BSR InnoShip

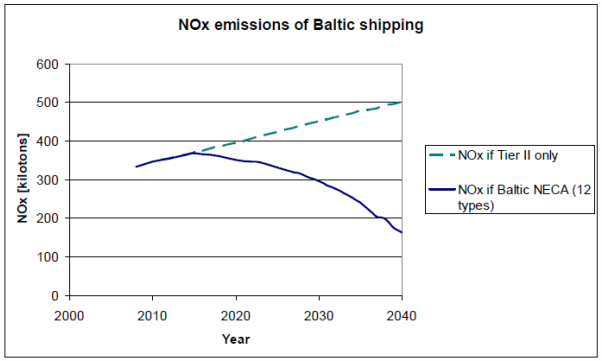
Baltic Sea cooperation for reducing ship and port emissions through knowledge- & innovation-based competitiveness

Suomen Itämeri-instituutti
The Baltic Institute of Finland

Alternative fuels – BSR InnoShip

Project leader:
Dr. Tapani Stipa
In partnership with 21 maritime organizations around the Baltic Sea Region

Baltic Sea Region
Programme 2007-2013

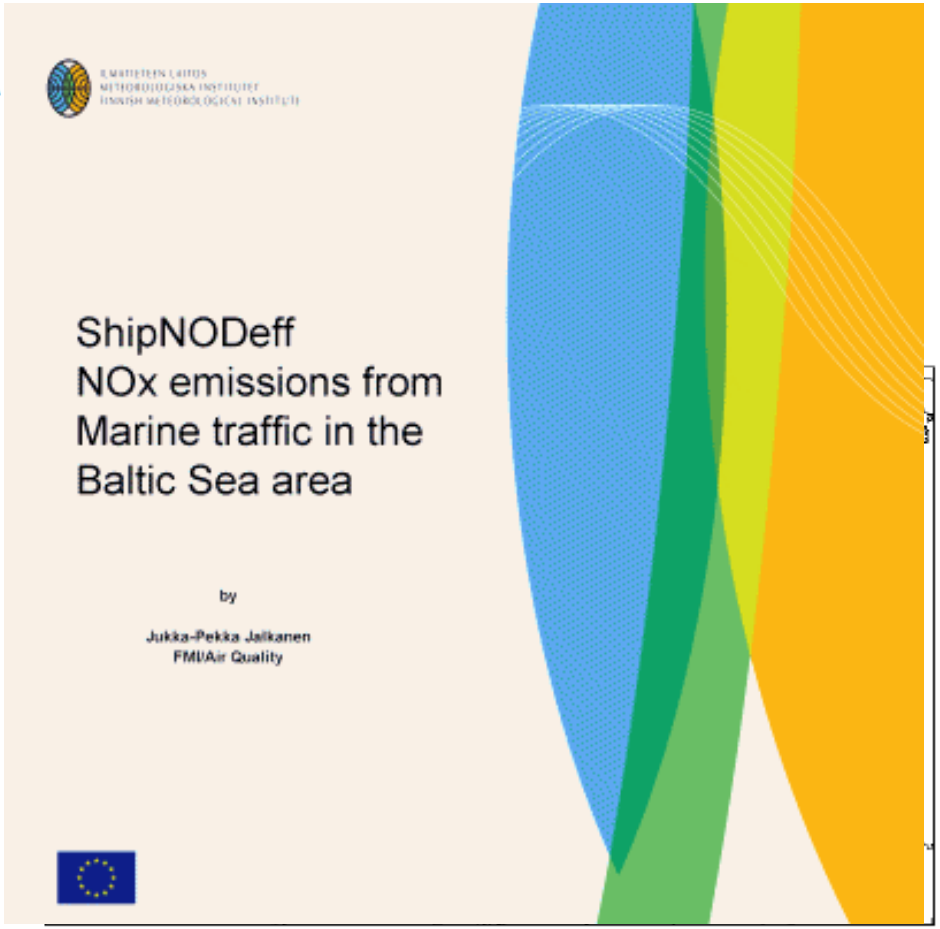


Policy framework

- **EU Strategy for the Baltic Sea Region, Priority Area 4 ("PA Ship"; clean shipping)**
  - a part of the flagship project *"Promote measures to reduce emissions from ships and enhance the development for shore side electricity facilities or for emission treatment in all major ports around the Baltic Sea"*
- **HELCOM Baltic Sea Action Plan**
  - Included in HELCOM Baltic Sea Action Plan: Maritime activities segment, e.g. 2010 HELCOM Ministerial Declaration
- **IMO has designated the Baltic Sea as a Sulphur Emission Control Area (SECA)**
  - progressive reduction in sulphur oxide (SOx) emissions from ships by 2015.
- **A NOx emission control area application is in preparation by HELCOM**

