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Overview on BONUS CLEANWATER

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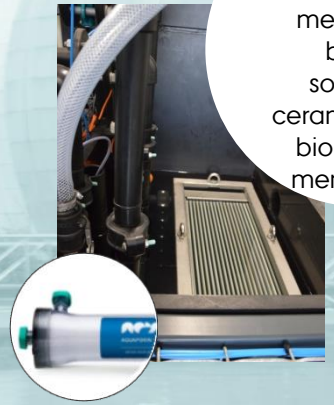
BONUS CLEAN WATER

WP1
Assessment of relevant pollution loads from stormwater and wastewater discharges into the Baltic

WP2
Environmental effective optimization of ozonation

WP3
Exploring and developing moving bed biofilm reactors (MBBR)

WP4
Exploring and developing membrane based solutions: ceramic MBR & biomimetic membranes



WP5
Biofilters for decentralised treatment of wastewater and stormwater

WP6
Comparative assessment of cost effectiveness and of environmental performance

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AARHUS UNIVERSITY

bfg Bundesanstalt für Gewässerkunde

sweden water research

LiqTech

Primozone

VEOLIA

LUND UNIVERSITY

AQUAPORIN

BIOFOS

Motivation of BONUS CLEANWATER

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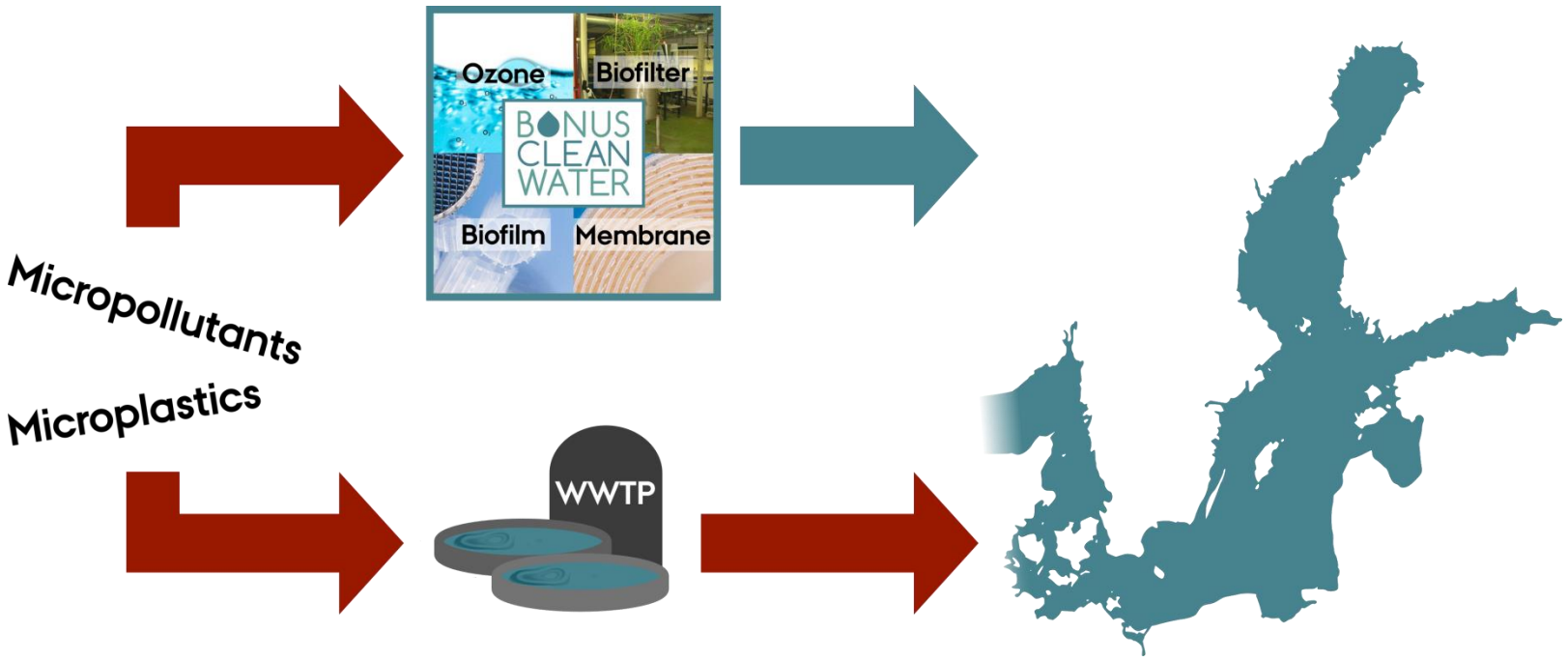

