

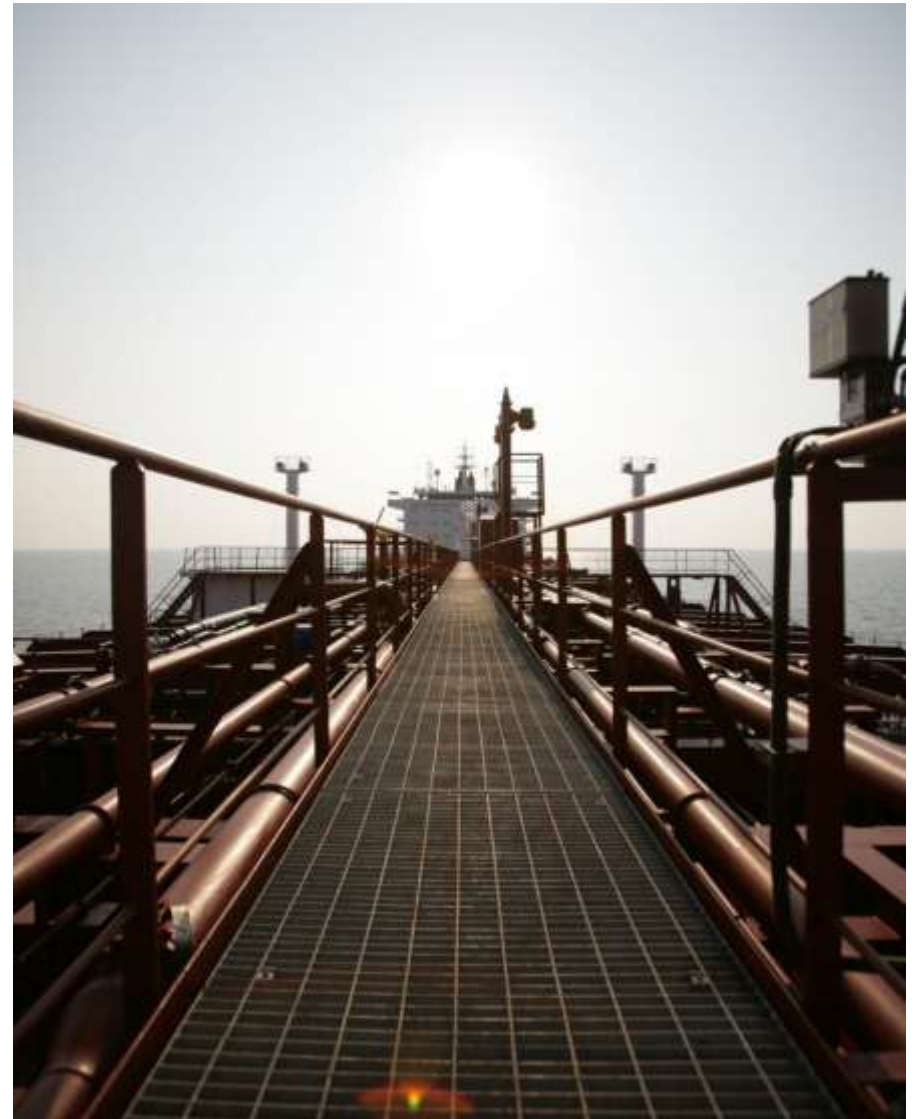
CO₂ EMISSIONS - MRV

Monitoring, Reporting &
Verification

Lars B. Christensen
Executive Vice President
Brussels
5 December 2012



- ▶ NORDEN at a glance
- ▶ MRV - Monitoring
- ▶ MRV - Reporting
- ▶ MRV - Verification
- ▶ Effect of MRV
- ▶ Complexity
- ▶ Industry perspective – MRV is not New – Real Reduction of CO₂ Emission



