DERIVING MEASURES TO REDUCE MICROPOLLUTANT EMISSIONS INTO THE AQUATIC ENVIRONMENT - POTENTIAL OF SFA -

Dr.-Ing. Felix Tettenborn,
Dr.-Ing. Thomas Hillenbrand
Fraunhofer ISI

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Partners

WWG · RUFIS · KOMS · VSA · FiW

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Project

Background

- Requirements on priority substances (Directives 2013/39/EC, 2008/105/EC and 2000/60/EC, Watch-List (EU) 2015/495)
- New insights on the environmental relevance of micro-pollutants
- Strategies of German States (NRW, BaWü) and Switzerland

Key questions

- What and where are options for possible implementations of measures to reduce emissions?
- Which developments can already be foreseen?
- In which areas do new measures have to be initiated?

→ **Aim**
Proposal of suitable and cost-effective measures or combinations of measures and their boundary conditions for the reduction of the entry of micro-pollutants

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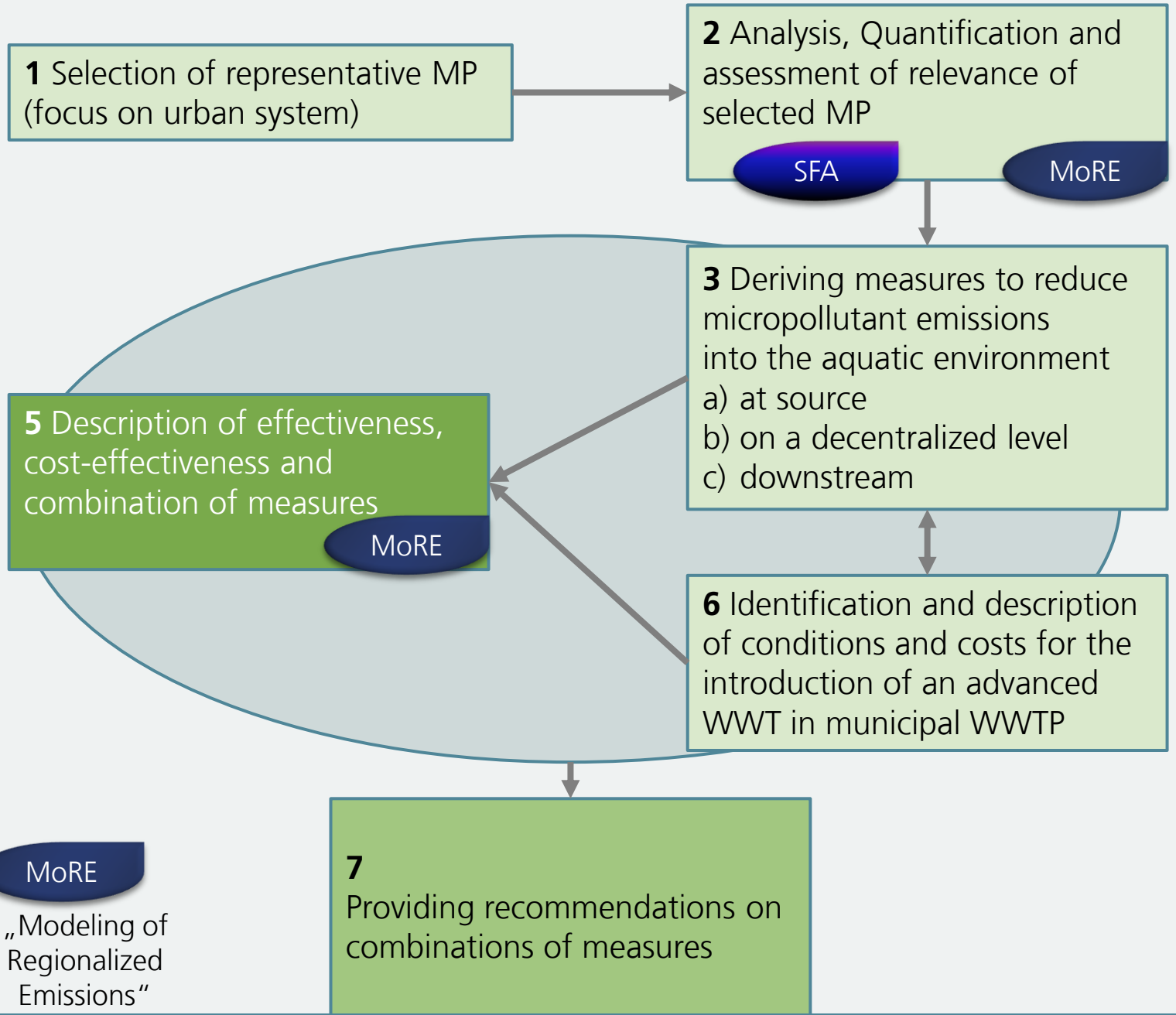
Project structure