→Decrease emissions into the Baltic Sea

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BONUS CLEANWATER WP 1:

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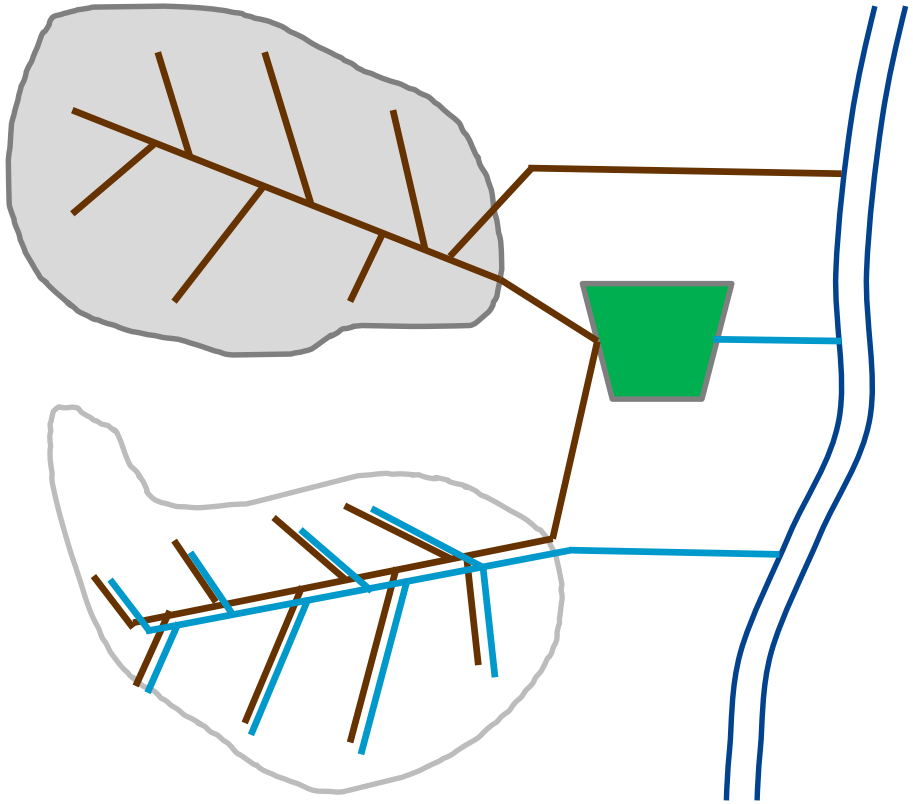
Assessment of pollution loads from stormwater and wastewater discharges into the Baltic



How much?

Which Pathway?

