# Workshop on Sludge management in the Danube Region for a greener EU

10 June 2021

# Legislation and experience in Germany

**EU GREEN WEEK 2021 PARTNER EVENT**

**ZERO POLLUTION** #EUGreenWeek
for healthier people and planet

DANUBE REGION strategy Water Quality

ICPDR IKSD
International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau

IAWD DANUBE WATER PROGRAM
Smart policies, strong utilities, sustainable services

INTERNATIONAL SAVA RIVER BASIN COMMISSION

German Federal Environment Agency (UBA)

# Legislation and experience in Germany

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# 1. Position and background

## Sewage sludge

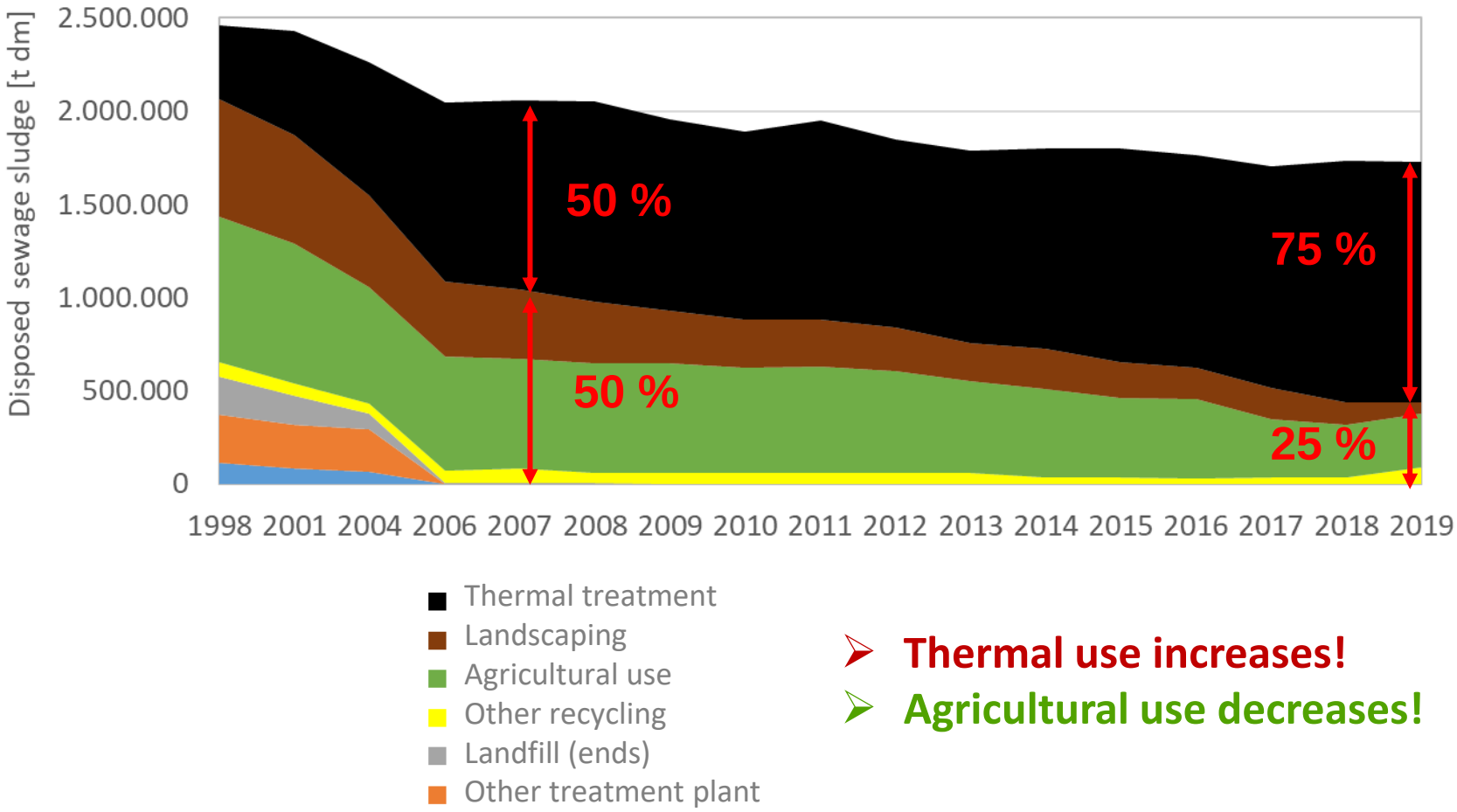
- contains unwanted and potential dangerous substances from sewage treatment (e.g. heavy metals, organic pollutants e. g. drugs, multi resistant microorganisms, nano materials, micro plastics)
- not possible to ban all substances from sludge
  → no save fertilizer
- contains valuable nutrients such as Phosphorus (P)
- Phosphorus as an essential, local and non renewable resource
- sustainable use of resources esp. P and closing of nutrient cycles

