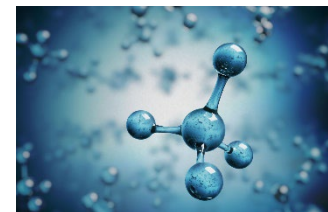




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What substances have been identified as worrisome in the region, and why?

Vasileios Kouloumpos
HELCOM Secretariat



Aims of HELCOM priority lists – New Recommendation

[...]

RECOMMENDS to the Governments of the Contracting Parties to the Helsinki Convention to:

HELCOM priority substances

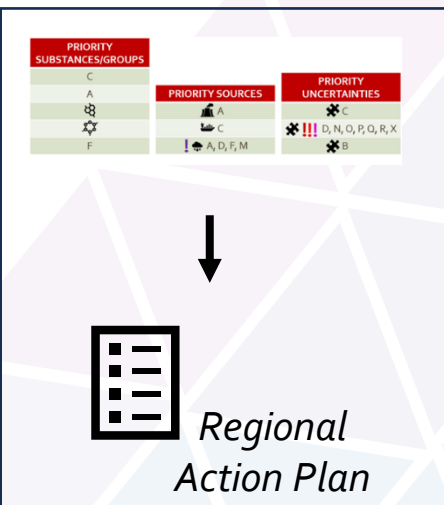
HELCOM substances of concern

HELCOM sources of releases

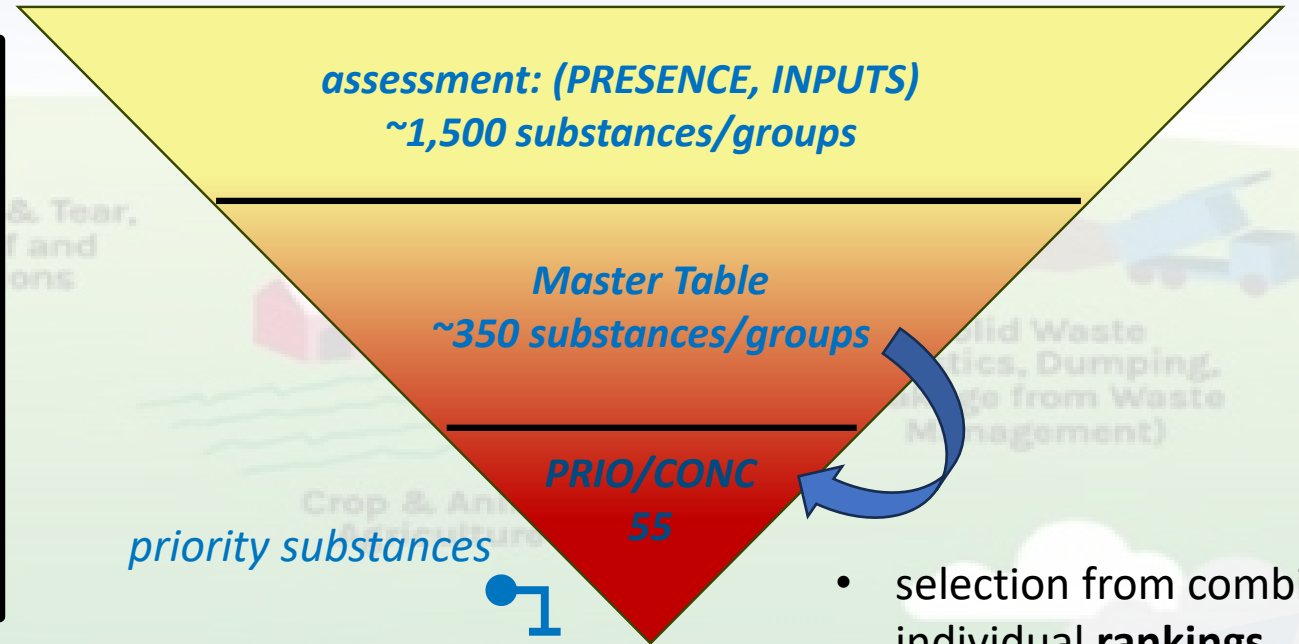
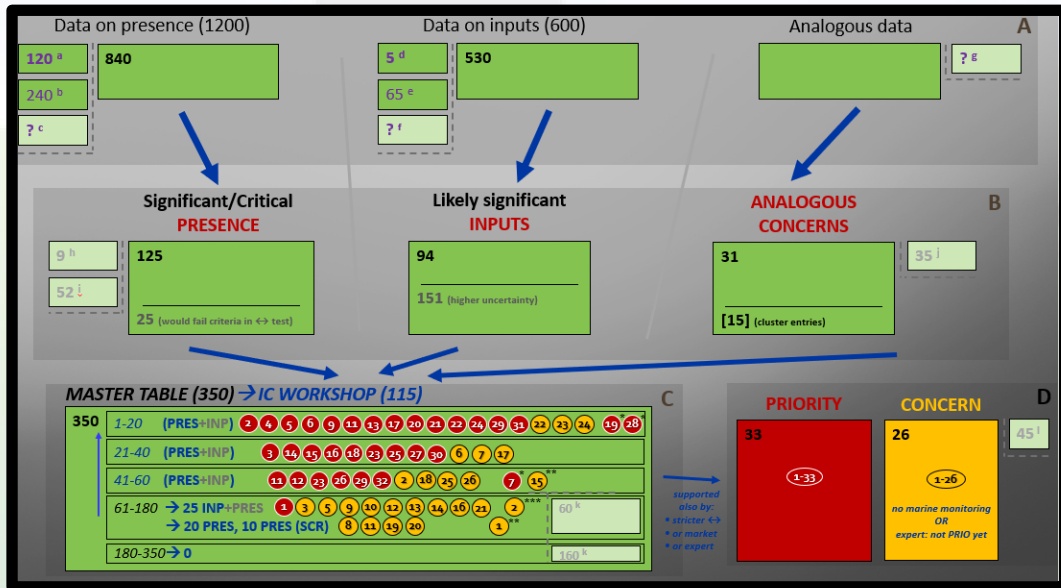
HELCOM horizontal uncertainties

