



Sewage sludge incineration plant's operators on the way to recycle phosphorus from sewage sludge ashes in the Netherlands

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Dutch Experience of sludge management

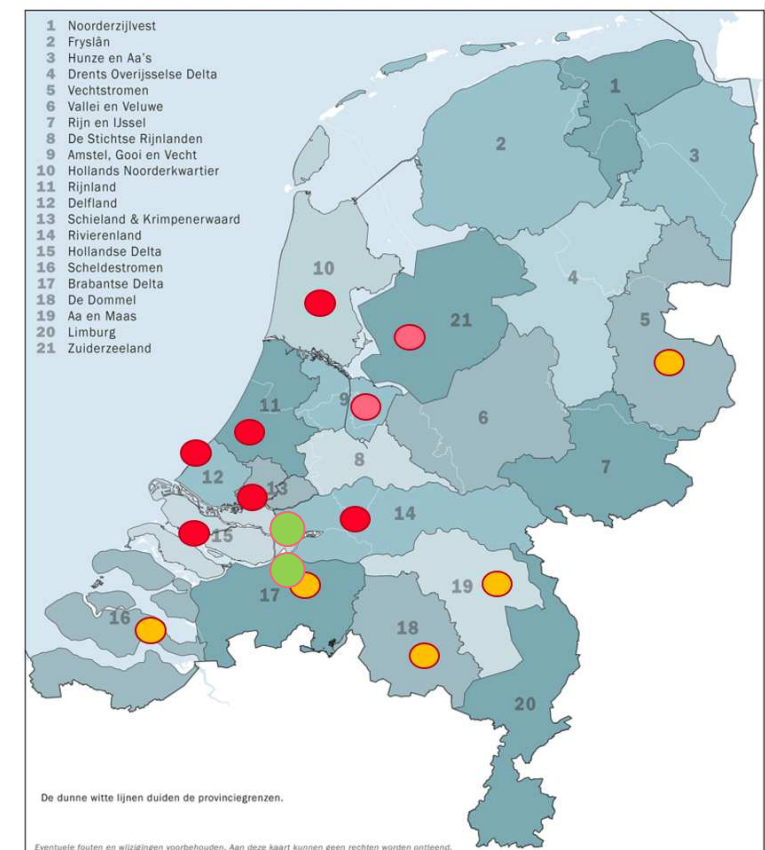


Content

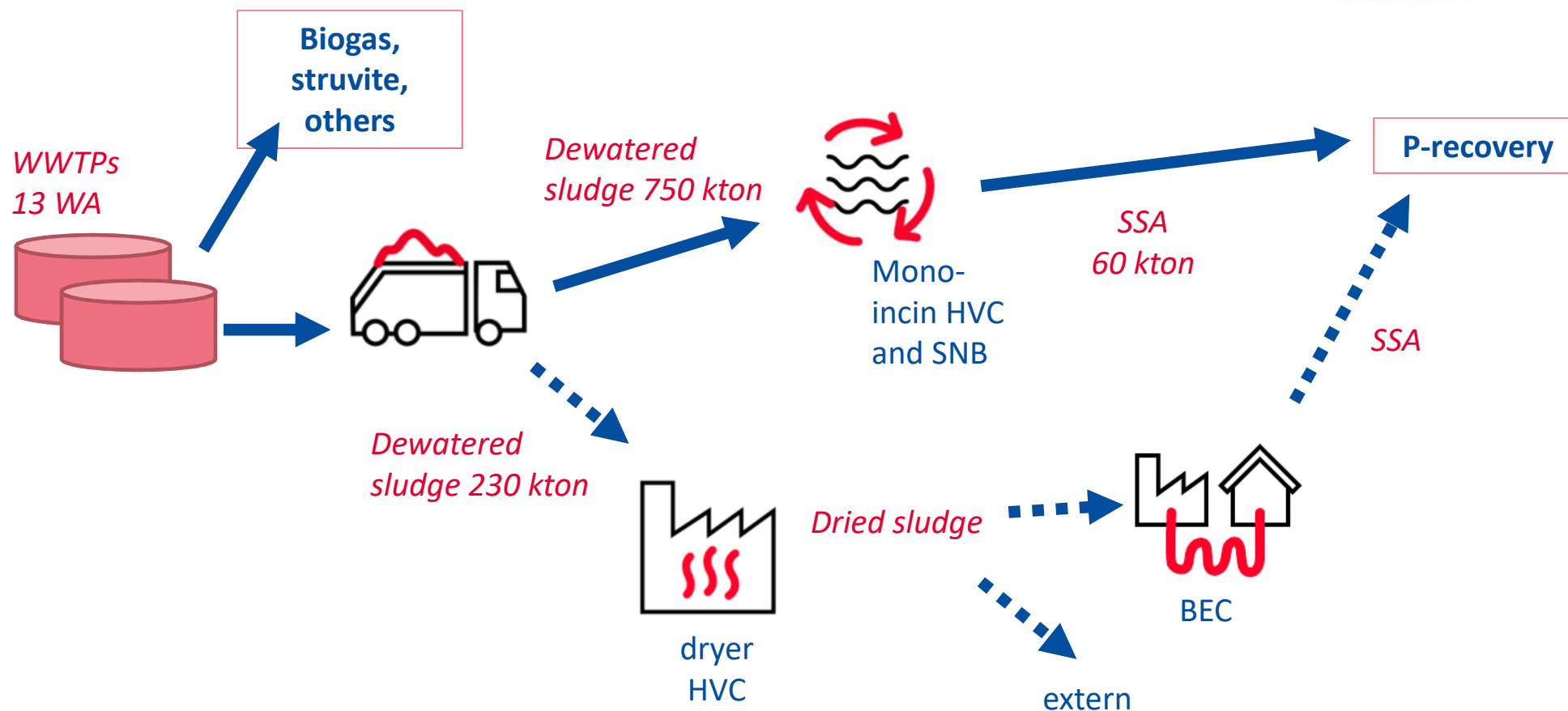
1. Waste water and sludge management in the Netherlands
2. Quality monitoring ashes
3. P recovery strategies
4. Conclusions & Lessons learned

