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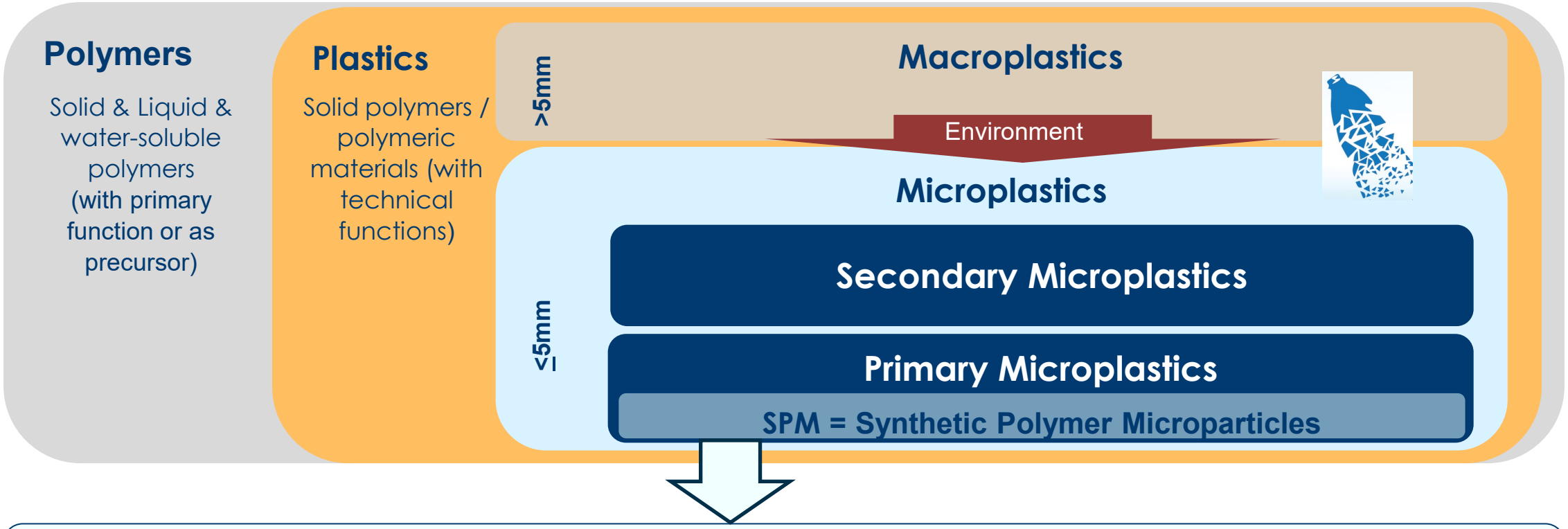
The Generic SPM-Tonnage Estimation Methodology – The FEICA Case

SPM: ONE FACET OF MICROPLASTICS



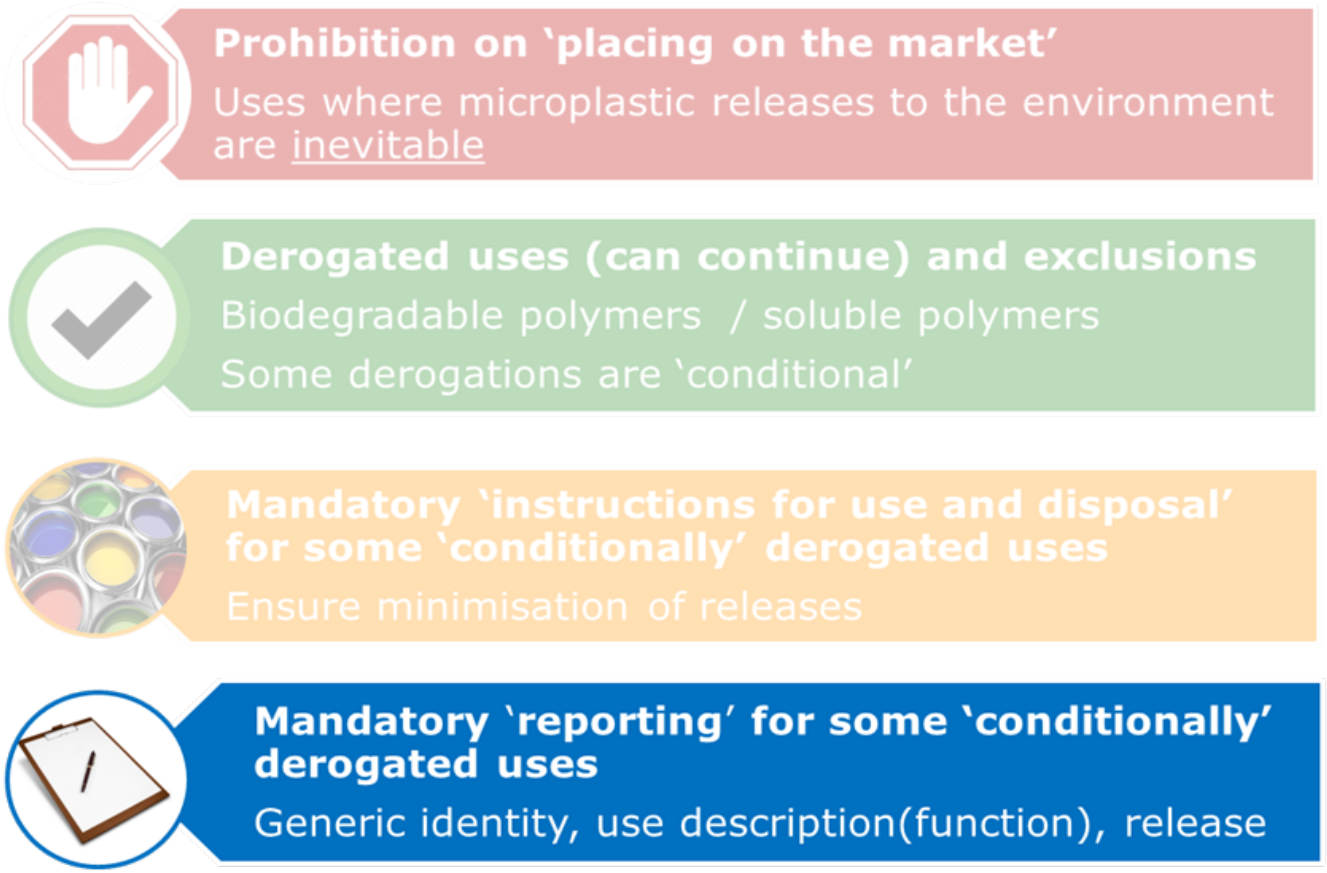
→ **Under the EU CIRCULAR ECONOMY PLAN (until 2050) the Commission has taken action to restrict SPMs effective as of 2023 (EU 2023/2055).**

