GREEN SHIPPING AND THE WAY FOR SHIPPING TO COMPLY WITH SULPHUR LIMITATIONS

DIRECTOR SUSTAINABILITY & PUBLIC AFFAIRS, DFDS GROUP
PER MARZELIUS

Short Sea Shipping and Motorways of The Sea,
Focal Points Meeting Helsingør,
Denmark 20 April 2012

THE DFDS WAY
Striving for Excellence

DFDS IN BRIEF

- DFDS is one of Europe’s biggest combined shipping and logistics companies
- Head office in Copenhagen
- Annual turnover of around DKK 12 billion
- 5,000 employees
- 55 vessels on 27 routes

THE DFDS WAY Striving for Excellence

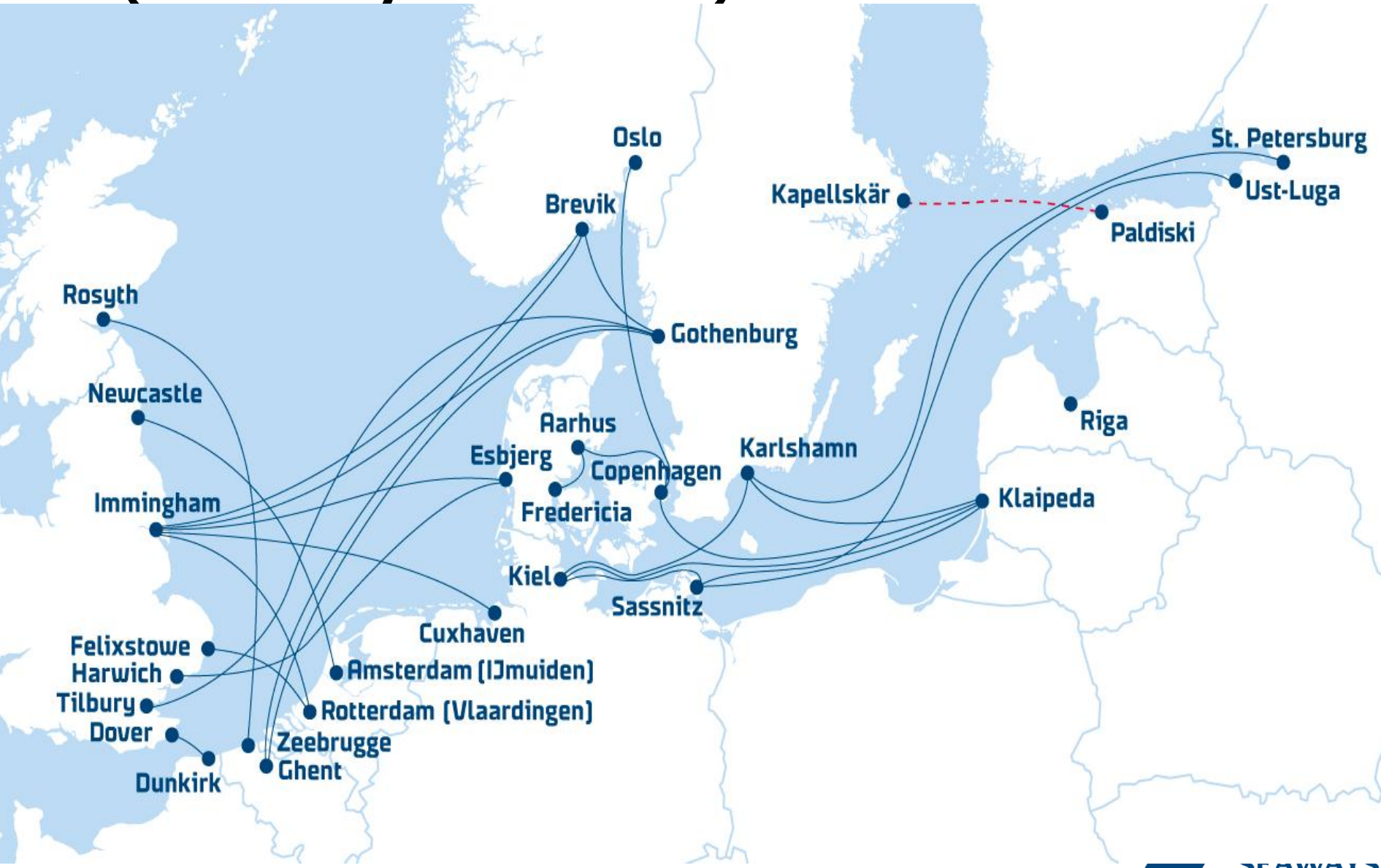
WE MAINLY OPERATE CARGO VESSELS (RO-RO)