1. Key-figures sewage sludge management in NL

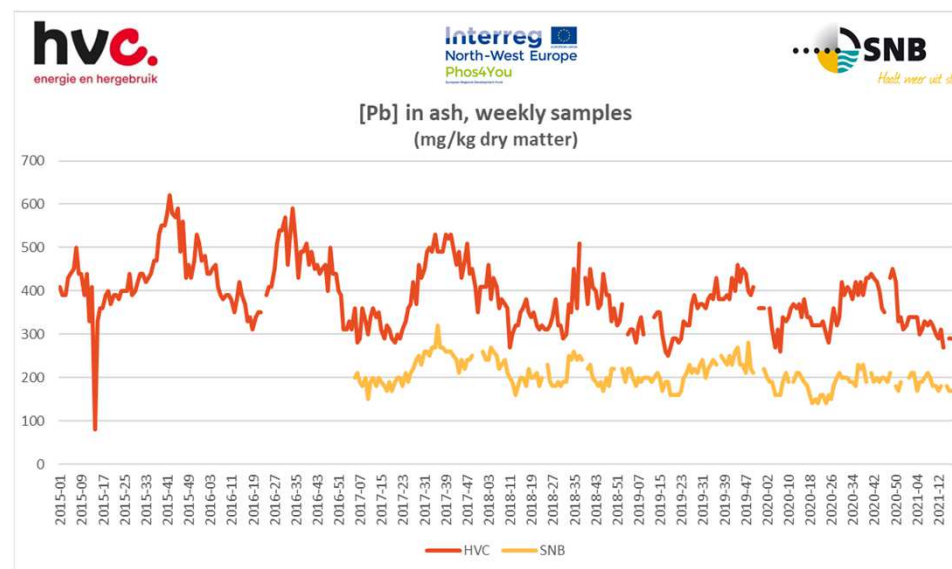
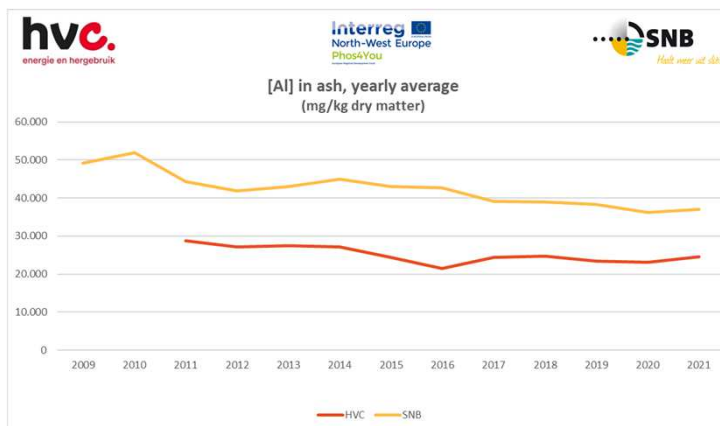
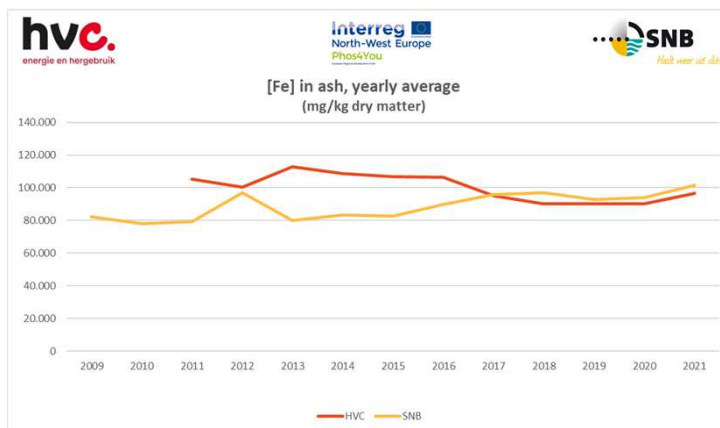
- 21 water authorities
- Responsible for water system (dikes, flood management) and surface water quality (WWTPs)
- Focus on P and N removal (and recent additional focus on removal of pharmaceuticals)
- 340 WWTPs, ± 24 M. p.e.
- 1,5 Mton of dewatered sludge
- 50% digestion of sludge
- Regulations led to establishment of 2 sludge incinerators: HVC and SNB in 1990's (green dots), owned by water authorities
- **Ambitions “Energy and Resource Factories”**
 - **More digestion → biogas and green gas with CO₂-capture**
 - **Recovery of resources → P**