The Restriction in a Nutshell

COMMISSION REGULATION (EU) 2023/2055 entry 78 of Annex XVII (enforced Oct 2023)

Scope

Synthetic polymer microparticles (SPM), solid, water insoluble, not biodegradable, <5mm (<15mm for fibres) shall not be placed on the market as **substances on their own** or, where the synthetic polymer microparticles are present …
… in mixtures in a concentration **≥ 0,01 % by weight**



adopted from ECHA

SPM: ONE FACET OF MICROPLASTICS

Polymers

Solid & Liquid & water-soluble polymers (with primary function or as precursor)

Plastics

Solid polymers / polymeric materials (with technical functions)

>5mm

Macroplastics

Environment

Microplastics

<5mm

Secondary Microplastics

Primary Microplastics

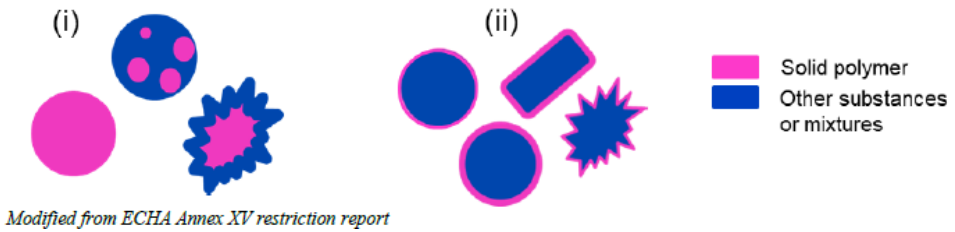
SPM = Synthetic Polymer Microparticles

Restriction:

SPM

- Solid polymer
- <5mm (<15mm for fibres)
- Chemically modified
- Non-biodegradable
- Non water-soluble (<2g/l)
- Contain carbon atoms

Figure 1. Examples of SPM contained in particles (i) or coating particles (ii)



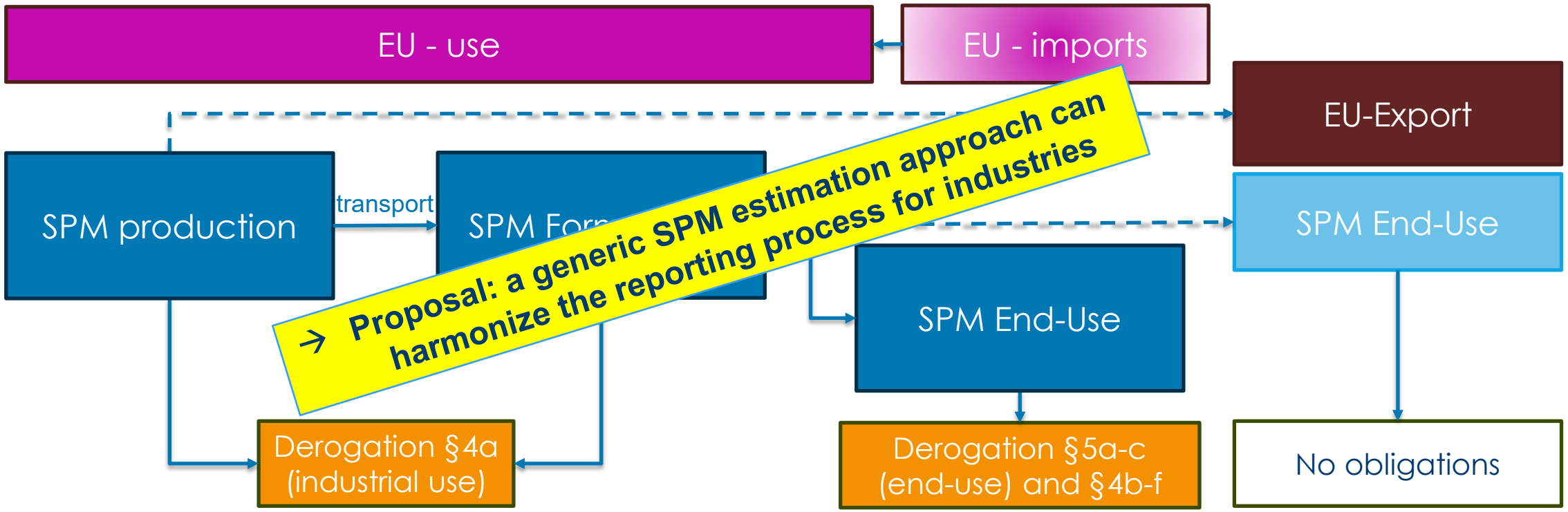
Modified from ECHA Annex XV restriction report

