



Tackling Micropollutants in Wastewater - Approaches on
Implementation and Innovation in Europe and the Netherlands



Tackling removal of micropollutants – The German Approach and the Strategy of Baden-Württemberg

3rd November 2021 – Dr.-Ing. Marie LAUNAY
STOWA Tackling Micropollutants in wastewater –
Aquatech Amsterdam

KomS Baden-Württemberg – dreifach gut



Universität Stuttgart



Micropollutant Strategy of the Federal Ministry of Environment

- **Stakeholder dialogue** on reduction of micropollutant emissions in surface waters on national level since 2016
- Final documents: Policy Paper (2017) and [Final Recommendations](#) (March 2019)
→ concretisation of measures to reduce micropollutant emissions:
 - *Selection of „relevant“ micropollutants*
 - *Measures to implement producer responsibility*
 - *Communication, education and environmentally appropriate use*
 - *Guidance framework for advanced wastewater treatment*
 - *Research questions*
- End of stakeholder dialogue in March 2021 after one and half year of **pilot phase**
- www.dialog-spurenstoffstrategie.de



Key elements from the stakeholder dialogue and results of the pilot phase

1. Expert Committee for the identification of „relevant“ micropollutants

- Results of the pilot phase → 7 substances classified as „relevant“:
- **lopamidol** (X-ray contrast agent), **diclofenac** (pain killer), **benzotriazole** (corrosion inhibitor), **thiaclorpid** (insecticide), **sulfamic acid** (cleaning agent), **tebuconazole** (fungicide), **decabromodiphenyl ether** (flame retardant)

2. Round Tables with producers and other stakeholders in particular to identify source- and user-related measures

- Pilot phase → Round Tables on X-ray contrast agents (RKM), diclofenac and benzotriazole
- Results of the Round Table on X-ray contrast agents:
 - [Study](#) to test the practicability of urine collection systems to reduce X-ray contrast medium input into wastewater (Fraunhofer ISI, in German)
 - [Result report](#) of the Round Table RKM



