

GO LNG – Final Conference to the SBSR Project “Martech LNG”

Development of framework conditions looked at from an IMO and EU perspective

Klaipeda 9 December 2014

Mogens Schrøder Bech
Danish maritime Authority

Outline

The aim: An overview

- Institutional point of departure

North Europe LNG Infrastructure project - short

European Sustainable Shipping Forum (ESSF)

- Sub-Group on LNG
- Sub-group on finance

The EU directive on the employment of alternative fuels infrastructure

IMO

- IGF Code – Gas fuelled ships

ISO - Guidelines for systems and installations of LNG

The DMA LNG Overview of Regulation

Conclusions

North Europe LNG infrastructure project 2011- 2012

EU MoS project

The new sulphur regulation in North Europe

- Competitiveness of shipping and regions

Distribution, storage and use as fuel of natural gas - LNG

From the LNG import terminal to LNG used as fuel in ships

The LNG supply chain

- "Hard" on maritime filling stations/infrastructures
- "Soft" on regulations, industry standards, etc.

The business case as a horizontal issue

How can we create this infrastructure?

- Recommendations to central stakeholders

LNG infrastructure outlay



Photo: Gasunie

Large LNG terminal



Truck

Bunker/feeder vessel

Truck

Bunker/feeder vessel

Gas pipeline

Photo: Gasunie



Liquefaction plant

Intermediary LNG Terminal

Onshore, e.g.

- Tank
- Container

Offshore, e.g.

- Vessel
- Barge

Small-scale liquefaction plant

Photo: SSPA



Bunker barge

Bunker/feeder vessel

Truck

Pipeline/direct filling

End users

SHIPS

Trucks

Cars

Industry/power generation

Gas grid

Etc.

Photo: SSPA



Recommendations

Aim: To establish a cost efficient LNG infrastructure

Grouping of 22 recommendations

- Bunkering solutions
- Economic and financial aspects
- Safety
- Technical and operational aspects
- The permit process

Basically we are discussing the same issues today

- But more informed!
- We learn from ongoing projects
- We learn from experience

ESSF - European Sustainable Shipping Forum (2013)

Tasks

- Fostering sustainable maritime transport
- Advice and technical expertise
- Facilitate exchange of information
- Deliver opinions, submit reports, develop and propose innovative solutions
 - Sustainability and competitiveness

Members around 60

- Member States, Norway and Iceland
- Industry organisations etc.

Specialized sub-groups

The immediate task

- The sulphur regulation

ESSF sub-groups

- Technology neutrality!!

LNG

Scrubbers

Implementation of the sulphur directive

- Enforcement
- Compliance

Financing

Research and innovation

Competitiveness

Port Reception Facilities (Under formation)

The ESSF sub-group on LNG 1/32

Assist the ESSF to advance:

- The "LNG Action Plan – Actions towards a comprehensive EU Framework on LNG for shipping"

The LNG supply chain represented

Regulation, industry standards and best practices etc

- EU
- IMO
- Industry organizations

Directive on the employment of alternative fuels infrastructure, e.g.

- Development of an LNG/CNG infrastructure
- Land, sea and inland waterways

The ESSF sub-group on LNG 2/2

Work packages

1. Hoses and connections
2. Simultaneous bunkering while
 - Passengers on board
 - Loading/unloading cargo
 - Embarking/disembarking passengers
 - Safety distances
3. Training
 - Focus onshore
4. Gas quality, heating value and CO2 reduction potential

Results up to now 2 IMO submissions – connected to the draft IGF-Code

- Standards for connectors and a bunker delivery note

Standards for connectors to be used at bunkering stations for LNG 1/3

Bunkering manifold part of the draft IGF code

- Withstand external loads

Connection at the bunkering station

- Dry disconnect type
- Additional dry break-away

Standard type stated in the draft code

- Which standard to be used?
- Clear advantages with standards

Standard I IMO submission

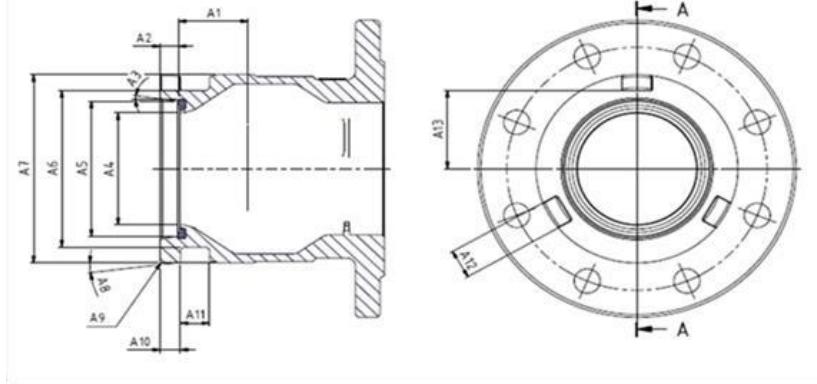
- Quick bunkering connector
- Up to 650 m³ an hour and up to 6"
- The open NATO standard for avionic fuelling