Northern Europe's SECA

- IMO Marpol Annex VI
  - SOx emission control area, SECA
  - Baltic Sea shipping: Fuel consumption 5.7 million tons (2009)
  - North Sea shipping: Fuel consumption 9.7 million tons
  - Total 15.4 million tons
  - Commercial shipping 13 million tons (12 290 ships, 13 ship types)
    - Ro-ro
    - Ropax
    - Product tanker
    - Container
    - Chemical tanker
    - General cargo
    - Vehicle carrier
    - Crude oil tanker
    - Bulk ship
    - LPG tanker
    - Cruise ship
    - Reefer
    - LNG tanker



MARPOL Annex VI additional costs

- Additional costs due to fuel switch (HFO → MGO) *today prices*

  = (SECA fuel consumption) * (assumed share of HFO)*(Distillate vs. HFO price difference)

  = 15.7 million tons/year * 0.85 * 294$/ton =

3.9 bn USD/y

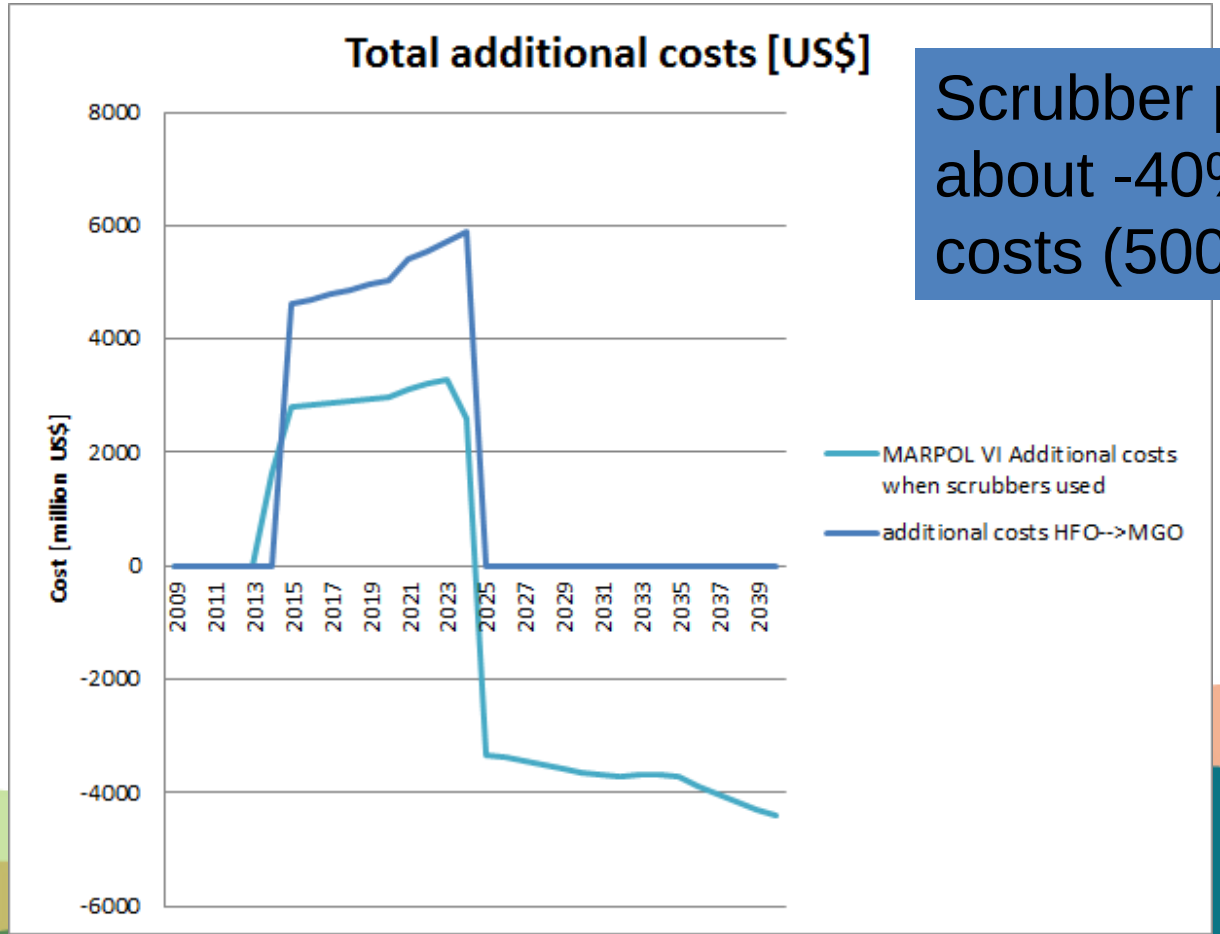
Price difference between MGO and HFO will increase in the future!

