Workshop on Sludge management in the Danube Region for a greener EU 10 June 2021

Nutrient recovery from sludge in Austria EU GREEN WEEK 2021 PARTNER EVENT











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1) Sewage sludge in Austria Status Quo

- 240.000 t of sewage sludge (dry substance) per year
- SS contains 40-50 % of the annual applied P as mineral fertilizers
- Current utilisation/application/treatment/disposal routes:
 - 20 % direct agricultural application
 - 27 % other treatment (*MBT, composting, humification)
 - 53 % thermal treamtment (waste incineration, cement industry, mono-incineration)
- Discussion points:
 - further nutrients (N, Ca, K)
 - heavy metals
 - organic pollutants
 - microplastic



1) Sewage sludge Austria Strategy

- First mentioned in national waste management plan 2017
 - 65 to 85 % of municipal sewage sludge needs to adress P-recycling
 - Focus on WWTP with a load of min. 0,8 g P PE^1 d^1
 - Szenarios for WWTP with a capacity of 20.000 / 50.000 PE₆₀
- STRAPHOS study (TU Wien): Assessment of technical, economic and ecologic aspects for an sustainable Austrian P-recycling strategy (<u>https://iwr.tuwien.ac.at/wasser/forschung/projekte/projekte/straphos/</u>)
- Legally binding P-recycling will be implemented within the waste incineration regulation (AVV) until mid 2022
- Implementation period until 1.1.2030

1) Sewage sludge Austria Strategy



WWTP capacity (PE)

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2) Recovery of P from waste water

Egle et al., 2016; Phosphorus recovery from municipal wastewater: An integrated comparative technological, environmental and economic assessment of P recovery technologies









Improvement of the sewage sludge quality



Thermal treatment (incineration) of the sewage sludge: > 850°C, > 2sec

Advantages:

- + Total destruction of organic pollutants (hormons, pharmaceuticals, relevant for fertilizer regulation (AOX, PCDD/F, PAC, PCB, PFT, organoclorine-pestides)
 → TOC: < 0,1 %
- + Destruction of "microplastic"
- + Up-concentration of P
- + Sink for volatile heavy metals as e.g. mercury, cadmium
- + Sterile (hygienisation), storable and transportable ash
- + Use of the contained energy (CO₂-neutral district heating & energy source)

Disadvantages:

- Bindung form of the P (chemically bound)
- Loss of carbon and nitrogen
- Up-concentration of metals

Raw phosphate rock vs. sewage sludge ash







SSA

Different HM concentrations / Significantly less Cd and U / Higher content of other elements as e.g. Ni, Pb) / High Fe- and Al-contents / "worthless" accompanying elements / Micronutrients (z.B. Cu*, Zn*, B, Mn, Se)

*At the same time heavy metal but also micronutrient

Vision – Circular nutrient flows



Landfill Rautenweg (MA 48)

4) Conclusions

- Great potential of P in municipal waste water
- Technologies are available to recover P
- With regard to technical, environmental and economic criteria the recovery of sewage sludge ash should be prefered
- Actions on EU-level to promote a clean circularity for P
- City of Vienna follows the EU plan and will implements P-recovery within the upcoming year