Micropollutant Strategy of the Federal Ministry of Environment

Key elements from the stakeholder dialogue and results of the pilot phase

3. Publicity campaigns / public relations work under the banner of the UN Water Action Decade



National campaign in the 1st quarter of 2020

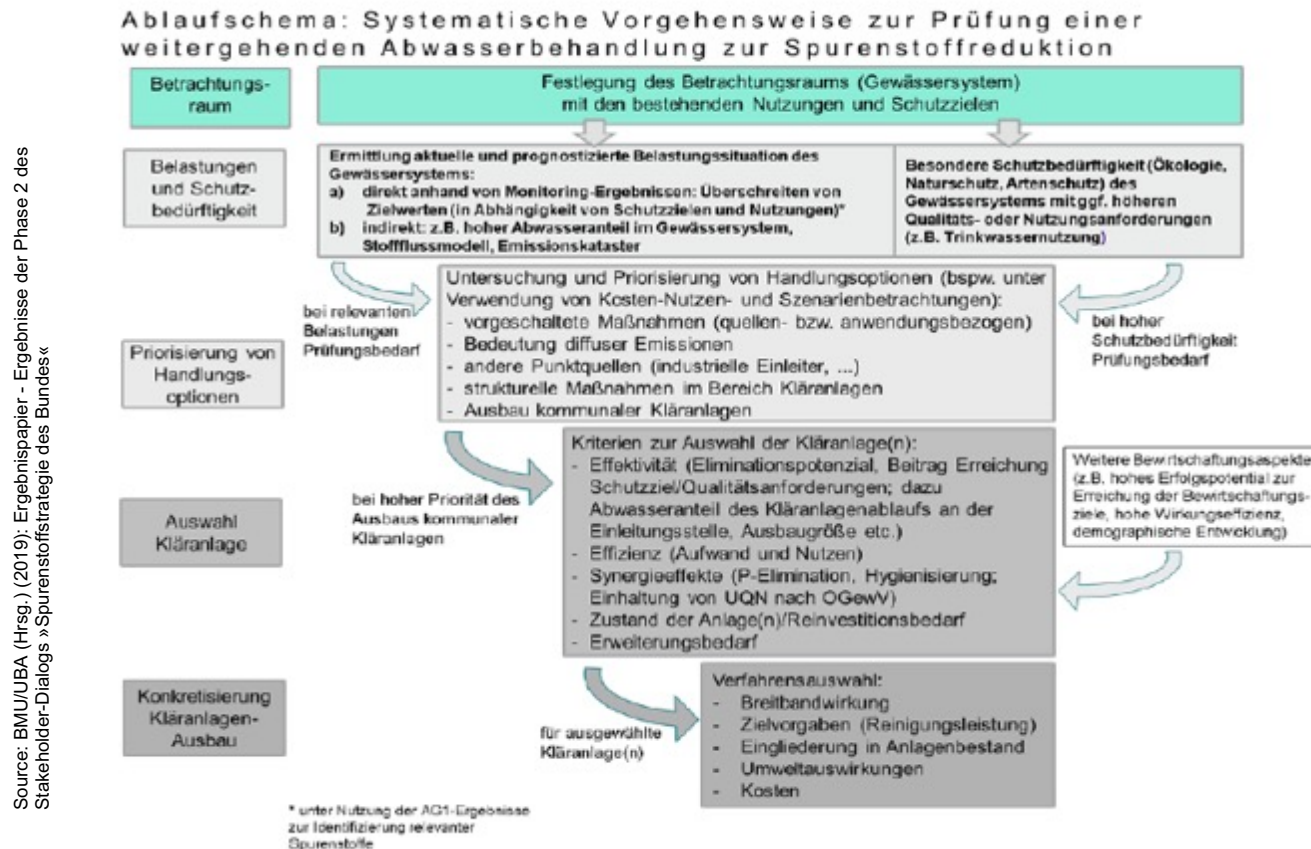


Flyer on the correct disposal of old medicines in Baden-Württemberg

Micropollutant Strategy of the Federal Ministry of Environment

Key elements from the stakeholder dialogue and results of the pilot phase

4. Orientation framework for the upgrade of municipal WWTPs for targeted micropollutant removal



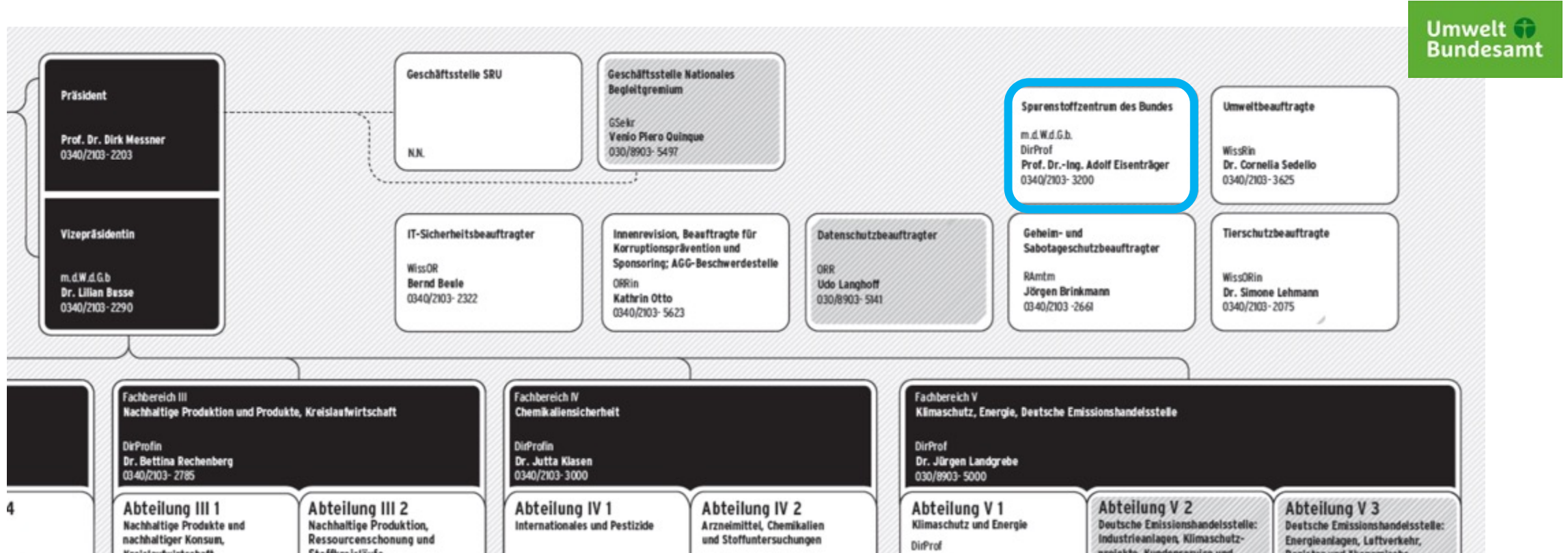
Source: BMU/UBA (Hrsg.) (2019): Ergebnispapier - Ergebnisse der Phase 2 des Stakeholder-Dialogs »Spurenstoffstrategie des Bundes«

