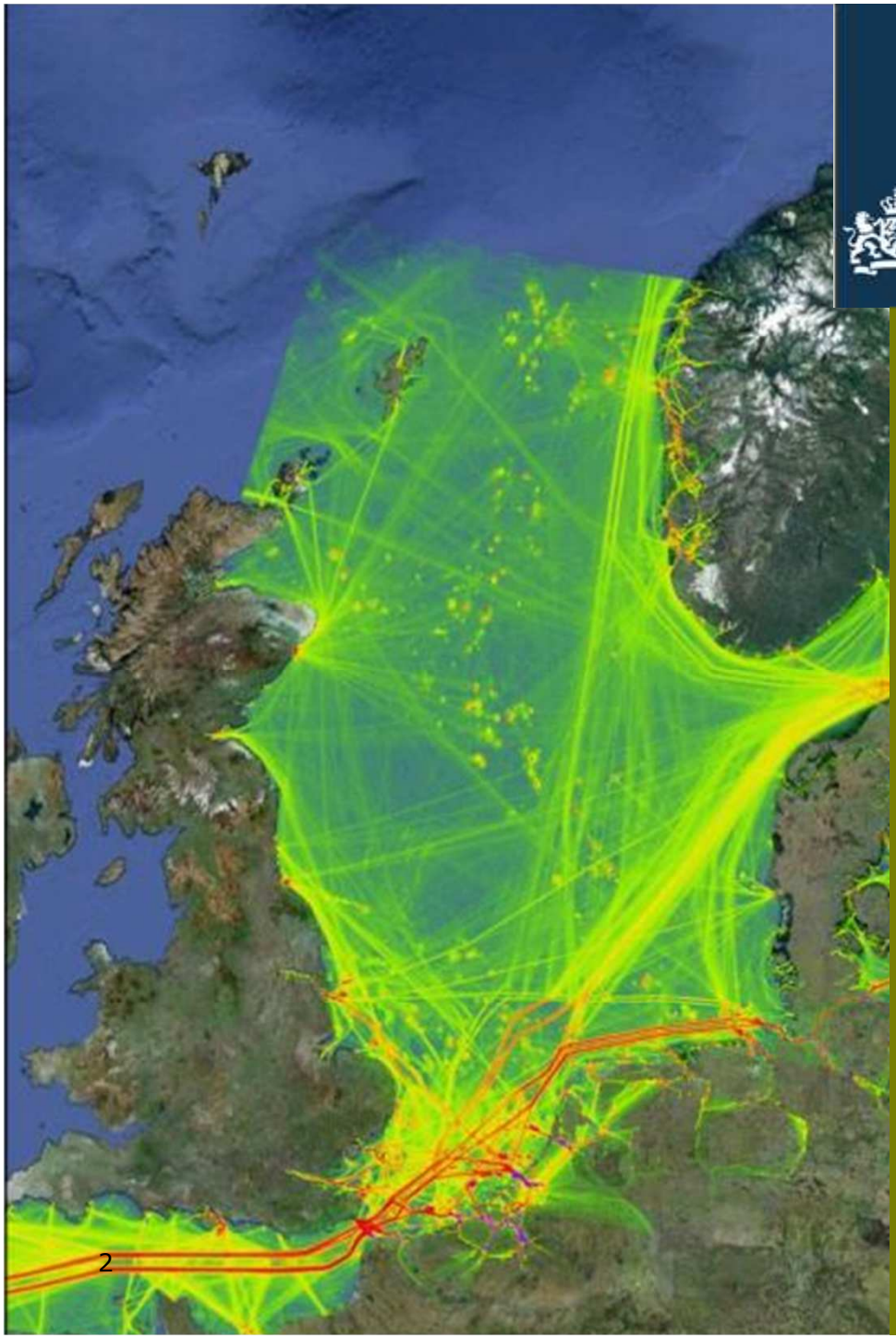
Seminar ‘Inwerkingtreding Zwavelregelgeving’ – 8 okt. 2014

13.00 uur	**Ontvangst**	
13.30 uur	Opening en introductie	Dagvoorzitter *Tineke Netelenbos*
13.35 uur	Milieueffecten van de nieuwe zwavelregelgeving	Planbureau voor de Leefomgeving *Pieter Hammingh*
13.50 uur	Handhaving van de zwavelrichtlijn	Inspectie Leefomgeving en Transport *Meindert Vink*
14.10 uur	Stand van zaken European Sustainable Shipping Forum (ESSF)	Min. van Infrastructuur en Milieu *Dick Brus*
14.25 uur	ESSF implementatie en scrubbers	European Maritime Safety Agency *Roel Hoenders*
14.40 uur	Gelegenheid voor vragen / discussie	O.l.v. Dagvoorzitter
15.00 uur	Koffie- en theepauze	
15.20 uur	Scrubbers in de praktijk. Toeleveranciers pitchen:	
	a. Werkingsprincipe a.d.h.v. voorbeeldcase	Axces Emission Technology *Kjelt Remmen*
	a. Retrofit van de Color Line Super Speed (Engelstalige presentatie)	Wärtsilä *Ole-Johan Svendsen*
	a. Closed loop system voor Scandlines	AEC Maritime *Jurrien de Vries*
16.00 uur	Scrubbers in de praktijk. Een reder vertelt	Spliethoff *Sjoerd Hupkes Wijnstra*
16.25 uur	Financiering van scrubbers	ABN – AMRO *Jan Raes*
16.40 uur	CEF subsidieprogramma: Kansen voor de scheepvaart	Min. van Infrastructuur & Milieu *Paul Zeer*
16.55 uur	Gelegenheid voor vragen / discussie	O.l.v. Dagvoorzitter
17.15 uur	Netwerkborrel	



PBL Netherlands Environmental Assessment Agency

Milieu-effectiviteit van de zwavelregelgeving bij de zeescheepvaart

8 Oktober 2014 | Pieter Hammingh

Waarom we zwavel niet willen…..

	PM (BC, OC)	SO_2	NO_x	VOC	NH_3	CO	CO_2	CH_4	N_2O	HFCs PFCs SF_6
Health impacts: PM (Loss in life expectancy)	√	√	√	√	√					
O_3 (Premature mortality)			√	√		√		√		
Vegetation damage: O_3 (AOT40/fluxes)			√	√		√		√		
Acidification (Excess of critical loads)		√	√		√					
Eutrophication (Excess of critical loads)			√		√					
Climate impacts: Long-term (GWP100)	(√)	(√)	(√)	(√)	(√)	(√)	√	√	√	√
Near-term forcing (in Europe and global mean forcing)	√	√	√	√	√	√	(√)	√	(√)	(√)
Black carbon deposition to the arctic	√									

Bron: IIASA EC4MACS

Lager zwavelgehalte betekent ook minder fijn stof

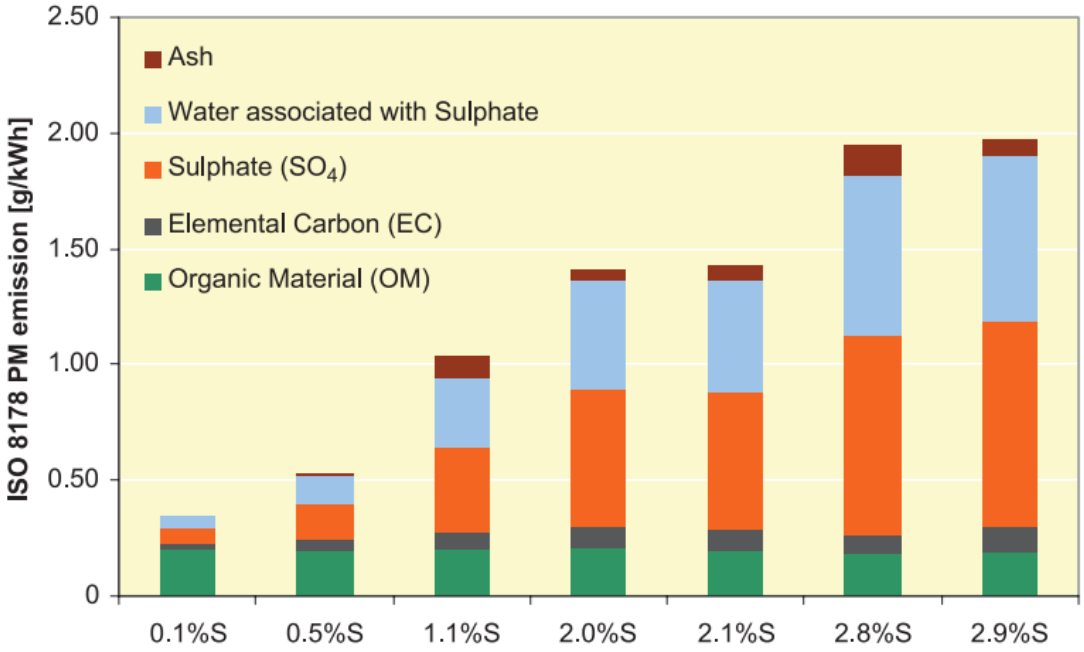
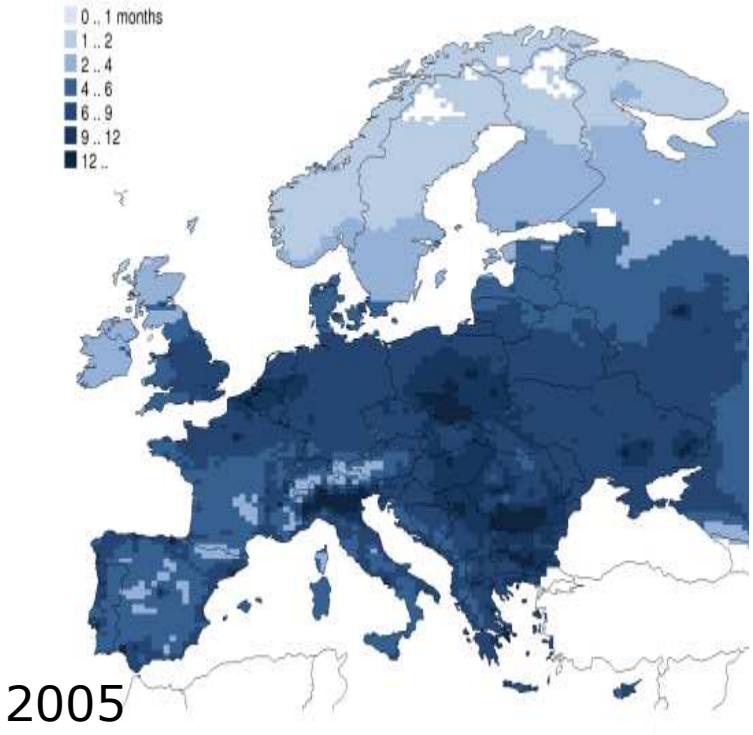


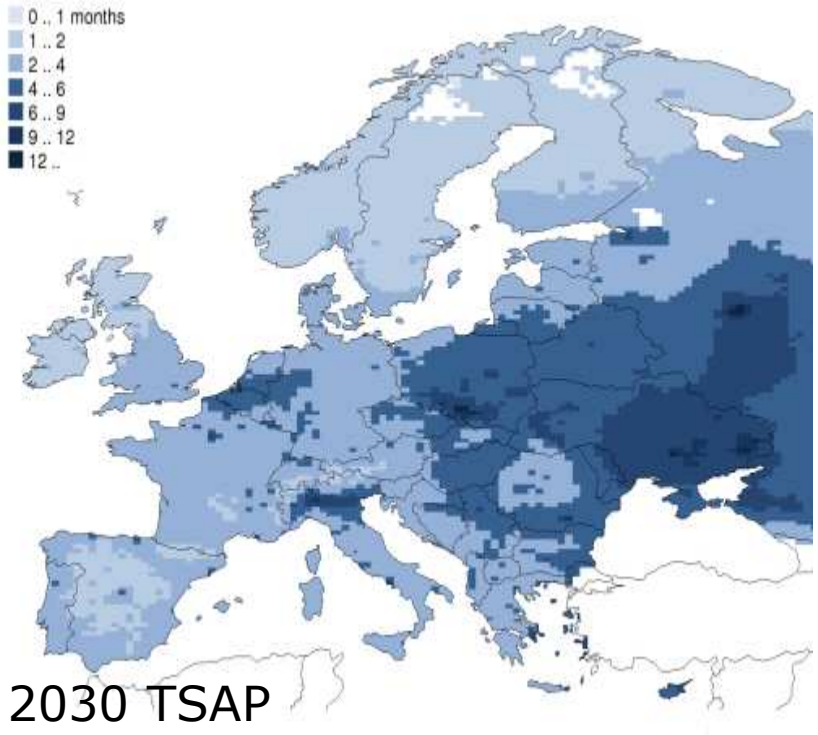
Figure 7.7 *The compositions of particulate matter obtained from different fuel types, Germanischer Lloyd [24]*

Bron: IMO (2009), 2nd GHG Study

Met minder fijn stof leef je langer



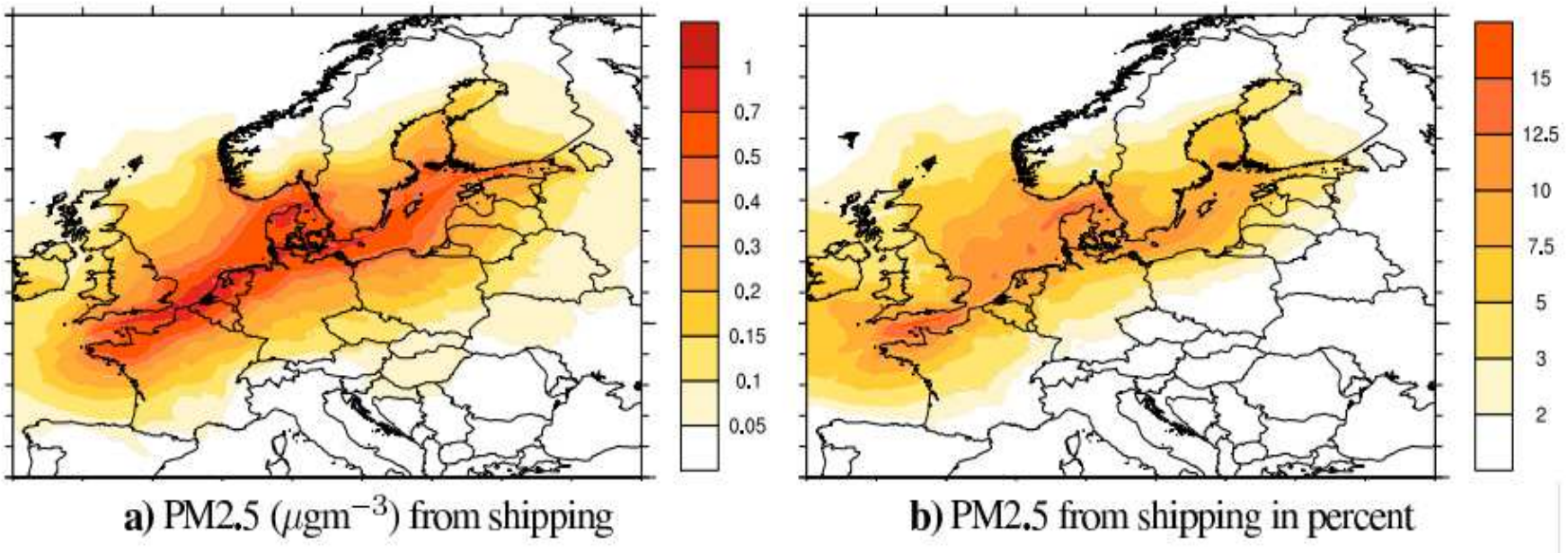
2005



2030 TSAP

Loss in statistical life expectancy from exposure to PM2.5 from anthropogenic sources. Bron: IIASA (2014).

