Inaugural Meeting of the Baltic LNG Cluster

LNG Fuel Systems for Ships

Piotr Dowżenko

26-27 April, Vilnius
Remontowa Holding

- 25 maritime companies
- 8000 employees and subcontractors
- 200 retrofits and new buildings annually
- EUR 750 mln revenue
The regulatory basis for LNG as fuel

**IMO, IGF Code** – International Code of Safety for Ships using Gases or other Low-flashpoint Fuels

**IMO, IGC Code** – International Gas Carrier Code

**ISO/TS 18683:2015** - Guidelines for systems and installations for supply of LNG as fuel to ships

**ISO 20519** - Specification for bunkering of liquefied natural gas fuelled vessels

*Society of International Gas Tanker and Terminal Operators* (SIGTTO) i *Oil Companies International Marine Forum* (OCIMF) – Guidelines for LNG transfer and Port Operation

*European Maritime Safety Agency* (EMSA) – Study on Standards and Rules for Bunkering of Gas-Fuelled Ships
Emission Control Areas

Outside an ECA established to limit SOx and particulate matter emissions

<table>
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<tr>
<th>Date</th>
<th>Outside Limit</th>
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<tr>
<td>4.50% prior to 1 January 2012</td>
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<tr>
<td>3.50% on and after 1 January 2012</td>
<td>1.50% prior to 1 July 2010</td>
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<tr>
<td>0.50% on and after 1 January 2020</td>
<td>1.00% on and after 1 July 2010</td>
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IMO: MARPOL – flue gas emissions, SOx

Baltic Sea ECA
(adopted 1997 / entered into force 2005)

IMO: MARPOL
Emissions from typical marine fuels

- **SOx Emissions (Tonnes/year)**
  - LNG fuel
  - Low Sulphur fuel*
  - Conventional fuel** + scrubber
  - Conventional fuel**

- **NOx Emissions (Tonnes/year)**
  - LNG fuel
  - Low Sulphur fuel*
  - Conventional fuel** + scrubber
  - Conventional fuel**

- **CO2 Emissions (Tonnes/year)**
  - LNG fuel
  - Low Sulphur fuel*
  - Conventional fuel** + scrubber
  - Conventional fuel**

- **Particle Emissions (Tonnes/year)**
  - LNG fuel
  - Low Sulphur fuel*
  - Conventional fuel** + scrubber
  - Conventional fuel**
Fuel consumption

Consumption of CNG/LNG
MWh/year

1 Large Ferry uses as much fuel as

- 65 inland ships
- 800 trucks
- 1,300 buses
- 10,800 taxis

- 395,000
- 5,900
- 500
- 290
- 40
LNG fuelled vessels in the maritime industry

[Graph showing the number of ships in operation, ships on order, and LNG ready ships from 2000 to 2018.]

- Ships in operation
- Ships on order
- LNG ready ships

Year of delivery

Number of ships


[DNV]
Global LNG prices

[geckoicapital.com,
International Monetary Fund, World Bank]
LNG fuel systems in ship types

The majority of systems is being installed on newly built vessels
LNG fuelled vessels in the maritime industry – units built in Poland
Typical LNG system under production
Typical LNG system under construction
Typical LNG system overview
Bunkering options

Ship to ship transfer

Shore to ship transfer

Truck to ship transfer

www.rls.rh.pl
Summary

- International standards for LNG cargo and fuel systems are finally completed
- Bunkering procedures and infrastructure must be developed
- LNG can easily meet ECA tier III limits and economics are starting to look promising
- RLS has reliable experience and can provide all LNG solutions for maritime
Thank you for your attention