BONUS CLEANWATER WP 2:

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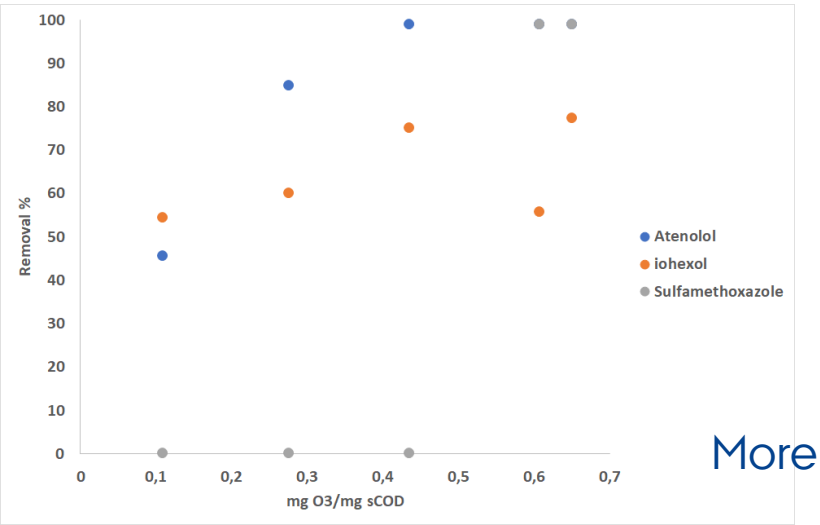
Energy efficient ozonation

TASKS

- Optimization of the ozonation process
- Studies – in pilot and in laboratory – of removal rates considering variations in pH, TOC and iron
- Optimization of ozone dosing and ozone transfer into the water
- Determination of unknown transformation products (TP's)
- Elucidation of formation and removal of formed TP's



Strong Synergies with CW Pharma

More in presentation of Michael and Suman

BONUS CLEANWATER WP 2:

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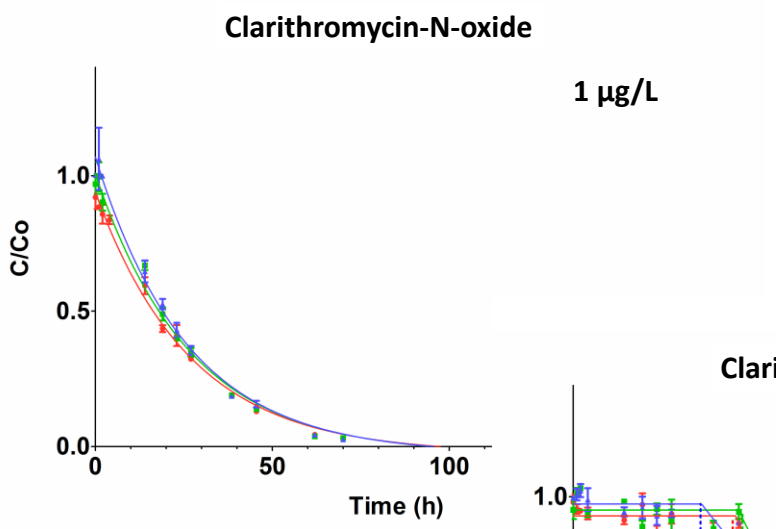
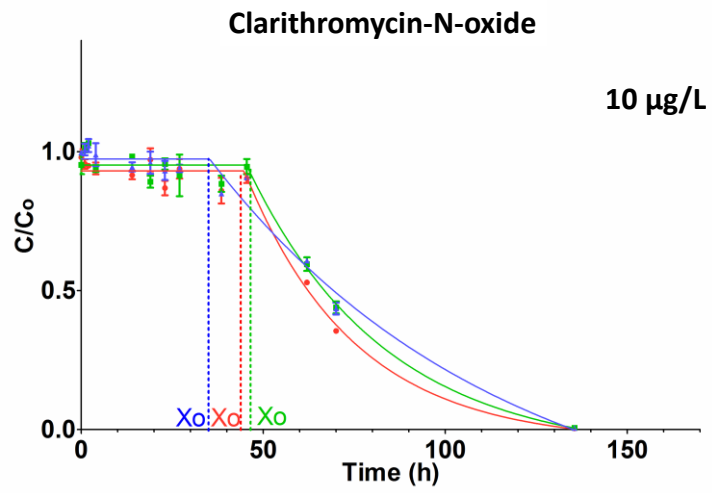
Energy efficient ozonation

Can the ozonation products be removed in MBBRs ?





