METHANOL - A future fuel for shipping

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Head of External Communication & Branding, Stena Group

IHS Chemical World Methanol Conference, 12 November 2015

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SHIPPING FACILITATES TRADE AND PROSPERITY

135 %

Increase in world GDP in the last two decades

180 %

Increase in world seaborne trade over the same period

abt. 90% of world trade travels by sea

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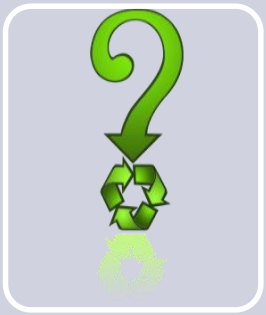
THE BIG CHALLENGE FOR THE SHIPPING INDUSTRY



Muscles	Wind	Coal	Oil	

STENA AB GROUP AT A GLANCE

(2014)

REVENUE
MSEK
33,563

ACTIVITES ALL OVER
THE WORLD

16,000
EMPLOYEES

76
YEARS IN BUSINESS

176
VESSELS
INCLUDING NEWBUILDINGS

26,700[1)]
RESIDENTIAL AND
COMMERCIAL UNITS

1) Owned and managed

96
WIND TURBINES
IN OPERATION

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STENA HAS SIX BUSINESS AREAS

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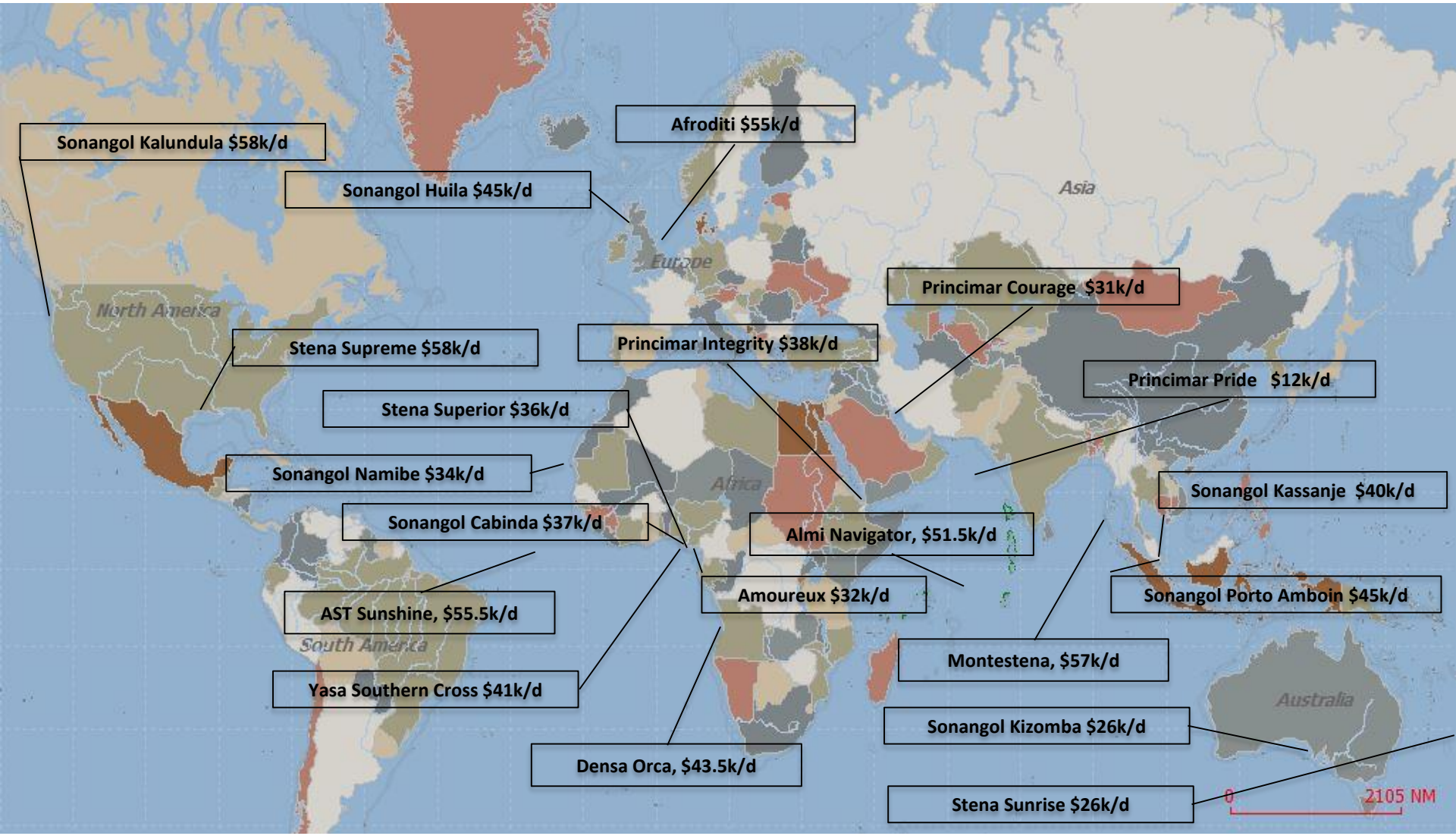
SSSP Positions August 6th 2015