Dry cargo

80% of revenue



Capesize



Post-Panamax



Panamax



Handymax



Handysize

Tanker

20% of revenue



LR1



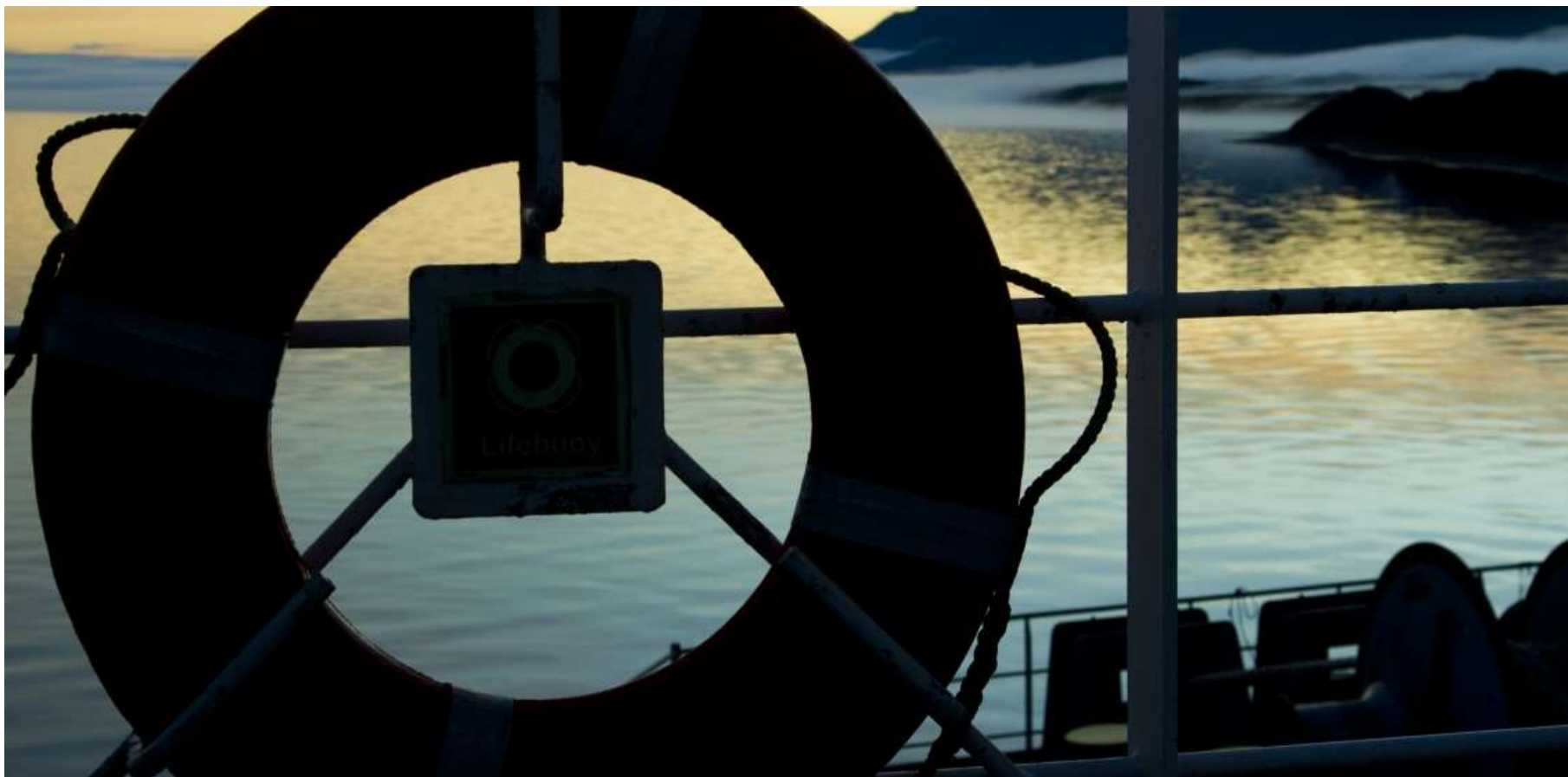
MR



Handysize



- ▶ Founded and stocklisted in 1871 in Copenhagen
- ▶ 5 overseas offices and 1,084 employees on shore and at sea
- ▶ Majority of business in emerging markets
- ▶ NORDEN operates in total 238 dry cargo and tanker vessels
- ▶ Modern fleet, average age of core fleet 3.2 years
- ▶ Revenue USD 2.3 billion in 2011



MRV – The Perfect Loop

24*7 seas



MONITORING

- Performance systems
- MOEPS (IMOS)
- Glomaris (IMOS)

VERIFICATION

- External third party verification: DNV and PwC
- Assurance statements



REPORTING

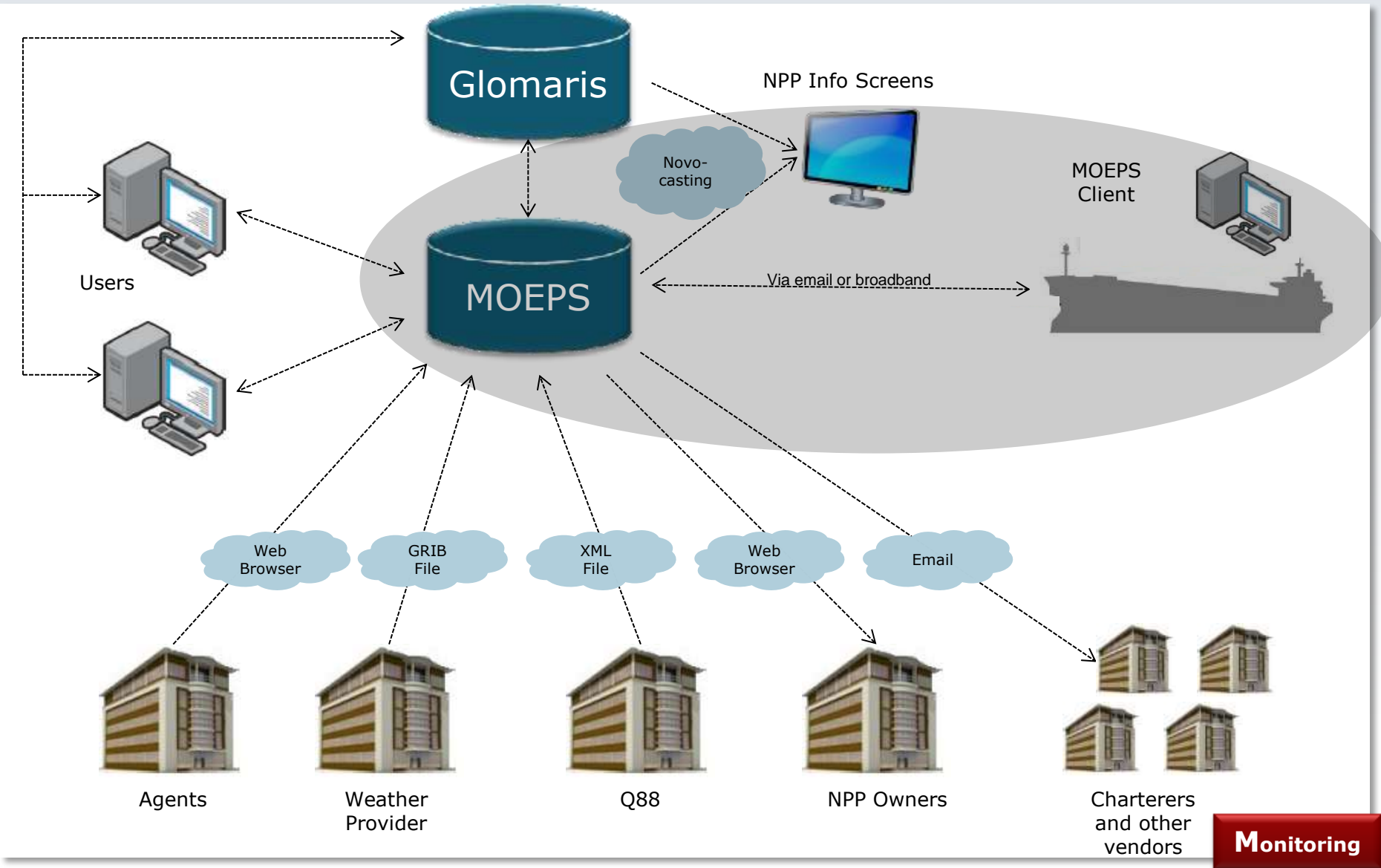
- CSR report
- Carbon Disclosure Project report





