

A dynamic splash of teal powder or paint against a white background, creating a sense of movement and texture. The splash is centered and spreads outwards, with some darker teal areas and lighter, more dispersed particles.

HaloSep

PURE SEPARATION


*Who in here thinks that Fly Ash/APCr with some treatment will be utilized outside landfills in the EU before 2030?*

# Stena Overview | HaloSep is part of Stena Metall, an industrial recycler and leader in the circular economy with a long history of resource management

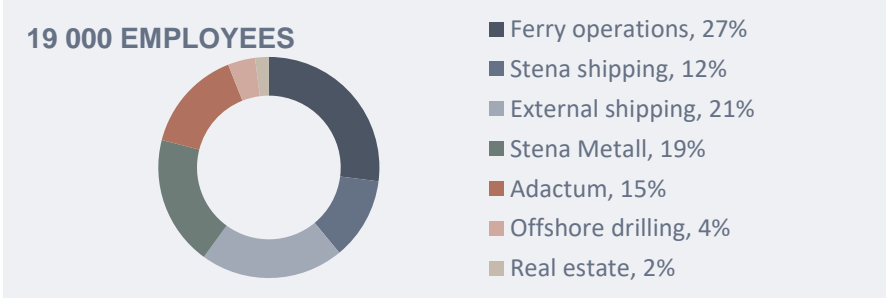
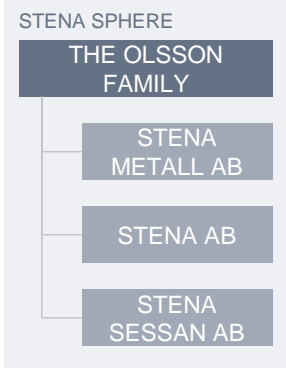
## Stena Sphere



**93,1**  
TOTAL REVENUE, BSEK



ACTIVITIES ALL OVER THE WORLD




## Stena Metall



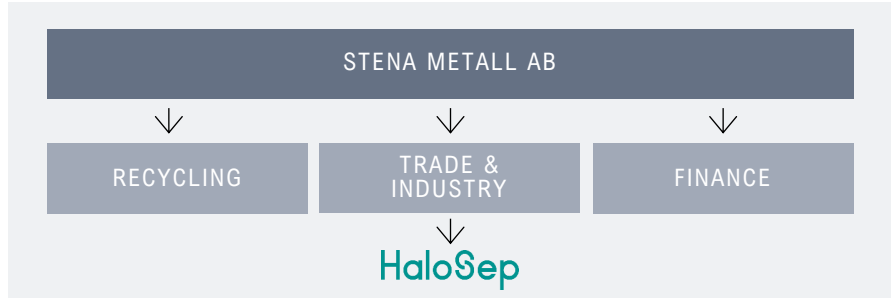
**44,3**  
TOTAL REVENUE, BSEK



**6,000,000**  
TONNES WASTE RECYCLED



**200+**  
LOCATIONS IN NINE COUNTRIES



# The Solution – HaloSep | Cutting-edge technology to transform hazardous FGT residues into valuable, recyclable, and non-hazardous materials

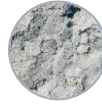
## HaloSep



*Patented Best Available Technology & application expertise*



Non-hazardous ash (~60%)



Salt fraction (~28%)



Metal fraction (~3%)