all lists

- strategically focus the work of HELCOM on priority substances for the Baltic Sea (HELCOM List of Priority substances as contained in Attachment 1) with the aim to develop measures preventing or minimizing their releases to the marine environment, as well as, where possible, remediating existent pollution or reducing its impacts;
- gather further evidence of the risk that other substances of concern (HELCOM List of Substances of Concern in Attachment 1) can pose to the Baltic marine environment and if actions should be taken to prevent or minimize their releases and integrate them, where relevant, to the list of priority substances in the next update of the list;
- target relevant sources of hazardous releases (Attachment 2) to minimize impacts of released substances aiming for actions with potential for horizontal benefits through effects on multiple substances or groups;
- reduce uncertainties related to hazardous substances, focusing the efforts in particular on the gaps as contained in Attachment 3, with the aim to support a further improved knowledge-base and technical capacity at the time when an update of the assessment and this Recommendation will be performed;
- convey the information contained in the three priority lists (Attachments 1 to 3) to all relevant national stakeholders, and European and global processes of relevance, with the aim to promote achievement of the Recommendation and BSAP vision, especially for those elements beyond the direct jurisdiction of national governments.



How we prioritized



priority substances

sub-listed as substances of concern

- evidence did not include marine monitoring data (but e.g. marine screening or inputs monitoring)
- or expert judgement pointed towards listing rather as substance of concern

- selection from combined & individual **rankings**
- further **uncertainty** analysis
- **market** information
- **expert** judgement