Orientation framework for the upgrade of municipal WWTPs – Implementation in the States (Länder)

- The Working Group of the Federal State on Water has recommended the application of the orientation framework to the federal states.
- Development of State-specific criteria on the basis of the orientation Framework underway (already implemented in BW in the working paper on micropollutant removal)
- 36 plants for targeted micropollutant removal in operation in Baden-Württemberg, Bavaria and NRW
- More than twice as many plants under construction or planned in at least five federal states
- Federal Ministry of Environment (BMU) is examining financing options
- Amendment of the Wastewater Charges Act still under discussion

Micropollutant Strategy of the Federal Ministry of Environment

August 2021: The Federal Ministry of Environment establishes a “Federal Micropollutants Centre” (Spurenstoffzentrum des Bundes) in Dessau (UBA, German Environment Agency)



Situation in Baden-Württemberg



- High population density and high industrialisation
- **Wastewater treatment in Baden-Württemberg:**
- 894 WWTPs (2021)
- Almost 60% of WWTPs discharge into a water body with a wastewater content of more than 10%.
- In karst landscape (Swabian Alb) effluent infiltrates into the ground
- Lake Constance is
 - an ecological valuable and vulnerable region and
 - an important resource for drinking water for about 5 Mill. people



Micropollutant Strategy in Baden-Württemberg

2006–2009

Study on new technology for targeted micropollutant removal in Ulm

2010

First large scale PAC treatment for targeted micropollutant removal on WWTP in Mannheim

2012



2018

Working paper: Priorisation of 125 UWWTPs

1992 to 1997

Implementation of the use of activated carbon on three WWTPs for deinking of wastewater

2012–2016

Study on ecological effects before and after establishing advanced technologies on WWTPs in the region of Lake Constance
„SchussenActivplus“
(RiSKWa)



Oct. 2021

Advanced treatment in operation on 22 WWTPs, under construction or planned on 24 WWTPs

Micropollutants Competence Centre BW

The Micropollutants Competence Centre Baden-Württemberg is dedicated to the build-up and transfer of knowledge regarding the subject of micropollutants and their removal from wastewater. In addition, it considers itself a platform for the exchange of information and experiences regarding the process-technical implementation. KomS is a cooperation between the University of Stuttgart, Biberach University of Applied Sciences and the Baden-Württemberg chapter of the DWA and is funded by the Ministry of the Environment, Climate Protection and the Energy Sector of the federal state of Baden-Württemberg.