4
Expert-Workshop

8
Final Workshop

9
Final reports

MoRE

„Modeling of Regionalized Emissions“

Selected Micropollutants
for subsequent SFA and deriving of measures

Objective

Selection of representative water-relevant micro pollutants with major pathway municipal wastewater system (pre-selection for further in-depth investigation)

Selection criteria

- Relevance of the substance with regard to discussions on national and international level (candidate list of priority substances, other substance lists)
- Relevance in terms of current production and use, and pollution situation in Germany
- Representativeness of various groups of pollutants
- Data availability: Production and use, pathways, water pollution

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Selected Micropollutants
for subsequent SFA and deriving of measures

Biocide

- Terbutryn
- Triclosan
- TBT

Pharmaceutical substances

- Diclofenac
- Ibuprofen
- Metoprolol
- Iomeprol
- Sulfamethoxazol

other organic substances or substance groups

- PAH
- Nonylphenol
- PFOS
- HBCDD

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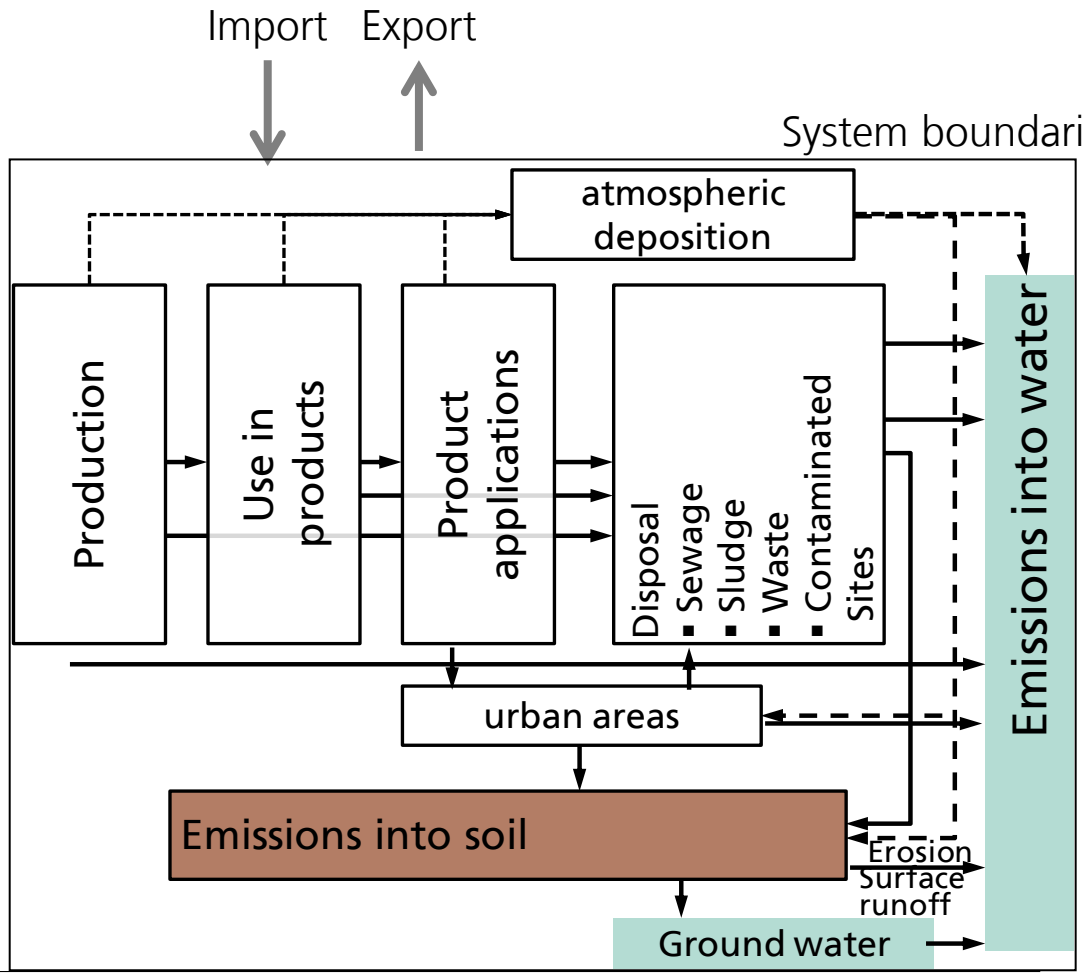
Methodology: Substance flow analysis