BUSINESS AREA FERRY LINES

42 VESSELS

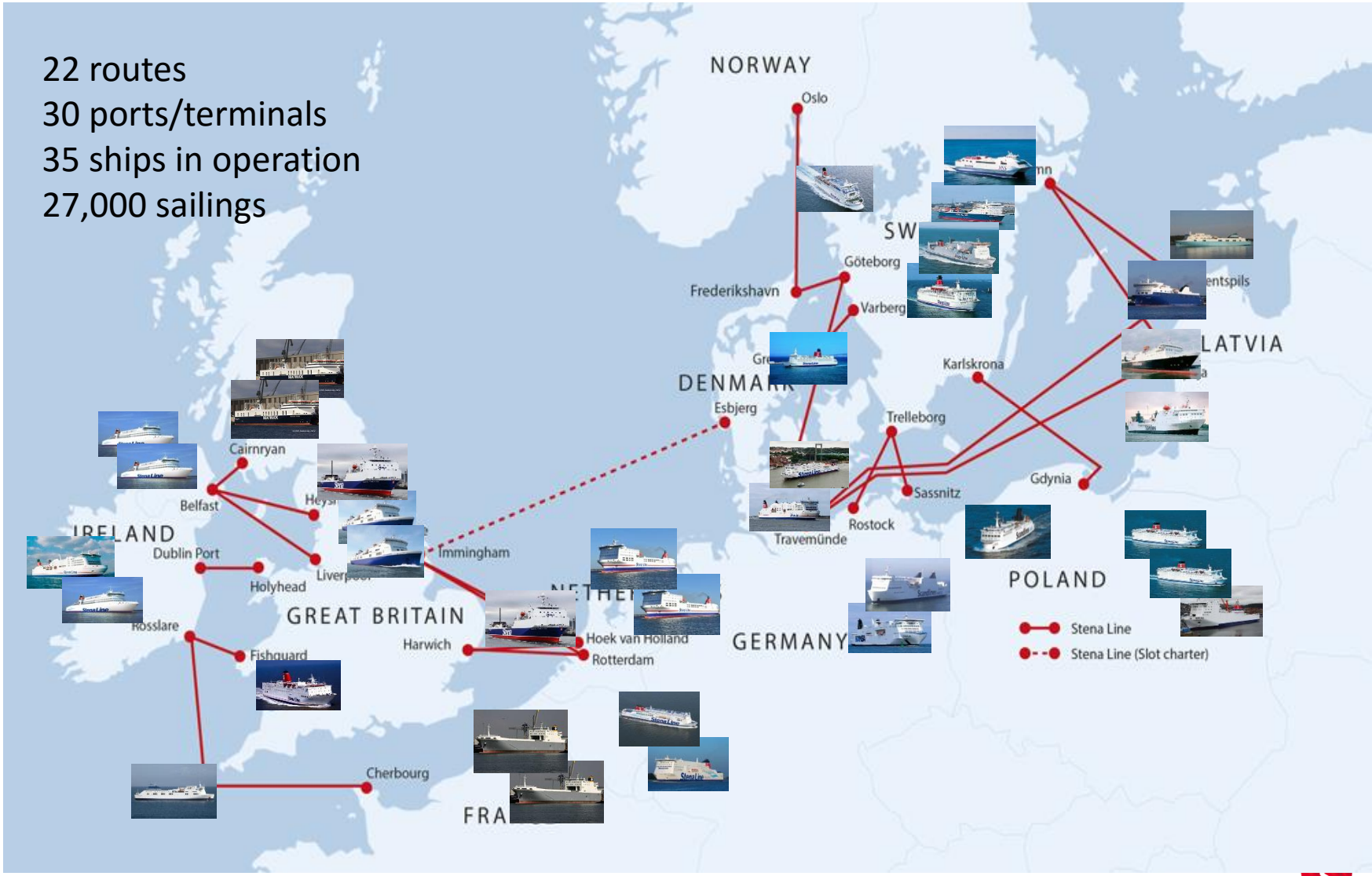
5,500 EMPLOYEES

36% SHARE OF GROUP REVENUE

- Important part of European logistics.
- Improved service and development of new travel and intermodal freight solutions.
- Large fleet of about 40 vessels on 22 routes.
- Owns and operates 5 ports.
- Carries about 2 million trailers, 2 million cars and 11 million passengers per year.
- World's first "Supergreen" methanol fuelled ferry.