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El Taliawy et al., 2018

BONUS CLEANWATER WP 3:

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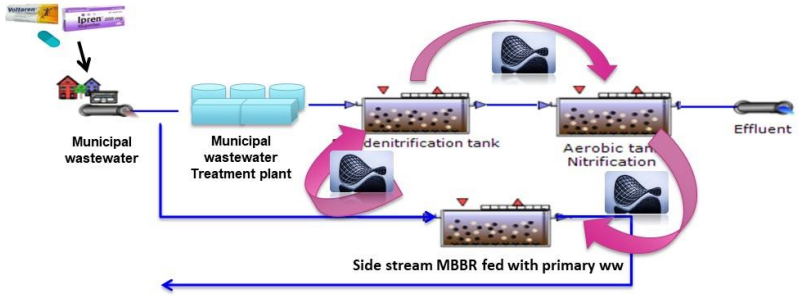
MBBR

- Adaption of biomass to remove recalcitrant compounds by control of feed/food supply
- Identification and characterisation of metabolites from selected micropollutants
- Study of the potential for different MBBR set-ups and the combination of ozonation and MBBR
- Determination of removal rates for compounds resistant to ozonation
- Determination of removal rates for ozonation products



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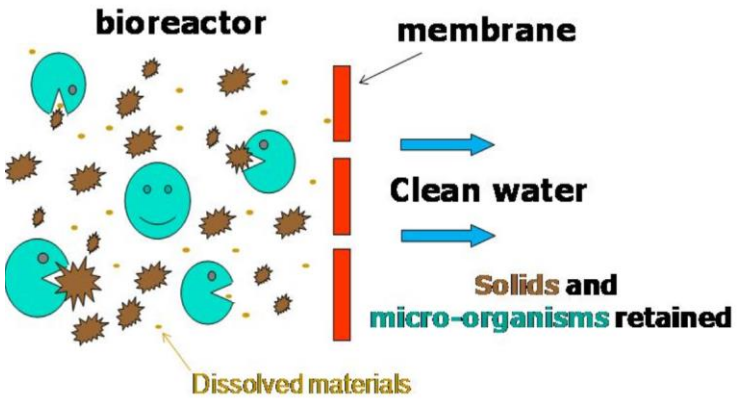
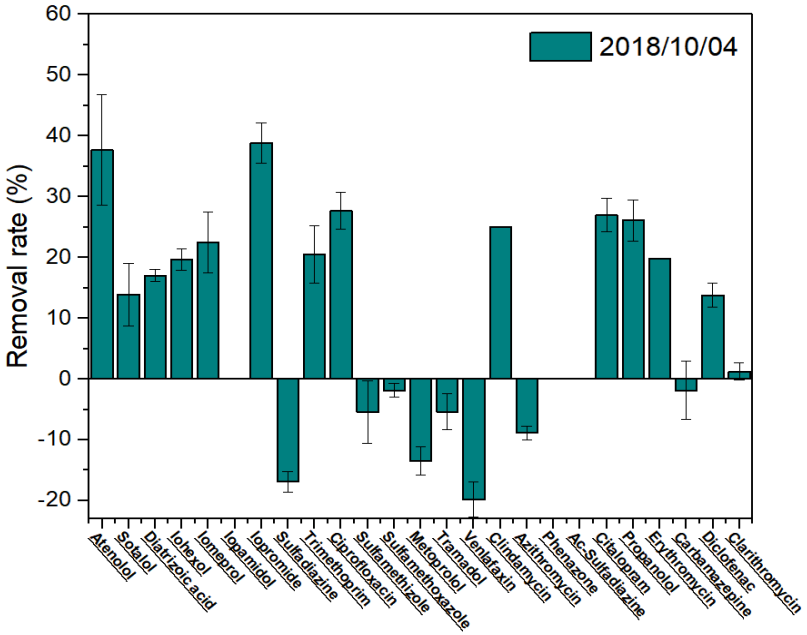
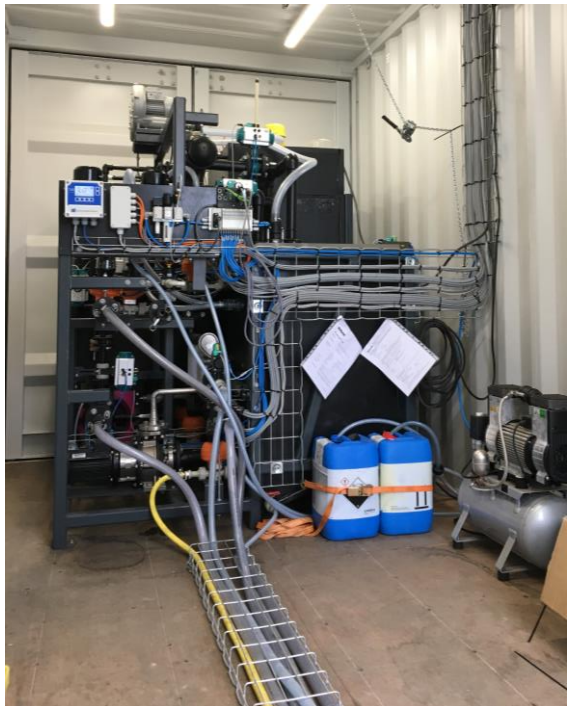
MBR with ceramic membrane