**Other fractions**  
~9%

H<sub>2</sub>O ~6%  
CO<sub>2</sub> (g) ~2 %

OS fraction >1 mm  
~1%

### Our Value Proposition



**1** Reduces or eliminates landfill and enables recovery of salt and metals

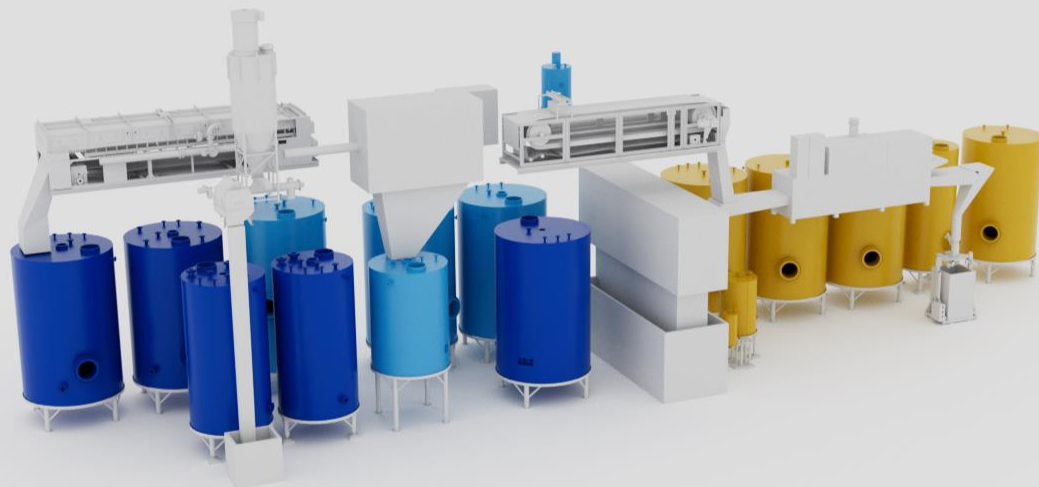


**2** Converts hazardous waste to useful and valuable resources



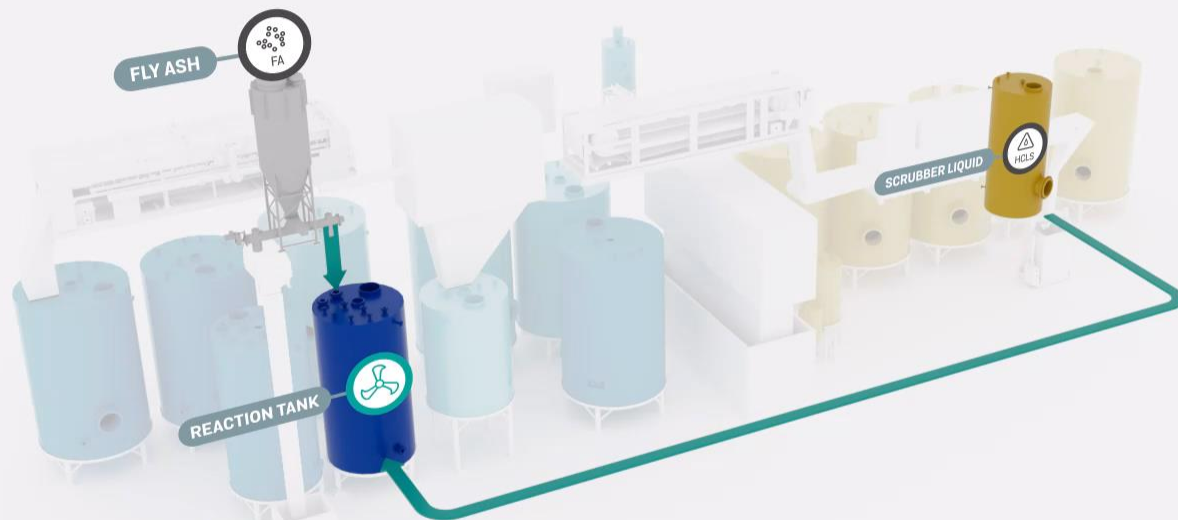
**3** Long range transportation costs and emissions are eliminated

