CLEAN BALTIC SEA SHIPPING
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FUTURE OF MARITIME TRAFFIC IN THE BALTIC SEA

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TRENDS IN THE WORLD TRADE AND SHIPPING

World seaborne transport

World Fleet Development

Fuel Costs

Source: www.clarksons.com and the shipbuilders' association of Japan (SAJ)

Source: Clarkson Research, April 2011
GLOBAL MARITIME TRANSPORT FORECAST

- Amount of marine transportation in 2015 and 2020 are the same as the expectation in 2009.
  \( (2008 \rightarrow 2020 \ -17\%) \)
- \( 1990 \sim 2008 \ +3.7\% \)
  \( 2008 \sim 2030 \ +2.2\% \) per year

Source: The shipbuilders’ association of Japan (SAJ)
## BALTIC MARITIME TRANSPORT FORECAST

### Forecast of growth dynamics by type of cargo

<table>
<thead>
<tr>
<th>Freight Segment</th>
<th>2030 (Million tonnes)</th>
<th>Total growth 2010-2030(%)</th>
<th>Average growth rate per year (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td>+82</td>
<td>+138</td>
<td>+4,4</td>
</tr>
<tr>
<td>Drybulk</td>
<td>+75</td>
<td>+42</td>
<td>+1,8</td>
</tr>
<tr>
<td>Liquid bulk</td>
<td>-22</td>
<td>-7</td>
<td>-0,4</td>
</tr>
<tr>
<td>RoRo, trailers</td>
<td>+56</td>
<td>+47</td>
<td>+2,0</td>
</tr>
<tr>
<td>RoRo, others</td>
<td>+12</td>
<td>+93</td>
<td>+3,4</td>
</tr>
<tr>
<td>Other categories</td>
<td>+25</td>
<td>+32</td>
<td>+1,4</td>
</tr>
<tr>
<td>All cargoes</td>
<td>+228</td>
<td>+30</td>
<td>+1,3</td>
</tr>
</tbody>
</table>

### Forecast of maritime trade by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Volume 2010 (tonnes)</th>
<th>Volume 2030 (tonnes)</th>
<th>Volume change 2010-2030 (Million tonnes)</th>
<th>Volume change 2010-2030(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>69 578 511</td>
<td>86 421 829</td>
<td>16,8</td>
<td>24,2</td>
</tr>
<tr>
<td>Estonia</td>
<td>37 113 053</td>
<td>38 730 507</td>
<td>1,6</td>
<td>4,4</td>
</tr>
<tr>
<td>Finland</td>
<td>98 351 104</td>
<td>125 269 304</td>
<td>26,9</td>
<td>27,4</td>
</tr>
<tr>
<td>Germany (Baltic Sea)</td>
<td>55 978 989</td>
<td>68 094 047</td>
<td>12,1</td>
<td>21,6</td>
</tr>
<tr>
<td>Latvia</td>
<td>61 531 809</td>
<td>75 371 385</td>
<td>13,8</td>
<td>22,5</td>
</tr>
<tr>
<td>Lithuania</td>
<td>37 929 200</td>
<td>44 718 069</td>
<td>6,8</td>
<td>17,9</td>
</tr>
<tr>
<td>Poland</td>
<td>48 755 702</td>
<td>73 097 503</td>
<td>24,3</td>
<td>49,9</td>
</tr>
<tr>
<td>South Norway</td>
<td>21 503 724</td>
<td>27 498 728</td>
<td>6</td>
<td>27,9</td>
</tr>
<tr>
<td>Russia</td>
<td>171 631 578</td>
<td>243 800 782</td>
<td>72,2</td>
<td>42</td>
</tr>
<tr>
<td>Sweden</td>
<td>154 764 477</td>
<td>201 805 685</td>
<td>47</td>
<td>30,4</td>
</tr>
<tr>
<td>Total</td>
<td>757 138 147</td>
<td>984 807 839</td>
<td>227,5</td>
<td>30,1</td>
</tr>
</tbody>
</table>

*Source: BTO 2030*
The Baltic Sea is already one of the most densely trafficked sea regions in the world. Over the next 20 years, shipping is expected to double in terms of the number of ships. At the same time, the size of the ships is predicted to increase substantially.