⇒ exit from agricultural use of sewage sludge (→ incineration)

⇒ recovery of P and use of P-recovery products esp. as fertilizers

# 2. Situation

## Sewage sludge disposal in Germany




- **Thermal use increases!**
- **Agricultural use decreases!**

## 2. Legislation

### New German Sewage sludge ordinance in 2017:

Regulates

- use of sewage sludge, mixed sludge and sludge compost as fertilizer on land = **agriculture, landscaping** (new)**, forests and gardens**
- **restrictions** (no use for different crops, grassland, in forests, protection zones, national parks etc.)
- **limit values** and analysis of soil and sludge
- cross references to **fertilizer regulation**
- sewage sludge treatment, sewage sludge disposal, **P-recycling/ P-recovery**

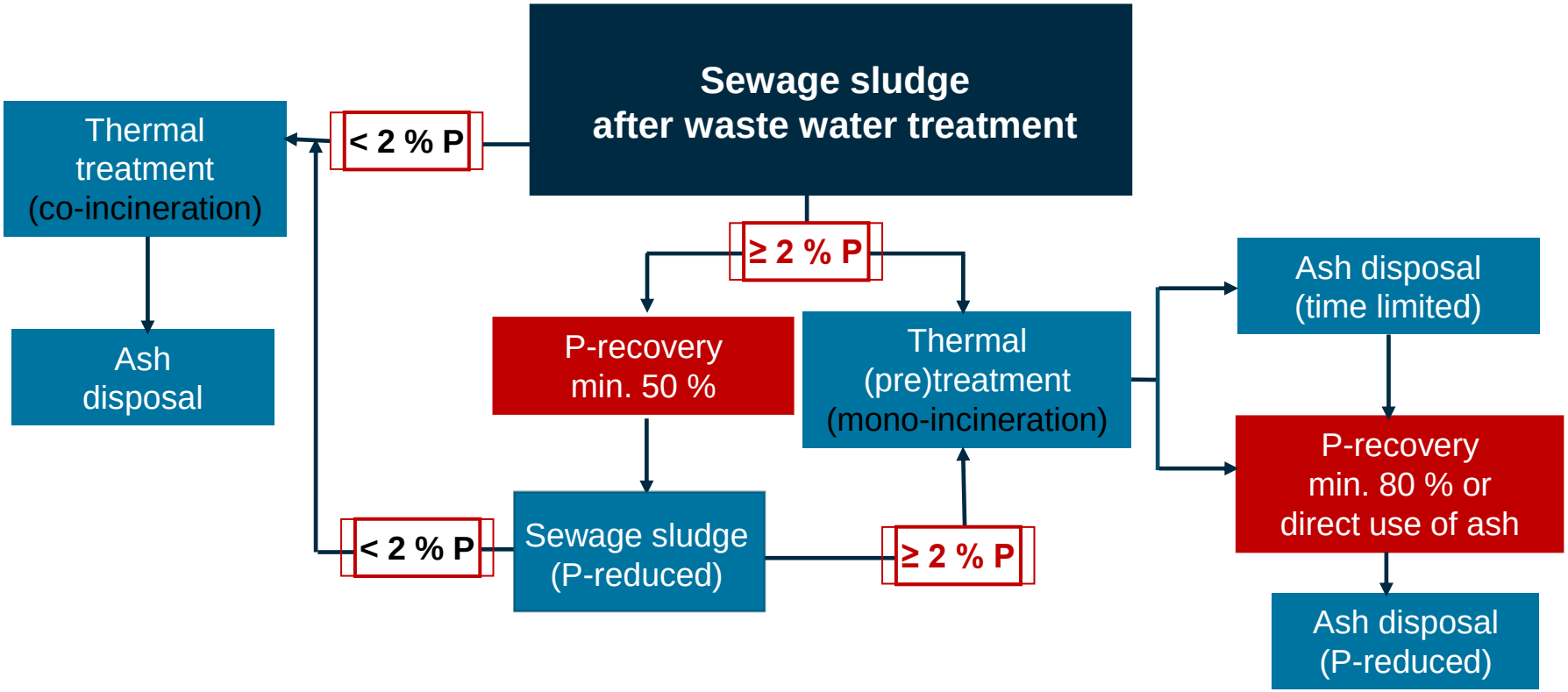
## 2. Legislation

**German Sewage sludge ordinance: sewage sludge disposal, P-recycling**

| Waste water treatment plants: | up to 50,000 P. E. | from 50,000 P. E. | from 100,000 P. E. |