Bijdrage zeescheepvaart aan fijn stof in 2009

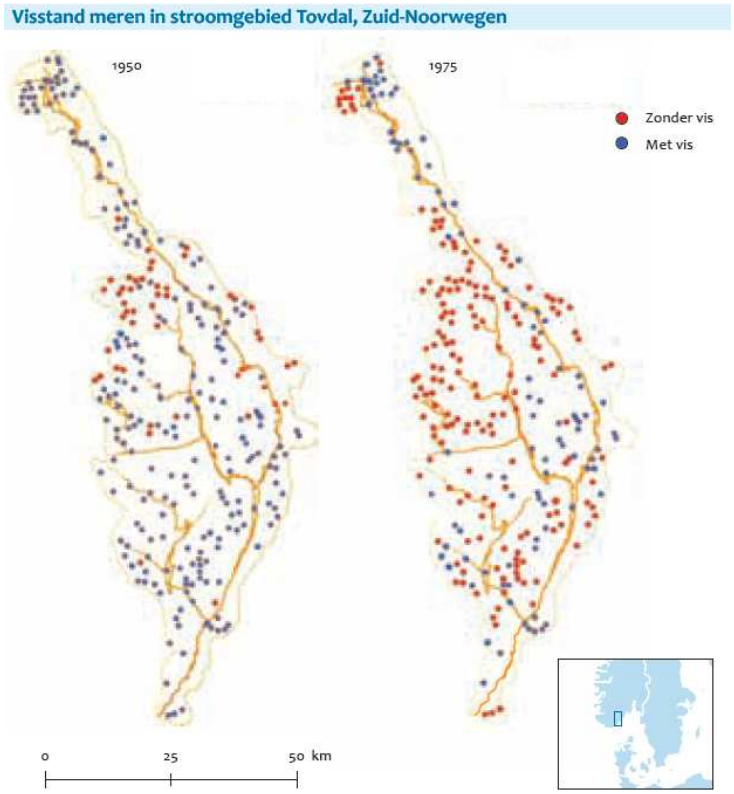


a) PM2.5 (μgm^{-3}) from shipping

b) PM2.5 from shipping in percent

Bron: J. E. Jonson , J. P. Jalkanen et al., (2014). Atmos. Chem. Phys. Discuss., 14, 21943–21974, 2014

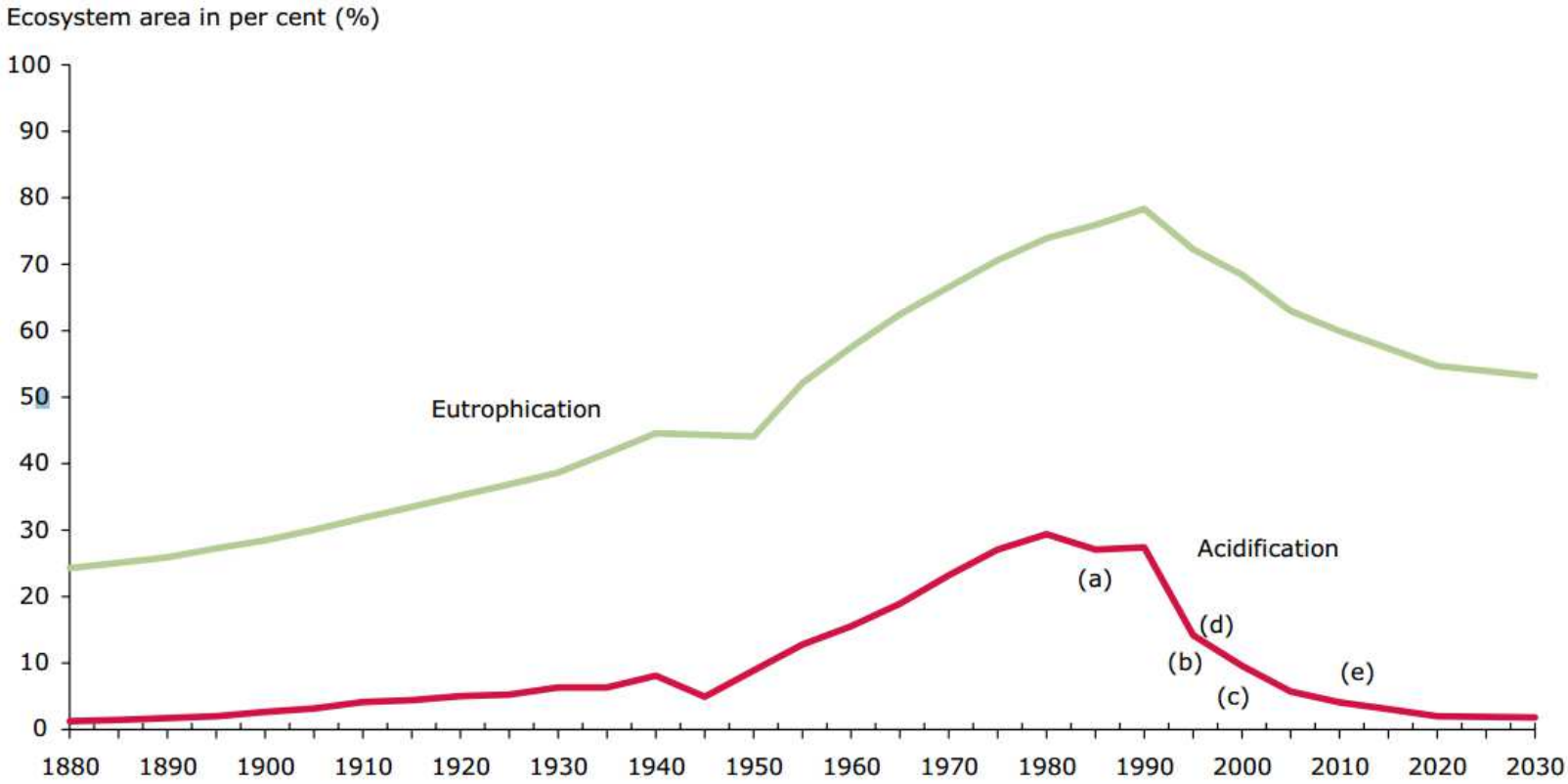
Verzuring



Bron: Brække (1976); bewerking PBL

Bron: VROM (1985)

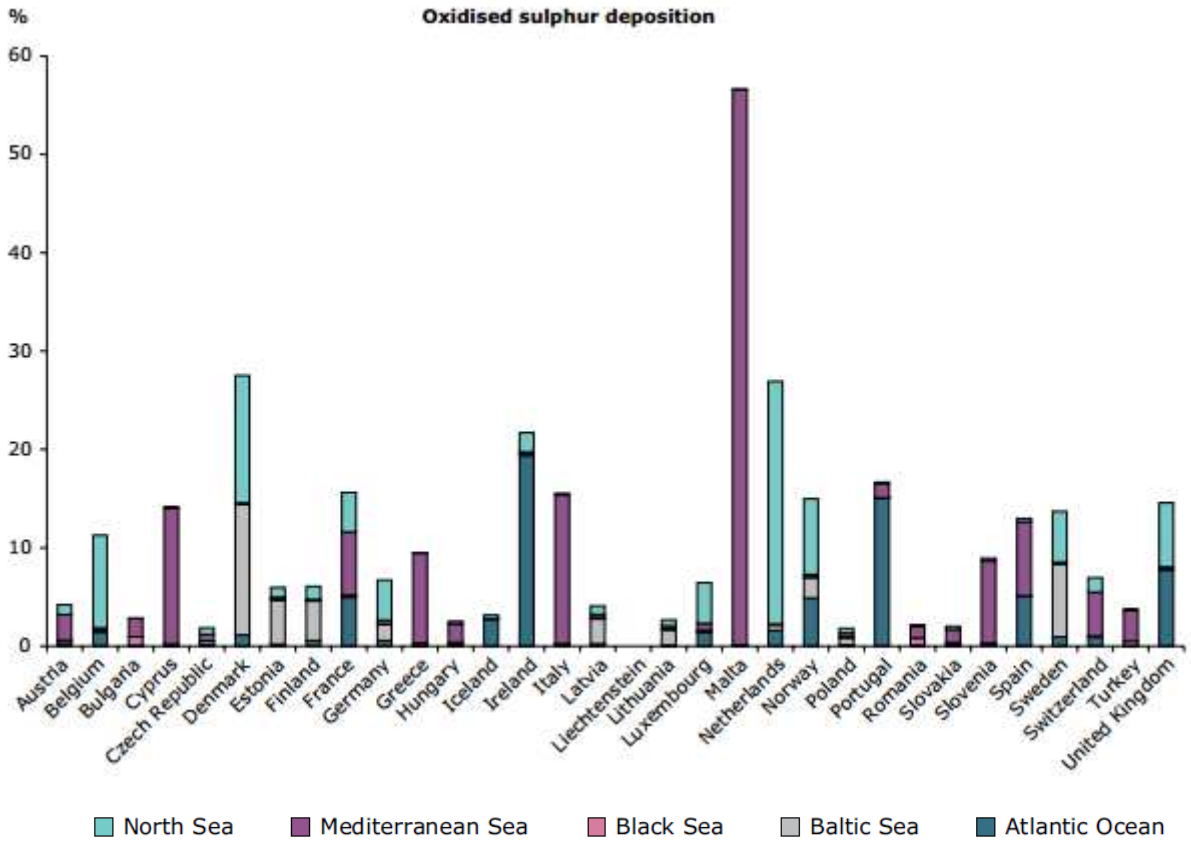
Verzuring in ecosystemen neemt fors af



Note: (a) First Sulphur Protocol (1985); (b) Second Sulphur Protocol (1994); (c) Gothenburg Protocol (1999); (d) NEC Directive (2001); (e) Amended Gothenburg Protocol (2012).

Bron: EEA technical report 11/2014.

Bijdrage zeescheepvaart aan zuurdepositie,2012



Bron: EEA technical report No. 4/2013, gebaseerd op EMEP (2012)

Uitstoot op zee vs land in Europa met huidig beleid

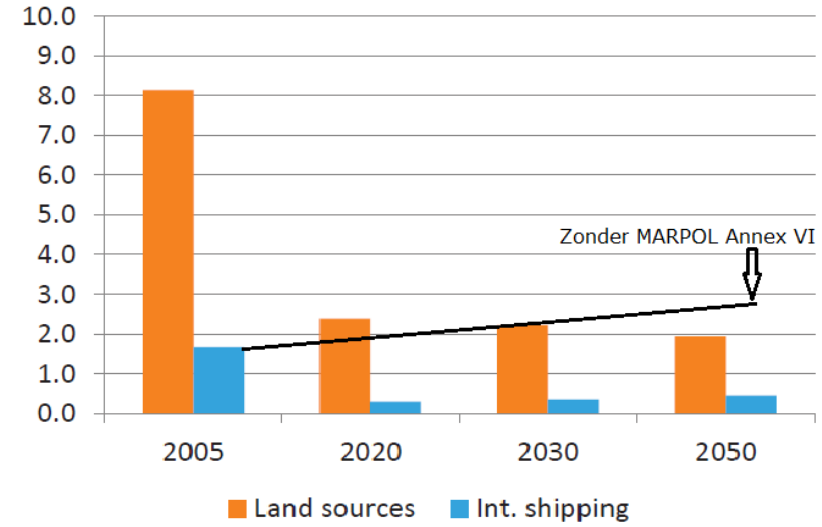


Figure 4.2 Comparison of land based and international shipping emissions of SO_2 (kt)

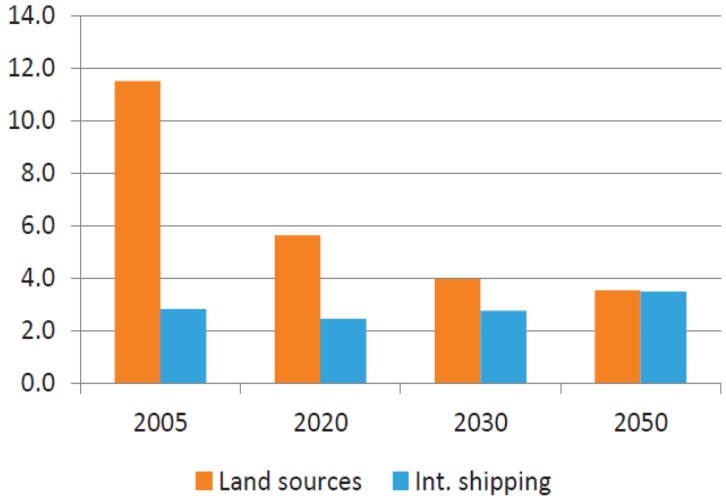
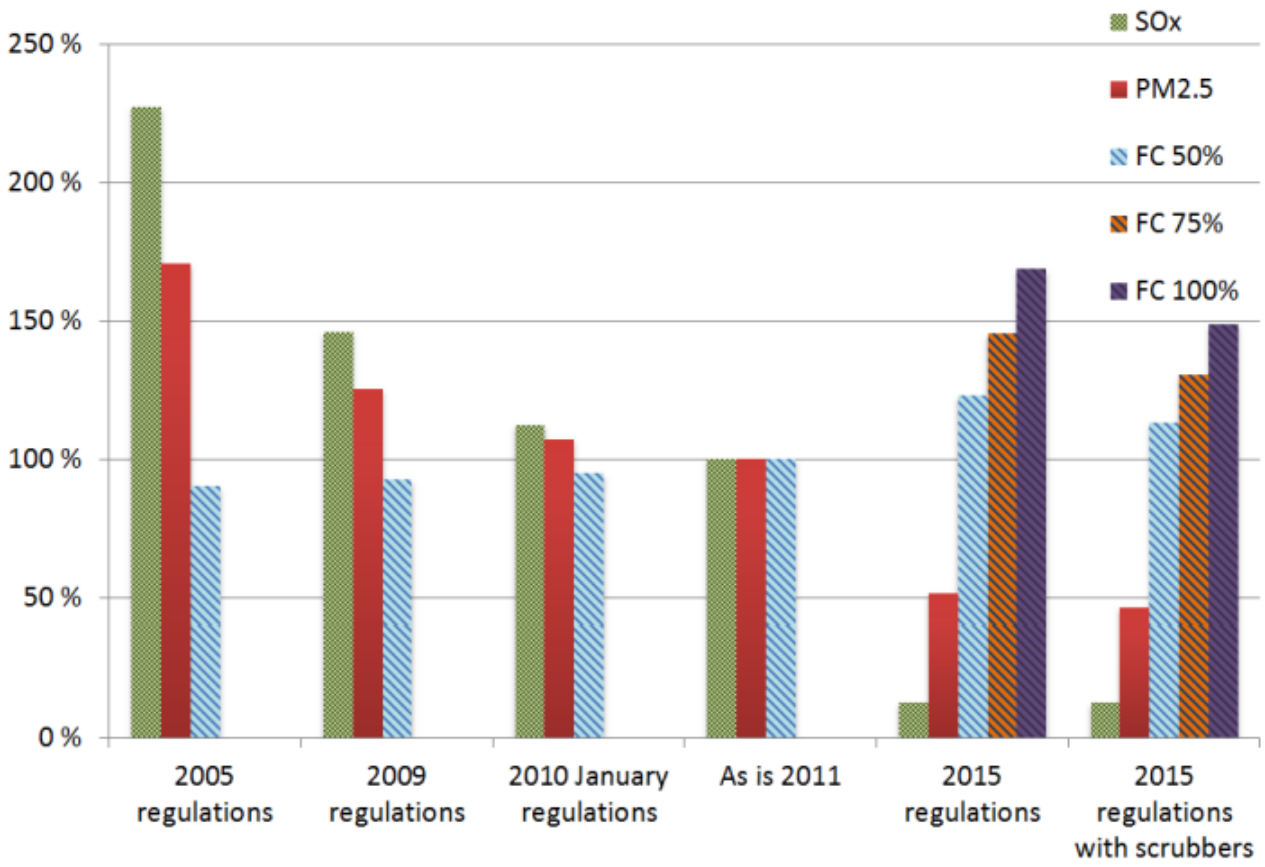


Figure 4.1 Comparison of land based and international shipping emissions of NO_x (kt)