THE DFDS WAY
Striving for Excellence

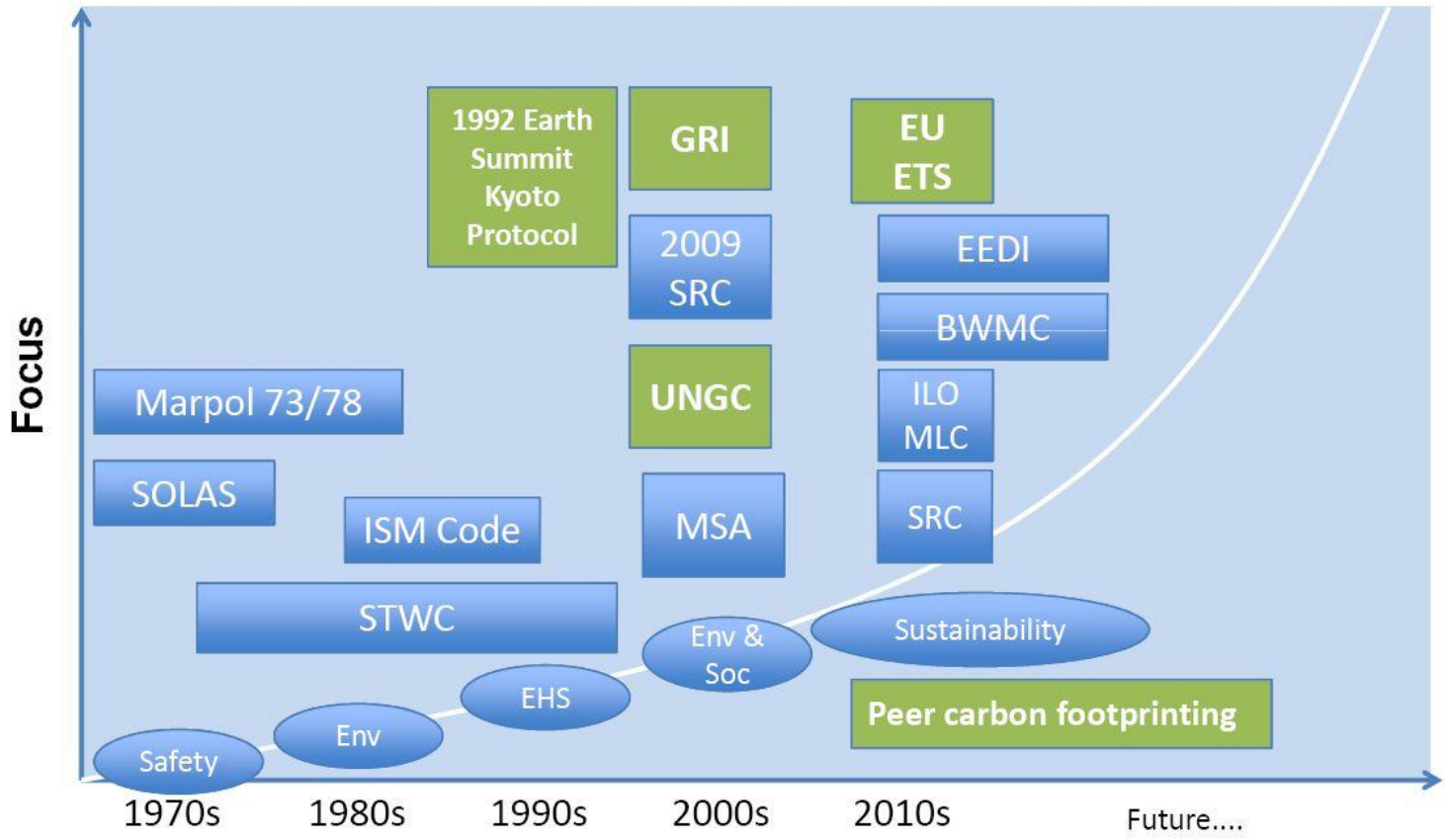
PASSENGER SHIPS

…AND COMBINED CARGO AND PASSENGER SHIPS

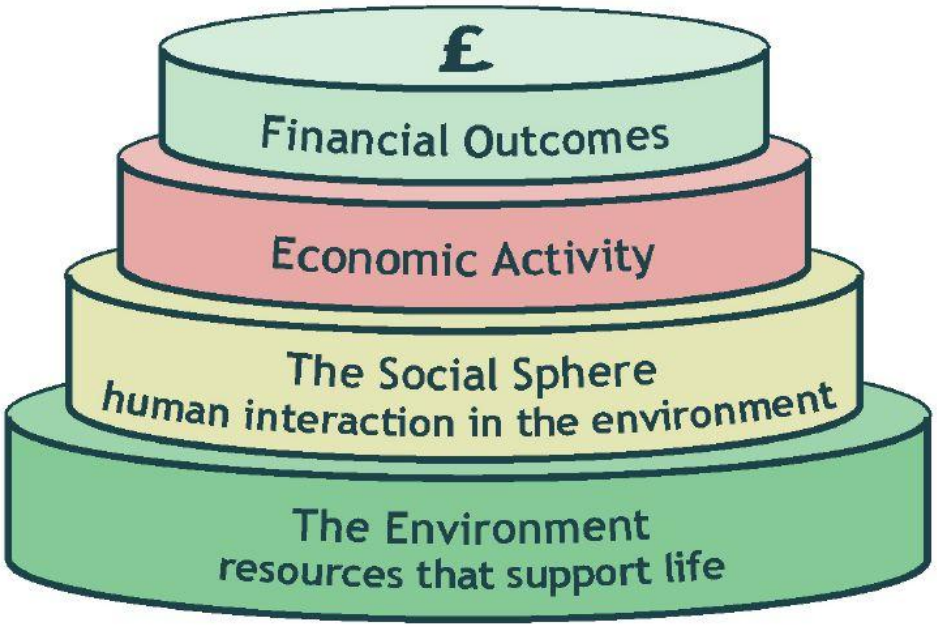
DFDS' ro-ro and ro-pax routes (Motorways of the sea)



Rising focus of sustainability in shipping and logistics industry



Sustainability



THE ENVIRONMENT

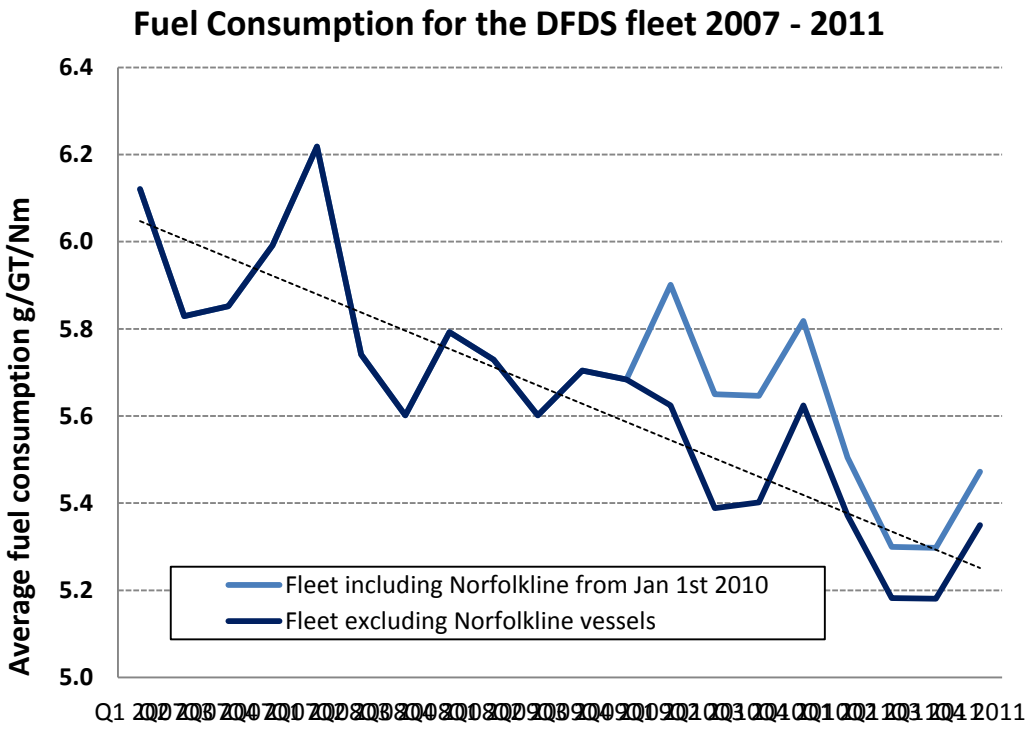
Focus on emissions of

CO2
SOx and particles
NOx

Furthermore focus on

- Noise
- Waste water
- Garbage handling
- Scrapping
- Ballast water

CO 2 – EMISSIONS REDUCED BY 10%



CO2 – HOW TO REDUCE

Slow steaming

Changed schedules
Reduced time in port = more time at sea

New technology

New ships with better engines
Larger ships
Seaplanner –optimal route planning
Cleaning of hulls between dockings
New propellers (optimised to slow speed – very effective)

