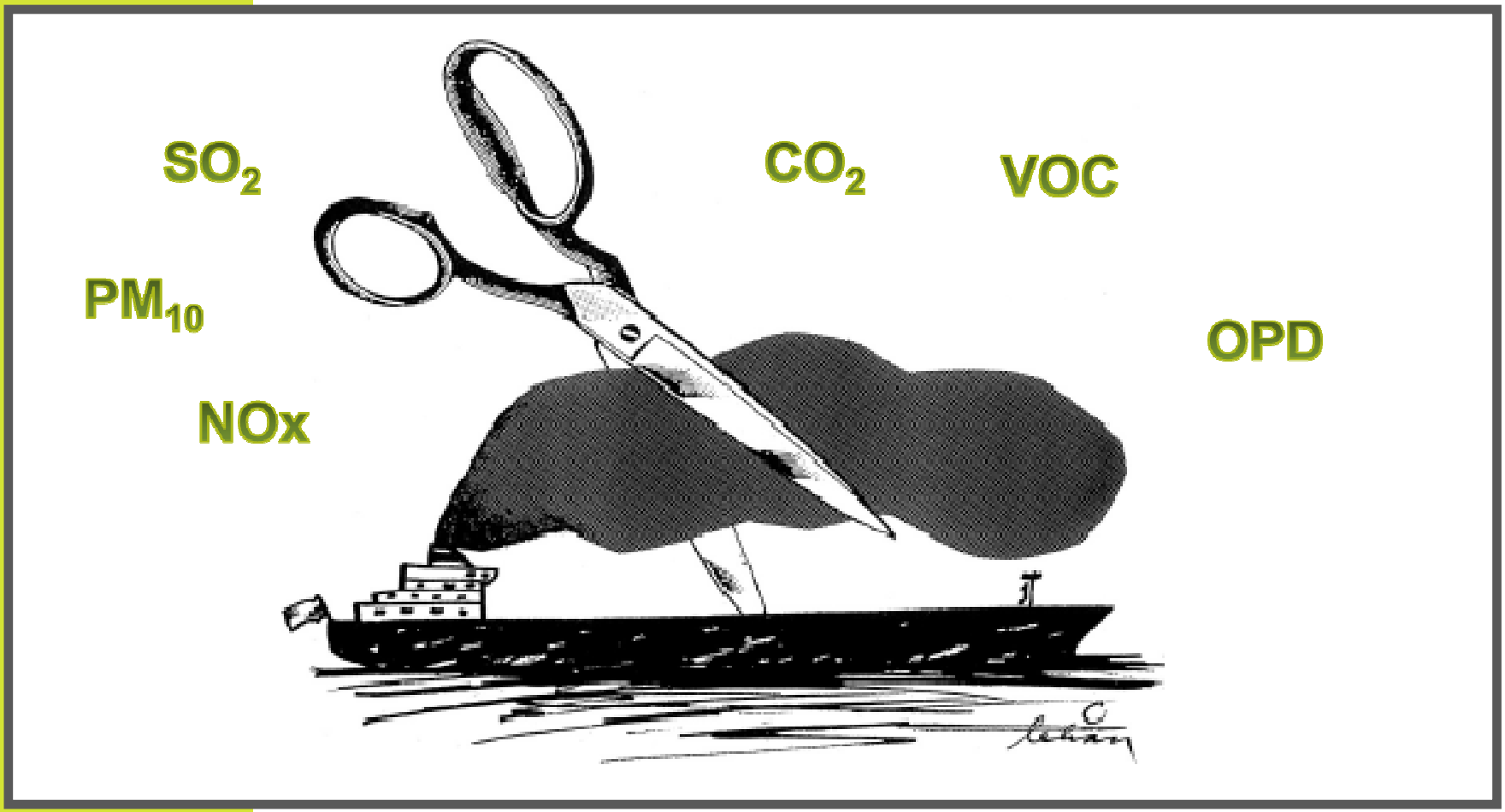
SHORT SEA CONFERENCE:

SESSION 5: THE USE OF LNG IN SHORT SEA SHIPPING

Bilbao, 14th April 2011

Alfons Guinier - ECSA Secretary General

AIR EMISSIONS
NO COMPLACENCY



MARPOL ANNEX VI
OUTCOME OF IMO/ MEPC

SULPHUR OXIDE (SOX)

SOX. AFTER INTENSE NEGOTIATION, UNANIMOUS AGREEMENT FOR THE FOLLOWING LIMITS, ON THE DATE SHOWN:

- **2010 – EMISSION CONTROL AREA (ECA) LIMIT REDUCED TO 1%**
- **2012 – GLOBAL LIMIT REDUCED TO 3.5%**
- **2015 – ECA LIMIT REDUCED TO 0.1%**
- **2020 – GLOBAL LIMIT TO 0.5% BUT A REVIEW IN 2018 (WITH THE AUTHORITY TO DELAY IMPLEMENTATION) WILL DETERMINE IF THIS IS ACHIEVABLE.**
- **2025 – GLOBAL LIMIT TO 0.5% NOTWITHSTANDING THE RESULT OF THE 2018 REVIEW.**

COMPLIANCE CAN BE ACHIEVED BY ALTERNATIVE FUELS OR ABATEMENT EQUIPMENT.

