



**OUTCOME OF THE HELCOM STAKEHOLDER CONFERENCE:  
BAL TIC SEA - NOX EMISSION CONTROL AREA  
HELSINKI, FINLAND, 4 MARCH 2013**

**General**

The HELCOM Stakeholder Conference: Baltic Sea – NECA was organized to shed further light on the implementation of the Baltic Sea NECA - Nitrogen Oxide (NOx) Emission Control Area (ECA) – under Annex VI of the MARPOL Convention.

The event took place on Monday, 4 March 2013 (9:45-ca.16.30) at the Marina Congress Center, Helsinki, Finland, and reported to the 2013 HELCOM Annual Meeting (HELCOM 34/2013), held on 5-6 March 2013. The 77 registered participants represented ship owners, operators and ports of the HELCOM member countries, manufacturers of related technology, other stakeholders as well as country representatives.

Key topics in the Conference agenda included regulation of NOx emissions from shipping, the environmental effects of a Baltic NECA; compliance options and technology; as well as estimations and practical experiences related to NOx reduction measures. Technological options highlighted at the event, with the potential to meet stricter NOx emission limits (Tier III) included various catalysator (SCR) solutions, Exhaust Gas Recirculation (EGR), and alternative fuel solutions, including Liquefied Natural Gas (LNG).

Addressing Nitrogen emissions in the Baltic Sea is a way for the shipping industry to join forces with municipal wastewater treatment and other measures on land in reducing nutrient pollution, or eutrophication, of the Baltic Sea. The conference brought different stakeholders together and through dialogue looked for the best ways forward to achieve this.

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The [Helsinki Commission \(HELCOM\)](#) is an intergovernmental organization of the nine Baltic Sea coastal countries, the EU Commission and a number of observer organisations (maritime industry, environmental NGOs, other stakeholders). HELCOM was established in 1980 to oversee the implementation of a regional treaty called the [Helsinki Convention](#) signed by the coastal countries in 1974, ratified in 1980 and revised in 1992. This piece of international law covers explicitly the pollution from ships in the Baltic Sea (Article 8, Annex IV). To implement this part of the Convention, the Contracting Parties cooperate within the targeted HELCOM MARITIME group, *i.a.*, to ensure the effective and harmonized implementation of rules adopted by the International Maritime Organization (IMO) in the Baltic Sea region (Helsinki Convention Annex IV, Regulation 1).

## 1. Report of the interactive session at the end of the day

### Final discussion, further development and measures to reduce emissions

The IMO has already agreed on similar regulations of NO<sub>x</sub> emissions from marine traffic under MARPOL Annex VI as part of the "North American ECA", which came into effect from 1 August 2012. The North American ECA will bring (in 2016) stricter controls on emissions of SO<sub>x</sub>, NO<sub>x</sub> and particulate matter for ships trading off the coasts of Canada, the United States and the French overseas collectivity of Saint-Pierre and Miquelon.

The meeting took note of the experiences of the North American ECA as presented by Wayne Lundy and Charles Fluke from the U.S. Coast Guard as follows:

- Implementing the ECA is a challenge and joint work with the stakeholders is needed for better compliance and strong enforcement.
- The issue of fuel availability has been raised when discussing SO<sub>x</sub>.
- Technology is available according to the IMO Correspondence Group review (report for MEPC 65).
- Safety procedures of use of LNG are available.
- Flexible technology is available to meet stricter requirements when sailing inside ECAs but use less expensive fuel when outside.
- There should be some sort of verification that Tier III compliant technology is being used when the ship comes into an ECA.
- Transport of goods from ports and shorter, port to port, shipping will most probably not be effected. Shipping will remain the major way of transportation in the US.
- There will be penalties (detentions, fines, etc) for non-compliant ships

During the general discussion the following issues were raised:

- Based on more than 10 years of operational experience MAN Diesel and Wärtsilä confirmed that SCR technology is available and it is compliant with Tier III, however some participants raised concerns on the maturity of the technology.
- In response to a question, whether the NECA decision to send in an application to IMO has been made or not, it was clarified that a decision to send in the application has been made within HELCOM, by the Contracting Parties, and that the only open issue is timing of the submission.
- It was further clarified that the decision, background documents and the NECA submissions themselves are publicly available from the HELCOM website without passwords.
- A participant considered that there are risks for modal shift away from marine traffic and that such a shift would have negative environmental impacts.
- Ensuring smooth implementation would be important to avoid excessive costs.
- North Sea NECA would be important to ensure level playing field for the north European shipping.
- The North Sea NECA application will be ready for political decisions by 2013.
- A representative of the shipping industry remarked that they would comply but that there would be economical consequences to the transport sectors and the consumers. He noted that the shipping industry is a service provider and a catalyst for economic growth.
- Another representatives of the shipping industry remarked that in order to make orders for new ships, with right technology, the decision about a NECA application should be available very soon, by mid-2013.