Communication and events

- KomS was created in 2012
- Team of 9 people (6 research engineers)
- Main activities:
 - Advice and support for WWTP operators, planners and authorities
 - Implementation and monitoring of (research) projects
 - Bundling of experience and results
- Publications: Recommendations for action (2018), technical guidelines, information leaflets
- Website: www.koms-bw.de/en



Engineers team



Secretary

Micropollutant Strategy of Baden-Württemberg

Initiative of Ministry of the Environment BW – Two pillars:



Ministry of the Environment, Climate
Protection and the Energy Sector
Baden-Württemberg

- **Priority for source- and user-oriented measures**
 - Information campaigns, dialogue with stakeholders (doctors and pharmacists, environmental associations, pharmaceutical industry), projects to reduce emissions of X-ray contrast agents
 - National stakeholder dialogue on micropollutants in surface waters since 2016
 - EU strategies i.e. Green Deal and Zero Pollution Strategy; approach to pharmaceuticals in the environment
- **Upgrade of municipal WWTPs with targeted removal of micropollutants according to precautionary principle**
 - Support for implementation on specific sites: resources for drinking water, high proportion of WWTP effluent in receiving surface waters



Upgrade of WWTPs in Baden-Württemberg – Framework

Framework for the implementation of procedures for micropollutant removal

Arbeitspapier

Spurenstoffelimination auf
kommunalen Kläranlagen
in Baden-Württemberg

20. Nov. 2018



- Implementation of advanced treatment is voluntary
- Financial support for investment costs by 20-80%
- Consideration of efficiency:
 - Design capacity of WWTP,
 - Need for reconstruction,
 - Synergy effects with other requirements
- KomS Guideline on construction and operation of advanced treatment
 - Specification of elimination rate
- Description of procedure for investigations to be carried out



Upgrade of WWTPs in Baden-Württemberg – Framework

Distinct criteria for implementation of advanced treatment on UWWTPs

Arbeitspapier

Spurenstoffelimination auf
kommunalen Kläranlagen
in Baden-Württemberg

20. Nov. 2018



- Discharge of WWTP effluent in the catchment area of Lake Constance or upper Danube
- Discharge of WWTP effluent into groundwater
- Discharge in karst landscape or infiltration into the ground
- Discharge in receiving water with a proportion of WWTP effluent more than 50%;
not applicable on WWTPs with less than 10.000 PE
- WWTPs with more than 500.000 PE

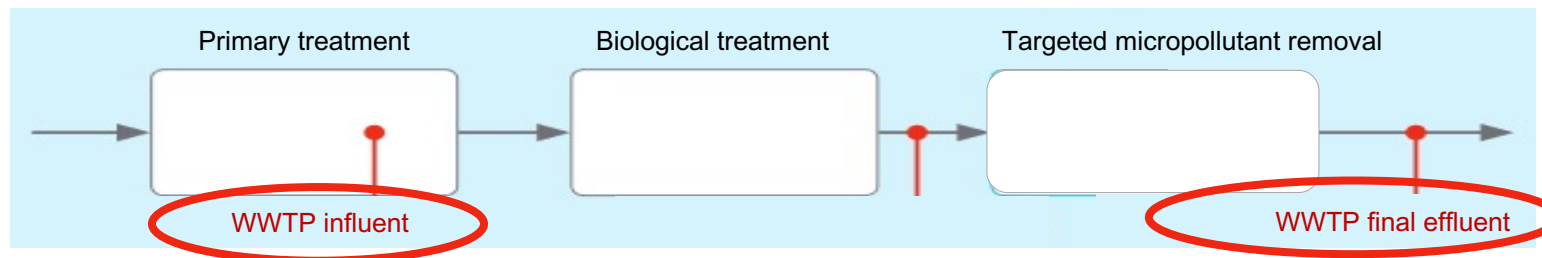
about 125
WWTPs

Upgrade of WWTPs in Baden-Württemberg – Required micropollutant removal

Required micropollutant removal in WWTPs in BW:

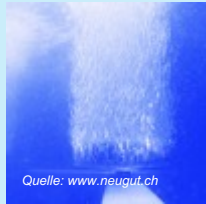
- Normal and continuous operation of advanced treatment plant
- **Sufficient micropollutant removal if the sliding agent, formed from removal rates of last 6 measurement campaigns on days with discharges to the WWTP up to a maximum of $Q_{\text{WWTP-MP,max}}$ is at least 80%.**
- Micropollutant removal efficiency of each measurement campaign is calculated as the mean value from the elimination rates of the following 7 substances:

Carbamazepine, Diclofenac, Hydrochlorothiazide, Irbesartan, Metoprolol, Benzotriazole, Σ 4- and 5-Methylbenzotriazole