Source: HELCOM/WWF
Increasing traffic is a challenge for:
- ports
- shipbuilding
- tourism
- local communities
- maritime business

- Approximately half of this fleet are cargo vessels, 17% are tankers and 11% passenger vessels.
- 70 million tonnes of oil were shipped in 2008, expecting an increase of a 40% by 2015.
- More than 50,000 vessels annually pass the Skaw at the northernmost tip of Denmark on their way into or out of the Baltic.
- Vessels with a draught less than 7 metres constitute the biggest part of the ships entering/leaving the Baltic via the Skaw.
### CHARACTERISTICS OF SHIP TYPES ON THE BALTIC SEA

<table>
<thead>
<tr>
<th>Ship type</th>
<th>No of ships deployed on Baltic</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC (reefer)</td>
<td>338</td>
</tr>
<tr>
<td>GC (general cargo)</td>
<td>2172</td>
</tr>
<tr>
<td>Product tankers (T-PROD)</td>
<td>270</td>
</tr>
<tr>
<td>Container ships (CONT)</td>
<td>324</td>
</tr>
<tr>
<td>Chemical tankers (T-CHEM)</td>
<td>842</td>
</tr>
<tr>
<td>Crude oil tankers (T-CRD)</td>
<td>332</td>
</tr>
<tr>
<td>Bulk carriers (BULK)</td>
<td>936</td>
</tr>
<tr>
<td>Ro-ro (RO-RO)</td>
<td>165</td>
</tr>
<tr>
<td>Ro-pax (RO-PAX)</td>
<td>226</td>
</tr>
<tr>
<td>Vehicle carriers (V)</td>
<td>208</td>
</tr>
<tr>
<td>Gas tankers (T_PLG)</td>
<td>119</td>
</tr>
<tr>
<td>Cruisers (PAS-CR)</td>
<td>80</td>
</tr>
</tbody>
</table>

Source: VTT Technical Research Centre of Finland
POLLUTION FROM SHIPPING

• In line with growing density of shipping, the threat for the maritime environment from shipping is increasing as the consequence of expanding traffic and increasing volume of various goods and number of passengers. Development of shipping and other type of maritime resources exploration cause enlargement in of the volume of pollution
• The pollution can appear in global, regional or local scale.
• The amount of hazardous substances (in terms of ton-miles) emitted in exhaust gases is not very high. However, in case of heavy trafficked sea areas like the Baltic Sea, the density cumulation of emission is harmful for the environment.
• The exhaust gases emitted from ships are polluting mainly the atmosphere and indirectly also the water environment.
• Around 3% of global pollution from transport can be attributed to maritime shipping. Emission from international shipping amount to around 8 mil-CO2t, which is equivalent to that of Germany, or 6th states in the world.
• The emission is expected to increase steadily in the long term.
MAIN SOURCES OF POLLUTION DURING VESSEL’S OPERATION

Each vessel emits polluting substances into water, shore and air, but depending on the stage and type of operation its intensity and volume of pollution differ. The largest amount of pollutants is emitted during regular operational activities of vessels. They include oil spills from propellers, wastes of cargoes, emission of exhaust gases and other pollutants harmful for the environment.

<table>
<thead>
<tr>
<th>Type of activity</th>
<th>Source of pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular operation</td>
<td>- Systems of cargo handling and protection</td>
</tr>
<tr>
<td></td>
<td>- Systems of passenger services</td>
</tr>
<tr>
<td></td>
<td>- Propulsion and navigation systems</td>
</tr>
<tr>
<td>Failure</td>
<td>- Cargo</td>
</tr>
<tr>
<td></td>
<td>- Elements of systems and vessel’s equipment</td>
</tr>
<tr>
<td></td>
<td>- Elements of construction</td>
</tr>
<tr>
<td>Accident, catastrophe</td>
<td>- Cargo</td>
</tr>
<tr>
<td></td>
<td>- Elements of systems and vessel’s equipment</td>
</tr>
<tr>
<td></td>
<td>- Elements of construction</td>
</tr>
<tr>
<td>Scrapping</td>
<td>- Elements of systems and vessel’s equipment</td>
</tr>
<tr>
<td></td>
<td>- Elements of construction</td>
</tr>
</tbody>
</table>
TRENDS IN THE BALTIC SEABORNE TRADE

BALTIC COUNTRIES SHARE IN TOTAL TURNOVER OF BALTIC PORTS 1992-2011

CARGO TURNOVER OF BALTIC PORTS BY COUNTRY 1992-2011

Source: Baltic Port List
TRENDS IN CONTAINER TRAFFIC

THE WORLD LARGEST TRIPLE-E CLASS VESSEL CALLING IN BALTIC SEA PORT

"Triple-E“ - the class's 3 design principles:

- Economy of scale,
- Energy efficient
- Environmentally improved

400 m long
59 m wide
73 m high
14.5 m draft

- Triple-E are the world's largest and fuel efficient container ships in service (planned to operate Asia-Europe lanes)
- This class uses a strategy known as slow steaming, which is expected to lower fuel consumption by 37% and carbon dioxide emissions per container by 50%
- Maersk plans to use the ships to service routes between Europe and Asia, projecting that Chinese exports will continue to grow.
TRIPLE-E CLASS SHIP FEATURES