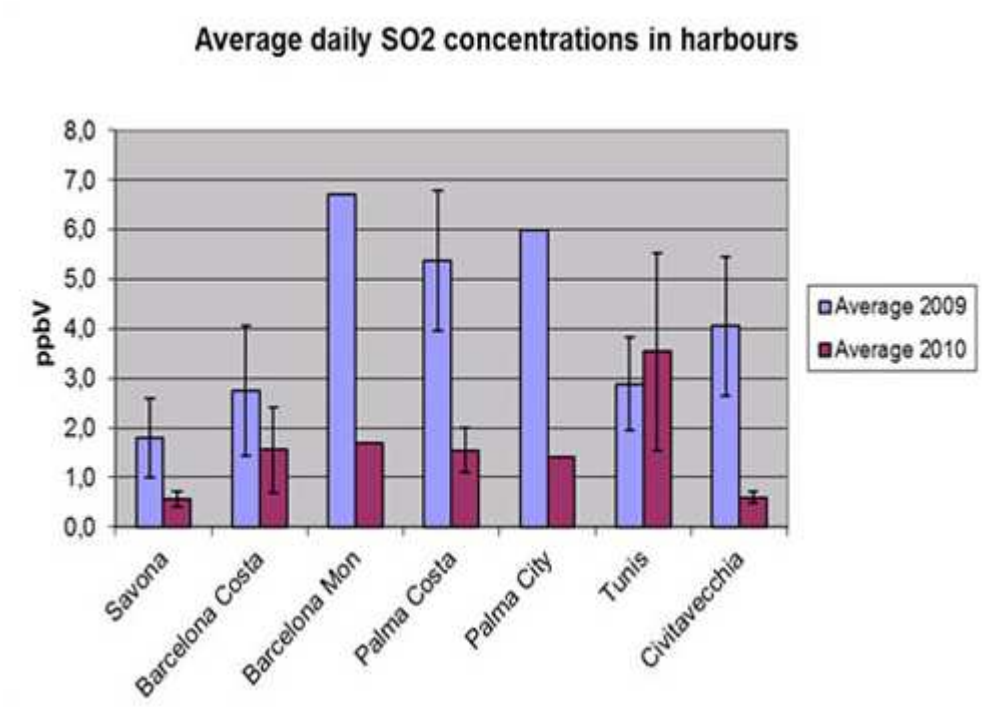
Bron: PBL aanpassing van VITO, 2013

Effecten SECAs op emissies en kosten

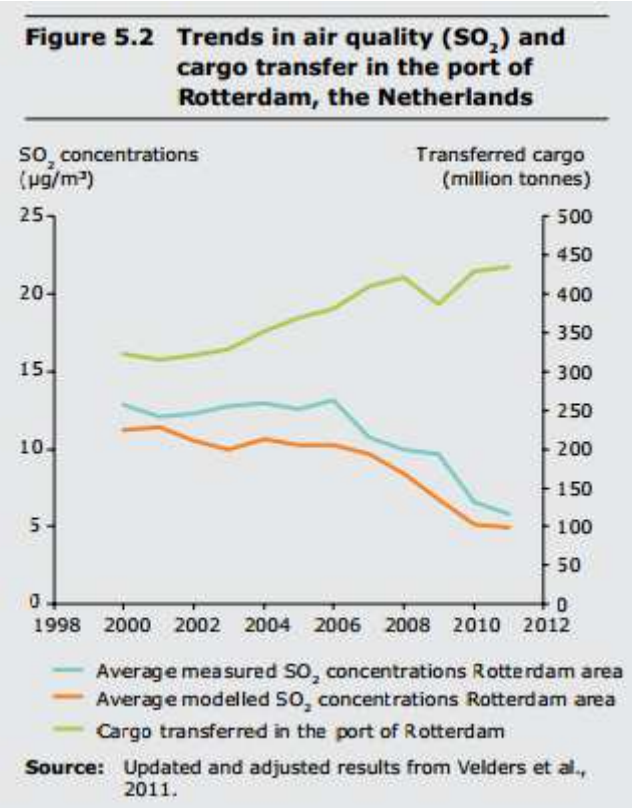


Bron: Johansson et al., 2013 (ACPD 13)

Effecten SECAs op de luchtkwaliteit in havens

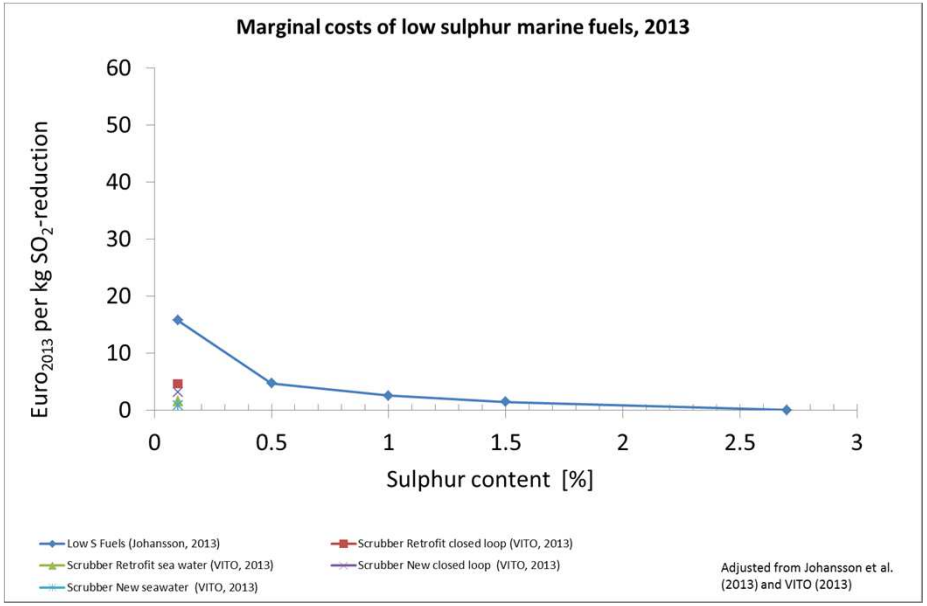


Bron: Schembari et al., 2012



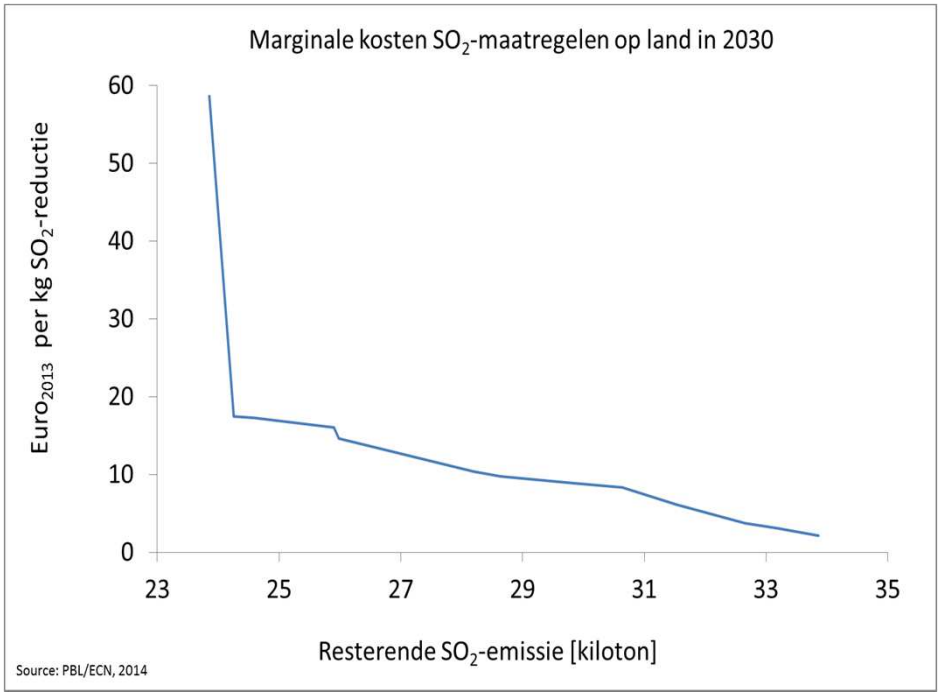
Bron: EEA technical report No. 4/2013

Kosteneffectiviteit SECAs vs landmaatregelen?



Disclaimer: schone brandstoffen verminderen naast de zwaveluitstoot ook de primaire fijnstofuitstoot (as, koolstof). Voor een goede kostenvergelijking zou een maatregelenpakket op land dan ook kosten moeten bevatten voor een vergelijkbare fijnstofreductie. Daarvoor zijn aanvullende analyses nodig.

De SO_2-maatregelen bij bronnen op land leveren nauwelijks nog fijnstofreductie op omdat daar meestal al fijnstoffilters zijn vereist en geïnstalleerd.



Bevindingen

- Zwavel uit de zeevaart draagt substantieel bij aan de huidige fijnstofconcentraties met de daaraan gerelateerde ziektelast en vervroegde sterfte + zuurdepositie;
- SECA-regels leiden nu al tot lagere gemeten SO_2-concentraties.
- Schonere scheepsbrandstoffen met 0.5%-S leveren een relatief forse zwavelreductie voor relatief lage kosten (t.o.v. land).
- 0.1%-S lijkt wat duurder, maar schonere scheepsbrandstoffen leiden ook tot minder primaire fijnstofuitstoot (as, koolstof). Als dit wordt verdisconteerd dan zou dat de kosteneffectiviteit van schonere brandstoffen gunstig beïnvloeden (t.o.v. land).
- De kosteneffectiviteit van scrubbers in 2030 ligt aan de onderkant van die van landmaatregelen….klopt dat?

Ministerie van Infrastructuur en Milieu

European Sustainable Shipping Forum ESSF

Seminar Inwerkingtreding zwavelregelgeving

8 oktober 2014

Dick Brus, Ministerie van Infrastructuur en Milieu

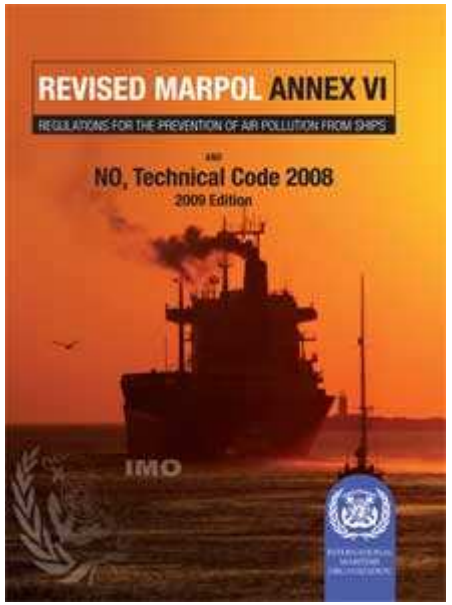
15 oktober 2014

Inhoud

- Revisie MARPOL Bijlage VI
- EU Zwavelrichtlijn
- Platform European Sustainable Shipping Forum
  1. Groep LNG
  2. Research, Technical development and Innovation
  3. Scrubbers zie presentatie Roel Hoenders
  4. Implementation zie presentatie Roep Hoenders
  5. Financing
  6. Competitiveness

Revisie MARPOL Bijlage VI, 2008

	Global limit	SECA-limit
Present	4,5 %	1,5%
1 march 2010		1,0%
1 january 2012	3,5 %	
1 january 2015		0,1%
1 january 2020 *)	0,5 %	



*) Evaluation in 2018. If these will be negative, the date of introduction will shift from 2020 to 2025

Revisie MARPOL Bijlage VI vervolg

Artikel 4. gebruik alternatieve technologie

- De Administratie van een Partij kan toestaan dat installaties, materialen, middelen of toestellen worden aangebracht op een schip of dat er andere procedures, brandstofolie of methodes worden gebruikt dan degene die worden vereist door deze Bijlage, indien …….. emissiebeperking ten minste even doeltreffend zijn
- De Administratie van een Partij neemt eventueel door de Organisatie ontwikkelde relevante richtlijnen met betrekking tot de in dit voorschrift voorziene gelijkwaardige voorzieningen in aanmerking.
- BV, Scubbers en IMO Waswater Criteria

Artikel 18, Brandstof beschikbaarheid

- Indien geen geschikte brandstofolie is de bevoegde autoriteit van deze Partij bevoegd ter zake van het schip te verlangen dat:
- .1 een verslag wordt overgelegd van de maatregelen genomen teneinde te pogen aan de vereisten te voldoen; en
- .2 bewijzen worden verschaft van pogingen tot aankoop van voor het reisschema geschikte brandstofolie en, indien deze niet op de geplande plaatsen beschikbaar was, dat gepoogd is alternatieve aanbieders te vinden, en dat men er ondanks alle redelijke inspanningen niet in geslaagd is geschikte brandstofolie in te kopen.
- 2.2 Van een schip mag niet verlangd worden dat zij afwijkt van de beoogde route of onredelijk veel vertraging oplopen om aan de vereisten te voldoen.
- 2.3 Indien ter zake van een schip de informatie bedoeld in lid 2.1 van dit voorschrift wordt verschaft, neemt een Partij alle relevante omstandigheden en het overgelegde bewijs in aanmerking teneinde te bepalen of en welke passende beheersmaatregelen worden genomen.

EU richtlijn zwavelgehalte van scheepsbrandstoffen, 2012, ESSF

1. Implementatie Revisie MARPOL Bijlage VI
2. Enkele scherpere regels voor passagiersschepen en schepen aan de kade
3. Afspraken over handhaving van de richtlijn
4. Verplichting voor rapportage over handhaving en resultaten
5. Verplichting voor de Europese Commissie om ongewenste modal shift effecten te monitoren, en indien nodig met aanvullend beleid te komen

Om de richtlijn goed te implementeren is de European Sustainable Shipping Forum, ESSF opgericht. The ESSF will bring together Member States and maritime industry stakeholders. The ESSF envisages in particular to:

- provide guidance on the implementation of the Sulphur Directive;
- create the framework conditions for the use of marine LNG as ship fuel;
- create the framework conditions for the use of scrubbing technology in shipping
- explore and evaluate all the available financing opportunities
- coordinate research and development activities and encourage innovation.

European Sustainable Shipping Forum ESSF

Deskundigengroep van de Commissie

The ESSF will bring together Member States and maritime industry stakeholders. It will enable a structural dialogue, exchange of best practices and coordination, thus providing the opportunity to discuss practical issues that could be encountered during the implementation process, in particular during the transition phase before the entry into force of the new standard.

Composition of the ESSF

All 28 EU Member States

The following 32 organisations:

Baltic Ports Organization
BMT Group Limited
Brittany Ferries
Compagnia Italiana di Navigazione
Conference of Peripheral Maritime Regions Cruise Lines International Association (CLIA) - Europe
DNV/GL
European Association of Internal Combustion Engine Manufacturers-EUROMOT
European Community Shipowners Associations (ECSA)
European Sea Ports Organisation
European Shippers Council (ESC)
European Transport Workers' Federation
SEA Europe
Seas At Risk
Shortsea Promotion Centre – Greece
Shortsea Promotion Centre – Spain
STX Shipyards France
Swedish Shippers Council
The oil companies' European association for environment, health and safety in refining and distribution - CONCAWE
Transport & Environment (T&E)
Wärtsilä Corporation
WATERBORNE European Technology Platform
FEPORT – Federation of European Private Port Operators
Ferry Port Split
Gas LNG Europe (GLE)
GDF SUEZ
IACS - International Association of Classification Societies Ltd
Interferry
International Association of Independent Tanker Owners (INTERTANKO)
Moeller-Maersk
Norwegian Marine Technology Research Institute MARINTEK
Royal Association of Netherlands Shipowners

Nederlandse deelname aan de ESSF

ESSF Plenair
- Dick Brus, vertegenwoordiger Nederland
- Martin Dorsman, ECSA

LNG subgroep
- Cees Boon, Haven van Rotterdam
- Philip van Wijnen, P&O ferries

Scrubbers subgroep
- Meindert Vink
- Philip van Wijnen, P&O ferries

Financing subgroep
- Caroline Nagtegaal-van Doorn, Haven van Rotterdam
- Sieger Sacco, Nederlands Maritieme Technologie
- Tiedo Vellinga, Haven van Rotterdam
- Maurits Prinsen, Haven van Rotterdam
- Sarah Olierook, Haven van Rotterdam
- Fer vd Laar, IAPH

Research and Development subgroep
- Eelco Leemans, Seas at Risk
- Bart Boosman, Wagenborg

Competitivenes subgroep
- Martin Dorsman, KVNR
- Peter van de Sluis, AWVH

Implementation subgroep
- Meindert Vink
- Stefan Hagens

Werkgroep LNG

Internationale oplossingen om gebruik LNG door zeeschepen mogelijk te maken:

- Veiligheid bij bunkeren moet worden gewaarborgd, ontbreekt nu nog in IMO regelgeving.
- LNG bunker delivery note, voorstel is naar de IMO gestuurd en wordt in Oktober in MEPC67 besproken
- Standaard LNG connector, gaat ook naar IMO. Discussie: aanpassing IGF code of ISO standaard???
- LNG potentie in verminderen uitstoot luchtverontreinigende stoffen
- Technische discussies over meting methaan, dual fueled schepen, methaan lek, e.d.