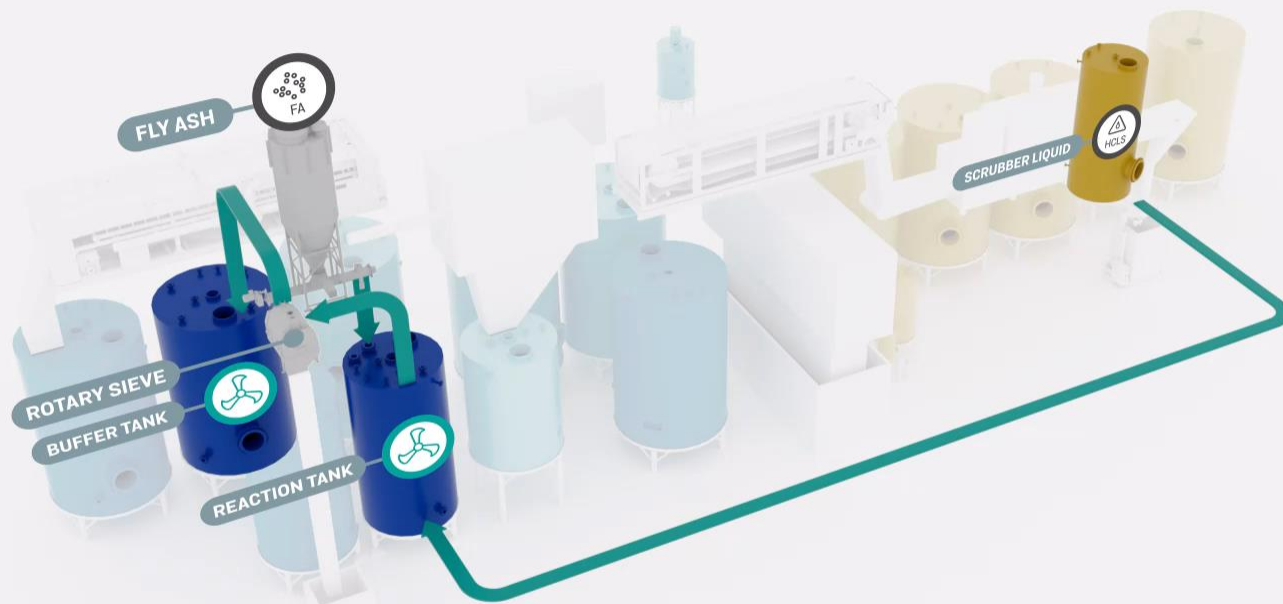
HaloSep



HaloSep

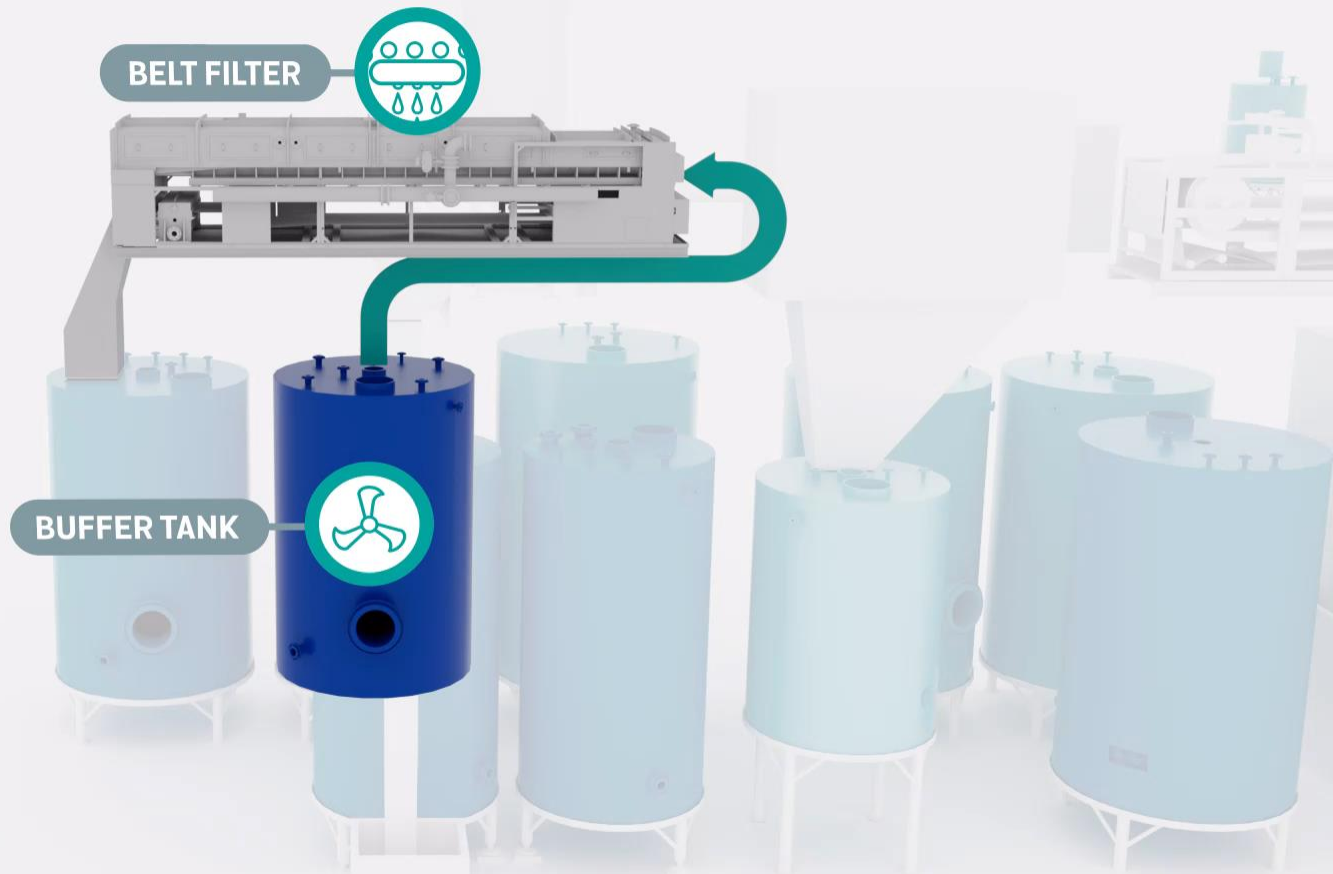


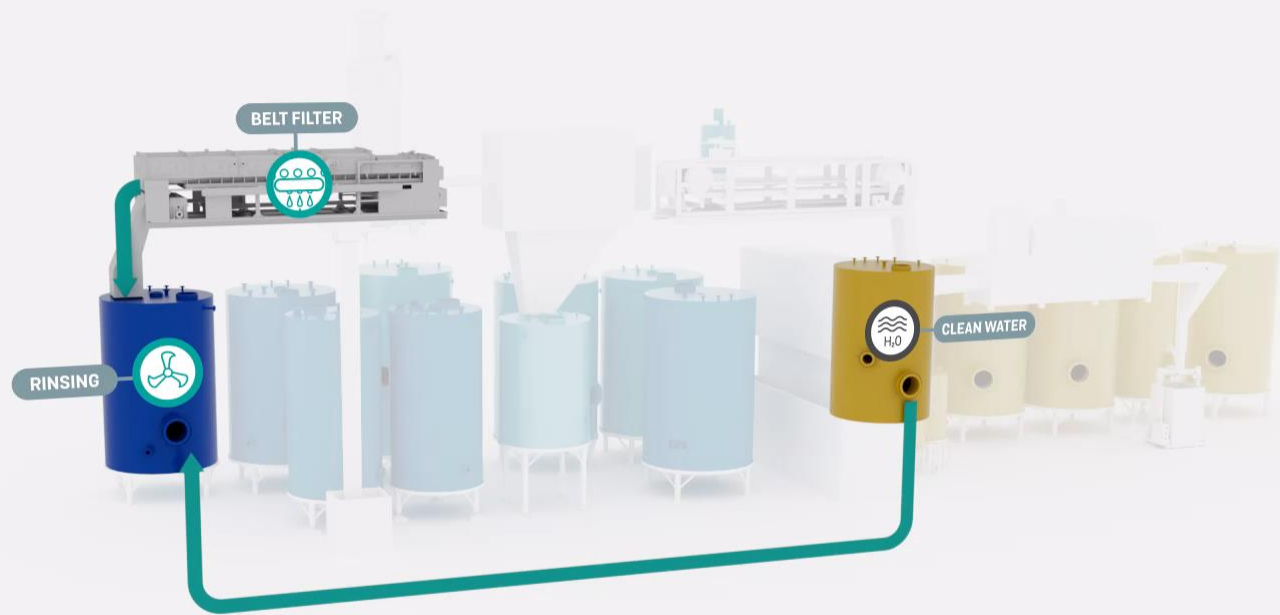


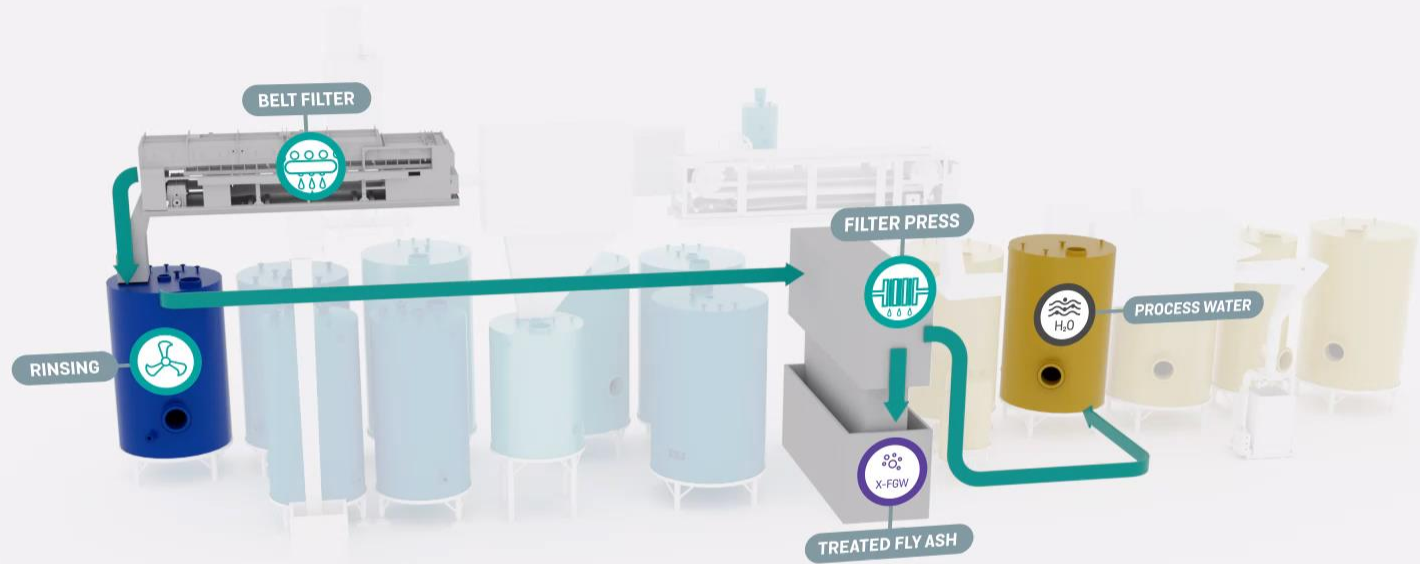