BSR InnoShip objective: reaching benefits at lower cost

Possible strategies for SECA

- Switching to diesel (MGO)
  - Absorb costs (BS-NS: 4-6 bn USD/y)
  - Slow steaming
- Using heavy fuel oil (HFO)
  - Scrubbers
- Alternative fuels, e.g. LNG

Costs reduction potential of scrubbers (see BTJ 2/2012)



Scrubber potential is about -40% of additional costs (500-1000 vessels)

Pilot of adopting low-emission solutions

on ship - Ship emissions and abatement technology assessment

STUDY
ON ALTERNATIVE FUELS
FOR MARINE
APPLICATIONS

by
Krzysztof Kołwzan
Marek Narewski
February 2012
Polski Rejestr Statków

PRS report: Fuel standards

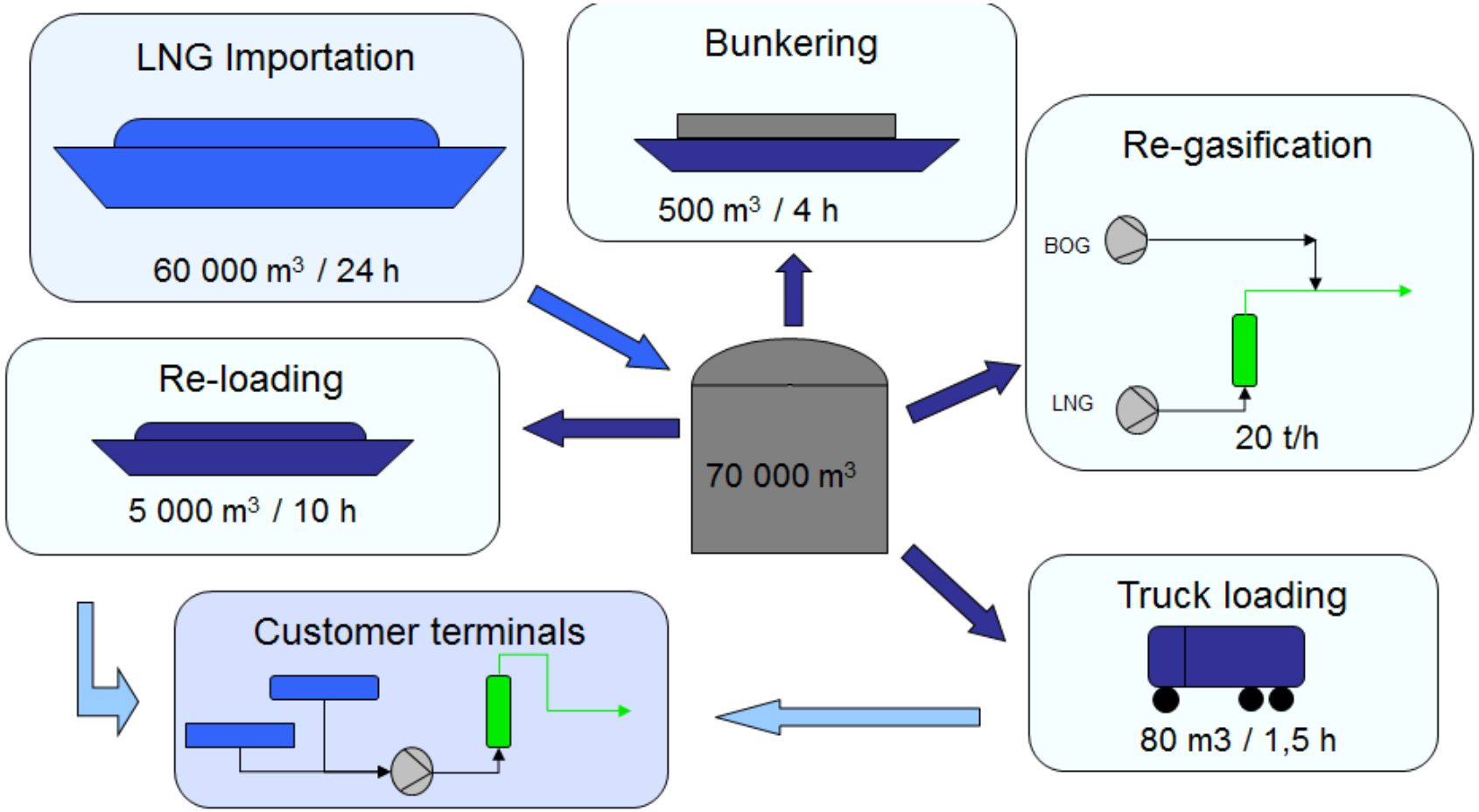
	Vegetable oil treated, non transesterified	Bio Diesel EN 14214	Automotive diesel EN 590	Marine diesel ISO 8217 DMB	Heavy Fuel Oil ISO 8217 RM ..