Monitoring

24*7 seas

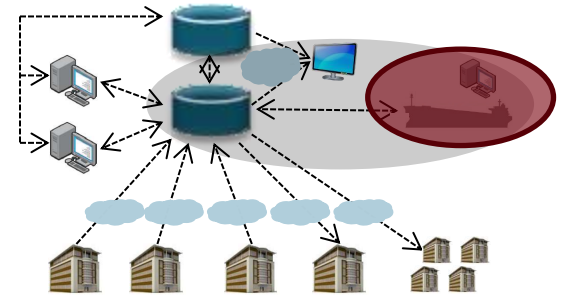
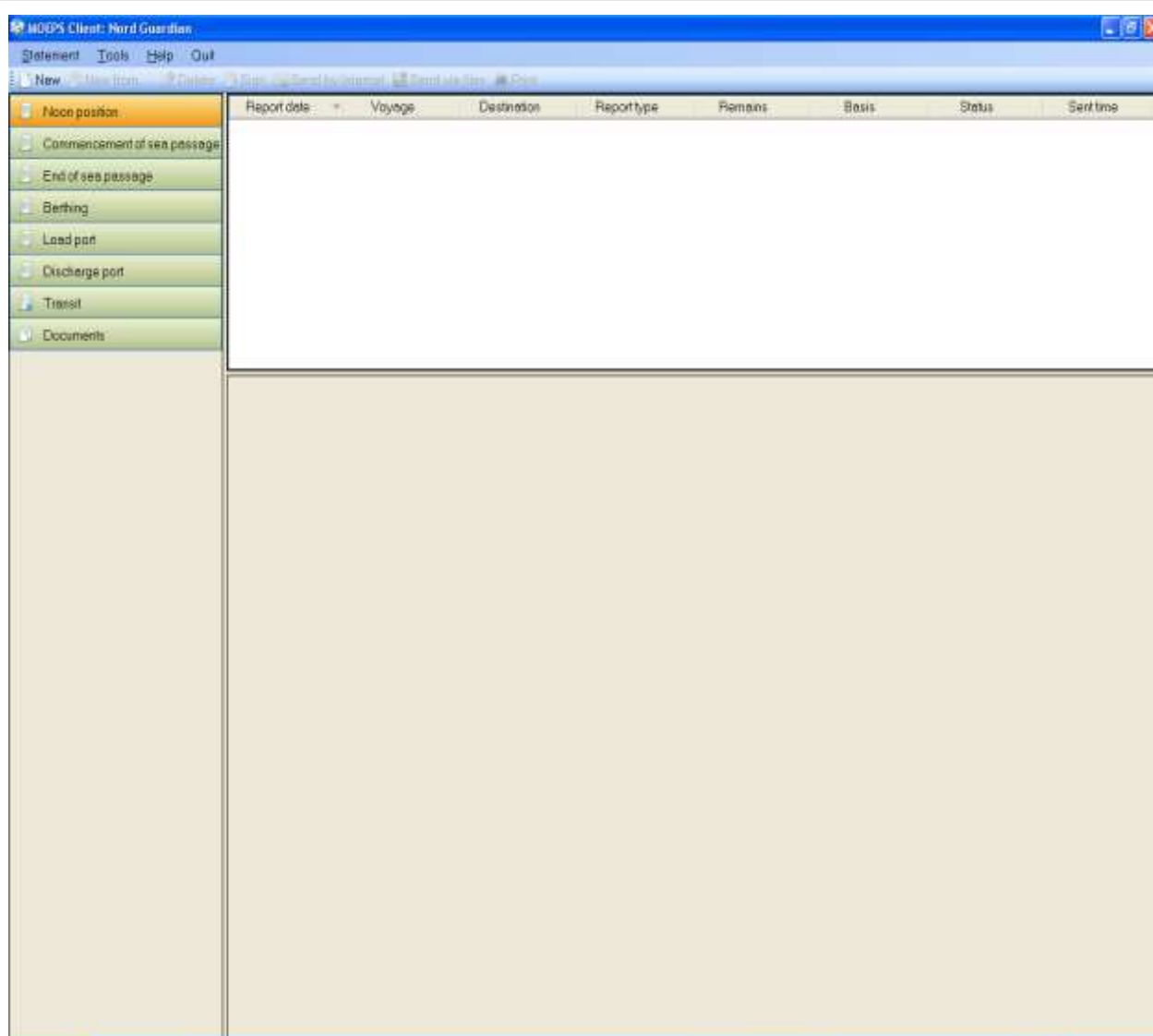


Vision defined in 2008 – fully completed in Q4 2009

Masters Operational Environmental Performance System (a software/server based Monitoring and Reporting system)

- ▶ Important highlights
 - ▶ Primary users are the ships Master and the vessel operator
 - ▶ "One-Entry" uniform reporting
 - ▶ An operational logbook for performance related data
- ▶ Ensure primary users focus their time on non-administrative tasks
- ▶ Generates input to "Right Steaming" and monitors adherence to speed and consumption instructions
- ▶ Focus is to optimize Fuel consumption

VESSEL REPORTING - ON BOARD



Monitoring

VESSEL REPORTING – BY MASTER

Noon position
✕

Bridge
Engine
Intermediate destinations
Cargo temperature
Receivers

General

Vessel/voyage:

Date of report: Sailing in ice

Latitude/longitude:

Final destination:

ETA local time: Anchored/Drifting

Est. arrival draft, m:

Remains, nmi: basis, kt:

Steaming time since last report, h:

Conditions

Wind force/direction:

Sea height/direction:

Swell height/direction:

Distance observed/logged, nmi:

Average speed observed/logged, kt:

True course:

Slip, %:

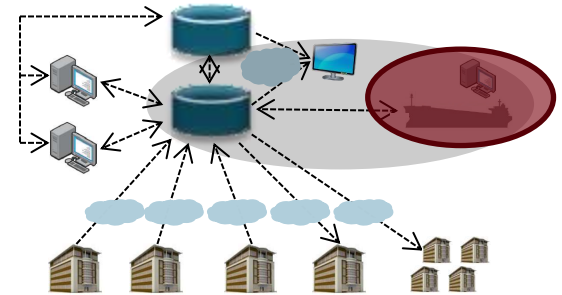
Reduced speed

Bad weather Adjusted Other

Remarks:

Period, h: Distance, nmi:

Sign
Copy
Delete
Save
Cancel



Monitoring

VESSEL REPORTING - BY CHIEF ENGINEER

Engine details

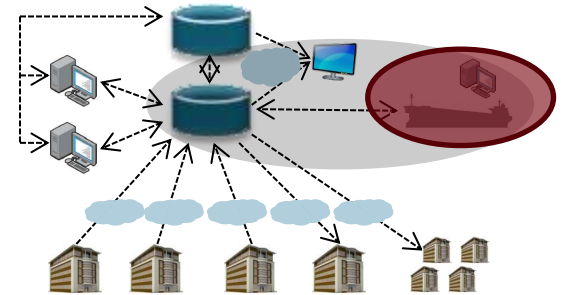
ME rotation speed, RPM:
 HFO sludge generated, mt:

ME rev counter, rev:
 Remarks:

Engine load, %:

Average power since last report, kWh:

	ROB	Consumption since last report				Reduced speed	
		Main	Auxiliary	Boilers	IG plant	Main	Auxiliary
HFO, mt:	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	
LS HFO, mt:	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	
MGO, mt:	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	
LS MGO, mt:	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	<input type="text" value="NNNN,NNN"/>	
ME cylinder oil, ltr:	<input type="text" value="NNNNNNN"/>	<input type="text" value="NNNNNNN"/>					
AE lube oil, ltr:	<input type="text" value="NNNNNNN"/>						
ME system oil, ltr:	<input type="text" value="NNNNNNN"/>	<input type="text" value="NNNNNNN"/>					
Fresh water, m ³ :	<input type="text" value="NNNN,NNN"/>	Running hours since last report					
Slops, m ³ :	<input type="text" value="NNNN,NNN"/>	AE	Hours	LO added, ltr. <input type="button" value="+"/>	Purifier	Hours <input type="button" value="+"/>	
Mixture water/oil, m ³ :	<input type="text" value="NNNN,NNN"/>						



Monitoring

VESSEL REPORTING – BY MASTER

Load port [Close]

Bridge | Engine | Statement of facts | **BL** | Tugs & lightering | Tanks | Receivers

Cargo details

Cargo

Grade	Units	BL	Ship incl VEF	Surveyor	Ship/BL, %	[Del]
<NONE>	mT (Air)	NNNNNN,NNN	NNNNNN,NN	NNNNNN,NN	NNN,NN	

BL date: 30.11.2012

Flash point, C: NNN,NN Pour point, C: NNN,NN Loading, C: NN,N

MTBE content, %: NN,N Sulphur content, %: NN,NN Max loading rate, m³/h: NNNN,NN

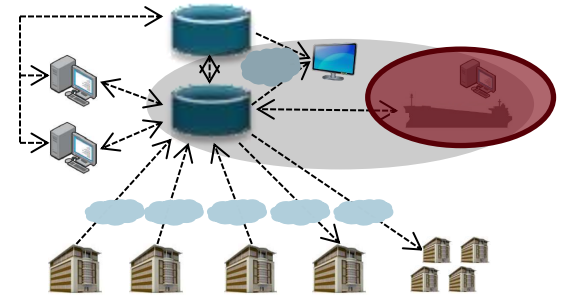
Slow rate reason: <None>

Cargo loaded in all tanks

	CTK 1	CTK 2	CTK 3	CTK 4	CTK 5	CTK 6	CTK 7	CTK 8	SLOP
Port:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Starboard:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Center:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[+ Add] Temperature: 0

[Sign] [Copy] [Get data from docs] [Delete] [Save] [Cancel]



Monitoring

VESSEL REPORTING – BY MASTER

Noon position

Bridge Engine Intermediate destinations Cargo temperature **Receivers**

Email receivers

Name	Email address	N/A	Remarks
<None>	<None>	<input checked="" type="checkbox"/>	<None>
<None>	<None>	<input checked="" type="checkbox"/>	<None>

+ Add receiver

+ Attach file

Charterer

<None>	<None>	<input checked="" type="checkbox"/>	<None>
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+ Add receiver

+ Attach file

Agents and others

<None>	<None>	<input checked="" type="checkbox"/>	<None>
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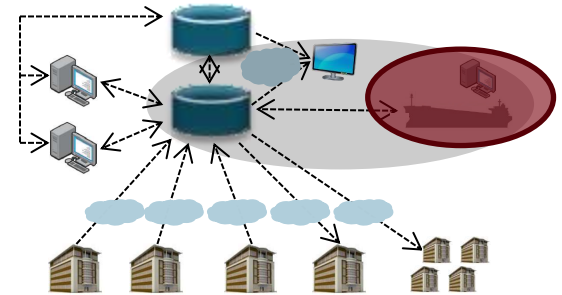
+ Add receiver

+ Attach file

General remarks

<None>

Sign Copy Delete Save Cancel



Monitoring

MONITORING - BY OFFICE OF SPEED AND CONSUMPTION

Vessel: Charterer: NPP Operator: Phone:

Type: Charterers Broker: NPP Headoperator: Owners Operator: Phone:

Status: Contact: Rpt Local Time, Noon: Timezone:

Voyage: Phone: 24 hour Consumption:

HFO	LS HFO	MGO	LS MGO	Lub. Oil	CO ₂
ROB: 95,5	96,6	0,0	49,5	0,0	
24 hour Consumption: 24,6	0,0	0,0	0,0	0,0	77,7

Fixture: Mobile phone: E-mail:

Freight Agreed: Owners Broker: Agr Speed Ballast: Cons: Agreed Temp:

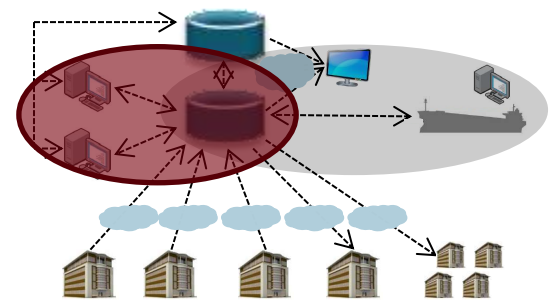
Freight Received: Charter Party: Actual Speed: Cons: Avg. Temp:

Comments:

Charter Party Date: Laycan START: Optimal speed to meet laycan: Start:

Laycan END: End:

Laycan TIMEZONE: CP Speed: Cons: Recap reference:



VesselName	Number	LayCanStartDate	OptimalSpeedLayCanStart	ActualSpeed	Agreed Speed
Baltic Wind	125	20.06.2010 00:01	4,89	12,3	12,5
Acor	49	20.06.2010 00:01	11,21	14,6	13,5

2 records

Monitoring

MONITORING - BY OFFICE OF SPEED AND CONSUMPTION

Glomaris sync: ● [Transactions](#) [Take ownership](#) [Disable sync](#) [SOFs](#) [Print](#) [History](#)

Vessel: Charterer: NPP Operator: Phone:

Type: Charterers Broker: NPP Headoperator: Owners Operator: Phone:

Status: Contact: Rpt Local Time, Noon: Timezone:

Voyage: Phone: Mobile phone: E-mail:

Fixture:

T/C Equivalent: Owners Broker: 24 hour Consumption:

HFO	LS HFO	MGO	LS MGO	Lub. Oil	CO ₂
ROB: 134,6	535,2	0,0	91,1	0,0	
0,0	24,0	0,0	0,0	0,0	75,8

Freight Agreed: Charter Party: Agr Speed Laden: Cons: Agreed Temp:

Freight Received: Charter Party Date: Actual Speed: Cons: Avg. Temp:

Comments:

Laycan START: Laycan END:

Laycan TIMEZONE:

CP Speed: Cons:

Recap reference:

Optimal speed to meet laycan
Start: End:
Slip, %: Calc slip, %:

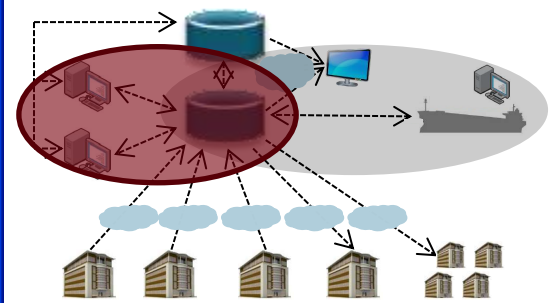
Chartering module calculates all possible speed combinations with resulting earnings and **thus highest earnings are chosen**

Speed Comparison Analysis

To analyze how alternative ballast/laden speeds can impact your voyage results, add a row for each desired speed combination.

Ballast	Laden	Profit	TCE	Daily Profit	Bunker Exp	Voyage Days
10,50	12,50	49.513,87	9.068,71	9.068,71	58.130,47	5,46
10,50	13,00	49.038,94	9.020,40	9.020,40	58.605,40	5,44
10,00	12,50	49.528,37	9.001,20	9.001,20	58.115,98	5,50
10,50	12,00	49.362,76	8.999,23	8.999,23	58.281,59	5,49
11,00	12,50	48.761,44	8.994,64	8.994,64	58.882,91	5,42
10,50	11,00	49.745,46	8.974,70	8.974,70	57.898,89	5,54
10,50	11,50	49.430,03	8.966,44	8.966,44	58.214,32	5,51
10,50	13,50	48.480,85	8.953,45	8.953,45	59.163,49	5,41
10,00	13,00	49.053,43	8.952,98	8.952,98	58.590,91	5,48
11,00	13,00	48.286,51	8.945,66	8.945,66	59.357,84	5,40
10,50	10,50	49.837,35	8.938,16	8.938,16	57.806,99	5,58
10,00	12,00	49.377,25	8.932,57	8.932,57	58.267,09	5,53

Clear Generate From Vessel Speeds



Monitoring



Reporting

24*7 seas

- ▶ CSR report

- ▶ 3 consecutive annual CSR reports

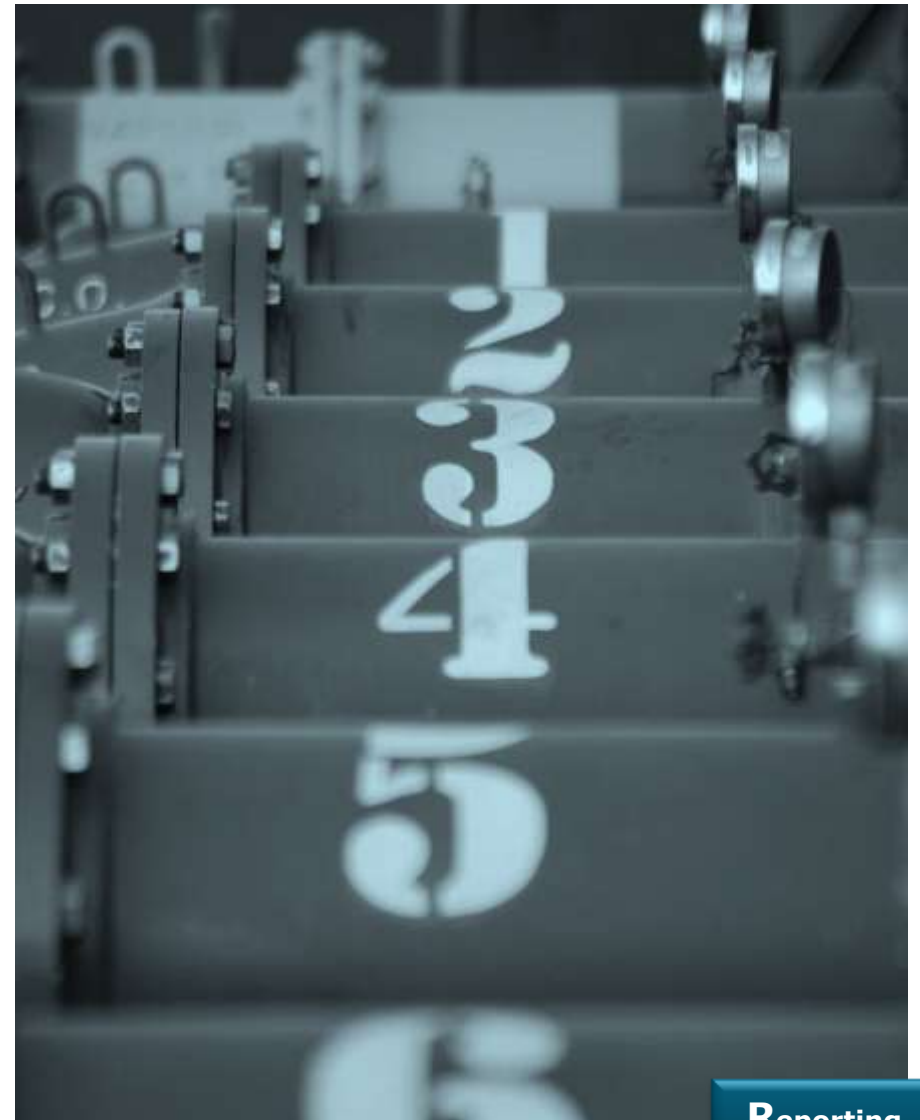


- ▶ CDP – Carbon Disclosure Report

- ▶ 5 consecutive annual CDP reports



- ▶ Danish Shipowners' Association



Reporting

ENERGY AND CLIMATE

Goal 1: Reduction of the simple average sulphur content from 2.09 % to max. 2% in total bunkers purchased in 2011