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BONUS CLEANWATER WP 4b:

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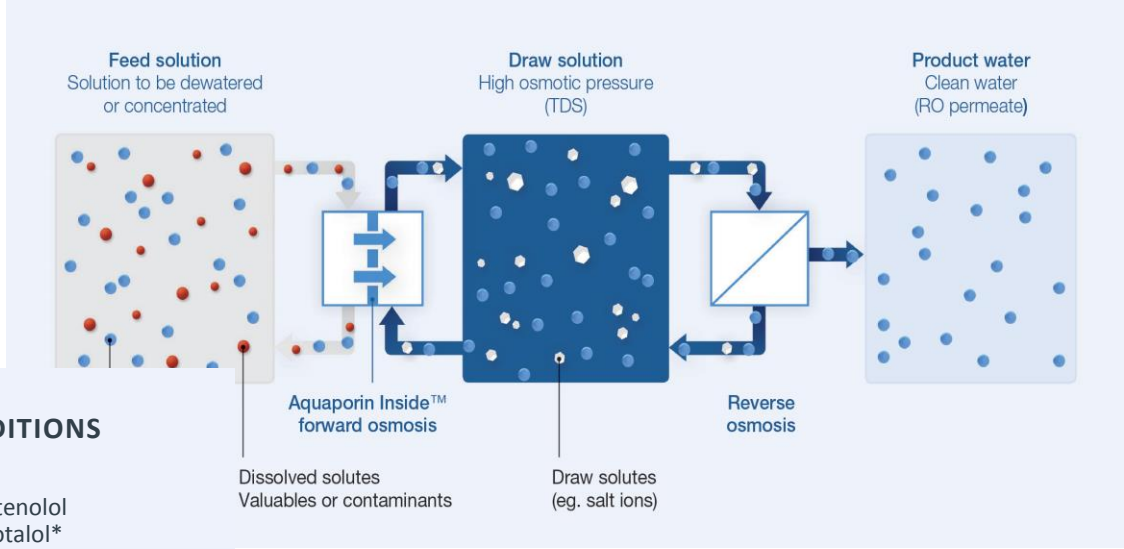
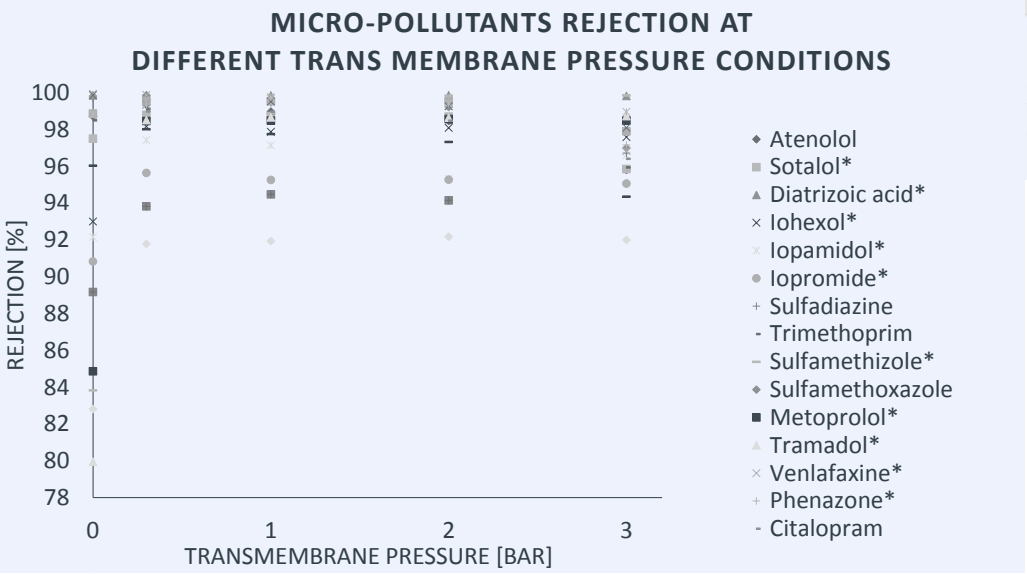
BMFO (biomimetic forward osmosis)