STENA LINE positions and route network

22 routes
30 ports/terminals
35 ships in operation
27,000 sailings



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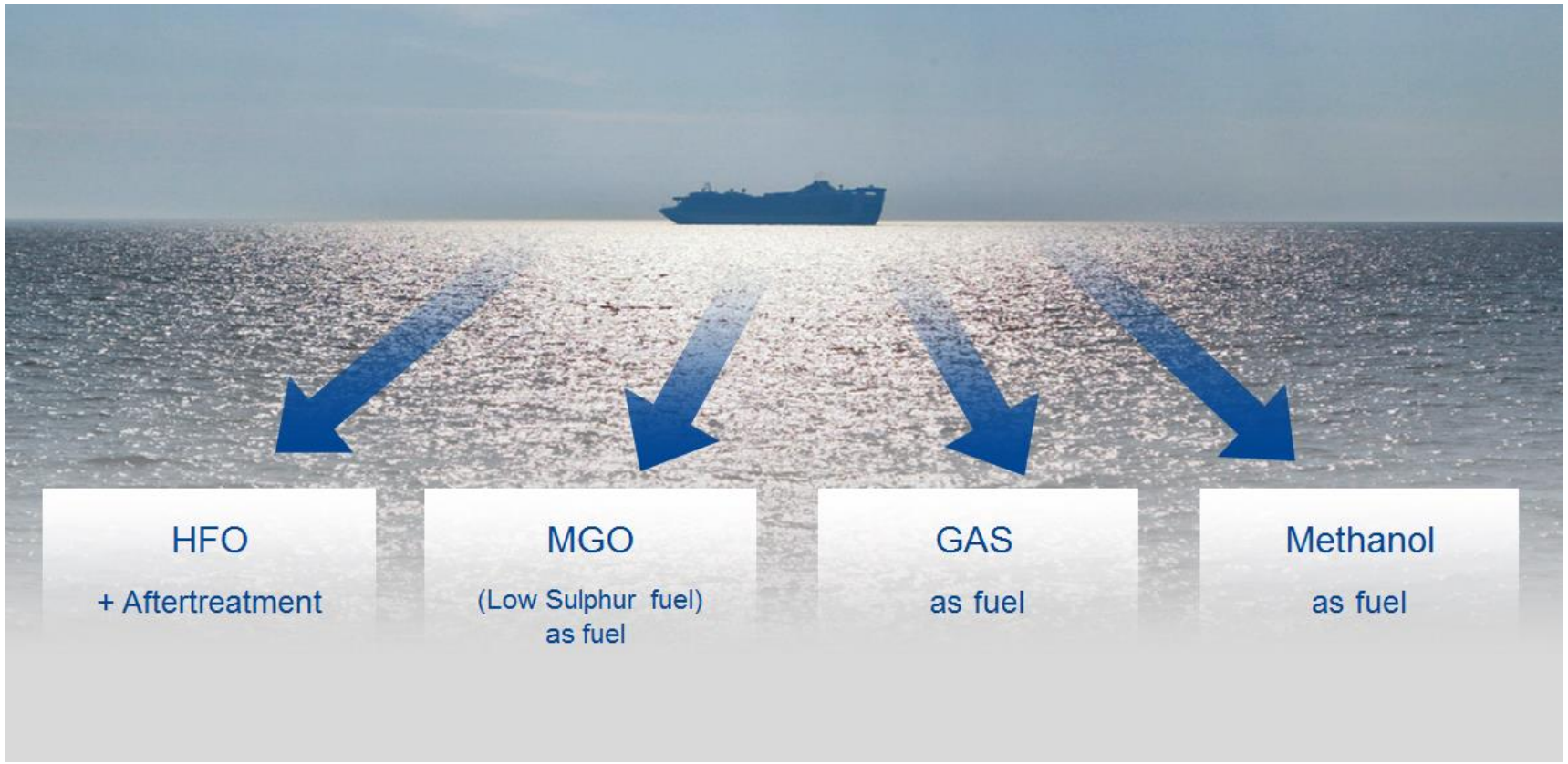
NORTH EUROPEAN SECA

SECA = Sulphur Emission Control Areas (North Europe and coastwise North America)

New regulation from 1 Jan 2015 – max 0,1% sulphur allowed in ships fuel instead of 1,0%

