Phosphorus Recovery Actions in Copenhagen

NORDIWA NORDIC WASTE WATER CONFERENCE

- The history of P in ash deposits, BIOFOS
- Promising methods to recover P and other elements in the ash

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3 Wastewater Treatment Plants & 2 Incineration Plants

Lynetten
1 mio. PE
170 MLD

Avedøre
400.000 PE
71 MLD

Damhusåen
350.000 PE
82 MLD

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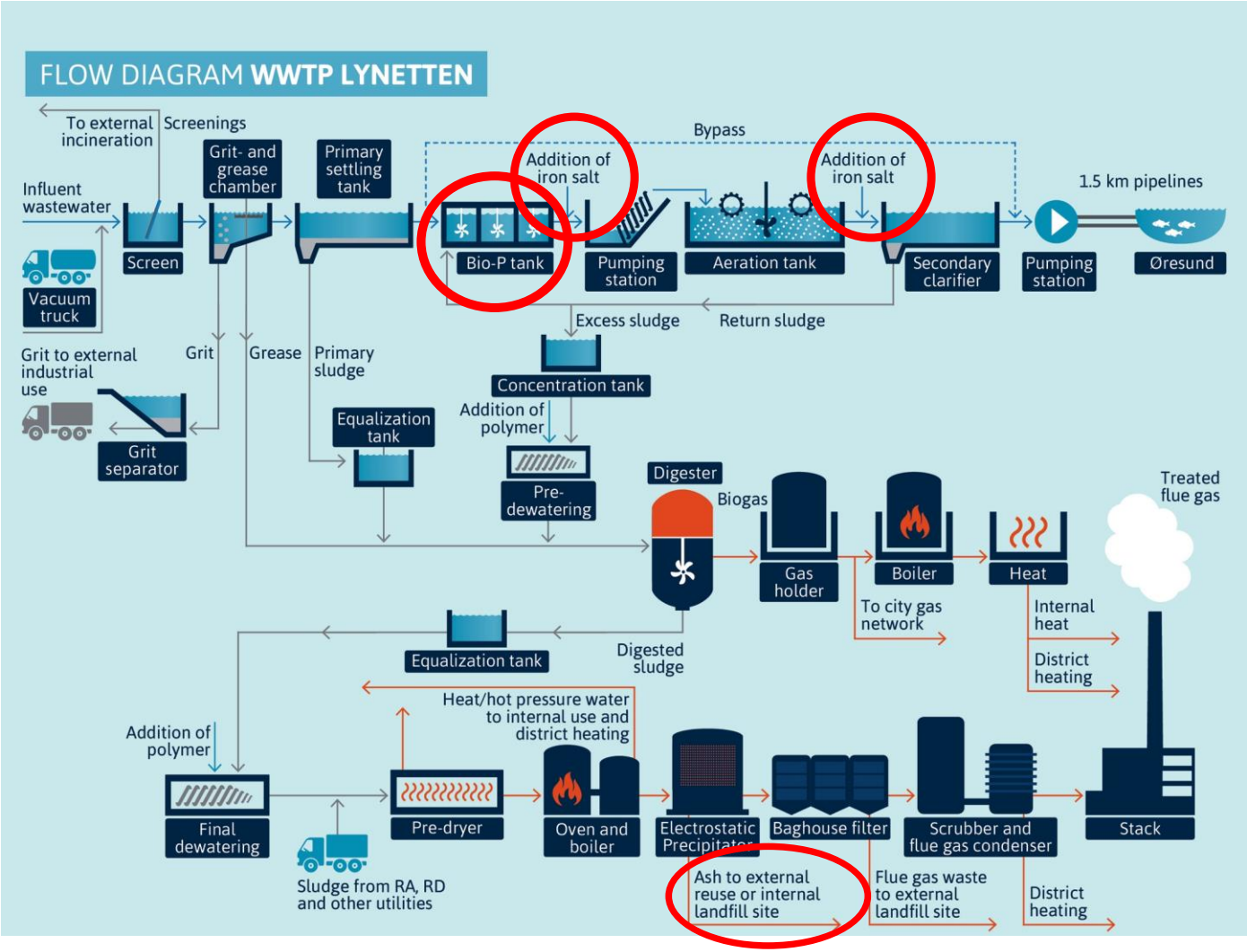
Phosphorous from wastewater to sewage sludge to ash



