

Sulphur Directive – Alternative compliance methods:

LNG as fuel, IGF Code and LNG bunkering

1

Roel Hoenders

Project officer for environmental protection

Safemed training

Relevant provisions of the Sulphur Directive

Marpol Annex VI

Regulation 4 - Equivalents

- The Administration may allow **any fitting, material, appliance or apparatus to be fitted in a ship or other procedures, alternative fuel oils, or compliance method used as an alternative** if (...) they are **at least as effective** in terms of emissions reductions as required by this Annex.

Directive 2012/33/EU

Article 2 – definitions

- *Emission abatement method means **any fitting, material, appliance or apparatus to be fitted in a ship or other procedure, alternative fuel, or compliance method, used as an alternative to low sulphur marine fuel (...), that is verifiable, quantifiable and enforceable.***

2

Article 4c – Emission abatement methods

- Ships using the emission abatement methods (...) shall **continuously achieve reduction** of sulphur dioxide emissions that are **at least equivalent** to the reductions that would be achieved by using marine fuels

EU policy context

- ❑ The Commission promotes LNG as alternative marine fuel in the EU:
 1. As possible way of compliance with the revised Sulphur Directive (Directive 2012/33/EU)
 - "Emission abatement methods hold the potential for significant emission reductions."
 - "Access to emission abatement methods should be facilitated."
 2. By establishing an alternative fuel infrastructure as proposed in Clean Power for Transport Package (COM(2013)18 final)
 - "Developing an 'economies of scale' on the supply side" and EU wide mobility on the demand side."
 - Breaking the oil dependence of the EU transport sector

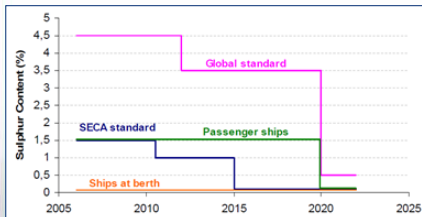
3



EU policy context

- 1. LNG as possible way of compliance with the revised Sulphur Directive
 - SO_x and PM emissions are almost eliminated
 - NO_x emissions are reduced by 90% and CO₂ by 20-25%
 - No visible smoke and sludge deposits after burning

4



Sulphur in fuel content as per revised Sulphur Directive

Fuel Type	SO _x (g/kWh)	NO _x (g/kWh)	PM (g/kWh)	CO ₂ (g/kWh)
Residual Oil 3.5% sulfur	13	9-12	1.5	580-630
Marine Distillate 0.5% S	2	8-11	0.25-0.5	580-630
Gasoil 0,1% S	0.4	8-11	0.15-0.25	580-630
LNG	0	2	~0	430-480

Figure 6. Indicated air emissions from LNG and other marine fuels. Emissions are related to engine output in kWh. Source: Marintek

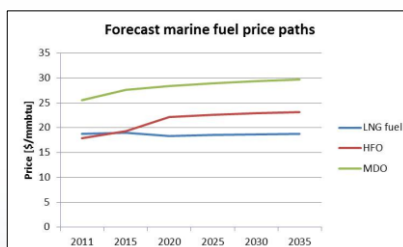
Prospects of alternative fuel technologies for shipping

IFO: 1% sulphur MGO: 0,1% sulphur

	IFO380	IFO180	MDO	MGO
Singapore	612.50 ▲	633.00 ▲	895.50 ▲	905.50 ▲
Rotterdam	594.50 ▲	617.50 ▲	-	881.50 ▲
Houston	586.00 ▲	645.50 ▼	-	966.50 ▲
Fujairah	623.50 ▲	672.50 ▼	-	997.50 ▲
Los Angeles	594.50 ▼	625.00 ▲	-	997.50 ▼

Source: Bunkerworld – Monday 17 June 2013

Current price difference between 1% and 0,1% sulphur content: around **250 \$ p/tonne**



Source: DNV

Development of alternative and 'cheaper' marine fuels is driven by:

- 0,1 sulphur in marine fuel requirement in EU SECA's as of 1/1/2015 AND
- Premium of distillates

5

EU policy context

2. Increasing the availability and demand of LNG as alternative maritime fuel through the proposed Directive on the 'Deployment of Alternative Fuels Infrastructure' (COM(2013)18 final)

- Lack of appropriate LNG bunkering facilities along EU shipping routes



6

EU policy context

2. Proposed Directive on the 'Deployment of Alternative Fuels Infrastructure' (COM(2013)18 final)

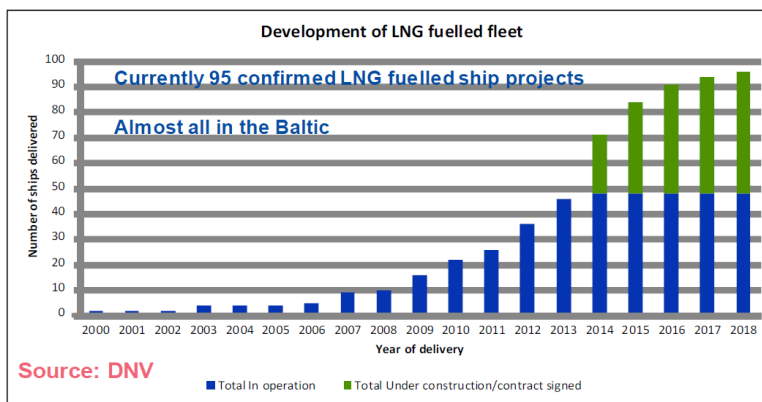
- **To break the "chicken and egg" situation, the Commission proposed:**
 - Deployment of the necessary LNG 'refueling' infrastructure/facilities in **all Maritime Ports of the TEN-T Core Network** by **Dec. 2020**
 - Flexibility and respect for local conditions & demand: **LNG refueling points** can be on-shore or off-shore / permanent or mobile
 - Creating **certainty** that LNG will be available in EU ports by 2020
- **European Parliament and Council have reached on inter-institutional agreement on the Commission proposal on 26 March 2013:**
 - LNG re-fuelling points in the TEN-T Core Network ports by **2025**
 - Pursue the development of **further international or EU standards**, including technical specifications, for LNG re-fuelling points by the relevant standardization bodies



