

Effects of PAC dosage on final sludge treatment

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Complex



We need a chain approach

Adsorption substances of high concern?

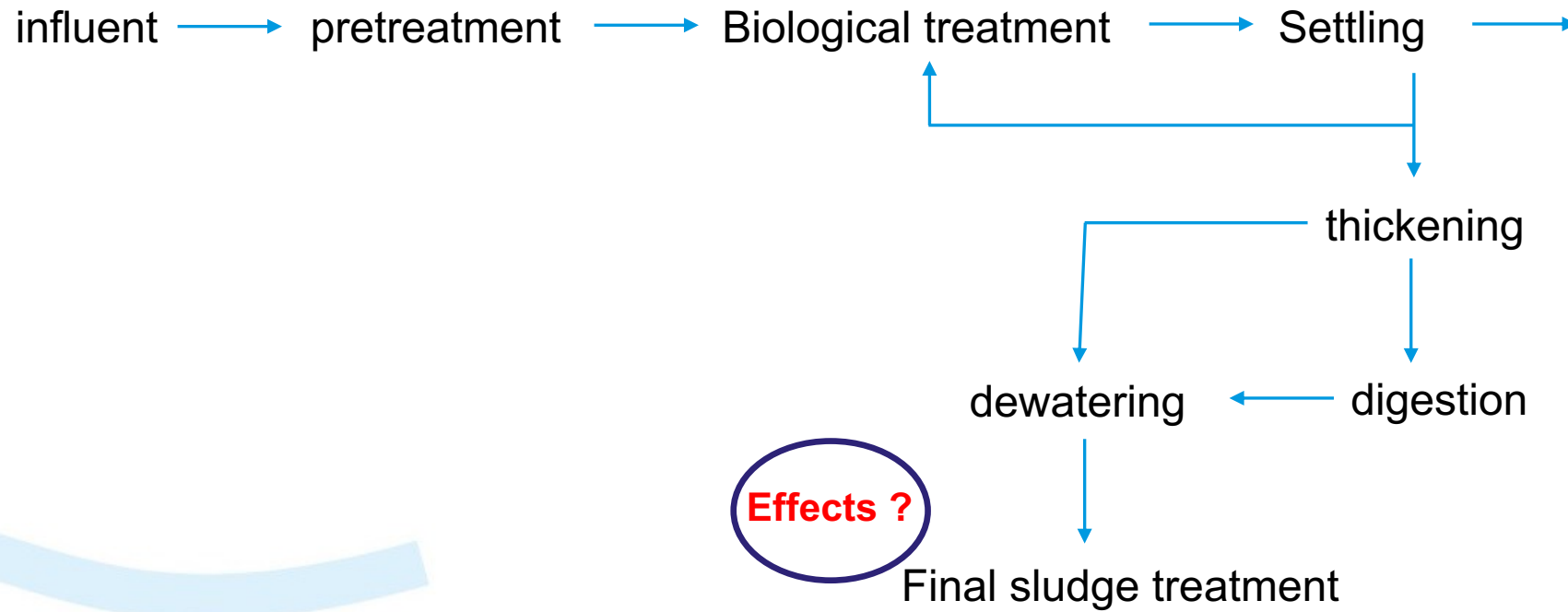
efficiency?

CO₂ footprint?

costs?

technology?

design flow ?



Approach

Uncertainty in how micropollutants are to be removed

4 scenarios for the extent to which PACAS is applied

- Number of WWTPs + PAC
- Effect PAC dosage
- Effect PAC on dewatering

} Based on 2018 sludge data

- Choice number WWTPs + PAC
- Choice PAC dosage
- Choice does/no influence on DS%

