Interreg Baltic Sea Region

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Sectoral guidance for Polymers and Fertilisers

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EU STRATEGY FOR THE BALTIC SEA REGION
FLAGSHIP

The chemical sector

- Europe is the second largest chemical producer after China (sales 2018 were € 565 billion)
- The largest chemicals producers in Europe are Germany 31,8 %, France 13,4 % and Italy 9,4 %
- Polymers (plastics, synthetic rubber & man-made fibers) 21,3 %
- Basic inorganic chemicals (other inorganics, industrial gases & fertilizers) 13,7 %
- There are 28 000 companies operating in the chemical sector in EU (CEFIC 2019). Most of the installations are SMEs and below the threshold of Industrial Emissions Directive (IED).
- 2 935 facilities registered under Chapter 4 Chemical industry (European Release and Transfer Register, all reporting states 2017)

Polymers and fertilizers

- IED installations
  - Polymers 400
  - Fertilizers 100

- IED installations according to E-PRTR and country specific information (Finland, Poland, Sweden, Estonia and Germany) located in the Baltic Sea catchment area
  - Polymers 33
  - Fertilizers 27

Baltic Sea catchment area

Number of Installations	Czech Republic	Estonia	Finland	Germany	Lithuania	Poland	Russia	Sweden	Denmark, Latvia, Slovakia Norway, Belarus, Ukraine
Fertilizer	0	1	2	1	2	18	1	2	Unknown/none
Polymer	3	1	14	3	0	0	Unknown/ none	12	Unknown/none

Description of key environmental issues

- Emissions of volatile organic compounds, in some cases waste waters with the potential for high loads of organic compounds, relatively large quantities of spent solvents and non-recyclable waste as well as the energy demand (POL BREF 2007)

- High energy consumption, emission to air (NO_x, SO_2, HF, NH_3 and dust), emission of N_20 (production of HNO_3), production of phosphogypsum in high volumes (LVIC-AAF BREF 2007)

Use of hazardous chemicals

Chemicals used for production of different types of polymers are for example surfactants, solvents, emulsifiers, catalysts, modifiers, antioxidants, protective colloids, polymerisation initiators, inhibitors, product stabilisers and extender oils

Use of hazardous chemicals in case studies

- Hazardous chemicals are used in polymer production for example in catalysts, adsorbents, maintenance chemicals and in synthesis and for dissolving. Modifiers and emulsification agents may also contain hazardous substances.

- Hazardous chemicals are used in fertilizer production for example as plant nutrients (copper, zinc, selenium, manganese and boron) and added to cooling waters

SVHC & WFD PS relevant for Polymers

- The information on substance uses in EU was compiled from the ECHA webpages and SPIN register
- The use volumes in EU were derived from ECHA infocards (total use in EU) and SPIN register (only Nordic countries)
- Key words ”polymer” or “polymers” or “used in polymers” or “used in polymer processing” it was deemed to be used in manufacture of polymers
- **Result: Almost 70 substances were identified**
  - For example: different phenols and phthalates, cadmium and lead compounds, PFAS compounds (PFBS and APFO)

Challenges in identifying sector specific substances

- Detailed data on substance use is partly lacking and laborious to collect
- Industrial sector specific use volumes in whole EU region not available
- Information on the industrial uses may be outdated

→ Expert judgement is needed to assess the information!

Specific product legislation

- Food stuff packaging regulations (polymers)
    - strict quality criteria
    - recycled raw materials
- Fertilizer product legislation (EU 2019/1009)

The new legislation bans the use of inorganic waste materials in EU fertilizers until the end-of-waste criteria are fulfilled and an assessment has been made to make sure that the materials are safe to use as fertilizer raw materials.

Use of safety data sheets

- ECHA Guidance (using & producing)
- Findings from case studies:

Beyond the supply chain communication requirements, as stated in the REACH regulation, detailed data about the impurities or intentionally added constituents is challenging to get from the suppliers. This concerns both impurities and ingredient substances in minor concentrations, which remain below thresholds (levels of concern) triggering their presence in section 3 of SDS. Even though the concentrations of impurities might be low, the load might become significant when the used volumes of raw materials are high

Use of safety data sheets

SDSs are kept up to date and checked regularly in the plants. Exposure scenarios are utilized and adapted to the specific uses at the installation. But all SDSs do not yet have exposure scenarios and in some the data is of poor quality, especially concerning mixtures. Sometimes the information in the SDSs is in contradiction between different suppliers of same chemical. Thus, the information is not harmonized.

SDSs are used to make short, easy-to-read safety cards to the plant operators. ECHA database is not utilized by the company but all the information is derived from the SDSs.

Use of safety data sheets

The quality of SDS supplied by European chemical companies is usually at a high level. This quality is not always guaranteed by smaller scale suppliers.

