European Shortsea Network

ESN Report

SECA 2015 preparedness

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Joint SSS and MoS Focal Points meeting

SECA report contents

Facts on the European SECA
- SECA traffic, fuel consumption, fuels used, bunkering
- impact of SECA

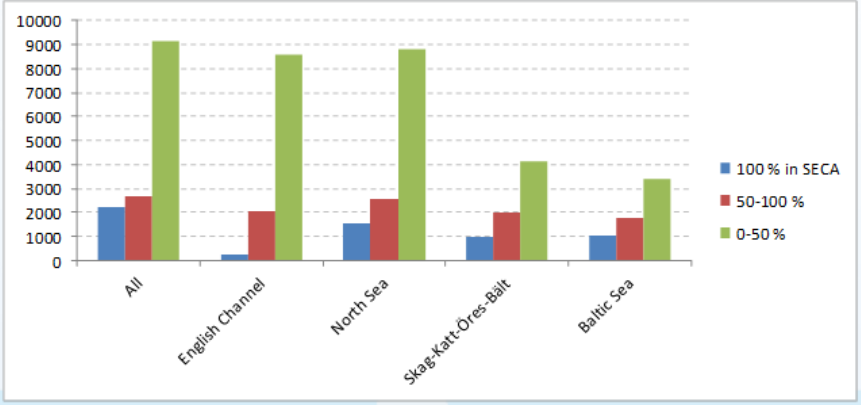
Current status on preparedness on 2015 and beyond
- How ship owners, ports and other stakeholders are prepared
- today and prospects for 2015

Opportunities: alternatives available
- MGO, LNG, scrubbers, alternative fuels
- LNG distribution, infrastructure, bunker suppliers
- port plans for SECA – infrastructure; onshore power
- support facilities

Reasons
- which issues affect to decisions, choise between the alternatives
- considerations on payback time

Vessels in SECA

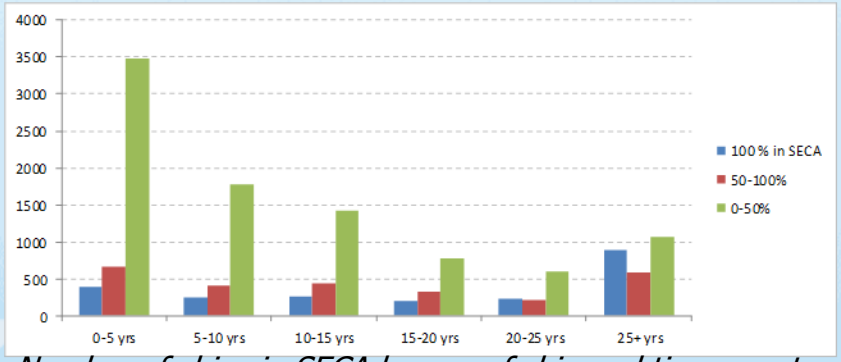
- at any time, on average about **5 000** ships in SECA
- more than **2 000** ships stay in the SECA 100 % of their operating time.
- **652** ships less than 10 years old and 100 % in SECA



Number of ships in the SECA by area and time spent in SECA

Cargo volumes

- North Sea: 1 828 million tonnes in 2011
- Baltic Sea: 839 million tonnes in 2012



Number of ships in SECA by age of ship and time spent in SECA

* Source : AIS study in DMA - North European LNG Infrastructure Project

Fuels used

- the total fuel consumption of the vessel traffic in the SECA was approximately 17 million tons in 2011.
- approximately 12 000 different vessels/year