|---|---|---|---|
| now | - agricultural use possible | - agricultural use possible | - agricultural use possible |
| in 2023 | - report measures of planned P-recovery or agricultural use and other disposal of sludge<br>- analyse P-value in sludge | | |
| from 2029 | - agricultural use possible (as P-recycling)<br>- P-recovery | - agricultural use possible (as P-recycling)<br>- P-recovery | - agricultural use not possible<br>- P-recovery |
| from 2032 | - agricultural use possible (as P-recycling)<br>- P-recovery | - agricultural use not possible<br>- P-recovery | - agricultural use not possible<br>- P-recovery |

## 3. Strategies

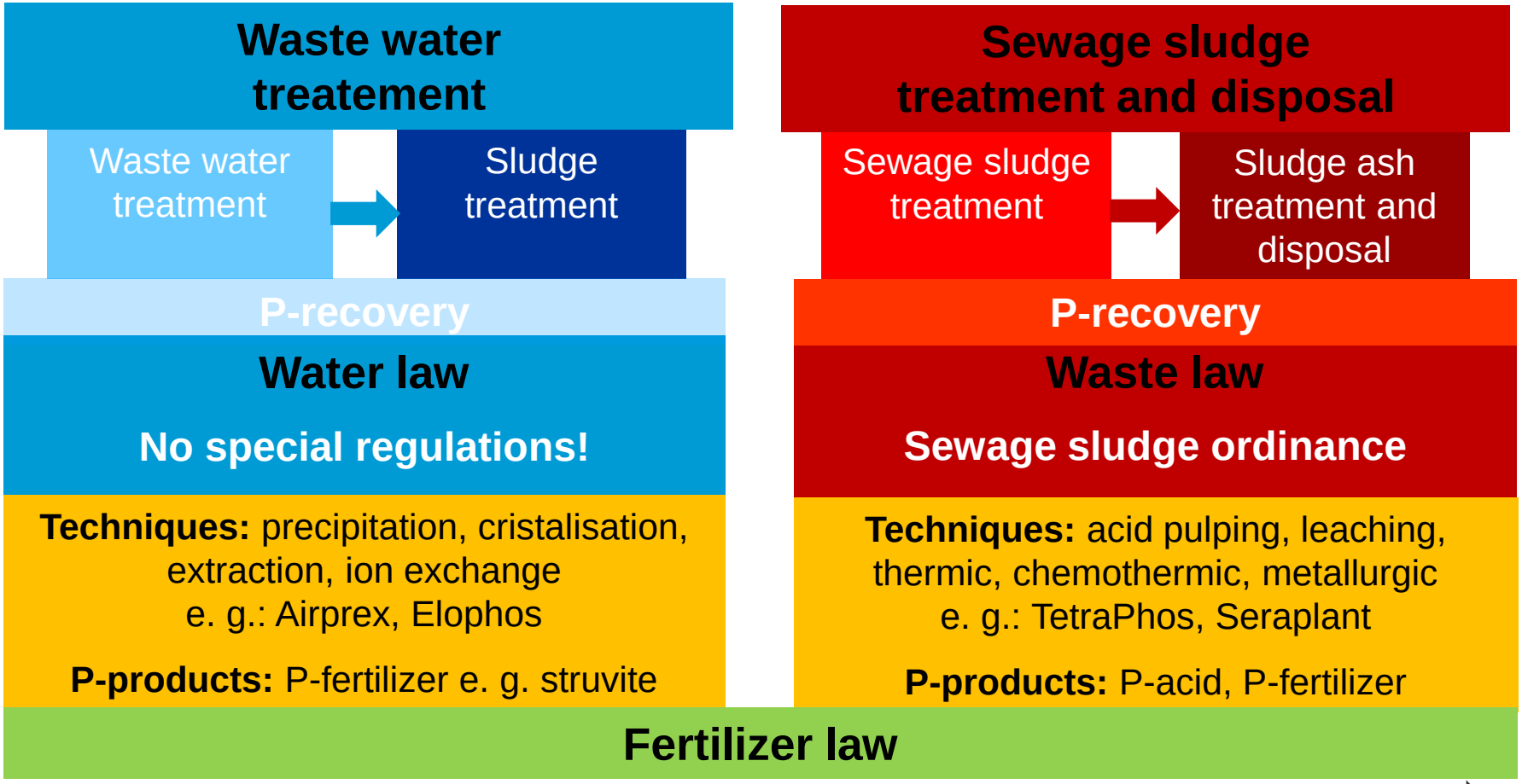
**German Sewage sludge ordinance: sewage sludge disposal, P-recovery if sewage sludge is not/ not allowed to use on land**