Werkgroep onderzoek, technologische ontwikkeling en innovatie

- Focus op short sea shipping en oplossingen om op korte termijn de kosten te verminderen
- Onderzoek naar de relatie van investeringen in R&D en de prestaties van maritieme bedrijven
- Relatie tussen nieuwe scheepsontwerpen en benodigde aanpassing van de benodigde infrastructuur
- Rol R&D, identificeren barrières en mogelijkheden om die op te ruimen

Werkgroep Financing

1. EU fondsen

- Motorways of the Sea
  - Veel geld beschikbaar, wel onder voorwaarden:
    - not for single undertakers
    - only for links between 2 or more member states
    - involvement of a core and a comprehensive network port as a minimum in relation to MoS-link based projects (such requirement does not apply for pilot actions or wider benefits actions)
    - The involvement of two ports is a prerequisite, but ships calling at at least two EU ports on a regular basis might trigger the need for related activities (not necessarily of a large magnitude) at these ports (e.g. for dealing with scrubber sludge or safety procedures for receiving ships fuelled by alternative fuels).

Werkgroep Financing 2

Connecting Europes FacilityCEF/TEN-T

- An analysis of the TEN-T funding in the past showed some shortcomings towards ferry operators.
- Some of these points are solved in the current framework of CEF and other EU-funds, others not.
- The subgroup is trying to find ways to finance projects in alternative ways, taking into account the shortcomings perceived by shipowners.

- Meer bijzonderheden later door Paul Zeer

Werkgroep Financing 3

Publiek private financiering

Een publiek private *"retrofit fund and/or bond instrument for financing environmental SECA retrofit investments"*

- With the assumption of needed EIB financing of the credit enhancement element, eligibility of CEF financing must be considered
- How can the instrument be aligned with existing ship financing?
- Legal issues, including taxation
- How can a risk profile for the instrument/different instruments be set up?
- How can the shipowners' new balance between operating costs (OPEX) and capital expenses (CAPEX) by retrofit investments be assessed? Basically the business case is the OPEX difference between the MGO (Marine Gas Oil) case and a scrubber case accommodating the use of HFO (Heavy Fuel Oil) or an LNG case. The use of MGO only demands modest investments in contrast to scrubbers or LNG and the amortized capital in relation to the investments must be deducted from the OPEX difference between the MGO and the scrubber/LNG case.
- Delimitation of mature technologies and/or technology neutrality and possibility of "gearing" SECA investments with energy efficiency investments
- What is the need for retrofit funds?
- Is there a role for CEF grants to support the fund and/or bond instrument in its development or implementation and if so, how shall it be formulated?

Werkgroep Competitiveness

Opdracht Commissie om te monitoren of er geen ongewenste modal shift effecten van zee naar land optreden

- identification of routes and cargo segments that are expected to be the most sensitive.
- the monitoring of the most sensitive routes/segments through surveys
- a comprehensive analysis and comprehensive methodology

Zorg sommige leden: te veel onzekerheden LNG en scrubbers, financiering en mogelijkheden komen te laat.

European Maritime Safety Agency

European Sustainable Shipping Forum

Sub-groups Implementation, Scrubbers & LNG : state-of-play

Roel Hoenders / Project Officer
Unit B.3: Marine environment and PSC

Harderwijk / 8 October 2014

EMSA

ESSF Implementation sub-group

Addresses:

1. Outstanding **legal questions** related to the 2012 revision of the Sulphur Directive (2012/33/EU)
2. Potential scope and content of the Directive's **Implementing Acts**

Participants:

- **All EU Member States**
- **Ship owners**: Brittany Ferries, Grimaldi, Royal Belgian Shipowners Association, Fjordline, KNVR, P&O Ferries, DFDS, Maersk, German Ship Owners Association, Royal Caribbean, Maran tankers, Lemissoler
- **Class**: LR, DNV/GL, Rina
- **Ports**: ESPO/Finnish Ports Association, Antwerp, Rome
- **Others**: Concawe, Transport & Environment, SeaEurope, Scheepsbouw NL, CEPI

Meetings:

- So far 3 meetings, EMSA is technical secretariat

ESSF Implementation sub-group

Ad 1. Addressing outstanding legal questions related to the 2012 revision of the Sulphur Directive:

- Enforcement of correct fuel change-over procedures at SECA entry:
  - safety risks
  - on-board fuel contamination
  - correct log-books
- Enforcement of historic fuel contamination as of 1/1/2015: possible grand-fathering?
- Enhanced controls of bunker suppliers: strengthened application of Marpol Annex VI Regulation 18?
- Acceptability of alternative emission abatement methods (boil-off gas, averaging,…) – *continuously achieving equivalent sulphur reduction*
- Use of alternative selection methods (remote sensing, sniffing,…)

➢ **Commission is assessing need of issuing interpretative guidance for a harmonised approach through an EU F.A.Q. document**

ESSF Implementation sub-group

Ad 2. Addressing potential scope and contents of the Implementing Acts (= secundary legislation as foreseen in the Directive) concerning:

1. Frequency of sampling
2. On-board fuel sampling methods
3. Reporting by Member States about enforcement actions

Implementing acts to be accompanied with **voluntary use** of :

- Thetis-S: shared enforcement database (inspections + sampling) for Member States
- On-board fuel sampling guidelines
- Guidance for Sulphur Inspections

(all currently being developed by EMSA)

➢ **Draft Implementing Acts will be discussed in 'comitology' (Member States only) on 23 October + 3 December**

ESSF scrubbers sub-group

Addresses:

1. Legal, technical and operational barriers hampering the take-up of scrubber technology in the EU
2. Financial instruments supporting technology development and take-up

Participants:

- **All EU Member States** (notably: NL, FI, DK, SE, UK, NO)
- **Ship owners**: Wilhemsen, DFDS, Scandlines, Carnival, German Ship owners, P&O, Grimaldi, RCCL, Spliethoff, Royal Belgian Ship Owners, Brittany Ferries, BIMCO, Exmar, Finnish Ports Association
- **Class**: LR, DNV/GL, ABS, BV
- **Manufacturers**: EGCSA, Wartsila, Alfa Laval,Elomatic, Clean Marine
- **Others**: ESPO, Euroshore, Transport & Environment, Total, Fincantieri, MAN

Meetings:

- So far 3 meetings, **next meeting on 5 November**
- EMSA is technical secretariat

ESSF scrubbers sub-group

Ad 1. Addresses legal, technical and operational barriers hampering the take-up of scrubber technology in the EU

- **Approval of scrubbers:**
  - Marine Equipment Directive (wheelmark), or through Comitology
  - Following a ‘trial’ as defined in the Directive
  - Commissioning of a scrubber vs. trial requirements
  - Acceptance of scrubbers approved by non-EU countries
- **pH of scrubber wash water**
  - Compatibility with other EU legislation: Water Framework Directive + surface water quality requirements
  - Acceptability of (open-loop) scrubbers in coastal waters + ports
  - Calculation methods for pH levels along the ship

ESSF scrubbers sub-group

Ad. 1 Addresses legal, technical and operational barriers hampering the take-up of scrubber technology in the EU

- Scrubber sludge: compatibility with Port Reception Facilities Directive
- Loading and on-board treatment of caustic soda

➢ **Commission is assessing need of issuing interpretative guidance for a harmonised approach through an EU F.A.Q. document**

➢ **Work of ESSF scrubber sub-group also resulted in two EU submissions to MEPC 67:**

- MEPC 67/4/22: Amendments to the IMO Exhaust Gas Cleaning Guidelines addressing pH calculation methodolgies
- MEPC 67/12/7: Amendments to Marpol Annex VI regarding standard text for the bunker delivery note for ships equipped with scrubbers

ESSF scrubbers sub-group

Ad. 2 EU financial instruments supporting technology development and take-up of scrubbers

- Work done in cooperation with the ESSF sub-groups on Financing & Competiveness
- **Current open Connecting Europe Facility (CEF) calls:**

Publication of Calls	11 September 2014
Eligibility period	From 1 January 2014
Calls deadline	26 February 2015 (17:00h)
Evaluation	March 2015 – April 2015
Presentation to CEF Committee	June 2015
Adoption of Selection Framework Decision	July 2015
Signature of individual grant agreements	As of September 2015 onwards

ESSF scrubbers sub-group

Current open Connecting Europe Facility calls:

- **Choose the right call:** 'Motorways of the Seas', 'Innovation', 'core network ports'
- **Motorways of the Seas:** 'upgrading of maritime link', 'pilot actions' (50% co-funding, new technological solutions in real operations conditions) or 'wider benefit actions'
- **Innovation**: Roll-out of alternative fuel distribution infrastructure, reduction of emissions and energy efficiency projects eligible
- Calls priority include co-funding of alternative fuels, **emission abatement technologies** and shore side power supply
- **Co-funding**: Motorways of the Seas call: **250 million €** / Innovation call: 160 million €

➢ **For more information, co-funding rates, eligibility criteria: check INEA (EU Innovation and Networks Executive Agency): www.inea.ec.europa.eu**

ESSF LNG sub-group

Addresses:

1. Legal, technical and operational barriers hampering the take-up of LNG as alternative fuel in the EU
2. Assessing the need for further harmonisation/standardisation of the EU framework for LNG bunkering

Meetings:

- So far 4 meetings, **next meeting on 11 December**
- EMSA is technical secretariat

➢ **Work of ESSF LNG sub-group also resulted in two submissions to MSC 94:**

- MSC 94/11/1: standard format for a LNG bunker delivery note
- MSC 94/11/2: standard for connectors to the be used at LNG bunkering stations

ESSF sub-group

Conclusions:

- Excellent cooperation through constructive dialogue between Member States, industry/stakeholders and Commission/EMSA
- Sulphur Directive is the basis, but participants are free to put forward any sustainable shipping related issue
- ESSF cannot replace normal legislative procedures/not intended to draft legislation, but can influence and steer these processes
- Concrete results/outcomes show high level of commitment and technical contents

Thank you for your attention!

roel.hoenders@emsa.europa.eu

twitter.com/emsa
facebook.com/emsa

EMSA

AXCES EMISSIE VISIE <8 MW

Kjelt Remmen Axces Emission Technology BV

Uitlaatsystemen specialisten: advies, ontwerp, fabricage en veld ondersteuning.

ONDERWERPEN

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- Aanpak Scrubber Oplossing
- Scrubber
- Combinatie

DEMPERS

- Inleiding
- **“Dempers”**
- Emissies
- Emissie eisen
- Aanpak
- Scrubber
- Combinatie

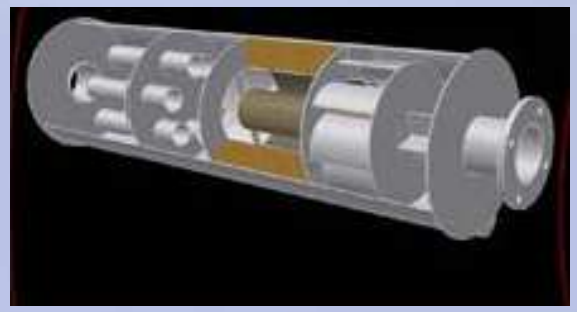
- Axces
- Toekomstgerichte ontwikkeling
- Scrubber technologieën
- Retrofit demper/ SCR katalysator/Scrubber
- Nieuwbouw demper SCR katalysator/scrubber

- Inleiding
- **“Dempers”**
- Emissies
- Emissie eisen
- Aanpak
- Scrubber
- Combinatie

Geluiddempers

Kernpunten

- **ontwerp op geluideisen**
- **afstemmen op specifieke inbouwsituaties**
- **minimaliseren tegendruk**



EMISSIES

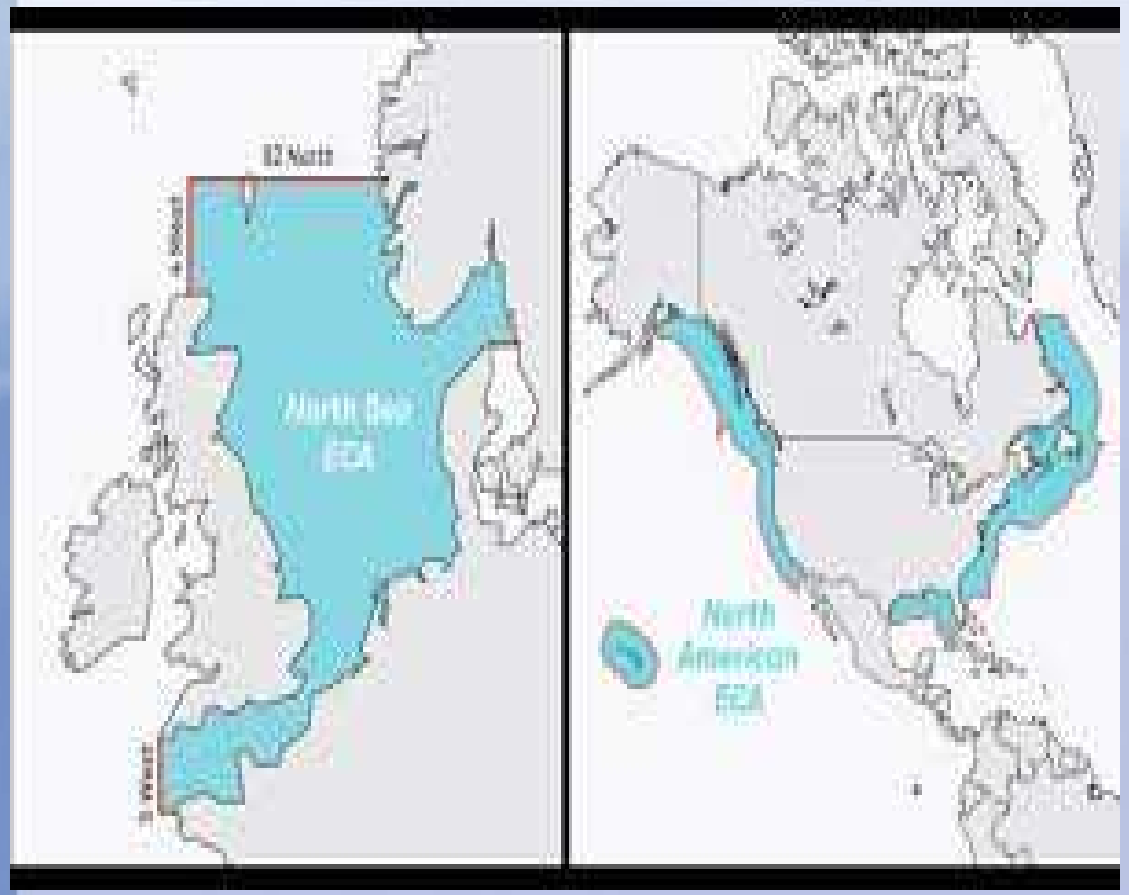
- Inleiding
- Dempers
- **Emissies**
- Emissie eisen
- Aanpak
- Scrubber
- Combinatie

- Gereguleerde Dieselmotor Emissies

- Geluid
- CO en HC (koolmonoxide en Koolwaterstoffen)
- Roet of Fijnstof PM
- Stikstof oxides of Nox
- Zwafel

