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ESN Report SECA 2015 preparedness

Riitta Pöntynen, SPC Finland
18 December 2013
Joint SSS and MoS Focal Points meeting

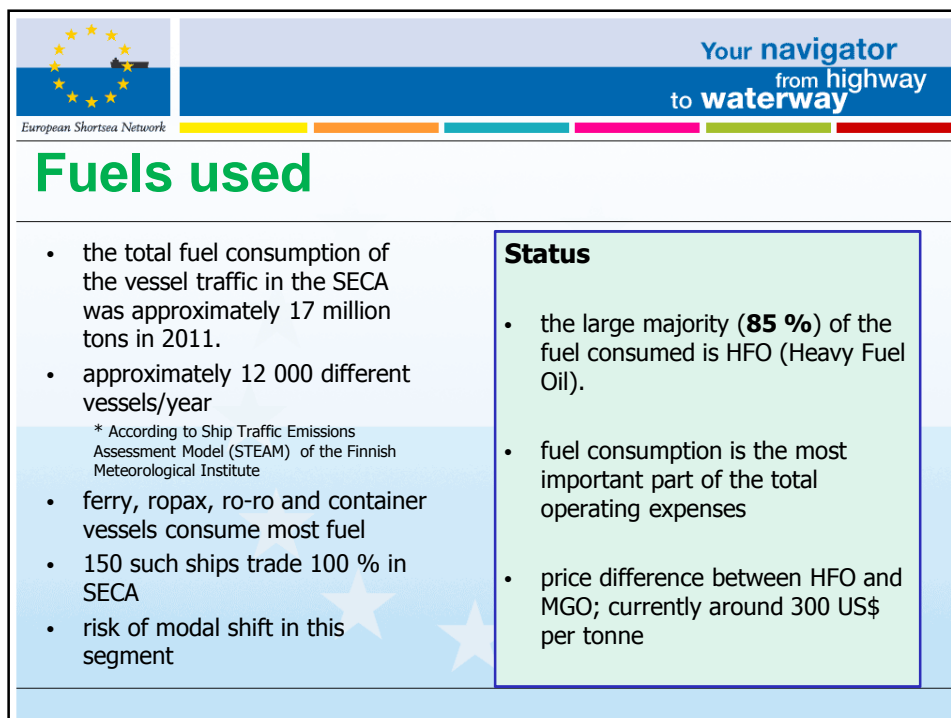
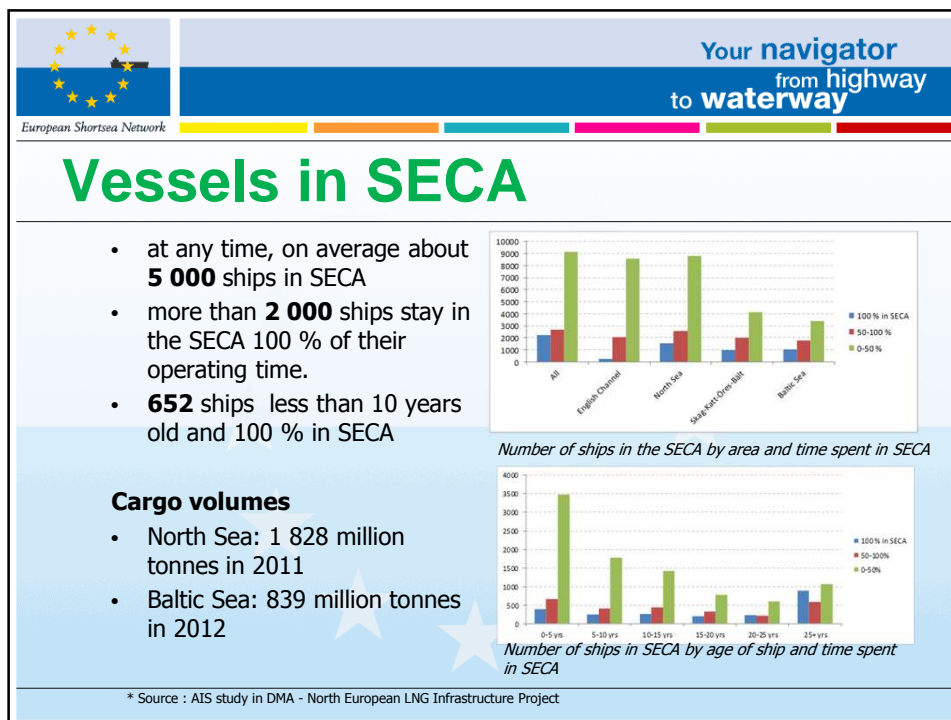


