Quaternary Treatment

Challenges and Opportunities

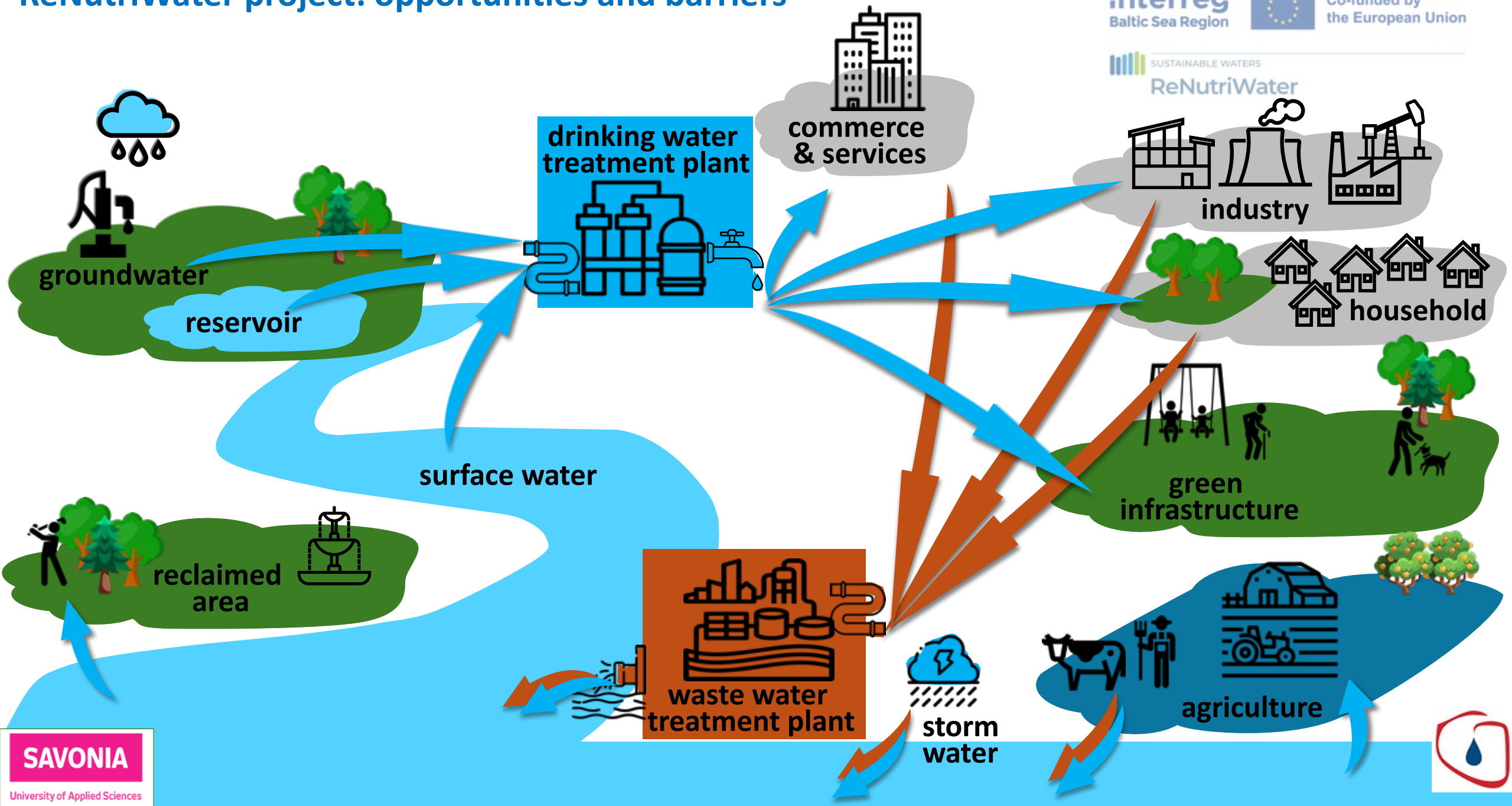