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BONUS CLEANWATER WP 5:

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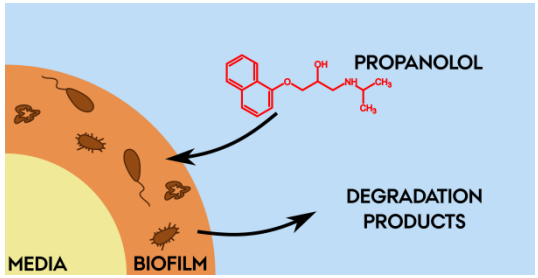
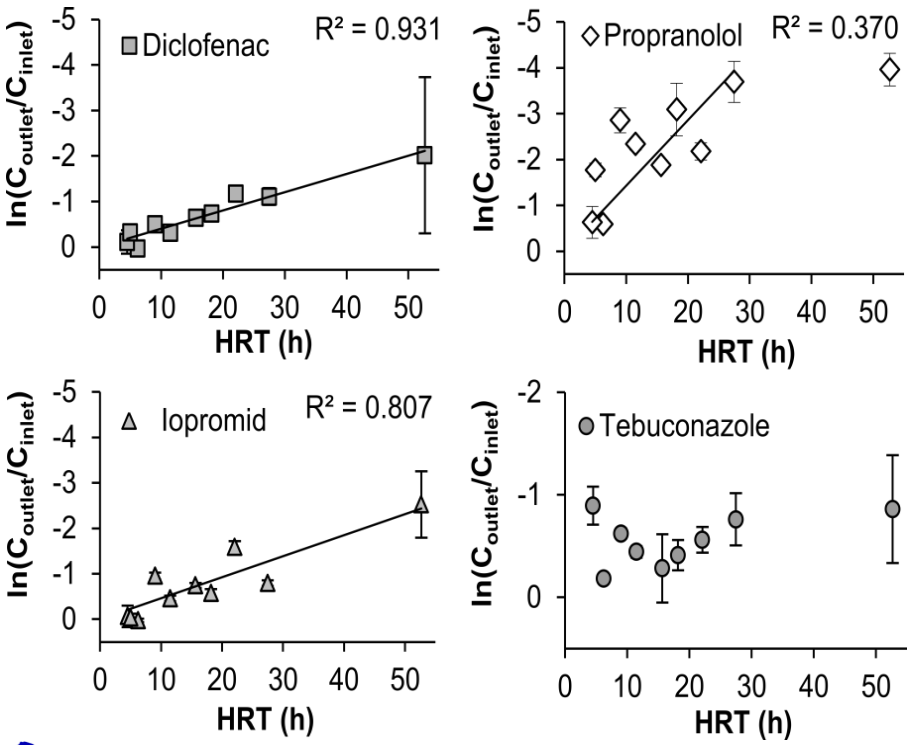
Biofilters