Aim:
displaying relevant paths and fate of selected substances

- Balancing input and output flows
- System boundary: Germany
- Emissions into surface waters: partially coupling with substance flow model "MoRE"



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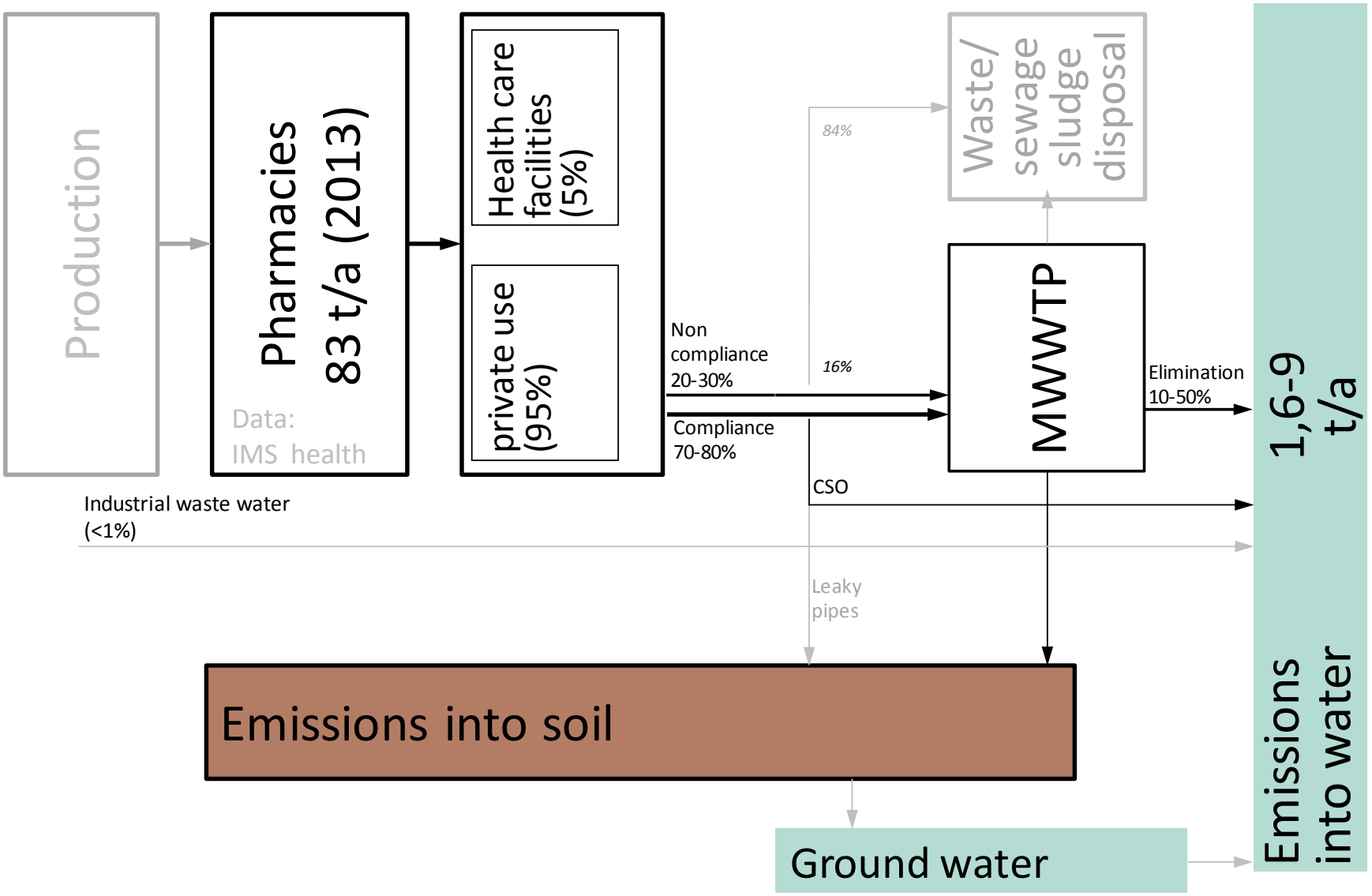