Klara Ramm

Chamber of Commerce

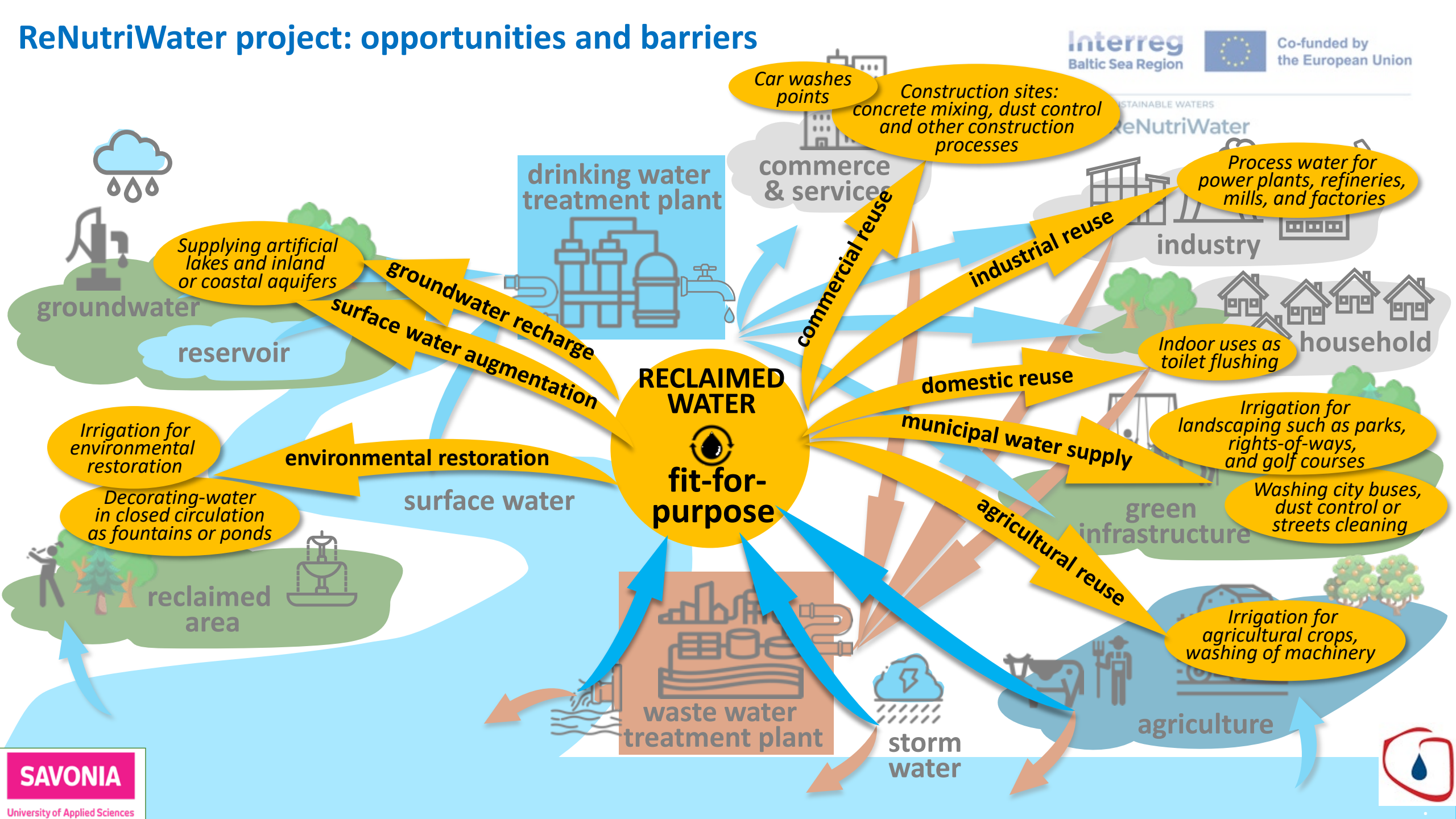
” Polish Waterworks”