MARPOL ANNEX VI
OUTCOME OF IMO/ MEPC

NITROGEN OXIDE (NOX)

- **NOX: THREE-TIER STUCTURE FOR NEW ENGINES WILL SET PROGRESSIVELY TIGHTER NOX EMISSION STANDARDS FOR NEW ENGINES DEPENDING ON THE DATE OF THEIR INSTALLATION**

- **EXISTING ENGINES: 'KIT-BASED' APPROACH**

MARPOL ANNEX VI

ECSA WELCOMES THIS GLOBAL AGREEMENT BUT:

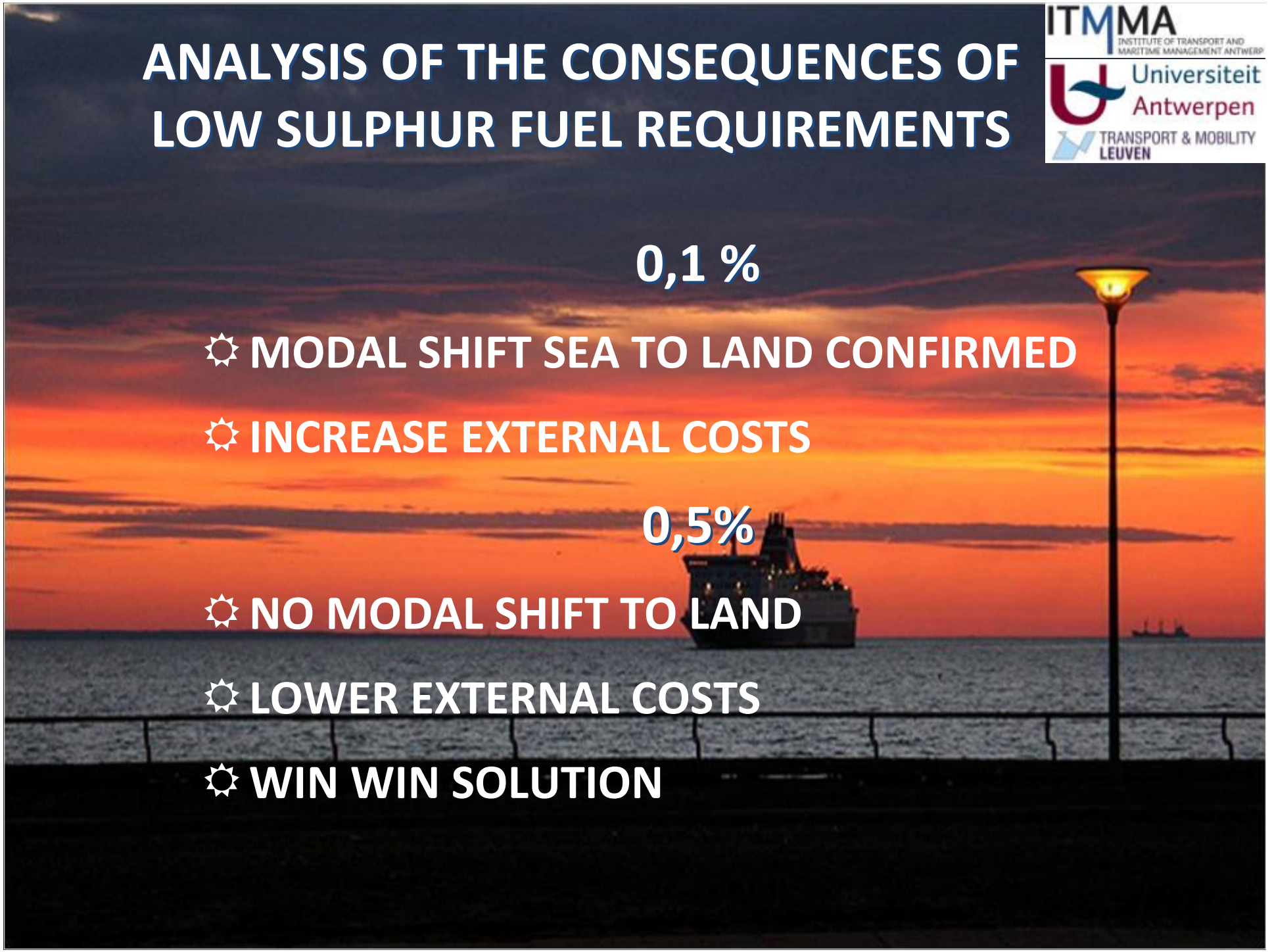
- **DRAWS ATTENTION TO THE POTENTIAL DANGER OF SHIFTING CARGO FROM SEA TO ROAD THROUGH THE 0,1% SULPHUR IN THE ECAs IN 2015**
- **NO IMPACT ASSESSEMENT MADE IN IMO**
- **SERIOUSLY ENDANGERS MODAL SHIFT FROM LAND TO SEA -> RISK OF PARALYSING INTRA EU TRANSPORT**
- **DIFFERENT FACT FINDING STUDIES CONFIRM OPPOSITE MODAL SHIFT FROM SEA TO LAND**

