



LNG fuel as an alternative to low-Sulphur marine gas oil for complying with the new emission rules

September 29th , 2017

Limassol

THE IMO'S 2020 GLOBAL SULFUR CAP

IMO sets 1 January 2020 for ships to comply with low sulphur fuel oil requirement. This means that ships will have to use fuel oil on board with a sulphur content of no more than 0.50% m/m, against the current limit of 3.50%

As a result of demand for low-sulphur marine gasoil will more than triple to 2.55 mb/d from about 0.75 mb/d a year earlier

Demand for conventional, high-sulphur residual fuel oil, by contrast, is expected to plummet to 1.38 mb/d

Ships can meet the requirement by using alternative fuels such as liquefied natural gas as when ignited it leads to negligible sulphur oxide emissions

Ships may also meet the SO_x emission requirements by using approved equivalent methods, such as exhaust gas cleaning systems or “scrubbers”

Oil refineries are said not to be prepared to provide low-sulphur fuels by 2020 therefore sulphur cap may lead to 'outrageous' fuel prices and shortages in 2020

Switch to alternative fuels such as liquefied natural gas

In March 2017 Sovcomflot ordered four 114,000-dwt LNG-fuelled ice-class Aframax tankers worth a total of \$240m at Hyundai Samho Heavy Industries (HSHI) on the back of LNG supply contracts from oil major Shell: SCF Green Funnel Project

Vessels to be delivered in 2017-18, they will be the world's first LNG-fuelled Aframax tankers

By running on LNG, the ice-class IA tankers can emit 90% less sulphur oxides (SO_x), 80% less nitrogen oxides (NO_x), 15% less carbon dioxide (CO₂) along with 50% reduced engine noise



Switch to alternative fuels such as liquefied natural gas

Successful LNG penetration as an alternative fuel in marine engines depends on a suite of conditions, which include but not limited to:

- ✓ Vessel design and performance
- ✓ Operations and maintenance
- ✓ Infrastructure
- ✓ Capital costs
- ✓ Safety
- ✓ Operator training

Some important considerations for the switch to natural gas fuelling are being addressed by maritime oversight agencies like the U.S. Coast Guard (USCG) and European Maritime Safety Agency (EMSA), classification societies, and industry.

Source: *Natural gas as a marine fuel* by Heather Thomson, James J. Corbett, James J. Winebrake. Energy Policy Volume 87, December 2015, Pages 153-167

SCF LNG Fueled Aframaxes:

▪ Vessel design and performance

- SCF Group chooses WinGD's X-DF technology for the first ever gas-powered Aframax tankers (low-speed dual-fuel engines with X-DF low-pressure gas admission)
- The 7X62DF engines are rated 13,800 kW at 86 rpm and designed to operate on a choice of LNG, HFO, distillate or hybrid liquid fuels. The engines comply with IMO Tier III limits for oxides of nitrogen (NOx) in their gas fuel mode, and with IMO Tier II when burning liquid fuel.



- The LNG-fuelled Aframax crude oil tankers have a capacity of 114,000 dwt. The vessels are designed to ice-class 1A and are scheduled to operate primarily in the Baltic and North Seas and enable year-round export operations from the Russian ports on the Baltic

SCF LNG Fueled Aframaxes:

▪ Operations and maintenance + Infrastructure + CAPEX

- The vessels will be built primarily for the Baltic – Cont trade where SCF has been traditionally one of the main players
- The maintenance and repairs can be done closer to the vessels main trade routes (Blohm + Voss, Remontowa Shiprepair Yard, etc)
- Port Discount “Ecomap” for LNG-Fuelled Vessels, e.g. ships calling Antwerp powered by LNG can receive a discount of 20%, while those that make use of closed scrubbers can get a discount of 15%*
- The Hague-based LNG giant Shell has signed a deal with’ Sovcomflot to supply liquefied natural gas to their LNG fuelled Aframax: a specialised LNG bunker vessel will supply LNG bunker at the Dutch Gate, and a second supply point in the Baltics**
- A higher CAPEX (abt USD 10 mln per vsI) may be offset by lower operating costs, “cheaper” bunker costs under the deal with Shell

WE BELIEVE IT IS NOW HIGH TIME TO ORDER REPLACEMENTS FOR AGEING ICE CLASS AFRAMAX FLEET FOR 2018 ONWARDS DELIVERY. ICE CLASS PREMIUM IS GOING TO RETURN BY THE TIME OF OUR DELIVERIES

*: Novoship, Port Agencies

**Shell

SCF LNG Fueled Aframaxes:

■ Safety



MARINE LNG BUNKERING DELIVERY PROCEDURES MANUAL

SST03430

7 July 2017

RESTRICTED, (Sharing under NDA)



LNG Bunker Checklist Ship to Ship

PART A: Planning Stage Checklist

This part of the checklist should be completed in the planning stage of an LNG bunker operation. It is a recommended guideline for the, in advance, exchange of information necessary for the preparation of the actual operation.