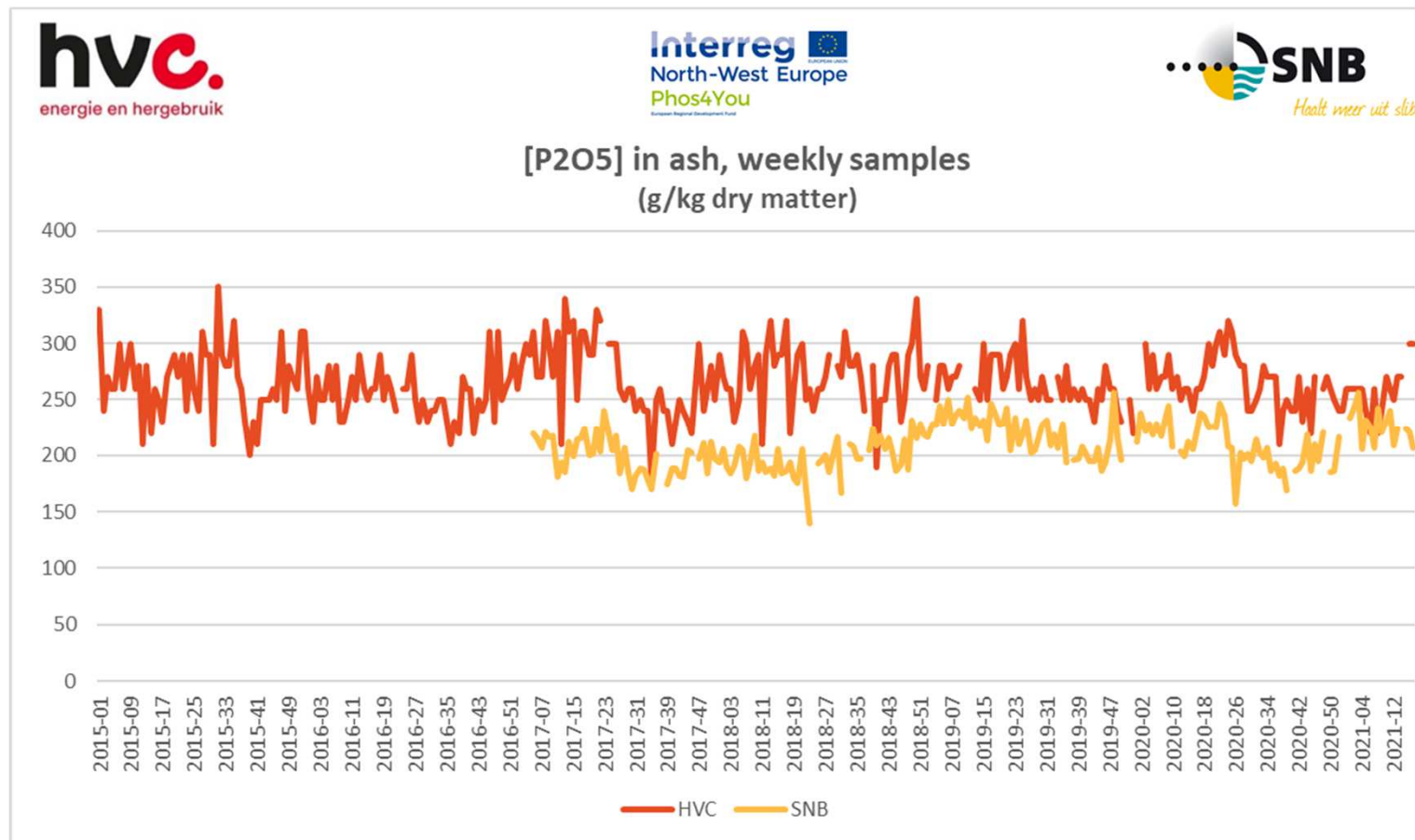
Sewage sludge processing today HVC & SNB