Uncertainty in short to long-term of the ways of sludge final treatment

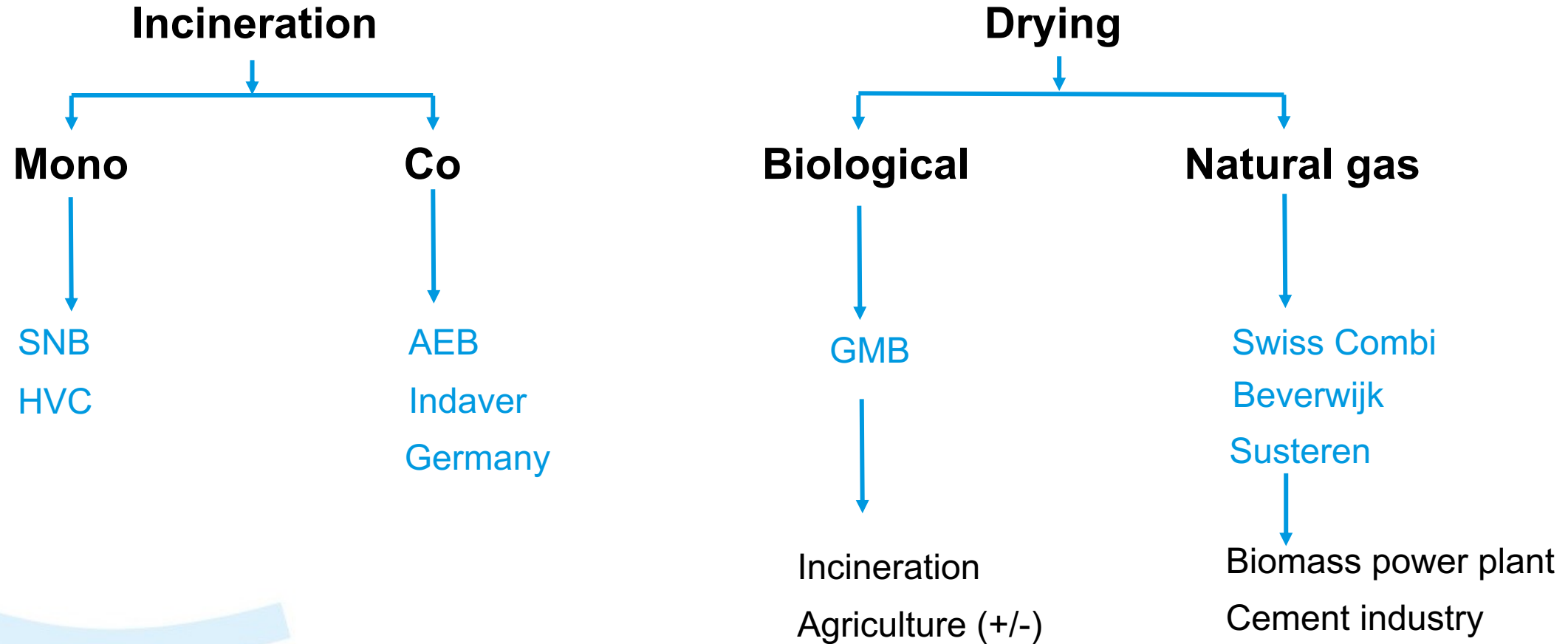
3 scenarios for the future of final sludge treatment