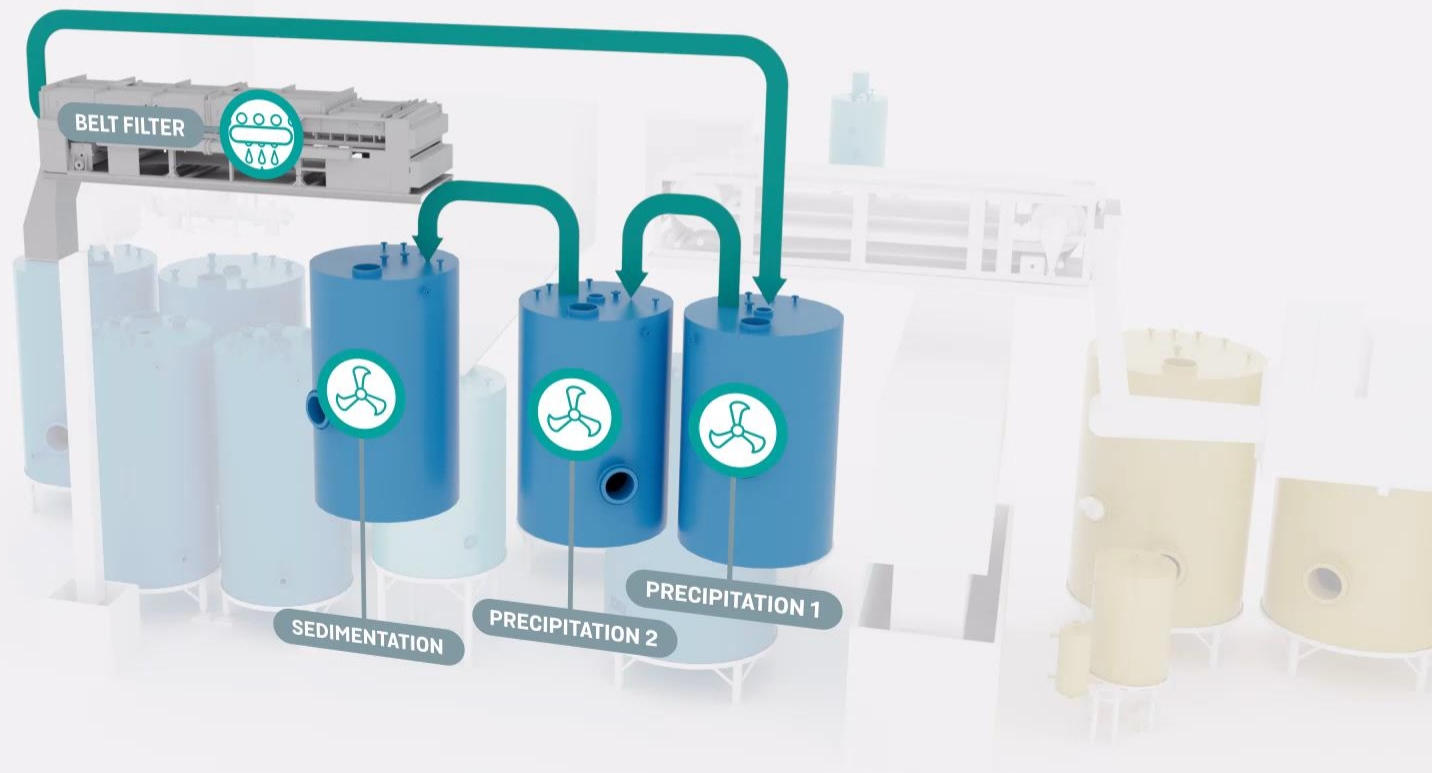


# HaloSep

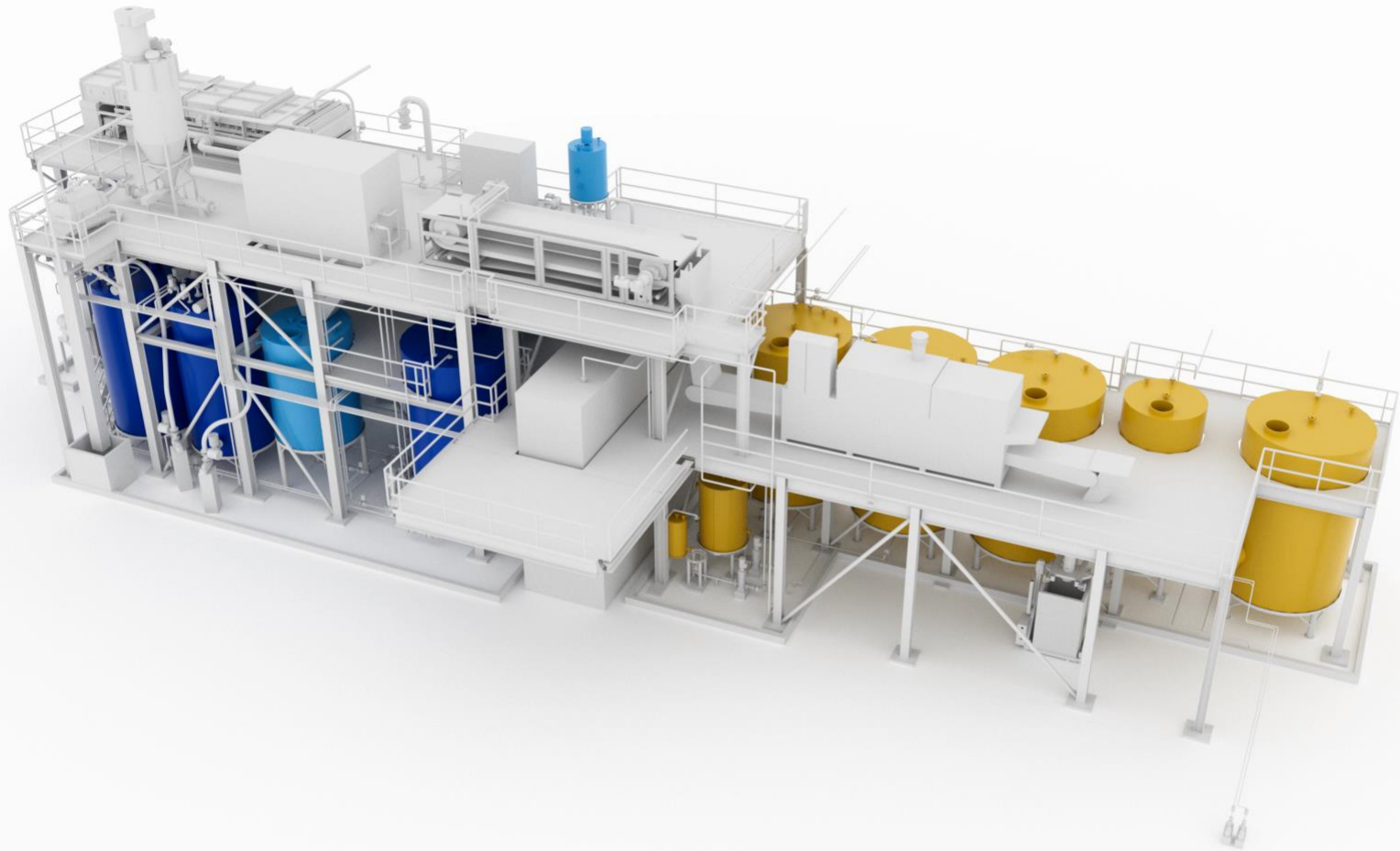












# LIFE HaloSep



PURE SEPARATION

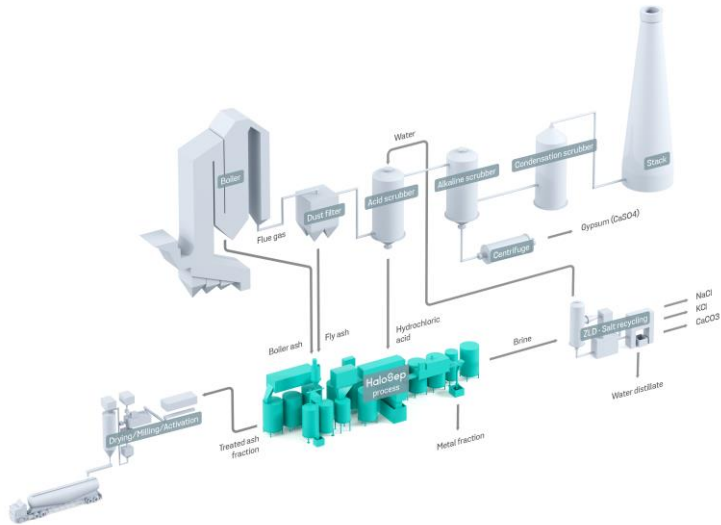
- In operation since January 2021
- The process is running 24/5
  - Running 3-shifts
  - Scale-up towards 100% to be met in 2025
- Leaching of zinc
  - Currently around 25% Zn content, increase in purity on-going
  - Sent for recycling
- Improvements & Optimizations
  - Slurry pumps
  - pH-metering
  - Cycle time reduction
  - Agitation
  - Oven efficiency
  - HCl-capacity and quality