ANALYSIS OF THE CONSEQUENCES OF LOW SULPHUR FUEL REQUIREMENTS

ITMMA INSTITUTE OF TRANSPORT AND MARITIME MANAGEMENT ANTWERP

Universiteit Antwerpen

TRANSPORT & MOBILITY LEUVEN



0,1 %

- MODAL SHIFT SEA TO LAND CONFIRMED
- INCREASE EXTERNAL COSTS

0,5%

- NO MODAL SHIFT TO LAND
- LOWER EXTERNAL COSTS
- WIN WIN SOLUTION

SULPHUR 0.1 % IN THE ECAS AS FROM 2015 WAY FORWARD

- OPTIONS AVOIDING NEGATIVE IMPACT OF 0,1% UNDER CONSIDERATION
- FACTUAL ANALYSIS:
  - AVAILABILITY OF OIL
  - SCRUBBERS
  - LNG
- TARGET: “WIN WIN” SOLUTION BOTH FOR TRANSPORT AND ENVIRONMENT

What are Scrubbers ?

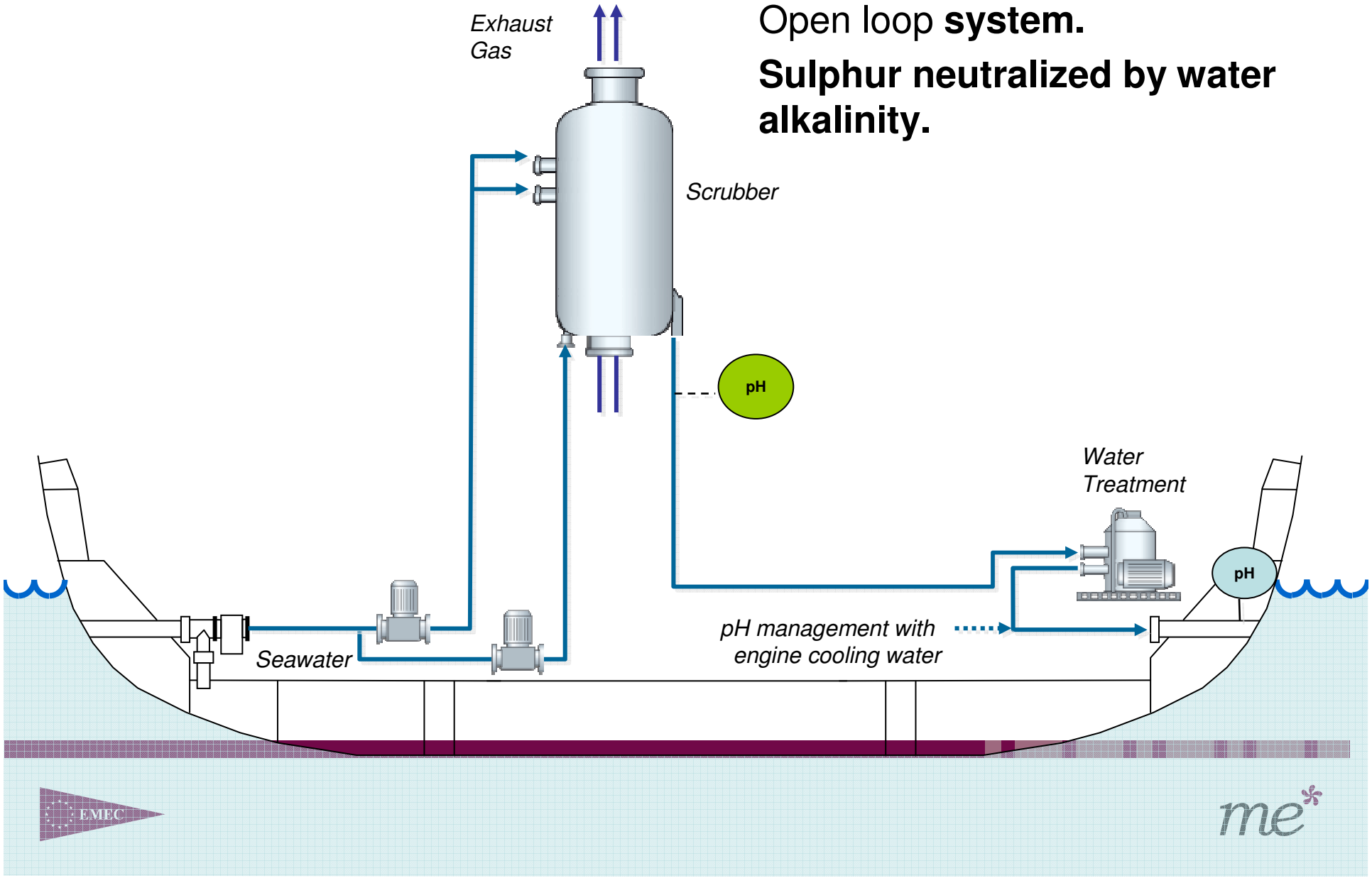
- **Scrubber** systems are a diverse group of air pollution control devices that can be used to remove particulates and/or gases from industrial exhaust streams.
- The term "scrubber" has referred to pollution control devices that use liquid to wash unwanted pollutants from a gas stream.