- Dual fuel engines can be certified to meet Tier III requirements in accordance with the NOx Technical Code.
- Some participants noted that the goal to reach good environmental status by 2020/21 is only a few years away and that a decision on the NECA submission should be made latest by 2013.
- Increased use of alternative fuels, such as LNG, would be a solution for both NOx and SOx emissions.
- Participants highlighted the need to work together to speed up the availability of LNG infrastructure.
- It was clarified that even if the share of shipping as a NOx source is currently smaller than land-based sources, all sectors should do their share in reducing Nitrogen input to the Baltic Sea. In addition the share of shipping as a source of NOx emissions is increasing due to stricter regulation of land based sources.
- Participants pointed out that in addition to discussions with the industry in working bodies of HELCOM it is beneficial for wide stakeholder engagement early in the process.
- Several industry organisations have observer status within HELCOM and that the participants are encouraged to get involved.
- Global application of NOx regulation would reduce distortion of competition
- According to FMI, who carried out the NECA application analyses, the NOx emission estimates included in the NECA application
- Recent discussions on SECA influence discussions around NECA even if NECA applies only to ships built on or after 2016, not existing fleet.

## 2. Presentations

### Opening and introduction to the work of HELCOM MARITIME

The Conference was moderated by Ms. **Anna Petersson**, Swedish Transport Agency, who welcomed the participants of the Conference.

In their [opening statement](#) the Chair of HELCOM MARITIME, Ms. **Lolan Eriksson**, & the Vice-Chair of HELCOM MARITIME, Ms. **Natalia Kutaeva** introduced the participants to the Baltic Sea, its maritime features and the joint work within the HELCOM MARITIME group by all the nine coastal states, the EU Commission as well as industry and civil society observers in curbing pollution from ships in the Baltic Sea.

The HELCOM MARITIME group functions as a regional platform for regional implementation, and development, of global shipping regulations discussed within the International Maritime Organisation (IMO). This has been a part of wider HELCOM work to comprehensively address pollution loads to the sea, whether from sea, or land based sources. Eutrophication, which means the effects of nitrogen and phosphorus pollution, is one of the central environmental issues in the Baltic Sea region and is targeted by NECA and other measures on land.

The Chairs warmly welcomed the participants to “Baltic Sea-NECA”, the first HELCOM Stakeholder Conference to explicitly deal with pollution from shipping.

### Session I Regulation of NOx emissions from shipping

#### [MARPOL ANNEX VI-Regulations for the Prevention of Air Pollution from Ships](#)

Mr. **Edmund Hughes**, International Maritime Organization (IMO) Secretariat, introduced the regulatory framework of the Baltic NECA: the MARPOL Annex VI and its Chapter 3, Regulation 13, focusing on NOx emissions. He noted that main source of NOx from shipping are marine diesel engines which are for NOx emissions certified under the IMO NOx Technical Code (Reg. 13.8).

Tier III NOx limits are to be applied in ECA areas and are stricter than limits which are to be applied elsewhere (Tier II). He noted that there will be two NOx – relevant MARPOL Annex VI ECAs in the world: the North American ECA, and US Caribbean ECA (soon to enter into force).

The IMO Correspondence Group has completed its work in defining and evaluating technologies that are expected to be used to meet the regulation 13 Tier III NOx standards. The results are to be discussed at the next meeting of the IMO MEPC.

He finally pointed out that pure gas engines do not currently fall under MARPOL Annex VI Regulation 13 and that some observers have highlighted that Tier III compliance of gas engines should be ensured.

#### [Introduction to the Baltic Sea NECA status application process](#)

Mr. **Jorma Kämäräinen**, Finnish Transport Safety Agency (Trafi), brought up HELCOM work in addressing pollution to the Baltic Sea from all sources and that nutrient pollution regulated by the NOx Emission Control area (NECA) designation is a key issue highlighted by the 2007 HELCOM Baltic Sea Action Plan (BSAP).

