Driver and Barriers - Struvite

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GreenTile (NuReSys process)

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N° 101060426.

Technical - Struvite (NuReSys Technology)

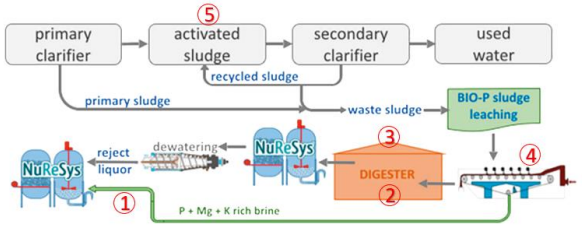
Technical drivers

- ✓ NuReSys technology = TRL 9
- ✓ Full-scale references in municipal and industrial wastewater treatment plants
- ✓ Business model = Integral phosphate management Not driven by struvite sales / optional and modular
- ✓ Recent research = struvite versus mineral = at least as good or even better

Technical barriers

- Lack of quantities per **production site** to compete with supply of conventional fertilizers = centralized solution for sales
- Variable/uneven granule size. Focus on removal of PO_4-P and not optimization of granule growth. Need for further processing for homogenization?
- Economy of scales
- Only soluble fraction of PO_4-P can be converted to struvite

IPM



1. Phosphorus return load
2. Pipe clogging / scaling issues
3. Struvite grit accumulation
4. Dewatering issues Bio-P
5. Stabilizing Bio-P process

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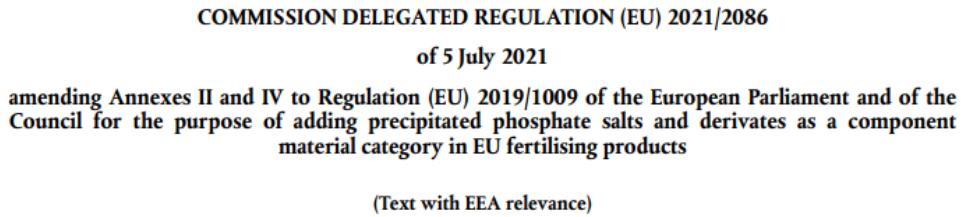
Legal - Struvite (NuReSys Technology)

Legislative drivers

- ✓ Struvite is CMC12, and PFC 1(C)(I)(a)(ii)
  (EU) 2021/2086
  Struvite recovered MWWTP and IWWTP
- ✓ Fertilizer Product Regulation for CE mark = process initiated
- ✓ Allows use in organic farming



COMMISSION DELEGATED REGULATION (EU) 2021/2086

of 5 July 2021

amending Annexes II and IV to Regulation (EU) 2019/1009 of the European Parliament and of the Council for the purpose of adding precipitated phosphate salts and derivates as a component material category in EU fertilising products

(Text with EEA relevance)

Legislative barriers

- ○ Lack of financial incentives to use recovered fertilizer
  Competitive conventional fertilizer price
  In Germany, P in solids < 2% = P recovery encouraged
- ○ Struvite formed within digestate = waste
  No separate recognition ≠ CMC12
  Not allowed for land spreading
- ○ Struvite in compost = added value but no separate recognition or validation
- ○ Struvite from manure = huge potential / manure status

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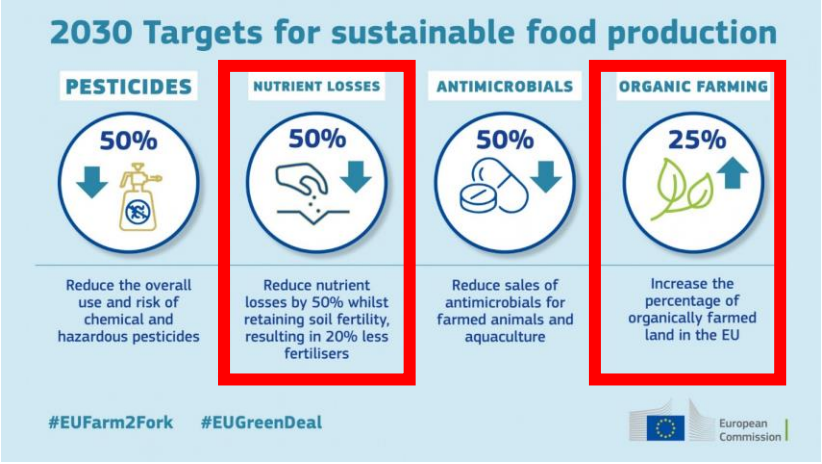
Environmental - Struvite (NuReSys Technology)

Environmental drivers

- ✓ Slow-release fertiliser = no runoff
- ✓ Phosphorus listed as critical substance EU
- ✓ EU Green deal
  Reduced GHG emission = NO_x



Environmental barriers

- Nutrient content not balanced
  Good P fertilizer, bad N fertilizer
  Need to be applied in combination with other fertilizers
- Commodity rather versus pure fertilizer
- Some specific low dosage rates (20-30 kg/ha) as precision fertilizer

Yang, Z., Ferron, L. M., Koopmans, G. F., Sievernich, A., & van Groenigen, J. W. (2023). Nitrous oxide emissions after struvite application in relation to soil P status. *Plant and Soil*, 1-15.
Wang, L., Ye, C., Gao, B., Wang, X., Li, Y., Ding, K., Li, H., Ren, K., Chen, S., Wang, W. and Ye, X., 2023. Applying struvite as a N-fertilizer to mitigate N2O emissions in agriculture: Feasibility and mechanism. Journal of Environmental Management, 330, p.117143.