Scrubber Types:

- Sea water scrubbers
- Fresh water scrubbers
  - Flexible solutions exist to switch between sea and fresh water
- Dry Scrubbers

Sea Water Scrubber

European Marine Equipment Council



Open loop **system.**

Sulphur neutralized by water alkalinity.

Sea Water Scrubbing (I)

- Advantage:
  - Ships may operate on high sulphur content oil within SECAs
  - Has been tested for 5 years on several ships
- Disadvantage:
  - Some ports and coastal water within SECAs do not allow discharge of the SOx loaded washing water
  - Requires large amount of water

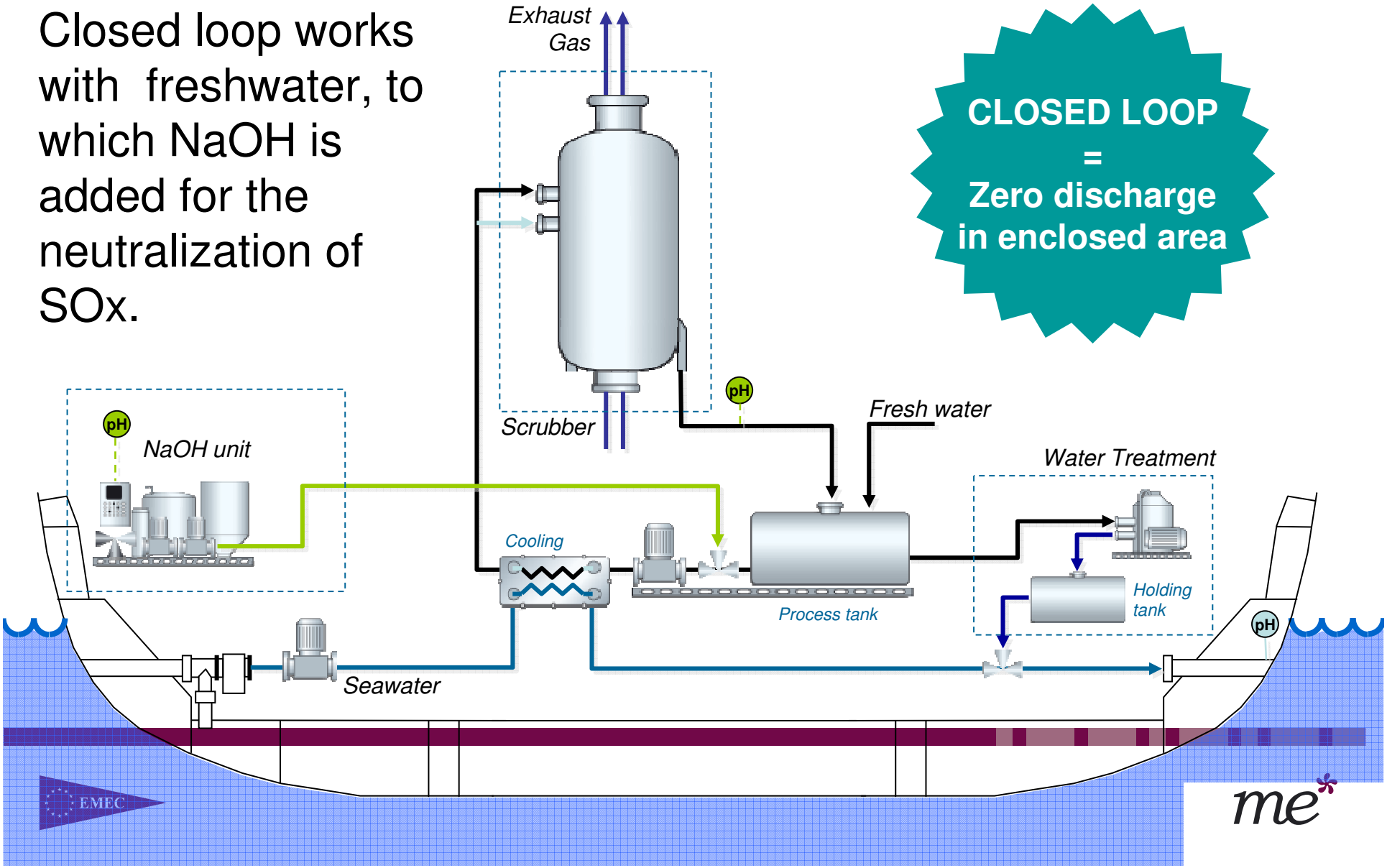
Sea Water Scrubbing (II)

