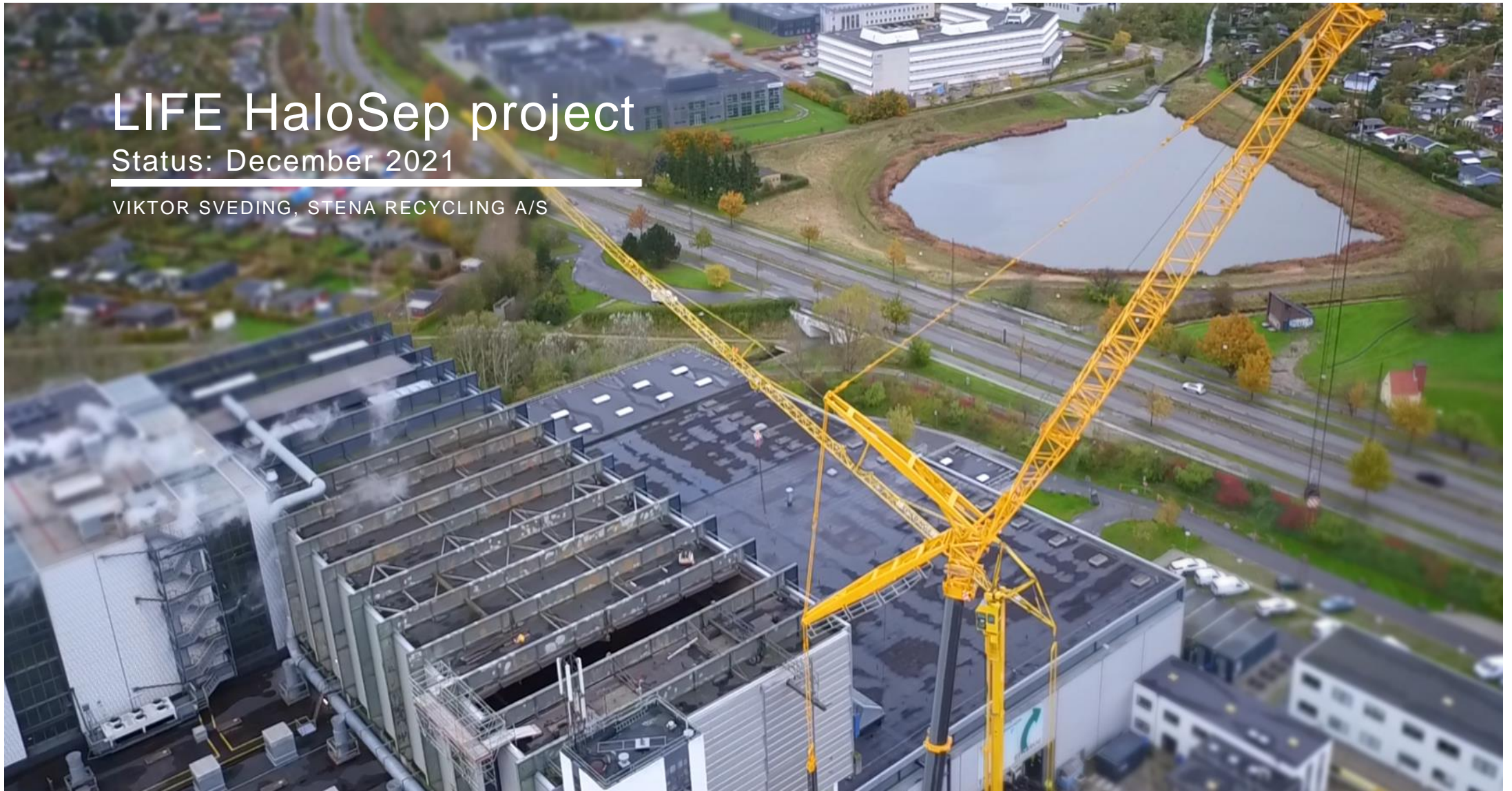


LIFE HaloSep project

Status: December 2021

VIKTOR SVEDING, STENA RECYCLING A/S

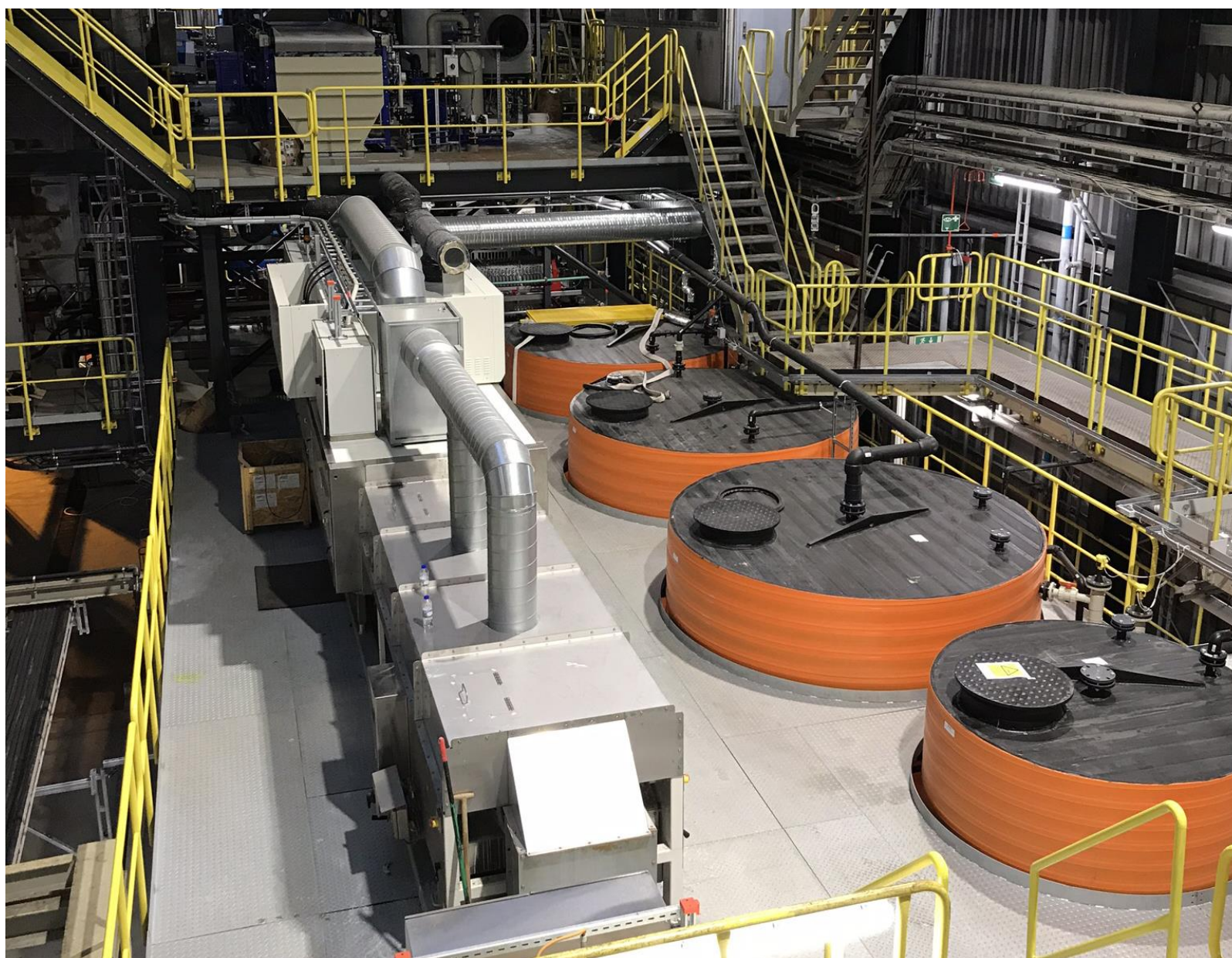


SEPARATION FOR REUSE




This project has received funding from European Union's
LIFE Program under Grant Agreement
LIFE15 ENV/SE/000265-HALOSEP