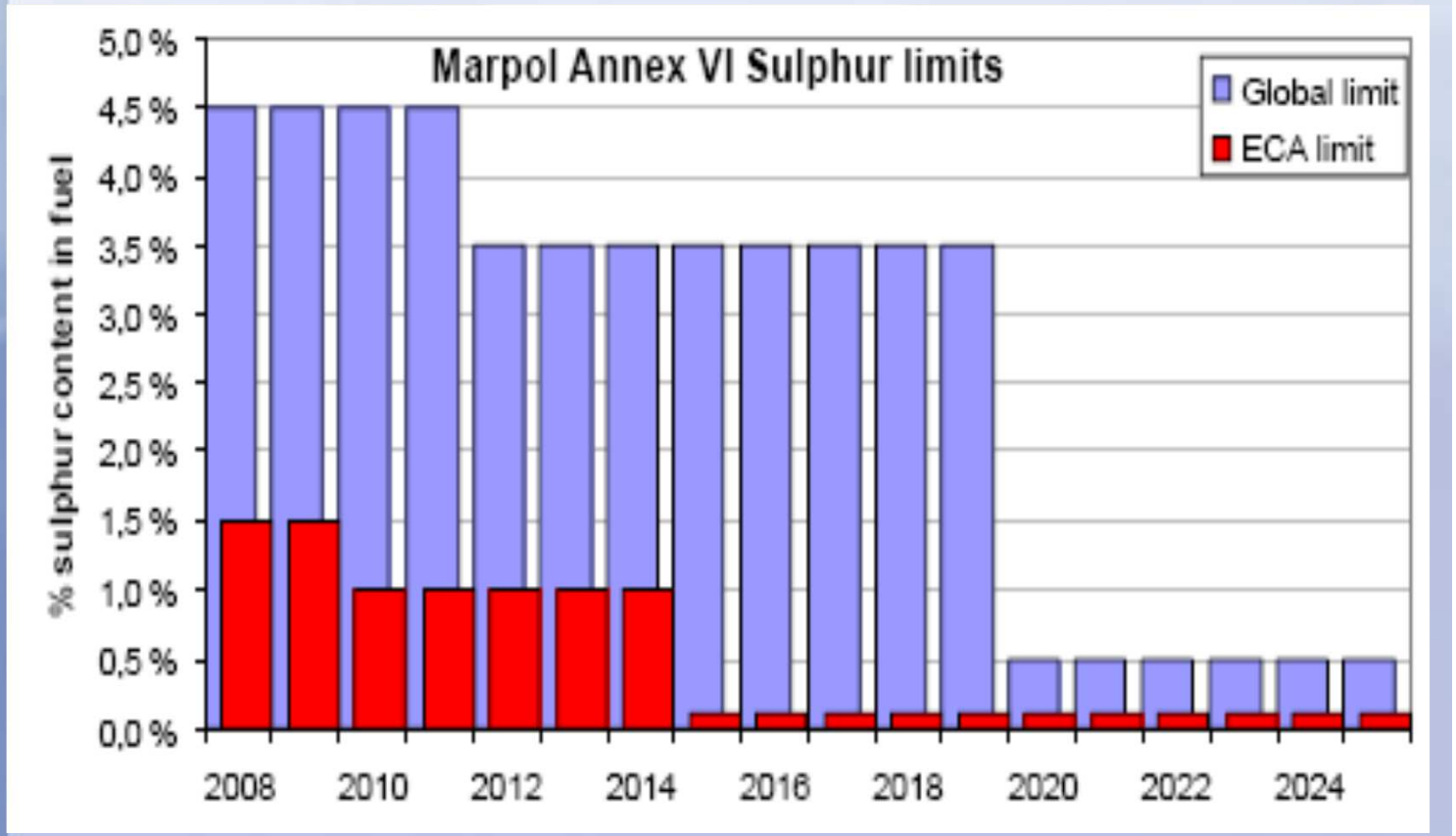
EMISSIE EISEN

- Inleiding
- Dempers
- Emissies
- **Emissie eisen**
- Aanpak
- Scrubber
- ombinatie



EMISSIE EISEN

- Inleiding
- Dempers
- Emissies
- **Emissie eisen**
- Aanpak
- Scrubber
- Combinatie



EMISSIES

- Inleiding
- Dempers
- **Emissies**
- Emissie eisen
- Aanpak
- Scrubber
- Combinatie

Afbeelding DNV

EMISSIE EISEN

- Inleiding
- Dempers
- Emissies
- **Emissie eisen**
- Aanpak
- Scrubber
- Combinatie

- **De ECA brandstof standard is:**
- 10,000 ppm start Juli 2010.
- 1,000 ppm start Januari 2015.
- **Wereld standaards zijn:**
- 35,000 ppm start Januari 2012.
- 5,000 ppm start Januari 2020 (heroverweging 2018, niet later dan 2025).

AANPAK

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- **Aanpak**
- Roetfilter
- SCR Kat
- Combinatie

- Nieuwe Motoren en brandstof soort
- Brandstof kwaliteit verbeteren
- Nabehandeling uitlaatgassen
- SECA met schip vermijden?

AANPAK

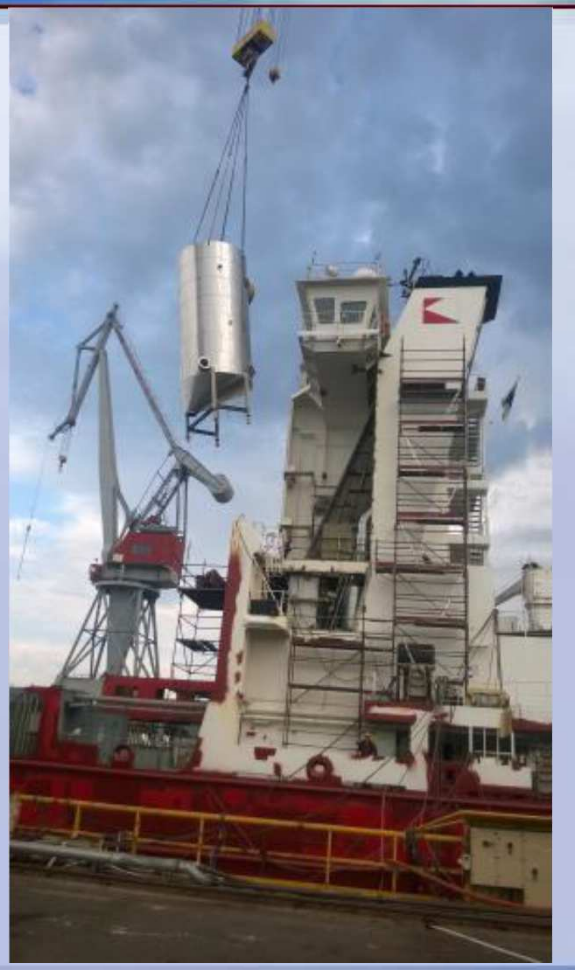
- Inleiding
- Dempers
- Emissies
- Emissie eisen
- **Aanpak**
- Roetfilter
- SCR Kat
- Combinatie

- •Emissie eisen
- •Br. Stof prijs
- •beschikbare ruimte
- •Zwaartepunt
- •Vervuiling ? Waar?
- Resedu?
- •Levensduur schip
- •kosten equipment

AANPAK

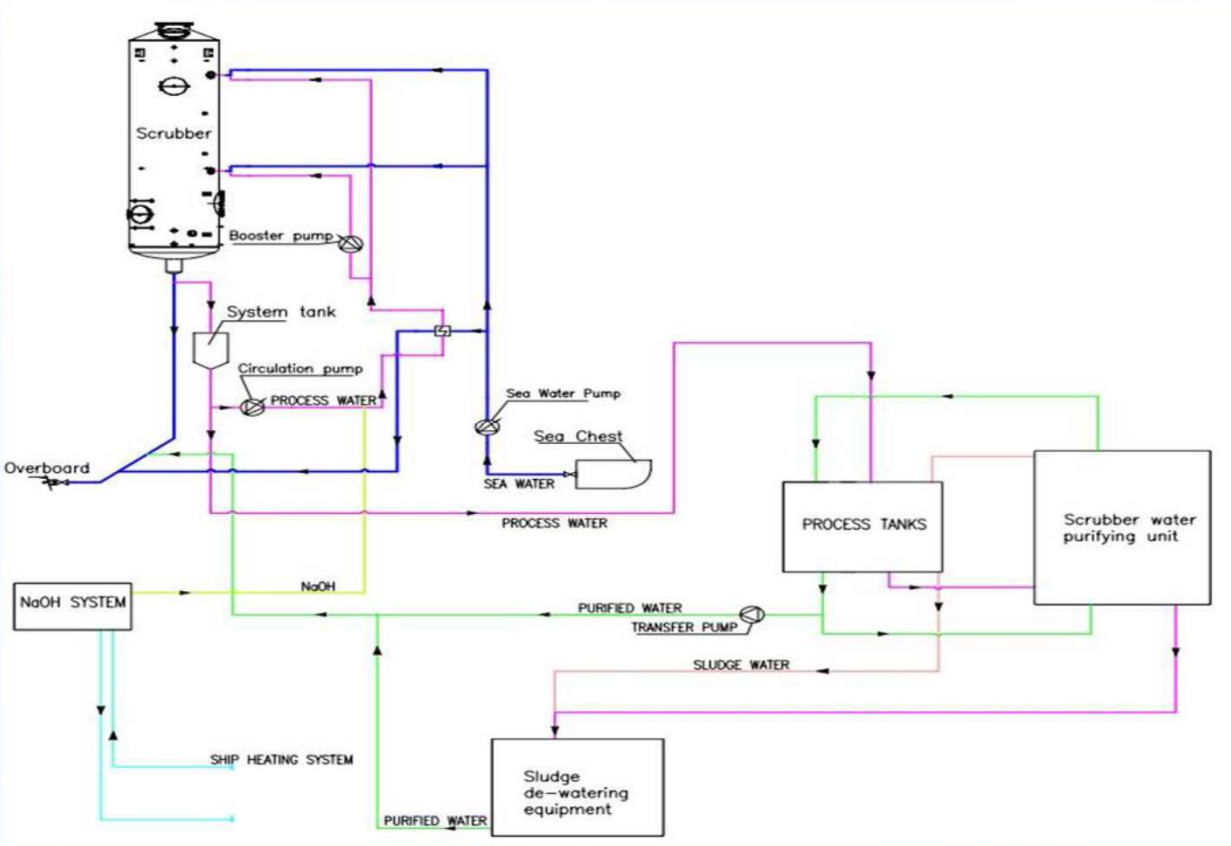
- Inleiding
- Dempers
- Emissies
- Emissie eisen
- **Aanpak**
- Roetfilter
- SCR Kat
- Combinatie

Foto: Deltalangh
Conversie/retrofit



AANPAK

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- Aanpak
- **Scrubber**
- Combinatie



SCRUBBER

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- Aanpak
- **Scrubber**
- Combinatie

Scrubber ook “closed loop”

- Water behandeling proces werkt onafhankelijk, “controlled by automation”en freq. regelaars.
- Fout / storing in werking water behandeling beïnvloed niet de werking van de scrubber werking. Andersom ook niet.
- Water behandeling systeem kan in machinekamer of in 20”container aan dek met apart bediening station.

SCRUBBER

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- **Aanpak**
- Roetfilter
- SCR Kat
- Combinatie

Sludge treatment and consumables

- •Sludge afvoer in
- Finland 400 Eur/ton + transport
- Belgium 500 Eur/ton incl. Transport
-
- •Caustic Soda (NaOH) in:
- Finland 235Eur/ton free port Kemi
- 197Eur/ton free Helsinki port

- •Detergent 5 EUR / 2 week
- •Sludge treatment chemicals :
- 10 EUR / day

SCR KATALYSATOR

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- Aanpak
- **Scrubber**
- Combinatie

- Scrubber systeem: inclusief demper werking
- € 1300,= per kW in de range tot 2000 kW.
- € 2,3/3.0 miljoen voor grotere motoren tot 6 mW motoren.
- Kosten van uitlaatgas nabehandeling van kleine motoren fors kostbaarder dan voor grote motoren per kW gerekend.
- Voor Retrofit zijn de installatiekosten vaak net zo groot als de systeemkosten.
- geprepareerd schip, kosten inbouw zijn 25 % van systeem prijs.

SCRUBBER 2 MW OL VOORBEELD

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- Aanpak
- **Scrubber**
- Combinatie

- Gewicht van 2mW scrubber zonder water is rond 1450 kg met Isolatie 2050kg
- Water is 640 kg in the scrubber(open loop)
- Diameter is 1,3m, Hoogte is 7,3 m
- Inlet diameter Ø600 and outlet ø600
- Circulatie van water in scrubber is 43 m3/h
- Behoefte zee water is 88-100 m3/h
- gïnstalleerd vermogen is 37 KW in 100%, verwacht gemiddeld rond de 25 KW
- Dus meestal voldoende met bestaande generator

MAAR: afhankelijk of er een afvoerpomp extra geplaatst moet worden om terug naar zee van 5-8 KW

SCRUBBER TOPICS

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- Aanpak
- **Scrubber**
- Combinatie

- Performance figures, HFO 2,5 % sulfur
- • Alkali consumptie 5 tot 6 liters x MWh x S%
- • Enerie gebruik 15 kW x MWh
- • Fresh water consumption 50 liters x MWh
- • Sludge formatie 0.4 kg x MWh
- • Bleed off rate 0.2 tot 0.3 m3 x MWh
- • Back pressure max. 100 mmWc
- * alle waardes afhankelijk van omgevings conditie, water kwaliteit en installatie specifieke invloeden.

COMBINATIE SCR/ SCRUBBER ?

- Inleiding
- Dempers
- Emissies
- Emissie eisen
- Aanpak
- Scrubber
- **Combinatie**