Density/15 °C	920 - 960 kg/m³	860 - 900 kg/m³	820 - 845 kg/m³	< 900 kg/m³	975 - 1010 kg/m³
Viscosity at 40 °C/ 50 °C	30 - 40 cSt	3.5 – 5 cSt	2 – 4.5 cSt	< 11 cSt	< 700 cSt /50 °C
Flashpoint	> 60 °C	> 120 °C	> 55 °C	> 60 °C	> 60 °C
Cetane no.	> 40	> 51	> 51	> 35	> 20
Ash content	< 0.01 %	< 0.01 %	< 0.01 %	< 0.01 %	< 0.2 %
Water content	< 500 ppm	< 500 ppm	< 200 ppm	< 300 ppm	< 5 000 ppm
Acid no. (TAN)	< 4	< 0.5	-	-	-
Sulphur content	< 10 ppm	< 10 ppm	< 350 ppm	< 20 000 ppm	< 50 000 ppm
Calorific value	ca. 37 MJ/kg	ca. 37.5 MJ/kg	ca. 43 MJ/kg	ca. 42 MJ/kg	ca. 40 MJ/kg

BothniaLNG – where transport meets steel, ice and liquid gas

- A public-private co-operation in the Bay of Bothnia
- Building on the TornioHaparanda LNG import terminal and its industrial baseload demand
- 3rd-4th largest LNG terminal in the Baltic
- LNG available in early 2016 (subject to FID)
- TEN-T proposal submitted