2. Quality monitoring ashes



Phosphate

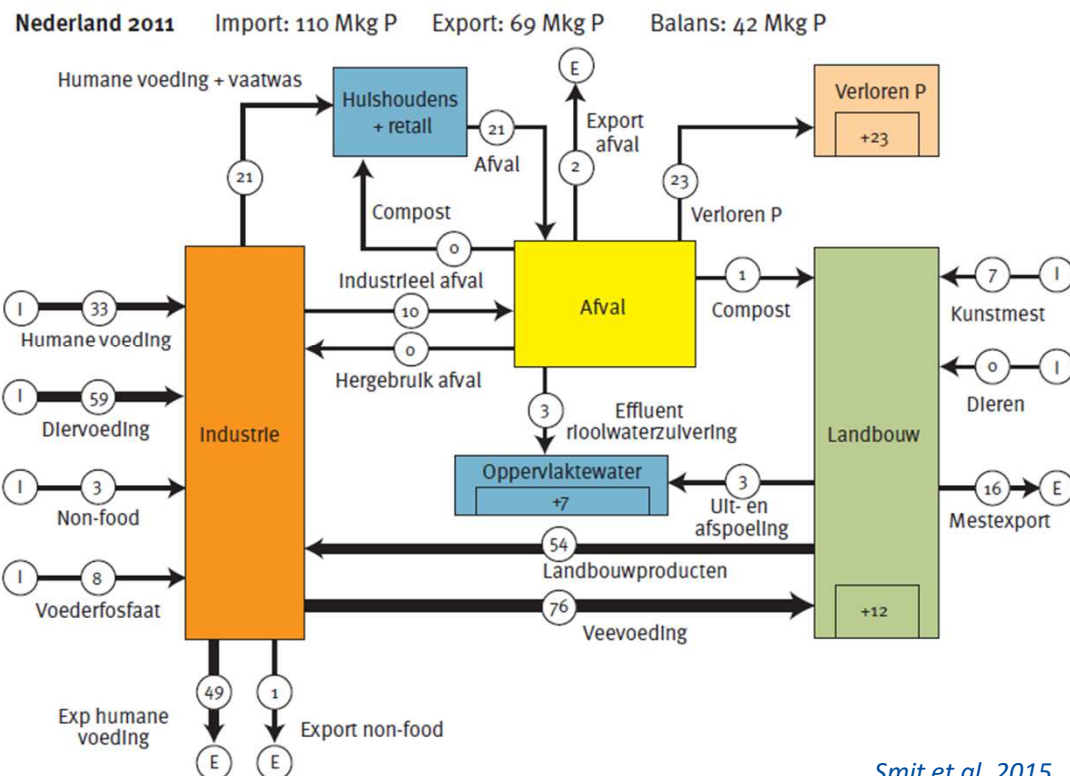


60 kton SSA
25% P2O5

= 6,5 kton P

P-unbalance in NL

Fosforstromen in industrie, landbouw, huishoudens, afval en oppervlaktewater in 2011
(miljoen kg P per jaar)



- Import P > export P
- surplus of 42 kton P/jr
- Of which:
 - 30% accumulates in agriculture (12 kton)
 - 15% is lost via surface water (7 kton)
 - 55% is lost via waste (23 kton)

→ of which 6,5 kton is in SSA!!!

3. P-recovery strategies

Phase 0 (2011-2019)

- Thermphos
- ICL → contract 2019-present, starting up now.
- Ecophos, extensive R&D cooperation from 2011 → Bankrupt in early 2020!

Calibration period (2019-2021)

- Continued monitoring of sludge and ashes
- R&D with new technologies/partners, f.e.:
 - Tetraphos/Remondis (DE)
 - Ash2Phos/Easymining (SE)
 - Susphos (NL)
 - Spodofos (NL)
 - Seraplant (DE)
 - Rubiphos/TTBS (BE)
 - Prayon (technology of Ecophos)
 - and spin-off from P4Y partners.
- Setting the internal vision: Resulting in a set of selection criteria (next slide)

3. P-recovery strategies

Criteria for selection

- Proven technology
- > 80% P recovery
- Removal of HM
- Time to realisation limited
- Full scale installation applicable/permittable at site close to SSA-producers
- Financial commitment of technology provider



P-recovery strategies

Phase I (2021-2025)

- Preferred Technology Tetraphos, and JV with SNB/HVC/Remondis
- Pilot tests finished 2021
- Full scale plant (60 kton ashes/year in Moerdijk)
- Schedule 2025 (if all according to smooth timelines)
- R&D for new/other technologies for phase 2

Phase 2 (After 2025)

- New and more sewage sludge and SSA available, although perhaps different qualities
- Realisation of smal(ler) scale additional P-recovery plant
- Many technologies to choose from

4. Conclusions & Lessons learned

1. Data-set of years on SSA analyses is valuable, many requests from partners for ash
2. 10 years ago just one technology emerged, whereas in recent years many new technologies emerged → how to choose? → selection criteria
3. Waiting for better technologies vs. just do it on large scale and take decisions on what we have and know NOW
4. BC drives on gatefee ash, sales of P, but crucial is valorisation of by-products
 1. Quality Fe and Al recovery
 2. Application of leached ashes
5. Until now, all studied technologies indicate that the P-content in SSA does not translate in a positive value for SSA
6. Phos4You created a valuable network and great support!

