



Taking LNG one step further

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LNG fuel moves into larger ships



A very first in container shipping

A very first into worldwide trading

A very first conversion of an existing large ship

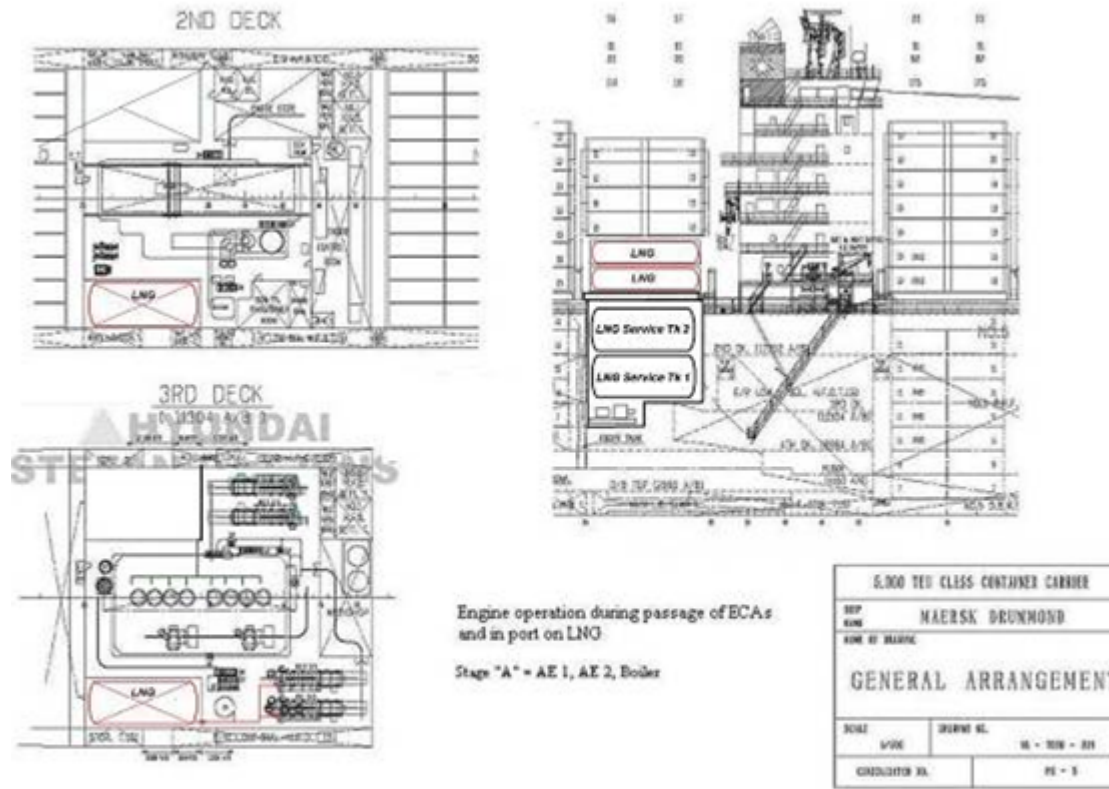
Ready to retrofit an existing vessel for multifuel service



- The project has been based on:
 - MV Maersk Drury – 5044 TEU
 - Built at HHI Ulsan 2006
 - Length o.a. 294,1 m
 - Deadweight 65.965 mt
 - DNV class
 - 1 Main engine MAN B&W 45.760 KW
 - 4 Auxiliary engines MAN 2100 KW each
 - 1 Auxiliary Boiler Aalborg
- Two auxiliary engines and auxiliary boiler to be modified for dual fuel operation (gas/HFO)

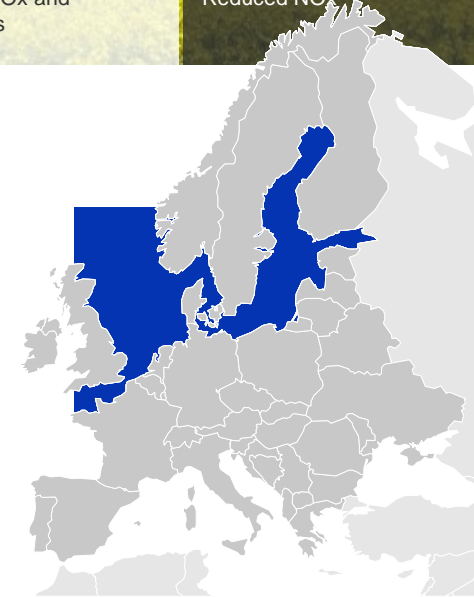
How it shall be done – short description of the project

- The principal technical elements
 - Converting cargo hold to a “Gas Technology Room”
 - Additional LNG containers on deck
 - Total LNG fuel capacity 240 + 500 m³
 - LNG supply via container only
 - Efficient bunkering solution
 - Minor loss of cargo space
- Timeline for completion
 - Project started March 2010
 - First LNG fuel onboard possible 2012
- Limited economical benefit
 - at least in the very beginning



A concrete example of how a shipowner and class can act together

- To reduce the local environmental impact
 - NO_x, SO_x emission and particles
- To reduce the global environment impact
 - CO₂ emission
- Probably the most cost efficient way of meeting the new European ECA requirements
- Additional benefits when the US and Canadian ECA zones come into effect in 2012



Improvements together with good partners

- MAN responsible for the modification of the auxiliary engines and systems
- TGE to adapt technical solutions and equipment for the gas machinery
- Charterer will need to address the supply infrastructure of LNG



“Mærsk is following the project from the sideline with great interest. Mærsk is however not taking an active part at this point of time as several other solutions are also being investigated.”

LNG gives less emissions and more flexibility

- Will be better prepared for passage in ECAs
- Dual fuel solution gives full flexibility
- Avoids use of cold ironing
- Fuel solution is independent of LNG bunkering infrastructure in ports
- Initiative welcomed by port authorities : *“All measures improving the air quality are highly appreciated. So the realization of this project would be a good step in the right direction.”*
Hamburg Port Authority



Reederei Stefan Patjens – a frontrunner on environment



■ Reederei Stefan Patjens

- 9 container vessels
 - 1 x 1000 TEU
 - 4 x 2700 TEU
 - 4 x 5000 TEU

“Many are waiting for environmental improvements, we make improvements”



DNV a front runner – also within LNG

- LNG technology safe and well proven
- 20 vessels operating on LNG today – all to DNV class
- DNV introduced our LNG class rules in 2001



DNV is world leader on LNG as fuel

DNV has proven rules for LNG since 2001



The world's ships on LNG fuel built to DNV class!*

LNG as fuel is taking an important step forward

Solutions

Flexible and independent

ECA

Better prepared for ECA passage than all the rest

1st time

In container shipping

1st time

In the global trade

Power

Optimizing electric power generation compared to shore power

Safeguarding life, property and the environment

www.dnv.com



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