Microbeads (SPM)

contained in cosmetics, make-up products, waxes and polishes for use as an abrasive, i.e. namely to exfoliate, polish or clean.

Reporting Obligations

(annually by May 31st for previous year, starting in 2027 for 2026)



- **<u>Reporting per Legal Entity and Use</u>**
- **Who:** Industrial DU and suppliers of SPM and SPM-containing mixtures for their own uses and end uses of their professional customers and the general public (DIY)
- **What:** generic information on the identity of the polymers, and its uses. A reference to the applicable derogation and…

… Difficult: an estimate of the quantity of SPM released into the environment of the European Economic Area (EEA) per legal entity in the previous calendar year

Scope of the Proposal

1. Provide a procedure to allow conservative estimations of environmental SPM releases for reporting purposes
2. Use of existing elements
    I. SPERCs* - established and accepted under REACH (Sector Use Maps)
    Cited by the EU Commision “SPM guidance”
    II. WWTP connectivity, types, sludge handling in EU countries (EuroStat)
    III. SPM removal efficiency in WWTP (ECHA Annex XV Restriction Proposal Report (2019))
3. Achieve broad applicability: several industries (open for expansion if additional SPERCs become available), different end uses, all EU-countries
4. Procedure easy to apply

* Specific Environmental Release Categories
(e.g. Saettler D, et al 2012. Integr. Environ Assess Manag 8:580–585
Tolls J., et al 2015. Integr. Environ Assess Manag vol 12:185-194)