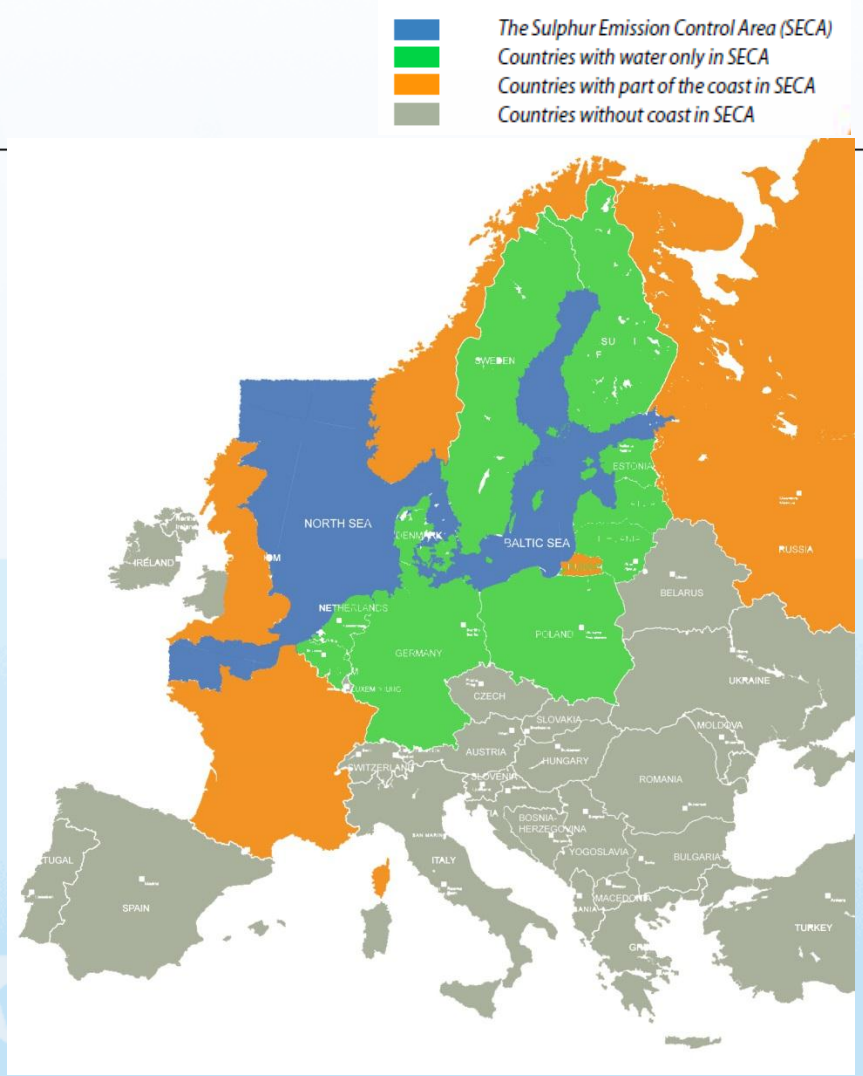
  * According to Ship Traffic Emissions Assessment Model (STEAM) of the Finnish Meteorological Institute
- ferry, ropax, ro-ro and container vessels consume most fuel
- 150 such ships trade 100 % in SECA
- risk of modal shift in this segment

Status

- the large majority (**85 %**) of the fuel consumed is HFO (Heavy Fuel Oil).
- fuel consumption is the most important part of the total operating expenses
- price difference between HFO and MGO; currently around 300 US$ per tonne

Impacts

- several studies
- **scenarios** on the level of increase of transport costs, even 20-40 % expected
- different impacts due to geographical situation in the SECA; most severe for Finland
- influences on production, on industries in the region, ports and employment
- **modal back-shift** – competition with road and rail
- possible back-shift for SSS routes **>** routes with shorter sea leg



Case – container Rotterdam - Oslofjord

- container and ro-ro competion with road
- case: a 40-foot container
- a vessel carrying 800 TEU / 400 FEU - 40 feet containers
- with a price difference of € 257/ton

>> an increase of 8-10% of the cost of transport from port-gate to port-gate, i.e. including terminal handling in port at both ends.

- higher price increase for smaller vessels and ro-ro
- estimated backshift 3-7 % for transport to Norway

Ship owners – plans for 2015

ESN survey among the ship owners

- during first half of 2013
- several options could be selected in the survey
- MGO >> demand of MGO will increase significantly
- MGO availability is good
- minimal investments needed, but operation price will be high
- possible fuel switch – operation in SECA and other areas

Plans for 2015	
MGO	70 % the only option
newbuilding with LNG	12 %
retrofit LNG	15%
Scrubber	18 %
move their vessels to other areas	15 %

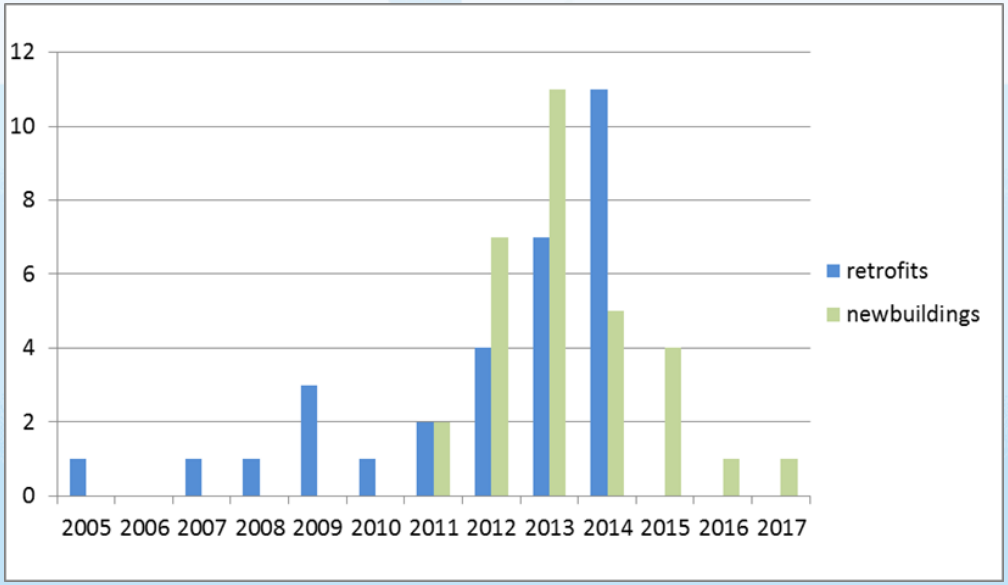
Scrubber installations in retrofits and newbuildings