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SECA report contents

- 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, choice between the alternatives
 - considerations on payback time

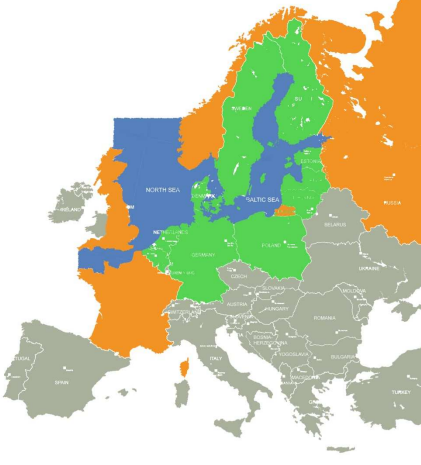


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Impacts

- 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



The Sulphur Emission Control Area (SECA)
Countries with water only in SECA
Countries with part of the coast in SECA
Countries without coast in SECA

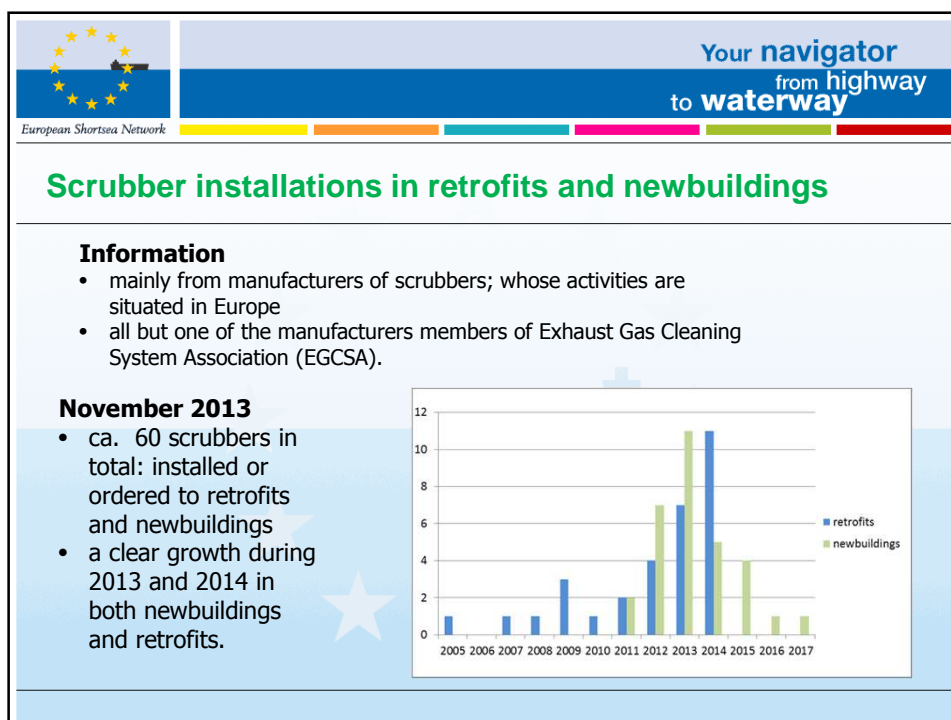
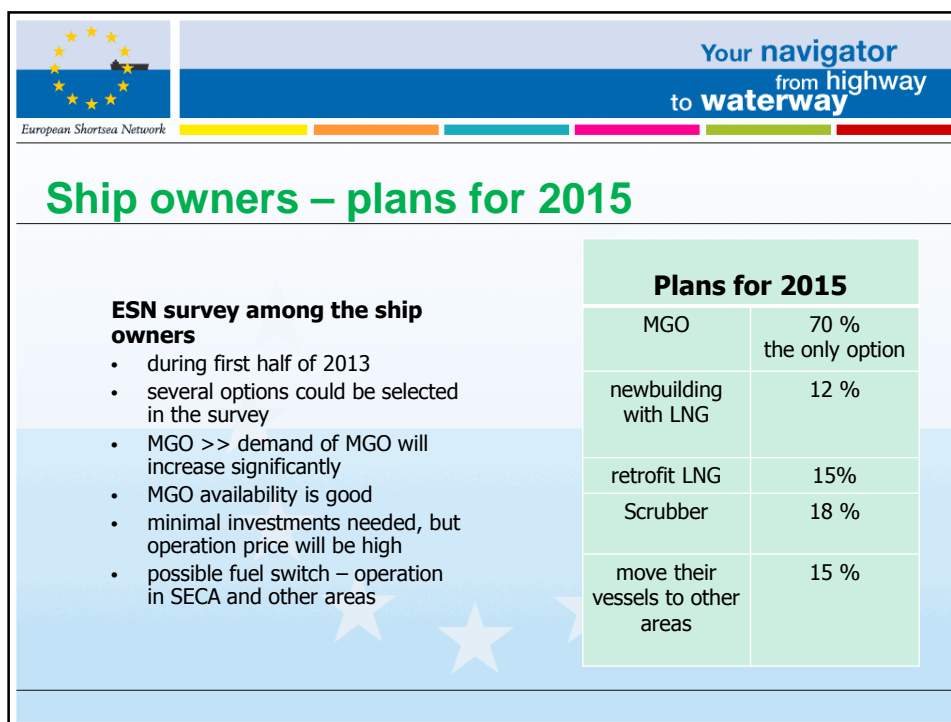
Transport and the Environment 2013, SPC Finland