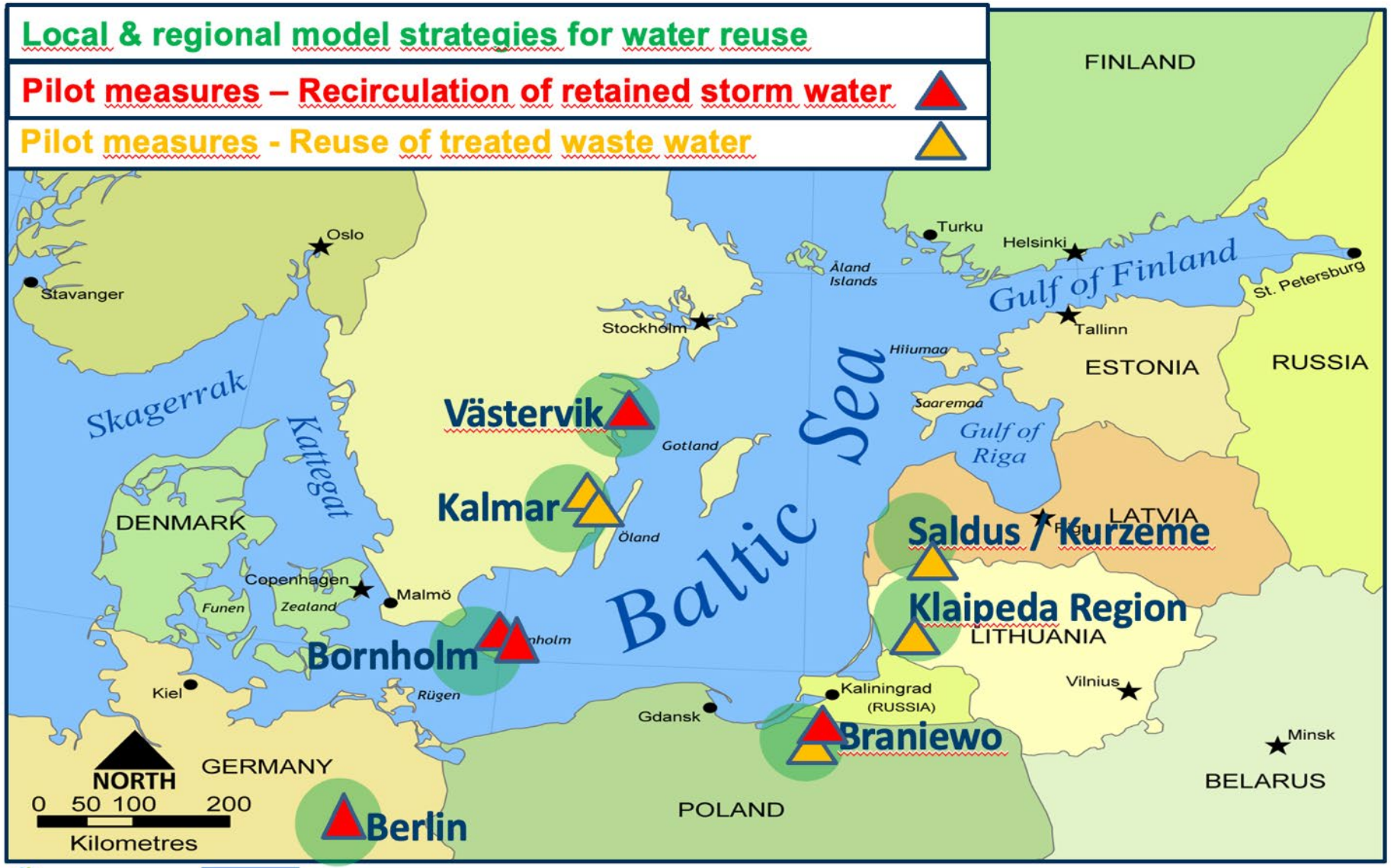
ReNutriWater project: opportunities and barriers