# Patent pending | Extraction of HCl by adding a scrubber

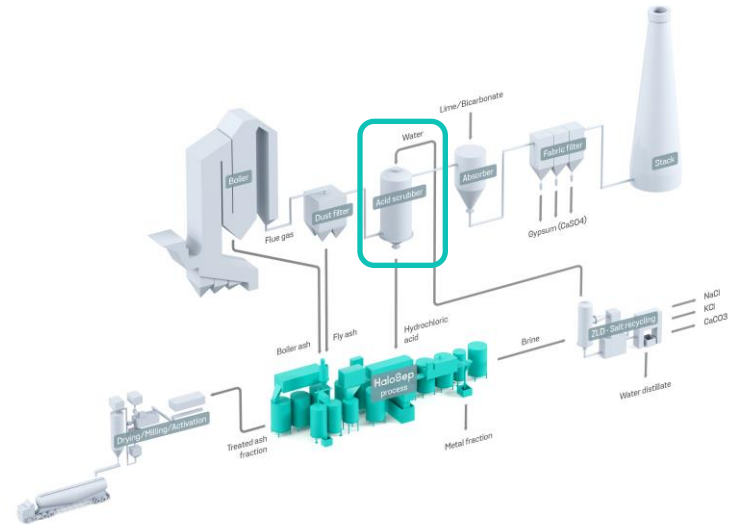
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## Wet Flue Gas Treatment System



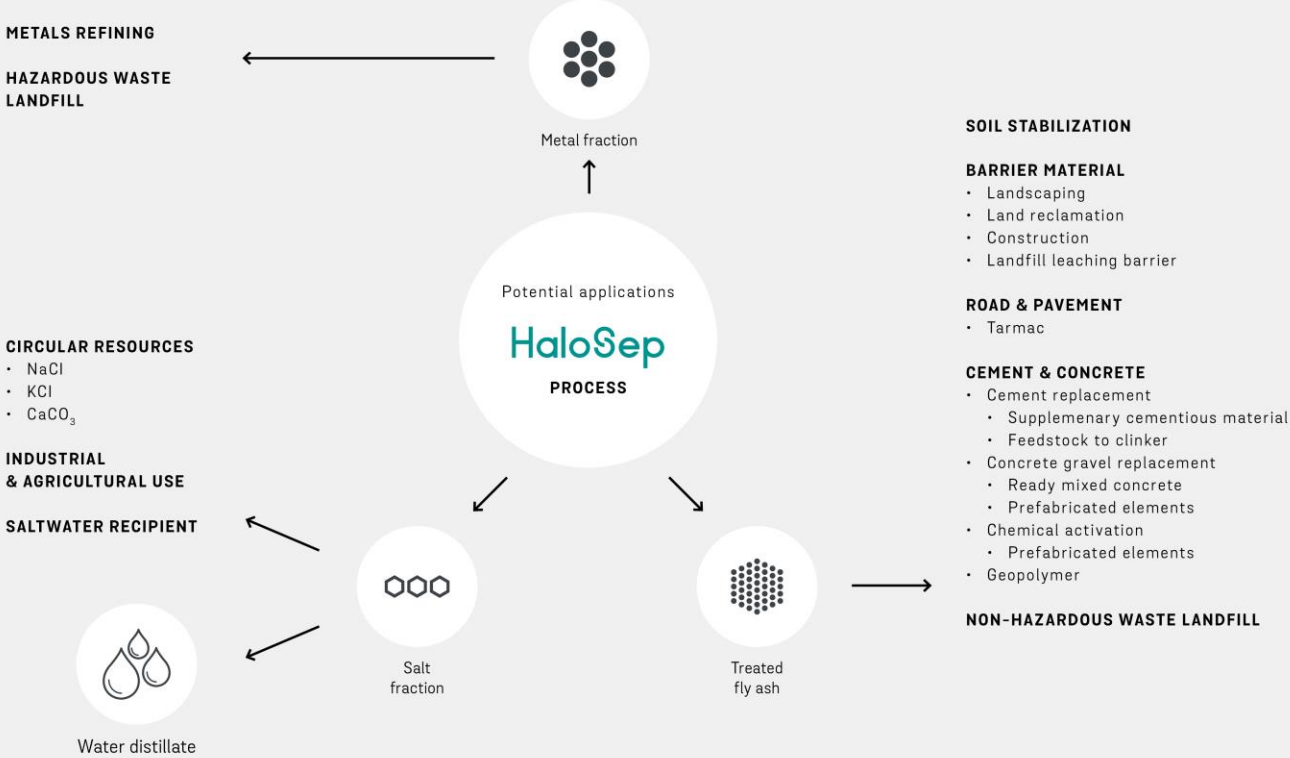
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## Hybrid Flue Gas Treatment System





# Applications – Outgoing Fractions | There is a range of potential applications for the outgoing fractions, e.g. in construction or agriculture