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Case – container Rotterdam - Oslofjord

- container and ro-ro competition 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



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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**

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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

Negative

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

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



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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 %
- CO₂ 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



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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




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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



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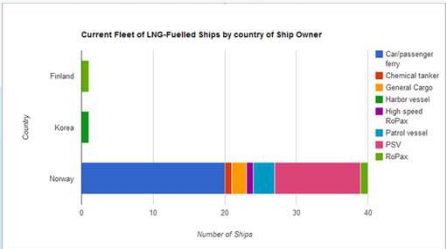
Current LNG fuelled fleet

- 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

Current Fleet of LNG-Fuelled Ships by country of Ship Owner



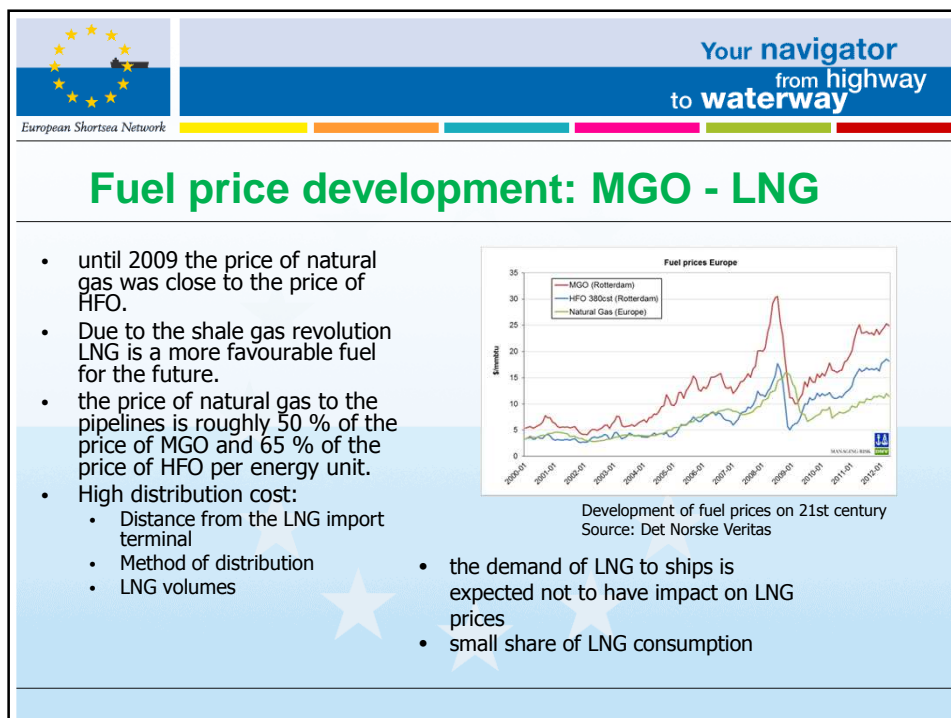
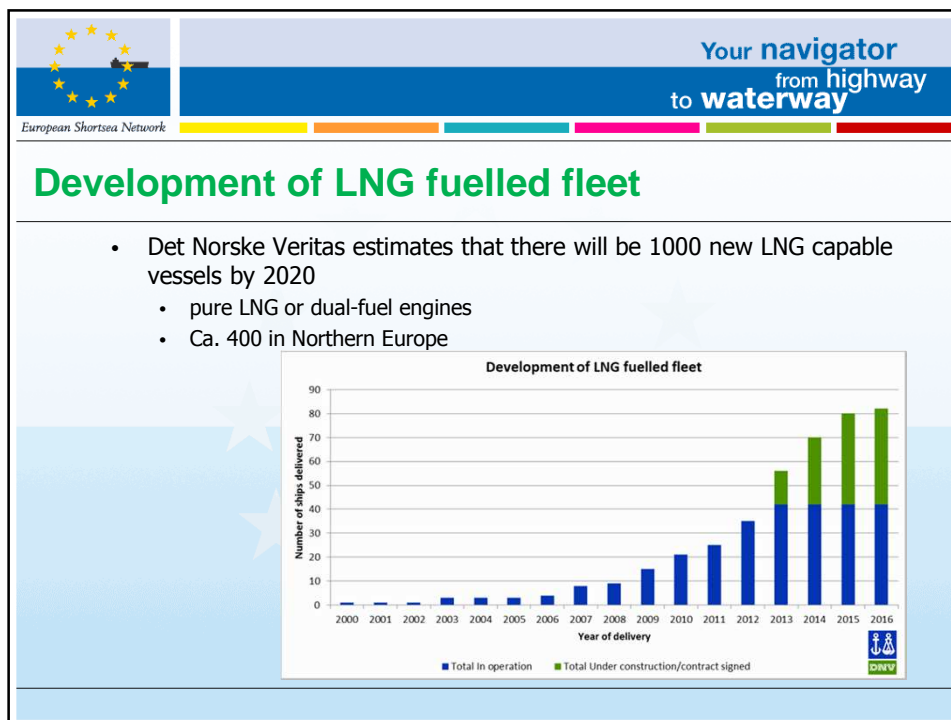
Country	Number of Ships
Finland	~2
Korea	~2
Norway	~42