Information

- mainly from manufacturers of scrubbers; whose activities are situated in Europe
- all but one of the manufacturers members of Exhaust Gas Cleaning System Association (EGCSA).

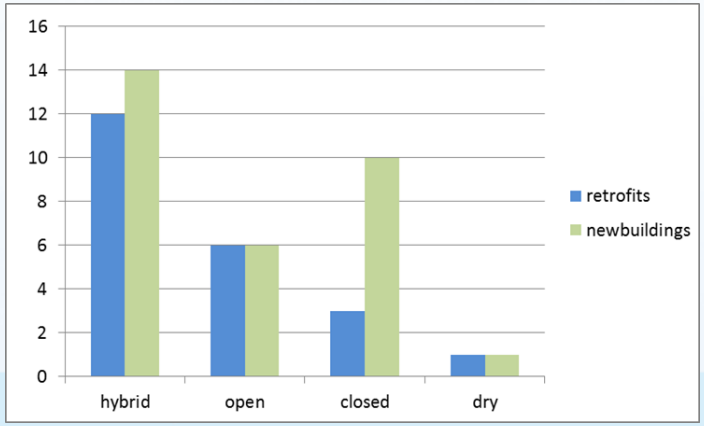
November 2013

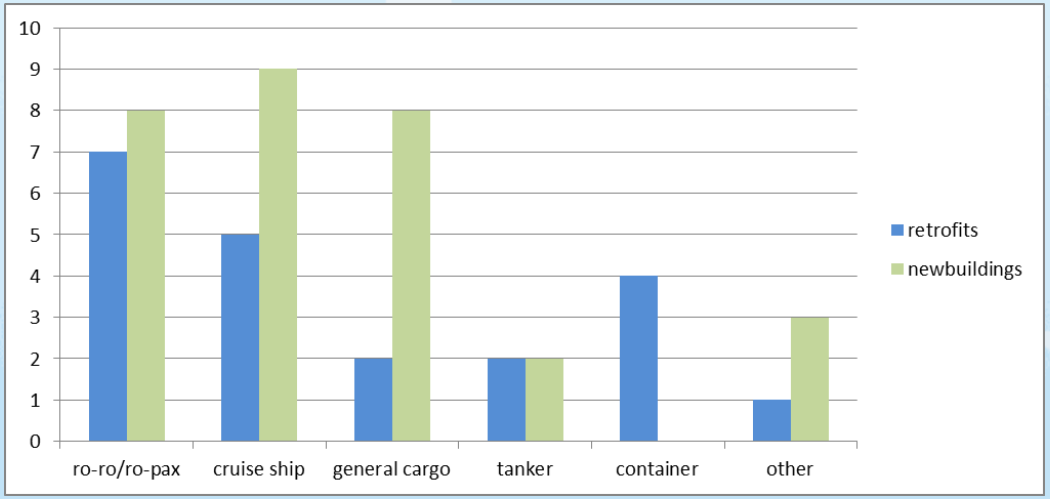
- ca. 60 scrubbers in total: installed or ordered to retrofits and newbuildings
- a clear growth during 2013 and 2014 in both newbuildings and retrofits.



Scrubber types and vessel types

- hybrid scrubber is the most common scrubber type among both retrofits and newbuildings
- open loop system is equally common in retrofits and in newbuildings
- closed loop systems in newbuildings
- dry scrubber in two installations