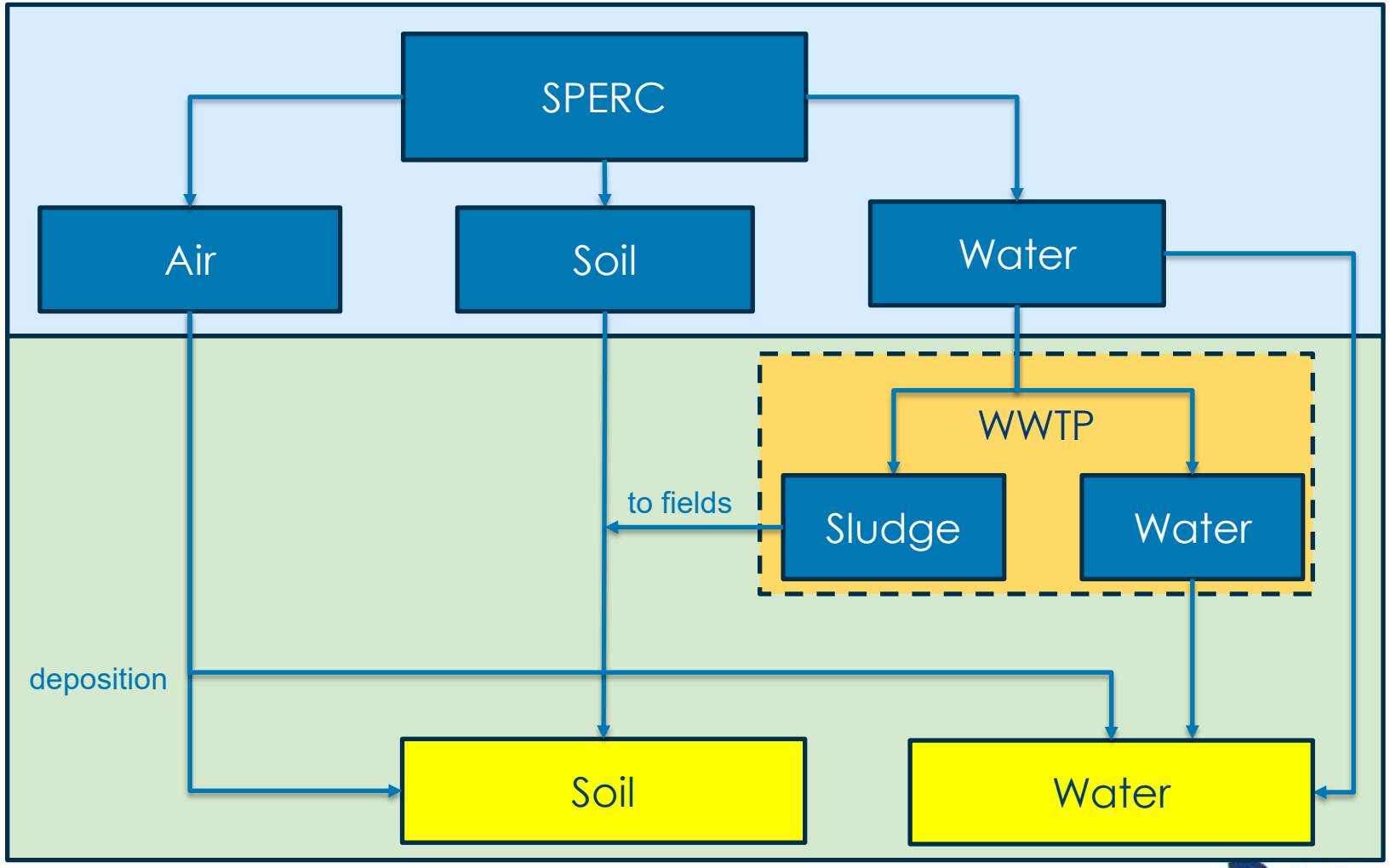
What SPERCs are

- SPERCs are environmental exposure scenarios that reflect specific use conditions (e.g., operating conditions and risk management measures) under which raw materials are used.
- SPERCs have been developed by many industries and for a wide range of applications in all relevant life cycle phases of material uses.
- The scope of SPERCs is very broad. They serve as conservative exposure models for environmental risk assessments of substances (REACH).
- The documentation and development of SPERCs is harmonized (SPERC fact sheets and background documentation)
- SPERCs are published on the ECHA webpage

Environmental Emissions via SPERCs

- SPERCs define **release factors** to air, soil and water

- SPERC release factors enable subsequent **emission modelling**



WWTP= WasteWater Treatment Plant

Example SPERCs with Release Factors

SPERCs are specific for the use of a substance and/or in products, examples are:

SPERC	Code	RF_{air}	RF_{soil}	RF_{water}
Formulation of **Water-borne** Adhesives / Sealants and Construction Chemical Products – **non-volatile** Substances	FEICA / EFCC SPERC 2.2b.v3	0.0097%	0.00%	0.505%
Formulation of **Solvent-borne and Solvent-less** Adhesives / Sealants and Construction Chemical Products - **non-volatile Substances**	FEICA / EFCC SPERC 2.1a.v3	0.08%	0.00%	0.02%
Formulation of **non-liquid creams** (small scale); (<1,000 t cosmetic products/year)	Cosmetics Europe SPERC 2.1.j.v3	0.00%	0.00%	4.0%
Coating-application; Industrial; **Spraying**; Indoor use; **Non-Volatile**	CEPE SPERC 5.1a.v2	1.50%	0.00%	0.0%
Widespread use of **non-volatile** substances in construction chemical products – indoor	EFCC SPERC 8c.1a.v2	0.00%	0.00%	1.5