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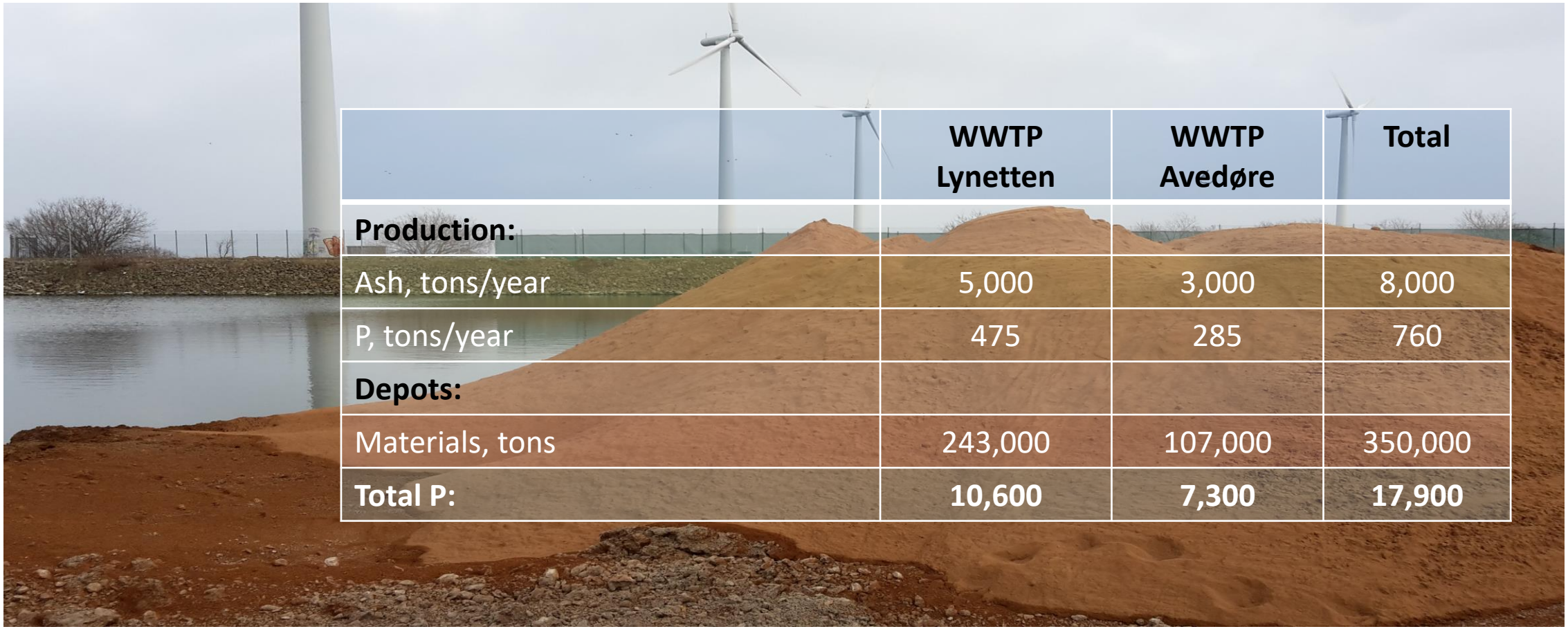
Sewage Sludge Ash – Amounts

BIOFOS 'Phosphorus-bank'



	WWTP Lynetten	WWTP Avedøre	Total
Production:			
Ash, tons/year	5,000	3,000	8,000
P, tons/year	475	285	760
Depots:			
Materials, tons	243,000	107,000	350,000
Total P:	**10,600**	**7,300**	**17,900**

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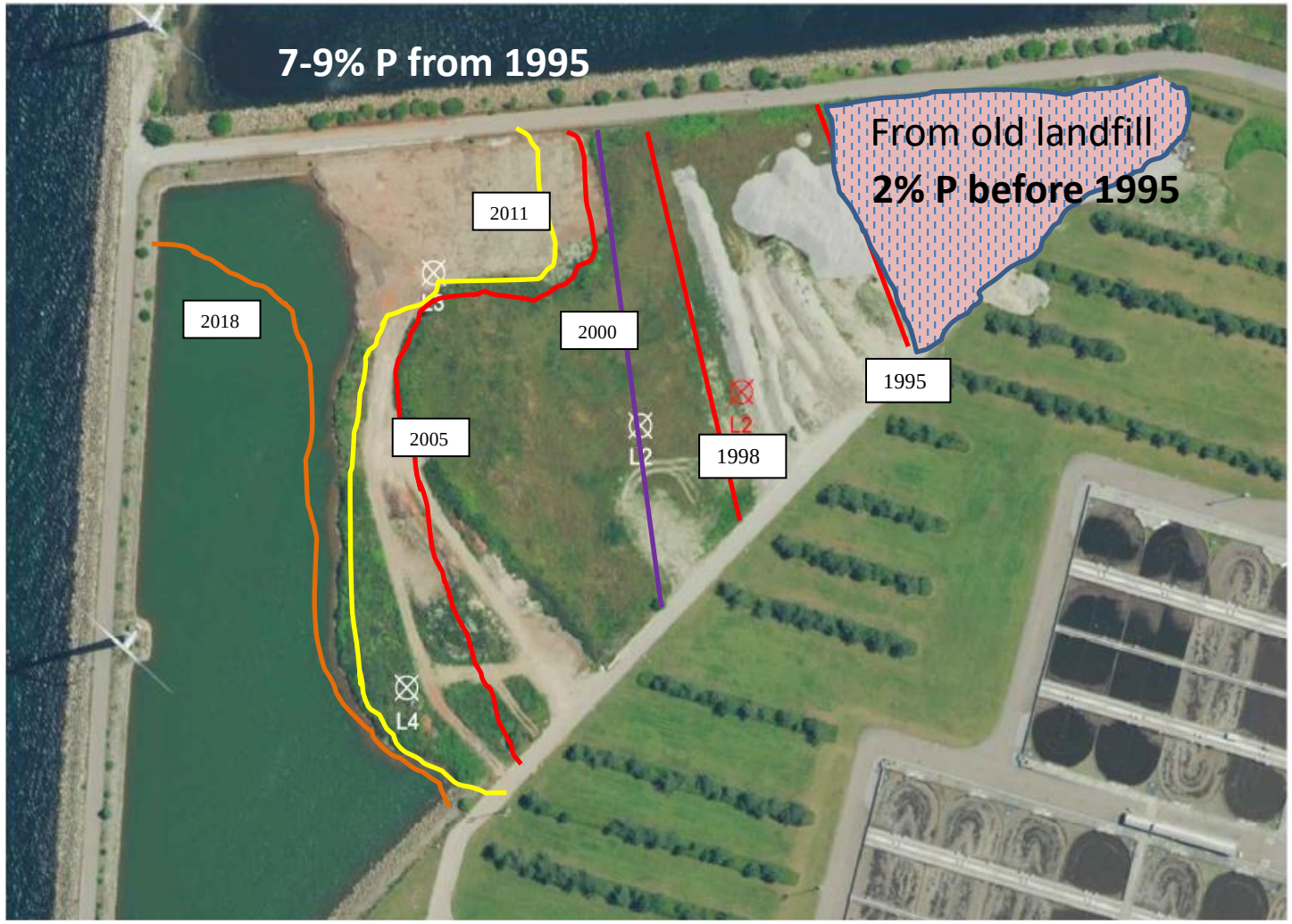
Ash Depot – Lynetten WWTP start in 1995

