

The challenges of delivering a cleaner fuel to shipping

Authors: Angus Campbell, Corporate Director Energy Projects and Capt. Tapan Panda, Senior Nautical Training Superintendent (BSM India)

This paper discusses the challenges faced by the shipping industry in the transition to cleaner fuels. It also includes a summary of the environmental and economic drivers generating change in this rapidly evolving energy sector. The final section provides an update on the Babcock Schulte Energy Gas Supply Vessel and related opportunities.

INTRODUCTION

Stringent regulations restrict fuel choice in Emission Control Areas. These strict limits on Sulphur Oxides (SOx) and Particulate Matter (PM) from marine bunkers will increase globally during the next five years, accelerating the move to different types of fuel. For all ships trading to Europe, the Monitoring, Reporting and Verification (MRV) regulations covering carbon dioxide emissions entered into force on 1st January 2018. The new IMO global Sulphur cap of 0.5% applies from 2020.

New equipment and infrastructure will be needed in all major bunkering hubs. Major bunkering hubs are already considering how to address the needs of Liquefied Natural Gas (LNG) fuelling and the infrastructure required. The number of ships being built to use LNG, a cleaner-burning carbon fuel, is increasing. This covers many sectors, including cruise, ferry, container, tanker and bulk carrier.

As a leading maritime solutions provider, Bernhard Schulte Shipmanagement (BSM), in conjunction with our partners Babcock International Group, have developed a key component in the LNG bunker delivery chain, the Gas Supply Vessel (GSV). This ship is designed to supply LNG to other ships and shore facilities on a regional basis as natural gas fuelling develops. This process requires stringent risk assessment and the ability to develop operational practices new to the existing LNG sector, such as simultaneous operations and delivering fuel to different customers in multiple locations.



Picture 1: The first ship designed by Babcock Schulte Energy to enter service on a long-term time charter with Nauticor in Q3 2018



Picture 2: GSV tank at Hyundai Mipo Dockyard

Babcock Schulte Energy

The Schulte Group, a 100% German family-owned company with over 130 years of shipping experience, and Babcock International, the UK's leading engineering support services company, have formed a joint venture known as Babcock Schulte Energy to develop small scale LNG projects.

The key commercial and technical considerations when embarking on the LNG bunker vessel project includes:

- Effective design, making full use of Schulte's marine expertise and LGE's gas process expertise.
- Environmental considerations, development of the FGSV Zero cargo system to avoid methane slip.
- Commercial considerations, evaluation of utilisation and capabilities required.

Change and the Drivers Impacting Our Industry

Emissions from the global shipping industry amount to around 1 billion tonnes a year, representing 3% of the world's total greenhouse gas (GHG) emissions and 4% of the EU's emissions. Without action, these emissions are expected to more than double by 2050.¹

RightShip, the world's leading maritime risk management and environmental assessment organisation, used its years of maritime sector experience in online risk rating algorithms to develop the Greenhouse Gas (GHG) Emissions Rating. Partnering with the Carbon War Room on www.ShippingEfficiency.org, the GHG Rating enables customers to include the growing importance of carbon emissions in their vessel selection process. It is now used as a vessel selection tool for 1 in every five ships chartered, equating to over 2 billion DWT per annum.

What is Driving the Change?

Restrictions on air emissions from shipping highlight the necessity of changing to cleaner fuels. Options for new ships differ from choices available to the existing fleet.

- EU MRV regulations designed to measure and reduce CO2 emissions, 1st January 2018.
- MARPOL Annex VI – 0.5% global sulphur cap in force from 1st January 2020.
- IMO global CO2 measurement and reduction – EEDI, 2013 – 2025.

- Reduced emissions, fuel cost and carbon tax advantages.
- Reduction in through life machinery maintenance costs.
- Reputational advantage of using a cleaner fuel.

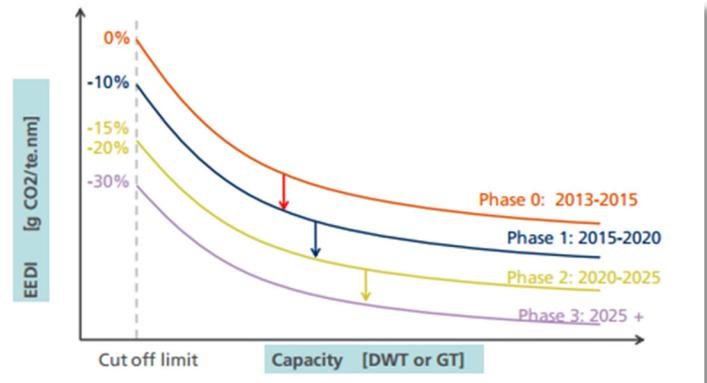


Chart 1: IMO Energy Efficiency Design Index (EEDI)- Air Pollution from Ships



Chart 2: IMO MARPOL Annex VI - Air Pollution from ships

The Regulation 2015/757 ('EU MRV Regulation') came into force on 1 July 2015 after a two-year legislative process.