→ **The use of SPERC require knowledge on product type and application (use)**

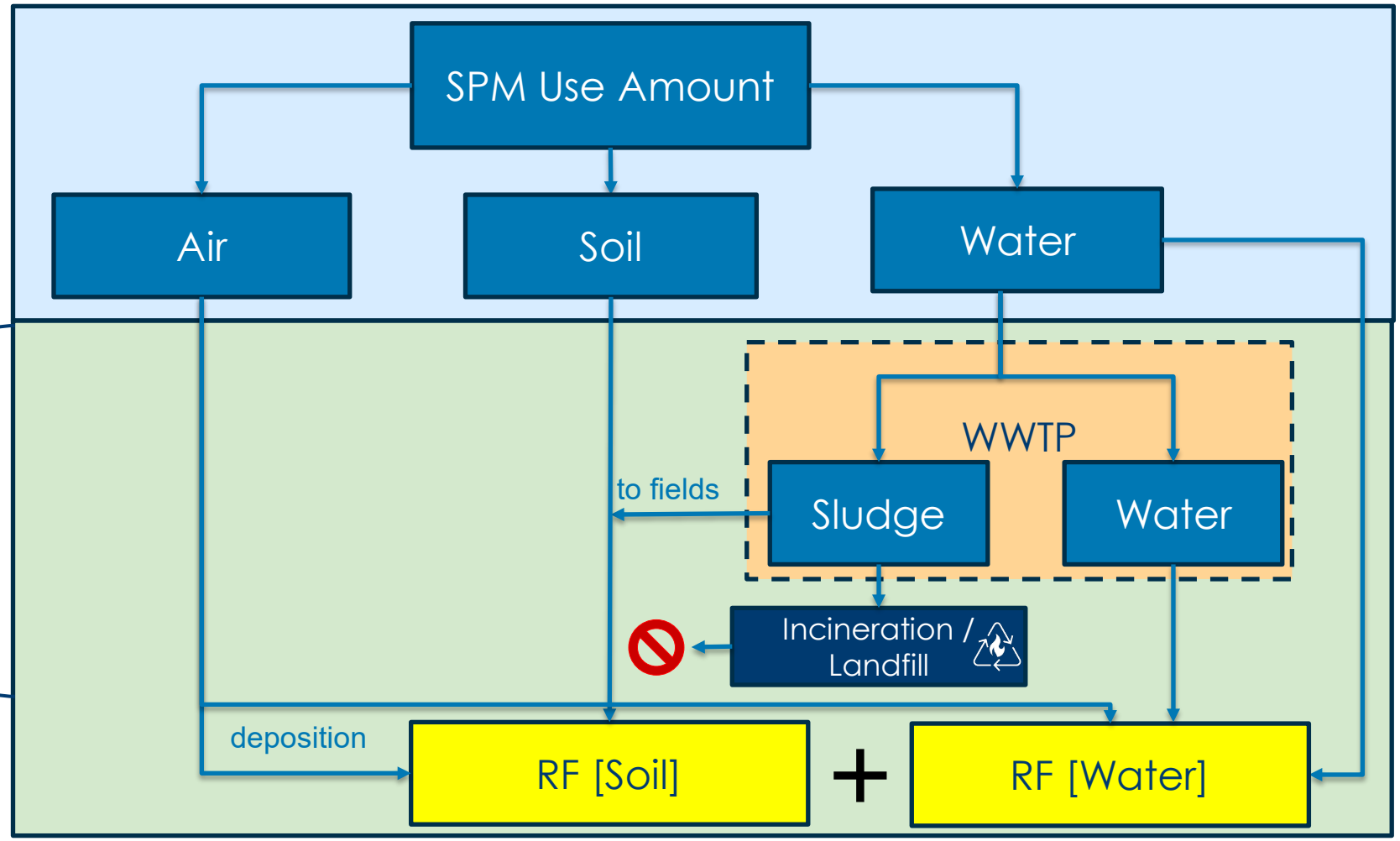
Environmental SPM Emission Modelling

"E_Calc_SPM Concept"

RF [%] SPERC
(release factors)

WWTP connectivity,
-types, sludge handling
in EU countries
(EuroStat)