LNG-Fuelled ships on order



Country of ownership	Number of ships
Canada	~2
China	~2
Denmark	~1
Germany	~1
Norway	~15
Saudi-Arabia	~2
USA	~8

Source: Det Norske Veritas





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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




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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 above	\$ 719/t	€ 27/MWh	

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Methanol

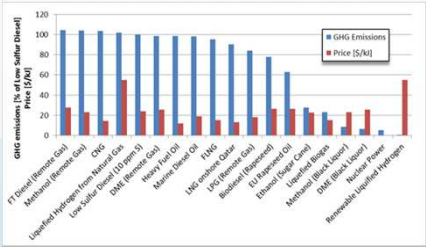
- Stena Line, vessels in regular service in SECA area
- distribution cost of methanol is lower than of LNG <-> production more expensive
- biodegradable
- if produced from wood > biofuel
- test Gothenburg – Kiel ferry
 - Conversion of 59 vessels



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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.



Fuel Type	GHG Emissions (% of Low Sulfur Diesel)	Price (\$/GJ)
FD Diesel (Reference Fuel)	100	~10
Methanol (Reference Fuel)	~100	~10
CH ₄	~100	~10
Liquid Hydrogen from Natural Gas	~100	~10
Low Sulfur Diesel (110 ppm SO ₂)	~100	~10
DME (Reference Fuel)	~100	~10
Heavy Fuel Oil	~100	~10
Marine Diesel Oil	~100	~10
LHG (Reference Fuel)	~100	~10
LPG (Reference Fuel)	~100	~10
Biomethane (Reference Fuel)	~100	~10
EU Reference Fuel	~100	~10
Edison Reference Fuel	~100	~10
Unrefined Bitumens	~100	~10
Ammoniac (Reference Fuel)	~100	~10
DME (Bio-Liquid)	~100	~10
Renewable Diesel	~100	~10
Renewable Synthetic Hydrogen	~100	~10

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

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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

Service	Percentage
HFO	~65%
Low Sulphur MGO (0.1% S)	~75%
LNG	~45%
Scrubber reception facilities	~35%
Shore power	~45%
other	~10%

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.

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Support to environmental initiatives

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 comprehensive ports, railways and rail-road terminals

Core	Comprehensive
Core port	Comprehensive port
Core high speed rail	Comprehensive high speed rail



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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.




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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



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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



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More information

- www.shortsea.info
- **environment**
- SECA report online
- recent **news** on the environment
- **InfoBank**