- The sea is also a natural reservoir of sulphate containing **10^{15} tons of sulphur in seawater as sulphate overall.** In this respect the amount of sulphate from scrubber systems is insignificant
- On-site scrubbing has by far a smaller overall CO_2 footprint than both distilling more Diesel/Gas oil and de-sulphurizing the residual fuel, even when including the impact of ocean CO_2 release caused by the added Sulphur
- That has benefits on air quality. Additionally most scrubbers will remove a large part of the Particulates emissions

Fresh Water Scrubber

European Marine Equipment Council

Closed loop works with freshwater, to which NaOH is added for the neutralization of SOx.



Fresh Water Scrubbing

Advantages

- Works anywhere
- Smaller water flow than sea water scrubber
- Lower pumping power
- Corrosion and scaling issues easier
- Tested and certified by classification societies

Disadvantages

- NaOH needed
- Fresh water needed
- Reception facilities for Wash Water required

- **Good solution for ships engaged in e.g. the Baltic Sea**

SCRUBBERS

QUESTIONS:

- **COSTS** ⟷ **BENEFITS**
- **LONG TERM RELIABILITY AND EFFECTIVENESS**
- **REGULATION**
- **QUID RESIDUE (SULPHUR)**
  - **AT SEA?**
  - **PORT RECEPTION FACILITIES ?**

ECSA/EMSA INITIATIVE ON LNG AS ALTERNATIVE FUEL

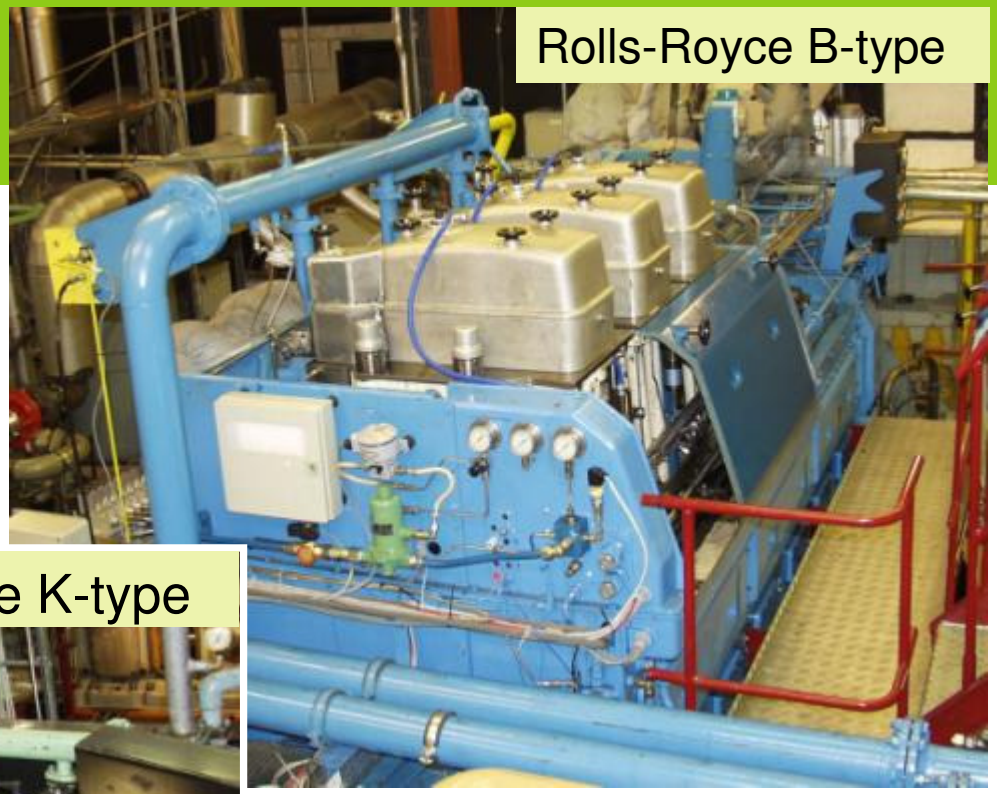
- SHORT SEA SECTOR
- ENGINE MANUFACTURERS
- CLASSIFICATION SOCIETIES
- BUNKERING
- TECHNICAL EXPERTS
- EU COMMISSION