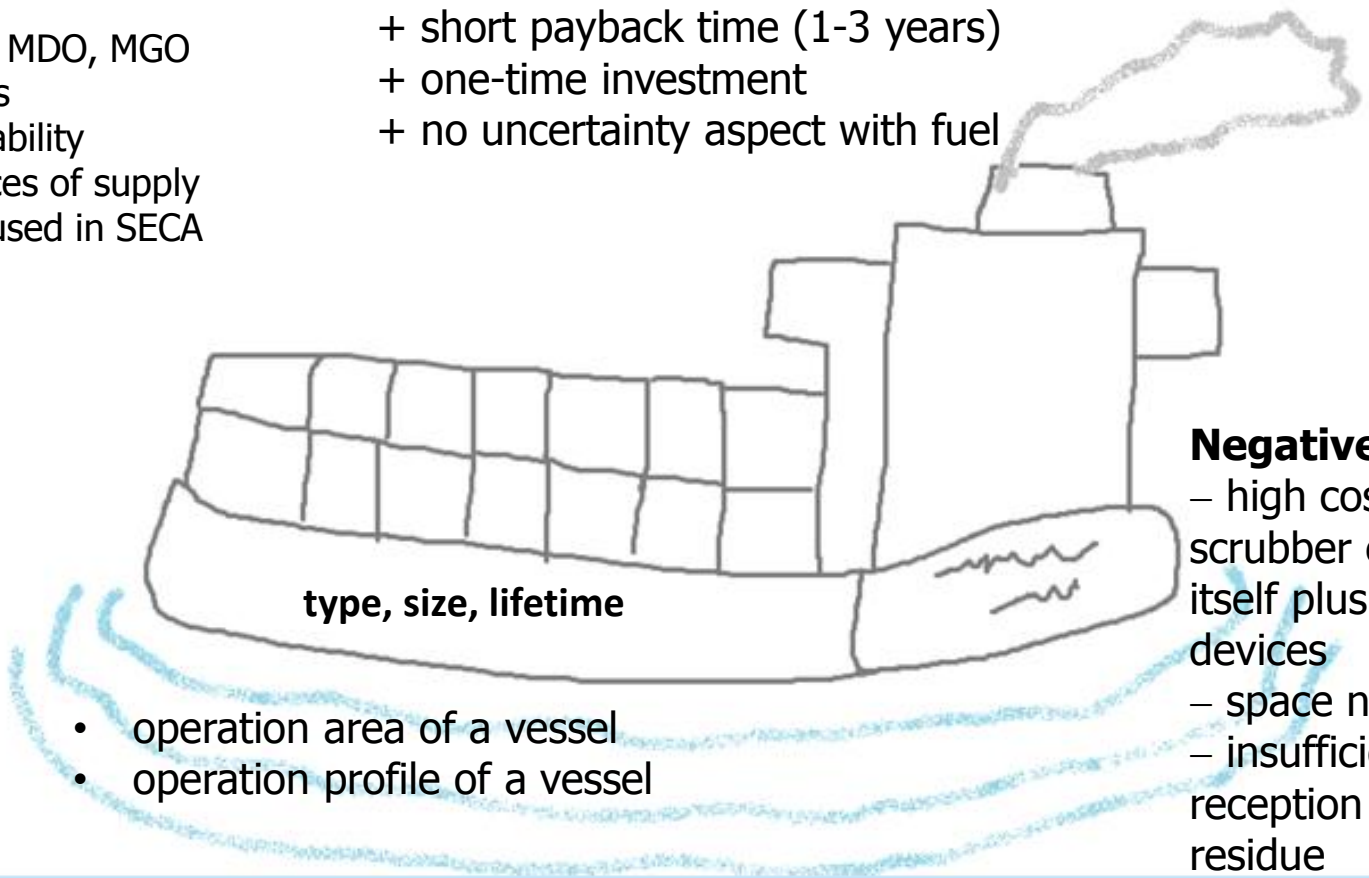


- **ro-ro/ro-pax** is the most common vessel type in both retrofits and newbuildings
- newbuildings of **cruise ships and general cargo** vessels

Feasibility of scrubber installations

Fuel
- HFO, MDO, MGO
- prices
- availability
- sources of supply
- fuel used in SECA

Positive
+ short payback time (1-3 years)
+ one-time investment
+ no uncertainty aspect with fuel



- operation area of a vessel
- operation profile of a vessel

Negative
– high cost of scrubber equipment itself plus peripheral devices
– space needed
– insufficient reception facilities for residue

LNG – an alternative for forthcoming regulations

Many environmental advantages

- the sulphur emissions and particulate matters can be reduced almost entirely and nitrogen oxides by 90 %
- CO_2 emissions reduced by 20-25 %