Baltic Sea Region Programme 2007-2013

The terminal is planned to be able to serve many types of LNG users



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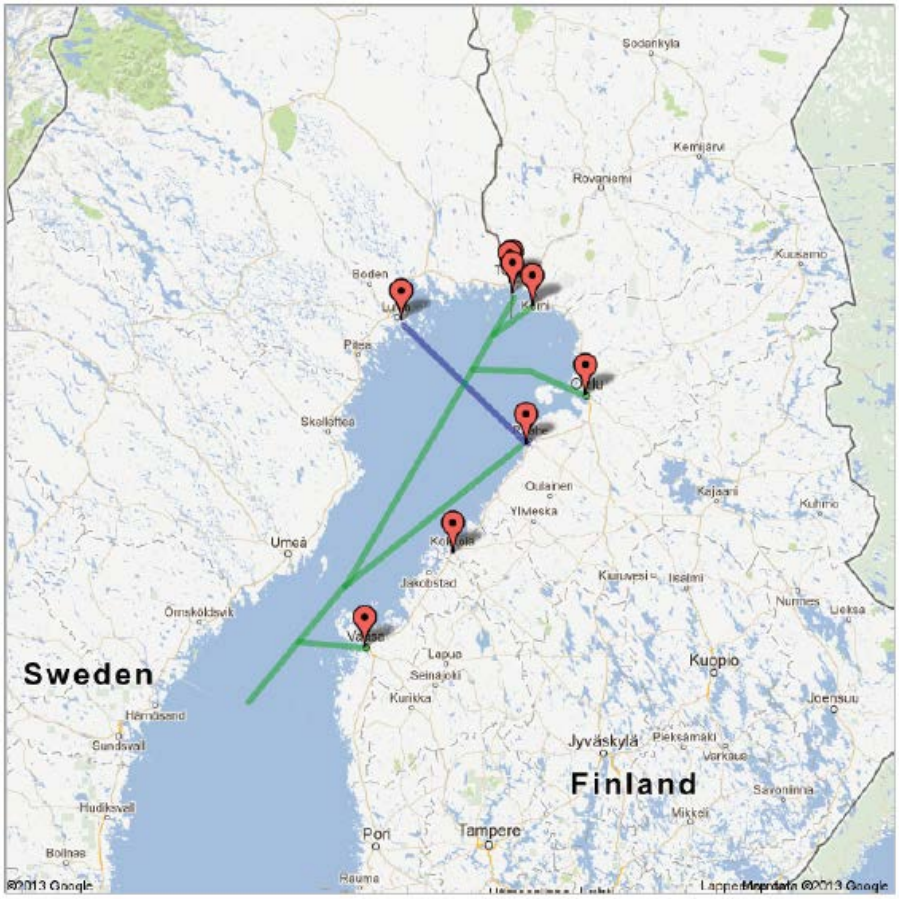