He noted that the Correspondence Group on designation of the Baltic Sea as a NECA was established at the 7<sup>th</sup> Meeting of HELCOM Maritime in 2008. The Correspondence Group worked intensively over five years until HELCOM 33 Meeting, which was held in March 2012. During the period 2008 – 2012 the following non-governmental organizations were involved in the work of the CG and HELCOM Maritime in addition to representatives of all HELCOM Contracting Parties:

- International Chamber of Shipping (ICS)
- European Community of Shipowners Association (ECSA)
- European Sea Ports Organization (ESPO)
- Baltic Ports Organization (BPO)
- WWF
- BIMCO

The HELCOM 33 Meeting held in 2011 decided that there will be two submissions by the Baltic Sea countries to IMO: the NECA submission and the technology overview submission. The Meeting agreed that both these submissions are complete and that the NECA application fulfills the IMO criteria in Appendix III of Annex VI to MARPOL. Since the HELCOM 33 Meeting the timing of submitting the documents to IMO has been the only remaining question.

During this work, a comprehensive review of the available technology meeting Tier III regulations, as well as on environmental as well as economic impacts of the NECA application was made. It was concluded that Selective Catalytic Reduction (SCR) and the use of alternative fuels (Liquefied Natural Gas (LNG)) would be available. Since the work of the CG was completed, Exhaust Gas Recirculation technology has been further developed and according to engine manufacturers, that technology will also meet Tier III regulations at least for two-stroke diesel engines.

He mentioned that Regulation 13.10 of MARPOL Annex VI calls for a review of the status of technological developments to implement the 2016 Tier III NOx emission limits but that the technological information assessed by the CG did not suggest a need to delay the 2016 implementation date of the Tier III NOx standards contained in regulation 13 of MARPOL Annex VI.

He also pointed out that the NECA status does not bring excessive costs to the Baltic Shipping industry, that Tier III regulations apply only to new ships and that calculations show that nitrogen reduction through NECA is as cost efficient as measures in agriculture or Wastewater treatment.

## Session II Environmental effects of Baltic NECA

### [Effect of Baltic NECA on Ship NOx emissions](#)

Mr. **Jukka-Pekka Jalkanen**, Finnish Meteorological Institute (FMI), presented the assessment on the effect of Baltic NECA on ship NOx emissions, included in the Baltic NECA application developed within HELCOM. He noted that modelling results are consistent with other estimations done by EMEP.

The modelling showed that, with a predicted 2% annual increase in shipping, an introduction of Tier III (NECA) in the Baltic Sea would mean that the NOx emissions would be 0.4 of the 2007 baseline in 2045. As an alternative scenario, application of Tier II (non NECA) only in the Baltic region, would lead to a growth of 1.6 in NOx emissions in the region by 2045. The existing estimates indicate that SOx and PM are likely to decrease while NOx and CO2 will not, as there is currently no regulation for NOx or CO2 from maritime traffic in the Baltic Sea.

### [NOx impact on Air Quality, Human Health and Ecosystems in Tier II/III ship emission scenarios for the Baltic Sea](#)

Mr. **Mikhail Sofiev**, Finnish Meteorological Institute (FMI), presented the results of a study on environmental and health effects in the Baltic Sea region based on three scenarios: current emissions, Tier II (non NECA) and Tier III (NECA). The study is based on a model (SILAM) used by FMI which has a good level of reliability compared to other available models.

Tier III would bring with it 60% decrease in NOx emissions while Tier II would indicate 60% increase in emissions. Tier III would mean 2-3 times decrease in NOx concentrations over the sea area and, especially in offshore areas of high traffic, reduce exceedance of NOx critical levels. Effect of Tier III on land would be limited as close to coastal cities the effect of land traffic have a comparatively large effect. Human exposure effects are concentrated to Ports.

## Session III Compliance and technology

### [Compliance options to meet Tier III NOx emission standards: SCR technology, LNG etc.](#)

Mr. **Holger Steinbock** from BG Verkehr presented compliance options to meet Tier III NOx emission standards and some examples from Germany. He noted that a number of ships would be exempted from NECA Tier III requirements -including ships constructed before 2016, ships operating outside the NECA, ships with engine power under 750 kW, recreation vessels under 24m, other engine types than marine diesel engines (gas turbines, steam turbines and combined).