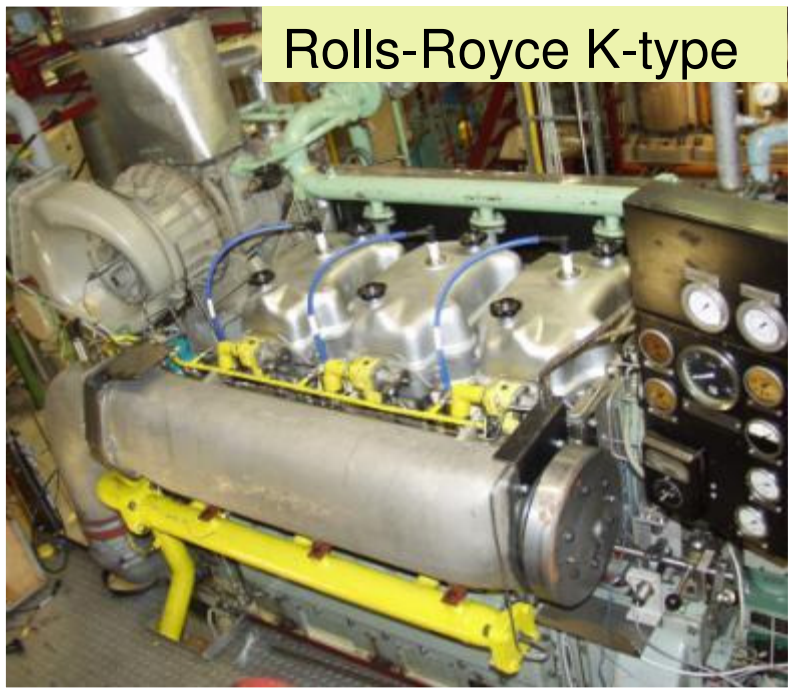
JOINT EMSA/ECSA WORKSHOPS 2009- 2010 LNG

KEY POINTS FOR DISCUSSION

- LNG FUELLED SHIPS STATE OF ART
- ECONOMIC & ENVIRONMENTAL DECISION FACTORS
- PORT INFRASTRUCTURE & LNG AVAILABILITY
- TECHNICAL CONSTRAINTS
- LNG FUEL CHARACTERISTICS
- SAFE OPERATION INCLUDING BUNKERING

GAS ENGINE DEVELOPMENT SINCE 1984





Dual Fuel gas engines
Lean Burn gas engines
- **Constant speed (generator load)**
- **Variable speed (propeller load)**

LNG powered RoRo freight ship (gas only)

Two ships under construction for delivery in 2011-12

Vacuum isolated pressure storage tanks

Tarbit Shipping chemical tanker “Bit Viking” (GL 111552) will be converted to LNG as fuel

Particulars

Deadweight 24,783 MT

Length over all 177,03 m

Beam 26,30 m

Cubic capacity 27,310 m³ 98%

Main engines 2 x WÄRTSILÄ 6L46B 5,850 kW

Classed GL* 100A5 E3 ESP IW
NAV-OC Chemical Tanker Type-2

ISSUES FOR FURTHER CONSIDERATION & ACTION

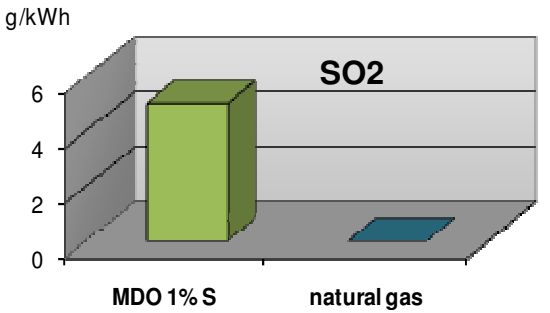
- LOSS OF ENERGY
- METHANE SLIP
- LESSONS FROM TESTS
- BUNKERING POSSIBILITIES
- INTERNATIONAL STANDARDS (IMO)
- NATIONAL RULES FOR BUNKERING
- RETROFITTING (INCLUDING COST)
- ECONOMIC VIABILITY (INCLUDING PRICE OF LNG)
- POSSIBLE INCENTIVES