ReNutriWater project: opportunities and barriers

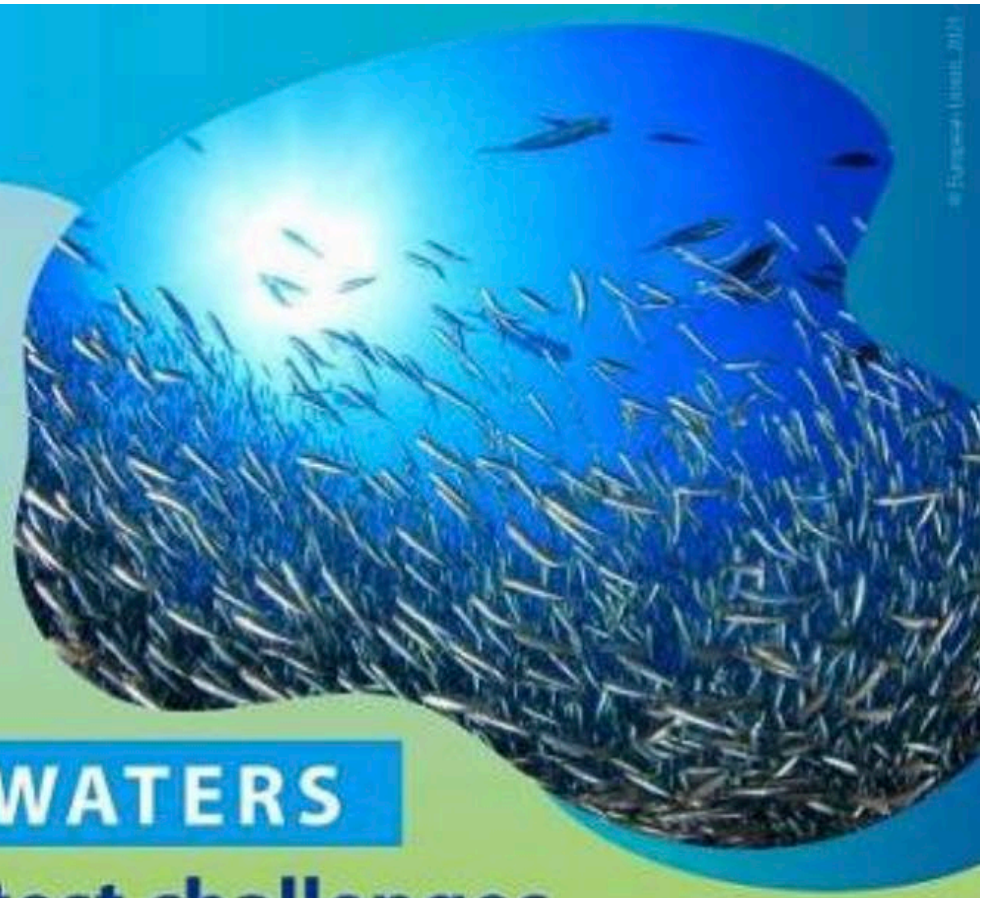


WaterMan: Model Regions & Pilot Measures



EUROPEAN UNION

EU MISSIONS



RESTORE OUR OCEAN & WATERS

Concrete solutions for our greatest challenges

#EUmissions #HorizonEU #MissionOcean

Directive 271 from 1991

collect-treat-discharge

Nutrients



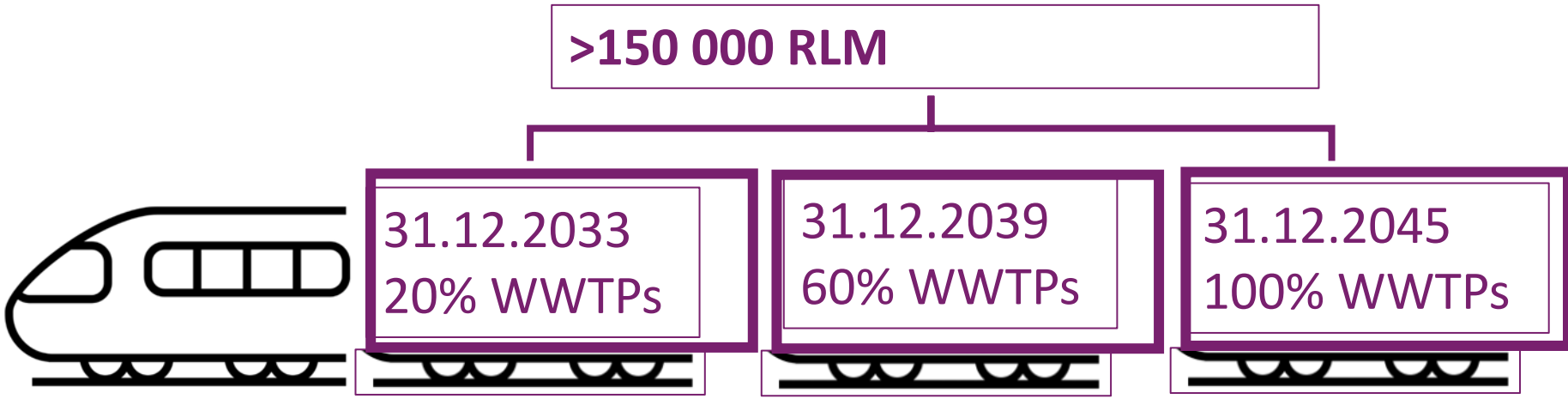
CE

One health
Nutrients
Energy
Water

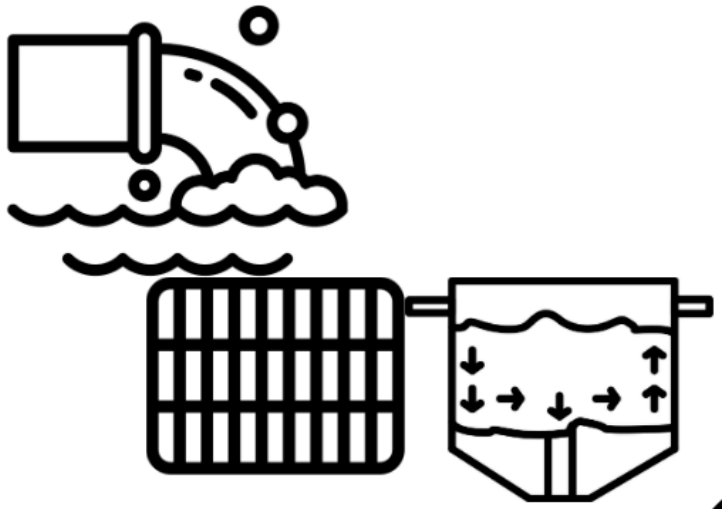
Art. 8 Quaternary treatment

Micropollutants





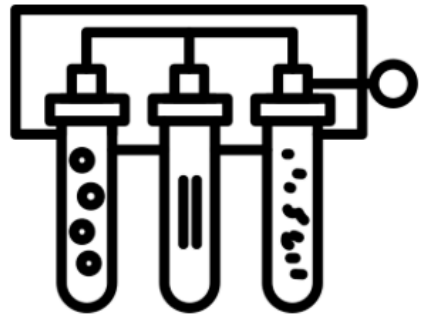
WWTP













Primary Treatment

Secondary and tertiary Treatment

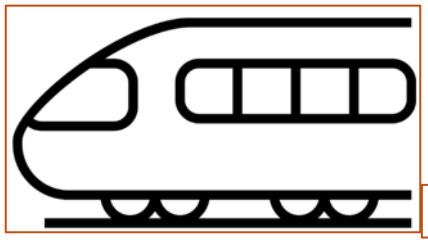
Quaternary Treatment

Art. 8 Quaternary treatment

By 30.12.2030 – list of areas where the concentration or accumulation of micropollutants from WWTPs poses a threat to the environment or human health

- Drinking water
- Bathing water
- Aquaculture
- WFD
- Groundwaters
- Coastal waters
- Transitional waters
- Sea water
- Natura 2000

>10 000 RLM



- 31.12.2033 10% WWTPs
- 31.12.2036 30% WWTPs
- 31.12.2039 60% WWTPs
- 31.12.2045 100% WWTPs

IA in Art 8.3 (quaternary treatment – risk assessment)

The Commission is empowered to adopt **implementing acts** establishing the **format of the risk assessment** referred to in paragraph 2, third subparagraph, and the **method to be used for that risk assessment**.

Quaternary treatment - Extended Producer Responsibility

Annex III

LIST OF PRODUCTS COVERED BY EXTENDED PRODUCER RESPONSIBILITY

- Medicinal products for human use falling within the scope of Directive 2001/83/EC of the European Parliament and of the Council.
- Cosmetic products falling within the scope of Regulation (EC) No 1223/2009 of the European Parliament and of the Council



Legislation for Assessments

Medicinal products

- Directive 2001/83/E: “medicinal products for human use”. ERA completed since 2006