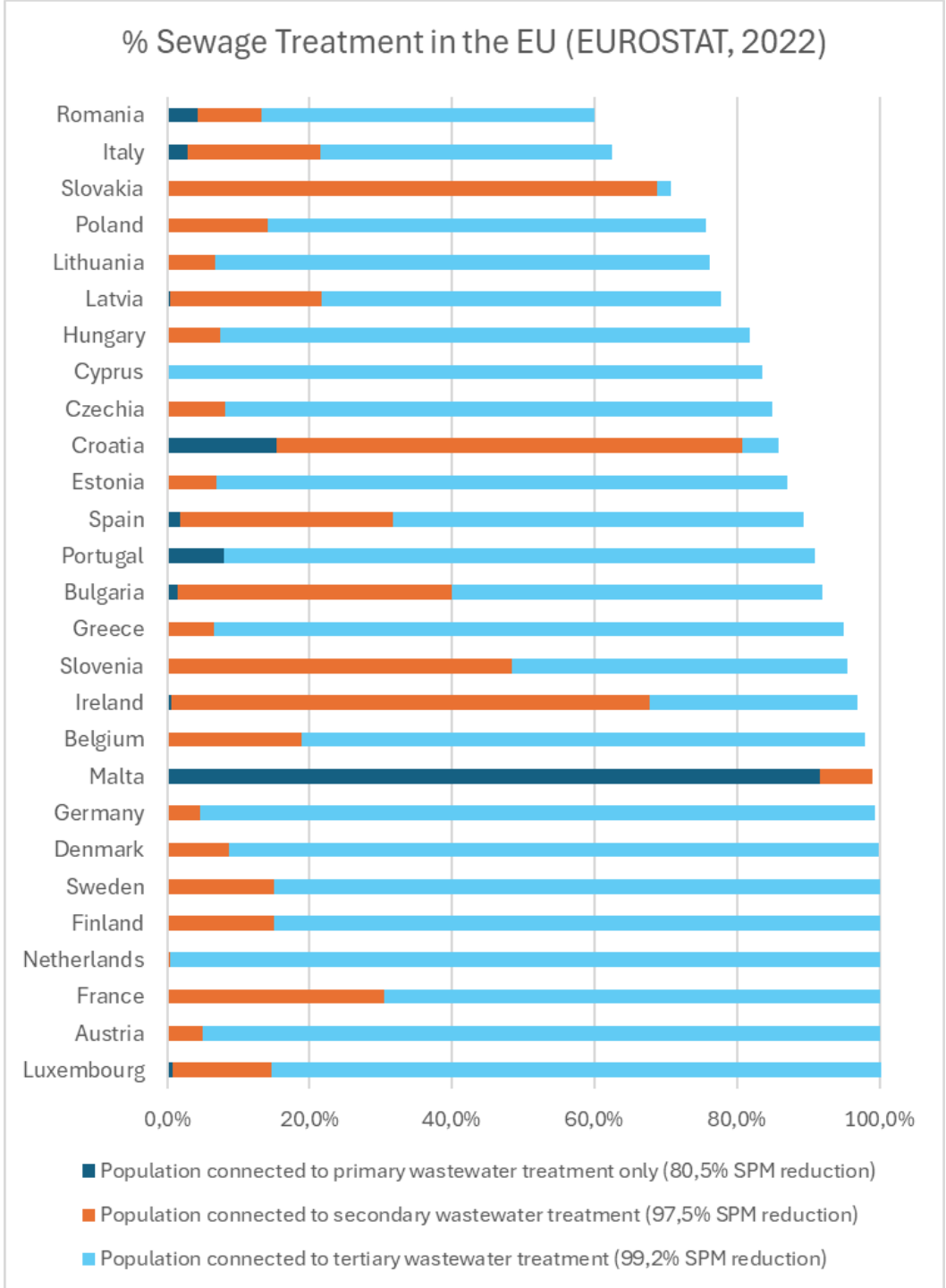
RF [%] SPM =



Sewage Treatment in the EU

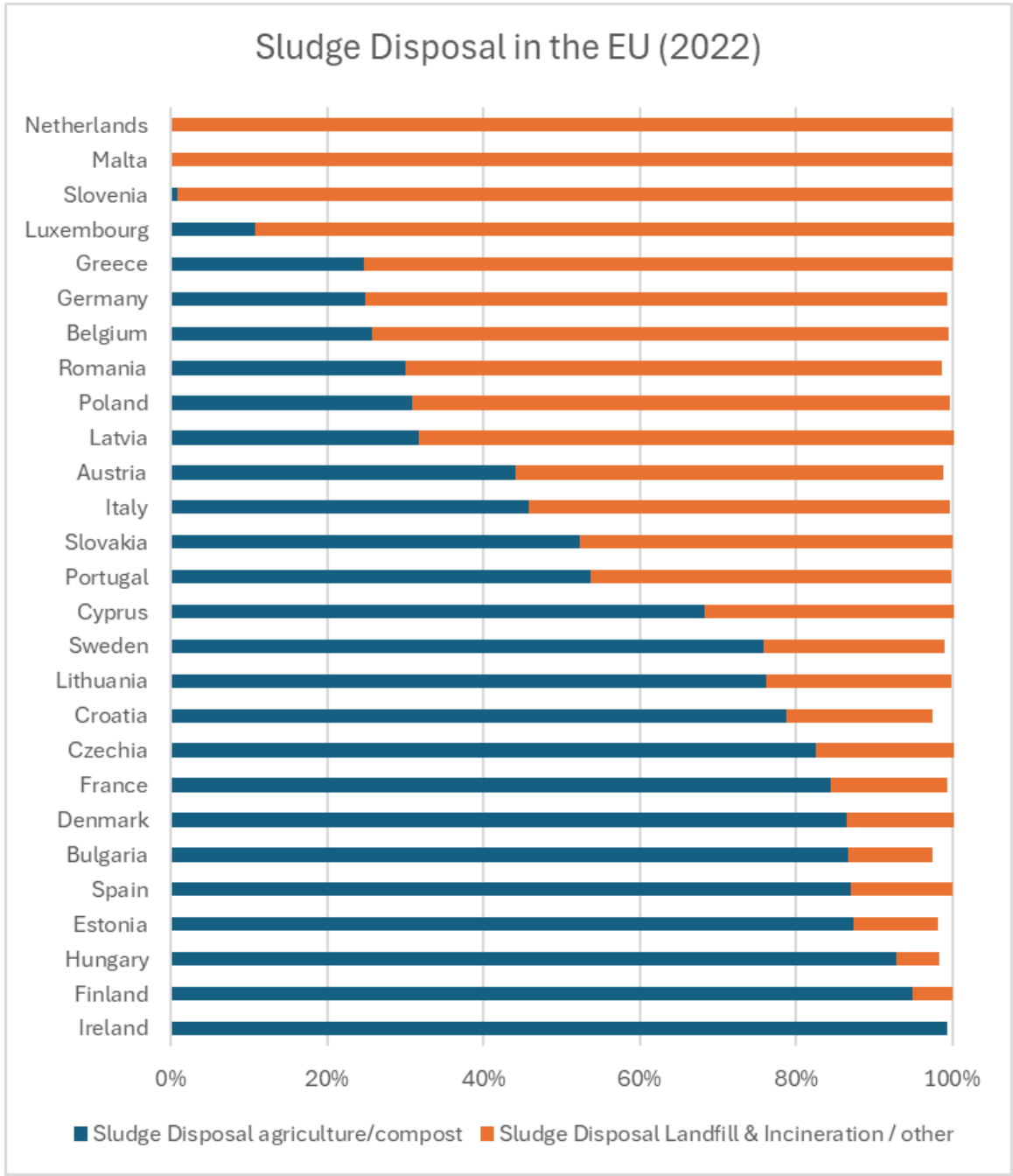
Differentiation of STP technologies and connectivity

1. SPMs are not biodegradable
2. In sewage treatment SPMs are eliminated via sludge (cf. ECHA Report)
3. Efficiency of SPM elimination to sludge depends on STP technology (cf. ECHA Report)
   - primary wastewater treatment: 80.5%
   - secondary wastewater treatment: 97.5%
   - tertiary wastewater treatment: 99.2%
4. EU member states differ significantly between the degree of STP technology and connectivity