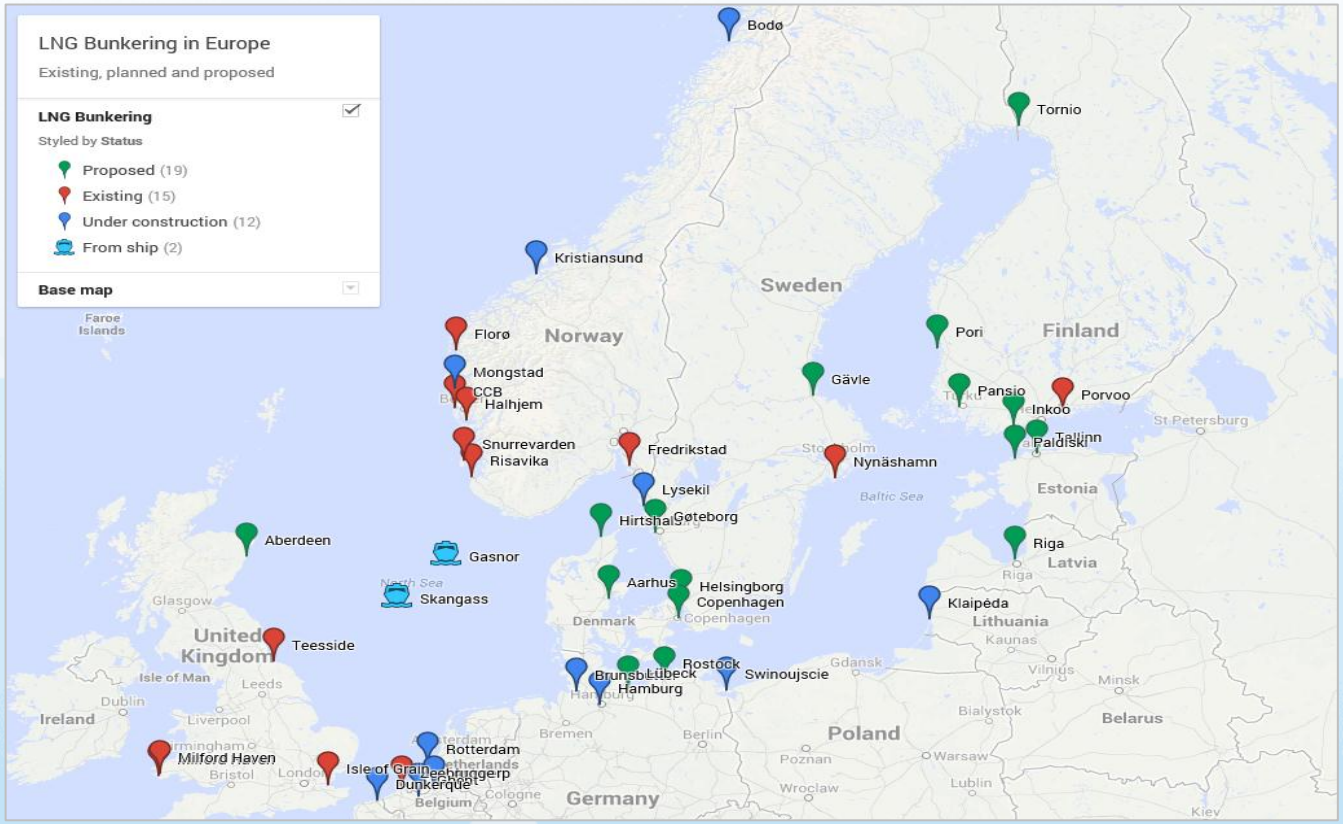
Combination of land and marine use

Prerequisites

- LNG bunkering network
- major investments needed in import, storage, distribution and end use of LNG
- harmonization of bunkering rules and facilities
- more certain LNG market, and positive development of LNG price
- price difference between LNG and MGO (does not favor LNG at the moment)

Cargo vessel Høydal with LNG power

LNG-terminals in Northern Europe



LNG Bunkering facilities in North-European SECA – existing, under construction and proposed

Source: Det Norske Veritas, SPCs in each country

LNG feeder and bunker vessels

Image from Marine Traffic

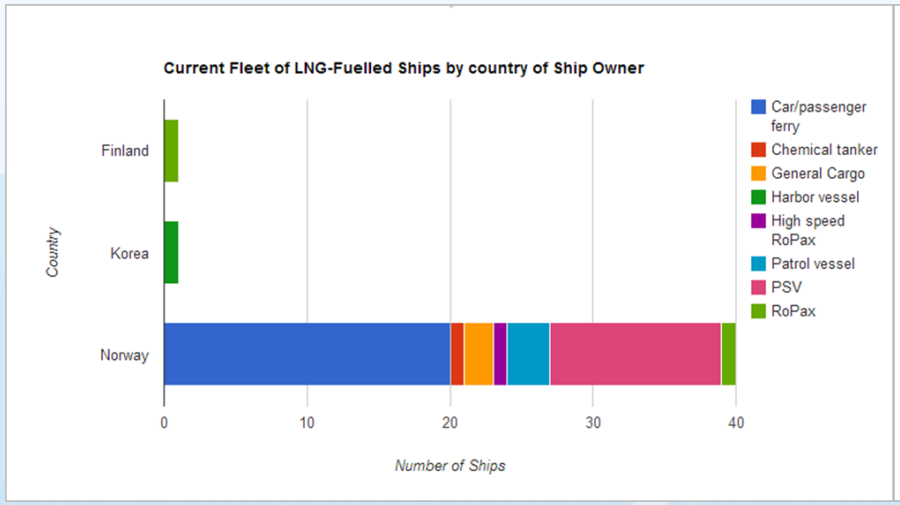
- the first dedicated LNG bunkering barge in the world is used by AGA in Stockholm
- m/s Viking Grace
- bunkering takes place while the passengers are onboard