- 2022
- 2025
- 2030

} Based on inventory 2019 from the waterboards



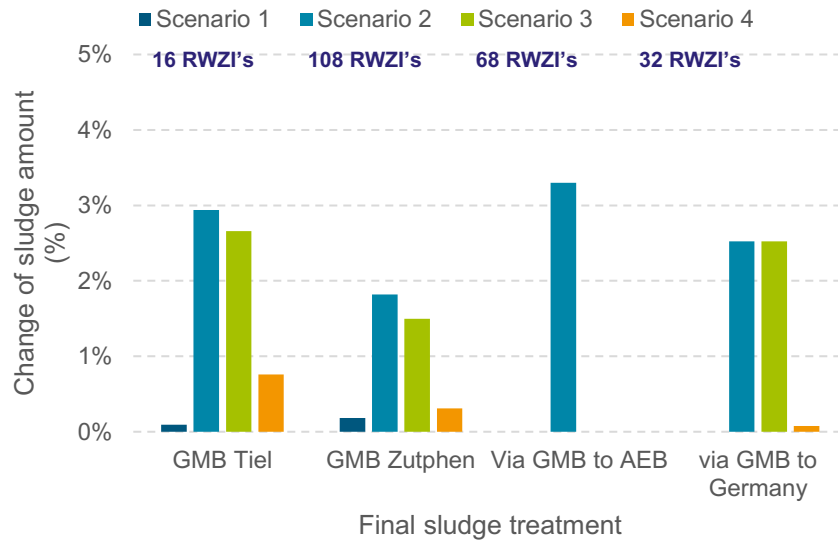
Final sludge treatment routes





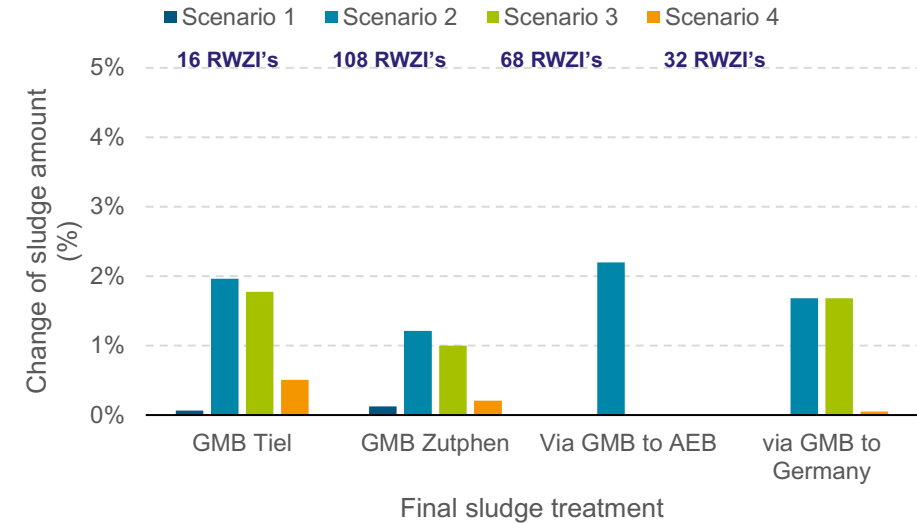
Effects number WWTP's and dosage

Effect number WWTPs with PAC dosage



More WWTP's with PAC dosage more sludge production
Absolute increase depending on the size of WWTPs