General alternatives for ship-owners



Same fuel but "scrubbers" clean exhaust fumes

Difference to previous fuel about +$250/MT - most common

LNG – Cleaner than MGO but expensive infrastructure

Clean as LNG but untested

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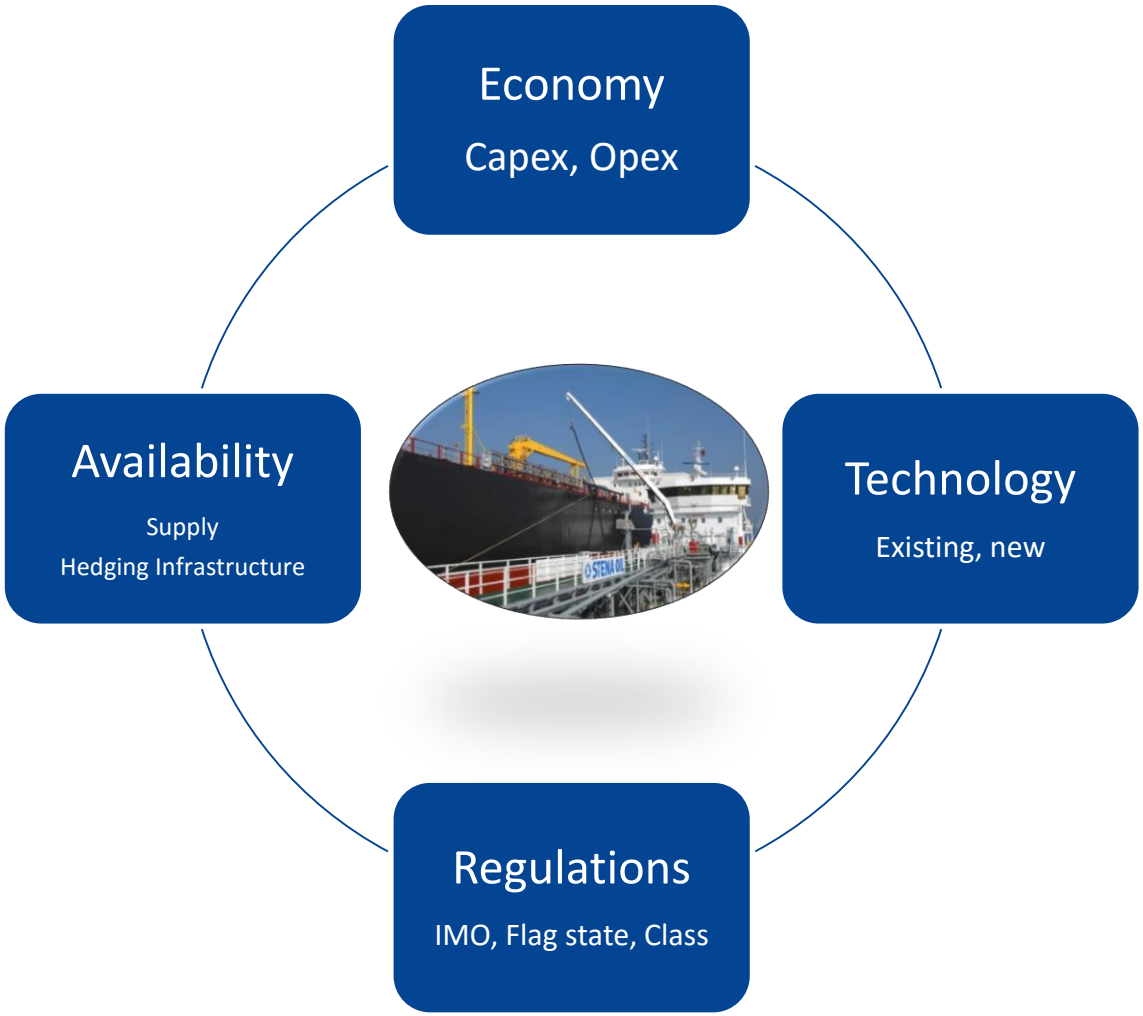
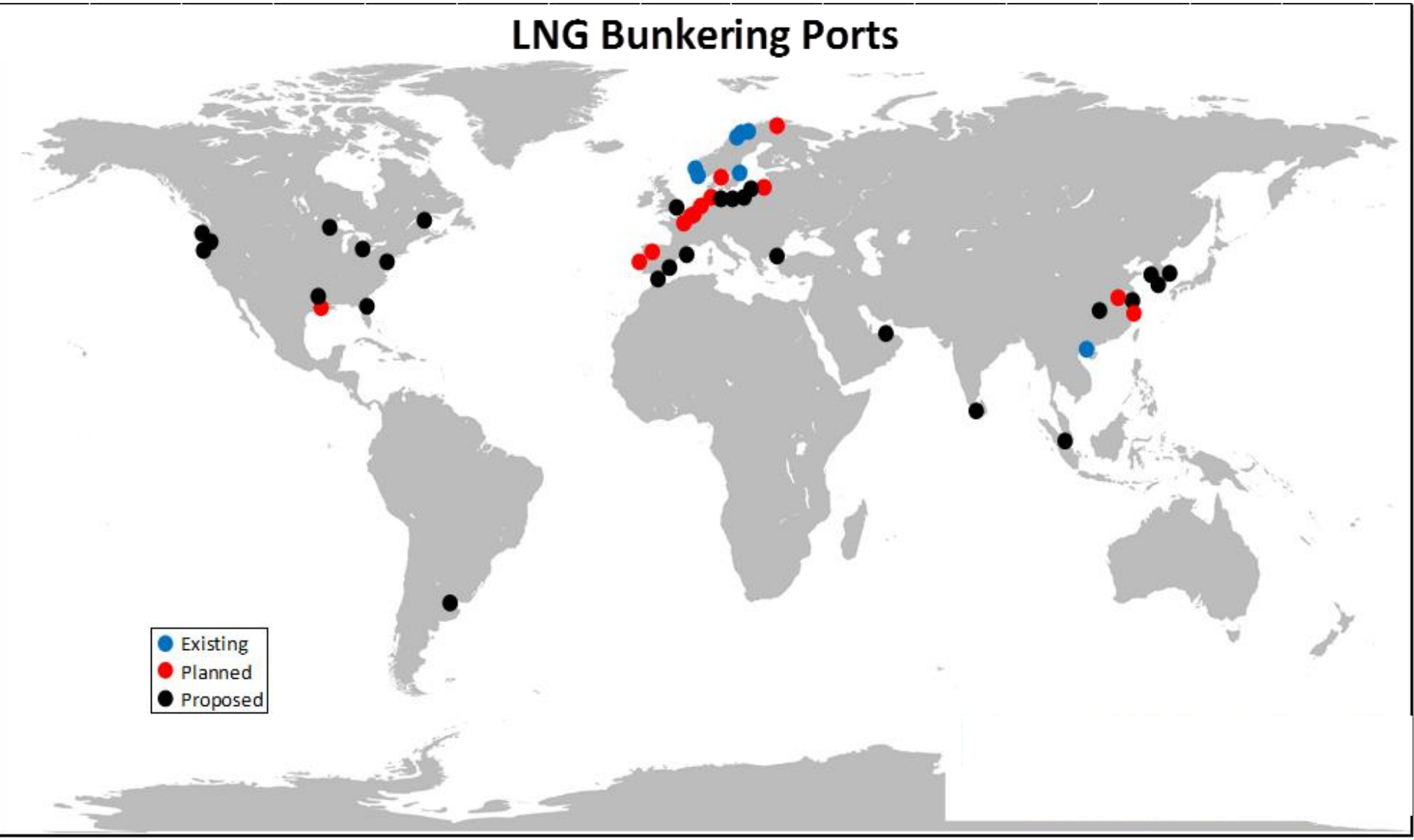
REGULATIONS, TECHNOLOGY, AVAILABILITY AND ECONOMY AFFECTS THE CHOICE OF FUEL



LNG is still under development



Enter – methanol, a marine fuel for the future

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WÄRTSILÄ
STENA OIL
PORT OF GOTHENBURG
PORT OF KIEL
methanex
the power of agility
Stena

Stena Germanica – timeline

A full scale project to convert four main engines to methanol-diesel operation (DF) 2013-2015