- April 2023, the Commission put forward a 'pharmaceutical package' to revise the EU's pharmaceutical legislation (making medicines more available, accessible and affordable, while supporting the competitiveness and attractiveness of the EU pharmaceutical industry, alongside higher environmental standards).
- April 2024, the European Parliament adopted its position.
- Council ?



Legislation for Assessments

Cosmetic products

- Regulation (EC) No 1223/2009: on “cosmetic products”

- Refers to Classification, Labelling and Packaging (CLP) 1272/2008 and the Registration, Evaluation and Authorisation of Chemicals (REACH) 1907/2006 Regulations for the classification of hazardousness (environmental fate, health hazard, environmental hazard, PBT)



→REACH controls the manufacture, import, supply and safe use of chemical substances in the EU

→CLP requires companies to classify, label and package their hazardous chemicals correctly before placing them on the market

That is…

GOAL of Quaternary Treatment

Reducing toxic load in water bodies

Consequences

Upgrade assets



- increased operator competence
- increased costs
- increased energy demand

EPR



To ensure affordability

EPR - exemptions

Article 9.2

2. Member States shall **exempt producers** from their extended producer responsibility under paragraph 1 where the producers can demonstrate any of the following:

(a) the quantity of the substances contained in the products they place on the Union market is **below 1 tonne per year**;

(b) the substances contained in the products they place on the market are **rapidly biodegradable** in wastewater or **do not generate micropollutants** in wastewater at the end of their life.

IA in Art 9.5 (EPR)

- “The Commission is empowered to adopt **implementing acts** to establish detailed criteria on the uniform application of the condition laid down in paragraph 2, point (b), to specific categories of product and their **biodegradability or hazardousness**. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 28(2) **no later than 31 December 2027**.”