Effect PAC dosage

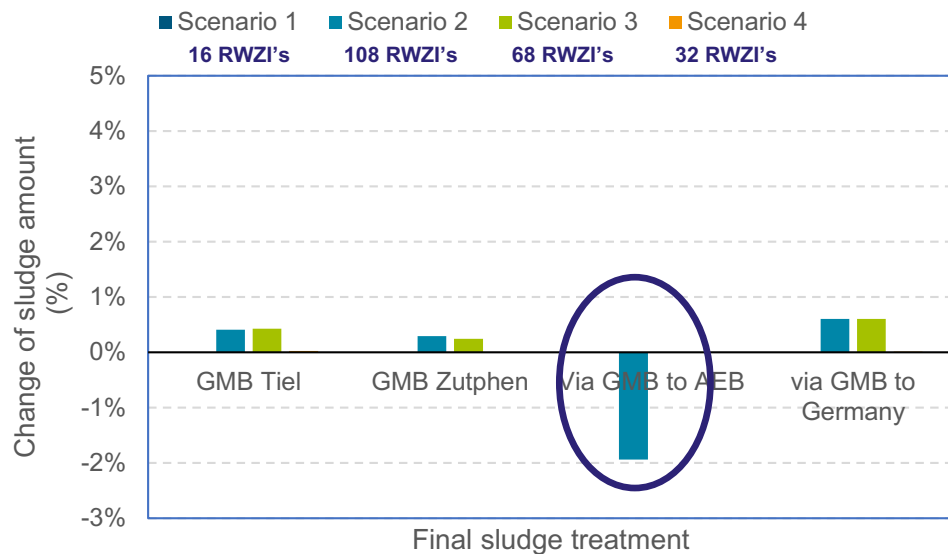


Lower PAC dosage = lower increase in sludge production



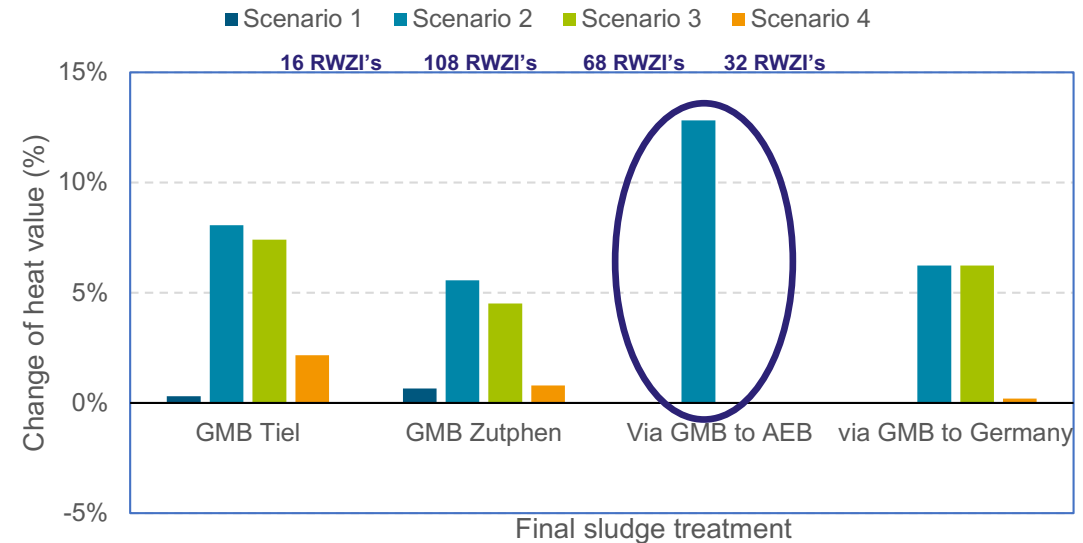
Effects on dewatering

Effects PAC on dewatering %



PAC in sludge can have a strong impact if the PAC part in the dewatered sludge is high, increase in dry matter can be compensated