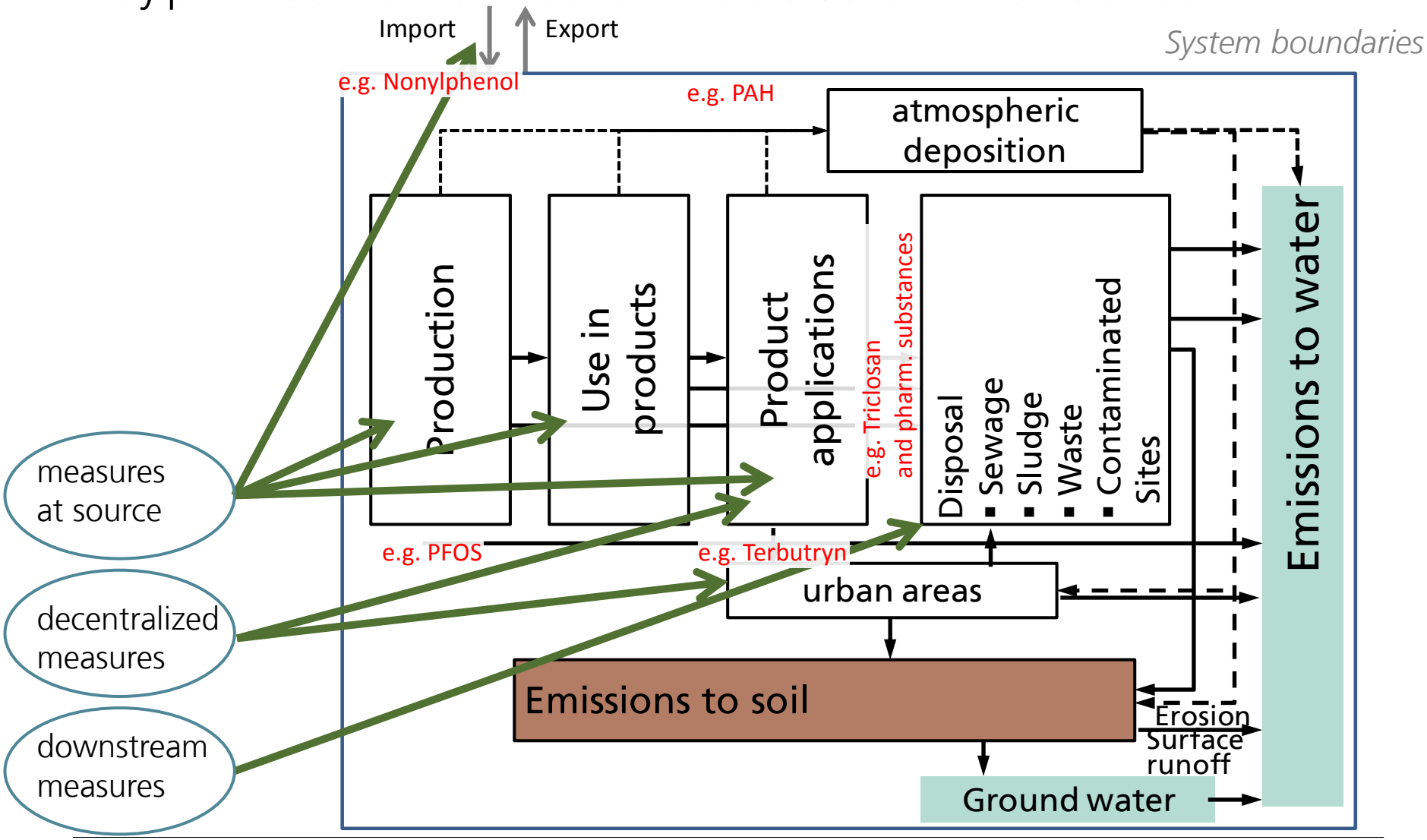
Emission oriented substance flow diagram
Example: Diclofenac



Summary of SFA
Keypoints for emission reduction measures



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Possible measures for the reduction of emissions; example: pharmaceuticals

