

Hazardous substances in municipal WWTPs - sources and removal



Event / Date UBC Talks, 24.11.2020

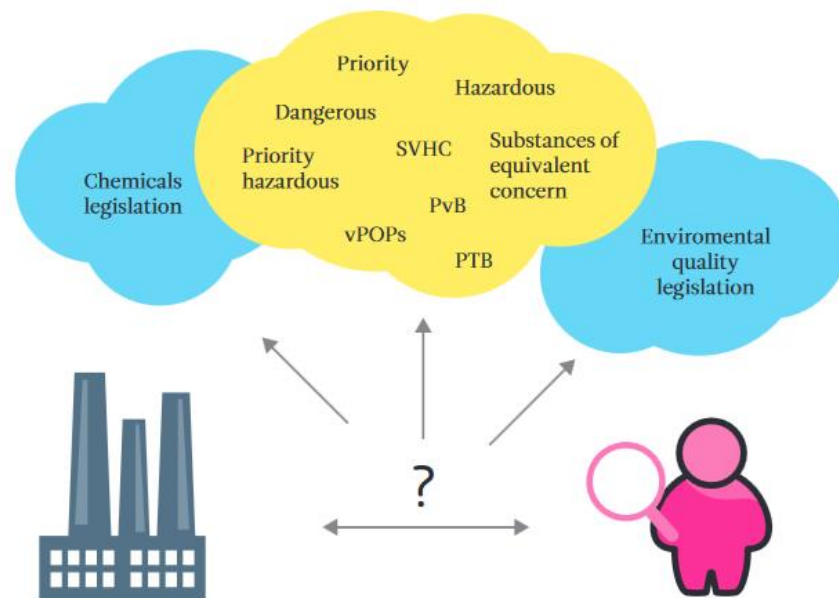
Organisation
Contact

Estonian Waterworks Association /
Estonian Environmental Research Centre
Vallo Kõrgmaa

Hazardous substances

- While talking about hazardous substances, there are many definitions available.
- Regarding hazardous substances in the water the most important are compounds that have following properties:

- Persistent
- Bioaccumulative
- Toxic
- Endocrine disruptors



Different hazardous substances terminology in legislative acts in EU.

BaltActHaz

(http://baltacthaz.bef.ee/files/c15/c55/HS_eng_Final.pdf)

Influent quantity and quality are often problematic in MWWTP

- 40 % of MWWTPs have issues with serious **fluctuations** in the wastewater flow or load
- Industry caused problems for 20% MWWTPs
- BOD/N/P not balanced in municipal ww
- Long list of hazardous substances was found from the influent
 - From 282 hazardous substances analysed only 45 (16%) were not detected above the limit of quantification (LOQ) from any of analysed samples
 - Several restricted substances could be found