Standard II IMO submission

- Remote operated mechanical bunkering connector
- From 650 m³ an hour and over 6"

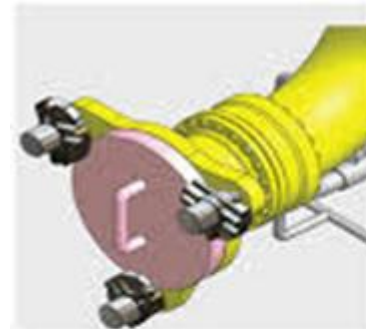
Standards for connectors to be used at bunkering stations for LNG 2/3

Open standard LNG connector (DN 65-150)



Standards for connectors to be used at bunkering stations for LNG 3/3

Multi-clamp/tripod connectors for AISI standard flanges



Defining a standard LNG bunker delivery note and standards of gas quality

LNG-Properties

- Methane number
- Lower calorific(heating) value
- LNG temperature delivered
- Etc.

LNG-Composition

- Methane
- Ethane
- Etc.

Total delivered

t, MJ, m³,GJ

Liquid delivery

GJ

Signature(s)

A commercial issue or enforcement!!!!

LNG consultancy work 1/3

1 mill Euro from the EU Parliament

- LNG Sub-group steering group for lot 1 - 3
- 4 lots overall

Lot 1. Completion of an EU framework on

- LNG fuelled ships
- Fuel provision infrastructure
- **(A true global market)**

Framework study structure

- Gaps and barriers
- Possible policy actions, rules, standards and guidelines
- Impact analysis
- Input to awareness campaign

LNG consultancy work 2/3

Lot 2. Creating awareness

- General public
- Industry Groups

Awareness methodology

- Overview of risks and opportunities
- Stakeholder need and perceptions
- Campaign concepts and plans
- Execute campaigns
- Measure campaign effects

Lot 3. LNG market development

- Price from a shipowner perspective
- Cost structures for LNG fuelled ships - compared to scrubbers and MGO
- LNG supply chain

LNG consultancy work 3/3

Lot 4. Financing opportunities for LNG infrastructures

Identify and assess the potential public and private financing mechanisms and incentives

- Successful models in other sectors

Identifying typical capital and operating costs for LNG bunkering stations

- Different needs, e.g. deep sea and small ferries

Analysis of commercial expectations on returns of investments

Financial modelling of different projects, rate of returns and risk analyses

- Financing mechanism - private and public
- Models for financing

Development of model and framework conditions for implementing optimal mechanisms and financial incentives

- Stakeholder validation

Sub-group on financing 1/3

Structural change for shipping

- The new sulphur regulation
- Overcapacity
- Energy Efficiency Design Index
- Development in ship values
- Financial stress in the banking system

EU Funds

- Connecting Europe Facility (CEF)
- LIFE – Environment and Climate Action
- Etc.
- Basically project oriented
- Evaluators and INEA (Innovation and Network Executive Agency) take decisions
- Market oriented approach?

State aid

- Limited up to now

Sub-group on financing 2/3

2 submission to the ESSF

1. Better exploitation of EU Funds

- Targeted information
- A vademecum on EU grants

2. A Retrofit Fund

- Mature technologies
- Targeting credit worthy retrofit projects/shipowners

The business case

- The cost difference between a MGO solution and a SECA compliant solution
- Implies a new balance between running costs (OPEX) and capital costs (CAPEX)
- Finance is imperative for the new balance
- Gearing with energy efficiency investments

Decisions on funding

- Must be taken by the private sector
- Assessment of risks a "core competence" for the private sector

Sub-group on financing 3/3

Capital sources

- Attraction of private capital via risk sharing/alleviation
- CEF offers risk sharing instruments
- Furthermore Member States and development banks etc.

Inspiration for a Retrofit Fund

- The EU Project Bond initiative
- Targeting big infrastructure investments
- Aims to build the gap between low investment grades of projects and the higher target ratings of investors

The Retrofit Fund

- A portfolio of different projects reduces risk
- More risk alleviation is needed!!!!!!!

It is possible to securitize the portfolio of a retrofit fund

- A Retrofit Bond is hereby created
- A marketable security/bond

Directive on the employment of alternative fuels infrastructure - adopted

3 infrastructures for transport

- Electricity
- Hydrogen
- Natural gas – CNG and LNG

Natural Gas

- CNG for land transport
- LNG for long haul heavy transport and ships

National policy frameworks within two years

- LNG - bunkering in core network ports at latest 2025
- A TEN-T core network view can reduce the obligation

Development of technical standards

The European Fund for Strategic Investments (315 billions EURO)

- Identifying the right projects!
- E.g. deployment of LNG infrastructures in ports

The IGF code by IMO (International Maritime Organization)

International code of safety for ships using Gasses or other low-flashpoint Fuels

- Natural gas – approved 2014 and expected adoption June 2015
- Further work – etyl and metyl alcohol, fuel cells and low-flashpoint diesel oil as start
- Up to now guidelines based on the ongoing IGF work

A safety approach

- But a framework for commercial decisions on the use of LNG/NG

Methodology for design and arrangements; e.g.