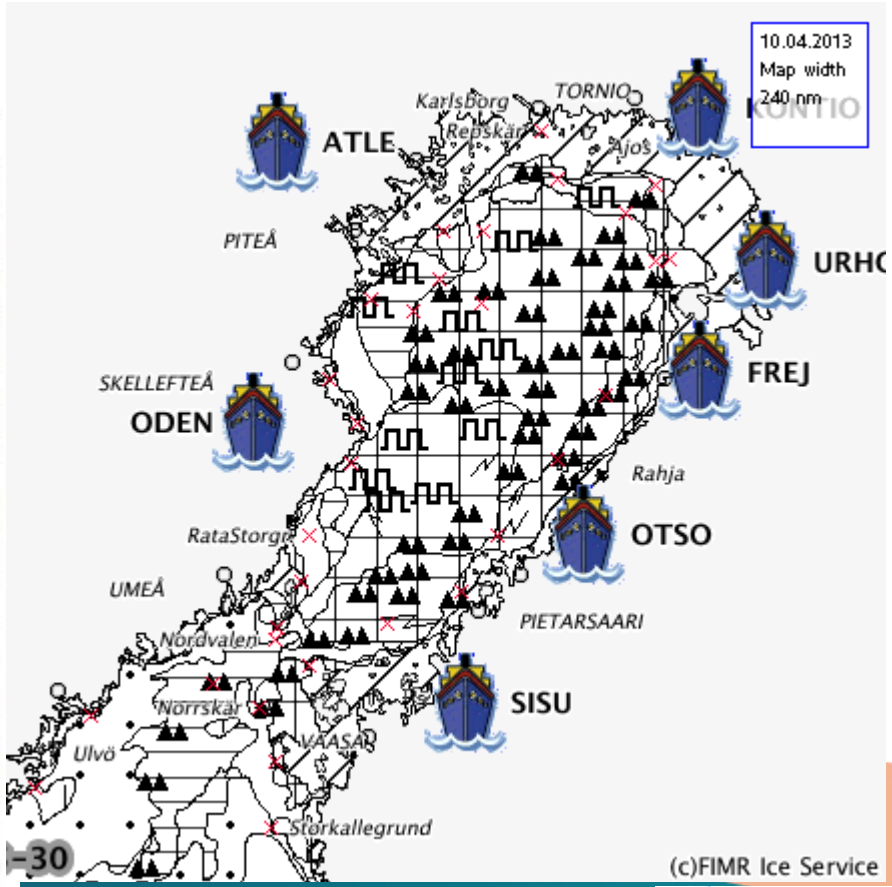

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BothniaLNG

LNG transport in ice

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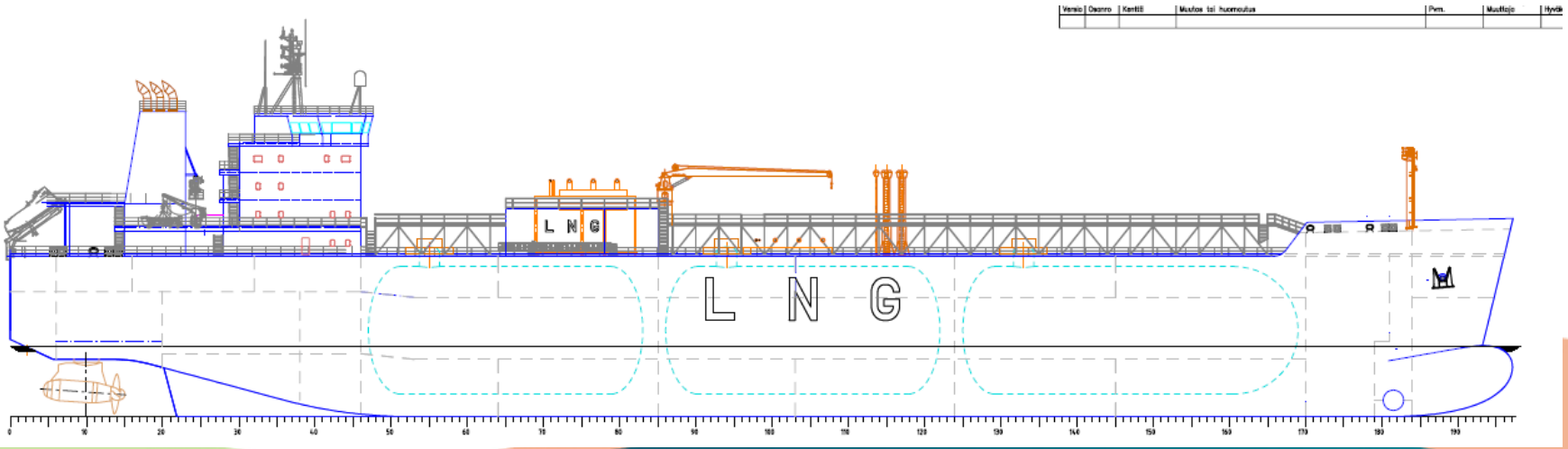
Self-sufficient LNG tanker

- Unique, novel pilot solution
- Technical challenges to be solved and demonstrated



Summing up

- Cost of maritime regulations high on a GDP level **if no actions are taken**
- There are means to reduce those costs
  - Efficiency is king, novel solutions needed
- We have a joint interest:
  - Prosperity and connectedness of our region
- **Time to act is now!** BSR InnoShip project is there to help you

Baltic Sea Region
Programme 2007-2013

Notes on the Way Forward

- Maritime transport is fundamental for our economies
- Price (and efficiency) is key
- Scale is fundamental for LNG
  - Mass adaption if price of LNG ≤ HFO
- There is no business as usual
  - New innovations (technical, business models) needed