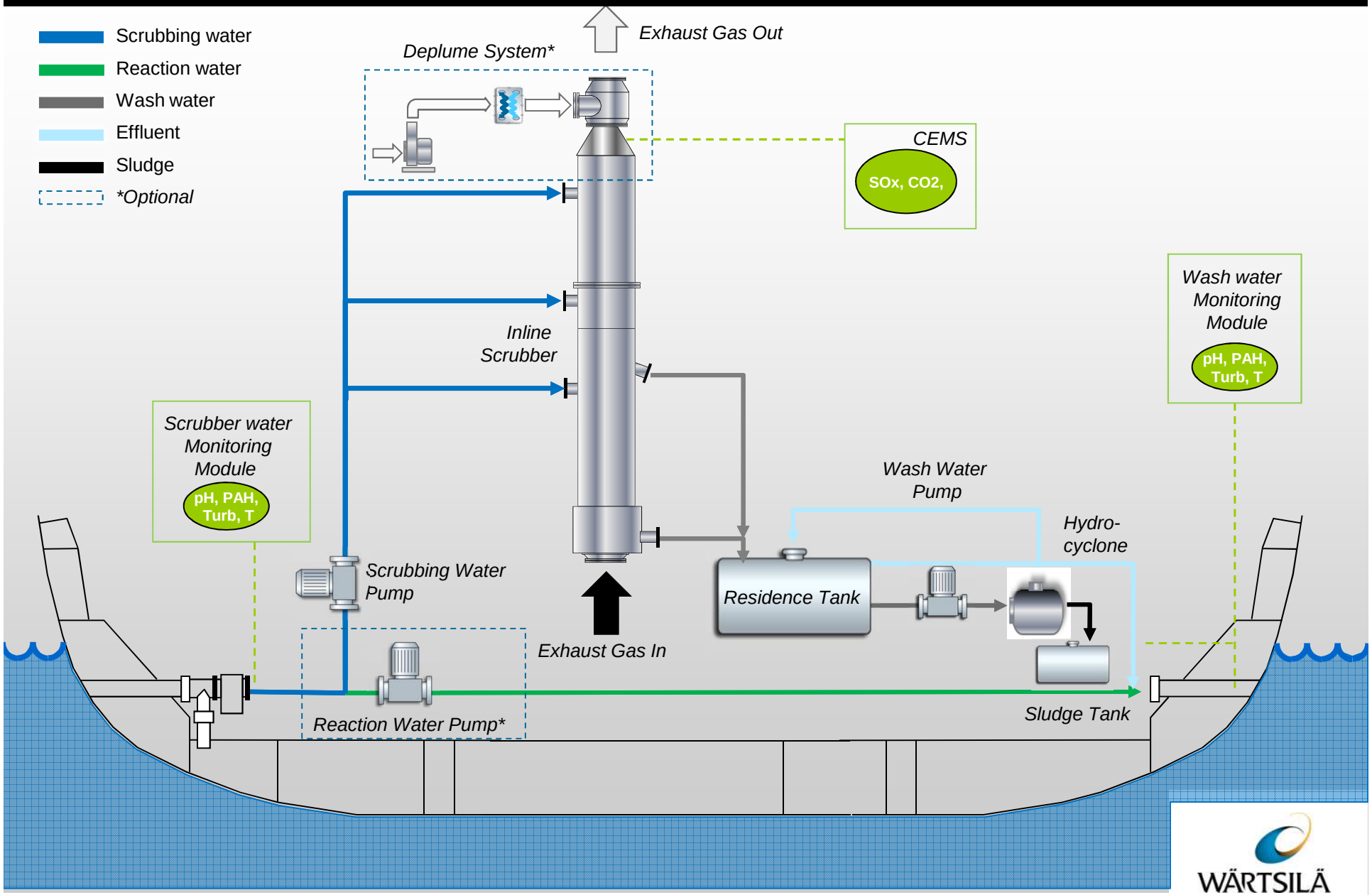
DANK U VOOR DE AANDACHT

KR@AXCES.COM

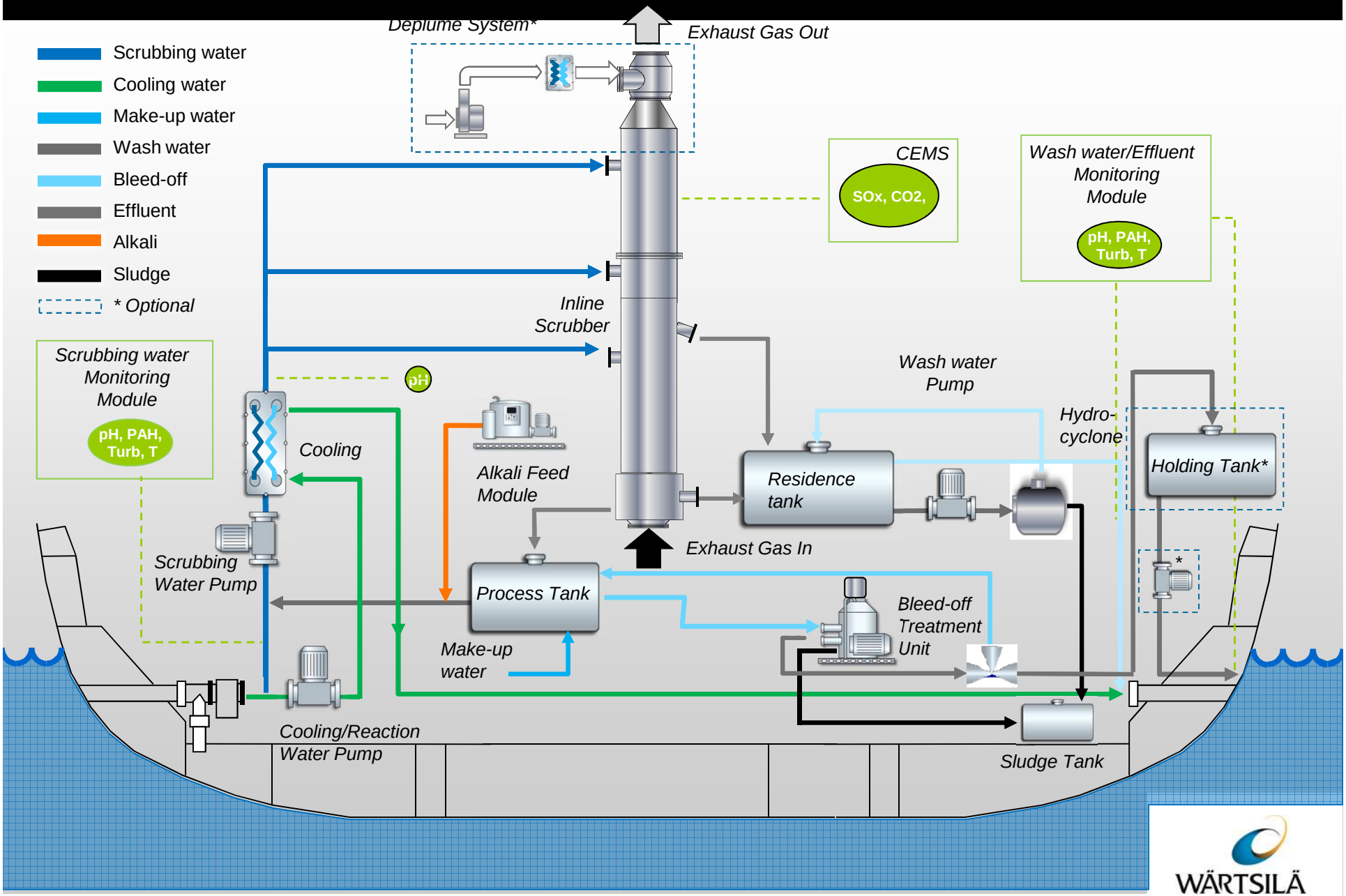

WÄRTSILÄ
CORPORATION
Inline Scrubber – Color Line SuperSpeed
WÄRTSILÄ

Wartsila Scrubbers

Wärtsila Inline Scrubber Open Loop



Wärtsila Inline Scrubber Hybrid



Wartsila Inline Scrubber

Current design range:

- Engine sizes between 5 and 20 MW
- Design basis: exhaust gas flow 6,000 Nm^3/MWh
- Pressure drop at design: 150 mm WG
- Open loop SOx reduction: 2,5% S -> 0,1% S
- Open loop sea water consumption: 50-55 m^3/MWh
- No by-pass - can run hot

WÄRTSILÄ

Case study: Retrofit

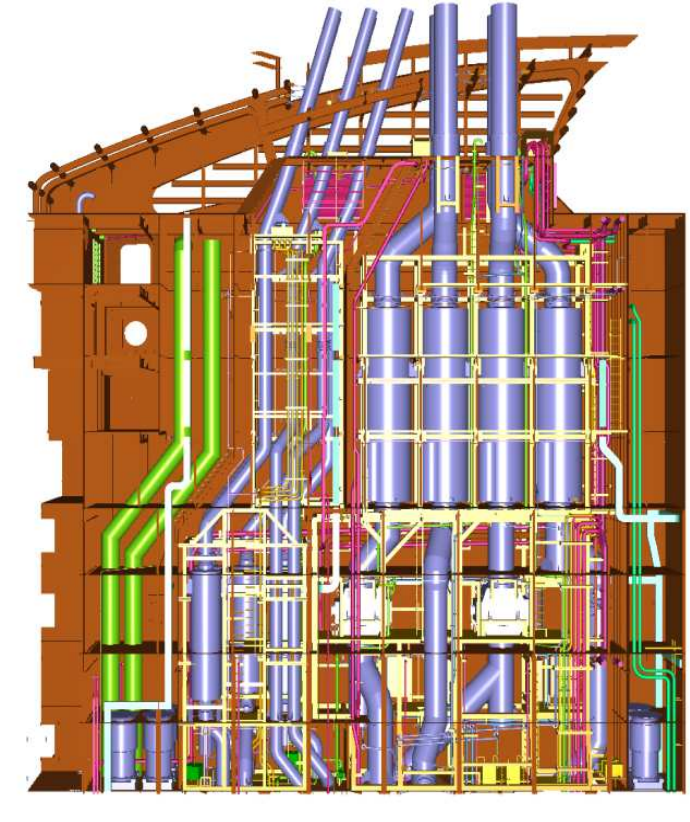
Color Line SuperSpeed 2

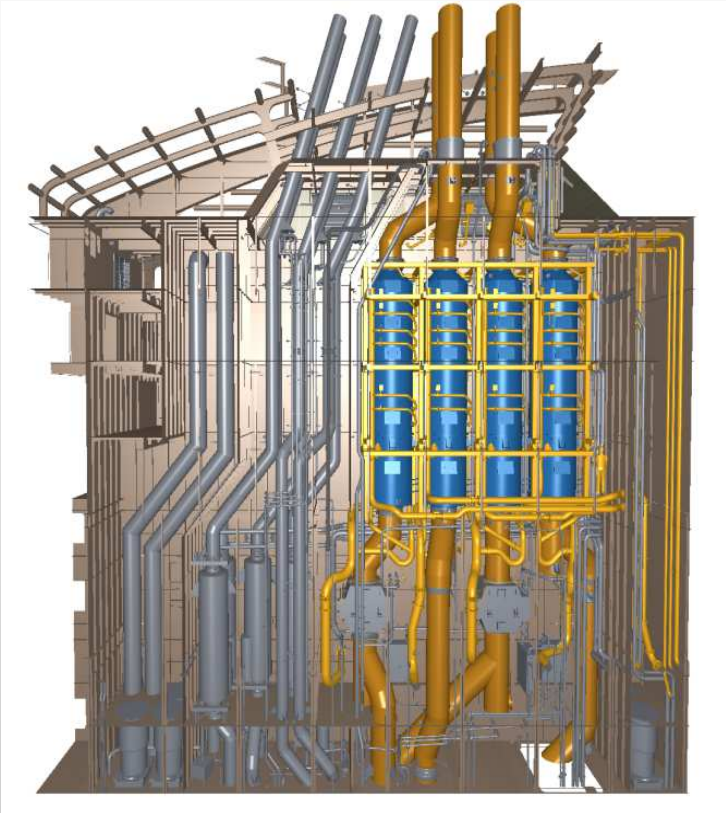
- Operates 100% within SECA
- 4 x 9,45MW Wärtsilä
- Retrofit: Space limitations in funnel
- Wärtsilä Inline Scrubber installation March 2014 at FaYard in Denmark

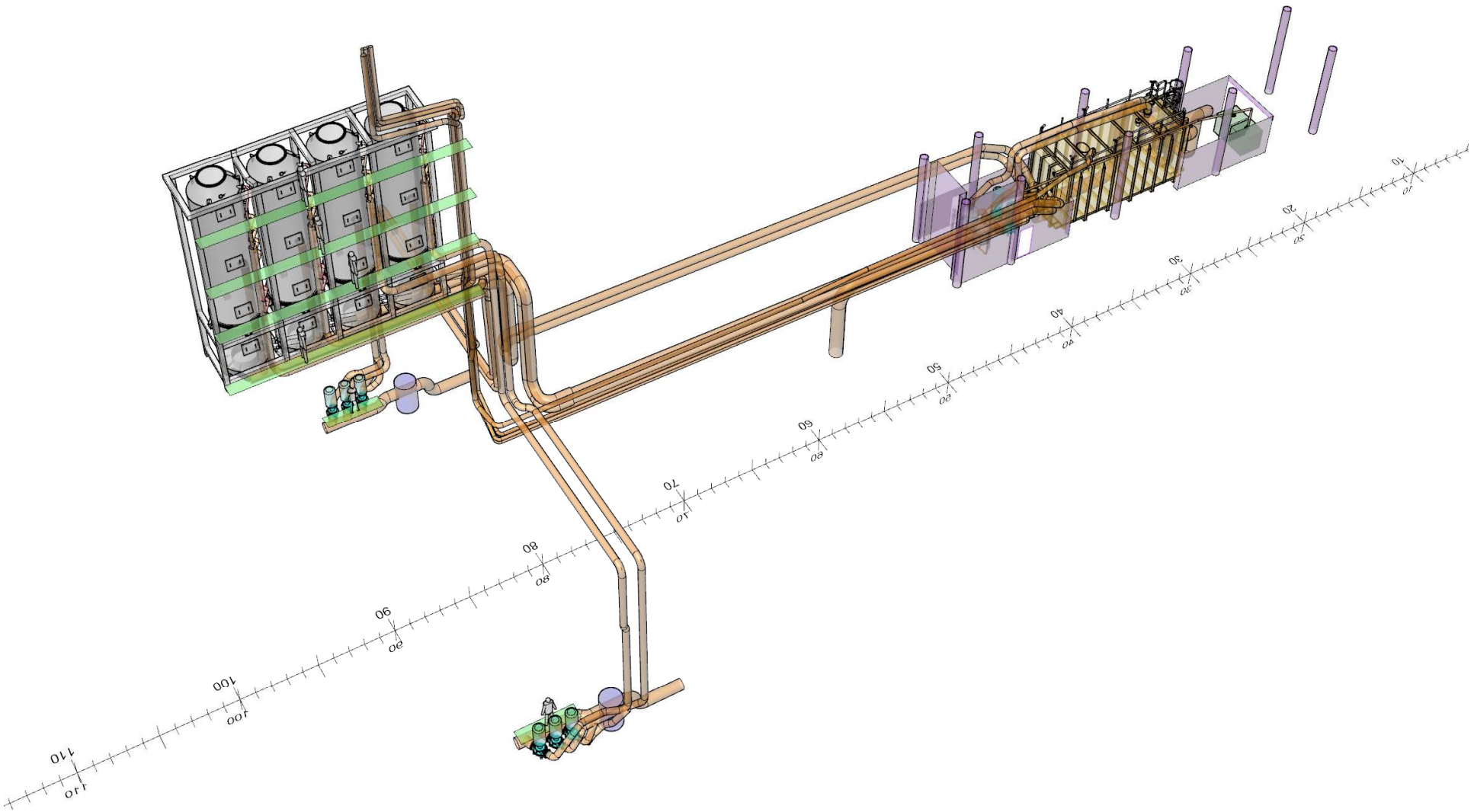
Case study: Retrofit

Wartsila Inline scrubbers ready for installation on Superspeed II

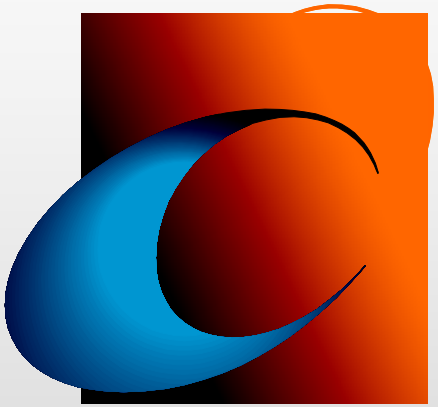
The silencers of Superspeed I and II are replaced by scrubber units







Case study: Retrofit



WÄRTSILÄ

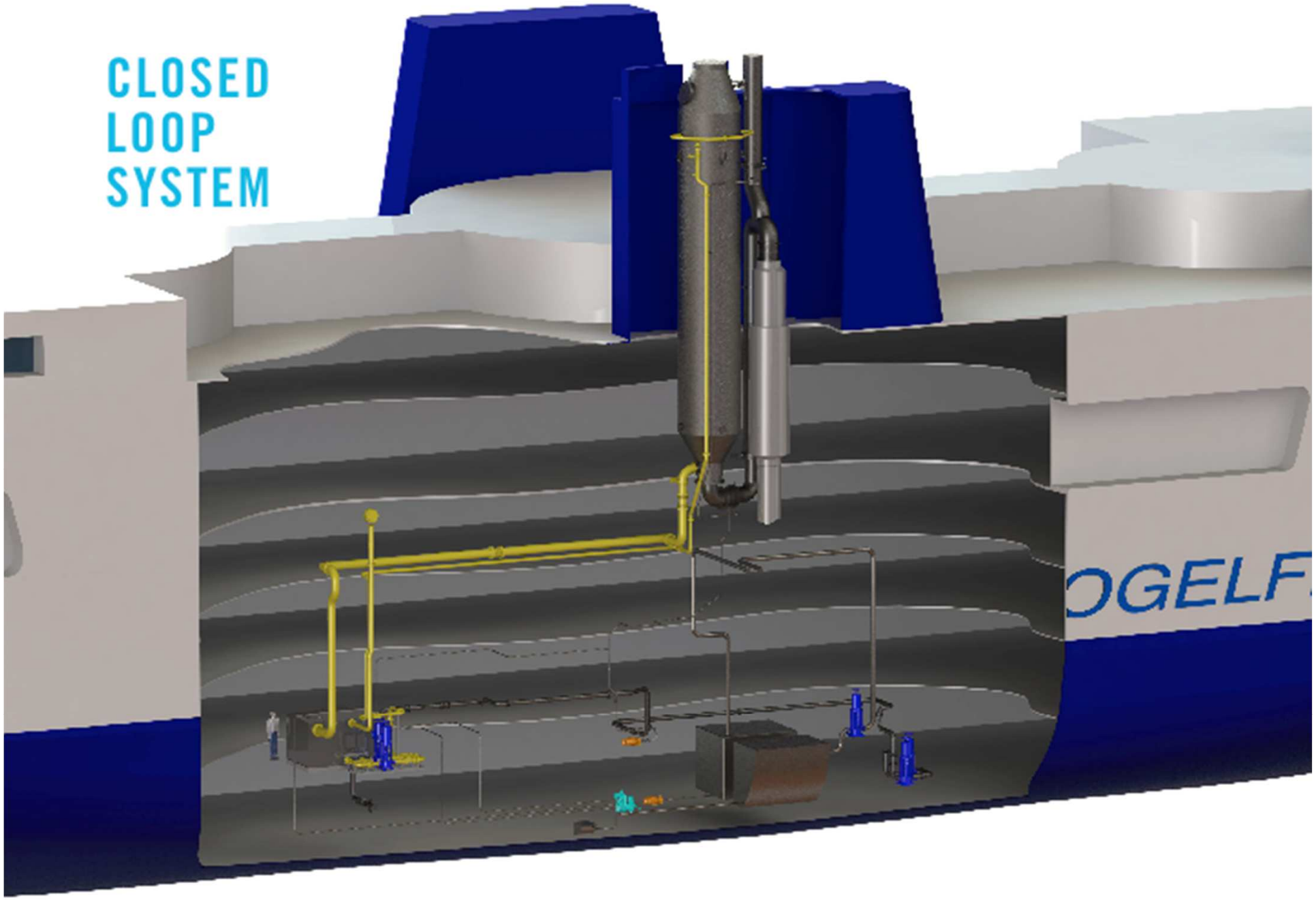
SCRUBBING MADE SIMPLE

EXPLAINING OUR TECHNOLOGY ON BOARD THE SCHLESWIG HOLSTEIN (SCANDLINES)