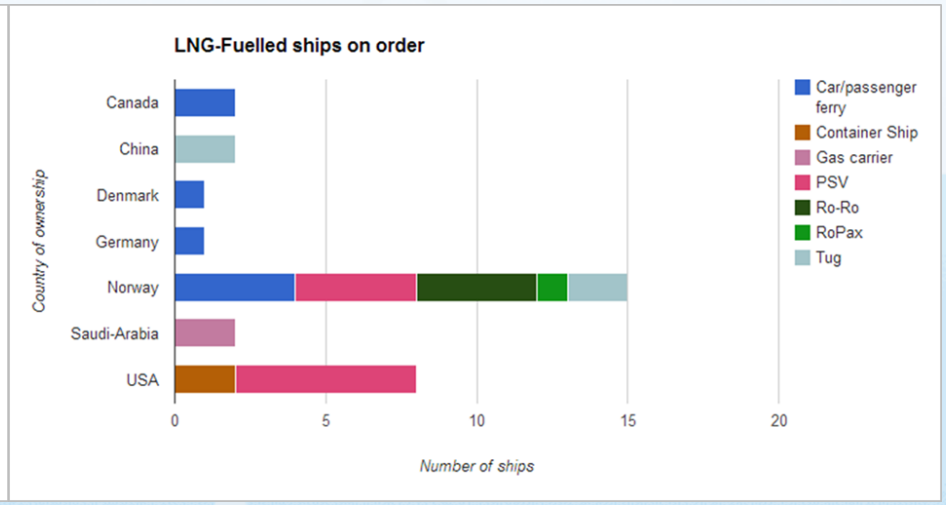
Current LNG fuelled fleet

- LNG powered fleet consist of 42 existing vessels (October 2013)

Orders

- 39 LNG fuelled ships on order
- in 2015, in total 80 vessels --- > 66 in Europe