He pointed out that the German ship owner "Reederei Rörd Braren" has been operating three carriers which have SCR technology installed since 1998. The company won the European Clean Marine Award of 2004.

The operating experiences include observations that the life time of a SCR reactor is ca 40.000 hours (6-7 years) and the systems reduce 90% NOx. A SCR reactor takes space and adds payload -but also reduces noise. SCR operation consumes urea, consumption of which is around 6-8% of fuel consumption. According to German experiences the CO2 slip is negligible, less than 1%, and thus SCR does not have an impact in terms of climate change.

He noted that most of ships which will be constructed after 2016 and for the worldwide trade will comply with Tier III requirements, the North American ECA is already in place, both SCR and LNG technology meeting Tier III is available, further technologies are under development (EGR). He concluded that as there is not much time for the shipping industry to react it would be better to start now.

### [NOx abatement technologies for meeting Tier III standards](#)

Mr. **Göran Hellen**, presented Tier III technology available by Wärtsilä. Wärtsilä produces different types of engines, is the world leader on 4-stroke and smaller player on 2-stroke.

He highlighted the role of gas and dual fuel engines for achieving large reductions in emissions (NO<sub>x</sub>, SO<sub>x</sub> and particulates) in the future. Wärtsilä has available dual fuel engines which can use gas inside ECA and switch to Tier II technology (diesel) outside ECAs. Such dual fuel engines are established technology, applications including Power Plants, Merchant fleet, Offshore and cruise and ferry industries.

Wärtsilä has also a long history with SCR technology. For marine applications Wärtsilä has so far delivered 180 engines with SCR. He noted that SCR can be used in combination with a scrubber for combined SO<sub>x</sub> reductions. Operational cost of SCR mainly consists of urea expenses. Other solutions than SCR and gas (e.g. in engine solutions) are possible but would likely require a combination of technologies to reach Tier III targets.

He concluded that Wärtsilä has Tier III compliant technologies available both as SCR catalyst solutions for HFO/MDO/MGO and as gas and dual fuel engines.

### [Field experiences of Tier III compliant SCR system on board a vessels](#)

Mr. **Ralf Oldenburg**, MAN Diesel, presented MAN Diesel work on Tier III compliant technologies. MAN Diesel has Tier III technology available as SCR solutions, dual fuel engines and Exhaust Gas Recirculation systems.

The company has available advanced control system for SCRs in order to i.a. minimize (optimize) urea consumption.

MAN SCR for 4-stroke engines has been certified by i.a. Lloyds and have considerable number of hours test operation behind them. MAN is working on reducing the size of the these 4-stroke engine SCR systems.

MAN has also available Tier III SCR for 2-stroke engine, certified and in service in 2011. MAN Diesel S46MC SCR is the first 2-stroke engine installed with Tier III SCR.

MAN has also available Tier III compliant Exhaust Gas Reduction (EGR) technology for 2-stroke engine. The S80ME-C EGR is the first 2-stroke engine, certified in November 2012 and in service Feb 2012.

MAN has also available dual fuel engines which can use different types of fuels (Tier II in diesel, Tier III in Gas) and even any mixtures of such fuels.

He concluded that MAN Diesel has available SCR, EGR and dual fuel (gas) solutions to meet IMO Tier III targets.

### [Baltic Sea NECA: operational and technological adventures](#)

Mr. **Lev Novikov**, JSC "CNIDI-Ecoservice" (Engine Research & Development Center), referred to estimations that only 1% NO<sub>x</sub> emissions in the Baltic Sea originates from shipping and 5% in regions of intensive shipping. These estimations are much lower than those estimated by FMI for the NECA application within HELCOM. He pointed out that some hours are needed for reduction of airborne nitrogen, during which the pollution will have moved away from the Baltic Sea and that as the reduction from Tier I to Tier II was much smaller than the reduction from Tier II to III more time is needed for complying with the requirements.

He highlighted that in the St Petersburg area around five percent of the NO<sub>x</sub> emissions come from shipping sources, main part is from land traffic.

He raised also technological concerns of SCR operation, including the narrow temperature range of operation and mentioned that SCR technology based on other technology than urea (Ti/V catalysts, propane and cold plasma) have been developed in Russia.

He raised concerns to the NECA application as the ship traffic contribution to Baltic NOx pollution is relatively insignificant, SCR technology is not problem-free thus time is not ripe to implement NECA.