WWTP upgrade in Baden-Württemberg – Current state

22 full-scale plants in operation – October 2021



Ozonation

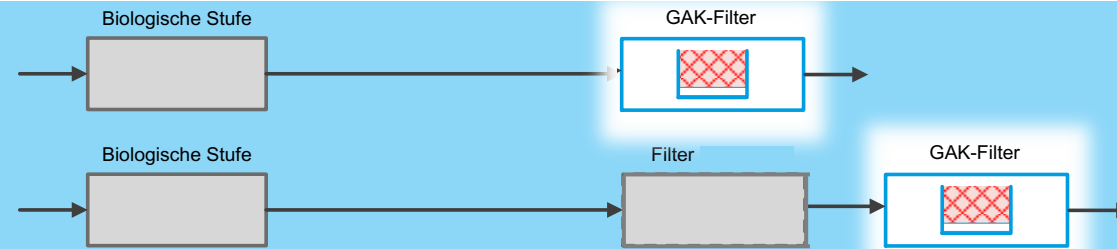
3 x



Granular activated carbon

2 x

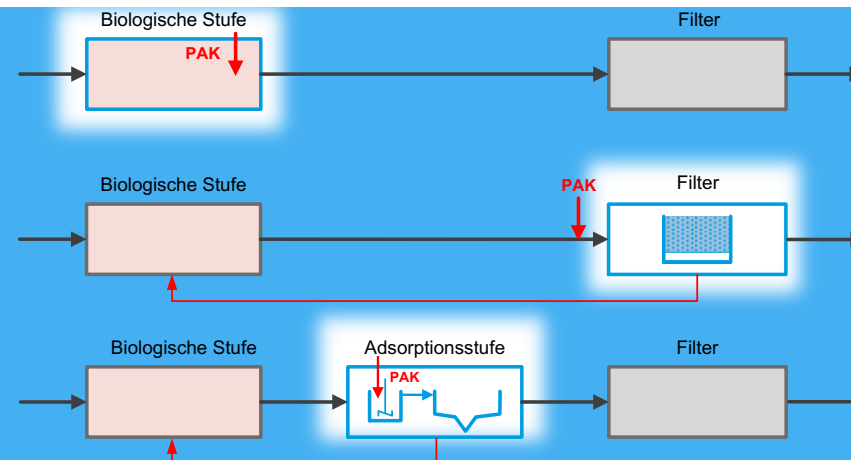
2 x



Powdered activated carbon

1 x

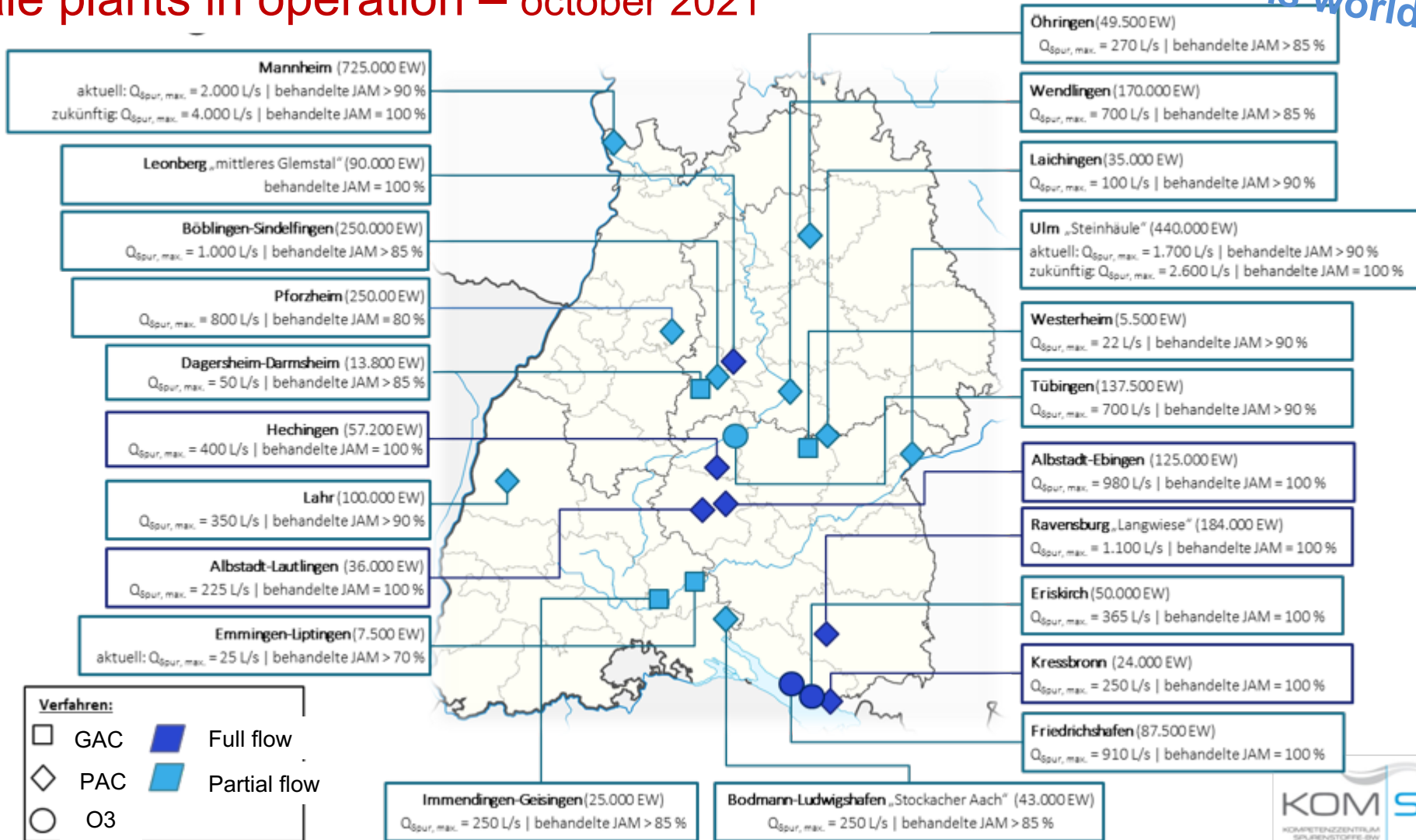
14 x