Option for decentralised treatment (CSO, stormwater, very small WWTPs)
For medium sized WWTP too space demaning

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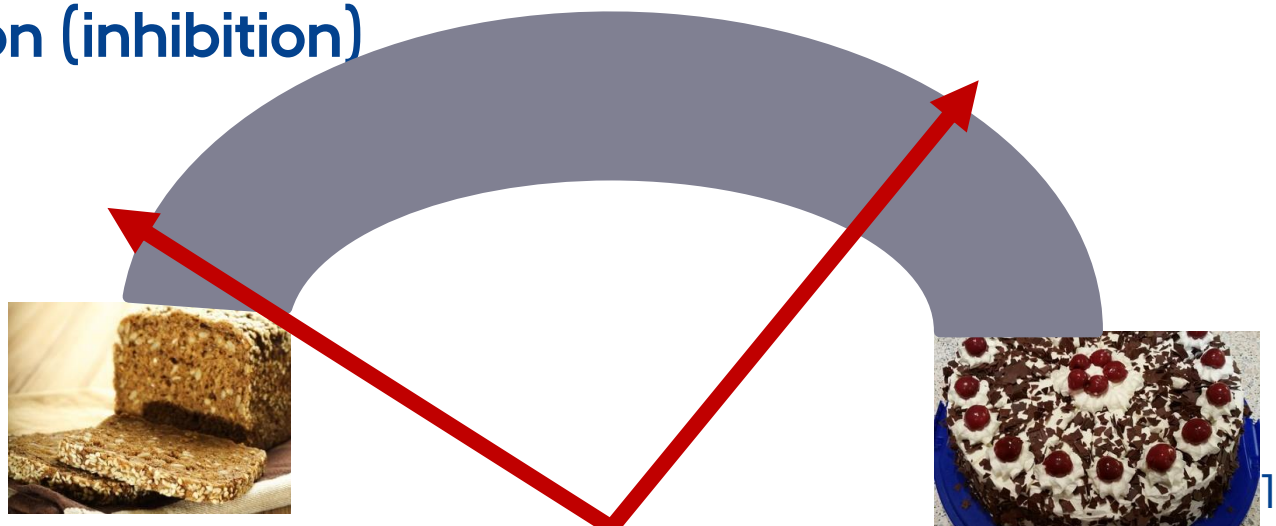
General considerations on biodegradation of micropollutants

Co-degradation: the organisms uses something else as primary C source

Enhancement of the easy degradable could result in better degradation (Strict co-degradation)

Enhancement of the easy degradable could result in worse degradation (inhibition)



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cost effectiveness/environmental performance

- There is good cost and cost effectiveness data for ozonation in D/Ch
  - Adaptation is needed for Scandinavia
- There are good cost data for Nitrification/denitrification MBBRs but
  - Adaption is needed for micropollutants
- Cost effectiveness & LCA for MBR and BMFO need to be established

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BONUS CLEANWATER WP 7:

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innovative sensing

- Improve micropollutants sensing by passive sampling
- Improve microplastic sensing by improved sample preparation and IR microscopy

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BONUS CLEANWATER: GOALS

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- Develop a clear profile for the respective technologies
  - Removal
  - Transformation products
  - Energy usage
  - Total costs for decentralized and centralized treatment

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