	Measures
Measures at source	Substitution / more environmental friendly pharmaceuticals
	Changes of modalities of concession and reimbursement
	Changes in scope of application (adapted prescription, alternative, non-drug therapies)
	Information; dissemination (professionals + population)
	Environmental classification system
Decentralized measures	Decentralized collection and treatment of emission relevant medical facilities
Downstream measures	advanced wwt incl. processes for micropollutant removal
	Save and environmental friendly disposal

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Evaluation of measures and collection of characteristics in measures-based profiles

Status	*in planning / in preparation / implemented*
Effect	*elimination potential; time considerations (implementation process and measure itself)*
Costs (or cost-effectiveness)	*invest costs, operating costs, transaction costs* *(as far as relevant and available)*
Technical operating capability	*level of development; reliability;* *adaptability to individual conditions*
Secondary environmental effects	*e.g. energy demand; demand of operating resources; additional improvement of water quality (e.g. nutrient or particle removal)*

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Evaluation of measures and collection of characteristics in measures-based profiles

Example: Decent. measures targeting pharm.

Measures	Decentralised waste water collection/treatment in hospitals / clinical centres
Status	measure is available but some R&D required
Effect	depending on drug - to +
Costs (or cost-effectiveness)	low / medium urine-diverting toilets: 24-42; mobile collection tanks 11-22; decentralised WWT: 190-310 €/patient
Technical operating capability	R&D required
Secondary environmental effects	- (energy demand)
→Need for action	R&D; need for legal amendments

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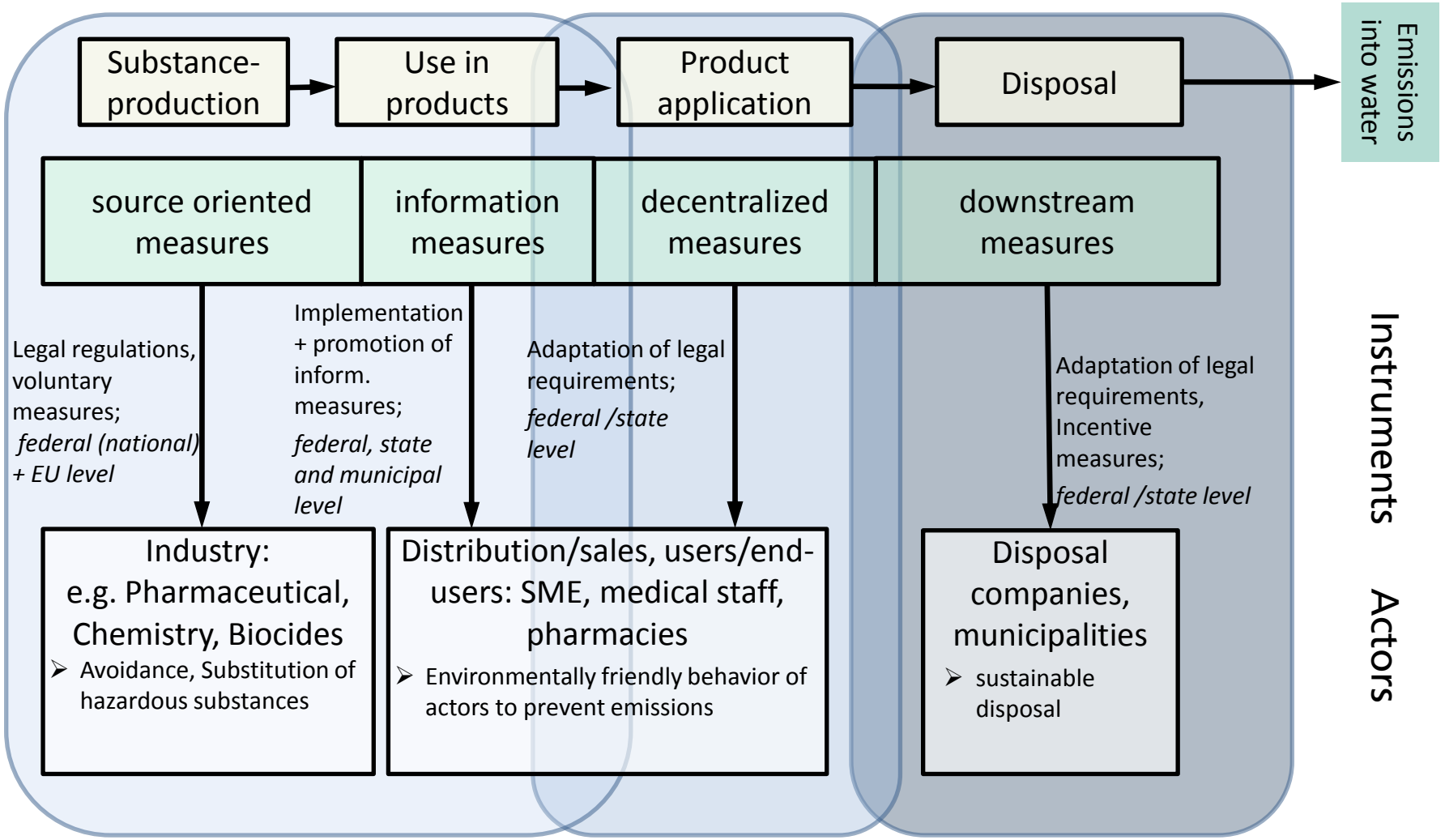
Measures for the reduction of micropollutants