Motivation

Knowledge sharing and Award
The DFDS Way - management and leadership

FICARIA SEAWAYS

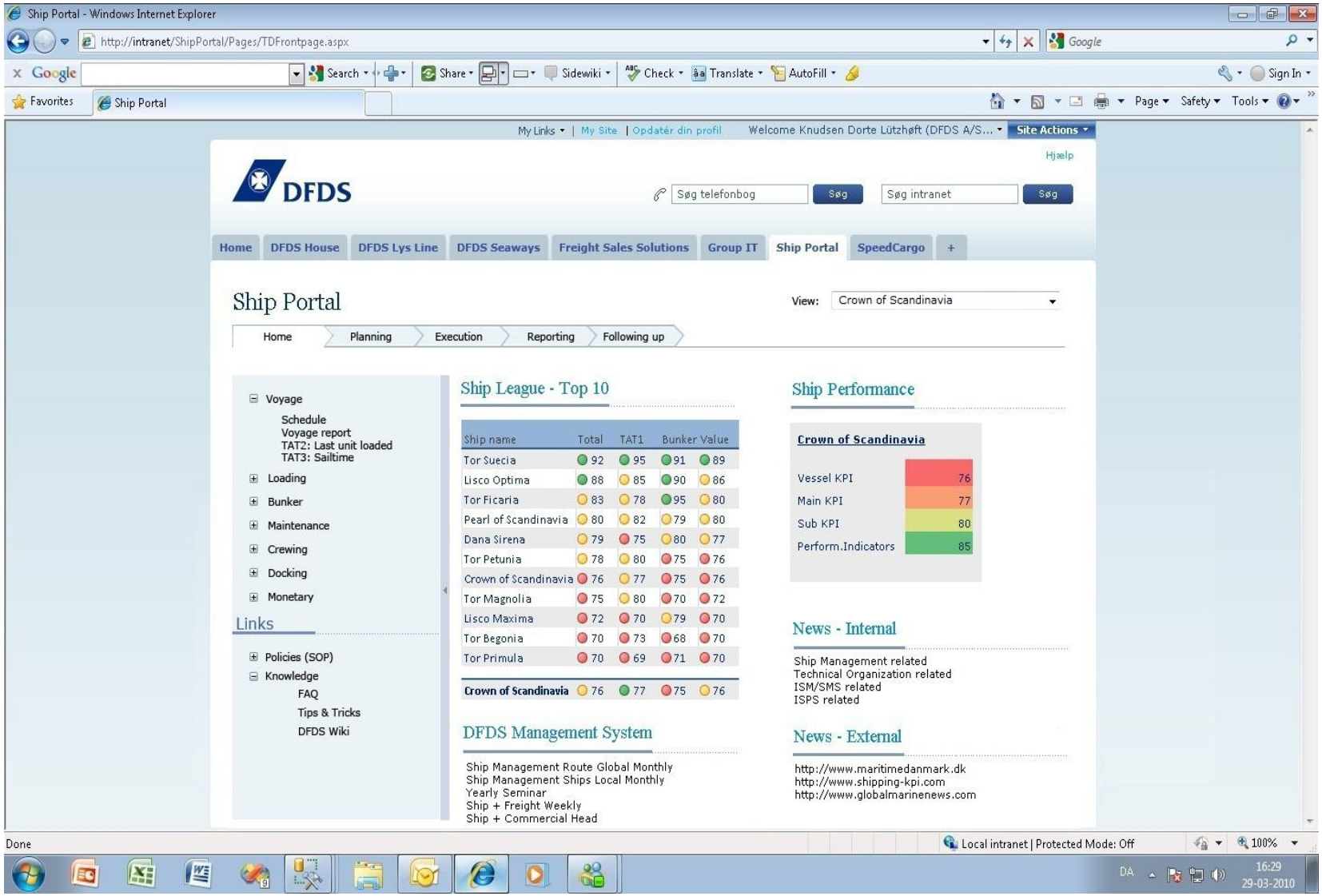
EXTENDED BY 30 M TO 4700 LM (+30%).
CONSUMPTION PER UNIT: -15%

THE DFDS WAY
Striving for Excellence

CO2 - REDUCTION PROGRAM

1. Propulsion & Powerplants
2. Propulsion resistance
3. Maneuvering
4. Voyage Planning
5. Draft
6. Heating
7. Air-condition
8. Ventilation
9. Lighting
10. Management
11. Miscellaneous

CO2 – SYSTEM FOR FOLLOW-UP



THE DFDS WAY Striving for Excellence

CO2 - REWARDING

THE DFDS

FUEL AWARD

First Quarter 2010

is hereby presented to
the management and crew on board

KING OF SCANDINAVIA

for being the DFDS-fleet's most successful crew in reducing the fuel consumption the first quarter of 2010.
*In addition to the Award, the crew on board KING OF SCANDINAVIA is given a prize of **DKK 50,000** to be used for the benefit of the ship's crew.*
We congratulate the crew on board KING OF SCANDINAVIA for their outstanding performance and contribution to DFDS' fuel-saving programme.