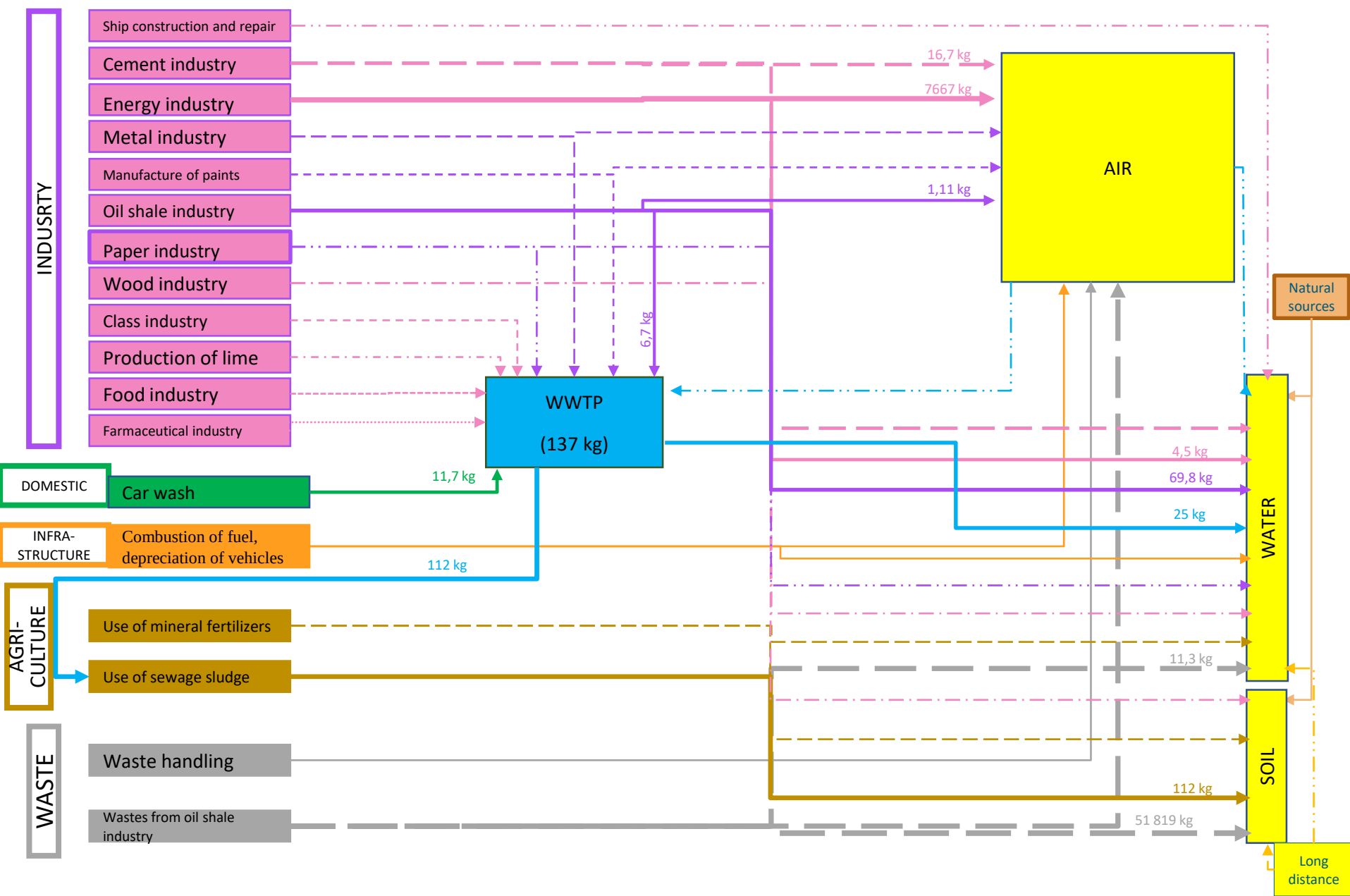
Study in 2017-2018 in Estonia

- During the study 282 hazardous substances were analyzed, including EU (n = 45) and Estonian (n = 31) priority substances.
- Di-2-ethylhexylphthalate (DEHP), toluene and heavy metals (As, Ba, Ni, Pb, Zn) were found from all samples.
- For some of the substances seasonal (e.g. diuron, glyphosate, trichloromethane) or population density patterns (e.g. tetrachloroethene was detected only from MWWTPs with capacity more than 10 000 PEs or median concentrations of trichloromethane increased linearly according to the plant size) could be detected.