Rockwool 2005



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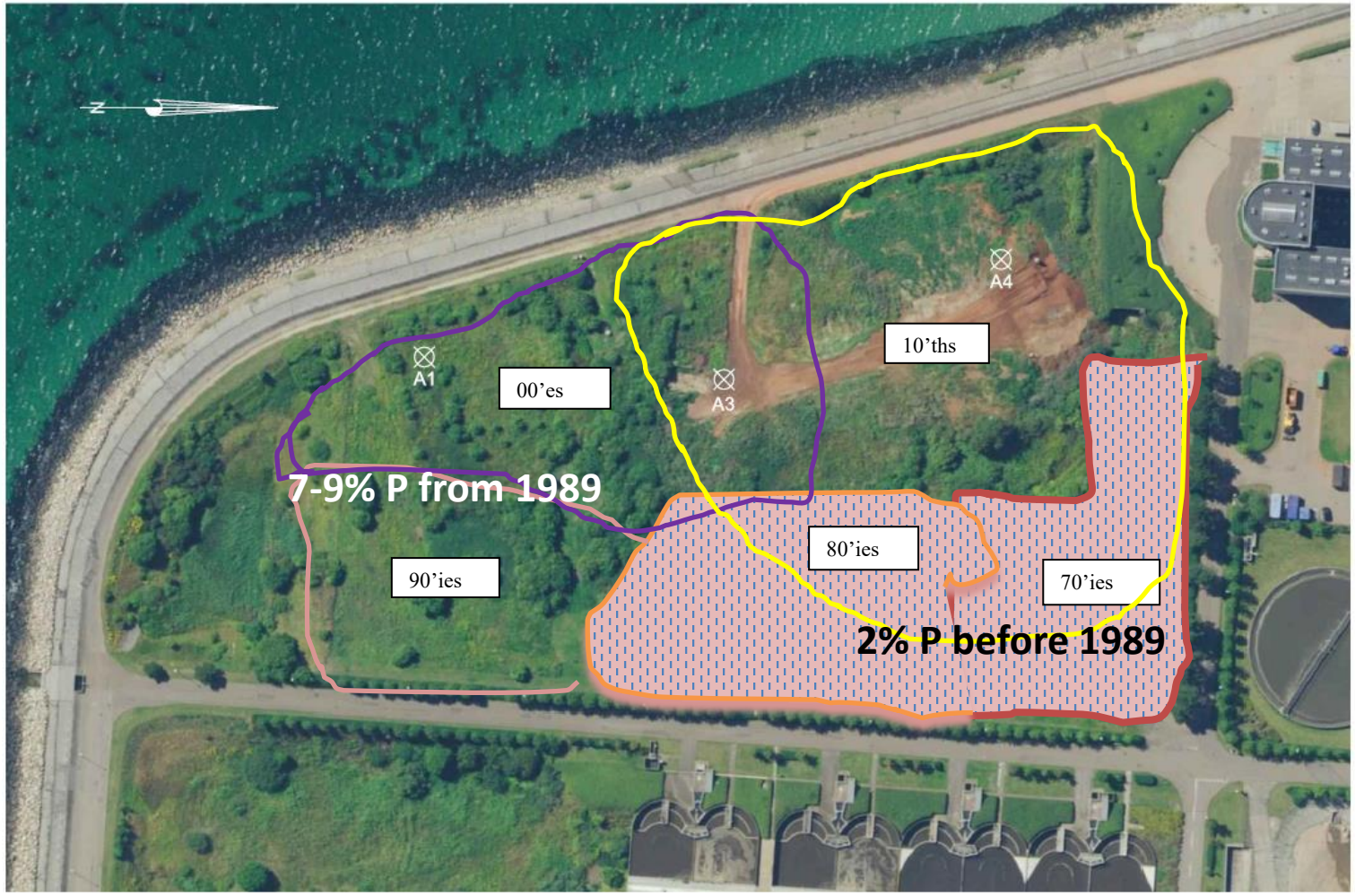
Ash Depot – Avedøre WWTP
start i 1972



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Evaluation Criteria - Ash Technologies

- Technology Readiness Level
- Cost
  - Capex & Opex
- Recovery and Environmental impact
  - % phosphorus
  - Minerals and heavy metals
- Market
  - for P
  - for other components

