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Liquefied Natural Gas as Ship Fuel: A Maltese Regulatory Gap Analysis

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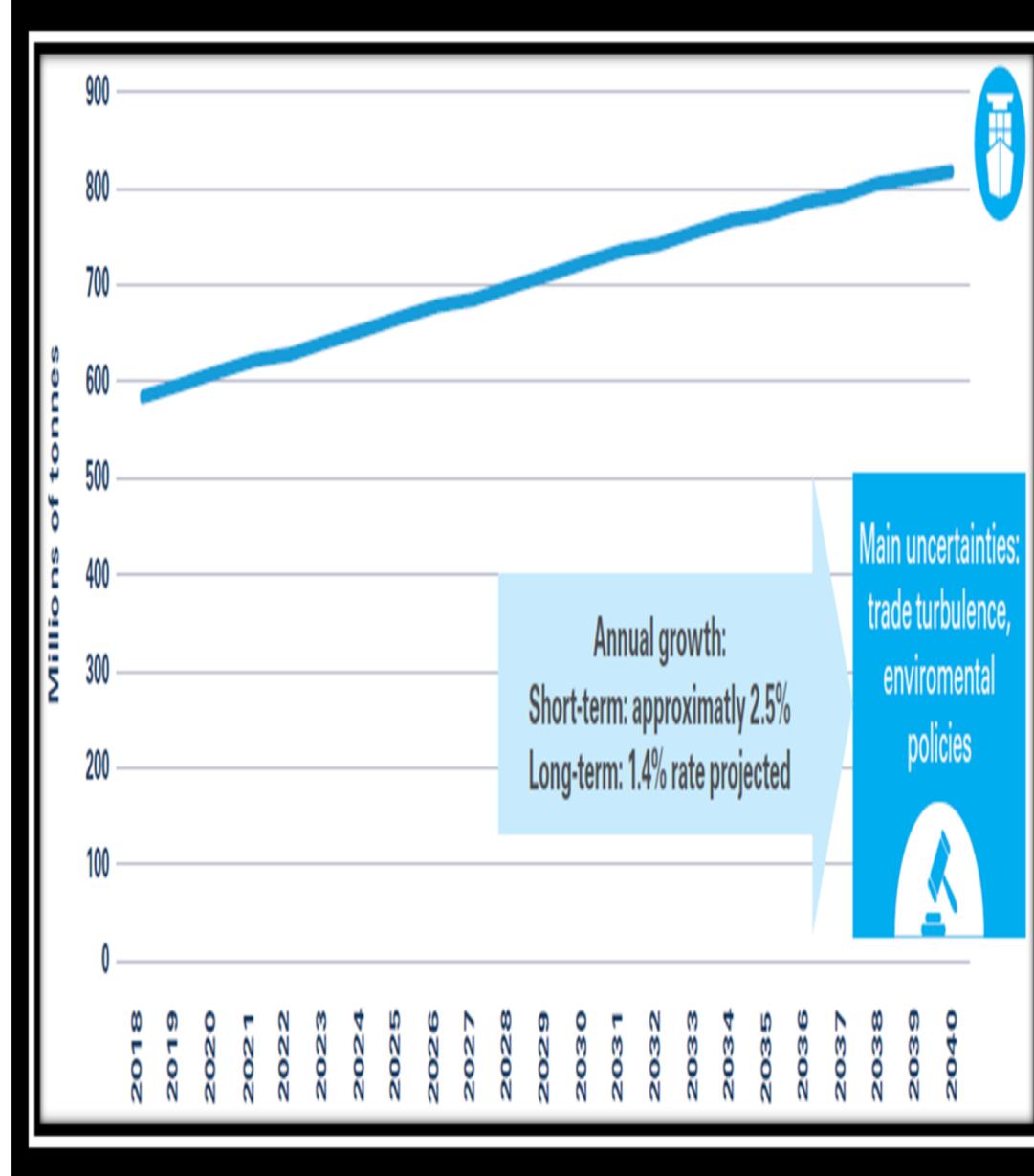
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Introduction:

- The world seaborne trade is expected to grow by a factor of 2.5% from 2020 to 2040 (Schröder-Hinrichs et al., 2018);
- The maritime transport industry is indeed serving about 80% of global trade (UNCTAD, 2019);
- The IMO, by adopting an initial strategy framework in reduction of GHG emissions from ships;
- Introducing a Data Collection System (DCS), along with the European Union (EU) which has introduced a Monitoring, Reporting, and Verification (MRV) regulation scheme (Nikitakos et al., 2018);
- Fuels with a “greener environmental footprint”, like Liquefied Natural Gas (LNG), are also part of a similar effort.