7

EU policy context

2. Proposed Directive on the 'Deployment of Alternative Fuels Infrastructure' (COM(2013)18 final)



8

Rules and standards for LNG bunkering in the EU

➤ Commission/EMSA Ad-Hoc LNG Expert Group meetings:

- Development of rules for the gas-fuelled ship is moving ahead, but
- Still no **binding regulatory framework for LNG bunkering**, leading to:

1. Diversification of bunkering rules in the EU and possibly:

- Disturbed level-playing-field for EU ports
- Different local requirements for ship-owners

9

2. Uncertainty as regards the level of safety when bunkering LNG

- Will the thorough preparation of the 'early movers' be followed by all EU ports and bunker suppliers? **Safety is key**

3. Yet, many cooperation & pilot projects + knowledge building on-going

- The absence of binding rules makes that many stakeholders are cooperating on knowledge building, and are still in a learning curve.



On-going work by the Commission and EMSA

Format of a possible EU LNG bunkering framework still unclear, but various EU initiatives aim at facilitating the use of LNG:

1. IGF Code: Pro-actively contributing to its finalization asap

2. EMSA Study: (by GL) identified all regulatory barriers for LNG bunkering (gap matrix + proposal for an EU standard)

3. Engaging in international initiatives: ISO, IAPH, SGMF to ensure alignment with intern. developments

4. EU funded projects: Follow-up to findings and outcomes of various **TEN-T** projects which address LNG (bunkering)

5. Commission tender: Aiming at completing the EU-wide framework for use of LNG as fuel (1M€: awaiting evaluation results)

6. Dialogue with stakeholders and Member States: through the 'Sustainable Waterborne Transport Toolbox' and '**European Sustainable Shipping Forum**': Ad-Hoc LNG Expert Group meetings + **ESSF Sub-Group on LNG**

10





European Maritime Safety Agency

European Sustainable Shipping Forum sub-group on LNG

- ❑ 1st meeting of the ESSF LNG sub-group 11 Dec. 2013 + 2nd meeting on 14 March 2014
- ❑ Objectives and mandate as defined by the ESSF Plenary:
 1. **Facilitating the promotion and implementation of LNG as marine fuel at EU level**
 2. **Identifying, assessing and recommending actions and solutions to establish the appropriate framework conditions (guidelines, standards, regulations) for the use of LNG in the EU**
- ❑ First meeting focused mainly on:
 1. **Compatibility of LNG bunkering rules in EU ports, and the link to international developments (ISO, IAPH, SIGTTO)**
 2. **Developing the business case of LNG as marine fuel**
- ❑ 6 'work-packages' have been identified

11



European Maritime Safety Agency

European Sustainable Shipping Forum sub-group on LNG

- ❑ **ESSF LNG sub-group members:**
 - **Member States:** Belgium, Denmark, Germany, Finland, France, Norway, UK
 - **Ship owners:** Anthony Veder, Belgian Ship Owners Association, German Ship Owners, Fjordline, Brittany Ferries, Exmar, TT Line, Viking Line, Carnival, Suardiaz
 - **Manufacturers/ship building:** MAN, Fincantieri, Rolls-Royce, Wartsila, Cotenaval
 - **Gas providers/owners:** Shell, Fluxys, Bomin Linde, SIGTTO, SGMF
 - **Ports:** Antwerp, Rotterdam, Valencia, Stockholm, Hamburg
 - **Class:** DNV/GL, RINA, BV, LR
 - **Other:** SSPA, Transport & Environment (T&E)

12

Other interested members that are willing to pro-actively contribute to the identified work-packages, are welcome



European Maritime Safety Agency

European Sustainable Shipping Forum sub-group on LNG

□ Main outcomes first meeting:

1. Ensure alignment with international developments, and not re-do work already done.
2. Excellent safety record of LNG should be maintained, also when use and bunkering of LNG increases across the EU.
3. No agreement yet on the need of a specific EU regulatory instrument for LNG bunkering, and of what this should consist.
4. Sub-group experts should jointly propose solutions for outstanding regulatory gaps, and identify areas where the EU may have to go beyond international recommendations.

13



European Maritime Safety Agency

European Sustainable Shipping Forum sub-group on LNG

□ The LNG sub-group identified 'work-packages' on issues which require further attention and possible guidance

□ Work-packages on regulatory aspects:

1. Hoses and connections

- Safe handling of hoses, incl. disconnection and 'wet' hoses
- Standard dimensions for the bunkering connections: take this to IMO/ISO?

2. Simultaneous bunkering while loading/unloading or embarking/disembarking + safety distances

- Further guidance on QRA (quantitative risk assessment) elements?
- Different approach for different ship types
- Determination of safety distances (frequency or deterministic)

3. Training requirements

- Slow progress in STCW, and additional requirements than in ISO

4. Gas quality, heating value and CO2 reduction potential

- Standard gas quality and bunker delivery note: recommendations to Plenary
- More information about the emission reduction potential of LNG

14



E u r o p e a n M a r i t i m e S a f e t y A g e n c y

THANK YOU FOR YOUR ATTENTION,

roel.hoenders@emsa.europa.eu



15