Goal 2: Reduce CO₂ emissions by 25% from 2007 to 2020 for owned tanker vessels

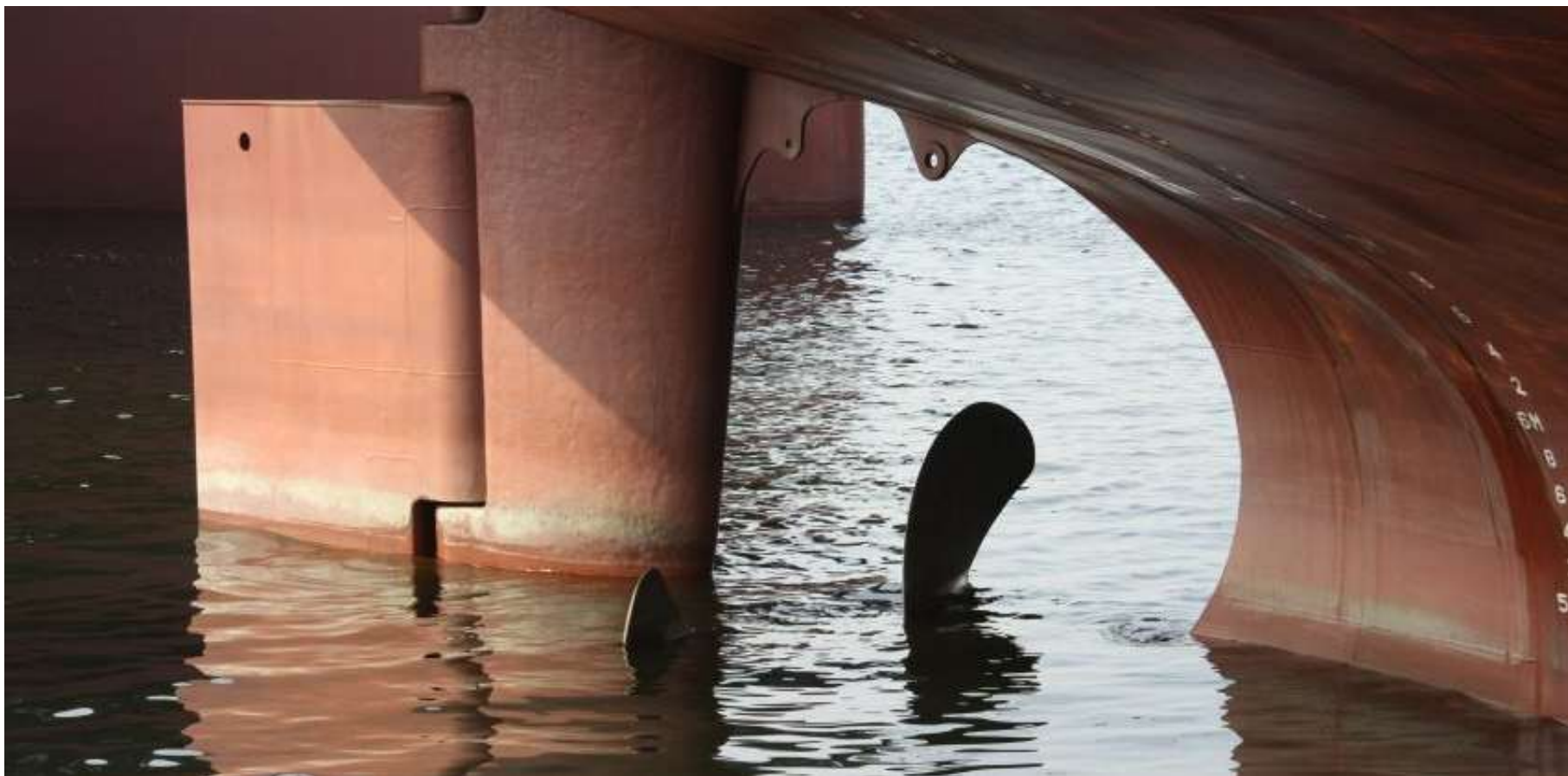


Goal 3: Reduce CO₂ emissions by 25% from 2007 to 2020 for owned dry cargo vessels



Goal 4: Part of the Leadership Index in the CDP reporting in 2011





Verification

24*7 seas

▶ DNV

- ▶ Scope 1 emissions include emissions from owned vessels and also emissions from owned company cars.
- ▶ Scope 2 emissions include emissions from land-based activities at NORDEN's offices worldwide, except the Annapolis office since electricity is integrated in rental costs.
- ▶ Scope 3 emissions include emissions from chartered vessels, business travel by air transport and leased company cars.
- ▶ SOx and NOx emissions.

▶ PwC

- ▶ The remaining data in the CSR report such as employees, waste, active core fleet, vetting, port state control, lost-time injury, near-misses, piracy and whistleblowing.
- ▶ Reviews DNV's verification process.