The documents with effect of LNG bunkering

The documents with effect of LNG bunkering which are analysed in this paper.

International Regulations

- ◆ IMO - IGF | IGC | MARPOL
- ◆ ISO
- ◆ IACS & classification societies
- ◆ Industrial societies

EU Directives

- ◆ (2010/769/EU) - Technological methods as an alternative to using low sulphur marine fuels;
- ◆ (2012/33/EU) - The sulphur content of marine fuels.
- ◆ (2014/94/EU) - The deployment of alternative fuels infrastructure.
- ◆ (EU 1316/2013) - Connecting Europe Facility

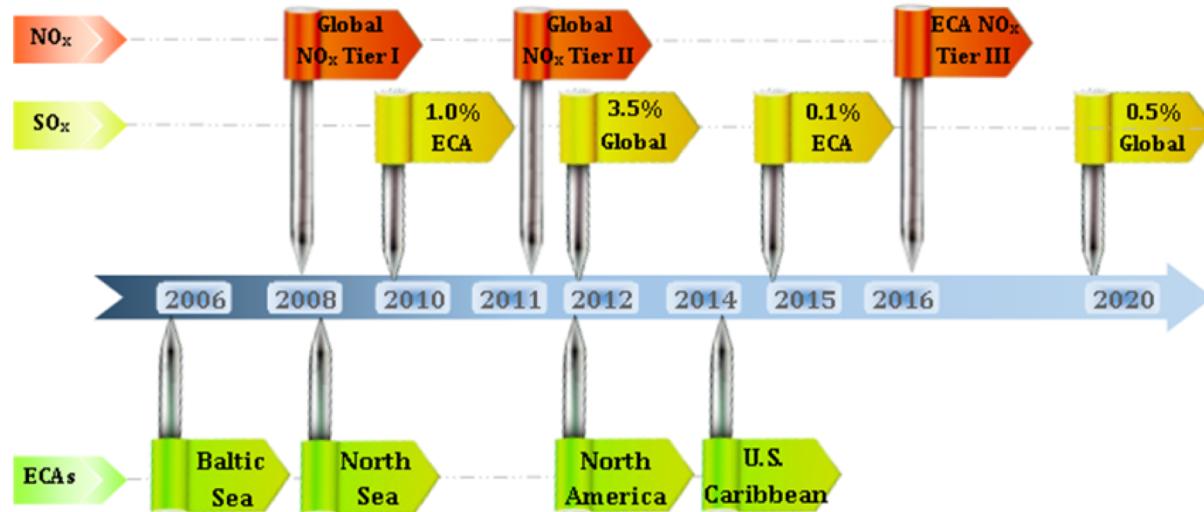
EU countries National Policies

- ◆ Baltic region countries
- ◆ Mediterranean region countries

Malta National Legislation & Targets

- ◆ S.L. 499.12
- ◆ S.L. 545.18
- ◆ L.N. 167
- ◆ Targets according to 2014/94/EC Art.6

Targets Set by IMO



Adapted from: (MARPOL, 2013).

NOx & SOx emission limits as set by the IMO.

Emission NOx limits as set by the IMO.

	Tier I	Tier II	Tier III
Ship construction date	1 st Jan 2000 – 1 st Jan 2011	On or after 1 st Jan 2011	1 st Jan 2016 & in NECA area
$n < 130\text{rpm}$	17.0g/kWh	14.4g/kWh	3.4g/kWh
$130 = n < 2000\text{rpm}$	$n^{(-0.2)}$ g/kWh	$n^{(-0.23)}$ g/kWh	$n^{(-0.2)}$ g/kWh
$n > 2000\text{rpm}$	9.8g/kWh	7.7g/kWh	2.0g/kWh

Emission SOx limits as set by the IMO.

