







TVTO



FRAME

A novel framework to assess and manage contaminants of emerging concern in indirect potable reuse



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Rationale

- Overexploitation of water resources calls for increased application of indirect potable water reuse (IPR)
- Management strategies for IPR in the European context are currently lacking

Aim of FRAME project:

 Develop new strategies to manage CECs and pathogens in IPR for drinking water augmentation

FRAME project overview

Analytical methods

- Biological: Pathogens
- Effect-based: in vivo, in vitro tests
- Mitigation strategies
 - Multi-barrier approach
- Modelling, prediction and decision support tools
- Integrated evaluation strategy
 - CECs, effect-based evaluation and pathogens





Transformation products



• TPs are not well understood in terms of toxicological effects^[1]

• For many CECs, TPs are unknown

[1] Brezina et al. Environ. Pol. 2017





TPs of Emtricitabine



Funke, et al. Water Res. 2016



Transformation of diclofenac



Jewell et al. Water Res. 2016





Monitoring studies • El Port de la Selva, Spain – Indirect Potable Reuse groundwater augmentation, prevent sea-water intrusion Infiltration basins WWTP Town,WWTP Secondary effluent \rightarrow UV \rightarrow SAT Groundwater flow Sample well 2 (20 m) Sample well I (3 m)

Basin



Monitoring studies

CEC removal measurements

Analysis of over 150 CECs incl. TPs

More details: Presentation by **Nina Hermes** Tomorrow at 10:15











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Water

FRAME







Include the **known TPs** of CECs in health and performance evaluation?



Inclusion of TPs?

- Health-based targets: health-relevant TPs
 - Treat TPs as separate CECs
 - Example: Emtricitabine TP (tox. effects still unknown)

• Performance-based targets:

Assess comprehensiveness of transformation

- Report formation separately^[1]
- Example: Diclofenac

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[1] Muntau et al. Sci. Tot. Environ. 2017





Novelty, impact, future research

• Novelty:

TPs are mostly unknown and not usually included in treatment process evaluation

• Impact:

Including TPs into evaluation gives a more detailed picture of processes and fate of CECs

• Future research direction:

Ozonation products, methods for polar TPs

Acknowledgement

- Representatives at the field sites
- Website: www.FRAME-PROJECT.EU



GEFÖRDERT VOM

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