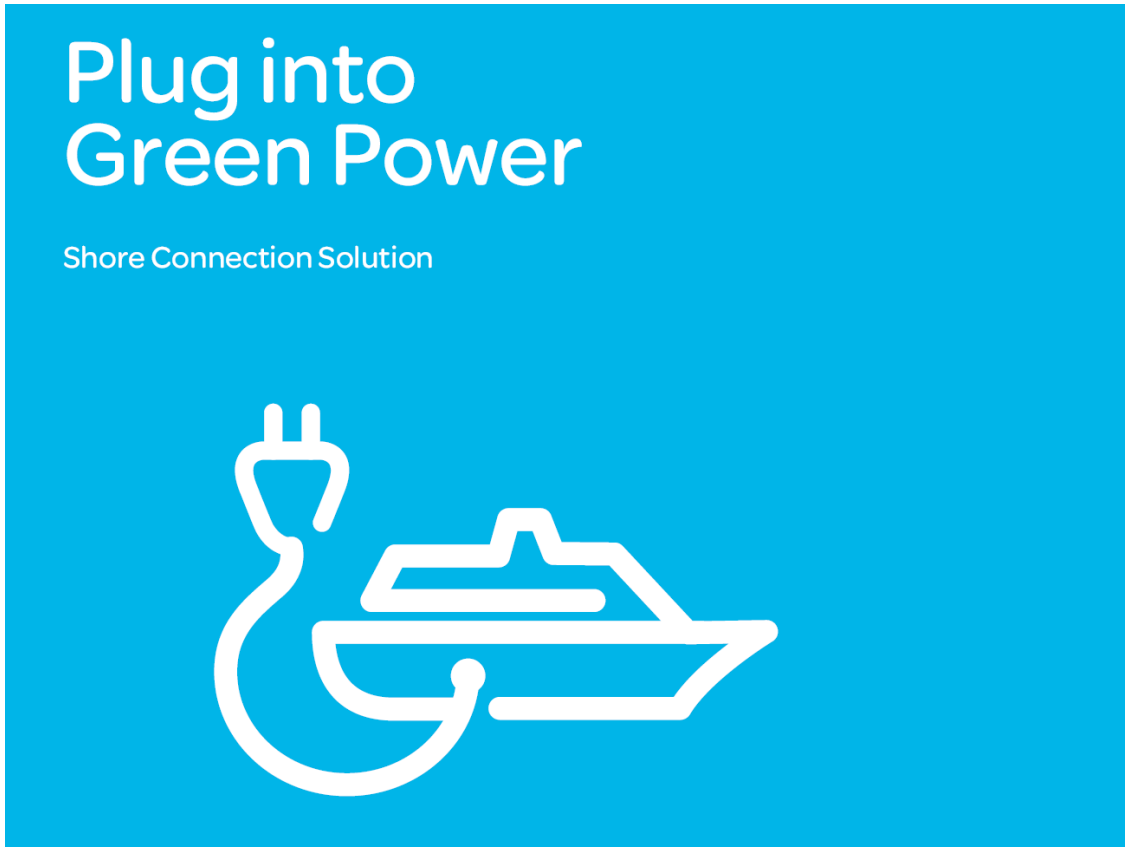
23 April, 2010

Niels Smedegaard

DFDS

THE DFDS WAY
Striving for Excellence

NOX – HOW TO REDUCE



EUROPEAN NETWORK FOR SHORT SEA SHIPPING

THE DFDS WAY
Striving for Excellence

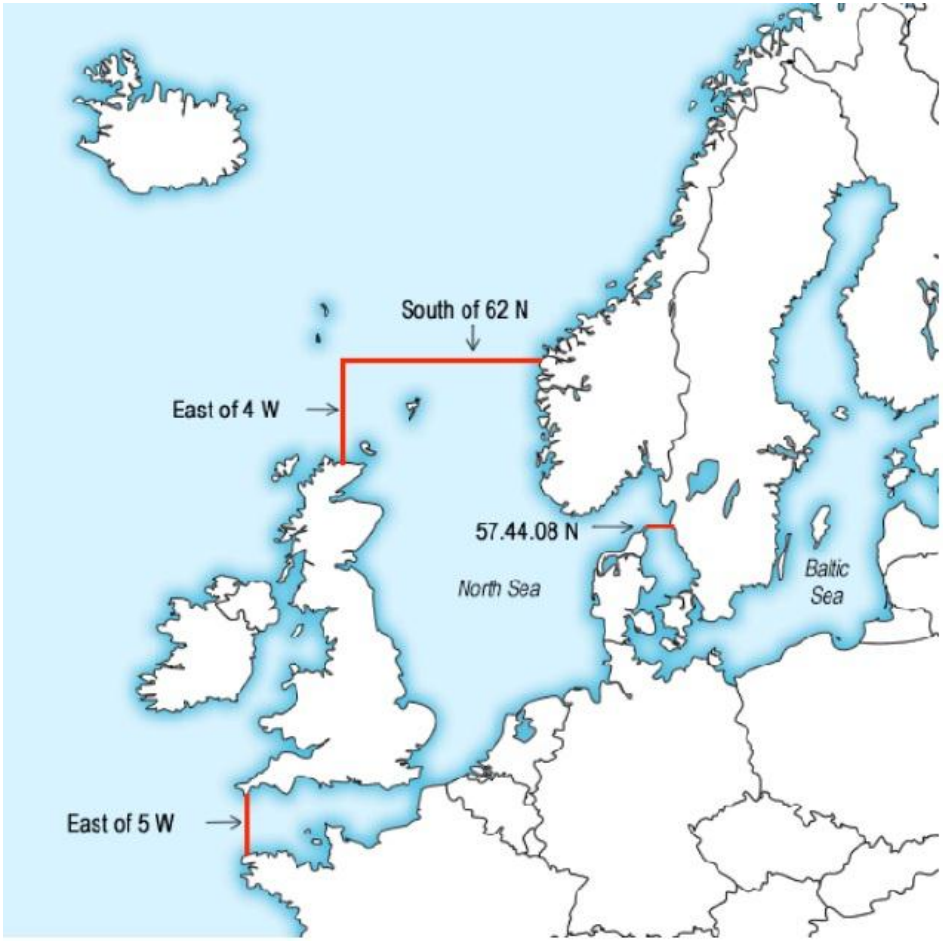
SOX – SULPHUR EMISSION CONTROL AREAS

Max fuel oil in SECA

Before 2010	1.5%
From 2010:	1.0%
2015	0.1%

Outside SECA

Currently	4.5%
2012	3.5%
2020 (judged)	0.5%



SOX – ENVIRONMENTAL BENEFITS

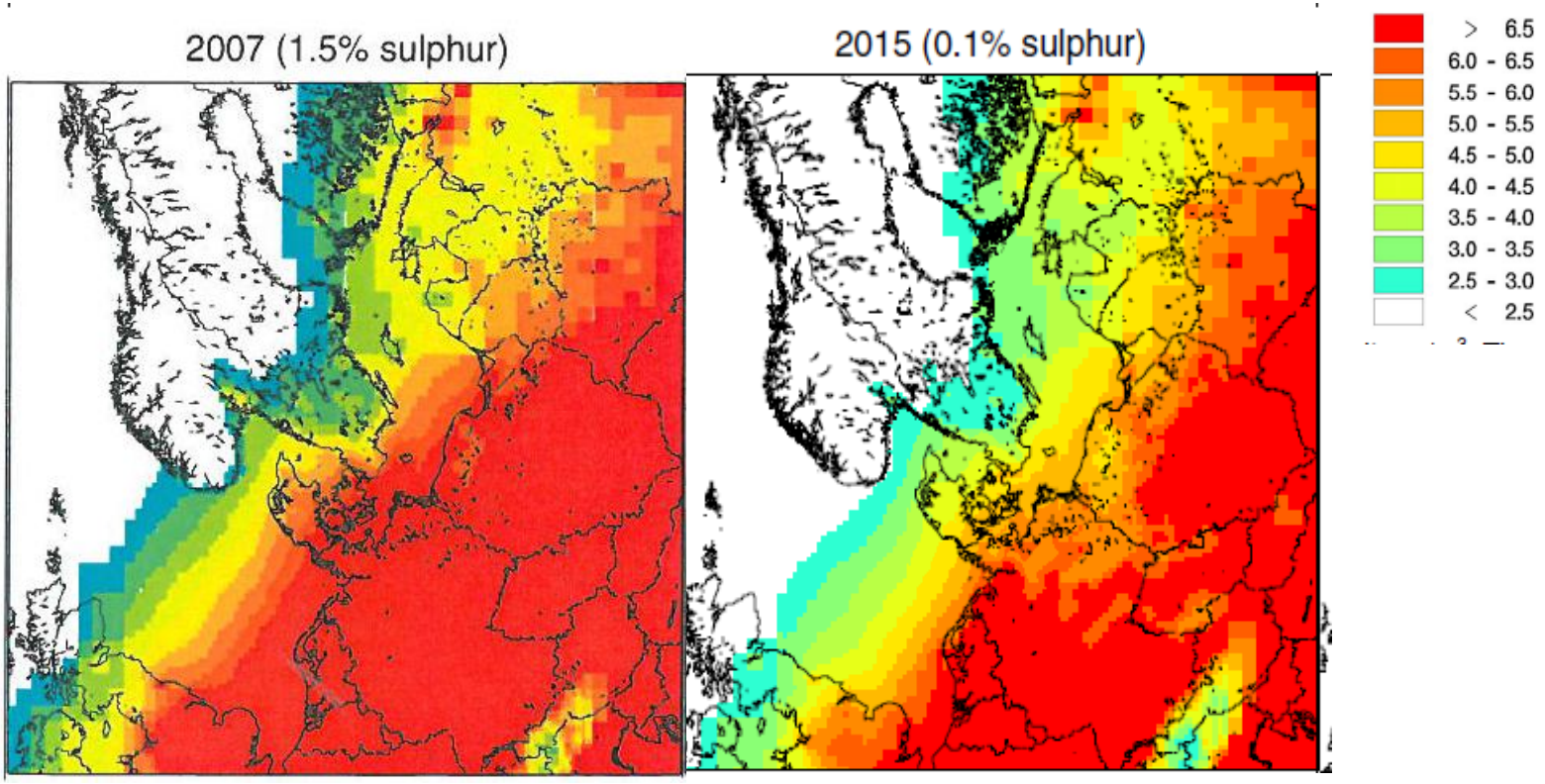
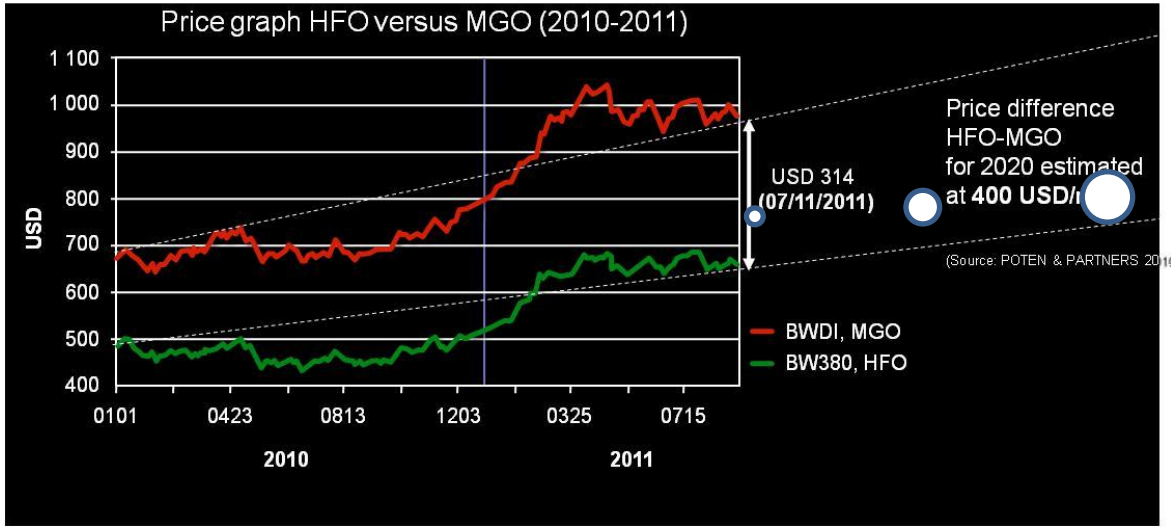


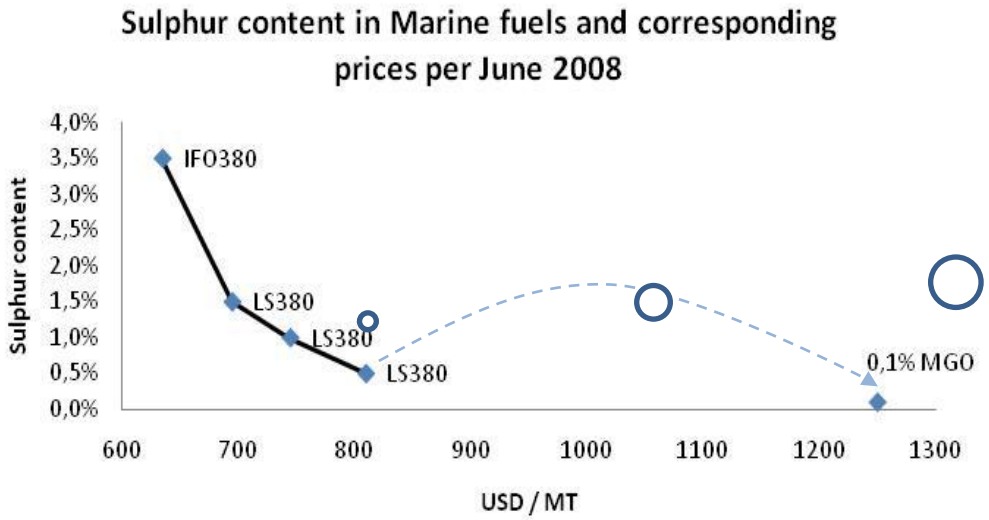
Figure 3.6. Concentration of total $PM_{2.5}$ ($mPM_{2.5}$) from all sources, both ships and land-based. Unit: $\mu g/m^3$. The upper row shows the situation in 2007, 2011 and 2020, while the lower is for 2015 with three different assumptions for sulphur level in fuel.

Aarhus University, Assessment of the impact of alternative regulations of the sulphur content in maritime fuel (Oct 2010).

SOX – COST FOR SOCIETY



+ 50 % ???



+70 % ???

** Conclusion made by independent analysis ordered by the Danish Shipowners' Association*

SOX - CONSEQUENCES OF MORE EXPENSIVE OIL

- Loss of competitveness to road transport
- Risk of modal back shift
- More traffic on the roads = more congestion, noise and accidents. In contrast to EU objective "From Road to Sea”
- Risk of losing routes sailing in parallel with land transport corridors

SOX – HOW TO REDUCE

ALTERNATIVES FOR THE FUTURE

HFO	MGO	Methanol	LNG
After treatment Scrubber SCR	NOX tier 3 compliant engine SCR		

SCRUBBER TECHNOLOGY

– wash the sulphur out of the exhaust gas.

- We started very early (2008) developing a scrubber in cooperation with
  - Aalborg Industries (development) Alfa Laval
  - MAN (adaptation to engine)
  - DFDS (test)

– One of the first scrubbers in the world on main engine

– Investement so far: 20 million DKK for DFDS.