2013 Stena Germanica and Gothenburg-Kiel identified as suitable vessel/route.

2014 July – December, development and testing of full scale conversion kit in Trieste by Wärtsilä

2014 August – contract with Methanex for methanol supply

2014 September – conversion contract with Remonotowa shipyard

2014 Q4 – risk analyses in the Ports of Kiel and Gothenburg

2015 January – vessel arrived in shipyard

2015 March – vessel sailed shipyard

2015 Nov – one engine operating on the new fuel, engines will convert to methanol one at a time

Length	240 m
Breadth	28,7 m
Draught	6,15 m
Cargo Capacity	4000 lane meters
Passenger capacity	1300
Main engines	4 x Wärtsila 8ZAL40S, 6000 kW

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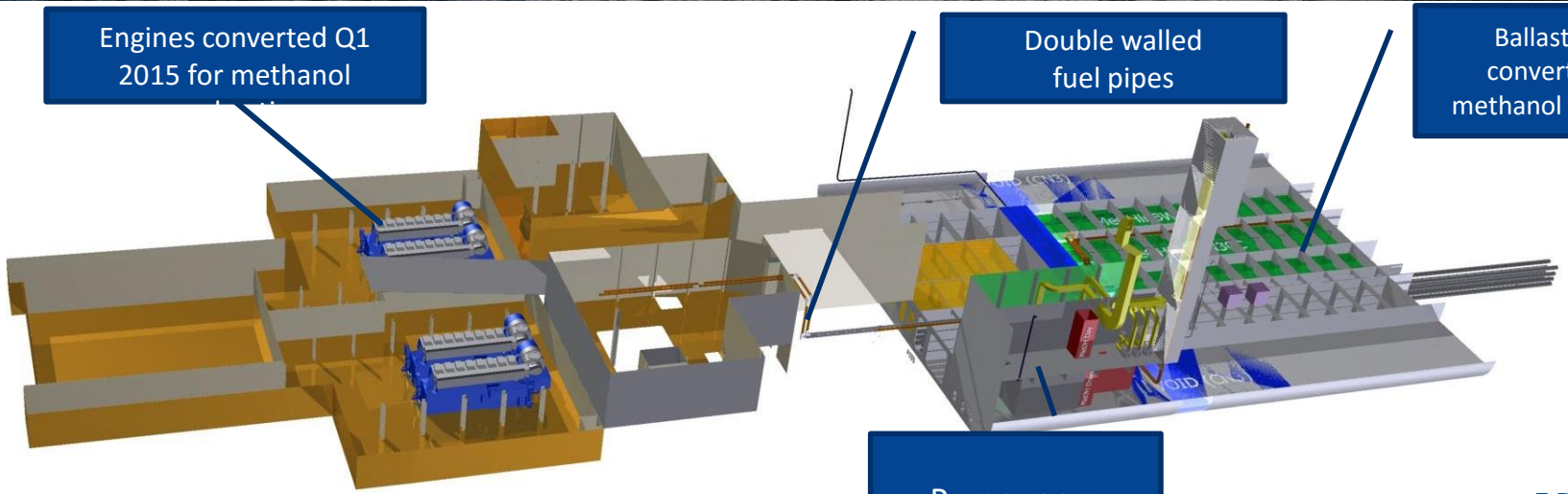
Stena Germanica – Worlds First Methanol Ship



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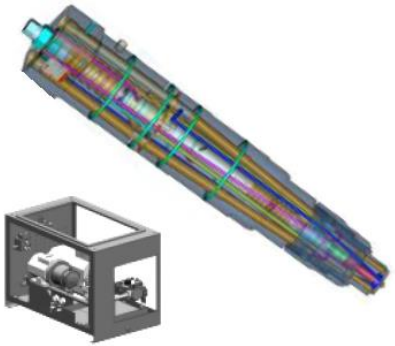
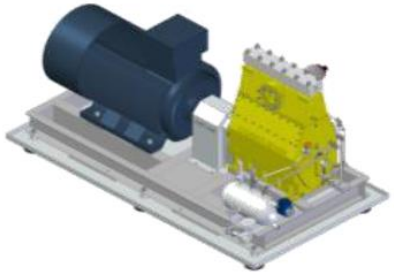
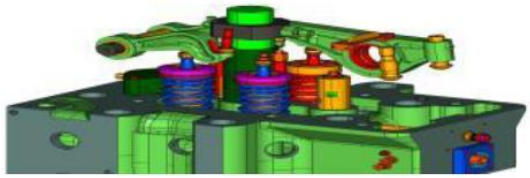
Wärtsilä has developed the technique to convert existing engines