HaloSep



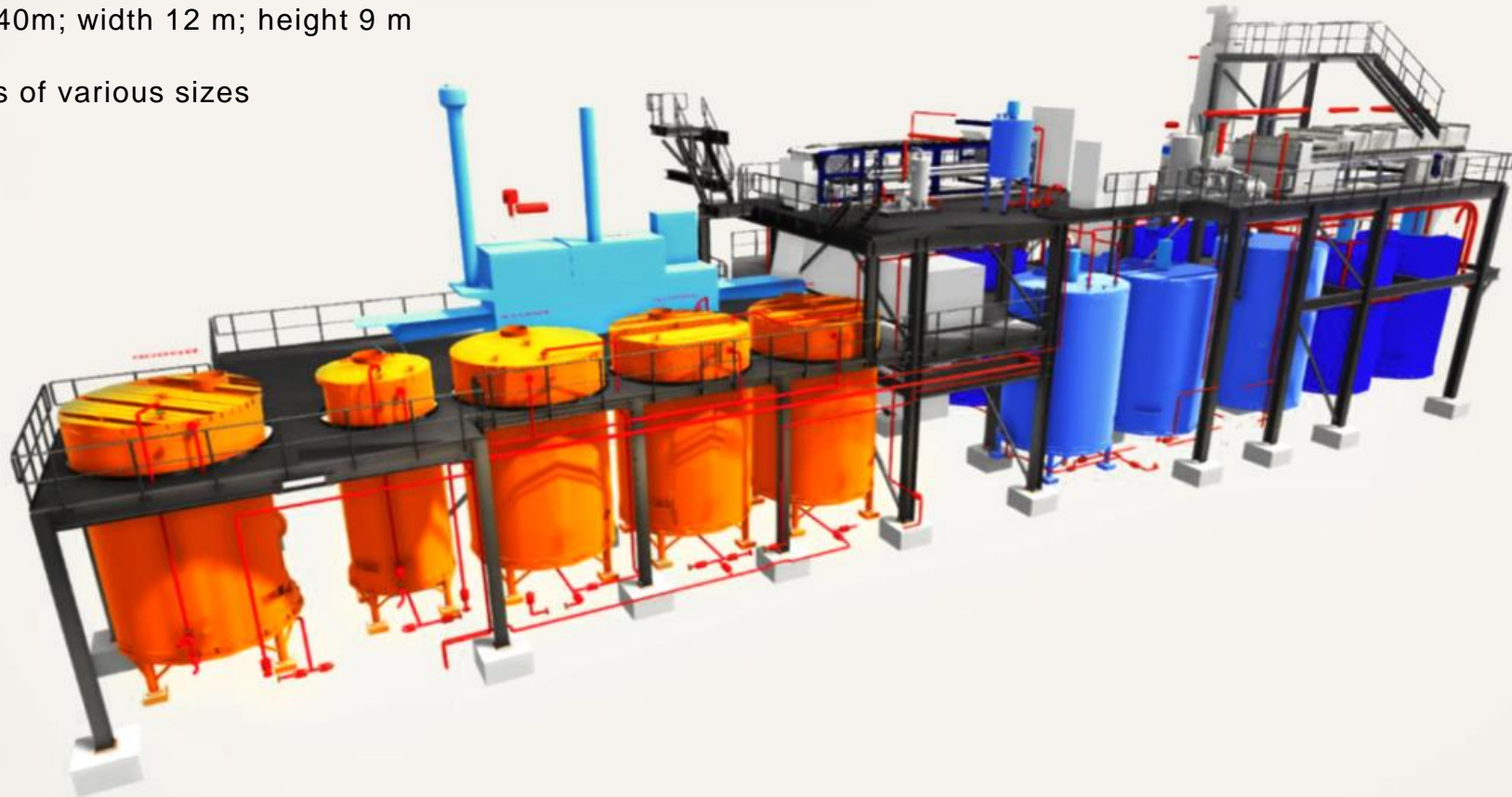
SEPARATION FOR REUSE



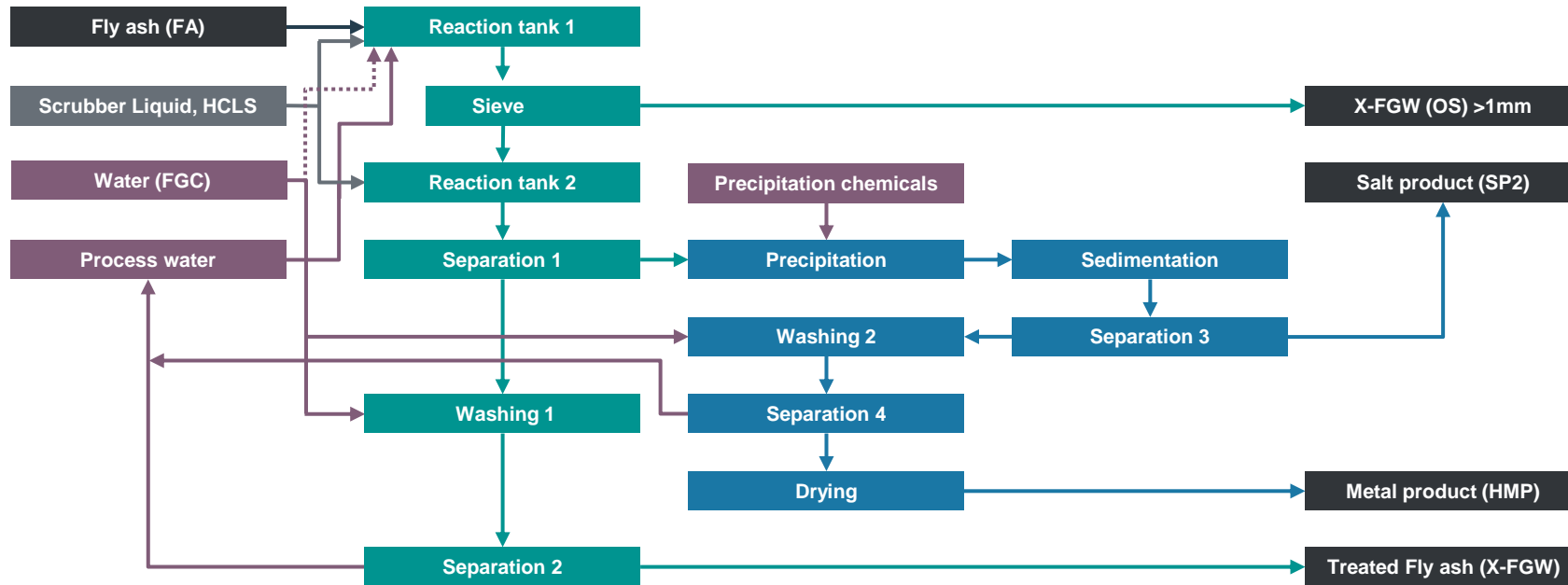
 This project has received funding from European Union's LIFE Program under Grant Agreement LIFE15 ENV/SE/000265-HALOSEP