ORIGINAL BUDGET

		Aalborg Industries		DFDS		MAN		Total	
	Sats	Timer	Budget	Timer	Budget	Timer	Budget	Budget	Budget
	DKr / time		Dkr *1000		Dkr *1000		Dkr *1000	Dkr *1000	Dkr *1000
Timeforbrug:									
Industriel forskning og udvikling									
Design af skrubbersystem				150	90				
Idriftsætning og indkøring af anlæg				100	60				
Rapportering af driftresultater									
Motorinspection og performmence evaluering									
Hardware:									
Scrubber (jet + absorber, max gas flow 187000 kg/h)									
1 stk havvandspumpe (800 m3/h, 4 bar)									
1 stk booster pumpe for jet (400 m3/h, 6 bar)									
1 stk pladevarmevekIser (800 m3/h, 6000 kW)									
Vandbehandlings system									
Elektrisk:									
Instrumentering (tryk, temperatur, flow)									
Emissions måleudstyr									
kontrol system									
Installation:									
Ombygning af skorsten					1000				
Rørsystem for tilledning og afledning af vand					2000				
Tank for NaOH opbevaring					50				
Bypass arrangement for udstødningsgas					500				
Rejse omkostninger:					50				
Total før tilskud fra miljøstyrelsen					3750				
Tilskud fra miljøstyrrelsen (25 %)					938				
Total efter tilskud fra miljøstyrelsen					2813				

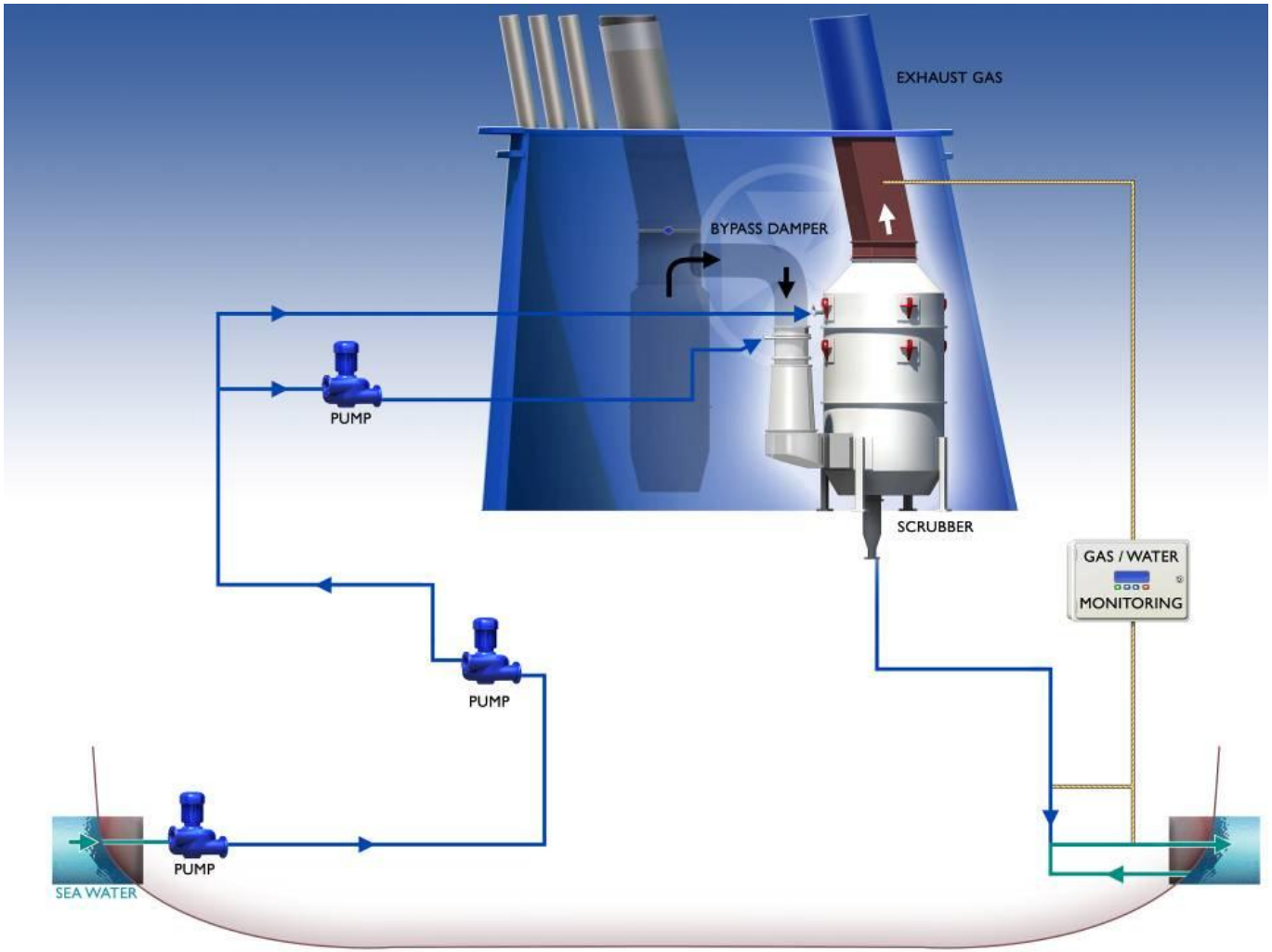
ORIGINAL PROJECT PLAN

	2008												2009											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
R&D activities, project management, fundraising																								
Design equipment to be tried after test engine																								
Procurement of equipment for test engine																								
Install equipment after test engine																								
Test and evaluate scrubber system																								
Reporting the test results																								
Present test results on WMTC																								
Discuss project potentials with one or two ship owners																								
Identify a vessel for service test.																								
Design equipment for service test																								
Procurement of hardware for service test																								
Install components on vessel																								
Test and evaluate the scrubber system on the vessel																								
Reporting the vessel test																								
Meeting with collaboration partners																								