#### **Session IV Baltic NECA and shipping: estimations and practical experiences**

##### [Costs and benefits of the implementation of Tier III regulations in the Baltic Sea area](#)

Mr. **Juha Kalli**, Centre for Maritime Studies-University of Turku presented that based on estimations using operation hours within ECAs the costs of NECA have been estimated to 2248 e/abated ton of NOx with 10% interest rate and 1843 e/abated ton, with 5% interest rate and that the figure 1843 e/abated ton is well in line with other estimates.

Due to the base in operating hours the costs are lower for ships operating proportionally more within the Baltic Sea.

##### *Baltic NECA, Effect of shipping*

Mr. **Alexey Klyavin**, Association of Shipping Companies (Russia) raised concerns to Baltic NECA implementation as SCR is the only available technology to meet Tier III requirements and it has drawbacks. Any premature steps in terms of NOx ECA would mean that new ships have the danger of not being built. Even if there are different economic measures to compensate for the increased costs, these can be interpreted as unfair competition and could for their part increase the costs of SCR technology.

He pointed out that the Baltic Sea is one of the busiest seas in terms of maritime traffic and that there is a need to balance between economic concerns of companies, available technology and environmental benefit.

He raised concerns to the NECA application as LNG is not available, SCR technology is not problem-free thus time is not ripe to implement NECA.

##### [The experiences of a shipowner on the operation of NOx abatement technologies](#)

Mr. **Niels Björn Mortensen**, Maersk Maritime Technology presented Maersk experience in Tier III technology and concluded that for Maersk the key issue is ensuring enforcement of NECA regulation, not NECA regulation in itself (20% extra cost for main engine).

#### **Additional presentations on Tier III technology were made by:**

[Mr. Joseph McCarney \(IACCSEA\)](#), [Ms. Karin Liljegren \(DEC Marine AB\)](#) and [Mr. Michael Rutkowski \(H+H GmbH\)](#)



## PROGRAMME

- 08.30-09.45**                    **Registration and coffee**
- 09.45-10.00**                    **Opening and introduction to the work of HELCOM MARITIME**  
*Ms. Lolan Eriksson, Chair of HELCOM MARITIME*  
*Ms. Natalia Kutaeva, Vice-Chair of HELCOM MARITIME*  
Moderator:                    *Ms. Anna Petersson, Swedish Transport Agency*
- 10.00-10.30**                    **I Regulation of NOx emissions from shipping**  
*Mr. Edmund Hughes, International Maritime Organization (IMO)*  
The IMO regulations concerning the NOx emissions, including  
Tier III NOx emissions standards for ships' diesel engines  
*Mr. Jorma Kämäräinen, Finnish Transport Safety Agency (Trafi)*  
Introduction to the Baltic Sea NECA status application process
- 10.30-11.00**                    **II Environmental effects of Baltic NECA**  
*Mr. Jukka-Pekka Jalkanen, Finnish Meteorological Institute*  
Effect of Baltic NECA on NOx Emissions  
*Mr. Mikhail Sofiev, Finnish Meteorological Institute*  
Effects of Baltic NECA on Environment
- 11.00-12.00**                    **III Compliance and technology**  
*Mr. Holger Steinbock, BG Verkehr*  
Compliance options to meet Tier III NOx emissions standards:  
SCR technology, LNG, etc.  
*Mr. Göran Hellén, Wärtsilä*  
Development and manufacture of modern diesel engine and their  
compliance with Tier III NOx emissions standards  
*Mr. Ralf Oldenburg, MAN Diesel & Turbo SE*  
First field experiences of an IMO Tier III – compliant SCR-system on  
board a vessel  
*Mr. Lev Novikov, JSC "CNIDI-Ecoservice" (Engine Research & Development  
Center)*  
Baltic Sea NECA - operational, technological and material adventures
- 12.00-13.00**                    **Lunch break (Industry Exhibition on available Tier III technology)**

**13.00-13.45 IV Baltic NECA and shipping: estimations and practical experiences**

*Mr. Juha Kalli, Centre for Maritime Studies-University of Turku*  
Costs and benefits of the implementation of Tier III regulations in the Baltic Sea area

*Mr. Alexey Klyavin, Association of Shipping Companies (Russia)*  
Baltic NECA: Effect of Shipping

*Mr. Niels Bjørn Mortensen, Maersk Maritime Technology*  
The experience of a ship owner on the operation of NOx abatement technologies