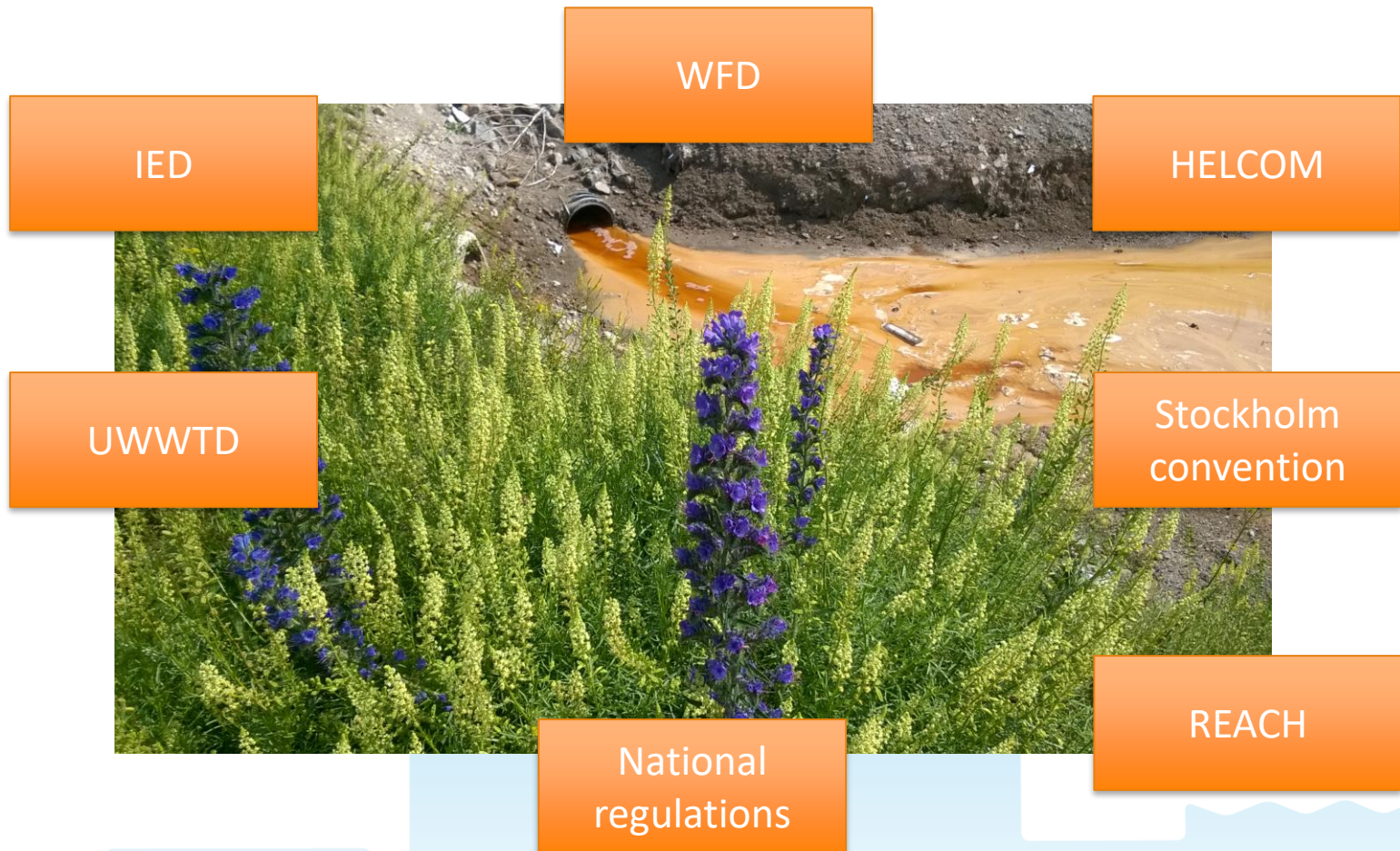
Sources of hazardous substances

- Wastewater in municipal sewer system is usually collected from two different sources - from the industries and from the population.

Arsenic – estimated loads in Estonia (2018) kg/year.