HaloSep

- 17 000 ton Fly Ash per Year
- 35 000 ton of Scrubber liquid
- Length 40m; width 12 m; height 9 m
- 18 tanks of various sizes



HaloSep – Flow sheet



LIFE HaloSep – project status December 2021

Full scale test status (B2.2). Start in February 2021

1. Test period 1 “Low salt (LH-01)”. Completed February-June 2021

- Use of treated fly ash (X-FGW) as construction material or as additive in concrete or cement will be tested and evaluated in this test period. (ongoing). Results from permeability measurements in December

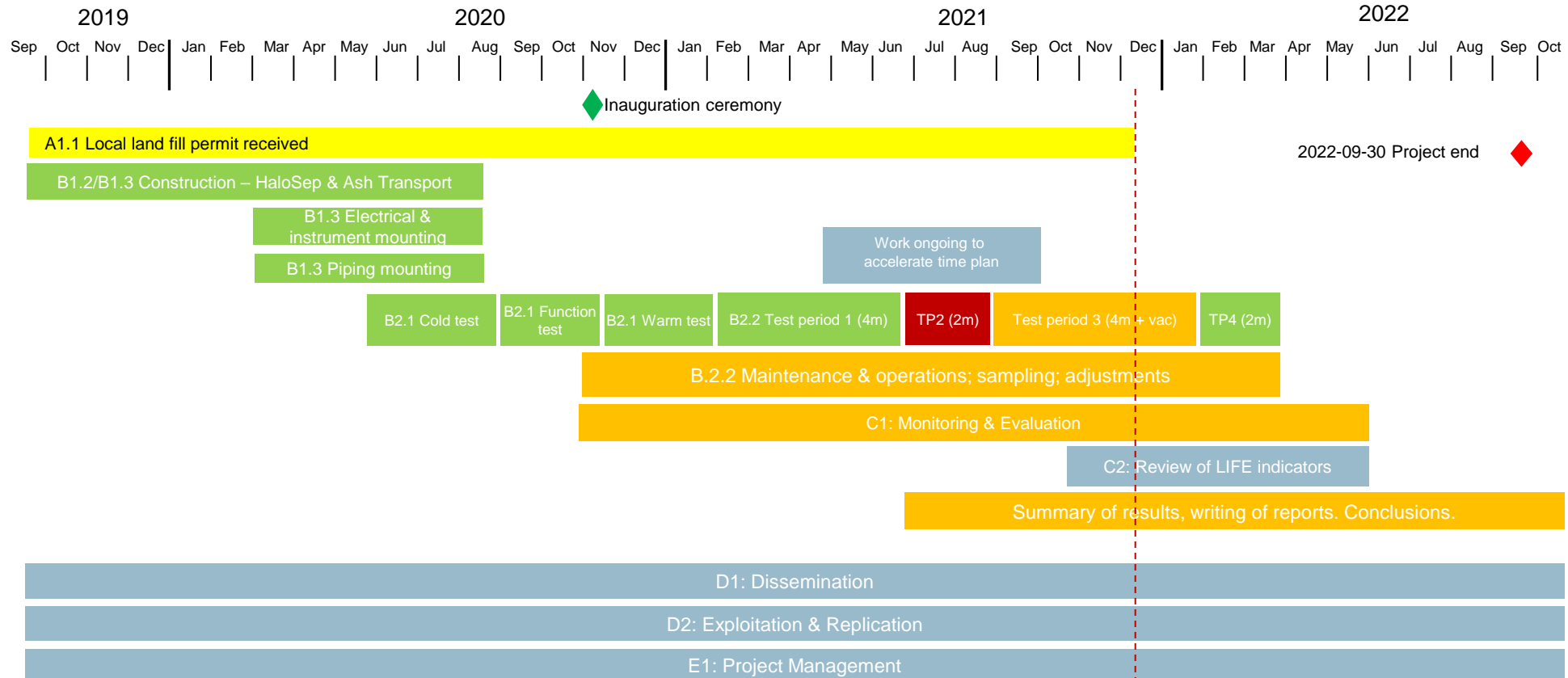
2. Test period 4: “Fly ash external WtE plant (LH-04)”. Completed August-September 2021