WWTP upgrade in Baden-Württemberg – Current state

22 full-scale plants in operation – october 2021

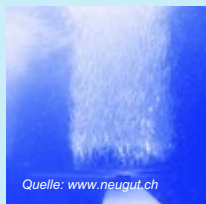
BW is worldwide outrider!



WWTP upgrade in Baden-Württemberg – Current state

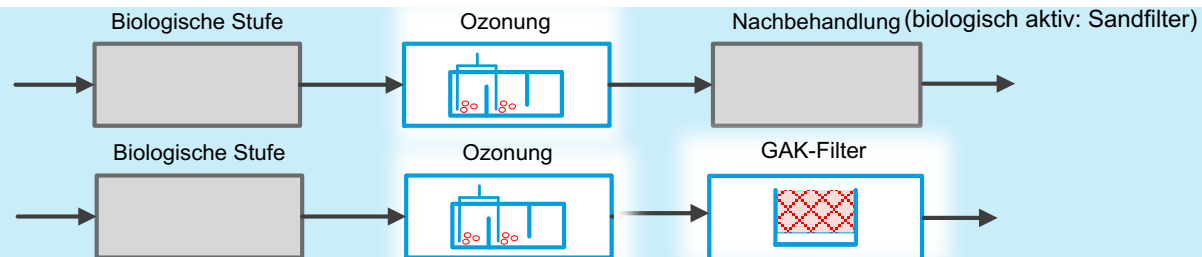
24 plants in planning or under construction – october 2021