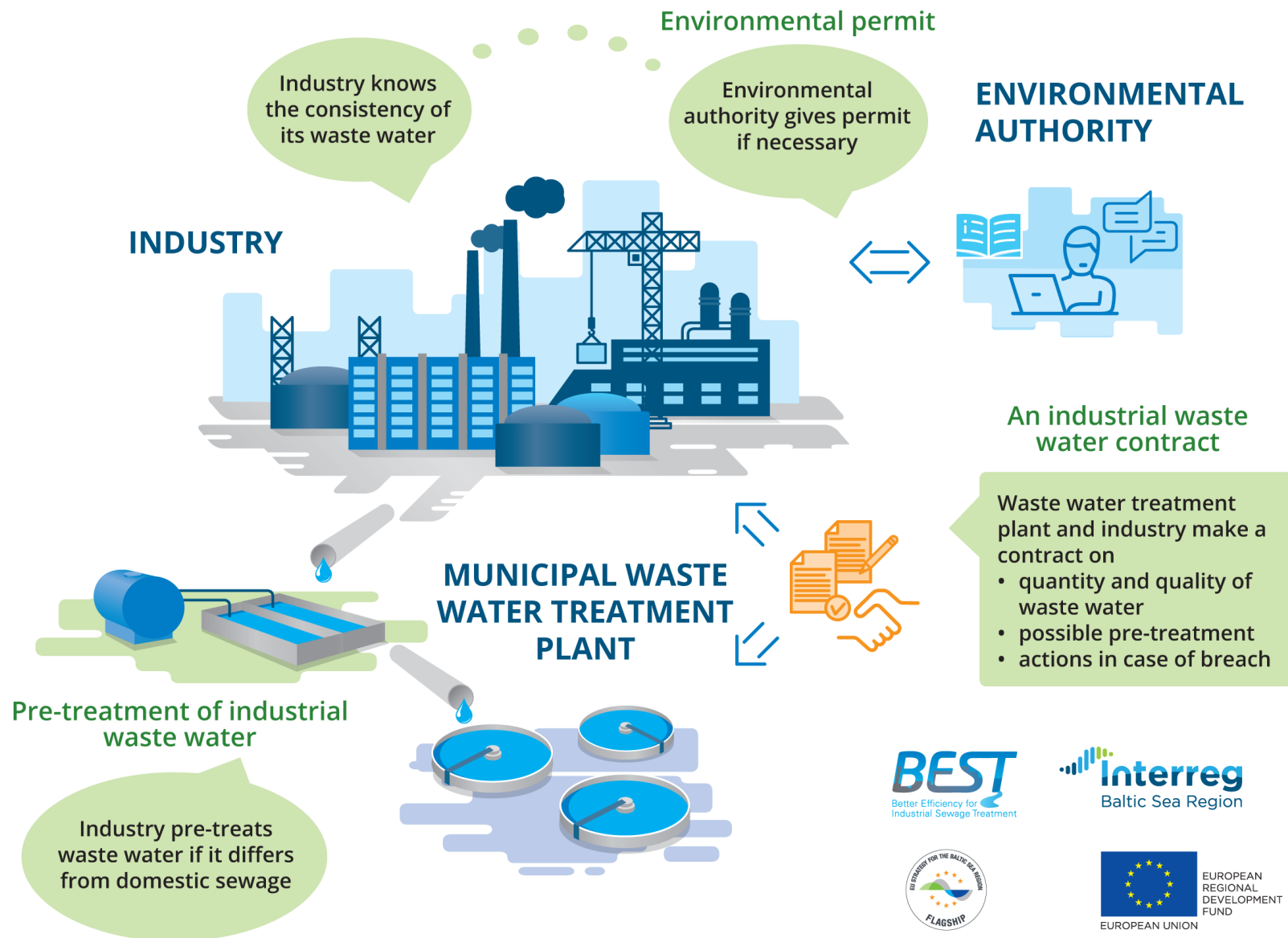
Regulations



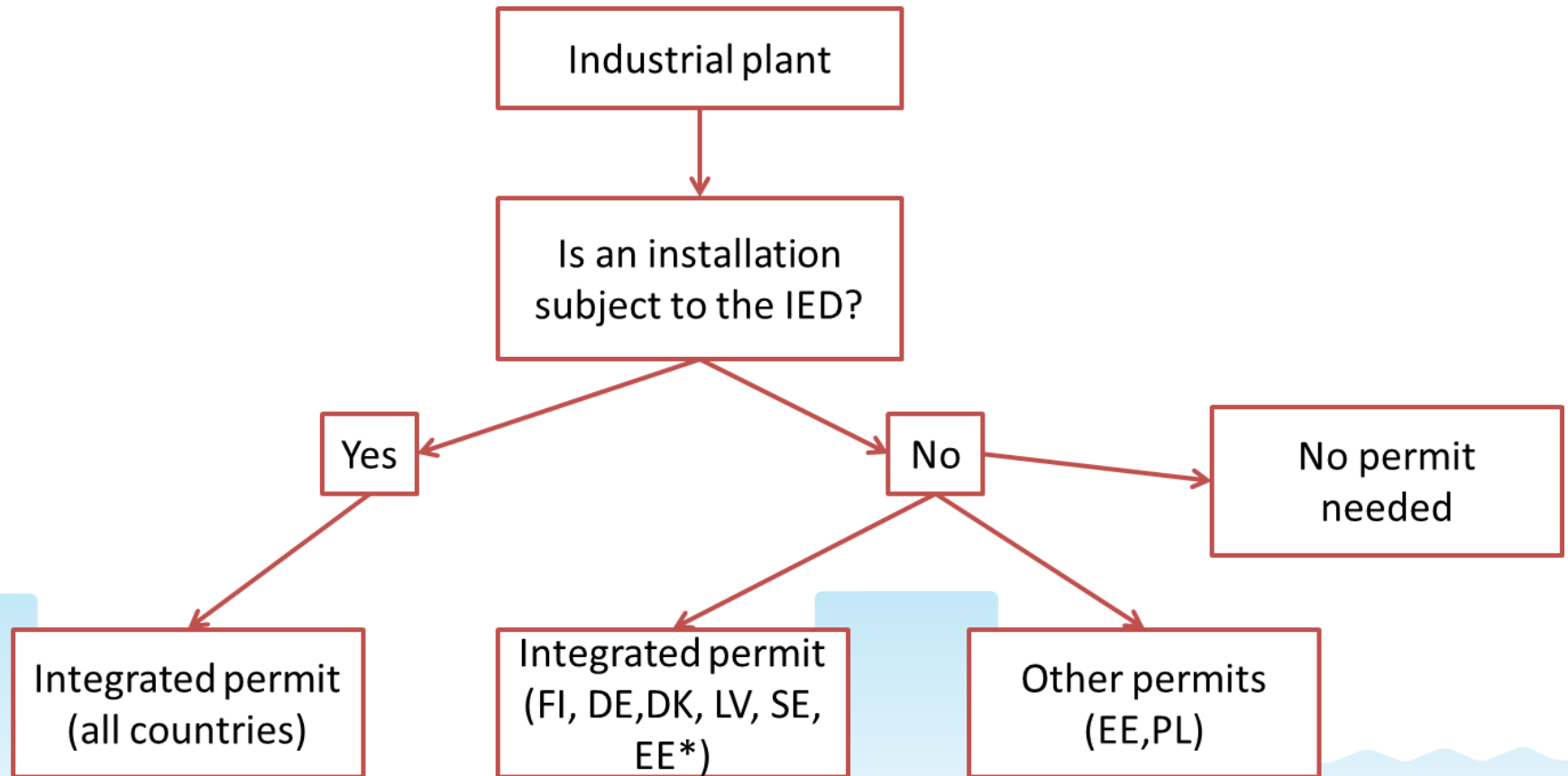
Controlling the source

- Controlling the chemical
 - REACH, Stockholm Convention are well working on industrial production level, but they are not capable of annulling the impact and emissions of products that already contain prohibited hazardous substances.
 - That makes controlling emissions from the population almost impossible.
- Controlling the industry
 - Emissions of hazardous substances in industrial (indirect) discharges could be controlled by **environmental permitting** (2010/75/EU) or by the **contracting conditions** between the industry and MWWTP,
 - Up to 2020 there were no permits for indirect discharge in Estonia

8



Permitting regulations in BSR countries



Integrated permits and single-medium permits

- **An integrated environmental permit**
 - to operate industrial plants with a high pollution potential in a way that ensures the least possible impact on the environment and human health
 - combination of permits replacing individual environmental permits - a special permit for water use, a waste permit and an ambient air pollution
 - conditions are commonly based on the BAT
- **A single-medium permit**
 - to deal with specific environmental problems (e.g. emissions to ambient air)
 - given out to control certain emission individually
 - the purpose is to protect human health or some element of the ecosystem