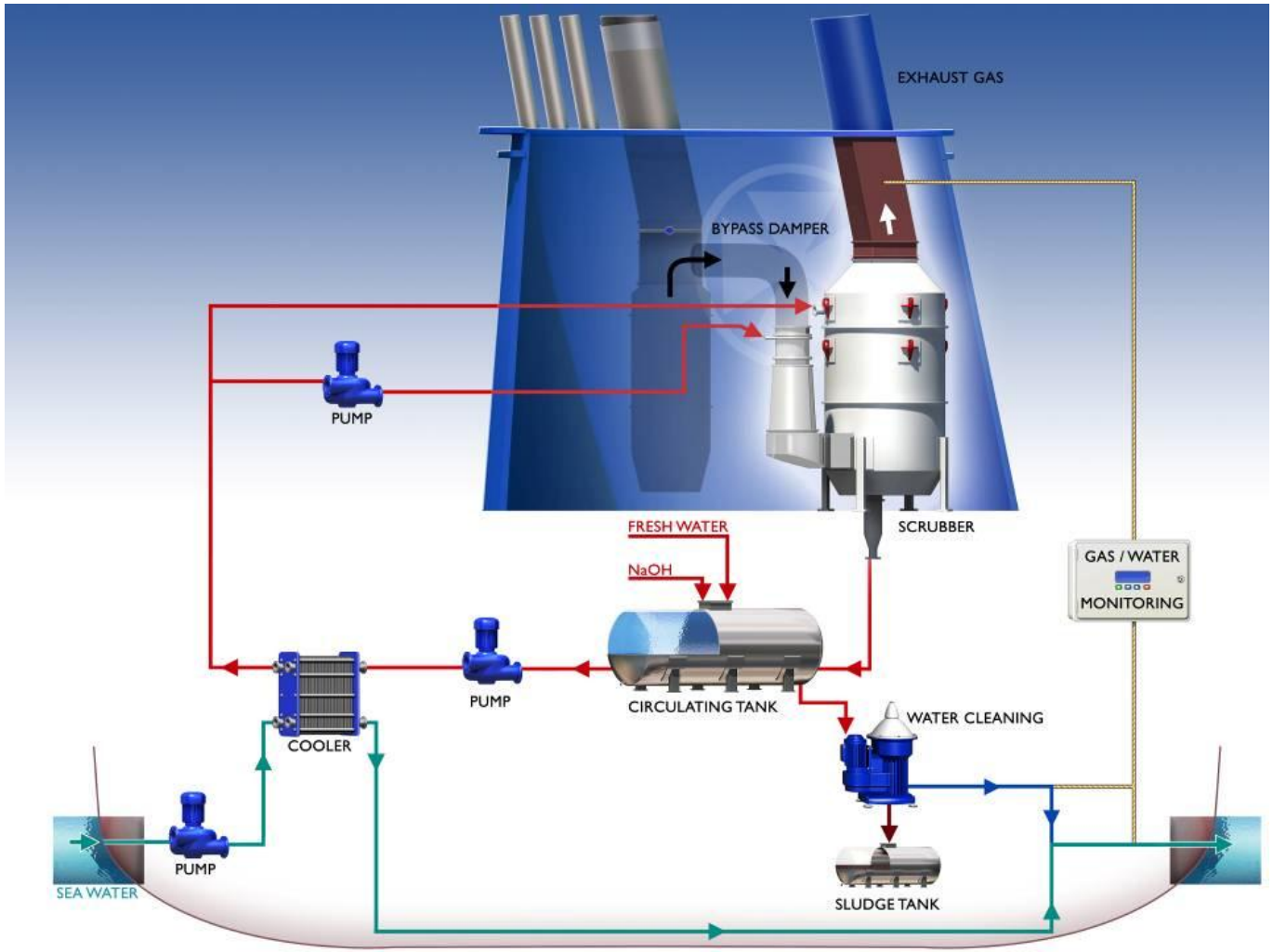
ACTUAL TIMELINE

- **Mid 2008: MAN Diesel A/S, Aalborg Industries & DFDS A/S sign a partnership regarding scrubber project**
- July 2009: Installation onboard Ficaria during 31 days in dry dock
- **April 2010: First live test**
- April 2011: Corroded piping system
- July 2011: Starting replacement of piping system with GRE
- Nov 2011: Scrubber back in SW test operation
- **Jan 2012: Scrubber back in FW (0,0%) & SW (0,3%) test operation**
- **2012: Expected final approval according to MEPC 170(57) Scheme B**

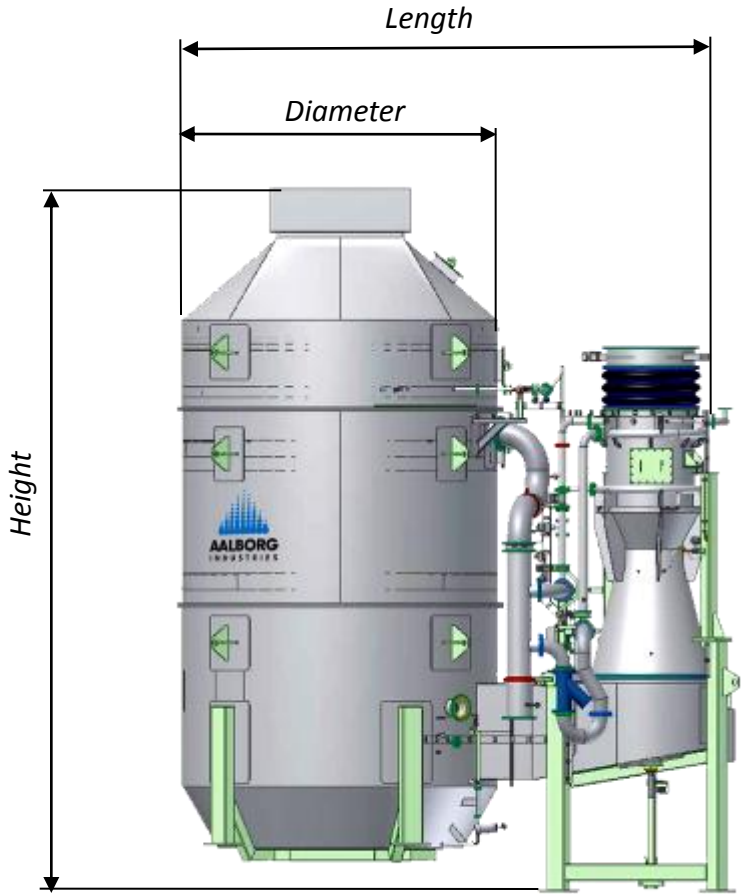
SCRUBBER – SW SYSTEM



SCRUBBER – FW SYSTEM



MAIN EQUIPMENT INSTALLATION

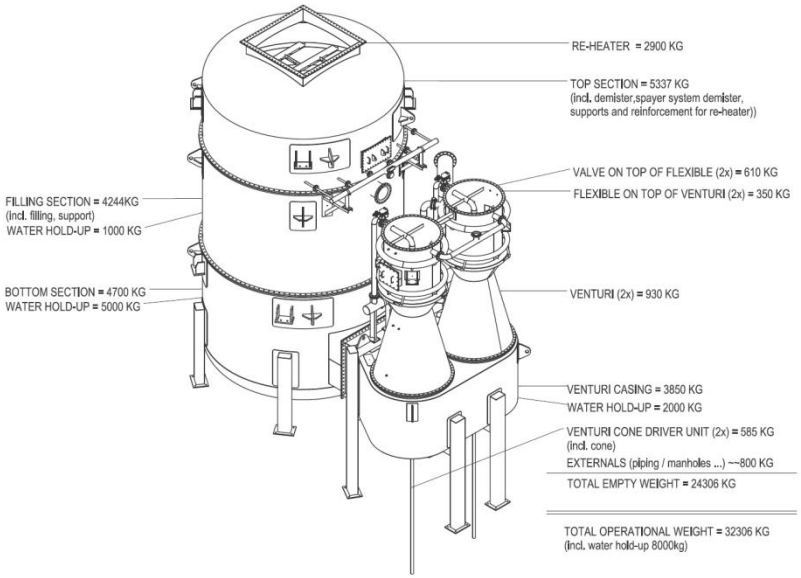


Technical data:

In operation since	May 2010
Height	10.5 metres
Length	8.2 metres
Diameter	4.6 metres
Weight empty	24T
Weight with water	32T
Exhaust gas	192,000 Kg/h
Material	SS alloys
PM Scrubbing	Jet + venturi
Sea water pump	200KW/1000m^3/h