The first regulatory deadline was 31 August 2017 when all ships exceeding 5,000 GT calling at EU ports will have to submit a monitoring plan to a verifier for approval.²

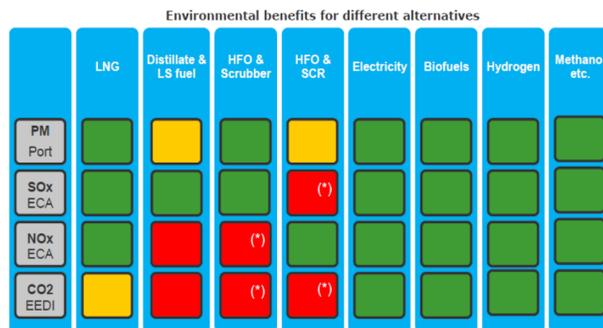
Subsequently in August 2017, shipping companies are made compulsory to submit a monitoring plan indicating the methodologies chosen to monitor and report emissions and other relevant information for each of their ships above 5,000 GT.

¹ <http://eumrv.com/>

² <http://eumrv.com/eu-mrv-process-outline/>

Cleaner Fuel Choices and Challenges

Clean Fuel Options



- This figure is valid for small to medium sized four strokes engine. Two strokes MAN ME-GI does not meet NOX Tier 3 without SCR
- The technical performance of the fuels does not vary between the areas studied in the report

■ Provides significant emission reductions and fulfills all known future regulations
■ Provides a reduction of emissions, but not enough to be considered a long term solution to emission problems
■ No reduction in emissions, (*) increased emissions due to increased fuel consumption

Early this year in January, shipping companies are required to monitor fuel consumption, carbon emissions and other relevant information for each ship on a per-voyage and an annual basis in accordance with the approved monitoring plan.

In April 2019, shipping companies will need to submit to the authority a mandatory report including carbon emissions and other relevant information during the 2018 monitoring period for each ship under their responsibility. The report must previously have been verified by an accredited verifier.

EU vs IMO on CO2 Reduction

European Commission (EC)

MRV enforced by European Maritime Safety Agency (EMSA)

Global approach preferred, but impact of IMO regulations too slow to meet EC climate change objectives

- Monitoring, reporting, verifying
- Greenhouse gas reduction targets
- Further measures – carbon tax

International Maritime Organisation (IMO)

EEDI and SEEMP are global, but the fleet renewal is required before significant impact is delivered.

CO2 reduction** is aimed at 30% by 2025 for new ships. Ship builders will need to consider cleaner fuels to meet this requirement

**Grams of CO2 generated per ton/mile of cargo carried

LNG as a Marine Fuel

Challenges vs Solutions:

- Natural gas is the mainstream choice with global availability
- New bunkering infrastructure is needed for this cryogenic fuel
- Option for new ships, LNG retrofit would be difficult for many existing ships
- LNG industry slow to define cost of natural gas as a marine fuel
- Regulation and public pressure will drive change to cleaner fuels

The Corporate Sustainability Factor

Clean port operations driven by increasing environmental regulation. Cargo owners focus on “supply chain carbon footprint” due to public pressure. Reduction in carbon footprint will become a business imperative for shipping.

Global Infrastructure and Safe Operations

This alignment between compliance and business advantage is a new factor:

- Investment in new bunkering infrastructure at key locations on shipping’s major trade routes is not new.
- The shift from one primary fuel to another has caused ship efficiency to improve significantly before.

- The change to cleaner fuels that we are seeing now is being accelerated by regulatory and commercial priorities.

- Displacing liquid fuel with cleaner natural gas for off grid customers
- Fully aligned with Scottish Government energy policy
- Opportunity covers marine and land-based infrastructure opportunities.

LNG as a Marine Fuel - Key Factors

Large LNG carriers and small-scale LNG carriers have its similarities and differences. The adoption of LNG as a primary fuel for conventional shipping would require the considerations of the following key factors:

- The critical importance of design.
- The introduction of simultaneous operations.
- IGC code IGF code interface.
- The importance of training and procedures.
- Risk assessment, mitigation and uniform standards.

Defining the scope of small scale LNG services, we can develop to build value. Small-scale LNG will have hub tanks that are either unmanned, or have minimum security watch. The telemetry that makes this possible is transmitted to a remote-control room. This is an infrastructure service that will leverage the strong skill set within BSE to add value.

Business Case for LNG Refuelling

Utilisation of purpose-built LNG bunker supply ships has to be managed with care to justify the investment needed. Design and capacity will change as infrastructure develops.

Global fuel pricing will emerge as volume increases. This will have geographic differences similar to the liquid fuels market that we know today.

Babcock Schulte Energy Gas Supply Vessel, Targets and Opportunities

BSE 7,500 m³ Gas Supply Vessel (GSV)

Update on development of our first GSV:

- Under construction at HMD, delivery October 2018. TBN “KAIROS”
- DP capable. Ice class 1A, highly manoeuvrable gas electric propulsion.
- Time Chartered to Nauticor for operation in the Baltic.
- Home port Klaipeda Lithuania.
- Employment will be a blend of STS and transshipment.

Small-scale LNG Opportunities

Caledonia LNG

- Aggregation of marine and land-based demand in Scotland