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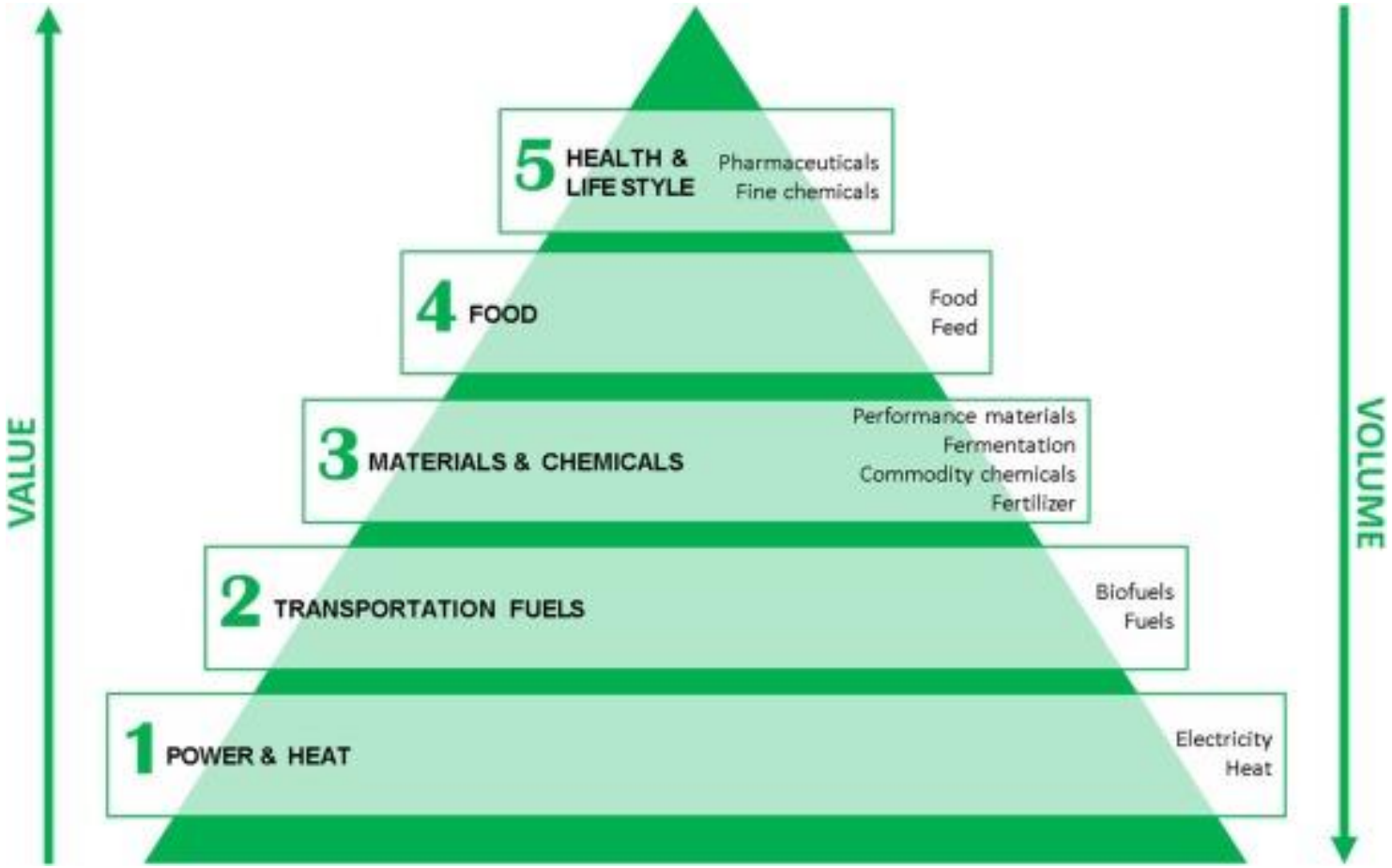
Value and markets of sewage sludge