for reducing ship and port emissions

tion-based competitiveness

BSR InnoShip

Clean Shipping Currents

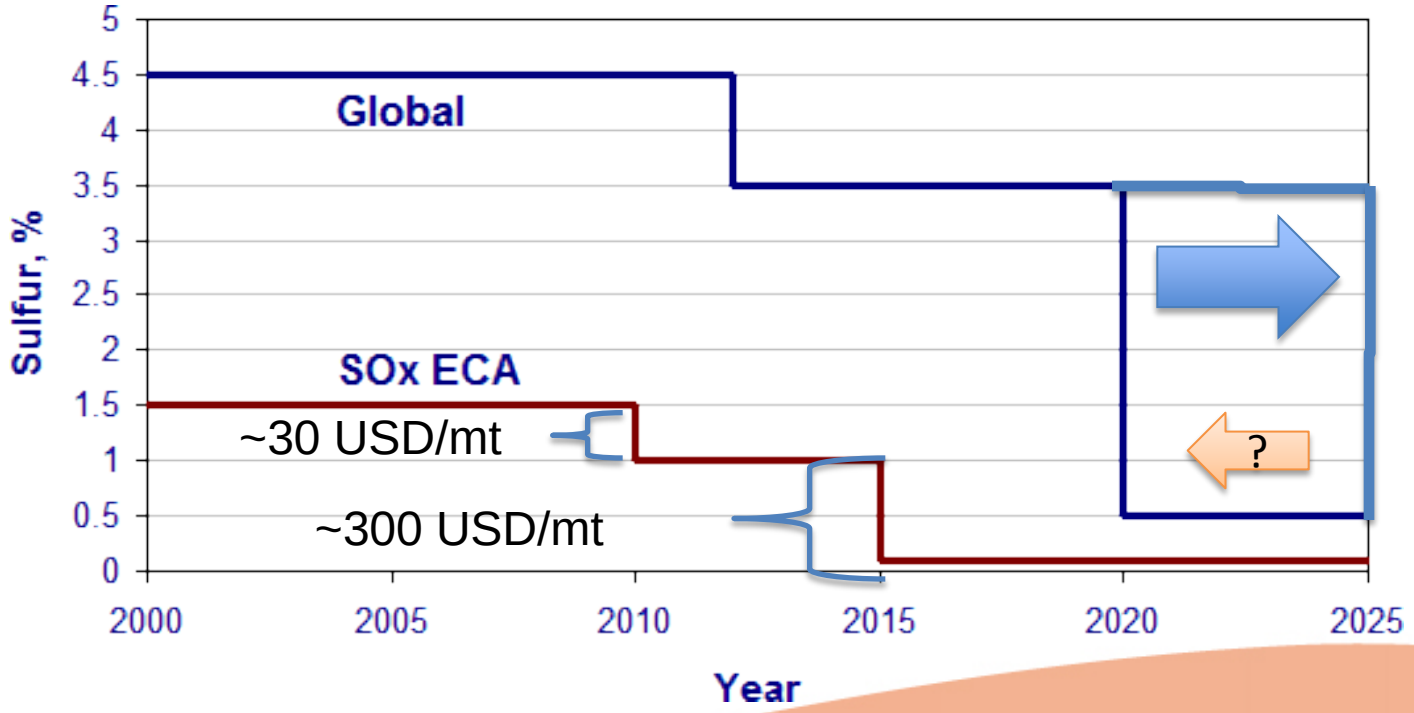
A new and interactive platform for rapid public-private information sharing around the Baltic region.