**13.45-14.45 V Final discussion, further development and measures to reduce emissions**

Participants: *All speakers and the audience*

*U.S. Coast Guard representative attends through a live video link*

Moderators: *Ms. Anna Petersson, Swedish Transport Agency*

*Mr. Jorma Kämäräinen, Finnish Transport Safety Agency (Trafi)*

**14.45-15.00 Coffee break**

**15.00-16.30 Presentations and Industry Exhibition on available Tier III technology**

*Mr. Joseph McCarney, International Association for the Catalytic Control of Shipping Emissions to Air (IACCSEA)*  
An overview of the technology options to meet IMO Tier III NOx limits

*Ms. Karin Liljegren, D.E.C. Marine AB*  
Challenges of SCR long term continuous operation

*Mr. Michael Rutkowski, H+H Umwelt- und Industrietechnik GmbH*  
Latest Information on SCR Technology for Marine Application



## Attachment 2

### LIST OF PARTICIPANTS

#### Speakers and moderators

Ms. Lolan Margaretha Eriksson  
Ms. Natalia Kutaeva  
Ms. Anna Petersson  
Mr. Edmund Hughes  
Mr. Jorma Kämäräinen  
Mr. Jukka-Pekka Jalkanen  
Mr. Mikhail Sofiev  
Mr. Holger Steinbock  
Mr. Göran Hellen  
Mr. Ralf Oldenburg  
Mr. Lev Novikov  
Mr. Juha Kalli  
Mr. Alexey Klyavin  
Mr. Niels Bjorn Mortensen  
Mr. Joseph McCarney  
Ms. Karin Liljegren  
Mr. Michael Rutkowski

#### Participants

Mr. Anders Alm  
Ms. Gertrude Anina  
Mr. Bodo Bahr  
Mr. Viktor Batianov  
Mr. Tadeusz Borkowski  
Ms. Sylvia Bretschneider  
Mr. John Briggs  
Mr. Tomasz Cepinski  
Mr. Guntis Drunka  
Ms. Ulrike Dufner  
Ms. Kristina Effler  
Mr. Conor Feighan  
Ms. Christina Gestrin  
Mr. Markku Hakala  
Mr. Juha Heijari  
Mr. Heiko Heitur  
Ms. Jessica Hjerpe-Olausson  
Mr. Per Holmström  
Ms. Mia Hytti  
Ms. Magdalena Jablonowska  
Ms. Eija Kanto  
Ms. Antoine Kedzierski  
Mr. Vladimir Kondratev  
Ms. Enn Kreem  
Mr. Dalius Krinickas  
Ms. Lotten Kronudd

Ms. Maija Lappi  
Ms. Kati Lehtoranta  
Mr. Klas Ljungmark  
Ms. Anne-Mette Lund  
Ms. Aurore Maillet  
Mr. Ari Malmi  
Ms. Maija Mattila  
Ms. Charlotte Mogensen  
Mr. Sergei Motorin  
Ms. Merily Must  
Ms. Anita Mäkinen  
Ms. Outi Nietola  
Mr. Piotr Nowosielski  
Ms. Lisbet Oelgaard  
Mr. Tarmo Pauklin  
Mr. Matthias Plötzke  
Ms. Eeva-Liisa Poutanen  
Ms. Monika Przedpelska Öström  
Mr. Timo Rajakangas  
Ms. Vanessa Ryan  
Ms. Mirva Salokorpi  
Mr. Paris Sansoglou  
Ms. Romy Schroeder  
Mr. Matti Spolander  
Mr. Tapani Stipa  
Mr. Jesper Stubkjaer  
Mr. Janne Tamminen  
Ms. Kirsti Tarnanen-Sariola  
Ms. Otilia Thoreson  
Mr. Silver Vahtra  
Ms. Viktorija Vaskeviciene  
Ms. Baiba Zasa

#### HELCOM Secretariat

Ms. Monika Stankiewicz, Executive Secretary  
Mr. Hermann Backer, Professional Secretary  
Mr. Mikhail Durkin, Professional Secretary  
Ms. Laura Meski, Assisting Professional Secretary  
Ms. Petra Kääriä, Assisting Professional Secretary  
Mr. Joni Kaitaranta, Data Administrator  
Mr. Manuel Frias Vega, Project Coordinator  
(HELCOM MORE)

#### Technology exhibitors

D.E.C. Marine AB  
H + H Umwelt- und Industrietechnik GmbH  
BSR InnoShip  
Wärtsilä Finland Oy