Verification

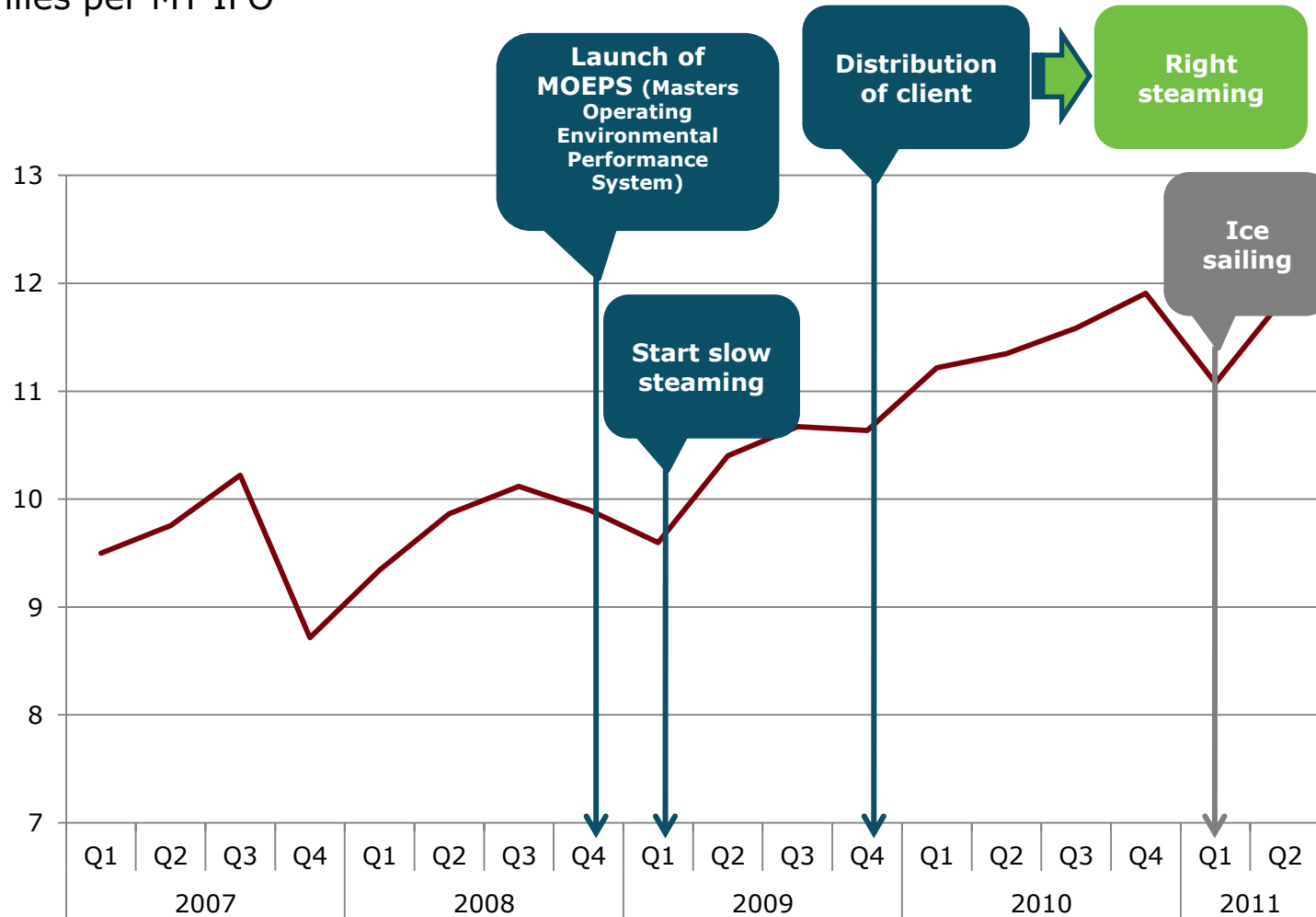


Effect of MRV

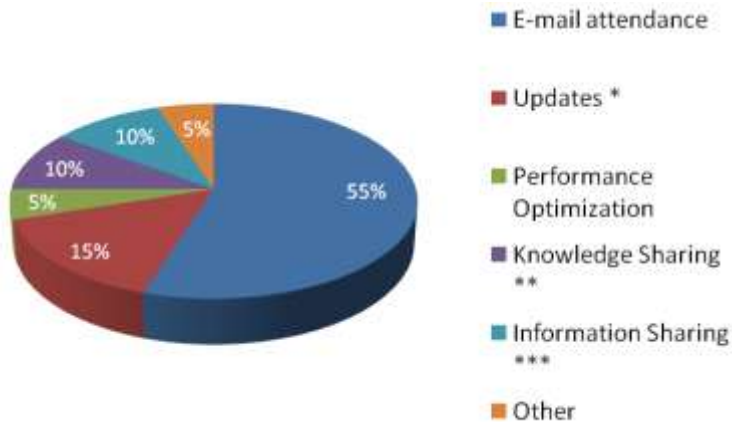
24*7 seas

WE CAN SAVE *MONEY* ON FUEL

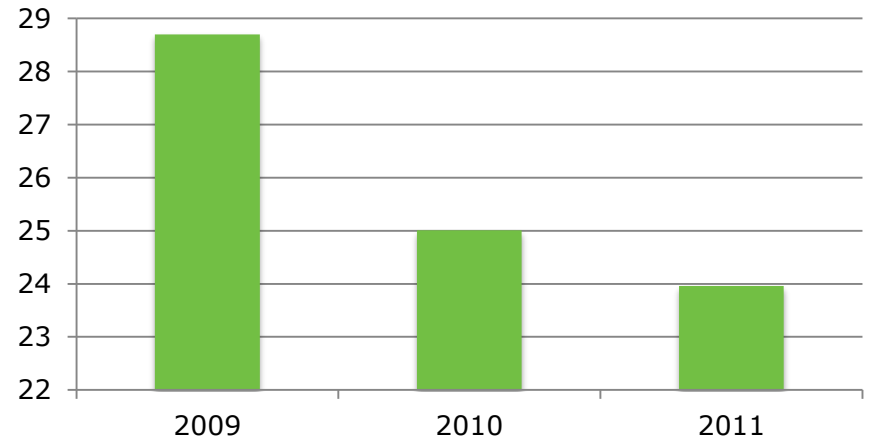
Sailed miles per MT IFO



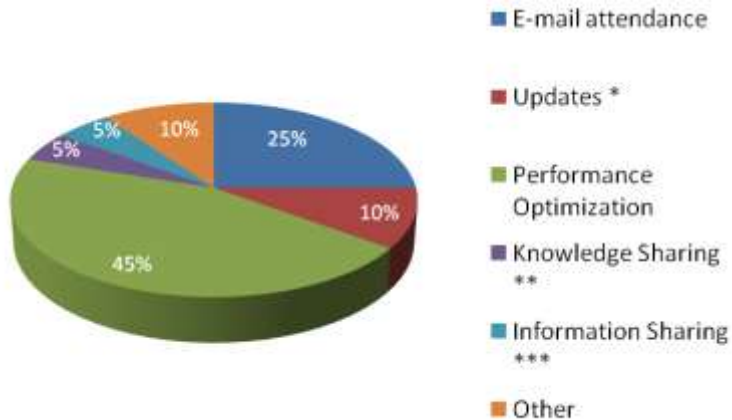
Past – Norient Product Pool



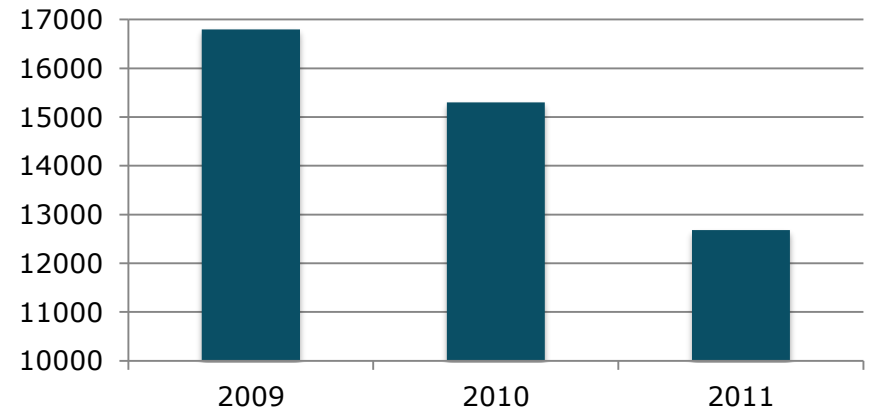
Avg. bunker consumption per day (mt)



