

How to get Approval for an Ammonia Fueled Vessel

René Sejer Laursen 28 AugusT 2020 The 2nd Ammonia = Hydrogen 2.0 Virtual Conference



© 2020 American Bureau of Shipping. All rights reserved

ABS MAN Copenhagen 2-S DF Slow Speed Engine Firsts



- Worlds first ME-GI engine order
- TOTE 2 x 3100 TEU Container Ships
- NASSCO shipyard, USA
- MAN 8L70ME-C8.2GI
- 1st delivery Q3 2015



- Worlds first ME-GI engine in operation
- Worlds first ME-GI conversion
- MAN 7S70ME-C-GI
- Q-Max 267m³ LNGC
- Operation Q3 2015



- Worlds first ethane as fuel conversion
- MAN 6S50ME-C8.2GI
- Converted summer 2018



IMO Emissions - GHG Reduction Strategy

- By 2030, reduce CO₂ emissions per cargo transport work by 40%, aiming at 70% in 2050, compared to 2008
- By 2050, reduce total GHG emissions by at least 50% compared to 2008



Key activities prior to 2023 adoption of revised IMO strategy

- Data collection from ships (January 2019)
- Fourth IMO GHG study using data from 2012-2018
- Review energy efficiency requirements (EEDI) for new ships



4th IMO GHG Study from August 2020

Key results:

- CO₂ emissions from international shipping somewhat increasing ~2% of global CO₂ emissions in 2012-2018
- CO₂ emission from international shipping has increased by 5%!

Table 1 – Total shipping and international shipping emissions 2012 – 2018 (million tones)

Year	Global Anthropogenic CO ² Emissions	Total Shipping CO ²	Total Shipping as a Percentage of Global	International Shipping CO ²	Percentage of Global
2012	34,793	961	2.76%	701	2.01%
2013	34,959	956	2.74%	683	1.96%
2014	35,224	963	2.74%	681	1.93%
2015	35,238	990	2.81%	699	1.99%
2016	35,379	1,026	2.9%	726	2.05%
2017	35,810	1,063	2.97%	745	2.09%
2018	36,572	1,056	2.89%	739	2.02%

*Data from 4th IMO GHG Study from August 2020



Compliance Options



DISTILLATE OR BLENDED FUELS

HIGH SULHUR FUELS

•

- MGO 0.1%
- MDO 0.5%S
- New marine fuels, 'Hybrid' - residual or distillate source
- VLSFO 0.5%
- ULSFO 0.1%

Gas Cleaning Systems (EGCS)

With Exhaust



ALTERNATIVE FUELS

- LNG
- Methanol
- Ethane
- LPG
- Hydrogen
- Ammonia

NEW FUELS

- Bio-fuels
- GTL
- Synthetic fuels
- efuels



5 | How to get Approval for an Ammonia Fueled Vessel

IMO GHG Reduction Strategy

- IMO initial GHG reduction strategy adopted 13 April 2018 by Resolution MEPC.304(72)
- Candidate short terms measures 4.7.11, "... develop robust lifecycle GHG/carbon intensity guidelines for all types of fuels, in order to prepare for an implementation programme for effective uptake of alternative low-carbon and zero carbon fuels ..."
- Candidate short term measures 4.7.5, "... consider and analyse measures to address emissions of methane ..."





ABS Sustainability Centers





Decarbonization Case Study – fleet of 10 bulk carriers

Example: The company has a fleet of bulk carriers:

- Involves technological improvements and operational measures
- Fleet of 10 bulk carriers
- Past and future performance
- Apply combination of measures
- Evaluate effects on carbon intensity
- Compare to Poseidon Principles
 trajectory
- Tank to Wake

In the future: Well to Wake figures needs to be considered





Current Rules and Regulations

- IGC Code
 - Applicable to gas carriers, revised Code effective July 2016
 - Alternative fuels (not toxic) considered under 16.9
 - Application of ammonia requires flag discussion ultimately requires amendment to the Code
- IGF Code
 - Adopted June 2015 MSC.391(95)
 - Entry Into Force 1 January 2017
 - IGF Code does not apply to gas carriers using cargoes or other low flashpoint fuels as fuel
 - Detailed requirements for natural gas only
 - Other low flashpoint fuels by 'Alternative Design' under 2.3
 - Equivalence by SOLAS regulation II-1/55 and MSC.1/Circ.1212 – risk assessment
 - Methyl/ethyl requirements under development expected to be completed CCC 6
 - LPG as fuel paper submitted to CCC 6





IGC Code



IGF Code Roadmap for Approval

- Agree with flag and Class the approval roadmap to address safety and environmental aspects
 - Class compliance Rules
 - Statutory safety IGF Code
 - Statutory environmental MARPOL Annex VI SOx, NOx, EEDI
 - Flag specific and operational area
- Low flashpoint fuels other than natural gas apply risk assessment approach





An example of MAN Ammonia Fueled Engine System

- Ammonia can be stored under same conditions as LPG (~17 bar)
- Corrosive nature \rightarrow use of some metals to be avoided in FSS
- Ammonia returning from engine to be collected in smaller separate tank:
 - to prevent contamination of main service tank with sealing oil
 - for further processing
- Emergency venting of NH₃:
 - Dilution of concentration to < 10ppm
 - Extension of vent mast to a safe height



Typical scope of a risk assesment for an ammonia fueled ship

- Ship arrangements and NH3 containment
- Bunkering arrangement
- NH3 fuel supply system
- NH3 Engine and Machinery Space
- All modes of operation for lifecycle of vessel
 - Bunkering, port departure, port entry, Cargo loading/unloading in port, voyage(ballasted/loaded), maintenance, overhaul, emergency/upset situation
 - Tank cooling, filling and gas freeing operation
 - Drying of fuel tanks, inerting, gassing up of fuel tanks, tank filling operations, gas freeing
- Maintenance operations (warming up, inerting, aeration)



Conclusions

- Class and regulatory framework in place
- Risk assessment is part of the approval process
- Experience and scope of dual fuel technologies growing
- All alternative low flashpoint fuels can provide solution for SOx compliance and potential for lower EEDI
- HP (Diesel) combustion process offers greatest DF suitability for wider range of fuels and quality
- Ammonia produced using renewable energy can provide route to zero and low carbon fuels
- In a future looking at well to wake emission, a blended strategy by the use grey and green ammonia can be used to reach any CO2 emission level









Thank You

www.eagle.org