Zinc and its compounds

(CAS numbers: e.g. 7440-66-6, EC numbers: e.g. 231-175-3 / Entry number in HELCOM list of priority substances: 33)

General sectors: Industry and commercial products, off-shore (shipping, dredged material deposition, OWF), biocide

DRIVERS | ACTIVITIES | PRESSURES | STATE | IMPACTS

Why a HELCOM priority?

Main evidence

S Concentrations of Zinc exceed the applied threshold value in **25** of the 39 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**4**/15 assessed off-shore areas). In these 25 areas, on average **60%** of the assessible samples in **water and/or sediment** (and/or biota, for which the threshold is exceeded more rarely) exceed the threshold value. This is based on monitoring data for the period 2015-2024 available in national and international databases[1]. A total number of 2331 data points were possible to evaluate for Zinc.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, Zinc scores **7.5/10** (confidence range: **6.7 – 8.0**) 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 Zinc were acquired from national WFD assessments[2].

I Current levels in the Baltic Sea indicate potential negative impacts on pelagic biota, sediment dwelling biota, and top predators such as mammals and birds.

Supporting evidence

P Approximately **3,800 – 7,800 tonnes of Zinc and its compounds** are estimated to enter the Baltic Sea every year, mainly via rivers (PLC[3]); secondly from Off-shore Wind Farms (OWFs)[4], atmospheric deposition[5] and depositing of dredged material[6]; and thirdly via direct coastal emissions mainly from WWTPs[7] and by direct off-shore emissions from shipping[8]. Given that the substance is **very persistent (metals do not degrade) and very toxic**[9], current inputs are considered as likely significant, in terms of risk they pose for the Baltic Sea and its ecosystem services. As mentioned above, levels in Baltic Sea have already exceeded thresholds, due not only to current but also historical inputs. Likely increased inputs in the near future are possible, due to it use in emerging sectors, such as in OWFs.

Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, Zinc scores **59-80/100** 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.

Facts relevant for management considerations

Causal chain and pathways

A Zinc and its compounds are manufactured/imported in the EU in quantities : ≥ 1,100,000 tonnes/year[10] (not complete calculation of EU REACH registered volume, as there are several substances containing Zinc). For the highest volume substance, i.e. elemental Zinc, REACH registered uses include e.g. metals, welding & soldering products, coating products, inks and toners, finger paints and metal surface treatment products, etc.[11]

Off-shore releases to the Baltic Sea are estimated to take place as follows: OWF: 198 - 1123 t/y, depositing of dredged material: 176-566 t/y, shipping (scrubber wash water, bilge water, grey water, sewage, antifouling paint) and leisure boating (antifouling paint): 117 t/y.

12 substances of zinc are approved biocidal active substances under EU BPR Regulation, for several product types, including also antifouling[13].

Main sectors which officially reported releases to the Baltic Sea catchment in the context of E-PRTR[14] and the respective shares for the reported emissions are as following:
Releases to water/soil (average reported releases 246 t/y, in the period 2018-2022): **Underground mining and related operations** (43%), **Industrial plants for the production of pulp from timber or similar fibrous materials** (30%), **Industrial plants for the production of paper and board and other primary wood products** (7%). Releases to air (average reported releases 130t/y, in the period 2018-2022): mainly **Thermal power / combustion** (40%), **Installations for the production of pig iron or steel including continuous casting** (16%), **Metal ore (including sulphide ore) roasting or sintering installations** (13%), Installation for the production of non-ferrous crude metals from ore by metallurgical, chemical or electrolytic processes (10%).

It is also used in pig farming, at least in Denmark (Zn used as antibiotic alternatve).

P Based on available estimations, Zinc appears to enter the Baltic Sea via **rivers** (2,810-5,243t/y, PLC), **direct off-shore** emissions (491 – 1,806 t/y), **atmospheric deposition** (410-610 t/y, EMERGE), and direct inputs from land activities (70-170 t/y, PLC, Undeman et al, 2022, E-PRTR).

S ? *In order to further improve the evaluation of the magnitude of risk, one aspect that could be investigated in the future is a review of the water toxicity threshold (compatibility in terms of form (soluble/total) between measured levels and the threshold). As well as the possibility that in the future it may replace other biocides such as copper-containing ones, which may also lead to increased emissions.*

Relevant policies (existing or planned measures)

M (on A/P)

- **ECHA recently prepared an Assessment for Regulatory Needs for Zinc and its simple inorganic compounds**[15]. Further relevant ARNs may exists (to be confirmed).
- There are provisions in **EU Best Available Techniques** Reference Documents for zinc
- Germany has research projects on meatls in sediments near OWFs (mainly in North Sea, but some new in Baltic may also be taking place).

References:

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.

[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]