Global	SECA
Before 1 st Jan 2012	4.5% m/m
On and after 1 st Jan 2012	3.5% m/m
After 1 st Jan 2020	0.5% m/m
Before 1 st July 2010	1.5% m/m
On and after 1 July 2010	1.0% m/m
On and after 2015	0.1% m/m

Adapted from: (MARPOL, 2013).

Collection of LNG bunkering related rules/guidelines from classification societies.

Classification Society	Type of Document	Rule Documentation	Reference Code	Publishing Year
ABS	Guide	LNG Bunkering: Technical and Operational Advisory	n.a.	n.a.
	Guide	LNG Bunkering	n.a.	January, 2017
BV	Guide	LNG Bunkering Ship	NR 620 DT R00 E	October, 2015
DNV.GL	Recommended Practice	Development and operation of liquefied natural gas bunkering facilities	DNVGL-RP-G105	October, 2015
LR	Rules	Classification of Natural Gas Fuelled Ship	n.a.	January, 2016
PRS	Rules	Bunkering Guidelines For LNG as a Marine Fuel	166/P	March, 2017
	Rules	Using LNG or Other Low-Flashpoint Fuels on-board Ships other than Gas Carriers	117/P	March, 2017
RINA	Guide	Guide for the Design and operation of Liquefied Natural Gas (LNG) Carriers	GUI. 11/E	n.a.

Adapted from: (MARPOL, 2013).

Stages of the Gap Analysis



Source: (Authors).

Gap analysis of the Maltese legislation in relation to ports and bunkering.

Malta National Legislation and Port Regulations

Current	Gap	Amendment Required
Definition of 'bunker' - "any non-volatile marine grade fuel oil used to fuel a ship or its machinery and includes lubricating oil"	The definition of bunker at no point does it include the gas fuel. Actually it specifies that bunkers are non-volatile fuel oils. This means that LNG is not considered as a marine fuel in Malta.	Amendments to the definition are needed for the provision of LNG as ship fuel.
Definition of 'Jetty pipeline' - "...substance could egress into any port or territorial waters"	LNG release will allow methane as a GHG gas into the atmosphere. Although no visible egress, there will be an invisible GHG impact.	Understand the air pollution cause by methane slip and include this in the definition in case of LNG pipeline damage.
Missing definition	Definition to be included	'SGMF', 'IGF code'
Part III – Bunker supply barges and bunker receiving ships	The information listed at no point does it specify the use of LNG bunker vessel. This is all in relation to oil fuels in terms of pollution. It is not subject to LNG bunkering.	The national legislation has to specify the use of LNG bunker vessel.
Bunkering checklist	The legislation does not include checklist dedicated to LNG bunkering.	All bunkering checklists should include the appropriate checklists for LNG
Legislation is up-to-date including emission regulations and LNG carriers making use of Boil off gas.	It does not mention other ships making use of LNG as marine fuel.	Need to include all ship types using LNG as fuel.
No relation to LNG bunkering service providers.	This Legal Notice (L.N.) specifies details for the Natural Gas market in Malta transposed from EU directive 73/2009. It rules the storage, distribution, supply and operation of natural gas.	Reference to LNG bunkering service providers required.

International and EU regulations, and port guidelines gaps for an LNG infrastructure in Malta.

