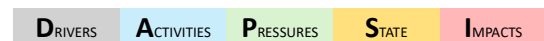


# Organotins

(CAS numbers: e.g. 36643-28-4

/ Entry number in HELCOM list of priority substances: 28)

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



## Why a HELCOM priority?

### Main evidence

**S** Concentrations of TBT (Tributyltin compounds) exceed the applied threshold value in **21** of the 25 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (**10/12** assessed off-shore areas). In these 21 areas, on average **98%** of the assessable samples in **sediment and/or biota** 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, in the context of the indicator 'TBT and imposex'<sup>1</sup>.

By further considering how much above or below the threshold each concentration is, and how often the substance is detected, TBT scores **8.6/10** (confidence range: **8.6 – 8.6**) 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.

Concentrations of MBT (Monobutyltin compounds), DBT (Dibutyltin compounds), TeBT (Tetrabutyltin compounds), and Triphenyltin compounds also frequently exceed their respective threshold value.

The threshold values for TBT, for sediment and biota, were acquired from the EC proposed Directive amending WFD and EQSD<sup>2</sup> and MSFD national assessments<sup>3</sup>, respectively. For the further organotins mentioned above, threshold values for sediment and biota were mainly acquired from MSFD national assessments, but also from the NORMAN Network ecotoxicology database<sup>4</sup>.

**I** A biological effect linked to exposure to organotins, imposex, has been observed to exceed the respective applied threshold value in 13 of the 17 examined areas (assessment units) of the Baltic Sea. The threshold is exceeded in both coastal and off-shore areas (1/3 assessed off-shore areas). This is based on regular monitoring data gathered by HELCOM Contracting Parties for the period 2016-2021, in the context of the indicator 'TBT and imposex'.

### Supporting evidence

**P** The quantified input estimations indicate **at least 20 – 90 kg of TBT** to enter the Baltic Sea every year, mainly via deposition of dredged material (HELCOM BSEFS<sup>5</sup>). In addition to this, direct emissions from shipping and leisure boating are expected (unquantified). Given that the substance is **very persistent, bioaccumulative, and very toxic**<sup>6</sup>, 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 the higher historical inputs. Similar evidence exist for other organotins, such as MBT (at least 20-90 kg/y mainly via WWTPs plus unquantified inputs via shipping) and DBT (at least 10-35 kg/y mainly via WWTPs plus unquantified inputs via shipping) (Undeman et al, 2022<sup>7</sup>, WATERBASE<sup>8</sup>).

**I** Several organotins are considered of **especially concerning mode of toxicity**: for example TBT is an endocrine disruptor<sup>9</sup>. Endocrine disruptors mimic or interfere with hormones and can cause developmental abnormalities, reproductive dysfunction, and population effects.

### Overall assessment

When assessing current levels in the Baltic Sea, current inputs, and the severity of the relevant toxicity mechanism, for example TBT scores **88-88/100** 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 TBT, several other organotins (mono-, di-, tri-, and/or tetra-substituted organotins), also called organostannic compounds, have hazardous properties and concerning environmental fate and/or occurrence profiles – or may degrade to such in the environment<sup>14</sup>. This substance group entry aims to reflect all such relevant individual substances.

## Facts relevant for management considerations

### Causal chain and pathways

**A** Organotins are manufactured/imported in the EU in the following quantities<sup>10</sup>: DBT ≥330-3,300 tonnes/year (at least 6 substances, including e.g. Dibutyltin dilaurate, Dibutyltin oxide, and Dibutylbis(pentane-2,4-dionato-O,O')tin), TBT and TeBT confidential (only uses as intermediate)<sup>7</sup>, Dioctyltins ≥1,000 – 10,000 tonnes/year, Dimethyltins ≥1,000 – 10,000 tonnes/year. And potentially further organotins. **REACH registered uses**<sup>11</sup> for Dibutyltin dilaurate include e.g.: industrial uses (as a catalyst / process regulator, additive to prevent reaction of polymer with reactive diluent, electrical wire enamelling and coating); as catalyst in professional and consumer uses of adhesives/sealants/fillers (building and construction work); and article service life e.g. in vehicles, machinery / electrical appliances, batteries and accumulators, rubber articles, wood articles, construction articles and building materials. Registered uses for Dibutyltin oxide include e.g.: industrial uses such as cataphoretic coating, catalyst/process regulator including use in production of polymers, intermediate; professional and consumer use of products such as fabrics, textiles and apparel, leather articles; and article service life similar to Dibutyltin dilaurate. Some of the above uses are also relevant for Dibutylbis(pentane-2,4-dionato-O,O')tin), plus applications such as coatings/paints/thinners/paint removers. And paper and board treatment products. Registered uses of dioctyltins and dimethyltins have not been compiled here.

Leisure craft and ships still have organotin compounds on their hulls. Whereas secondary releases during maintenance work is also expected.

### Relevant policies (existing or planned measures)

**M (on A/P)**

- Organotins are **subject to the International Convention on the Control of Harmful Anti-fouling Systems on Ships**<sup>12</sup>.
- Accordingly, organotins are **restricted under EU REACH** for uses as biocides/antidouling. Furthermore, tri-substituted organotins, dibutyltin (DBT) compounds, and dioctyltin (DOT) compounds are restricted as concerns their inclusion in many types of articles above 0.1% tin. Five organotin substances are **listed as REACH SVHC** (two DBT and two dioctyltin substances due to their toxicity for reproduction properties; and one TBT substances due to its PBT properties). One of the dioctyltin substances has further been included in **REACH Authorization list. Assessments of Regulatory Needs / Risk Management Options Analyses** have been prepared in the context of ECHA's Integrated Regulatory Strategy at least for certain individual dioctyltins and dimethyltin substances<sup>13</sup>.

- TBT is listed as a priority hazardous substance under **WFD** and its update proposal HELCOM indicator. It is also part of a **HELCOM indicator**.

## References:

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

[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]