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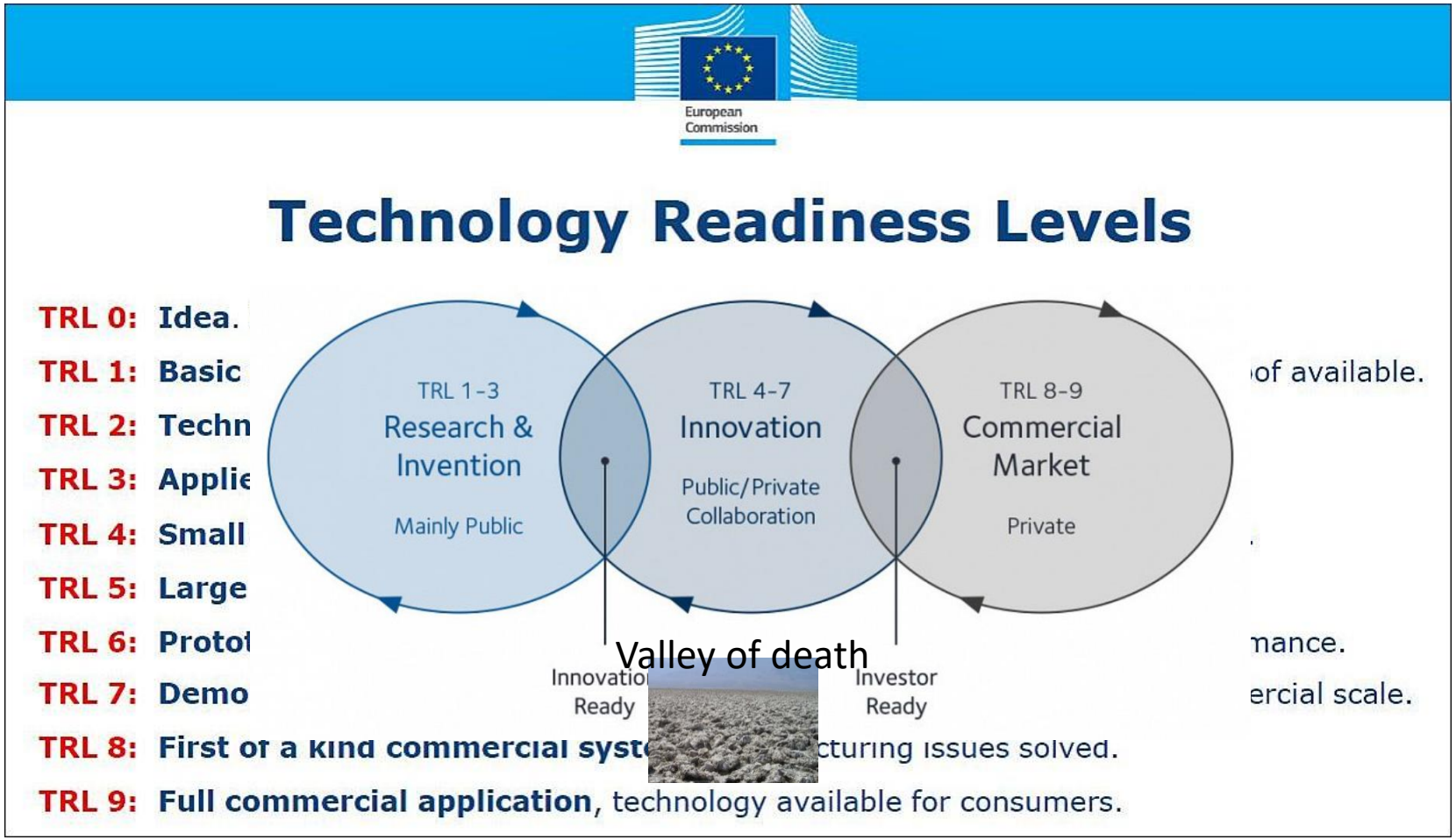
From Idea to Product for the Market



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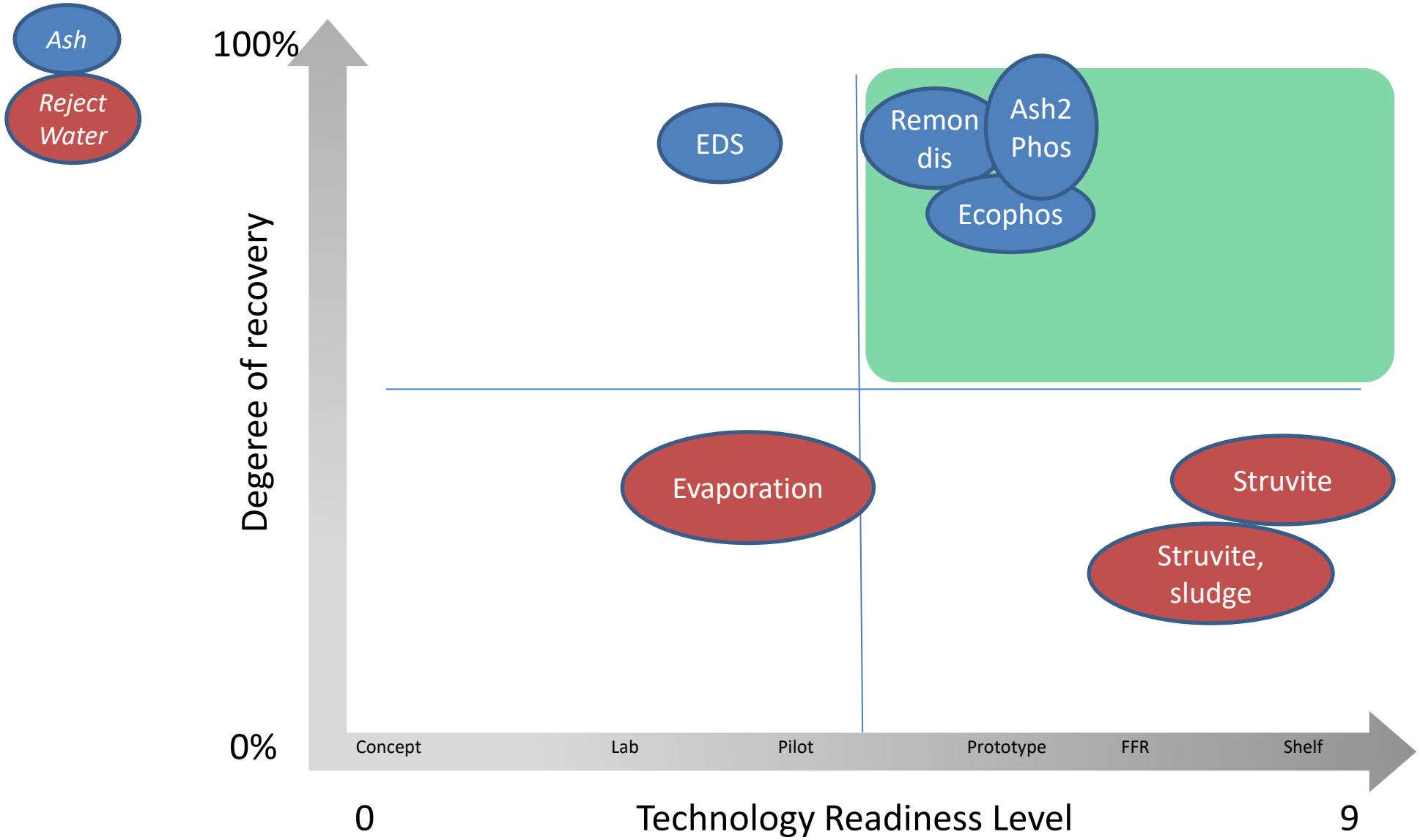
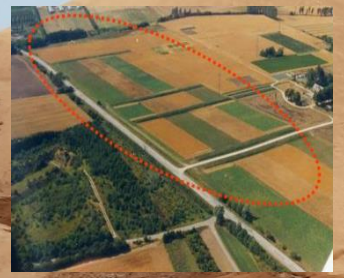
Technologies for P-recovery* – Ult. 2018