- Draft too deep to enter American ports or to cross the Panama Canal but able to transit the Suez Canal when sailing between Europe and Asia
- The most efficient container ships per TEU of cargo - 3 m longer and 4 m wider than E-class ships but 2,500 more (16%) container carrying capacity, total 18,000 TEU
- Dual 32 MW (43,000 hp) ultra-long stroke two-stroke diesel engines, driving two propellers at a design speed of 19 knots max speed 23 knots

18,000 TEU capacity is 16% more (2,500 containers) than that of Emma Maersk
Emitting 20% less CO2 per container moved, compared to Emma Maersk and 50% less than the industry average on the Asia-Europe trade lane
Consuming approx. 35% less fuel per container than the 13,100 TEU vessels being delivered to other container shipping lines, also for Asia-Europe service

Source: Vikipedia
INNOVATIVE SHIPBUILDING TECHNOLOGIES

IHI Marine United (IHI-MU) *eFuture 13000C*

- 21% Reduction in Propulsive Performance
- 10% Reduction by Propulsion Plant Efficiency
- 1% Reduction by application of Natural Energy

Mitsubishi Heavy Industries (MHI) *MALS-14000CS*

- 24% Reduction by High-performance hull form
- 10% Reduction by Mitsubishi Air Lubrication System (MALS)
- 5% Reduction by Propulsion plant 5%

Heat Recovering System

By MHI
- Power Turbine Generating Plant (PTG)

Power Turbine Generating Plant (PTG)

Power Range: 800-4,400kW

Installed for onboard trial

Solar Panel

By MHI, NYK etc.
- Hybrid Turbo Charger Generator

By NYK, WWL & MHI
- Hybrid Turbo Charger

MET42MAG (Gen. output: 250kW)

High Performance and More Economical

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Auriga Leader
- LOA: 200 m, 6,200 cars
- Solar Panels: 40 kW

Toreador
- LOA: 200 m, 6,500 cars
- Solar Panels: 10 kW

Generating Power is limited & is not economical, yet
THE WORLD LARGEST TRIPLE-E OF 18 000 TEU FIRST AT BALTIC SEA PORTS (DCT GDANSK)

• First Triple-E class vessel Maersk Mc-Kinney Moller (currently the world largest container ship) was delivered in July 2013

• Secret of large capacity is in special design of loading compartments, wider hull and more round bow

• The U-shaped body of the ship can accommodate additional row of containers within the shipboard (total 23 rows of containers between sides (compared with 22 rows on E-class vessels)

• The entry of the world largest containership to DCT Gdansk confirms the importance of that port as the gate to the Central –Eastern Europe’s and Russian markets.

• DCT Gdansk is the only inner Baltic port that is capable of handling as large units as the Triple-E containerships.

Source: DCT Gdansk
DCT was the first terminal that attracted direct calls from Asia to the Baltic Sea and is today the destination for the largest vessels in the world departing from China, Korea and other Asian countries.

This process initiated a split of the most important shipping trade-lane in the world, Asia – Europe, into Asia – North West Europe and Asia – Baltic.

The DCT is currently the only terminal on the Baltic Sea capable of handling the largest container vessels, even with the container capacity of 18 000 TEU.

The terminal handles Polish import and export, transshipment and transit.

With an easy nautical accessibility comprising of 17 m deep approach channel and up to 16.5m depth along the berth, DCT is a natural gateway for CEE containerized trade volumes.

DCT terminal is well linked with the international hinterland.

Other global operators are considering to follow the example of Maersk and include Baltic ports in their sailings.

Current capacity of DCT Gdansk is 1,25 mln TEU pa. Within the next 10-15 years the capacity will be extended up to 4 mln TEU pa.
CRUISERS ON THE BALTIC SEA

CRUISE SHIP CALLS (NUMBER) IN THE BALTIC PORTS IN 2010

TENDENCIES OF CRUISE PASSENGER TRAFFIC IN BALTIC PORTS 2000-2012

Source: ShipPax-Market

Source: http://www.cruisebaltic.com [20.08.2013]
Cruise tourism has been increasing by about 12% per year in the BSR region between 2000 and 2010. Assuming the same growth also in the future, the number of passengers would increase by about 600% in 2030.

The number of cruise ships in the area is increasing annually with a growing trend for the use of larger ships and more international cruisers.
WASTE GENERATED ON BOARD OF PASSENGER SHIP

• GREY WATERS (from kitchen, loundry, dining)
• BLACK WATERS (from bathrooms, toilets)

Estimated amount of waste water: 2 m³ - 4,3 m³ /person/day

Total waste of 1 passenger/crew per day by type (est.):
  • 1,5 kg garbage
  • 150 l black water
  • 40 l kitchen water
  • 140 l gray water

Dumping the waste in the port or port entrance is forbidden (except grey waters). It must be removed by specialized equipment and companies
TRENDS IN BALTIC SEA PASSENGER TRAFFIC

• Significant disproportions between the number of cruise and ferry passengers in various Baltic ports. The largest total number of passengers (2010) recorded Helsingborg (over 9,4 mln) and Helsinki (9,3 mln), while for ex. Gdynia and Gdansk recorded 0,49 thous and 0,17 thous accordingly.