Industrial & Recreational Fishing

Oil Platforms & Oil Spills

Aquaculture

Recreational Boating

Cruises

Disaster Debris



Results: HELCOM priority and concern lists in a nutshell

regulatory status

HELCOM indicator status

remaining uncertainties

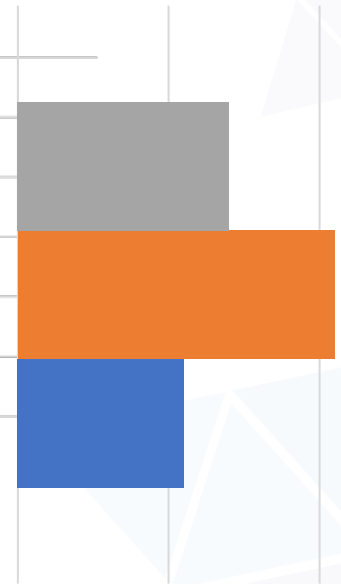
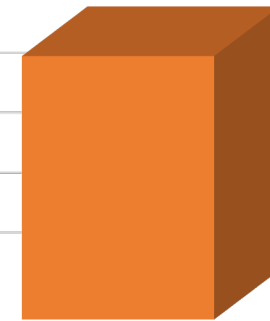
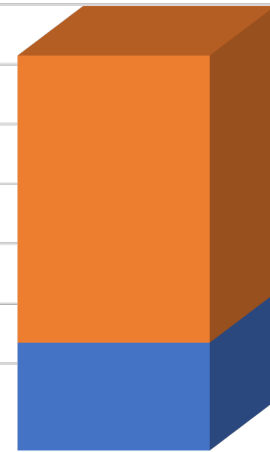
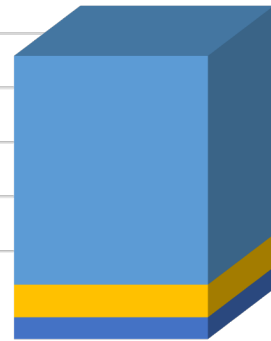
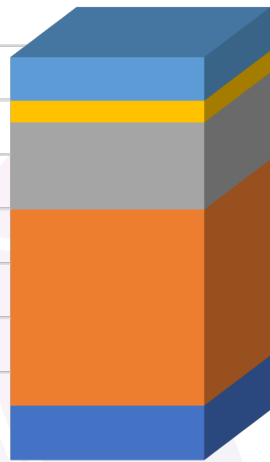
PRIORITY

CONCERN

PRIORITY

CONCERN

CONCERN



- No regulatory listing
- Other regulatory lists, e.g. EU REACH SVHC, EU Cosmetics Regul.
- EU WFD UPDATE PROPOSAL Priority
- EU WFD Priority
- EU WFD Priority + Legacy

- HELCOM indicator
- no HELCOM indicator

- Other
- Threshold review
- Identity confirmation



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HELCOM list of priority substances

Alkylphenols and their ethoxylates
Bisphenols
PBDEs (Polybrominated diphenyl ethers)
PFAS (Per- and polyfluoroalkyl substances)
Phthalates

Dioxins (dioxin-like PCBs, dioxins and furans)
Hexachlorobenzene
PAHs (Polycyclic Aromatic Hydrocarbons)

Octinoxate

Carbamazepine
Clarithromycin
Diclofenac
Gabapentin

Organotins

Diuron
Irgarol (Cybutryne)

Arsenic and its compounds
Cadmium and its compounds
Chromium and its compounds
Copper and its compounds
Lead and its compounds
Mercury and its compounds
Nickel and its compounds
Zinc and its compounds

17b-estradiol
17α-ethinylestradiol
Estrone

Chlorpyrifos
Cypermethrin
DDT and its degradation products
Heptachlor and its degradation products
Lindane (gamma-Hexachlorocyclohexane)
Nicosulfuron



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HELCOM list of substances of concern

1-Dodecanamine, N-dodecyl-N-methyl-
Butyl acrylate
Das2 (C.I. Fluorescent Brightener 220)
DSBP (distyrylbiphenylsulfonate)
N-Methyl-2-pyrrolidone (NMP)
Nonanedioic acid (azelaic acid)
Octadecanamide

2-Propen-1-yl 2-(cyclohexyloxy)acetate
Bemotrizinol
Cetylpyridinium (hexadecylpyridinium chloride)
Chlorhexidine