Ozonation

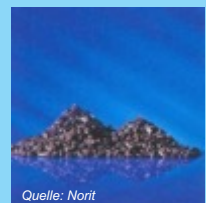


2 x

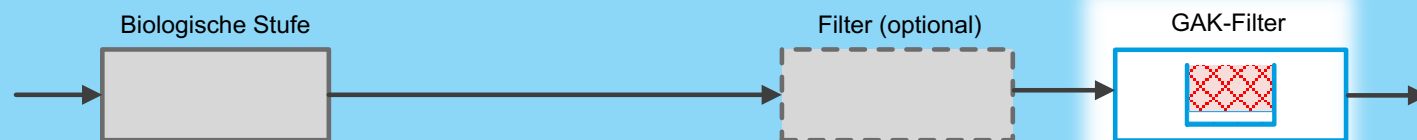
2 x



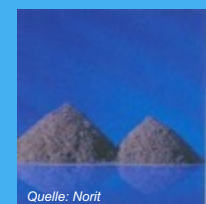
Granular activated carbon



5 x



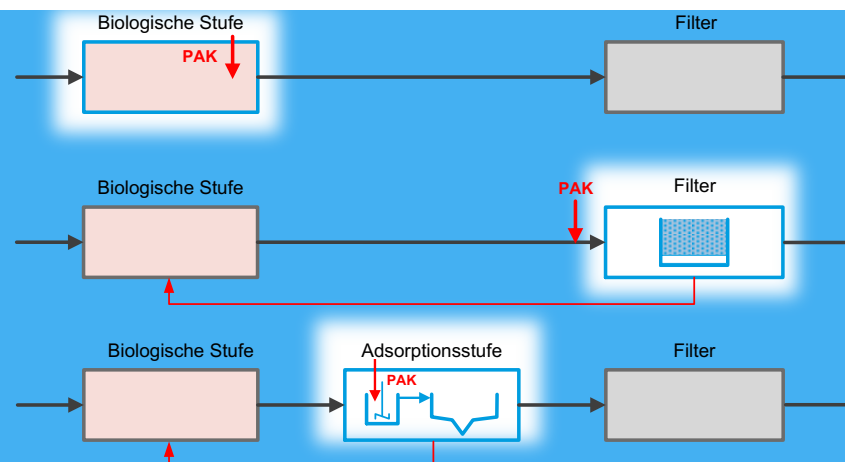
Powdered activated carbon



3 x

3 x

9 x



Guidelines for feasibility studies

- New guidelines for feasibility studies for targeted micropollutant removal (September 2020)
- Feasibility study = first important step for planning
- Requirements for the content → to ensure better comparability and to guarantee a minimum standard for their elaboration
- *Statement for the reasons*
- *Consideration of other treatment objectives (synergy effects)*
- *Presentation of the framework*
- *Preliminary investigations and data evaluation*
- *Local conditions*
- *Elaboration of technical variants and process selection*
- *Comparison of variants and process recommendation*



<https://koms-bw.de/cms/content/media/Handlungsempfehlung%20Machbarkeitsstudien%201seitig.pdf>

Long-term view on costs of advanced treatment with PAC

- Long-term view on costs of treatment with PAC (2019)
- Recording of actual costs for 6 plants with PAC (5 year-data)
- Present cost implications of this new technology to politicians and citizens,
- Create detailed, reliable data for planning new plants and to review existing assumptions,
- Support plant operators in monitoring success of planning and operation,
- Serve as a basis for structured exchange between WWTP operators.
- Annual costs: between **2,9 and 7,8 €/inh. (4-10% of annual wastewater charges)**



https://koms-bw.de/cms/content/media/Broschuere%20Langzeitbetrachtung%20Pulveraktivkohlebehandlung_Druck.pdf

- Currently, 22 plants for targeted micropollutant removal are in operation in Baden-Württemberg
- Numerous operating experiences and measurement data are already available!
- **Synergies** (most extensive P elimination, disinfection, treatment of stormwater...) must be taken into account when planning plants.
- Please find actual information in our new document “Micropollutants in wastewater”

https://koms-bw.de/en/cms/content/media/Projektbroschuere%20Spurenstoffe%20KomS%20Englisch_Ansicht.pdf

June 2021



**Thank you very much
for your attention !**

www.koms-bw.de/en/

KomS Baden-Württemberg – dreifach gut



Universität Stuttgart