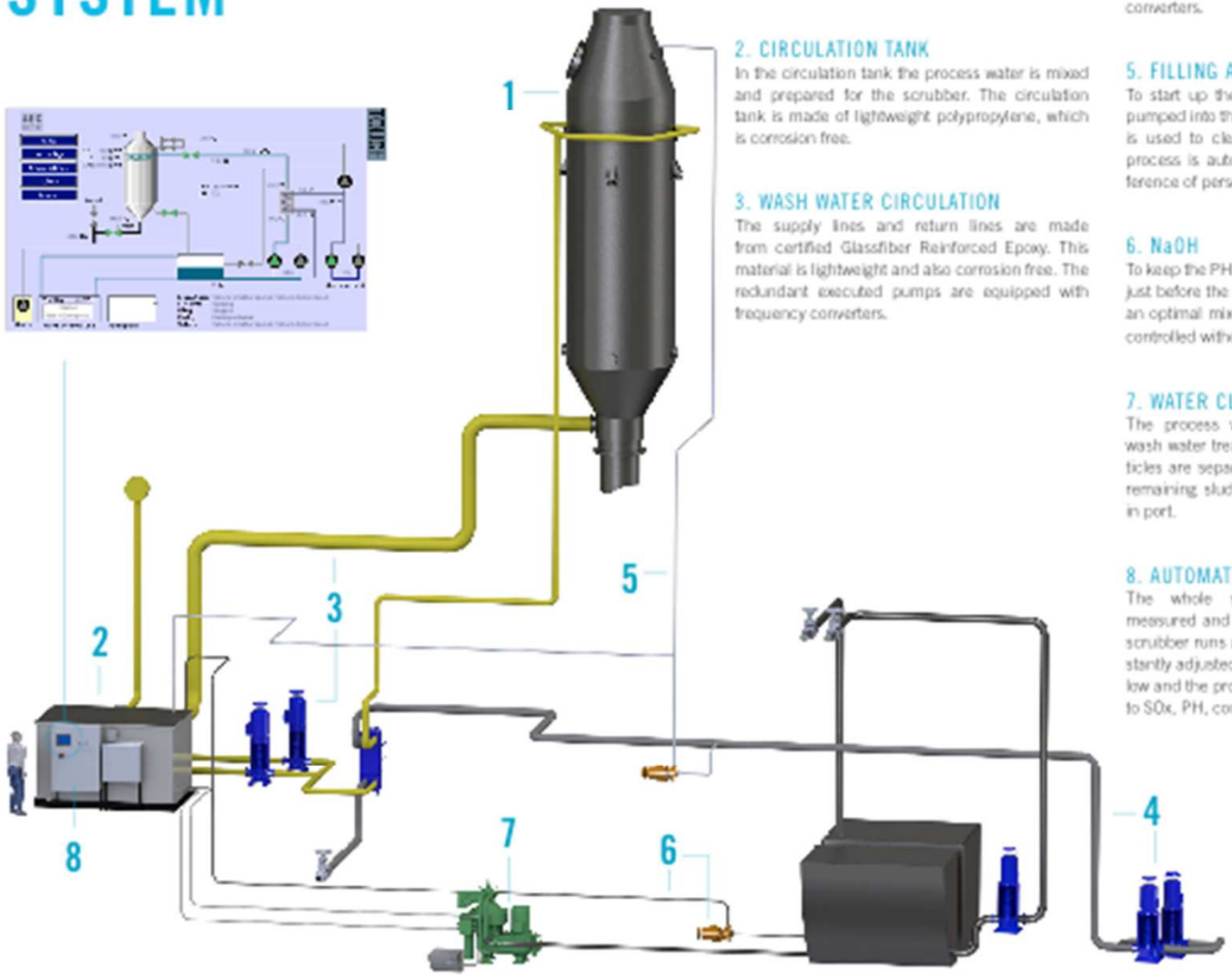
AEC MARITIME

FUNNEL

CLOSED LOOP SYSTEM



CLOSED LOOP SYSTEM



1. SCRUBBER

The scrubber has an open tower structure without any filters. There are no moving parts and there is no need for a bypass. If needed, the scrubber can run dry.

2. CIRCULATION TANK

In the circulation tank the process water is mixed and prepared for the scrubber. The circulation tank is made of lightweight polypropylene, which is corrosion free.

3. WASH WATER CIRCULATION

The supply lines and return lines are made from certified Glassfiber Reinforced Epoxy. This material is lightweight and also corrosion free. The redundant executed pumps are equipped with frequency converters.

4. COOLING SYSTEM

A heat exchanger is installed to cool down the process water to optimize the process. Seawater is taken from the ship's main supply. The redundant executed pumps are equipped with frequency converters.

5. FILLING AND DEMISTER CLEANING

To start up the closed loop system, seawater is pumped into the circulation tank. The same pump is used to clean the top of the demister. This process is automatically controlled without interference of personnel.

6. NaOH

To keep the PH level neutral, caustic soda is added just before the entrance of the circulation tank for an optimal mixture. This process is automatically controlled without interference of personnel.

7. WATER CLEANING SYSTEM

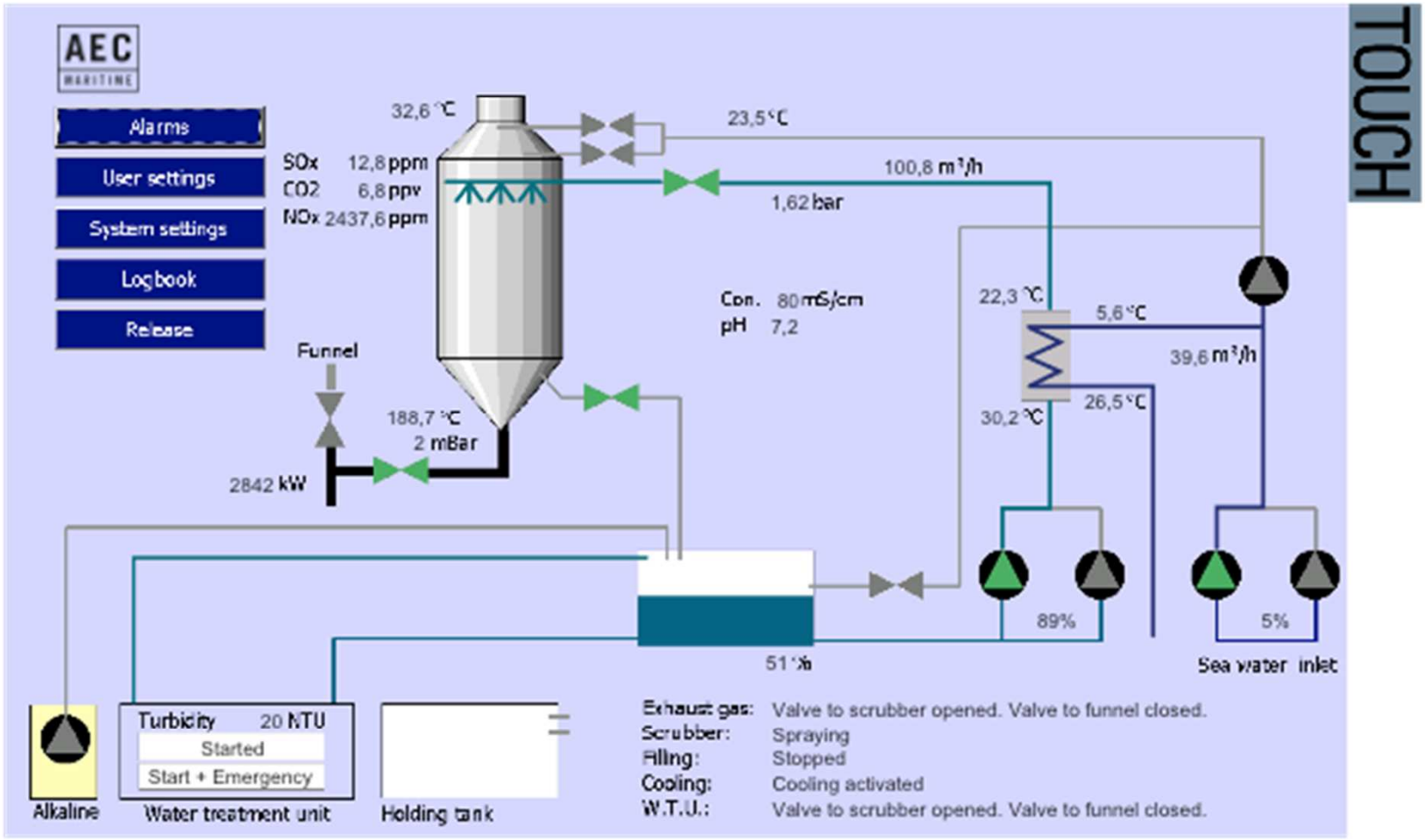
The process water constantly runs through a wash water treatment unit. This is where the particles are separated from the process water. The remaining sludge can be stored and discharged in port.

8. AUTOMATION AND CONTROL SYSTEM

The whole scrubber system is constantly measured and controlled. Once switched on, the scrubber runs automatically. The scrubber is constantly adjusted to keep energy consumption level low and the process water in balance with respect to SOx, PH, concentration of PAH and turbidity.

AEC MARITIME

AUTOMATION AND CONTROL SYSTEM



SOx SCRUBBING
MADE SIMPLE

Financing of Exhaust Cleaning Technology

8th October 2014 – Sulphur Regulation Seminar

ABN·AMRO

Our Sustainability Strategy

Member of Sustainable Shipping Initiative

MAERSK LINE

RIO TINTO

Unilever

GEARBULK

BUNGE

DNV·GL

Cargill

CHINA NAVIGATION
SWIRE

WÄRTSILÄ

AkzoNobel

NAMURA
SHIPBUILDING CO.,LTD.

holman fenwick willan hfw

Carnival

Deloitte.

UCL

ABN·AMRO

ABS

Lloyd's Register

UNEP Finance Initiative
Innovative financing for sustainability

Alternatives to meet environmental exhaust regulation

NO_x	SOx	Particulate Matter	Greenhouse Gas
Acid rains Ozone depletion 2011:Tier II 2016? Tier III NECA	Acid rains From 2012 : 3.5% SECA 2015 : 0.1% Global 2020 : 0.5%	Impact on air quality Along with SO_x reduction	Global warming EEDI Further evaluation by IMO

LNG conversion possible
Simultaneous reduction of SO_x / NO_x / PM / GHG

MGO, Bio-Fuels, Methanol
Can fulfill 0,1% SO_x limits, Scrubber NO_x / PM, GHG: propeller, hull, engine, speed and operations

HFO
Scrubber SO_x / NO_x / PM, GHG: propeller, hull, engine, speed and operations

Exhaust related challenges for the maritime industry

Challenge for ship owners and charterers

- Sulphur causes acid rains and impacts air quality
- From start of 2015 in SECA (0.1%) and 2020 Global Sox directive (0.5%)
- Different fuels on board at different cost

Challenge for port state

Few port state checks are adequate.

- Static sensors run risk of fuel switch after passing the sensor
- Continuous Emission monitoring devices expensive and not tamper free
- Experiments with mobile drones that are sniffing exhaust level

Challenge for banks

- Tailor-made finance solutions for exhaust cleaning and fuel efficiency.

Risk drivers and exhaust cleaning

1. ⇩ **Non-Compliance risk decreases**: SECA in 2015 and IMO Sulphur Directive in 2020
2. ⇩ **Technology risk decreases:** Exhaust cleaning available from multiple tech providers and increasingly used
3. ⇩ **Price and availability risk decreases:** Helps owner to mitigate cost of fuel bills and insecurity about low sulphur fuels
4. ⇧ **Competitive advantage:** Shipping companies with exhaust cleaning have competitive edge in ECA area over competitors. This can be further increased by adding fuel efficiency improvements to the vessel
5. ⇧ **Future preparedness increases:** Emission control legislation and territory expected to grow over time and expected increased control from port authorities

What does the process look like?

Emission Control Regulation (SECA)

Baseline Measurements & Monitoring

Upgrade of the Ship with exhaust cleaning

Financing via Loan

Competitive Advantage Trading Area for ship

Exhaust cleaning generates Cost savings

Owner receives competitive charter rates

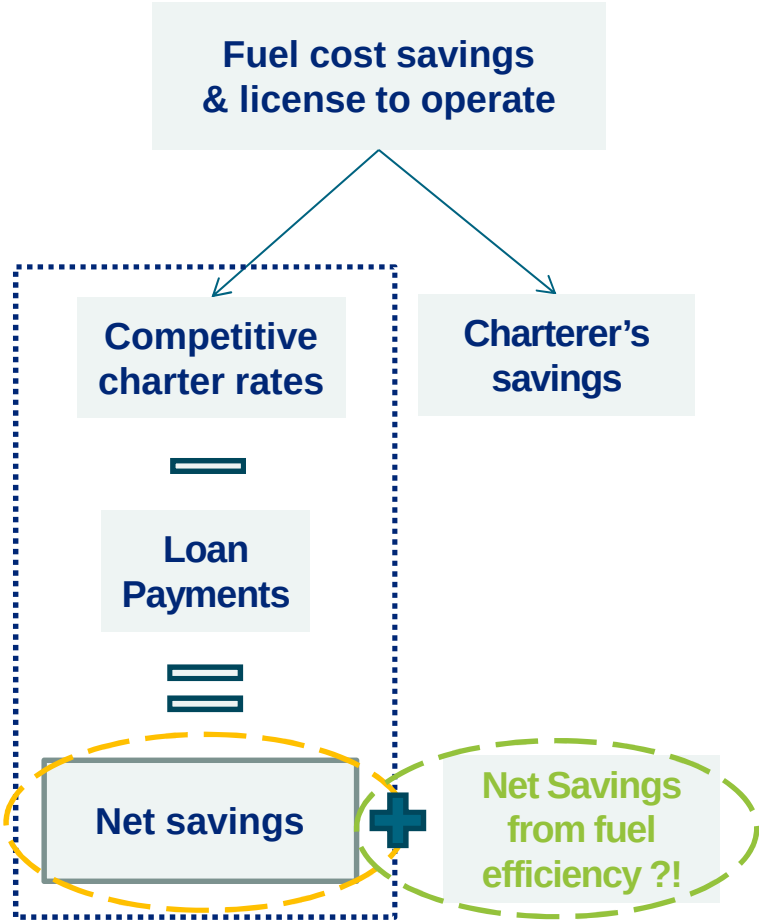
Loan Repayment

How does the financial model work?

KEY INPUTS

- Initial Investment
- Bunker Price
- Technology Outputs (daily fuel consumption)
- Premium when bidding for charters
- Loan Profile (duration, interest)
- License to operate

OUTPUTS



Possible next Steps and scenarios

1. For suitable vessels a detailed proposal can be produced, we deliver tailor made financial solutions, based on our prior experience with financing scrubbers
2. Additional Scrubber Tranche
    1. Scenario #1: Security by first priority mortgage over the ship. ABN finances the vessel and adds an additional scrubber tranche to finance the acquisition of a scrubber
    2. Scenario #2: Charterer willing to pay premium for the scrubber. Charter premium is arranged and documented in a separate contract, pledged to ABN AMRO. First priority mortgage bank waives it's right on this part of the earnings.
3. The owner retains the license to operate in SECA, also gains competitive advantage and thus gets steady income during and after the loan period. Possible PR opportunity for vessel(s) with exhaust cleaning. A scrubber itself does not add to fuel efficiency. Adding fuel efficiency improvements to the vessel can help to improve the business case.

Thank you for your attention!