cleanshippingcurrents.eu

Dr. Tapani Stipa

Baltic Institute of Finland

IMO sulphur limit implementation



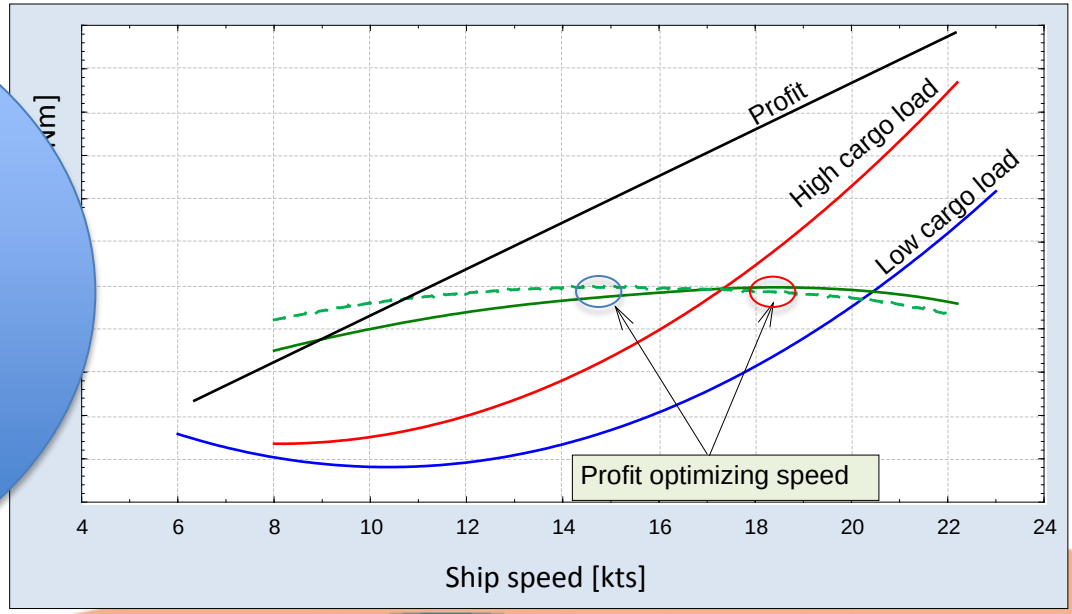
Baltic Sea Region Programme 2007-2013

Slow Steaming in shipping

- The optimal vessel speed depends on freight rates and fuel costs.
- Assuming, that fuel prices will not significantly drop, it can be concluded that slow steaming is best operating mode for container vessels.

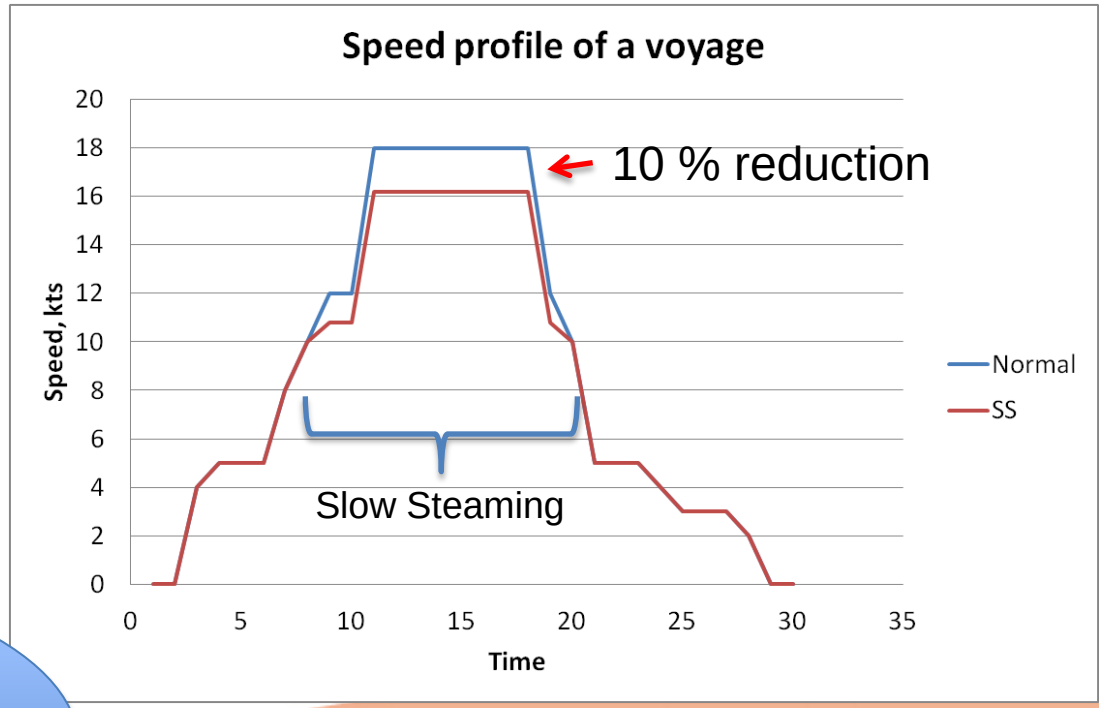
BSR - WP4 project

Offer:
Emission and cost optimization plan for all ships operating in the Baltic (MUS)



Slow steaming in Baltic Sea scale

- 10% speed reduction compared to normal if going over 10 knots
  - ”10/10 scenario”
  - ”30/10 scenario”
- High impact on vessels operating near their (high) design speeds
  - RoPax, Cruise, RoRo, Vehicle carriers



Cost reduction potential 20-40 % of additional costs