**P-recycling mandatory > 2 % P = 20 g P/ kg sewage sludge dry mass (dm)**

## 3. Stategies

**Statutory framework: sewage sludge management and P-recovery**



## 4. Experiences and outlook

**Results from UBA research activities:**

- Sewage sludge contains resistance genes, mobile genetic elements and selective substances – size of waste water treatment plant has no influence on numbers!
- P-recovery reduces contamination of soil with organic pollutants such as pharmaceuticals!
- P-recovery is economical and ecological reasonable!

## 4. Experiences and outlook

**What is to do now?**

- Installation of (mono)incineration plants to ensure treatment of sewage sludge!
- Further promotion of implementation and demonstration of technical P-recovery (support programs for scaling up the techniques)!
- Increasing acceptance of P-recovery-products!
- Better harmonization of water and waste law!
- Possibilities to recover other valuable substances from sewage sludge?
- Total ban of sewage sludge use in agriculture, horticulture and landscaping?!

# Legislation and experience in Germany

## Links:

regulations:

- https://www.bmu.de/en/law/sewage-sludge-ordinance/
- https://www.umweltbundesamt.de/themen/nachhaltiger-umgang-klaerschlamm-in-der

about sewage sludge and sewage sludge disposal:

- https://www.umweltbundesamt.de/publikationen/sewage-sludge-disposal-in-the-federal-republic-of
- https://www.umweltbundesamt.de/publikationen/guidance-for-decision-making-on-sewage-sludge
- https://www.umweltbundesamt.de/publikationen/technical-guide-on-the-treatment-recycling-0

about organic pollutants in sewage sludge:

- https://www.umweltbundesamt.de/publikationen/arzneimittelrueckstaende-in-rezyklaten-der
- https://www.umweltbundesamt.de/publikationen/environmental-risks-from-mixtures-of-antibiotic

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# New sewage sludge ordinance

## LIMIT VALUES FOR SLUDGE: (mg/kg dm)

| Para-meter | Pb | Cd | Cr | Cr(VI) | Cu | Ni | Hg | Zn | As | Tl | Fe |
|---|---|---|---|---|---|---|---|---|---|---|---|
| sludge (old) | 900 | 10 | 900 | - | 800 | 200 | 8 | 500 | - | - | |
| sludge (new) | | | just analysis | | | | | **4,000** | | | just analysis |
| ferti-lizer | **150** | **1.5** | | **2** | **900** | **80** | **1.0** | (4,500) | **40** | **1,0** | |

| Para-meter | PCB | PCDD/F incl. dl-PCB | AOX | B(a)P | PFT | Hygiene |
|---|---|---|---|---|---|---|
| sludge (old) | 0.2 | 100 ng | 500 | - | | |
| sludge (new) | **0.1** | (with PCDF) | **400** | **1** | | |
| ferti-lizer | | **30 ng** | | | **0.1** | **see § 5** |

# Technical possibilities

## on wwt plant:

- sewage, sludge water
- digested sludge

precipitation, cristalisation, extraction, ion exchange

> Struvit, CAP (P-fertilizer)

**operational advantages, low costs**

**possible up to 15-50 % P**

**needed < 20 g/kg sludge dm**

**No P-recovery in the context of the sewage sludge ordinance!**

## sewage sludge after wwt:

- sewage sludge for disposal
- sewage sludge ashes after monoincineration

acid pulping process, leaching, thermic, chemothermic, metallurgic

**destroy all organic materials**

**possible up to 90 % P**

**needed min. 80 % from the ash**

**P-recovery in the context of the sewage sludge ordinance!**