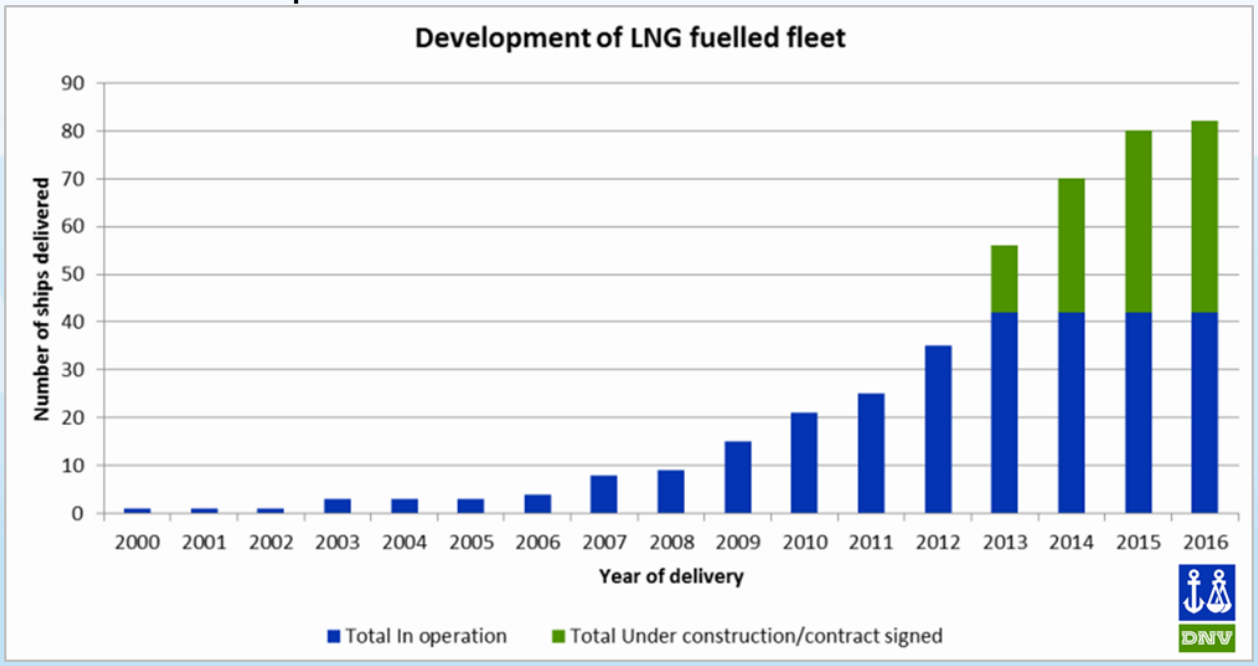




Source: Det Norske Veritas

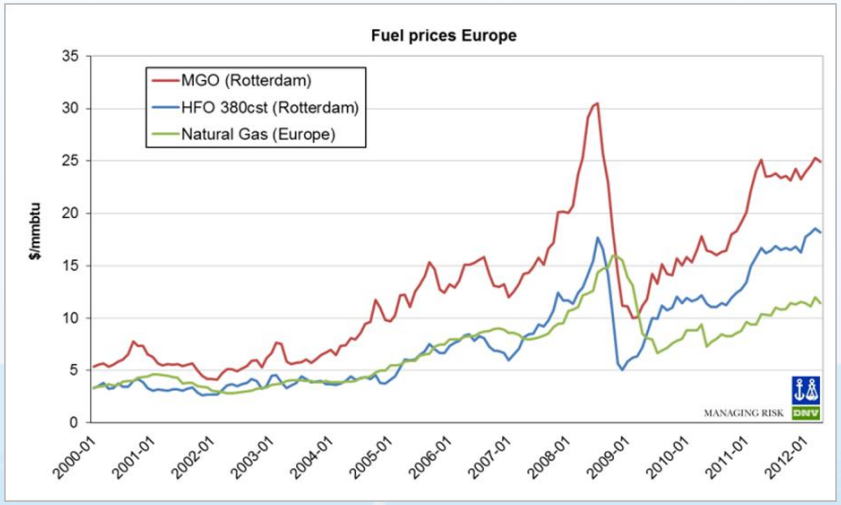
Development of LNG fuelled fleet

- Det Norske Veritas estimates that there will be 1000 new LNG capable vessels by 2020
  - pure LNG or dual-fuel engines
  - Ca. 400 in Northern Europe



Fuel price development: MGO - LNG

- until 2009 the price of natural gas was close to the price of HFO.
- Due to the shale gas revolution LNG is a more favourable fuel for the future.
- the price of natural gas to the pipelines is roughly 50 % of the price of MGO and 65 % of the price of HFO per energy unit.
- High distribution cost:
  - Distance from the LNG import terminal
  - Method of distribution
  - LNG volumes



Development of fuel prices on 21st century
Source: Det Norske Veritas

- the demand of LNG to ships is expected not to have impact on LNG prices
- small share of LNG consumption

LNG – scrubber investments

LNG

- Price difference between HFO and LNG

Investment costs

- fuel tank (most expensive)
- new engine
- new gearbox
- design work
- yard work

- extra cost related to LNG is lower in newbuildings than retrofitting cost

Scrubber

- Price difference between HFO and MGO

Investment costs

- scrubber system
- peripheral devices
- operating and maintenance costs
- education of personnel

In retrofit:

- modification costs of the vessel
- docking period during the installation
- start-up process, test, repair work

Repayment time scrubber- LNG

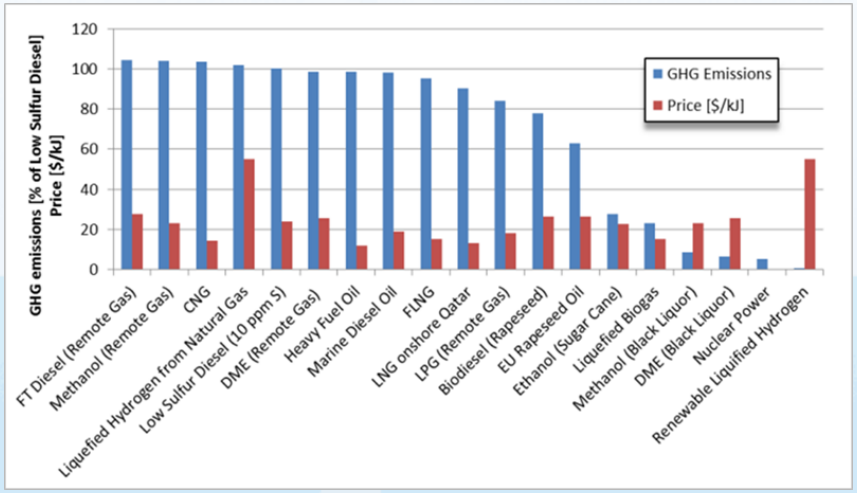
	HFO+Scrubber	LNG	LSMGO
Fuel consumption (tonnes/year)	10 000	8 100	9 400
Investment € '000	3 000	6 000	100
Extra operation cost € '000/yr	370		
Fuel price $/tonne	585		910
Fuel price €/tonne	424	617	659
Fuel price €/MWh	38	45	56
Fuel price $/mmBtu		18	
Fuel price relative to LSMGO	68 %	81 %	100 %
Fuel cost € '000/year	4 240	5 000	6 200
Fuel cost saving vs LSMGO € '000/year	1 960	1 200	-
Annual cost saving vs vs LSMGO € '000/year	1 590	1 200	-
Repayment time of extra investement vs LSMGO at 8 % yield	2,0	6,5	
Fuel price for same yield for HFO & LNG at market price abov	$ 719/t	€ 27/MWh	