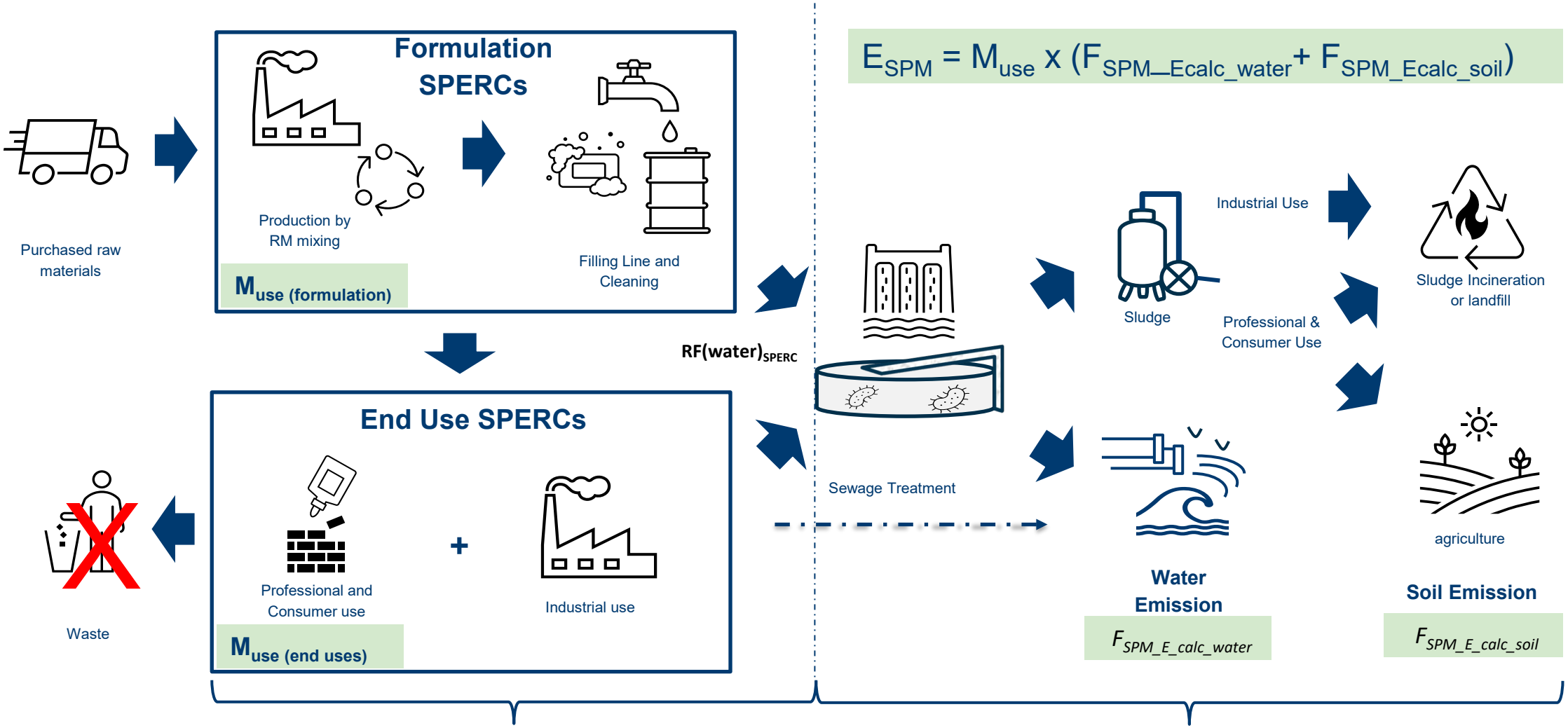


Sludge Disposal in the EU

1. SPMs may enter to agricultural soil via sludge
2. No environmental emissions where sludge is disposed in landfills or is incinerated
3. EU countries differs significantly regarding STP sludge disposal



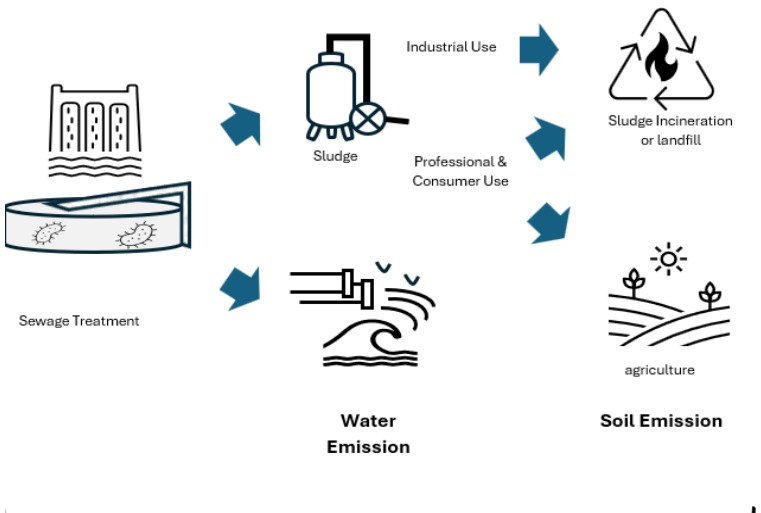
Generic Principles of "E_calc_SPM" (FEICA-Example)



