



TRAFICOM

Finnish Transport and Communications Agency

Reports on Baltic Sea shipping in 2006 - 2022

12-6 Underwater noise

12-4 Discharges to sea

12-5 Exhaust gas emissions

Background

- ▶ STEAM modelling system
 - ▶ The estimate builds on the vessel activity data from HELCOM AIS data received by the Baltic Sea countries
 - ▶ The timeline on reports cover years 2006 - 2022
- ▶ Three reports were made with STEAM modelling
 - ▶ 12-6 Underwater noise emissions from Baltic Sea shipping in 2006-2022
 - ▶ 12-4 Discharges to sea from Baltic Sea Shipping in 2022
 - ▶ 12-5 Emissions from Baltic Sea Shipping in 2022

12-6 Underwater noise emissions from Baltic Sea shipping in 2006-2022

- ▶ Report by Finnish Meteorological Institute in co-operation with Chalmers University of Technology, Swedish Defense Research Agency and Finnish Environment Institute
- ▶ The values listed in this document represent noise energy emitted
 - ▶ cannot be taken as representative of shipping noise experienced by marine animals.

12-6: Key findings

- ▶ Noise energy increased 4 % in 2022 compared to 2021
 - ▶ Emissions have not yet reached the pre-pandemic levels
 - ▶ Noise emissions from ships sailing the Baltic Sea increase at a significantly slower rate than the global average (Jalkanen et al. 2022)
- ▶ Liquid tankers, bulk cargo, and containerships combined are responsible for two thirds of vessel noise
- ▶ Regarding noise efficiency LNG tankers emit most noise energy per tonne and general cargo ships are the most silent ones
- ▶ The noise efficiency was slightly improved in bulk carriers, LNG tankers and Refrigerated cargo vessels and slightly deteriorated in vehicle carriers and ROPAX-vessels

12-4 Discharges to sea from Baltic Sea Shipping in 2022

- ▶ Report by Finnish Meteorological Institute in cooperation with Chalmers University of Technology, Swedish Environmental Research Institute and Tallinn Technical University
- ▶ The discharges estimated in this report include:
 1. scrubber discharge water
 2. oily bilge water
 3. ballast water
 4. sewage and gray water
 5. food waste nitrogen
 6. stern tube oil leaks
 7. anti-fouling paint release

12-4: Key findings (1/2)

1. The total volume of discharge water from Exhaust Gas Cleaning Systems (EGCSs or scrubbers) was about **312 (2021:286) million cubic meters**. This was almost completely (**99.99%**) from **open loop scrubbers**. During the year 2022, there were 781 (2021:593; +32%) vessels operating the Baltic Sea area using scrubbers.
2. Bilge water releases from the Baltic Sea fleet were estimated as 505 000 cubic meters (-1.0%)
3. Estimated ballast water volume release to the Baltic Sea was 494 million tonnes (2021: 454 million tonnes; +8.8%). This volume contains both untreated and treated ballast water discharge.
4. **Sewage discharge to the sea was predicted as 0.5-1.4 million cubic meters (2021:+37%)**. Sewage volumes are lower than in 2019 (1.8 million m³). Since June 2021, it is prohibited to release untreated sewage to the Baltic Sea from passenger ships, unless visiting St. Petersburg from outside the Baltic Sea area. No cruise ship traffic to Russian part of the Gulf of Finland was observed.
5. Grey water discharge was estimated to be 5.4 million cubic meters(2021:+47%), which is still less than in 2019, before the pandemic (2019: 6.9 million m³). **Passenger ships are responsible for over 84% of grey water discharges.**

12-4: Key findings (2/2)

6. The total amount of Phosphorus released to the sea was estimated as 179-188 tonnes. These were discharged as sewage (0-9 tonnes), food waste (110 tonnes) and grey water (68 tonnes). Here, it was assumed that the phosphorus removal of wastewater treatment plants used in passenger ships was 98% and in constant use.
7. Total Nitrogen discharge was estimated as 402-447 tonnes, which were from food waste (101 tonnes), sewage water (68-113 tonnes) and grey water (232 tonnes).
8. Stern tube oil leakage was assumed to be about 4740 cubic meters. This is an order of magnitude estimate because experimental data concerning leakages are scarce.
9. Release of six substances commonly used in anti-fouling paints were modeled. The wet surface area of large vessels is about 50 million square meters and the contribution of the 500 000 small boats around the Baltic Sea coastline is estimated at about 7 million square meters. **Over 569 tonnes of anti-fouling paint residues are released from ships' hulls to the sea**, which does not include the contribution from small boats. Of the estimated amount of antifouling paint released for ships, about 82% is Copper(II)oxide (CuO).

12-5 Emissions from Baltic Sea Shipping in 2022

► Report by Finnish Meteorological Institute

► Air pollutants considered:

- Nitrogen Oxides (**NO_x**)
- Sulphur Oxides (**SO_x**)
- Non-methane volatile organic hydrocarbon (**NMVOC**)
- Particulate Matter (**PM2.5**)
- Carbon Monoxide (**CO**)
- Carbon dioxide (**CO₂**)
- Methane (**CH₄**)
- Nitrous oxide (**N₂O**)
- Ammonia (**NH₃**)

Since
2022



12-5: Key findings (1/2)

- ▶ Air emissions in 2022 have increased compared to 2021.
- ▶ CO₂ emissions still lower than pre-pandemic emission levels.
- ▶ The most significant contribution to emissions from Ro-Ro passenger ships, chemical and oil tankers and Ro-Ro cargo ships.
- ▶ Overall transport work has increased by +2 % while the total travelling distance of IMO-registered vessels have decreased by 7 %.
- ▶ Nitrous oxide N₂O and ammonia NH₃ included for the first time

	Change	Emissions [ton]
NO _x	+ 1 %	258 097
SO _x	+ 2 %	8 880
PM2.5	+ 2 %	4 040
CO	+ 6 %	26 238
CO ₂	+ 3 %	15 454 000
CH ₄	+56 %	6 675 CO ₂ e: 187 000
N ₂ O	New	791 CO ₂ e: 210 000
NH ₃	New	70

12-5: Key findings (2/2)

- ▶ Sailing in ice conditions: 3 124 ships (GT ≥ 5000: 1814 ships)
- ▶ Total distance travelled in ice conditions: over 2.5 million nautical miles
 - ▶ 1.1 million nm in Gulf of Finland
 - ▶ 1.0 million nm in the Bothnian Bay
- ▶ For all ship types, including the operation in ice conditions increases the annual average Carbon intensity indicator (CII) by an average of 4 % for ships with 5,000 gross tonnage and above.
- ▶ On the average, sea ice increases the total annual fuel consumption of ships with 5,000 gross tonnage and above sailing in ice conditions by 5 % in the Baltic Sea in 2022



Thank you!

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