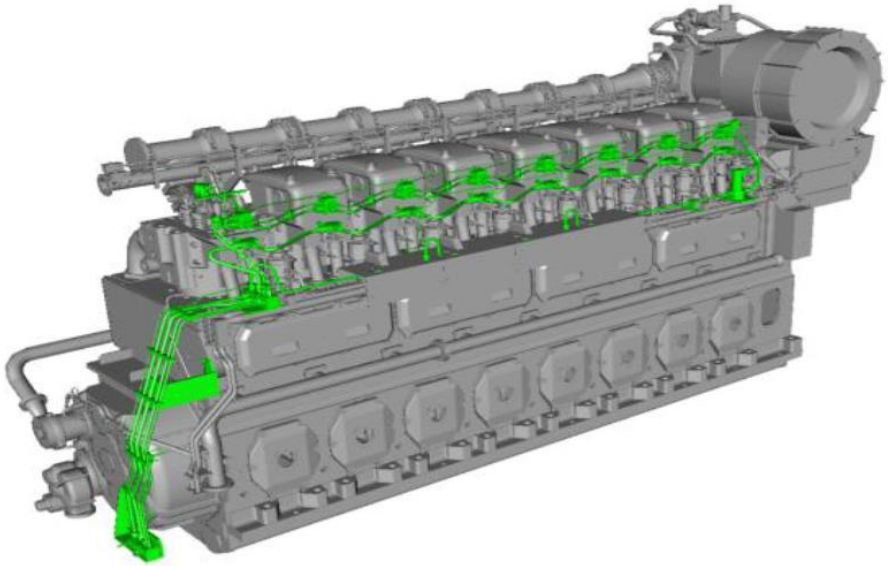
Methanol Engine Conversion Scope



On-engine scope is limited to exchange of cylinder heads, fuel injectors and fuel plungers in existing fuel pumps.
A common rail system for methanol injection will be added on the engine.
In addition to the Engine related conversion includes the conversion kit a stand-alone high pressure methanol pump with belonging oil unit for supply of sealing oil and control oil to the fuel injectors.
A UNIC C3 solution will be used for engine control.







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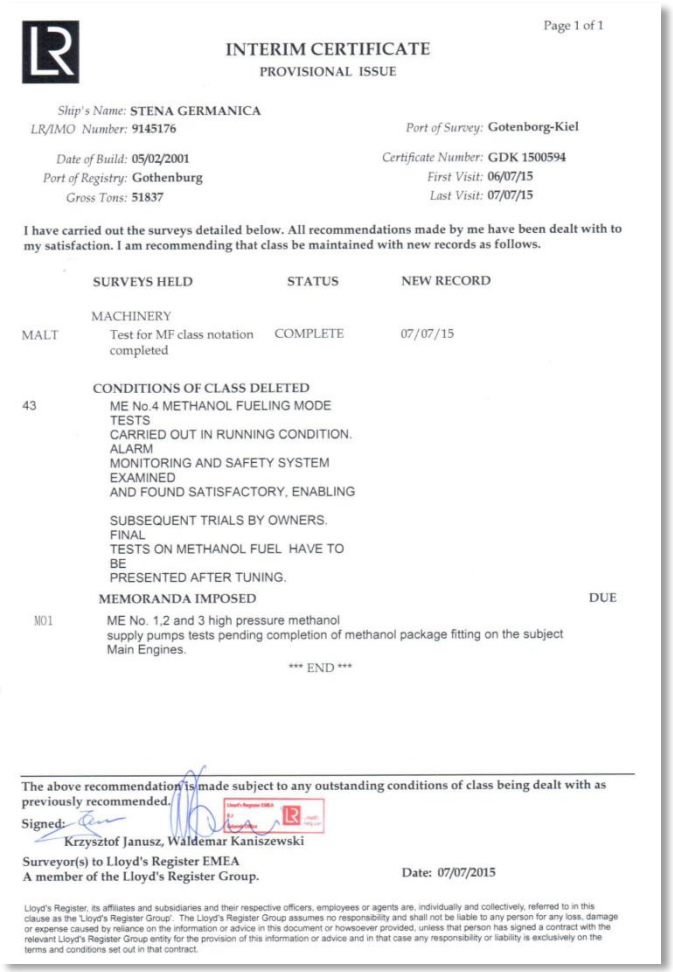
Shipping fuel is highly regulated and Methanol is not on the approved list (yet)

- Major effort to establish new standard with IMO
- Fueling procedures, storage, fire and other safety measures have been challenges to overcome
- Engine is working fine but there has been issues with pipes and pumps.

Approval from Lloyds register to run on Methanol!



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INTERIM CERTIFICATE
PROVISIONAL ISSUE

Ship's Name: **STENA GERMANICA**
LR/IMO Number: **9145176**
Port of Survey: **Gotenborg-Kiel**

Date of Build: **05/02/2001**
Port of Registry: **Gothenburg**
Gross Tons: **51837**
Certificate Number: **GDK 1500594**
First Visit: **06/07/15**
Last Visit: **07/07/15**

I have carried out the surveys detailed below. All recommendations made by me have been dealt with to my satisfaction. I am recommending that class be maintained with new records as follows.

	SURVEYS HELD	STATUS	NEW RECORD
	MACHINERY		
MALT	Test for MF class notation completed	COMPLETE	07/07/15
	CONDITIONS OF CLASS DELETED		
43	ME No.4 METHANOL FUELING MODE TESTS CARRIED OUT IN RUNNING CONDITION. ALARM MONITORING AND SAFETY SYSTEM EXAMINED AND FOUND SATISFACTORY, ENABLING SUBSEQUENT TRIALS BY OWNERS. FINAL TESTS ON METHANOL FUEL HAVE TO BE PRESENTED AFTER TUNING.		
	MEMORANDA IMPOSED		DUE
M01	ME No. 1,2 and 3 high pressure methanol supply pumps tests pending completion of methanol package fitting on the subject Main Engines.		

*** END ***

The above recommendation is made subject to any outstanding conditions of class being dealt with as previously recommended.