• Significant disproportions in the number of port calls between cruisers and ferries in various Baltic ports. Port of Helsingborg was dominating with over 42 thous. of cruise and ferry calls in 2010.

• The estimated total number of passengers on the entire Baltic Sea waters is over 3 mln per year.

• In total ca. 226 ferries and 80 cruisers are deployed on the Baltic Sea.

• In regular services the same vessels visit several times the same ports and they produce enormous amount of sewage and waste during each trip – particularly ferries (nearly each ferry makes over 300 round trips within a year).
The Baltic Sea ports are up to 15% of the world’s cargo transportation. Around 3,500 - 5,000 ships operate monthly on the Baltic Sea waters, including large oil tankers and large passenger ferries.

The number of ships is expected to double by 2030 and the size of ships is expected to increase substantially. Shipping of oil is predicted to grow by 64% by 203.

Source: BTO 2030 and HELCOM
IMPROVING RECEPTION FACILITIES

- In 2000 the European Commission’s directive 2000/59/EC on port reception facilities was adopted. This was designed to protect the marine environment by reducing the discharge of waste into the sea. It applies to all commercial ports, regardless of their size.
- The directive required each port to provide adequate waste reception facilities to meet the needs of ships, and to develop and put in place a waste reception and handling plan. The reality, though, is that – 12 years on – the facilities and plans have largely failed to materialise.
- Having invested heavily in advanced new treatment plans, cruise ships can now recycle up to 95% of their own waste; but reception facilities for recyclables in Europe are virtually non-existent.
- A call for more flexibility in the port charges levied on cruise ships has come up. Port costs have been rising steadily in recent years while average cruise ticket prices have fallen almost 30% since 2009.
BALTIC SMALL AND MEDIUM SIZE PORTS

• Small Baltic ports operate on a very fragmented market, handling in general dry bulk cargo but also specialise in some types of cargo (e.g. timber, offshore wind farm equipment) and sustain local tourism and fishery.
• About 66 % of all Baltic sea ports are small ports which handle less than 2 million tonnes of cargo per year.
• Small ports share in total cargo turnover of Baltic ports is around 10%.
• For majority of small Baltic ports dry bulk cargo is the main type of handled cargo. Many ports are specialized in handling some types of cargo, like some Finish ports dedicated to handling timber.
• In some of this ports, tourist traffic plays an important role.
• Small ports development is strictly connected with the development of the port city and the region and is vital for developing local and regional businesses and sustainable development of the area.
BALTIC FISHING DEVELOPMENT

- Commercial fisheries are intensive in the whole Baltic Sea, but fishing pressure is particularly high in the southern parts.
- The number of commercial fishermen and fishing fleets in the region has decreased due to overcapacity in the sector and shrinking fish populations after several years of overfishing.
- Commercial fishing in the Baltic Sea is politically regulated through quotas on an annual basis. If the fishing quotas are set at a level which is sustainable for the survival of the fish populations, fishing will initially decrease in the region but may later increase as fish populations are allowed to recover.
- It is expected that the number of fishing vessels will continue to decrease, but still smaller area of the Baltic Sea will be exploited by fishing.
- A decrease in fleet number may only imply increased quotas and larger areas to fish for a lower number of vessels.
- Also, recreational fishing is an important activity in the Baltic Sea region that is steadily growing.
CONCLUSIONS

• Developments by 2030 may result in considerable changes to transport patterns. This, will have a significant impact on the future position of the Baltic Sea region, where a sustainable economic growth is currently observed and expected in the near future.

• Shipowners are introducing larger vessels in container transport, aiming for reduction of costs per unit.

• Need for deepwater ports that can handle larger ships is being observed, it mean fewer port calls and the elimination of secondary calls from rotations on the main arterial routes. Ports have to respond to the extended requirements to handle large ships. Due to certain restrictions, the largest container vessels until recently avoided the Baltic ports. The turning point breaking that routine was the decision of Maersk Line.

• The DCT is currently the only terminal on the Baltic Sea capable of handling the largest container vessels, even with the container capacity of 18 000 TEU.

• The total demand at Baltic container ports is expected to grow from 38% to 60% up to 5.68 mln TEU by 2015, and by a further 55%-65% to just over 10 mln TEU by 2020. The container handling capacity of Baltic ports will increase from 13,8 mln TEU in 2015 to 29 mln TEU in 2025 (Baltic Russian ports will increase by 42%-72% to 3.8 mln TEU by 2015 and to 6.8 mln TEU by 2020. Polish ports will increase to 1.43 mln TEU, and by a further 49% to 2.1 mln TEU, respectively.