THE DFDS WAY Striving for Excellence

THE SCRUBBER



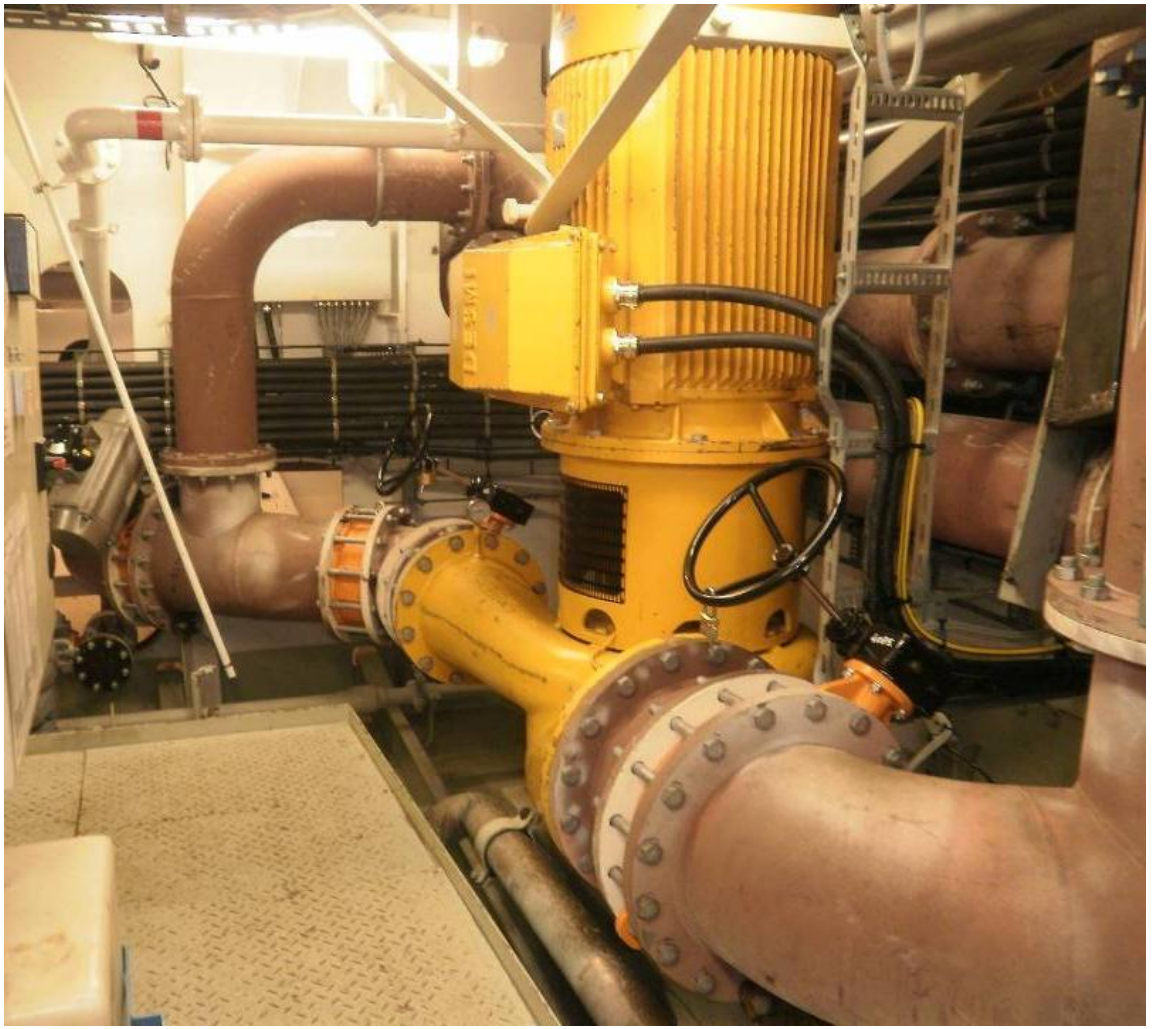
MAIN EQUIPMENT INSTALLATION

FUNNEL - MODIFICATION

FIRE 1

WASH WATER PUMP

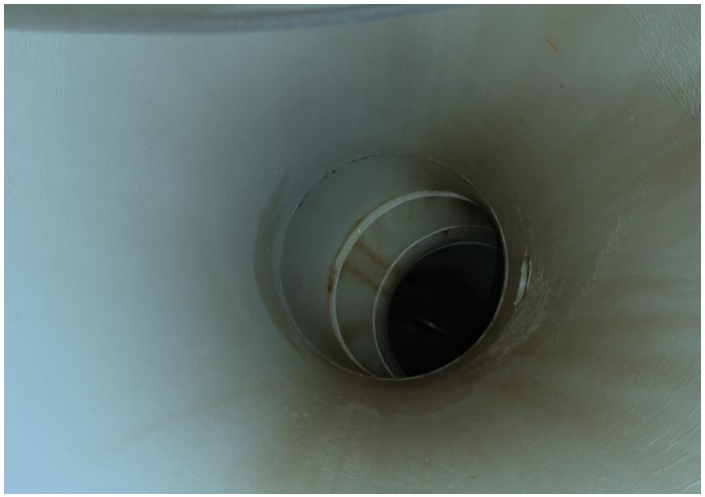
- 200KW/1000m3/h ~ 1,5 % more CO2



FW CLEANING

- **80% water / 20% solid**
- **Sludge amount in liquid form less than 2.5 litres per MWh engine output**

CHANGE CORRODED PIPES



Pipe with deep pitting.

CHANGE CORRODED PIPES

SCRUBBER FEASIBILITY

	RoRo		RoPAX		TOTAL	
Number of vessels	27		78		105	
Wet scrubber not impossible	19	70%	43	55%	62	59%
Failing for AGE	0	0%	21	27%	21	20%
Failing for STAB	0	0%	6	8%	6	6%
Failing for DWT	0	0%	12	15%	12	11%
Failing for CASING	3	11%	9	12%	12	11%
Failing for SCR	5	19%	7	9%	12	11%
Remaining number of vessels	19		43		62	
Number of very difficult	10		9		19	
WET is feasible	9	33%	34	44%	43	**41%**

DFDS' CONCLUSIONS

•The technology works

•Not yet mature for general use on all ships, utilization and reliability needs to improve.

•INTERFERRY study on 108 vessels shows that scrubber is not feasible on 60% of the vessels

•Rules for using scrubbers (washing of materials into the sea) not yet in place (needed for investment decisions)

•Practicalities for waste disposal from scrubbers not yet in place

•Loss of energy efficiency = greater emissions of CO2 (1.5%)

•Higer operating costs on chemicals

•Expensive investment solution = higher operating costs

STATUS

- Scrubber technology pending (short term)
- LNG coming (long term)
- Both may be part of the solution, but not the entire answer in 2015.
- More time needed for technical development (Reliability)

DISCUSSION SESSION

- What to do with vessels not feasible for scrubbers
- How to handle low utilization and reliability
- Grandfathering for early movers
- Grace period for early movers
- Bottlenecks like yard facilities and scrubber production
- Increase of road tax to prevent modal back shift
- EU subsidy, today not able to support the industry

Q & A // Any questions?

We have come far …

… and we are moving on