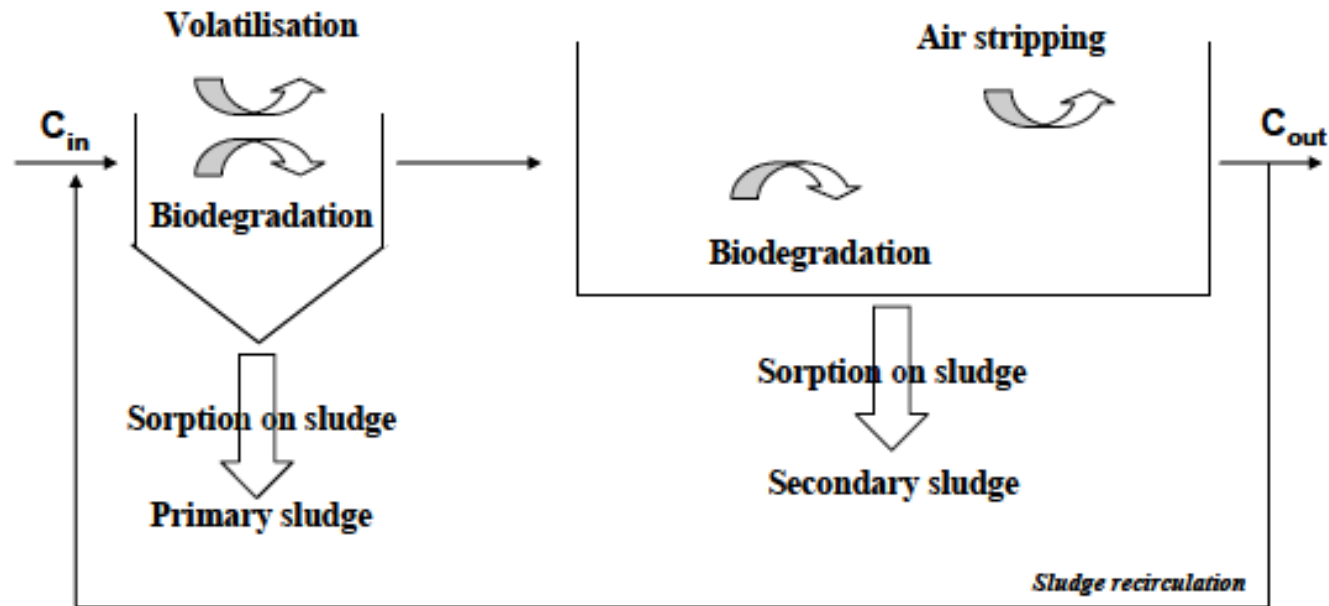
11

Contracts

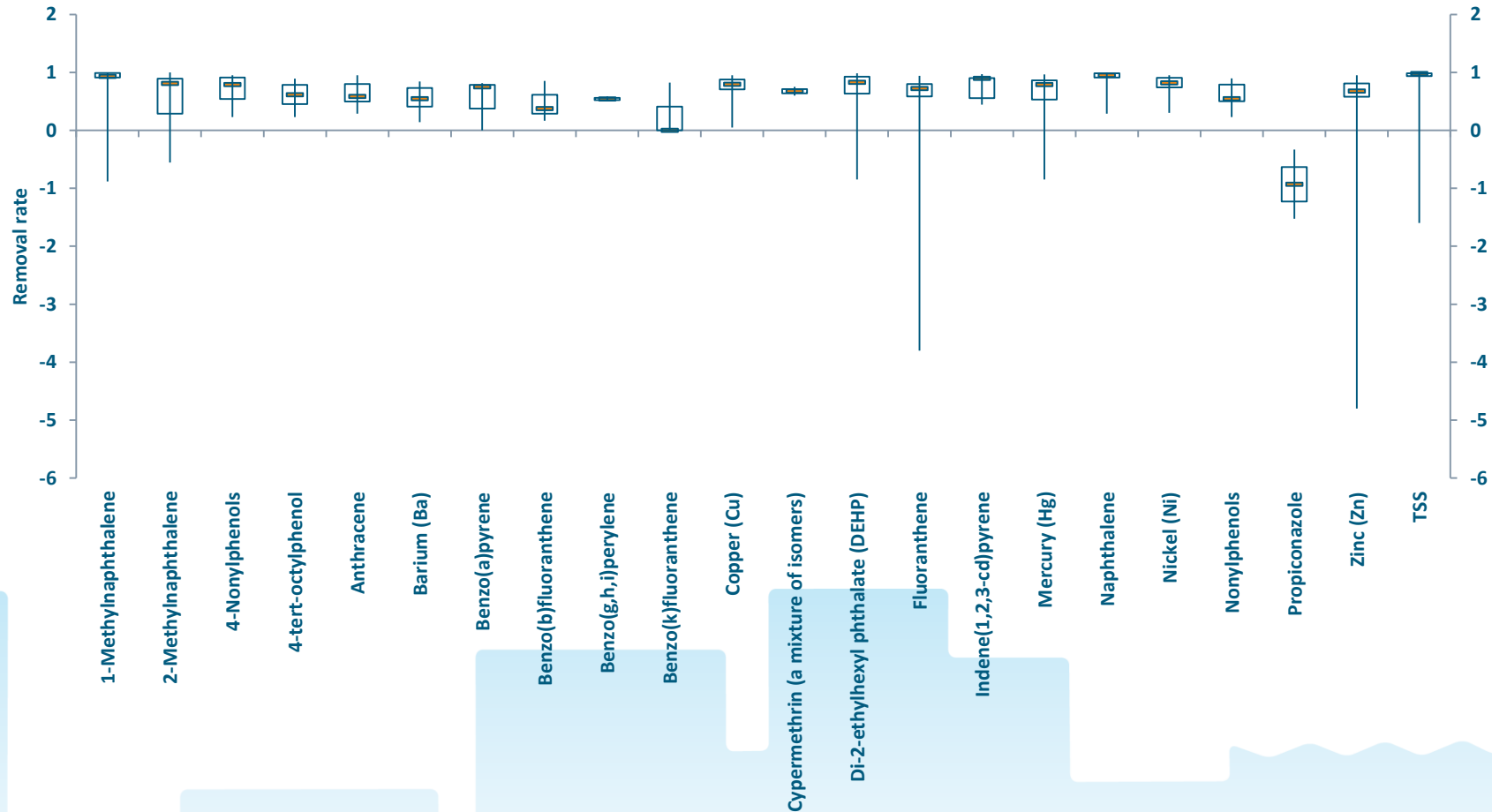
- Most of industrial facilities discharge their wastewater to the public sewer system.
- The industry has to **get approval** in order to discharge its wastewater to the public sewer system and must have an industrial wastewater **contract or agreement** with the appropriate water company.
 - These contracts are not public.
 - Inhibition tests might be needed
- Pretreatment is often necessary and recommended to perform if the quality of waste water cannot meet the requirements for discharging to municipal sewer.
 - Guidelines for the Management of Industrial Wastewaters:
<https://bestbalticproject.eu/outputs/guidelines-for-management-of-industrial-wastewaters/>