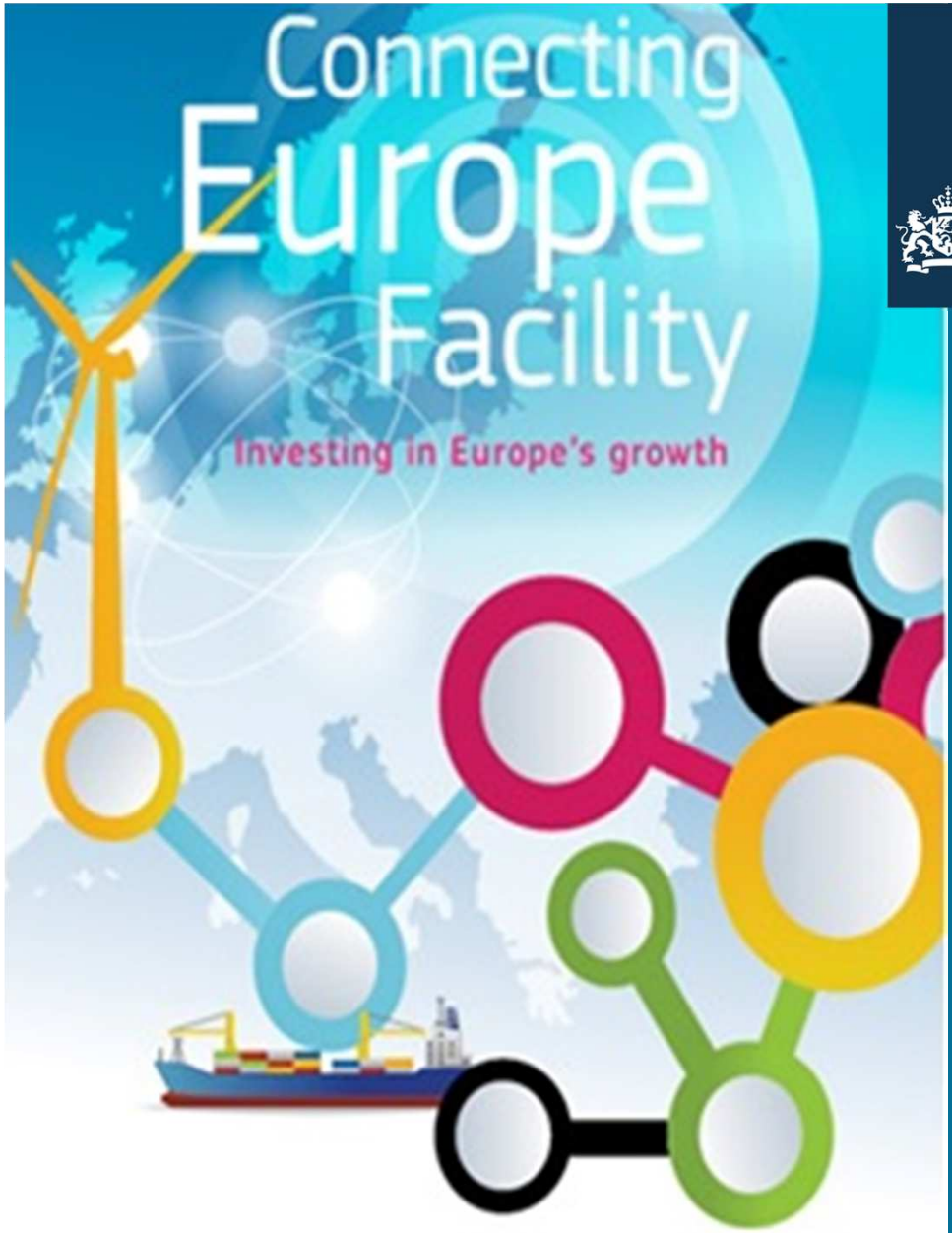
Jan Raes

Business Development Manager

Jan.raes@nl.abnamro.com

JRRAES

Jan Raes



Ministerie van Infrastructuur en Milieu

CEF en kansen voor de scheepvaart

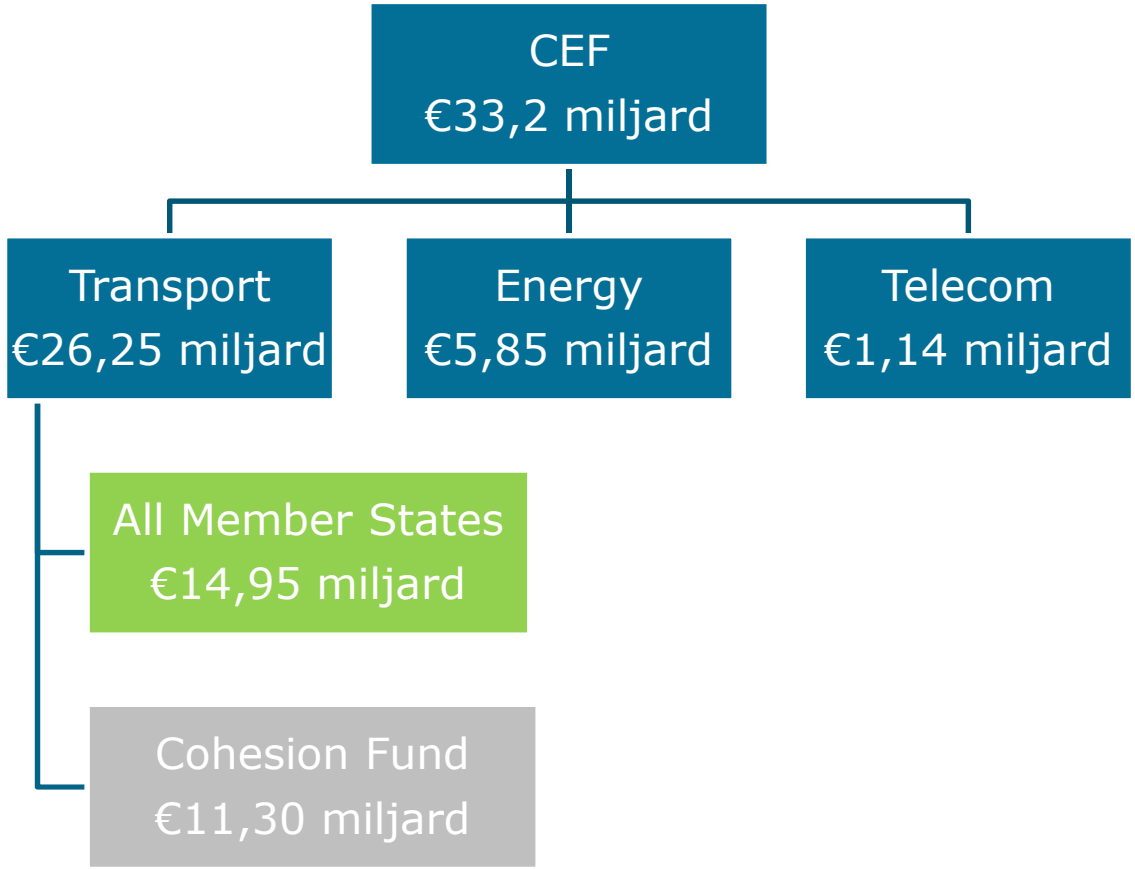
Paul Zeer
Beleidsmedewerker Maritieme Zaken
E: paul.zeer01@minienm.nl
T: 06 - 55214538

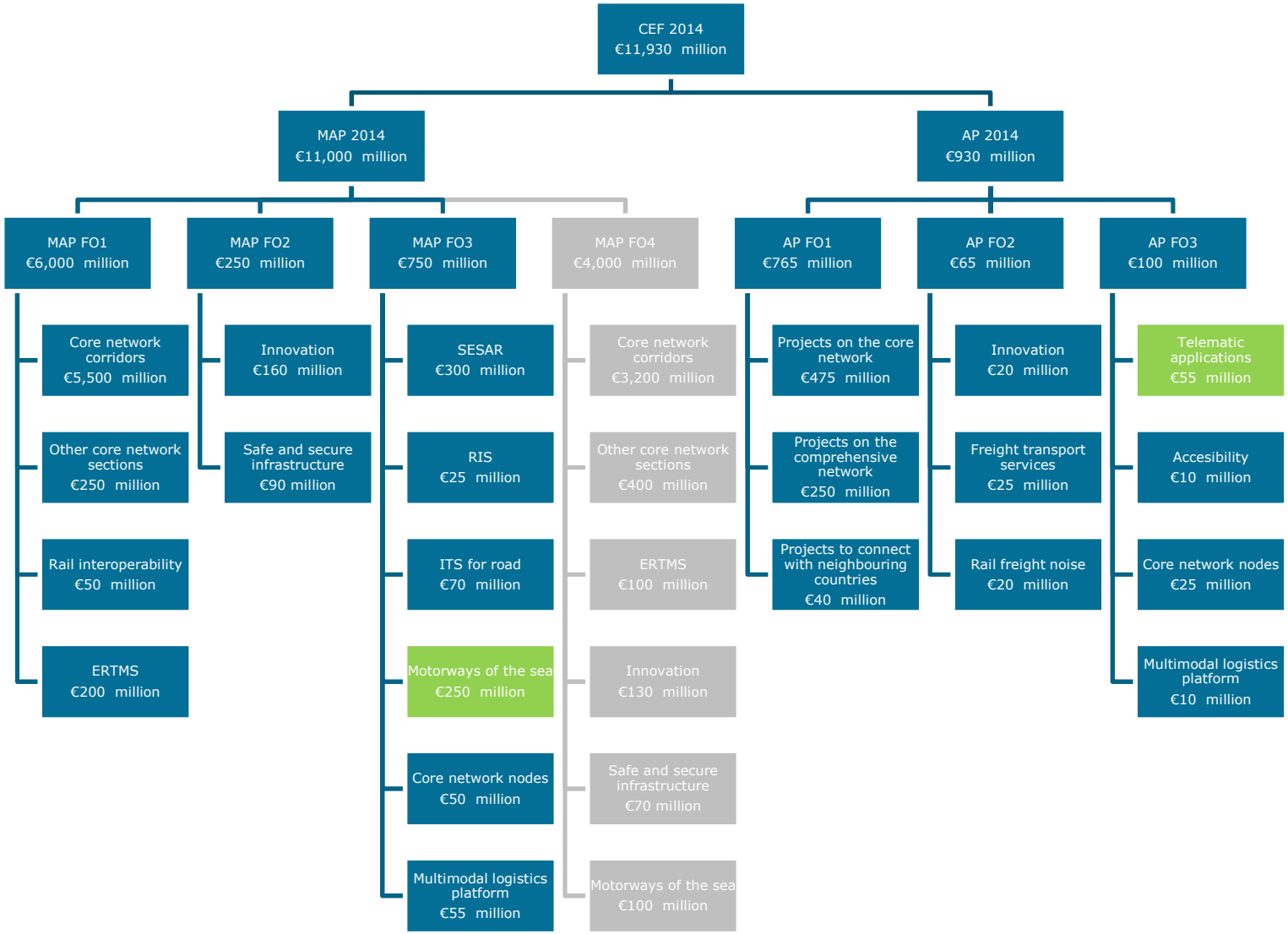
15 oktober 2014

CEF: doelstellingen

- Transport, energie en telecom is van groot belang voor de Europese economie.
- EU beleid is gericht op (1) banen, (2) groei en (3) concurrentievermogen.
- Transport financiering concentreert zich op de 9 kernnetwerk corridors, maar daarbuiten is ook ruimte voor bijvoorbeeld de scheepvaart.

CEF: budget


CEF
€33,2 miljard
Transport
€26,25 miljard
Energy
€5,85 miljard
Telecom
€1,14 miljard
All Member States
€14,95 miljard
Cohesion Fund
€11,30 miljard


CEF 2014
€11,930 million
MAP 2014
€11,000 million
AP 2014
€930 million
MAP FO1
€6,000 million
MAP FO2
€250 million
MAP FO3
€750 million
MAP FO4
€4,000 million
AP FO1
€765 million
AP FO2
€65 million
AP FO3
€100 million
Core network corridors
€5,500 million
Other core network sections
€250 million
Rail interoperability
€50 million
ERTMS
€200 million
Innovation
€160 million
Safe and secure infrastructure
€90 million
SESAR
€300 million
RIS
€25 million
ITS for road
€70 million
Motorways of the sea
€250 million
Core network nodes
€50 million
Multimodal logistics platform
€55 million
Core network corridors
€3,200 million
Other core network sections
€400 million
ERTMS
€100 million
Innovation
€130 million
Safe and secure infrastructure
€70 million
Motorways of the sea
€100 million
Projects on the core network
€475 million
Projects on the comprehensive network
€250 million
Projects to connect with neighbouring countries
€40 million
Innovation
€20 million
Freight transport services
€25 million
Rail freight noise
€20 million
Telematic applications
€55 million
Accesibility
€10 million
Core network nodes
€25 million
Multimodal logistics platform
€10 million

CEF: co-financiering

Types of projects	All Member States	Cohesion Fund
(a) Studies (all modes)	50%	85%
(b) Works on		
Motorways of the Sea (MoS)	30%	85%
Traffic management systems VTMIS (ground/onboard)	50%/20%	85%

MoS: works

Maximaal 30% co-financiering kan worden aangevraagd voor:

1. *Maritime link based projects*:
   - i.i.g. twee EU netwerkhavens (waarvan één minimaal kernnetwerk) in twee verschillende lidstaten;
   - i.i.g. één reder.

2. *Projects of wider benefit*:
   - zover bekend betreft dit enkel infrastructuur.


Örebro
Linköping
Jönköping
Göteborg
Hirtshals
Frederikshavn
Aalborg
Randers
Aarhus
Herning
Helsingør
Helsingborg
København
Malmö
Trelleborg
Esbjerg
Kolding
Flensburg
Rødby
Karlskrona
Sassnitz
Stralsund
Kołobrzeg
Kiel
Rostock
Wismar
Lübeck
Hamburg
Cuxhaven
Neumünster
Bremerhaven
Wilhelmshaven
Oldenburg
Bremen
Emden
Leeuwarden
Groningen
Hoogeveen
Zwolle
Amsterdam
Den Haag
Utrecht
Rotterdam
Arnhem
Nijmegen
Enschede
Hannover
Wolfsburg
Braunschweig
Magdeburg
Berlin
Münster
Bielefeld
Hamm
Dortmund
Duisburg
Essen
Vlissingen
Oostende
Antwerpen
Gent
Brugge
Dunkerque
Calais
Boulogne-sur-Mer
Bruxelles/Brussel
Mons
Namur
Liège
Aachen
Köln
Bonn
Koblenz
Düsseldorf
Kassel
Leipzig
Dresden
Görlitz
Erfurt
Jena
Decin
Hof
Cheb
Praha
Plzen
Frankfurt am Main
Mainz
Trier
Luxembourg
Metz
Saarbrücken
Mannheim
Nürnberg
Regensburg
Ceske Budejovice
Passau
Karlsruhe
Stuttgart
Nancy
Strasbourg
Ulm
Augsburg
München
Reims
Paris
Amiens
Le Havre
Rouen
Caen
Dieppe
Cherbourg
Roscoff
Brest
Quimper
Lorient
Rennes
Le Mans
Dublin
Belfast
Larne
Holyhead
Liverpool
Manchester
Leeds
Kingston upon Hull
Grimsby
Sheffield
Nottingham
Birmingham
Norwich
Fishguard
Milford Haven
Swansea
Newport
Cardiff
Bristol
Felixstowe
Harwich
London
Southampton
Portsmouth
Dover
Newcastle-upon-Tyne
Hartlepool
Glasgow
Edinburgh
Dundee
Aberdeen
Inverness
Ullg

MoS: maritime link based projects

- Prioriteit zal worden gegeven aan:
  - kosten om aan Annex VI van de IMO MARPOL Convention te voldoen;
  - kosten om aan de EU Sulphur Directive (2012/33/EU) te voldoen;
  - kosten die bijdragen aan een milieuvriendelijke maritieme dienstverlening.

- Maar:
  - specifieke *maritime link* tussen twee EU netwerkhavens;
  - alleen de upgrade voor milieuvriendelijke doeleinden komt in aanmerking;
  - voorstel moet voldoen aan de CEF criteria.

MoS: studies

- Maximaal 50% co-financiering kan worden aangevraagd voor:

1. *Pilot actions*:
   - introduceren van nieuwe en innovatieve concepten en technologieen (hoewel geen R&D) in de pre-implementatie fase en het testen (bijv. alternatieve brandstoffen, uitstoot verminderende technologieën, milieu vriendelijke voortstuwing/motoren.

2. Studies:
   - bijv. naar ICT applicaties, maar geen markt- of haalbaarheidstudies.

CEF: toekenningscriteria

- *Relevance* (*EU added value*):
  - een significante verbetering van een transportverbinding of vervoersstromen tussen lidstaten ter bevordering van de efficiëntie, duurzaamheid, concurrentiekracht en cohesie.

- *Maturity*:
  - de reeds bereikte voortgang en het vermogen om te kunnen implementeren in overeenstemming met de voorgestelde tijdsplanning.

- *Impact*:
  - het verwachte effect van de financiële steun van de EU op het business plan, het sociaal-economische effect en effect op klimaat, milieu en toegankelijkheid.

- *Quality*:
  - de deugdelijkheid van het voorstel in termen van de inhoud van de activiteiten, de kwaliteit van het projectmanagement, de samenhang tussen de doelstellingen en de geplande middelen / activiteiten.

CEF: aanvraag