“E_calc_SPM” – Input & Model

Product Technology

Sector SPERCs



EUROSTAT – EU Data

→ Waste Water Treatment and Sludge disposal

1. User input:

   - The product technology triggers selection of relevant SPERCs
   - Amounts per use / formulation (M_{use}), countries/region

2. Model:

   - SPERC define release factors
   - SPM reduction efficiency per WWTP technology is taken from ECHA (2019)

   - Sewage treatment situation
     - % no treatment
     - % primary treatment
     - % secondary treatment
     - % higher treatment

   - Fate of sludge
     - % sludge incineration
     - % to landfill
     - % compost and agricultural use

Eurostat data for 2022:
- evaluated for 27 EU countries
- generic for EU per pop-equivalent

SPM Emission Factors per Use

FEICA Examples based on EU average data:

$$F_{SPM\_Ecalc\_env(SPERC)} = F_{SPM\_Ecalc\_water} + F_{SPM\_Ecalc\_soil}$$

Life cycle step	Use description (acc. to SPERCs)	SPM to water $F_{SPM\_Ecalc\_water}$	SPM to soil $F_{SPM\_Ecalc\_soil}$	SPM to environm. $F_{SPM\_Ecalc\_env\ (SPERC)}$
Formulation	1. Formulation of SPM in Solvent-borne and Solvent-less Adhesives / Sealants and Construction Chemical Products	0.0026%	0.0093%	**0.0119%**
	2. Formulation of SPM in Water-borne Adhesives / Sealants and Construction Chemical Products	0.0668%	0.2339%	**0.3007%**
Industrial Use	3. Formulation of SPM in Cementitious Construction Chemical Products and Tile Adhesives	0.000%	0.000%	**no emission**
	4. Industrial use of SPM Solvent-borne and Solvent-less Adhesives / Sealants	0.000%	0.000%	**no emission**
	5. Industrial use of SPM of in Water-borne Adhesives / Sealants	0.0397%	0.1389%	**0.1786%**
Professional / Consumer Use	6. Widespread use of SPM in adhesives / sealants - indoor	0.1984%	0.6947%	**0.8931%**
	7. Widespread use of SPM in Adhesives/Sealants and Construction Chemical Products - outdoor	0.1984%	0.6947%	**0.8931%**
	8. Widespread use of SPM in construction chemical products - indoor	0.1984%	0.6947%	**0.8931%**

$$E_{SPM} = M_{use} \times F_{SPM\_Ecalc\_env(SPERC)} \Rightarrow$$ Calculation tool (FEICA)

Status of the E_calc_SPM Proposal

- This draft proposal has been developed by BASF and Henkel.
- IVK (German Adhesive Association) and Deutsche Bauchemie have approved the proposal and forwarded it to FEICA in Aug ‘24.
- FEICA approved concept in October ’24 and initiated a TF to finalize approach. DUCC engagement started in Dec ’24 to adopt the proposed method as consensus method among the DUCC member associations
- Current: ECETOC TF - Objective: Outline of a pragmatic approach to estimate emissions of primary microplastic that qualify as SPM for a peer-reviewed publication (scientific acceptance)

Polymeric Microparticles from Products (E-calc_SPM)

Background

In 2023 the Commission put a restriction on “Synthetic Polymer Microparticles” (SPM) into force, l
down in entry 78 of Annex XVII of the REACH Regulation, as introduced by Commission Regulation (E
2023/2055 (COM 2023). The restriction entails a ban on the placing on the market of all polymers th
meet the SPM definition unless their specific use is derogated from the ban. Derogations from the b
on the placing on the market for certain cases exist where using the SPM or the product containi
them does not release SPM, or those releases can be prevented/minimised; or to avoid overregulati
of certain uses and sectors. For those derogated uses the restriction lays down requirements
suppliers to provide instructions on how to handle and dispose the (SPM in the) product to prevent
minimise the SPM loss to the environment (the Instructions for Use and Disposal –“IFUD”) and
reporting to ECHA on estimated environmental release of SPM , to monitor the effectiveness of IFI
and the restriction in general.

Objective

This paper addresses a generic approach for suppliers of SPM and SPM-containing mixtures, the
calc_SPM”, on how to estimate environmental release of SPM. The approach is based on emissi
estimations of specific Environmental Release Categories (SPERCs) as developed by seve
downstream user associations for relevant steps of chemical substances during the substance l
cycle. Following the SPERCs approach, the E-calc SPM has a large applicability domain and is also bas
on conservative worst-case assumptions (Tier 1.5) which may lead to an overestimation of the relea
of SPM into the environment. Further emission pathways to water and soil are assessed by statisti
evaluation of sewage treatment connectivity and sludge disposal practices throughout Euro
However, it is acknowledged that due to the generic approach followed, there may be situations whe
an individual assessment may be more appropriate.

Scope

The definition of SPM refers to polymers with certain properties (solid, insoluble, non-biodegradal
and synthetic). As additional conditions, the corresponding polymer(s) must be part of a particle w
certain dimensions. Only those solid, insoluble, non-biodegradable and synthetic polymers that ma
up at least 1% by weight of particles with the corresponding dimensions or form a continuous surfa
coating on these particles are to be regarded as SPM and only this polymer content is to be taken in

Thank you