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Social - Struvite (NuReSys Technology)

Social drivers

- ✓ Biobased product, allowed in organic farming

Social barriers

- End users only happy to use recovered products from food waste industry
  Assumed 'safe'
- Reluctantcy to use product from MWWTP origin

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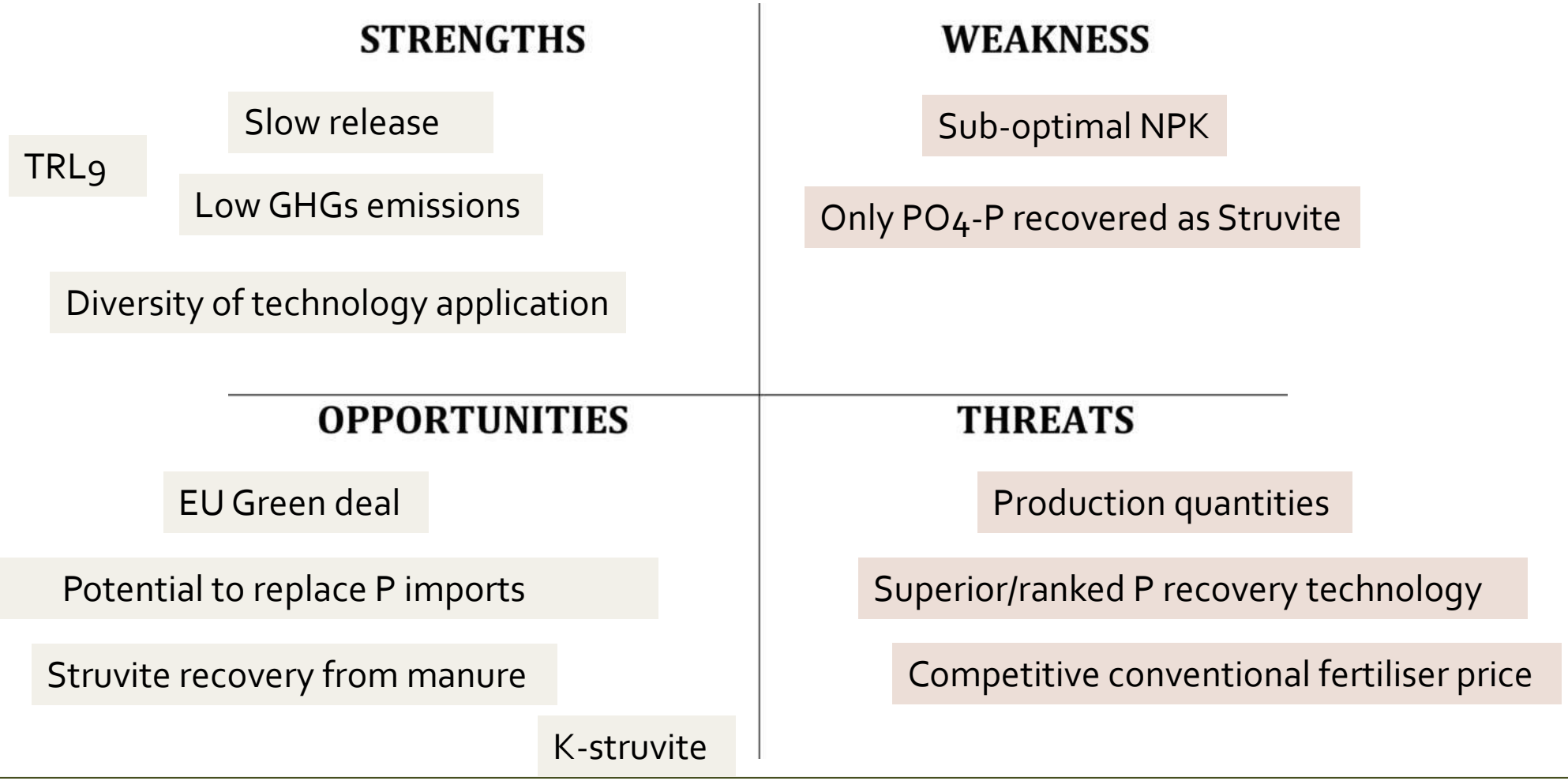
SWOT Analysis



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"Struvite technology is a mature process with high potential combining solving P related issues with recovery of high grade and multi-functional end product"

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