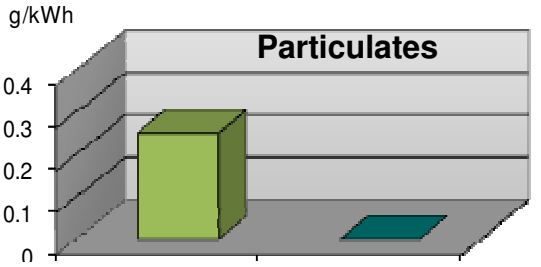
WAY FORWARD AFTER 2 WORKSHOPS

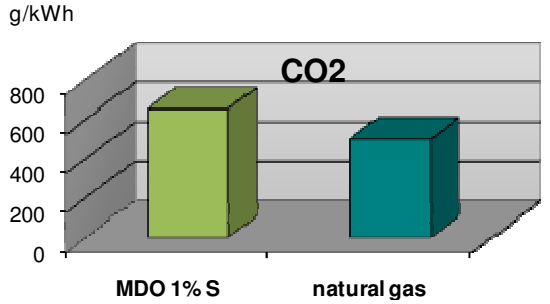
- THINKING AND WORK MATURED
- TECHNOLOGIE IMPROVED AND TESTING GOING ON
- ENVIRONMENTAL BENEFITS
  - SOX: NIL
  - NOX + PARTICLES: HUGE REDUCTION
  - CO2: MINUS 20%

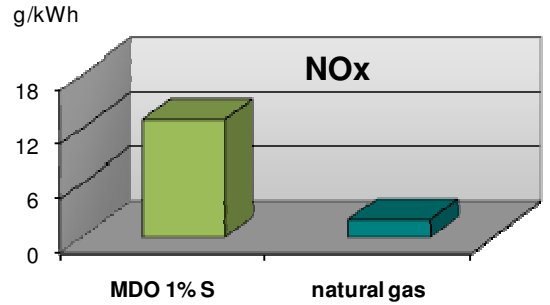
EXHAUST EMISSION - NATURAL GAS VS MDO

- Sulphur emission is eliminated
- Particulate matters is close to zero
- CO2 is reduced by 26%
  Due to unburned methane the net reduction of greenhouse gases is somewhat lower
- NOx is reduced by 80-90%









Source: Rolls-Royce Marine

KEY ISSUES ON BUNKERING

- INFRASTRUCTURE
- HANDLING IN PORTS
- REFUELLING
- BUNKERING WITH PASSENGERS ON BOARD DURING THE OPERATION IN PORTS.
- INTERESTING IDEAS ON BUNKERING BY SMALL LNG TANKERS AND BARGGES. THIS BUNKERING SHOULD BE SIMPLE, CREW FRIENDLY, IN LINE WITH EXISTING PROCEDURES AND SAFE.