- Machinery
- Electric installations
- Storage systems
- Distribution systems
- Bunker stations on board the ship
- Ship bunkering station interface towards offshore and onshore bunkering
- Training of crew

ISO - Guidelines for systems and installations for supply of LNG as fuel for ships

To provide guidance for the planning and design of

- The bunkering facility
- The ship/bunkering facility interface
- Procedure for connection and disconnection
- The emergency shutdown interface and disconnection
- The emergency shutdown interface
- The LNG bunkering process control

LNG Bunkering Facilities

- Shore-to-ship bunkering
- Truck-to-ship bunkering
- Ship-to-ship bunkering

The mother for work with bunkering permits!!!!!!

The international dimension for LNG shall constantly be nurtured

- Important international organizations – e.g. IMO, EU and industry organizations

LNG Overview of Regulation

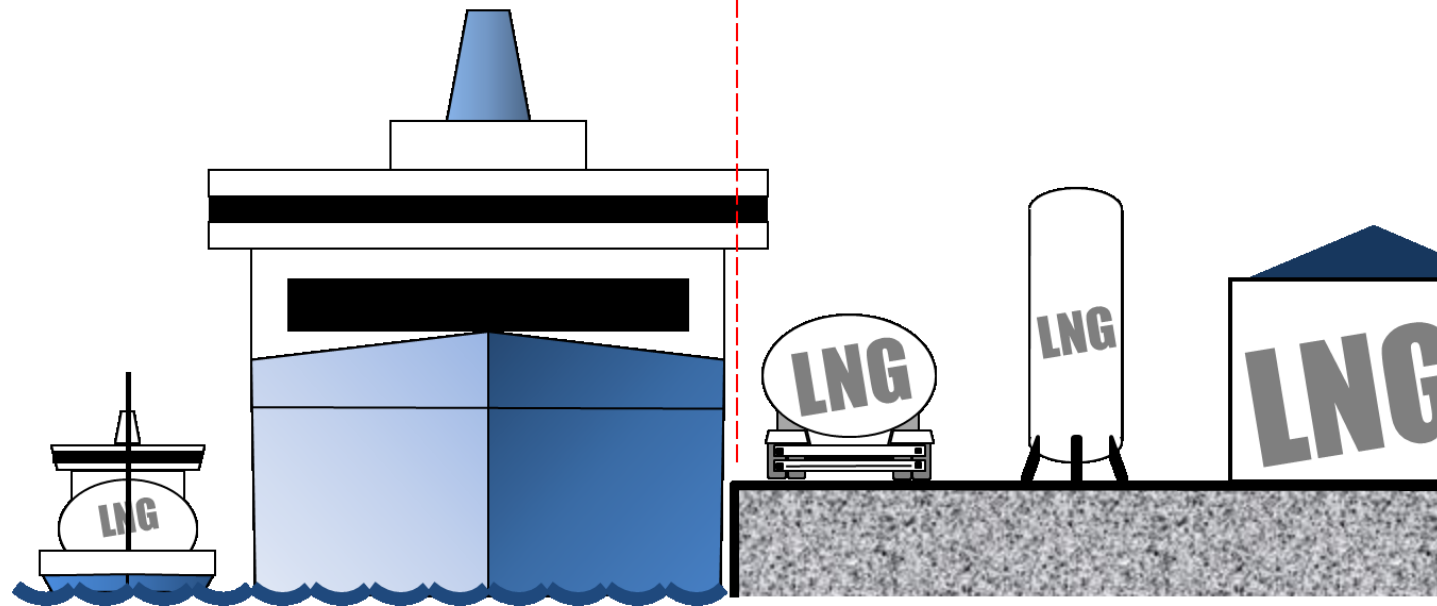
DMA :Municipalities etc.

Required coordination

SØFARTS STYRELSEN

KOMMUNEN m.fl.

nødvendig koordination



The DMA LNG Overview of Regulation

A "cookbook" perspective for applicants and authorities

- Issues, regulations and authorities

The ship side - the Danish Maritime Authority, e.g.

- Technical solutions
- Procedures
- Bunker operations
- Training of ships crew

The shore side with terminals etc. – the municipality

- Safety
- Environment
- Extension of port areas
- Construction works

Other aspects (often through the municipality)

- Security
- Occupational health
- Safety in relation to carriage of LNG
- Port bye laws

Read more: <http://www.dma.dk/legislation/sider/lngasfuel.aspx>

Conclusions

Comprehensive activities on LNG framework conditions are going on

- International
- EU
- National

LNG is a technical viable solution today

- More developed framework conditions
 - A bigger certainty for LNG investment
 - Vil bring costs down

The EU and national approach

- Where can we do a difference?
- The "LNG Action Plan – Actions towards a comprehensive EU Framework on LNG for shipping" is on its way

Is the business case strong enough?

- A (shipowner) wait and see strategy!
- Scrubbers are chosen as retrofit!
- Up to now no game changer as the US shale gas revolution!

Thank you for your attendance