12

What happens in WWTP?



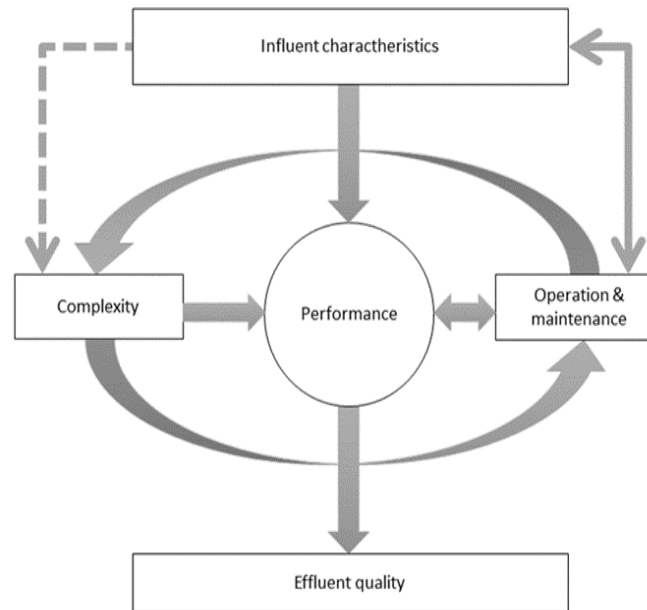
Removal of hazardous substances in MWWTPs



14

What affects performance of the MWWTP?

- Wastewater treatment is a complex process, where the product (effluent) quality is strongly dependent on
 - the variations in feed (influent) characteristics,
 - complexity of the technology,
 - maintenance procedures and operational decisions.



Conclusions

- Many substances that are subject to international restrictions (e.g. Stockholm Convention, REACH) are still present in raw sewage and treated effluent;
- For most of the substances removal in MWWTPs was observed, but the chemical analyses of sewage sludge indicate that pollutants are often transmitted from water to the biomass.
- Not all liquids originating from industrial production should be allowed to be discharged directly into the sewer system.