Administrations is proposing a <u>PROCEDURE and ORGANIZATION/RESPONSIBILITIES for SIMOPs to</u> 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
<b>what</b>	<ul style="list-style-type: none"> <li>MoU between all interested parties in SIMOP operations</li> </ul>	<ul style="list-style-type: none"> <li>Concept of Operation</li> <li>Risk Assessment</li> <li>Technical Aspects defined</li> </ul>	<ul style="list-style-type: none"> <li>Verification of the Conditions agreed in the <b>MoU</b></li> </ul>	<p><b>SIMOPS take place within the defined boundaries agreed and certified by the Port Authority.</b></p>	<ul style="list-style-type: none"> <li>Identification and Reporting of Incidents and Near Misses</li> <li>Identification of points to Improve</li> </ul>
<b>How</b>	<ul style="list-style-type: none"> <li>Public notice for interested parties to participate in SIMOP MoU</li> </ul>	<ul style="list-style-type: none"> <li>Technical File and Risk Assessment with all recommendations and actions submitted to Port Authority</li> </ul>	<ul style="list-style-type: none"> <li>The SIMOPS SUPERVISOR verifies all parties preparation for Operations.</li> </ul>	<p><b>LNG Bunkering Operation + Other Simultaneous Ops</b>  <b>- SIMOPS SUPERVISOR</b>  <b>- COMMUNICATIONS</b></p>	<ul style="list-style-type: none"> <li>Listing and reporting to centralized data base</li> <li>Post SIMOP Report</li> </ul>
<b>who</b>	<ul style="list-style-type: none"> <li>PORT AUTHORITY</li> <li>PORT ADMINISTRATION</li> </ul>	<ul style="list-style-type: none"> <li>All REGISTERED PARTIES (TERMINAL, SHIP Operator, Bunker Supplier, Container Handling)</li> </ul>	<ul style="list-style-type: none"> <li>SIMOPS only possible if ALL conditions can be verified.</li> <li>Only accredited parties can take part.</li> </ul>	<ul style="list-style-type: none"> <li>RECEIVING SHIP</li> <li>BUNKER SUPPLIER</li> <li>TERMINAL</li> <li>PORT AUTHORITY (SIMOPS SUPERVISOR)</li> </ul>	<ul style="list-style-type: none"> <li>SIMOPS SUPERVISOR</li> <li>All other parties contribute</li> </ul>

## Levels and Width of Responsibility – SIMOPs



**EMSA Workshop on LNG Bunkering to Port Authorities/Administrations**

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	<b>G. Christofi</b> (Head of Unit B.3 – Environment & Capacity Building, EMSA)
09:15 – 10:00	<b>LNG for shipping - EU policy with regard to use of LNG in maritime transport</b>	<b>Agnieszka Zaplatka</b> (DG-MOVE, D1)
10:00 – 11:00	<b>Development of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations</b> Summary of Results from the EMSA LNG Bunkering online survey to Port Authorities/Administrations <sup>5</sup> LNG Bunkering Challenges – The interface paradigm.	<b>Ricardo Batista</b> (EMSA)
11:00 – 11:15	Coffee break	
	<b>Port Management for LNG Bunkering</b>	
11:15 – 11:45	<b>LNG Bunkering – Port Authority Perspective.</b> <b>LNG and Good Governance in Ports</b>	<b>Cees Boon</b> (Port of Rotterdam)
11:45 – 12:45	<b>Discussion Round 1</b> <ul style="list-style-type: none"> <li>• <u>Discussion Paper 1 - Small Scale LNG bunkering - SEVESO requirements</u></li> <li>• Discussion on the relevant aspects of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations.</li> </ul>	
12:45 – 14:00	Lunch break	
	<b>LNG Bunkering Operation and Port Authority Procedures</b>	
14:00 – 14:30	<b>LNG Bunkering Guidance (existing guidance)</b> IACS Recommendation 142 on LNG Bunkering SGMF Safety Guidelines for LNG Bunkering	<b>Thomas Spencer</b> (Society for Gas as a Marine Fuel, SGMF, LR)

<sup>5</sup> 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
	ISO/TS 18683:2015, ISO 20519	
14:30 – 15:00	LNG Operating Regulations – Port of Gothenburg	<b>Capt. Dan Erik Andersson</b> (Port of Gothenburg)
15:00 – 15:40	<b>LNG Bunkering – Planning, Preparing and Operations</b>	<b>Stuart Carpenter</b> (Shell)
15:40 – 15:50	Coffee break	
15:50 – 16:50	<b>Discussion Round 2</b> <ul style="list-style-type: none"> <li>• <u>Discussion Paper 4 – SIMOPs - Suggested Procedure for SIMOPs Authorization</u></li> <li>• Discussion on the relevant aspects of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations.</li> </ul>	
16:50 – 17:00	Conclusions of the first day	

## Friday, 02 December 2016

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

Time	Agenda Item	Speakers
14:30 – 15:30	<p><b>Discussion Round 4</b></p> <ul style="list-style-type: none"> <li>• <u>Discussion Paper 3 – Permitting, Multi-Layer Process, Single-Window</u></li> <li>• Discussion on the relevant aspects of the EMSA Guidance on LNG Bunkering to Port Authorities/Administrations.</li> </ul>	
15:30 – 15:45	Coffee Break	
15:45 – 16:00	<p>Conclusion of the Workshop</p> <p>Wrap-up and listing of main issues to follow-up</p>	