Large LNG terminals in Europe

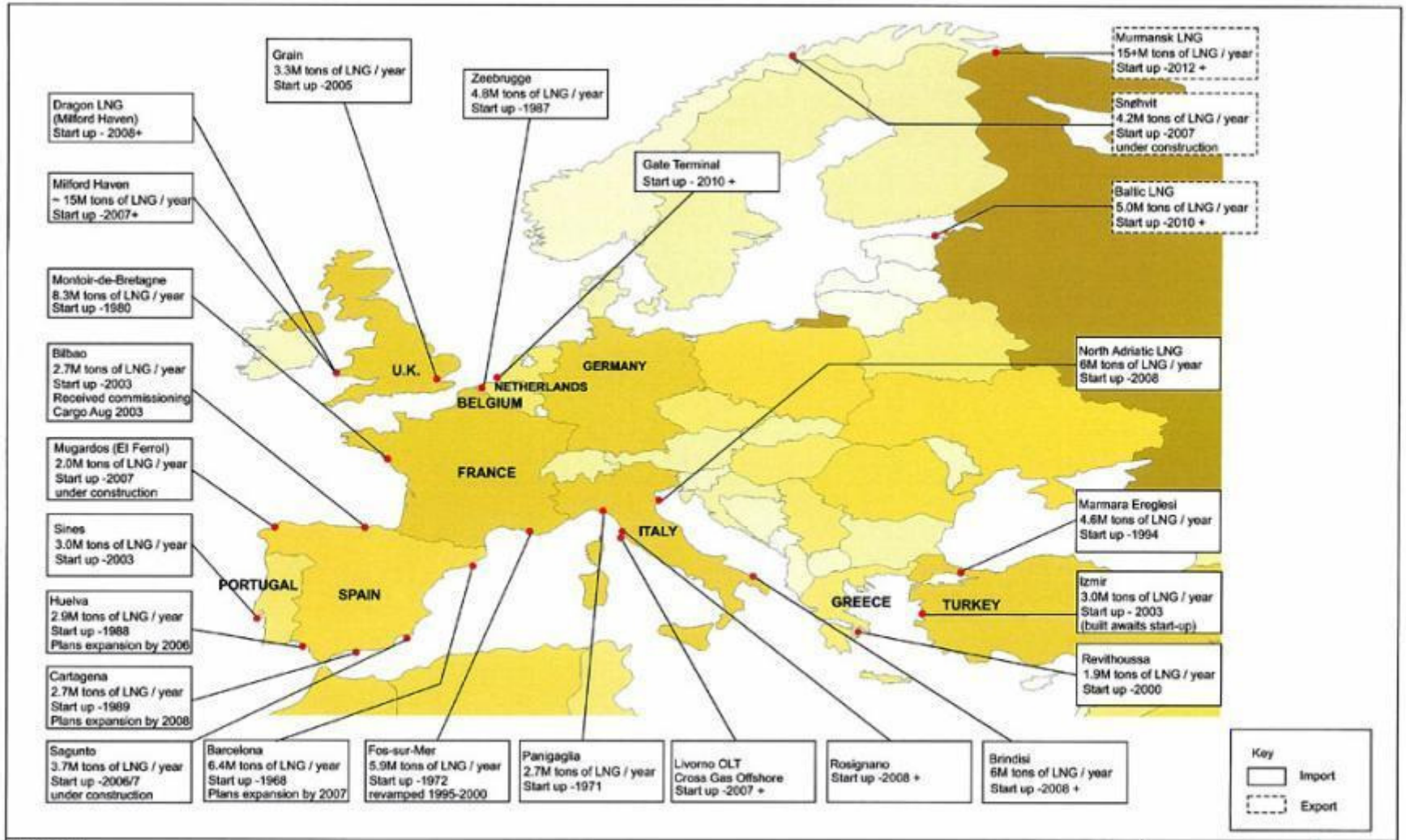


Figure 3.7

LNG TERMINALS (EUROPE)
(SOURCES: WORLD LNG MAP FEBRUARY 2006 EDITION. PETROLEUM ECONOMIST &
THE GLOBAL LIQUEFIED NATURAL GAS MARKET : STATUS AND OUTLOOK.
ENERGY INFORMATION ADMINISTRATION, US DEPARTMENT OF ENERGY. DECEMBER 2003)

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DATE: 13/07/06

Environmental Resources Management
ERM

COSTS:

- UNCERTAINTY LNG PRICE
- RETROFITTING: HIGH COST
- NEW ENGINES: HIGH COST
- PRESENT TESTS: SUBSIDISED
- SUPPORT NECESSARY

REGULATORY ISSUES

- **IMO GUIDELINES (ON BOARD)**
  - **AMENDING SOLAS 2014/2015**
- **BUNKERING: DIFFERENT NATIONAL RULES**

ESPO/ECSA COMMON SURVEY ON CURRENTLY AVAILABLE LNG INFRASTRUCTURE IN EUROPE

1. **Are there LNG terminals currently available in your country? If Yes:**
   a) **Please provide a description (location, capacity, operators, origin of LNG) of the availbale**
   b) **Are those facilities currently in position, or are they considering any modifications in order to supply LNG to vessels (small bunkering vessels and/or big shuttle tankers)?**

ESPO/ECSA COMMON SURVEY ON CURRENTLY AVAILABLE LNG INFRASTRUCTURE IN EUROPE

2. **Are there any LNG bunkering available facilities (also for inland navigation) in your country? If Yes:**
   a) **Please provide a description (location, capacity, operators, origin of LNG) of the availbale**
   b) **Please describe the rules/regulations that are applicable for LNG bunkering (Building permit, Safety of bunkering operations)**

ESPO/ECSA COMMON SURVEY ON CURRENTLY AVAILABLE LNG INFRASTRUCTURE IN EUROPE

3. **Are there plans to develop in the near future LNG terminals in your country? If Yes, please provide a description (foreseen location, capacity, operators, origin of LNG) of those.**

ESPO/ECSA COMMON SURVEY ON CURRENTLY AVAILABLE LNG INFRASTRUCTURE IN EUROPE

4. **Are there plans to develop in the near future LNG bunkering facilities (also for inland navigation) in your country? If Yes,**
   a) **Please provide a description (foreseen location, capacity, operators, origin of LNG) of those**
   b) **Please provide some insight on the rules/regulations that will applied for LNG bunkering (Building permit, Safety of bunkering operations)**

FURTHER FOLLOW UP

- ECSA/ESPO/EMSA TO LIST OUTSTANDING ISSUES
- FURTHER ACTION ON THEM TO BE STEERED AND MONITORED
- POSITIVE APPROACH BUT WILL TAKE TIME
- NOT READY IN 2015

THANK YOU

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