Methanol

- Stena Line, vessels in regular service in SECA area
- distribution cost of methanol is lower than of LNG <-> production more expensive
- biodegradable
- if produced from wood > biofuel
- test Gothenburg – Kiel ferry
  - Conversion of 59 vessels

Biofuels

- second and third generation biofuels, which do not compete with food production
- lower CO2 –emissions, counted from production to end-use
- according to the Clean Power for Transport a European alternative fuels strategy, there is no single fuel solution but a comprehensive mix of alternative fuels.

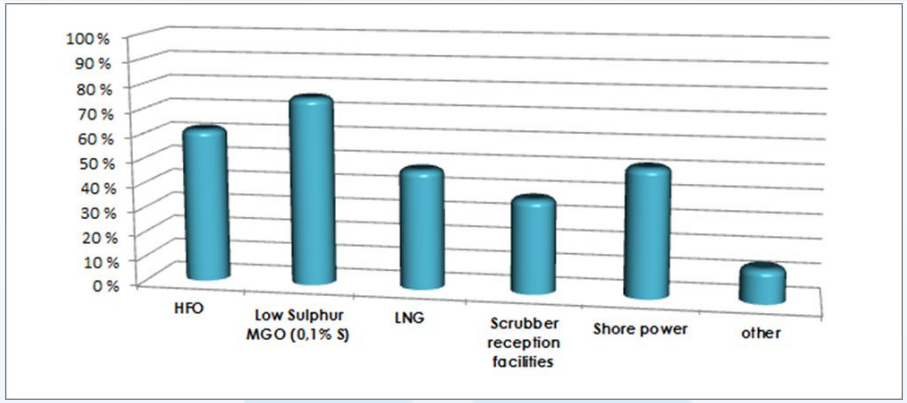


Well-to-propeller CO2 emissions and relative prices
Source: Det Norske Veritas (ESN the Way Forward, SECA report)

Port plans for SECA

- supply of fuels, bunker and fuel facilities available in 2015
- waste reception
- onshore power

- MGO most common option
- most plans of ports linked with LNG infrastructure and bunkering of LNG
- trucks, barges, tanks and terminals
- shore power



Planned services in ports
ESN survey for ports, 2013

As the shipping companies have not decided on their reaction towards the upcoming constraints regarding sulphur and nitrogen oxides, the demand side for reception facilities / bunker qualities is still very uncertain.

Support to environmental iniatives

EU funding sources

- Commission Staff Working Paper "Pollutant emission reduction from maritime transport and the Sustainable Waterborne Transport Toolbox"
- TEN-T: current and new financial framework 2014-2020; Connecting Europe Facility (CEF)

Other financing sources

- loans and grants
- EIB, NIB

Core and comperehensive ports, railways and rail-road terminals

Norwegian NOx fund

- to reduce nitrogen emissions of shipping
- granted for shipping between Norwegian ports.

Support may be granted in 2013 for:

- New buildings and retrofitting gas propulsion and LNG infrastructure
- New and promising NOx reducing measures
- SCR systems with the use of urea on ships and SCR and SNCR systems in the incineration industry
- Battery-powered propulsion of car and passenger ferries
- Gas in land based industry
- Engine modification and replacement
- EGR and water based treatment
- Other NOx reducing measures (for instance energy efficiency)

- The NOx Fund has granted support to 49 ships converted to LNG or new LNG vessels.

Finland: Environmental Aid Scheme

- Ministry of Transport and Communications 2010, amendment in 2013
- Finnish shipping companies
- new and existing vessels
- investments improving the level of environmental protection
- retrofitting, in particular sulphur scrubbers.
- decisions in 2013 for 22 vessels, 19 million euros out of the budget of 30 million euros
- another call for proposals in 2013
- investments during 2013-2014

Investment Support for LNG terminals

- granted by the Ministry of Employment and the Economy
- 123 million euro, for investments in construction of a national LNG terminal network in 2013 and 2014
- call for proposals in 2013
- five applications received until 27 November 2013

Conclusions

Status 2015 ?

- LNG infrastructure is under preparation
- 66 LNG fuelled vessels in Europe (existing and orders)
- 60 scrubbers installed (existing and orders), the amount will increase by 2015
- methanol, biofuels
- with reference to 5 000 vessels

Most common option

- MGO

Follow-up

- fuel prices
- use of different (alternative) fuels
- use of new technologies, innovations
- infrastructure and distribution
- markets and statistics
- support measures
- advice and information for the sector
- benchmarking, best practices

More information

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