Signed:
Krzysztof Janusz, Waldemar Kaniszewski
Surveyor(s) to Lloyd's Register EMEA
A member of the Lloyd's Register Group.
Date: 07/07/2015

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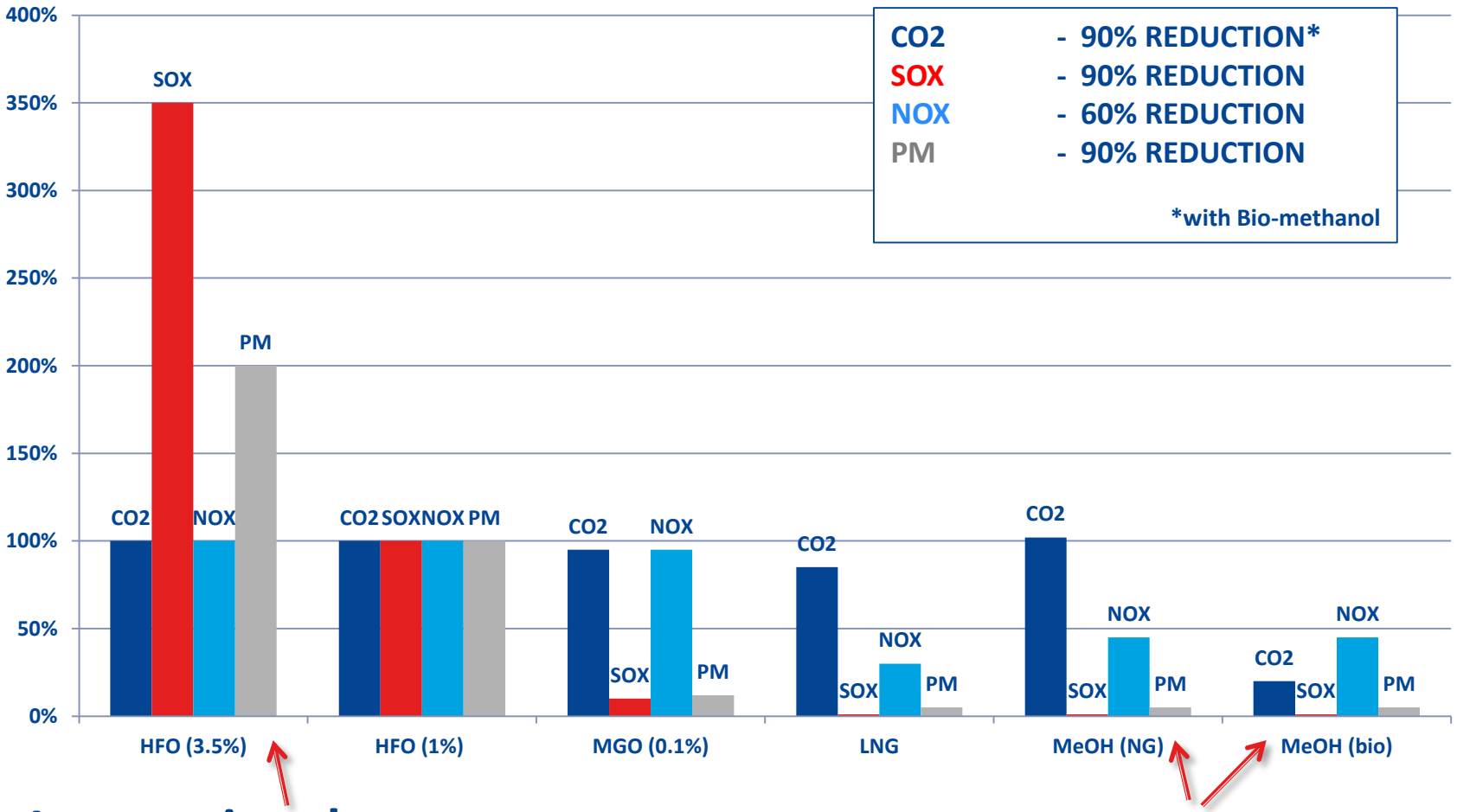
A Sustainable Fuel For Global Shipping



International bunker fuel

Methanol

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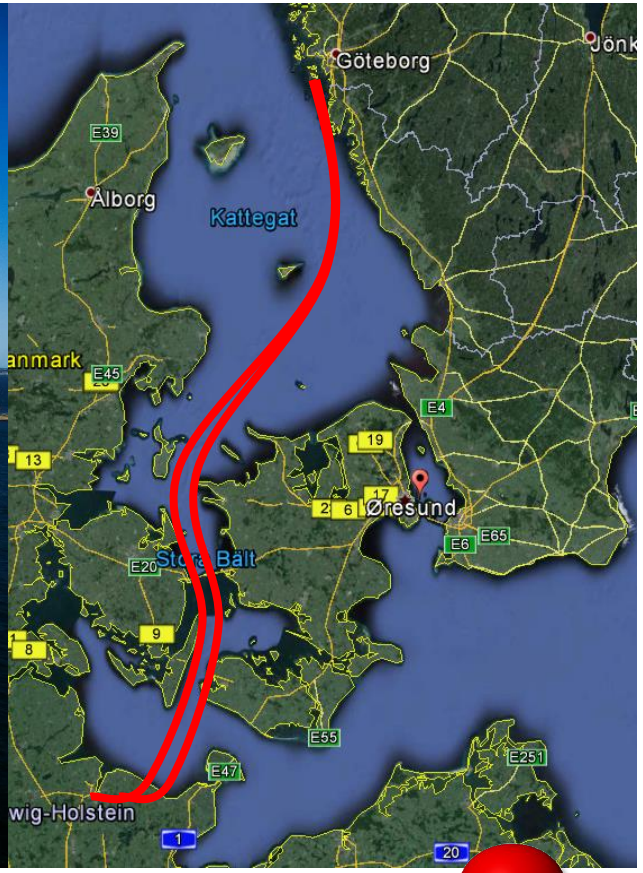
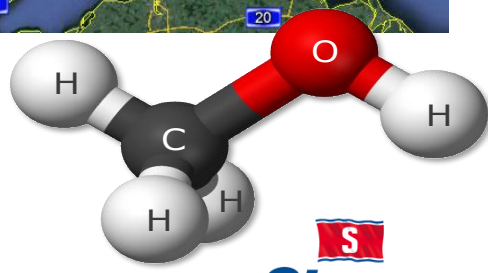
Gothenburg – Kiel – a busy route