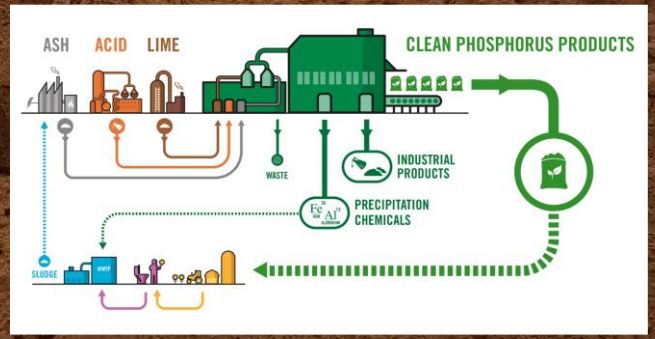


*Studied by BIOFOS

Recovery of the resources in the Ashes from Incineration

Promising future use of the ash:





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Products in which SSA can be added

Insulating material (batches) and Flagstones of contcrete:

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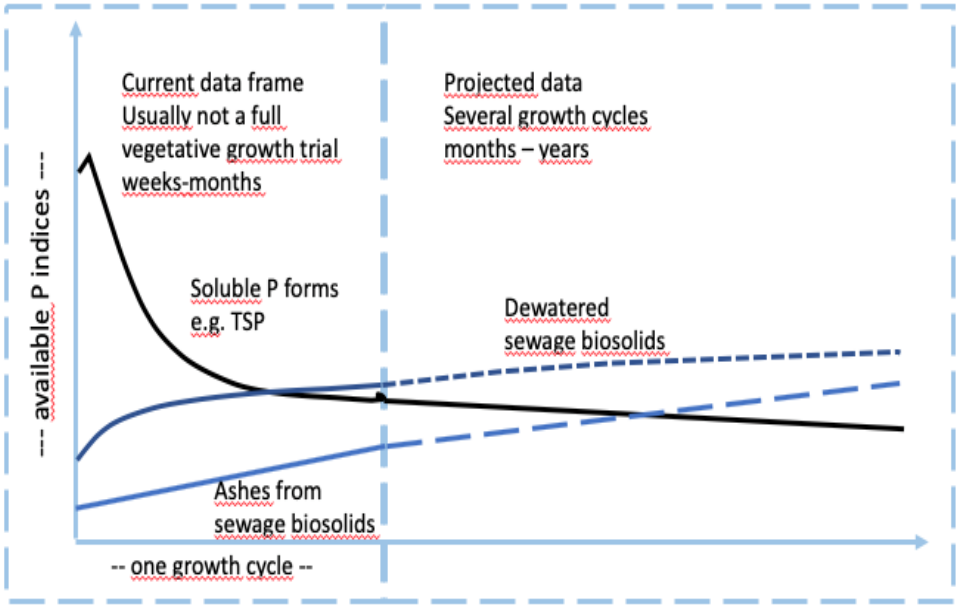
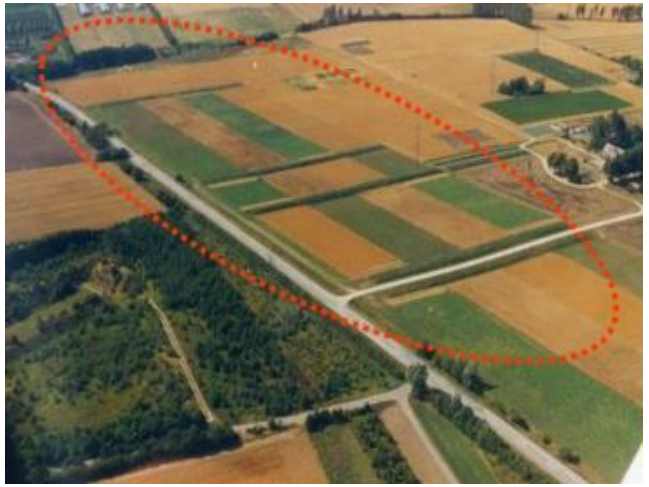
Ash to field test – cooperation with Copenhagen University