Effects PAC on heating value

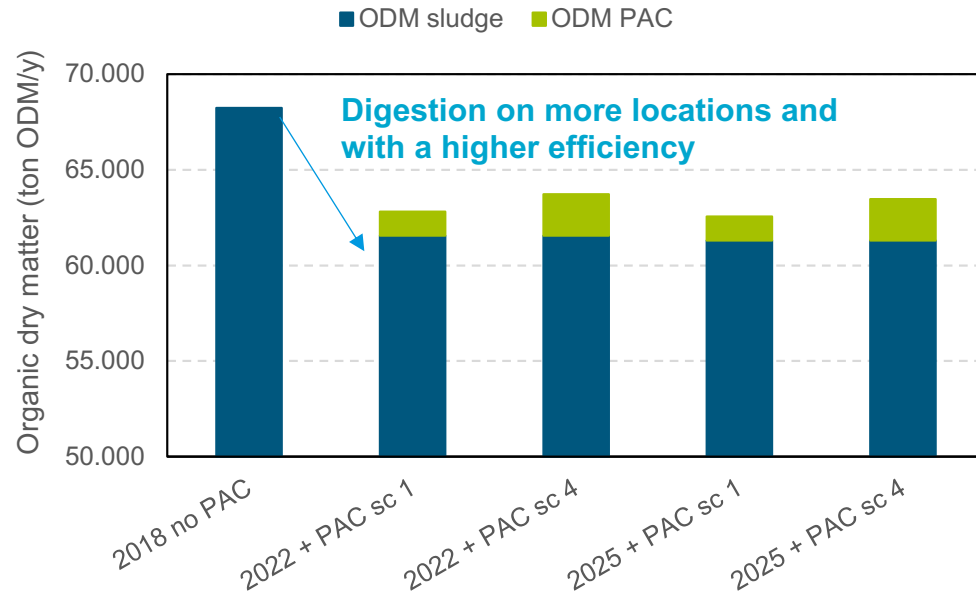


Higher dry matter content due to PAC leads to higher heating value of the sludge

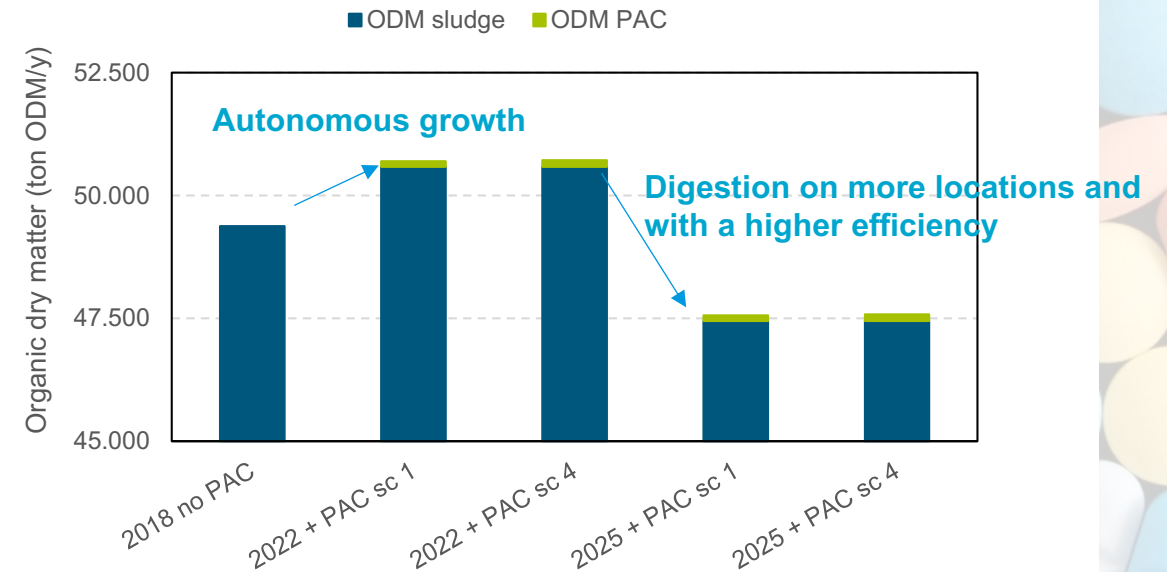


Effects autonomous developments

Effects SNB



Effects HVC



Autonomous developments such as higher wastewater discharges and/or more or better digestion processes can have more effect than the presence of PAC in sludge



Conclusions

- PAC in sludge affects processing capacity:
 - the impact at national level appears to be limited
 - the impact on an individual installation can be significant
- Choosing whether or not using PAC from a perspective of sludge final treatment has to be made by the water board from their specific point of view
- PAC influences sludge composition:
 - adsorption of arsenic, heavy metals and substances of very high concern
 - effects on final sludge treatment cannot yet be properly mapped out



Recommendations – research questions

- When deciding on the method of removal of micropollutants, also include the final sludge treatment
- For new sludge treatment, take PAC in sludge into account
- Monitor the influence of PAC in sludge on the dewatering results
- Monitor the extent to which heavy metals, arsenic, substances of high concern adsorb to the carbon and investigate to what extent this leads to bottlenecks in final sludge treatment



Thank you for your attention!



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Rijkswaterstaat
Ministry of Infrastructure
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Tackling Micropollutants in Wastewater
Approaches on Implementation and Innovation in Europe and The Netherlands

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