Frequently commercially competitive chemicals from outside the community provide very general SDSs to the EU market. This may result from the lack of such data from the manufacturer, or not put full information may be intentional action.

Using exposure scenarios

- ECHA Guidance

- Findings from case studies:

The companies use the exposure scenarios even though they are not directly usable but need to be refined to specific uses of the substances

The exposure scenarios are difficult to read and too generic to apply and thus not directly usable for the production units. Specific environmental release categories (SPERCs) could be helpful

The exposure scenarios and data on environmental hazards should be improved in the SDSs

Chemical inventories

Findings from case studies:

- The chemical inventory could be improved if detailed data about the impurities or intentionally added constituents would be available in SDS
- Some case study companies take part in Responsible care program
- The internal company rules and practices are often stricter than legislation or requirements of authorities

Chemical inventories

- The processes which include hazardous chemicals have the most detailed rules. These rules are part of the process safety requirements: if any unknown and unwanted substance enters the sensitive process there is even a risk for explosion. Therefor all new chemicals are assessed in detail before taking them into use in the production process. The installations are not allowed to use any chemicals before they have been tested and approved by the company

Best available techniques BAT

Some existing BATs under IPPC and IED

EFS (2006)

- 5.1 Storage of liquids and liquefied gases
- 5.2 Transfer and handling of liquids and liquefied gases
- 5.3 Storage of solids
- 5.4 Transfer and handling of solids

POL (2007)
Generic BATs:

- BAT 1 EMS
- BAT 2-4 Fugitive emissions
- BAT 5 Dust emissions
- BAT 6 Start ups and stops
- BAT 9 Prevent water pollution
- BAT 10 Separate different water and gas streams
- BAT 11 Treatment of air purge
- BAT 15 Re-use of waste
- BAT 17 Buffer for waste water
- BAT 18 Waste water treatment

Best available techniques BAT

LVIC-AAF (2007)
Common BATs in section 1.5.1 and 1.5.2 concerning:

- monitoring of key performance parameters and to establish and maintain mass balances
- recycling or re-routing mass streams
- reducing waste water volumes and loads by recycling condensates, process and scrubbing waters
- EMS

CWW (2016)
Generic BATs:

- BAT 1 EMS
- BAT 2-4 Inventories of waste water an waste gas streams and monitoring
- BAT 5 Diffuse VOC emissions
- BAT 7-11 Handling of waste water
- BAT 12 Waste water treatment
- BAT 13-14 Handling of waste
- BAT 15 Recovery of compounds and reduction of emissions to air
- BAT 16, 19 Emissions to air

Best available techniques BAT

Recommendations on BAT candidates (from SWECO report)

- Chemical Management System
- Chemical and raw material inventory
- Management of new chemicals, approval process
- Closed cycle
- Process mapping of hazardous substances
- Wastewater Treatment

Permitting Process and Management

Findings from case studies:

- More open communication during the permitting process would make the whole process more effective and faster. Also, more communication between the authorities would be valuable, for example the information regarding the use amounts of chemicals must be reported to many different authorities. More open communication and involvement of all stakeholders during the application stage could lead to less complaints and overall faster and more streamlined process

Permitting Process and Management

- Some companies use consultants to help them check/follow legal requirements. In addition to monitoring program, company's own surveillance is carried out and certificates and audits are utilized
- The term "technically and economically feasible" would need more clarification
- The personnel at the installations criticize the setting of different emission limits values in the environmental permits for the same parameters in different sites. It is not always clear for the operator what the limit values are based on
- The personnel at the installations would like that the monitoring is based on chemical inventory so that the amount of substances monitored would be reasonable and justified based on environmental fate of the substances and significant releases

Circular Economy issues

- There is great potential in plastic recycling. Open communication through the whole value chain would enable more efficient recycling. Chemically recycled raw materials can be used if they are pure enough
- Tall oil /by-product of paper production from pine trees/ is a source of fatty acids from renewable sources
- Some waste water streams are reused for washing product
- Gas from some reactors and chemical tanks are treated in a recycling facility

General first recommendations

- To have a good Chemical Management System with focus on the use of hazardous chemicals and risks associated with that
- To have a Chemical and raw material inventory in order to have full control of the chemicals and raw materials used
- To have a system for reviewing new chemicals and for substitution

General first recommendations

- To establish closed cycle in processes in order to save chemicals, resources and minimize emissions and waste generation
- To map the processes using hazardous chemicals
- To add abatement techniques to the wastewater treatment to minimize emissions of microplastic (polymers)

Recommendations from case studies

- Impurities should be better noted in the MSDSs of raw materials
- Exposure scenarios and data on environmental hazards should be improved and SPERCs developed

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Hazardous industrial chemicals in the IED BREFs

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Thank You for your attention!

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https://www.syke.fi/projects/hazbref

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