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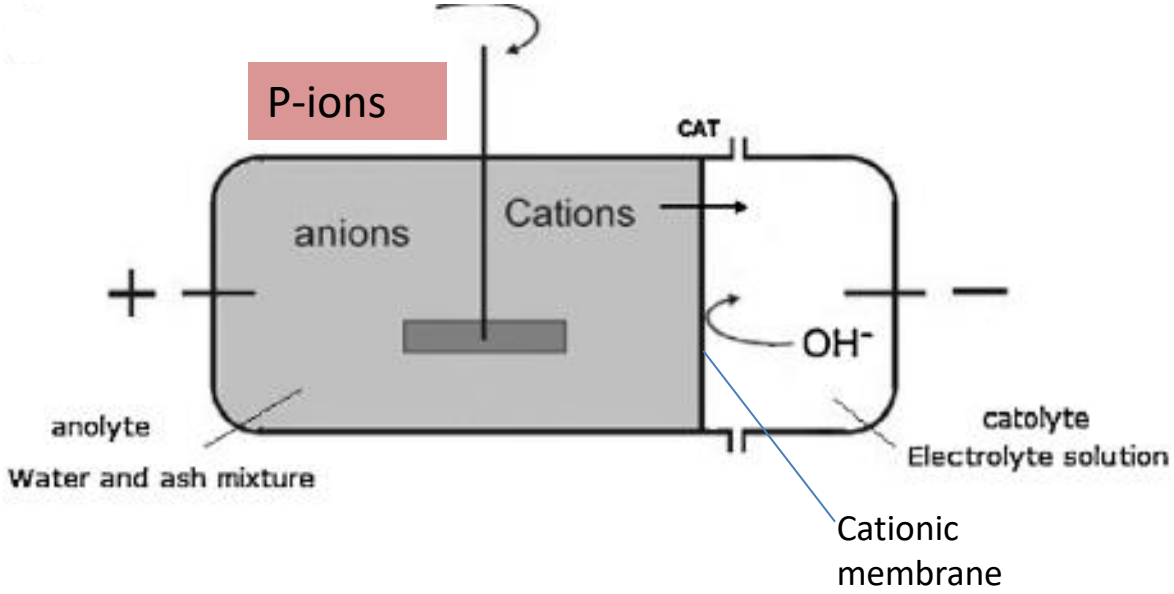
ElectroDialysis Separation for recovery of P from SSA

Lab. scale test of 2-chamber electrodialysis and pilotscale test of mixing (Krüger/Veolia, Denmarks Tech. Uni., BIOFOS)

Principle



Pilot for test of mixing

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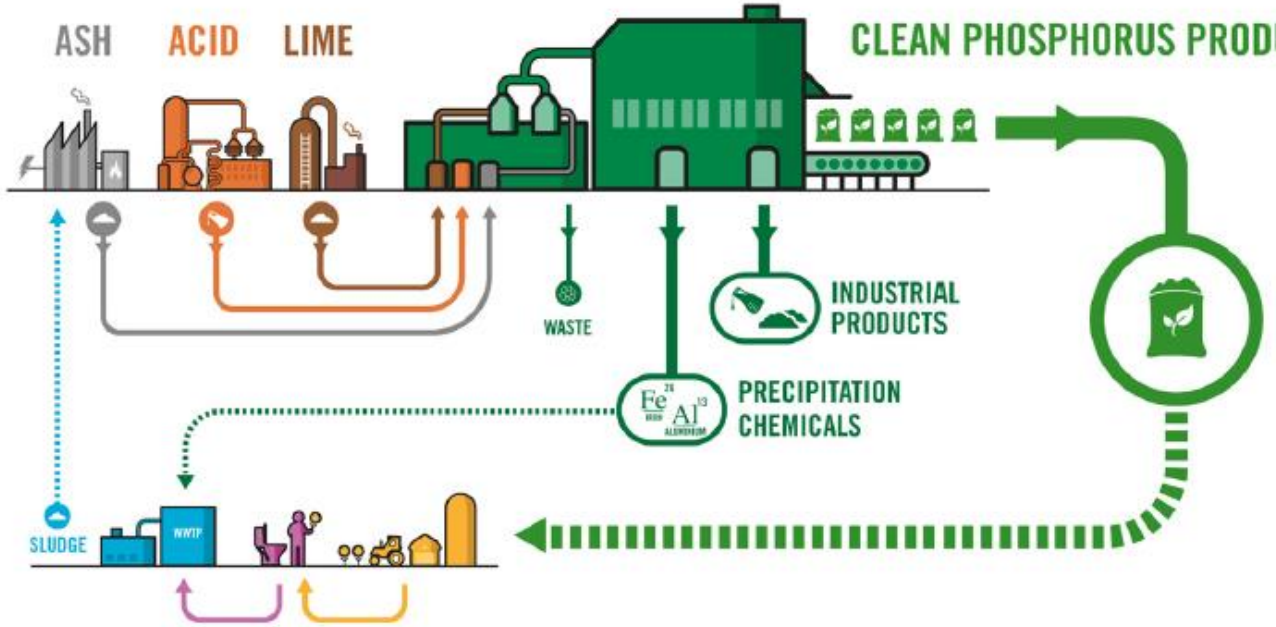
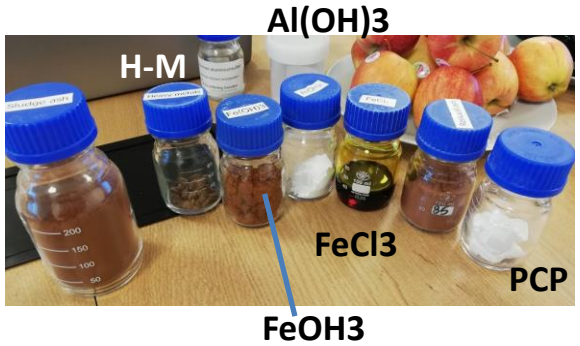
Ash2®Phos - process