Planned date and time: _____

Port and Berth: _____

LNG receiving ship: _____

LNG bunker vessel: _____

Check	Ship	Bunker Vessel	Terminal	Code	Remarks
1				P	
2				P	
3					Time notified: _____ hrs
4					Time notified: _____ hrs
5					e.g. Port byelaws
6					e.g. Terminal regulations
7	For the Ship	For the Bunker Vessel	For the Terminal		
8					
9				A	

LNG Bunker Checklist - Ship to Ship - Version 3.6 - Jan 2015

FINAL

	Bunkering Procedure	SMS-G-11

Non-compliance with this procedure has the potential to result in substantial costs, penalties and even greater delay where spillage occurs as a consequence. In some jurisdictions accidental spillage of bunker fuel can also result in criminal charges.

General

Bunkering operation means a bulk transfer of the fuel oil and/or lubricating oil from the shore facility or one vessel to another vessel for the purpose of replenishment.

Bunkering operation also includes transferring of oil residues (sludge and other oil residues) generated in the Machinery Space to the shore reception facility or the barge.

The practice of simultaneous receipt of different grades of bunkers is prohibited. Only one grade at a time is to be taken.

This restriction does not apply to lubricating oils. This will increase the total duration of the bunkering operation, however, safety and environmental protection demands require that this time be allocated.

In such cases when the bunkers are planned to be delivered by more than one barge or supplier, then this procedure must be completed for each individual operation.

The company defines the following bunker tank filling limits (i.e. excluding lubricating oil tanks, which must not be filled in excess of 95%):

- Tanks up to 700 m³ total capacity - 90%
- Tanks over 700 m³ total capacity - 95%
- Tanks with known air-locking difficulties experience - 90%.

Never to bunker directly into a settling or service tank. No bunker transfer is to take place during bunkering.

The personnel onboard who are designated to manage the bunkering operation should not be involved in other operations. Spillages are often caused by staff being distracted by another task.

Ship staff should be fully conversant with their relevant duties in the event of a pollution incident. To ensure that the exercises should be conducted against oil pollution contingency plans as required by the Schedule for Emergency Drills and Training.

Bunker Transfer System

The Bunker Transfer System is defined as any bunker pipeline used for taking on, discharging or internally transferring any fuel for consumption on board. It also includes the discharge pump.

Pressure Test of Bunker Transfer System

Pipelines should be visually examined, this includes corrosion of bolts and flanges on dresser couplings and subjected to pressure tests in accordance with the below procedures to verify their condition.

Pressure testing should be a hydrostatic test i.e. static liquid pressure. Pressure testing using compressed air is not acceptable. If water was used for pressure testing then proper records shall be maintained for disposal of water in accordance with MARPOL.

Other means of non-destructive testing or examination, such as ultrasonic wall thickness measurement, may be considered appropriate, but should always be supplemented by visual examination.

Each vessel shall be able to provide the written statement of the pressure tests and inspections of the Bunker Transfer System with indication of date, test pressure and method of testing (hydrostatic pressure test).

Controlled

Revision: 02/03/2017
Approved by: MB/C/O
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SCF participates in the Shell's working group for development the LNG bunkering procedures and manuals. Accordingly the SCF quality and safety management system bunkering procedures are amended to secure safe and efficient delivery of Marine LNG. SCF requested SHELL also to raise the issue of Dual Fuel ships within OCIMF for possible amendments to SIRE VIQ for vetting purposes

SCF LNG Fueled Aframaxes:

▪ Operator training

- SCF has been operating DFDE vessels since 2014. Currently there are 6 DFDE vessels owned and managed by SCF
- Engineers from actual SCF LNG Pool will be employed on the new LNG fuelled Aframaxes
- Additional training can be provided at the makers' facilities, shipyard and in-house at the SCF Training Centre in St. Petersburg

SCF DFDE Fleet Profile:



- ***Marshal Vasilevskiy***
FSRU, 174,100m³/ Arc4, **DFDE**, Built 2017 by HHI,

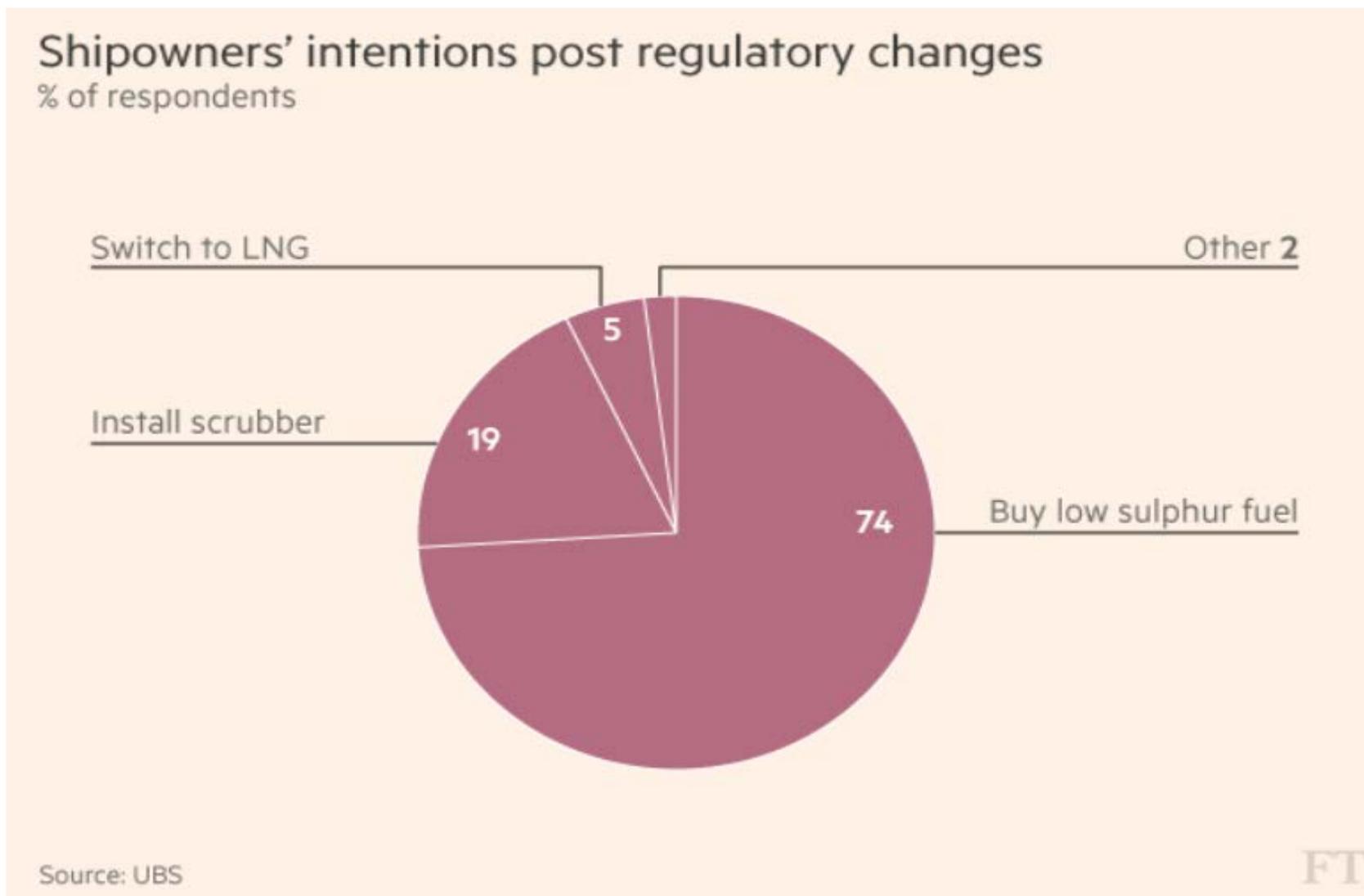


- **YAMALMAX type: *Christophe de Margerie***
LNG/C 172,000m³/ Arc7 ice breaking/ **DFDE**



- ***Velikiy Novgorod/ Pskov/SCF Melampus/ SCF Mitre***
LNG/Cs built 2014-15 in STX Korea, ; 170,000m³, **DFDE**, ECO notation, Ice class 1C

Fuel supply an issue in IMO sulphur rules



A survey of 51 shipowners by UBS showed that three-quarters would buy low sulphur fuel

Conclusion

- “A report by EnSys Energy and Navigistics Consulting commissioned by Bimco and several petroleum associations shows that the bunker fuel rule changes would increase prices by about \$10 to nearly \$20 per barrel, or 11 to 23 per cent, across all products worldwide”*
- At the end Money talks, when SCF placed the order for 4 LNG Fuelled tankers it had managed to comply with the suite of conditions for a potentially successful LNG fuel implementation
- Nevertheless the choice of the other industry players of a bunker fuel after 2020 will be entirely individual and whatever choice they make, it will be expensive increasing shipping cost up to 85%*

...with uncertainty looming over the consequences of the implementation of a global sulphur limit of 0.50% m/m , Bimco’s Mr Pederson says: “It’s a global experiment. That’s what we’re warning about.”*