Liquefied Natural Gas (LNG): fuel for inland navigation

Challenges and solutions

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Holland Shipbuilding Association

- Holland Shipbuilding Association (2008) is a private co-operation of
  - Shipyards: VNSI
  - Equipment: HME
- 400 member companies, 30+ staff
- Offices in Holland, Belgium (Brussels), Brazil, Vietnam, China and Russia
- Activities in government lobbying, finance, innovation, export promotion, working methods, international regulations, human resources and PR
LNG as marine fuel: target groups

- Deep sea vessels
- Short sea vessels
- Offshore vessels
- Fishery vessels
- Ferries/passenger vessels
- Harbour bound vessels
- Inland navigation vessels
LNG, fuel for inland navigation?

Basic attitudes NL authorities:
• Ministry of Infrastructure & Environment: very positive. Invites and receives proposals. If positive, recommendation to CCNR / EU
• Port of Rotterdam: yes please! Is looking for suitable bunkering locations
• Province of Zuid-Holland (including Rotterdam area): absolutely positive. Pro-active role in realizing bunkering locations. Aims to become a knowledge center in this respect

Challenge:
• Creating public acceptance for nearby potential LNG bunkering locations (coping with NIMBY)
Objectives and method of the LESAS project:
- Roadmap to develop a small-scale supply chain for LNG as marine fuel (Case: Rotterdam)
- Outline possible legal barriers
- Supply recommendations for public authorities and industry on legislation and safety
- Based on stakeholder viewpoints on how an economically stable supply chain should look like

Major participants a.o.
- Port of Rotterdam
- Ship owners (sea and inland waters)
- LNG suppliers, terminals, transporters, retail, constructors, equipment suppliers, engine manufacturers, shipyards
- Province of Zuid-Holland
- Ministry of Infrastructure and Environment

Conclusion: a very important project
- Start: February 2011
- Final report: 3rd quarter 2011
Topics to be addressed

- Quality requirements LNG / LBG (biogas)
- Distribution
- Bunkering facilities
- Bunkering procedure
- LNG storage onboard
- LNG technique onboard
- Types of combustion engines
- Energy management onboard
- Emissions
- Safety onboard
- External safety
- Education & training
- Coping with NIMBY
Quality requirements LNG / LBG

• Fuel requirements to be specified by engine manufacturers
• Questions have been raised about mixing different LNG qualities and their effect on engine performance

• Both items will be addressed in aforementioned LESAS project
Distribution and Bunkering

Options:

• Load bunkering barges at terminal and distribute to other vessels (ship/ship)
• Distribute LNG to bunkering station, from there to inland navigation vessel (bunkering station/ship)
• Most likely intermediate bunkering solution for inland navigation: fuelling by LNG trucks (truck/ship)

• Subsidy scheme for bunker locations very recently made available by Ministry of Infrastructure & Environment
Bunkering procedure

- Standard procedures to be elaborated for all bunkering options
- Draft procedure for ship/ship bunkering is available at http://www.lnggot.com/tags/Lng-bunkering/
  (concept in principle accepted and approved by DNV)
LNG storage onboard

Options:
- Above or below deck
- Within or outside cargo zone
(Safety requirements vary on location of tanks and machinery)

Design challenge:
- How to lose as little cargo space as possible, while retaining the vessel’s size characteristics (dimensions, draft, air draft)
- Cylindrical tanks are standard. Pressure is low (< 10 bar), other tank forms might be introduced within a few years.
Engine types / Energy management / Emissions

Options:
• Dual fuel (diesel/gas) – direct propulsion drive
• Gas – direct propulsion drive
• Diesel/gas electric – indirect propulsion drive
• Gas electric – indirect propulsion drive

Uncertainty:
• NOx emissions of dual fuel engines in real operation (effects of various diesel/gas ratios)

Challenge for technique suppliers and ship owners:
• Optimise energy management on board (propulsion, generator sets, cargo heating etc.). Learn from other industries!
LNG technique onboard

Availability:
• A lot of proven technique is available
• Experience especially in Norway: about 20 ships operational with LNG as marine fuel (all DNV classed)

Regulations:
• Installations must comply with regulations for LNG as marine fuel
• But: there are no regulations for inland navigation yet. Temporary solution: copy them from IMO sea regulations, being a.o.
• IGF Interim Guidelines, IGF Code, IMO-FP Fire Protection
• Class rules (DNV, Lloyd’s, BV, GL), which are based on IMO regulations
Safety information, education, training

To be included in project proposals:
• Operational management procedures
• Crew education and training

Challenges:
• For suppliers and users: harmonize procedures, instructions, education and training where possible
• For regulatory bodies and local authorities, in collaboration with business community: elaborate good information material for public use (coping with NIMBY !!)
Available reports and information


- Feasibility study “LNG als brandstof voor de binnenvaart”, *(CMTI / Holland Shipbuilding Association, January 2011)*

  *Both available on request, mail to Bert de Vries at bvr@scheepsbouw.nl*

- Various reports and presentations can be downloaded on [http://scheepsemissies.nl/](http://scheepsemissies.nl/) , among which: “Sustainability in Inland Shipping - The use of LNG as Marine Fuel” *(Delft University of Technology, December 2010)*

- LinkedIn group: LNG as marine fuel *(highly recommended)*

- And many others ………..
LNG as marine fuel: a practical challenge for all of us!

Thank you for your attention

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