Products from the process

- Phosphorus
  - Calcium phosphate (feed phosphates)
  - Ammonium phosphate (fertilizer)
- Precipitation chemicals (iron chloride & aluminum sulfate)
- Heavy metal (disposal)
- Undissolved ash



- Clean well known products
- Input chemicals become part of products
- Products effective in their applications

EasyMining

BIOFOS

Summing up

- BIOFOS is mono incinerating all sewage sludge.
- BIOFOS wants to recover all parts of the ashes as products.
- Several technologies have been evaluated for phosphorus recovery.
- Struvite production is deselected, as the recovery will be from ashes only.
- EasyMining Ash2Phos-project, ongoing investigations.
- Ongoing project with Tech. Univ. and Krüger about ElectroDialysis.
- Use of the untreated ash as fertilizer in the agriculture, cooperation with Univ. of CPH.

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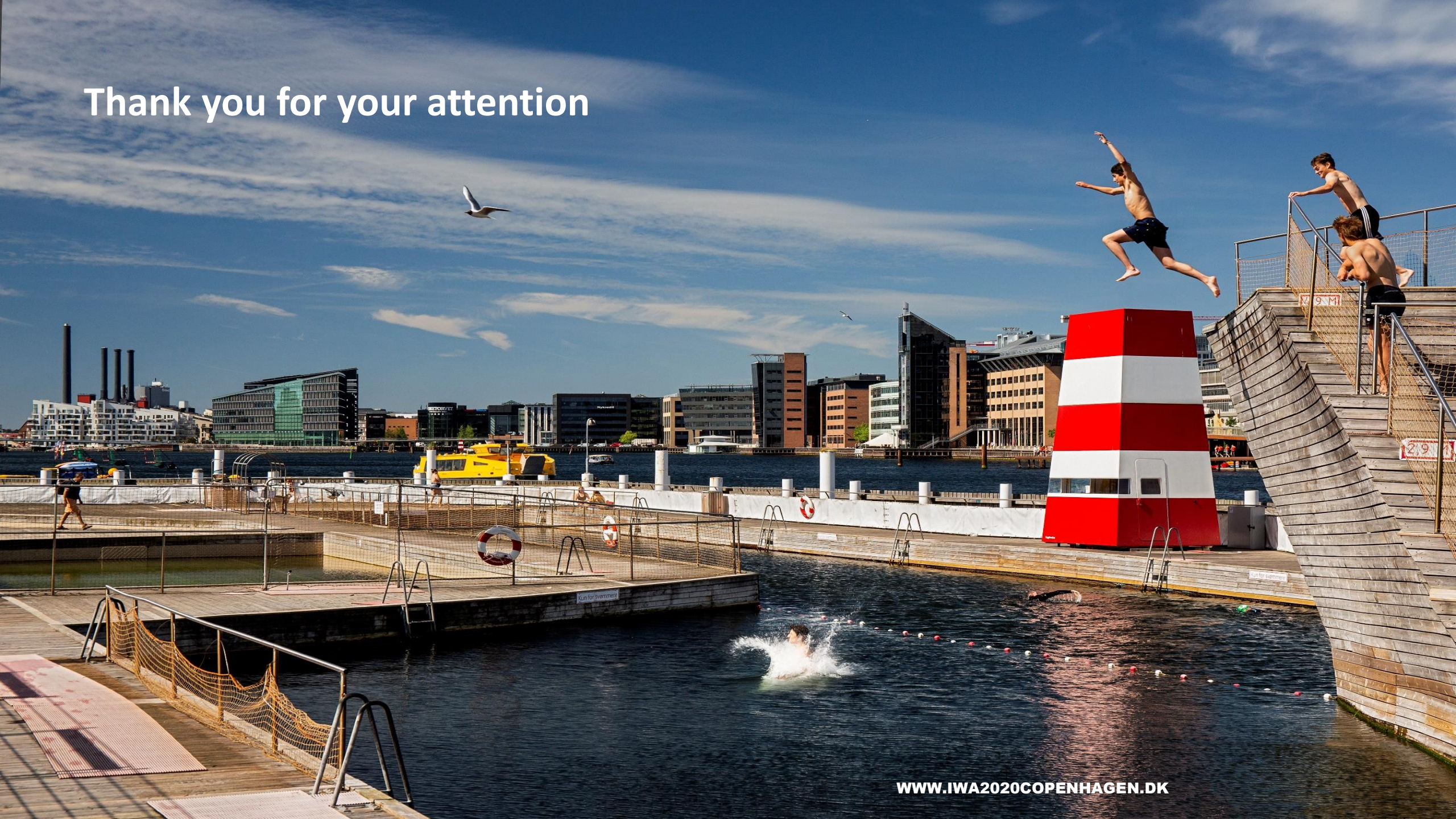
Thank you for your attention



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