2,4,6-Tribromophenol (TBP)
2-Ethylhexyl diphenyl phosphate (EHDPP)
Bis(2-chloro-1-methylethyl) 2-chloropropyl
phosphate
Dechlorane Plus (anti-DDC-CO)
Pentabromobenzyl acrylate (PBB-Acr)
Tris(2-ethylhexyl) phosphate (TEHP)

Kinoprene
Metsulfuron-methyl
Prometon

Cobalt and its compounds
Uranium and its compounds



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PFAS (Per- and polyfluoroalkyl substances)

ICAS numbers: e.g. 335-67-3, 1762-23-1, 355-66-4, 375-95-1, 375-73-5, 307-24-4, 375-22-4, 2706-60-3, 2706-91-4, 325-76-2, 307-55-1, 2058-94-8, 375-85-9, 72629-94-8, 375-60-8, 335-77-3, 376-06-7, 67905-18-5, 16517-1-4, 62027-80-3, 66845-44-8, 647-62-7, 679-39-7, 1196931-81-9. EC numbers: e.g. 206-207-9, 217-179-8, 206-587-1, 206-801-3, 206-793-1, 206-194-4, 206-798-3, 229-203-7, 229-203-2, 206-490-3, 206-203-0, 218-165-4, 206-798-9, 276-745-2, 206-800-8, 206-801-0, 206-802-6, 267-638-1, 340-582-5, 700-240-3, 211-477-1, 211-468-0, 682-239-6 / Entry number in HELCOM list of priority substances: 21)

General sectors: *Industry and commercial products*

DIAGNOSIS ACTIVITIES PRESSURES SOURCE IMPACTS

Why a HELCOM priority?

Main evidence

S Concentrations of PFOS exceed the applied threshold value in **37** of the 39 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**13/13** assessed off-shore areas). In these 37 areas, **100%** of the assessable samples in biota (and/or water, for which the thresholds are exceeded more rarely) exceed the threshold value. This is based on regular monitoring data gathered by HELCOM Contracting Parties and reported to the HELCOM COMBINE database for the period 2016-2021, as part of the more limited, PFOS indicator¹.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, PFAS scores **9.3/10** (confidence range: **9.3 – 9.3**) in the scale established when assessing the criticality/significance of current levels in the Baltic Sea pose, where 5 indicates concern and 10 extreme risk, and the range reflects the level of reliability and representativeness of concentrations and the thresholds.

The threshold values for PFOS, for biota and water, were acquired from the EC proposed Directive amending WFD and EQSD² (not yet in effect as of February 2025).

Concentrations of PFNA, PFDA, PFUnDA, PFTiDA, PFDoDA, PFOS, FOSA, and other PFAS substances also frequently exceed their respective threshold values in biota, while TFA, G-2 FTS, PFOA, PFHxS and N-EtFOSA (and other PFAS) are in addition to previous often detected in water at high concentrations. This is based on monitoring data for the period 2015-2023 as reported by Contracting Parties (CPs) as response to a data call organized by HELCOM for PFAS.

It is noted that **high trophic magnification** has been reported, for PFAS³.

I Current levels in the Baltic Sea indicate potential negative impacts on pelagic biota, top predators such as mammals and birds and humans via consumption of seafood.

Supporting evidence

I PFAS are considered of **especially concerning mode of toxicity**: for example some of them are toxic for reproduction and/or endocrine disruptors⁴.

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, PFOS alone scores **94-94/100** in the scale established for assessing the overall risk for impacts/threat for the Baltic Sea, where 50 indicates concern, 100 extreme risk, and the width of the span outlines the uncertainty in the assessment. Besides PFOS, thousands of other Per- and polyfluoroalkyl substances have been shown to have hazardous properties and to exhibit concerning environmental fate/occurrence profiles⁵. This substance group entry reflects any chemical containing at least one saturated CF2 or CF3 moiety⁶.

Facts relevant for management considerations

Causal chain and pathways

A Although PFOS is restricted under Annex B of the Stockholm Convention, there are specific exemptions, such as in metal plating, fire-fighting foams for liquid fuel vapour suppression and liquid fuel fires, and insect baits. It is not registered for EU REACH⁷, thus likely on EU market in low tonnage as it has been notified by about 30 companies without specific use information⁸. There are expected releases e.g. from legacy firefighting foams and life of products containing it.