LNG Bunkering Regulatory Gap in Malta		
Documentation	Gap	Amendment Required
The sulphur content of marine fuels (2012/33/EU)	As from 2020 Malta has to abide to the Sulphur emission level in ports and territorial waters	By providing a LNG bunkering infrastructure both in port and for international shipping, Malta will be providing a clean alternative fuel for local and international shipping.
The deployment of alternative fuels infrastructure (2014/94/EU)	Without the implementation of an LNG bunkering infrastructure, Malta will not be giving its full input to the EU directive in providing alternative marine fuels.	
Strategic Environmental Assessment SEA Directive (2001/42/EC)	This directive requires environmental assessment which have to be conducted when setting up a new plan for the implementation of projects on land and sea. The aim is to provide a high environment protection. Therefore upon setting up an LNG bunkering infrastructure within port, these have to be conducted and abide to accordingly.	
IPPC - Industrial Emissions Directive (2010/75/EU)	The aim of this directive is to control pollution levels from industrial plants. For such an infrastructure dealing with LNG, the essential tests and certification have to allow commercial operation.	
Environmental Impact Assessment EIA Directive (2011/92/EU)	This directive applies to both private and public projects which are considered with possible effect on the environment due to their size and kind of investment. It is up the national authorities to decide if this directive will be applicable or not. However, it is expected that a project for an LNG bunkering infrastructure would require such assessment	
Seveso II Directive (96/82/EC)	In order to control the possibility of major accident for a project, this directive analyse the possible accidents involving hazardous substances. Dealing with LNG, this directive will be essential for the implementation on LNG bunkering infrastructure.	

<p>The mode of bunkering ideal for each port has to be studied specific to port</p>	<p>Introduce the possible modes of bunkering within the ports of service. This will include the study of possible storage of LNG demanding on port size and location. The supply of LNG to the port area will depend on the mode of bunkering chosen.</p>
<p>No information on the risks and hazard within the Maltese port harbours</p>	<p>All safety scenario analysis such as HAZID, HAZOP, QRA. Guideline on how these analysis should be conducted in relation to LNG can be found in ISO/TS 18683/19, ISO/TS 16901/29 and ISO 20519:2017.</p>
<p>No information for bunkering zone identification within the Maltese Harbours</p>	<p>The study and identification of non-specific bunkering zone with ports. This is also effected by the size of bunker and the mode of bunkering.</p>
<p>Simultaneous operations have never been considered</p>	<p>SIMOPS requires a case by case analysis depending on which port and what type of ship is requesting bunkering. Multipurpose ports do require more dedicate assessments for simultaneous operations.</p>
<p>Emergency plans lack potential hazards from the use of LNG</p>	<p>Procedures for emergency plans for various type of accidents that might occur.</p>
<p>Lack of LNG bunkering service availability</p>	<p>Accreditation of service providers as per requirements for operators. ISO 18683, ISO 20519 and IAPH accreditation model provide guidelines with the terms under which accreditation is provided</p>
<p>Control of Bunkering within port</p>	<p>Due to multiple operations within the port area, a control system has to be established to coordinate the port operations and traffic while bunkering. A best practice guidelines and procedures within ports should be created including the procedures for different modes of bunkering</p>

Competence and training

Possibility of offshore LNG bunkering Station

Setting up the regulations for safety and procedures for conducting an LNG fuel transfer on anchor outside port limits but within territorial waters of Malta.

Such case will require more detailed study in terms of the weather conditions, in setting up the safe conditions to allow LNG bunkering to take place.

No gap is training related to LNG as this was not in use. However, with the introduction of LNG services, the gap for competence and training will be of much importance.

Training for operators of LNG bunkering to familiarise and understand the knowhow and any possible results of misuse of the LNG system. ISO/TS 18683 and ISO 20519:2017 provides training requirements.

Familiarisation training for port operators for knowledge on how to act in case of emergency.

Source: (Authors).

Conclusion

The introduction of LNG as shipping fuel following 2020, meeting the requirements for cleaner alternative fuels, Malta has to imminently conduct a feasibility study for the future availability of LNG fuel service.

Multiple fuel transportation methods should be analysed, while figuring out the potential demand increase from both the local and international shipping sector.

For the local maritime industry, especially for port services, one should deeply analyse potential incentives to help local operators switch to cleaner fuelled vessels.

More knowledge on the safe operation of LNG fuelled vessels should be made user friendly and more accessible. Advantages of having LNG as ship fuel should be shown to the local maritime operators to fully understand the positive effect they can benefit from, while assisting the Maltese ports in reducing their emissions.

As seen in the Baltic region and other Mediterranean countries, vessels operating on LNG have been pushed forward by incentives and collaborative work.

Step is to set-up the required national regulations and make LNG available, leading to incentivising the local operators, and on the longer perspective, the international shipping is expected to increase following that the regulations and directives are in force and the bunkering infrastructure will be available.



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Thank you