Present – Norient Product Pool



Average CO₂ emission per vessel (mt)



GOOD FOR ENVIRONMENT - GOOD FOR THE BOTTOM LINE

	2009	2010	2011
Avg. Bunker Price (USD)	352	451	621
Spot vessels in the period (No.)	32	38	47
Avg. Speed (knots)	13,40	12,85	12,55
Avg. Bunker consumption per vessel at sea per day (MT)	28,70	25,01	23,96
Avg. Days at sea per vessel	168	192,96	167,5
Avg. bunker consumption per vessel per year at sea (MT)	5.316	4.842	4.013
Total bunker consumption at sea (MT)	170.119	183.315	188.443
Total bunker cost (USD)	59.881.888	82.675.065	116.956.892
CO ₂ emission for spot Fleet(MT)	537.576	579.275	595.480
INDEX 2009			
Bunker Saving (MT)	-	27.057	37.315
CO ₂ Saving (MT)	-	85.500	117.915
Loss of T/C E days due to slower speed	-	323	535
Saving including lost T/C E days (USD)	-	8.217.210	15.947.711



Complexity

24*7 seas

- ▶ Sphere of control
 - ▶ Energy Efficiency Operational Indicator (EEOI) is defined by IMO as the ratio of mass of CO₂ (mt) emitted per unit of transport work
- ▶ Responsibility → Complexity
 - ▶ Owners → T/C out
 - ▶ Commercial Managers/Operators → T/C in
- ▶ Slow Steaming = less earning days
- ▶ Baseline for Consumption
 - ▶ 2007 ? – uniform level for all
 - ▶ 2013 ? – penalize early movers/improvers

ratio of mass of CO₂ (MT)
portwork

$$\text{Average EEOI} = \frac{\sum_i \sum_j (FC_{ij} \times C_{Fj})}{\sum_i (m_{\text{cargo},i} \times D_i)}$$

Technical / EEOI-Optimization

- Fuel optimization
- SFOC (specific fuel oil consumption)

Operation

- Speed
- Consumption
- Performance driven operation
- Etc...

Commercial

- Utilization
- Ballast/Laden ratio
- Cargo intake

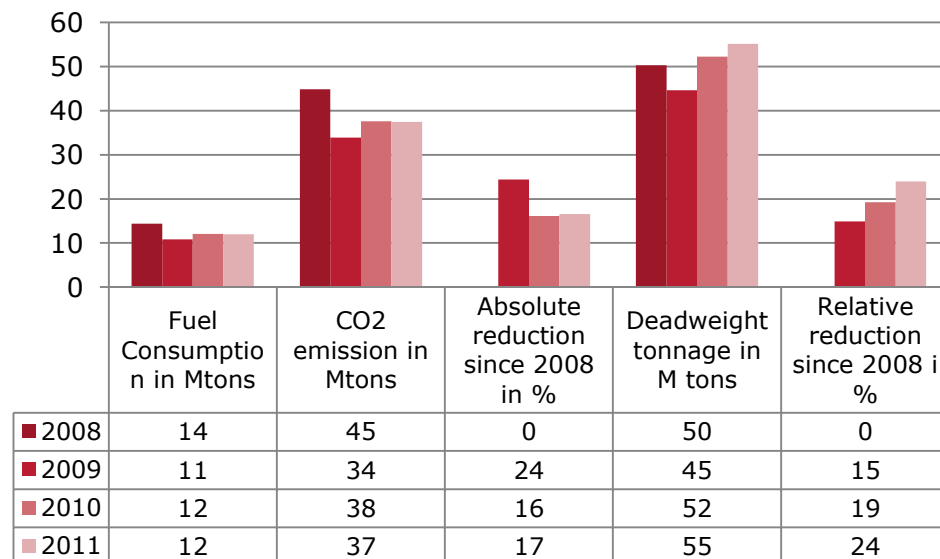
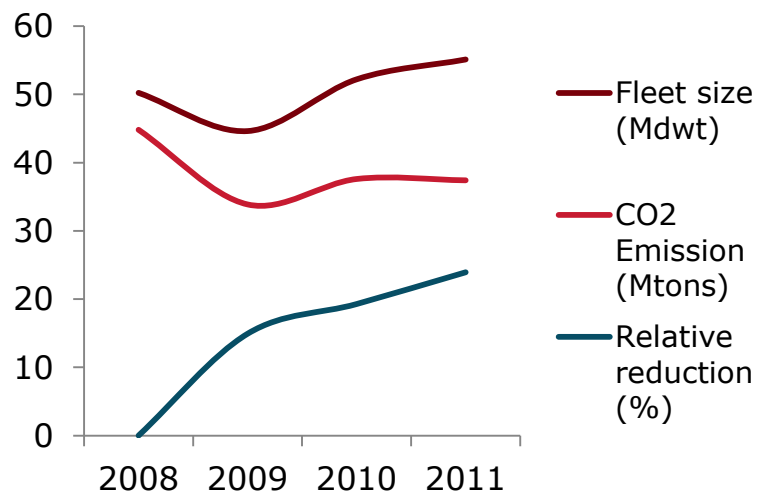




Industry Perspective

24*7 seas

- ▶ MRV is not a new scheme, but good common sense in a difficult market environment.
- ▶ Since 2008 the Danish Shipowners' Association have reported and publicized its members annual bunker consumption / CO2 emissions vs. fleet size.
- ▶ Relative to fleet growth Danish shipping has achieved 24% reduction.
- ▶ It is in the interest of the industry to be transparent about their consumption – status quo is not an option.



- ▶ Operational efficiency – verified by MRV – is an investment by shipping companies in Slow/Right Steaming and/or Energy Saving Devices.
- ▶ Beneficiaries of operational efficiency are the shipping companies due to lower cost/improved bottom line AND the environment as a result of CO2 reductions.
- ▶ The Industry and Environment do NOT need MBM, securing (only) new revenue streams from ETS or Fund Payments, and only limited, if any, Consumption and Emission Reduction.
- ▶ Operational efficiency will ensure real reductions in consumption and emissions.
- ▶ We support MRV as a transparent and robust way to implement operational efficiency – the industry should support MRV.

THANK YOU FOR YOUR ATTENTION
QUESTIONS ?

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