Release estimates for the broader PFAS (non-polymeric) group: textile, upholstery, leather, apparel and carpets (80%), food contact materials and packaging (7%), electronics and semiconductors (7%)⁹. Certain cookware and paints may as well contain PFAS¹⁰.

P Based on available estimations, PFOS appear to enter the Baltic Sea at the following amounts: **rivers** (0.2 t/y, WATERBASE¹¹), atmospheric deposition (0.06 t/y), direct emissions from land-based activities (0.02 t/y, Undeman et al, 2022¹²). **WWTPs** is roughly estimated to contribute with 0.07 t/y. There is available information also about estimated inputs of further individual PFAS.

Relevant policies (existing or planned measures)

- M (on A/P)**
- Some sub-groups of PFAS are listed under **Stockholm Convention** on POPs (signed by all HELCOM Contracting Parties) – Annexes A (elimination) / B (restriction) – accordingly **EU POPs Regulation** – including respective **national Action Plans**.
 - **Some PFAS are listed as REACH SVHC** (basic: toxicity for reproduction / PBT / endocrine disruption, depending on the case). In 2023, authorities from Denmark, Germany, the Netherlands, Norway and Sweden submitted a **REACH restriction proposal**¹³.
 - PFOS is listed as a priority hazardous substance under the **EU WFD** (instead, PFAS is listed as priority hazardous substance under its update proposal) – including respective national **Programmes of Measures for this**.
 - PFOS is a more limited **HELCOM indicator**.
 - There are provisions in EU Best Available Reference Documents for these substances

References:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13.

[Note: Listing of detailed references will be provided in an upcoming update of the fact sheet – for a listing of the most common references among the different substances see the section at the end of the consolidated document which includes all the fact sheets]

More details: Fact sheets!



HELCOM relevant sources of HAZ substances: *Horizontal perspective and what substances fit here better*

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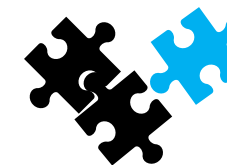
| |
|--|
| Industrial sectors (including where relevant whole life cycle of products), including among many sectors: mining, production/smelting of non-ferrous metals, thermal power stations and other combustion installations, production of pig iron or steel, polymers/resins, batteries, paints/coatings/inks, adhesives, production of pulp/paper/board/wood products, electronics, medical devices, landfills (various hazardous substances, including also nanomaterials from high-tech industries) |
| Agriculture (use of pesticides, veterinary products and micronutrients, emissions of hormones) |
| Dredged material deposition and seabed disturbance activities |
| Wastewater treatment plants (e.g. pharmaceuticals and personal care products, disinfection byproducts) |
| Stormwater (e.g. metals, PAHs, biocides, disinfection byproducts) |

| |
|---|
| Shipping (antifouling, scrubber emissions, oil spills, flame retardants, bilge or ballast water, grey water and sewage) |
| Dumped munitions (explosives and chemical warfare agents) and wrecks in the Baltic Sea (munitions and their toxic degradation products include amongst others α chloroacetophenone, sulfur mustard, clark-type munitions, TNT, HMX, RDX, etc.) |
| Atmospheric deposition to Baltic Sea and its catchment |
| Off-shore wind farms, floating terminals of Liquefied Natural Gas, and other renewable energy sectors including hydrogen production (antifouling / disinfection agents (sodium hypochlorite) and by-products, corrosion protection, oil spills etc.) |
| Submarine sediment banks or landslides of / runoff from contaminated soil of industrial origin – in particular relating to abandoned plants |
| Aquaculture (pharmaceuticals, disinfection agents and byproducts, biocides, food additives) |



HELCOM horizontal uncertainties to address: Investing for the next cycle

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- important data not readily available/retrievable during exercise
- available data not processed within the limited time of the exercise
- investigation needs triggered by analysis of existing data
- lacking methodologies

If this data/processing were there, .. priorities and actions would have been more likely to target what matters the most!