Summary

- Diverse micropollutants with different emission patterns from different applications and sectors
- for all of the selected micropollutants measures for emission reduction at source and downstream are available
- none of the measures is covering all emission paths or is reducing all emissions
- implementation and effects of measures are often delayed

-> therefore combinations of measures to balance out time-effects and differences in effectiveness

- Required accompanying activities:
  - research programs and
  - monitoring of implementations

→ Need for a comprehensive overall strategy involving all relevant actors

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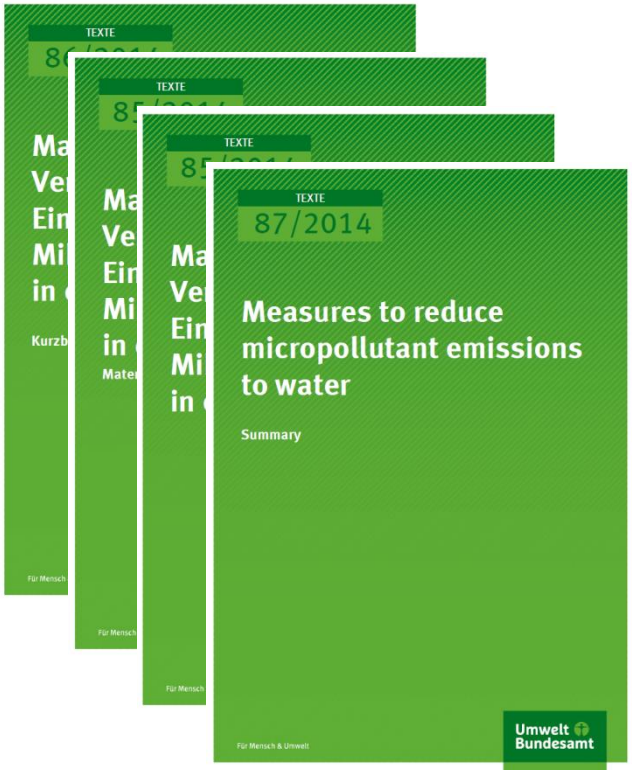
Results phase 1 (End 2014)

- Final reports: UBA-Berichte 85/2014, 86/2014, 87/2014
  http://www.umweltbundesamt.de/publikationen/massnahmen-zur-verminderung-des-eintrages-von



Project partners

Fraunhofer ISI	• SFA, Evaluation of measures	• Fraunhofer Institute for Systems and Innovation (Fraunhofer ISI)
IWG	• Substance flow modeling	• Karlsruhe Institute of Technology (KIT), Inst. for Water and River Basin Management
KOMS	• Efficiency and costs of advanced WWT	• Baden-Württemberg Competence Centre Trace Elements (KomS)
FiW	• Cost bearing	• Research Institute for Water and Waste Management (FiW)
RUFIS	• Analysis of costs and value	• Ruhr Research Institute for Innovation and Regional Policy (RUFIS)
VSA	• Experiences from Switzerland	• Swiss Water Association (VSA), Platform "Micropollutants – Process engineering"

Dr. Felix Tettenborn

Fraunhofer-Institute for Systems and Innovation Research ISI

felix.tettenborn@isi.fraunhofer.de

Dr. Felix Tettenborn

Fraunhofer-Institute for Systems and Innovation Research ISI

felix.tettenborn@isi.fraunhofer.de

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