Biodegradability test in the EMA guidance

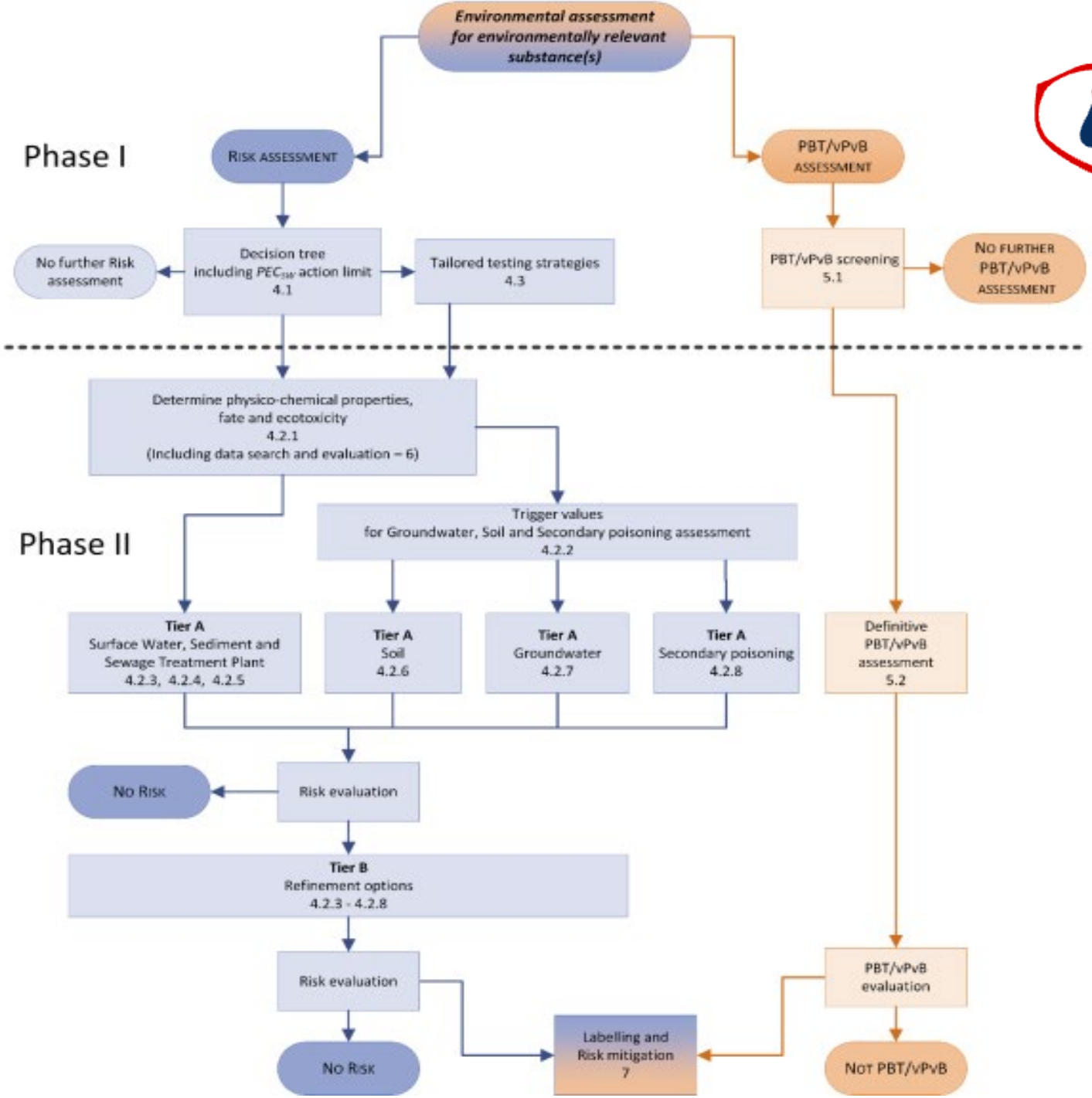
- The ready biodegradability of a substance should be determined according to OECD Test Guidance 301 (or 310):
  - ❖6 methods A – F: depends on the solubility, volatility, absorption of the molecule
  - ❖Inoculum: activated sludge, sewage effluent, surface waters, soil, mixture
  - ❖Monitor: DOC, O_2 or CO_2
  - ❖28 days test

→The pass levels for ready biodegradability are 70% removal of DOC and 60% of ThOD or ThCO2 production for respirometric methods.



ERA Decision tree

2024 EMA guidance



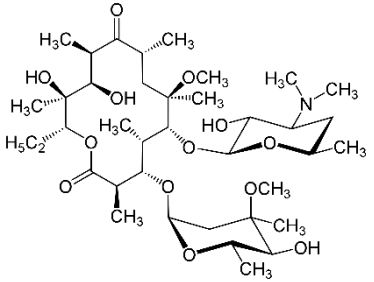
Chemical Safety Assessment – REACH

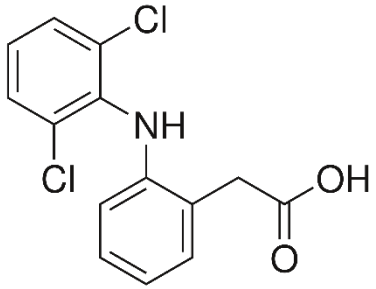
Chemical Safety Assessment (Annex I, section 7 REACH):

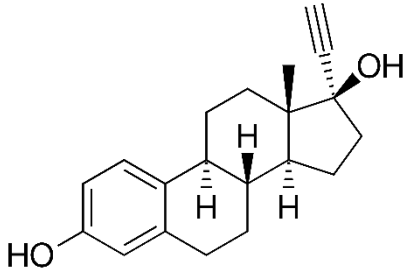
1. Environmental fate properties
2. Human health hazard assessment (Toxicity, irritation, corrosivity, sensitisation, mutagenicity, carcinogenicity, ...)
3. Human health hazard assessment of Physicochemical properties (Explosivity, Flammability, Oxidising potential)
4. Environmental hazard assessment (different compartments, PNEC using LC50 or NOEC),
5. PBT (Persistent Bioaccumulative Toxic) and vPvB (very Persistent and very Bioaccumulative substances) assessment, (Annex XIII of the REACH).