Identity confirmation in non-target screening samples

Past trends of marine levels

First data about marine levels

Investigation of possible sample contamination during analysis

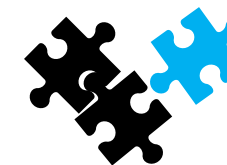
2. KEY GAPS IN ASSESSING PRIORITY: INPUTS TO THE BALTIC SEA

| Entry number | horizontal gap | main examples of substances it applies to | rationale |
|--------------|--|---|--|
| 12 | Regional market data – and identification of candidate substances of concern on that basis along with PBT properties | <p>Substances in sectors beyond pharmaceuticals (for which sales data was made available via a data call) and beyond data in the SPIN database.</p> <p>Candidate substances of concern on the basis of market information (REACH registrations and SPIN database) and PBT (/suspected PBT) properties, but for which no presence/inputs information was available for the Baltic Sea, include e.g.:</p> <ul style="list-style-type: none"> • Terphenyl, hydrogenated • Cyclomethicones/Hydrocarbylsiloxanes • Fluorescent Brightener CF-351 • Di-tert-butyl 3,3,5-trimethylcyclohexylidene diperoxide | <ul style="list-style-type: none"> ➤ conclude on HELCOM priority ➤ identify new HELCOM priority substances |



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HELCOM horizontal uncertainties to address: *Investing for the next cycle*



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Candidate substances of concern based on regional market data and PBT properties

Actual chemicals in spills

Predicted Marine Levels based on estimated Inputs

Investigation of possible sample contamination during analysis

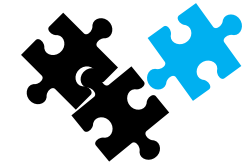
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More reliable data about marine quality standards, - including establishment of background levels for naturally occurring substances in the sea

First indicative marine quality standards (incl. for taxa for which monitoring data is available)

First / more reliable data about Persistence, Bioaccumulativity

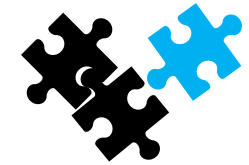
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Substances (/ their mixtures) that triggered observed biological effects

Biological effects:

- Further spatial coverage
- Further taxonomical groups (e.g. algae)
- Specific thresholds values

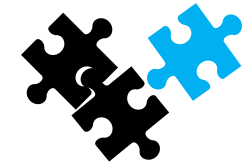
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More comprehensive apportionment of activities / releases / inputs

Key drivers – as well as ongoing and future influence of climate change on the overall hazardous substances landscape

2. KEY GAPS IN ASSESSING PRIORITY: INPUTS TO THE BALTIC SEA

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Back to the original aims: *what we achieved, what next*

' [...] there is a need to generally improve
identification of marine-relevant contaminants for
assessment'

[...] discussion on the selection of relevant
contaminants at RSCs has been ongoing for many
years, but the process to agree on the relevant
contaminants is too slow ..

Measures should target the substances/groups,
sources, and knowledge gaps that matters the most!