50 000 Cars
43 000 Trucks/trailers
220 000 passengers

Lifted from the road every year (per ship)



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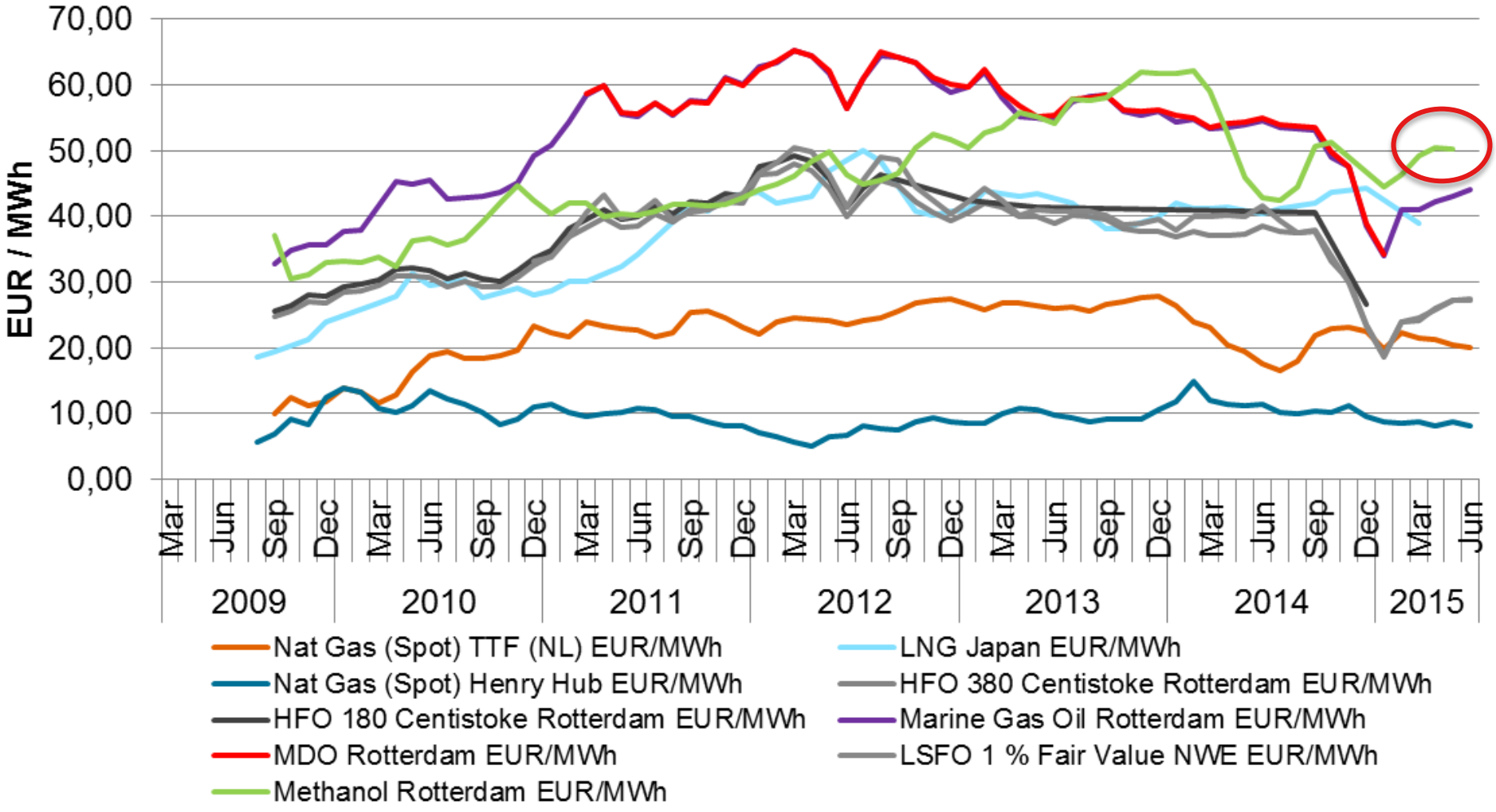
But operationally it's currently an expensive alternative



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SUPERGREEN
Sustainable Shipping

OUR SUPERGREEN PROJECT IS MAKING WAVES

Winner:

1. Swedish Maritime Day “Innovation Award 2015”
2. Green Ship Technology: “GST Ship-owner of the year”
3. The Swedish Confederation of Transport Enterprises “2015 Pegasus award”
4. 2015 Global Business Excellence Awards UK "Outstanding Green Initiative Award"

Finalist:

- The Economist’s “Ocean Innovation Challenge “
- Seatrade Awards “Clean Shipping Award”
- Fathom Ship Efficiency Awards 2015 as “Sustainable Ship Operator of the Year”
- Lloyds List Global Awards “Environmental Award”

Summary Methanol as a shipping fuel

- Conversion of existing vessels are possible at a reasonable cost
- It´s a clean fuel that goes beyond existing legislation
- It´s easy to access but there might be limits in supply if many vessels convert
- It´s a fuel that can be renewable

BUT

- Current market price double the price for conventional fuel (heavy fuel oil)

70.000 ships in the world consuming some 300 million tons of bunker oil equals over 600 million tons of methanol

If market prices changes Methanol will be attractive for shipping

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Our Supergreen project

WE CARE

WE INNOVATE

WE PERFORM

[Take Care film (short version)]