Hazard assessment shows that none of the three investigated substances are rapidly biodegradable







	Claritromycin	Diclofenac	Etinylestradiol
Toxicity	**Very high acute toxicity** NOEC: 0,002 mg/l	**Moderate chronic toxicity** NOEC: 0,32 mg/l : OECD 210	**Very high chronic toxicity** NOEC: 1 ng/l : OECD EPA FIFRA Subdev. E, 72-5. (Reference VI)
Bioaccumulation	**Low potential** log P: 3,16	**Low potential** BCFss 3-5: OECD305 log P: 4,51	**High potential** BCF: 371-634: OECD 305 log P: 4,2
Biodegradability	**Potentially persistent** 0% degradation: OECD 301D	**Slow degradation** ~56% degradation: OECD 301 No OECD 308 available	**Slow degradation** 46-75 days (OECD 308)
Risk ratio (PEC/PNEC ratio)	**Low (2011)** 0,75 (>0.1–≤1)	**Insignificant (2022)** 0,0096 (=< 0,1)	**High (2019)** 12,3 (>10)

Source: Diklofenak: Diclofenac - Janusinfo.se / Diklofenak Sandoz - FASS Allmänhet / Ethinylestradiol: Ethinylestradiol - Janusinfo.se / Neovletta® 28 - FASS Vårdpersonal /Clarithromycin: Clarithromycin - Janusinfo.se

If any of the three exoneration criteria is met, the substance will be exonerated from EPR

	Claritromycin	Diclofenac	Etinylestradiol
Total API volume placed on the Swedish market	231 kg	2564 kg	2 kg
Extrapolation to the total EU market	10072 kg	111902 kg	90 kg
Rapidly biodegradable according to EU 1272/2008 CLP	No	No	No
Generation of micropollutants	Yes	Yes	Yes
Exoneration likely?	No	No	Yes

Stakeholder engagement

Early identification of relevant stakeholders (Art. 9.4(a))

Clear definition of roles & responsibilities

Decisions approved by competent authorities and based on expertise

Roundtables to discuss implementation

EurEau:

Transparency

EurEau

- Allows to build trust & confidence
- Embraced by all stakeholders
- Clear & reliable data and information

EurEau:

Harmonisation

1. Definition of costs to be covered by EPR

- **Clear & harmonised approach** to the definition of costs covered by EPR
- Costs should be **defined by UWWTP operators** and approved by their competent authorities (Art. 9.1, Recital 23)
- **Prioritisation** of the implementation of treatment and investment needs: based on **agglomeration/UWWTP size** and on **impact** on the environment & human health (Art. 8.2 & 23.1(b),)
- EPR to cover at least 80% costs 4T: other 20% left to MS discretion - guarantee the **affordability of wastewater services**

EurEau:

Harmonisation

2. Contributions of producers

- Harmonised approach to the calculation - **one model** (formula) for all MS
- Contributions are provided to PROs in a **timely** manner and **nimbly** allocated to UWWTP operators (Art. 10.1(b))

3. Exemptions from EPR

- **Definition** of exemption rules should be carried in a **harmonised** way
- Ensure **affordability of water services**
- Prevent an imbalanced potential impact on the accessibility, availability and affordability of products within the EU
- **UWWTP operators and producers should be involved** in the definition – **approval by competent authorities**

EurEau:

Harmonisation

4. PRO

- Setting **PROs at the national level** - harmonised implementation of EPR and avoid distortions among countries
- Based on **transparent practices** and promote **stakeholder engagement**
- All relevant stakeholders should have a role in PROs
- PROs should be **controlled by competent authorities** to avoid conflict of interest

5. Reporting obligations

- **Robust information system on EPR**
- Exchange of information and experiences among member states

EurEau:

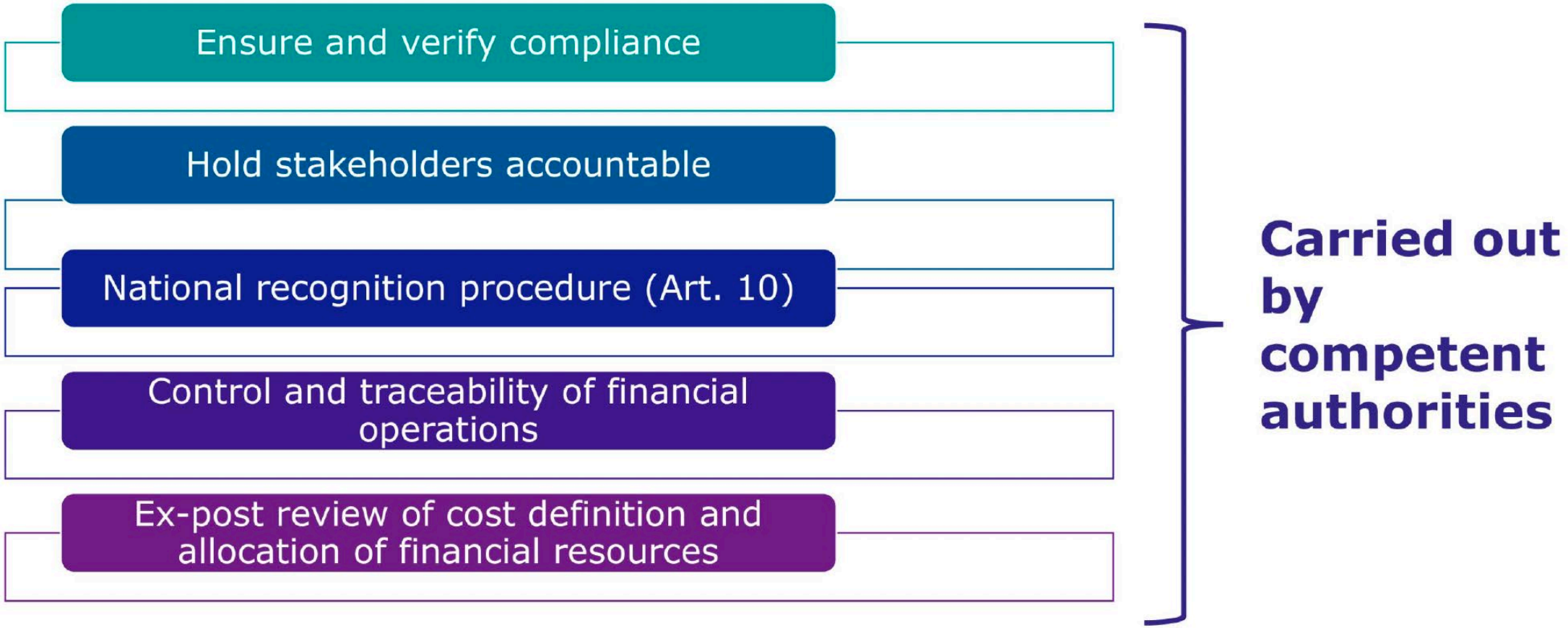
Harmonisation

6. Extension of sectors contributing to EPR

- Extension of the scope of producers contributing to the EPR should be carried out in a **harmonised way among MS**
- **Avoid distortions** in the implementation of EPR and in the internal market

EurEau:

Monitoring, control and evaluation



UWWTD – Thematic subgroups

Subgroup I: IS & SWO

- Art. 4.4(a): IA minimum requirements design, operation & maintenance IS
- Art. 4.4(b): IA minimum requirements for regular inspections IS
- **Art. 5.6(a)**: IA methodologies for identification of measures in IUWWMPs
- **Art. 5.6(b)**: IA methodologies to determine alternative indicators for pollution reduction SWO
- **Art. 5.6(c)**: IA format IUWWMPs

Subgroup II: GHG emissions, energy neutrality & sludge

- **Art. 11.5**: IA methods to assess whether the energy neutrality objectives have been met
- Art. 21.4: IA methodologies for measuring, estimating and modelling direct and indirect GHG emissions from UWWTPs
- **Art. 20.2**: DA combined minimum reuse and recycling rate for P from sludge & UWW

Subgroup III: Measurement Methodologies

- **Art. 8.3**: IA format & method of the risk assessment for 4T
- Art. 8.6: IA monitoring & sampling methods to determine the presence & quantities in UWW of the indicators of 4T
- Art. 17.3: IA minimum sampling frequency & methodology to measure AMR in UWW
- Art. 21.5: IA methodology to measure 'PFAS Total' & 'Sum of PFAS' in UWW
- Art. 21.4: IA methodologies for measuring, estimating and modelling microplastics in UWW & sludge

Conclusion

- Medicinal Products and Cosmetic Products are on 2 different legislation for risk assessments, but lots of overlaps in between the 2
- COM: The IA on the exemptions ot EPR (Art. 9.5) - a consultant





EurEau: determine biodegradability and hazardousness of micropollutants to be used for the exemptions to EPR,

Costs should be covered by EPR: how the remaining 20% of the costs of quaternary treatment will be covered (ensure affordability of water services).