HL11. Support and influence other
policies

HL9. Utilize information generated by other
policies



Back to the original aims: what we achieved, what next

E-PRTR sectors reported release to Baltic Sea catchment

| | 6 Bothnian Sea SE | 7 Åland Sea SE | 8 Åland Sea FI | 9 Northern Baltic Proper SE | 10 Northern Baltic Proper | 11 Gulf of Finland FI | 12 Gulf of Finland EE | 13 Gulf of Finland RU | 14 Gulf of Riga EE | 15 Gulf of Riga LV | 16 Western Gotland Basin SE |
|------------|-------------------|----------------|----------------|-----------------------------|---------------------------|-----------------------|-----------------------|-----------------------|--------------------|--------------------|-----------------------------|
| 100w (wt) | N/A | X | N/A | 100w (wt) | X | N/A | X | N/A | X | N/A | N/A |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| U | U | X | X | X | X | X | X | X | X | X | U |
| 100w (ws) | X | 0 (b) | 100w (ws) | 100w (wsb) | 0 (b) | 100w (wsb) | X | 100w (wsb) | X | 9s (sb) | |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 100s (wsb) | U | 0 (b) | 100s (b) | 0 (wb) | 0 (b) | 0 (wb) | 0 (b) | 0 (wb) | 0 (b) | 50s (wsb) | |
| 44s (wsb) | 0 (s) | 100s (b) | 36s (s) | 50s (wsb) | 67s (b) | 33s (wsb) | U | 71s (wsb) | 0 (b) | 10s (ws) | |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 100s (s) | U | X | U | X | X | X | X | X | X | 100s (s) | |
| 100s (sb) | 0 (s) | U | 100s (wsb) | 100s (b) | 100s (b) | 100s (b) | 100s (b) | U | 100s (b) | 100s (sb) | |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| X | X | X | X | X | 100w (w) | X | X | 100w (ws) | 100w (ws) | 100w (ws) | |
| 67s (ws) | X | 0 (b) | 61s (s) | 100w (wsb) | 0 (b) | 100w (wsb) | X | 100w (wsb) | X | 100s (sb) | |
| U | U | 100s (b) | U | U | 100s (b) | U | U | U | 100s (b) | U | |
| 0 (w) | U | U | 0 (s) | 0 (w) | U | 0 (w) | U | 0 (w) | U | 0 (w) | |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 33s (ws) | X | 0 (b) | 0 (s) | 0 (wsb) | 0 (b) | 0 (wsb) | X | 0 (wsb) | X | 0 (ws) | |
| U | X | U | U | U | U | U | X | U | U | U | |
| 100s (ws) | U | U | 100s (s) | 0 (w) | U | 0 (w) | U | 0 (w) | U | 100s (ws) | |
| 50w (wb) | U | 0 (b) | U | 0 (b) | 0 (b) | 0 (b) | 0 (b) | 0 (b) | 0 (b) | 0 (b) | |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 0 (w) | X | X | 33s (ws) | 0 (ws) | X | 0 (ws) | X | 0 (ws) | X | 0 (w) | |
| N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 100s (wsb) | 100s (s) | 100s (b) | 100s (b) | 100s (b) | 100s (b) | 100s (b) | 100s (b) | 100s (b) | 100s (b) | 100s (b) | |
| 0 (b) | X | X | 100s (sb) | X | X | X | X | X | X | 100s (sb) | |
| 0 (b) | X | X | 100s (s) | X | X | X | X | X | X | 100s (sb) | |
| 83s (wsb) | X | 0 (b) | 60s (s) | 0 (wb) | 0 (b) | 0 (wb) | X | 0 (wb) | X | 0 (ws) | |
| 100s (ws) | X | 0 (b) | 100w (ws) | 0 (wsb) | 0 (b) | 5s (wsb) | X | 0 (wsb) | X | 100s (wsb) | |
| 100w (wsb) | 100w (ws) | 75s (b) | U | 33s (b) | 50s (b) | 17s (b) | 25s (b) | 0 (b) | 0 (b) | 100s (sb) | |
| X | X | X | 100s (s) | 0 (b) | X | 0 (b) | X | 0 (b) | 0 (b) | 100s (sb) | |

Industrial waste-water treatment activities covered in annex
Production of an industrial
(7%)
to Baltic Sea catchment air
of cement clinker in rotary
or lime in other furnaces

pathways

| SUBSTANCE / GROUP | PATHWAYS TO BALTIC SEA (t/y) | | | |
|-------------------|--------------------------------------|---------------------------------|-----------------|------------------------|
| | direct inputs (off-shore activities) | direct inputs (land activities) | riverine inputs | atmospheric deposition |
| Lead | 43 - 145 | 2 - 5 | > 78 - 153 | 50 - 93 |
| PFOS | | 0,02 | 0,2 | 0,06 |
| TBT | >0,02 - 0,07 | 0,002 | 0,009 | |



HELCOM Stakeholder Conference 2025
A 'one Baltic' approach towards a sea
unaffected by hazardous substances
31 March 2025

Thank you!

[Webpage of HELCOM list of priority substances and substances of concern](#)

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SUSTAINABLE WATERS 
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