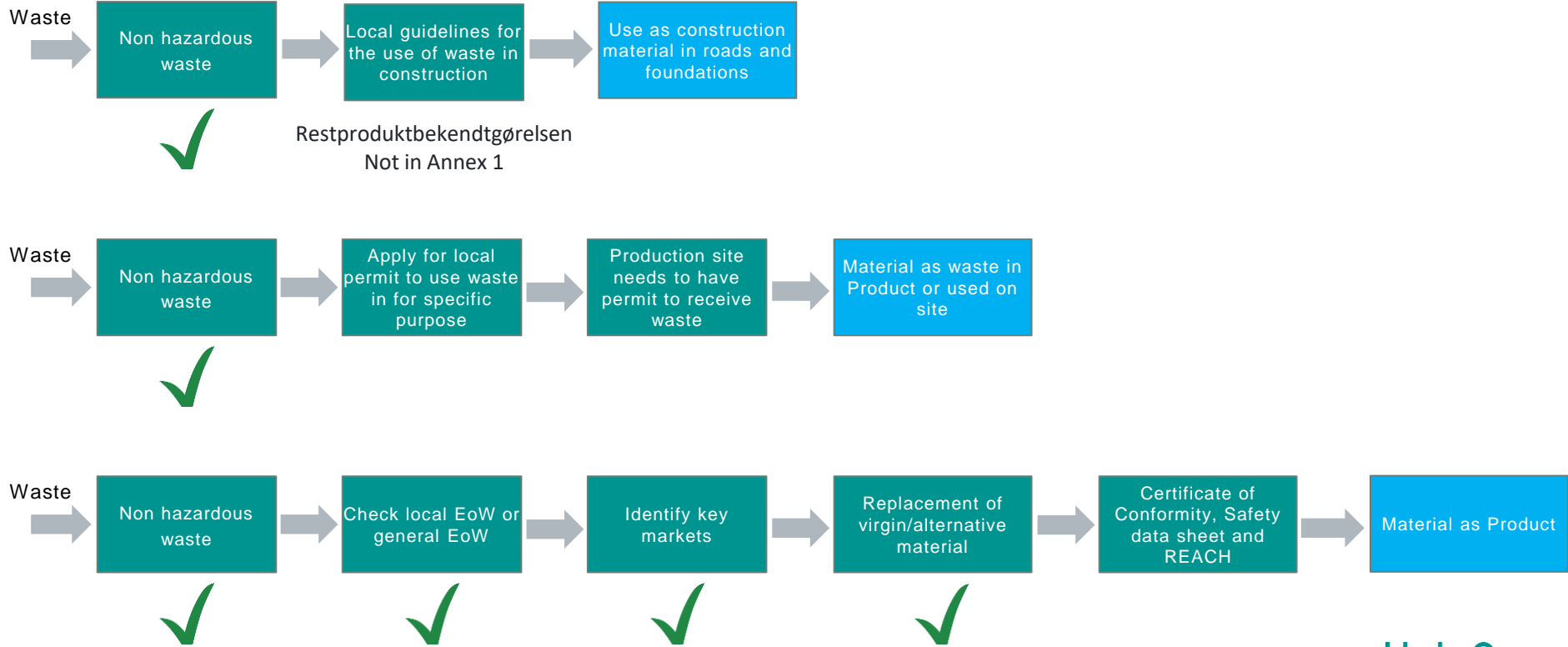
# Classification of treated fly ash | To use Treated Fly Ash in society it needs to be a classified as non-hazardous waste

		Before HaloSep	After HaloSep
HP1	Explosive	N/A	N/A
HP2	Oxidizing	N/A	N/A
HP3	Flammable	No	No
HP4	Irritant	Yes	No
HP5	Specific Target Organ Toxicity (STOT)/Aspiration Toxicity	No	No
HP6	Acute Toxicity	No	No
HP7	Carcinogenic	Yes	No
HP8	Corrosive	Yes	No
HP9	Infectious	N/A	N/A
HP10	Toxic for reproduction	Yes	No
HP11	Mutagenic	No	No
HP12	Release of an acute toxic gas	N/A	N/A
HP13	Sensitising	No	No
HP14	Ecotoxic	Yes	No
HP15	Other*	N/A	N/A
POP	Persistent Organic Pollutants	No	No

**Classification approved by Danish Authority with the European Waste Code 19 02 06 (Sludges from physico/ chemical treatment other than those mentioned in 19 02 05)**

- Water soluble salts and reactive calcium is greatly reduced in the HaloSep process  
 → No HP4 and HP8
- Advanced measurement methods show that toxic forms of heavy metals are removed in the HaloSep process  
 → No HP7, HP10 and HP14
- HaloSep AB will provide data to classify the treated fly ash as non-hazardous waste in accordance with European standards and thereby enable industrial use
  - 3<sup>rd</sup> update of zinc speciation
  - Our own classification tool

# Classification of treated fly ash | Routes to Industrial Use



# Update on outgoing fractions | Declaration of interest



# Summary | HaloSep Process

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- Be ambassador for new technologies, where landfills can be avoided
- Other circular applications and pioneering countries should inspire us to move faster
- HaloSep AB have changed our business model to help customers with outgoing fraction
- Do not hesitate to contact us
- What are your expectations of HaloSep AB to move forward faster?

# THANK YOU FOR YOUR ATTENTION!

**Customer contact references:**

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Daniel Holm

Henrik Jilvero

[www.halosep.com](http://www.halosep.com)