3. Test period 3: “Optimizing Zinc content in metal product (LH-03)”. (Ongoing,- planned completion October to January 2022). October no samples. First samples to Eurofins week 48

4. Test period 2 “High salt (LH-02)”. Pending completion of test period 3.

- Show that the salt product can be recycled as a brine with about 10% salt content. It will be evaluated during this test period if up to 2.000 tons salt can be used as road salt during the winter period

LIFE HaloSep project status November 2021



PRELIMINARY CONCLUSIONS FROM “LOW SALT” FULL SCALE TESTS, 2021

Preliminary conclusions Halosep outgoing fractions

1. X-FGW >1 mm: amount 0.3-0.4%.
 - Material fed back into the VF ovens (OK)
2. X-FGW: amount 59-61%.
 - Application for local (DK) disposal (class MA1) (ongoing)
 - Column Leaching results (OK) – chemical analysis, inorganic & organic (OK) – pH dependence tests (OK)
 - [Permeability tests determines its use as construction material \(membranes\) on landfill disposal sites \(pending tests\). Laboratory scale tests meets requirements for membrane construction.](#)
3. Salt brine: amount app. 30%.
 - Salt brine fed into existing WWTP (OK)
 - Use of surplus process water (0.6-1% salt) fed back into A6 scrubbers (OK)
 - [Use of the salt brine for road deicing meets applicable EU requirements based on “trace metal” contents \(pending planned test s\)](#)
4. Zn-Metal product: amount 5-6%.
 - [Zinc content in Metal product low compared to “lab. & pilot tests”, Optimization ongoing in current test period.](#)
 - Zinc content 15-21 % (w/w) (expected 30-40 % (w/w))

LEACHING TEST RESULTS

VESTFORBRÆNDING FLY ASH

Parameter	Measured leaching values incl. color coding wrt X-FGW disposal (LH-01-AK002-03) IA1 (green), MA1 (yellow), FA1 (brown)		
	L:S 0,1	L:S 1,6	L:S 9,4
	CO mg/l	mg/kg	mg/kg
pH	> 6	> 6	> 6
DOC, dis..org.carbon	1,2	<0,62	< 0,5
Antimony (Sb), dis.	0,13	0,024	0,31
Arsenic (As), dis .	0,013	0,005	0,04
Barium (Ba), dis.	0,17	0,056	0,37
Lead (Pb), dis.	0,032	0,081	0,0068
Cadmium (Cd), dis.	0,0016	0,00016	< 0,00022
Chloride, filtered	2300	140	310
Chromium (Cr), dis.	0,053	0,061	0,22
Fluoride, filtered	7,4	3,7	18
Coppar (Cu), dis.	0,0021	<0,006	0,0068
Mercury (Hg), dis.	0,0012	0,00059	0,0010
Molybdenum (Mo), dis.	0,39	0,21	0,73
Nickel (Ni), dis.	0,0059	<0,0003	0,17
Selen (Se), dis.	0,041	0,013	0,041
Sulphate, filtered	1200	810	7800
Zinc (Zn), dis.	0,004	<0,0037	0,013

EXTERNAL FLY ASH

Parameter	Measured leaching values incl. color coding wrt. X-FGW disposal (LH-04-AK002-08-09) IA1 (green), MA1 (yellow), FA1 (brown)		
	L:S 0,1	L:S 1,9	L:S 10,0
	CO mg/l	mg/kg	mg/kg
pH	> 6	> 6	> 6
DOC, dis..org.carbon	2,8	< 1	< 1
Antimony (Sb), dis.	<0,001	0,029	0,58
Arsenic (As), dis .	<0,0008	0,0021	0,15
Barium (Ba), dis.	0,055	0,052	0,68
Lead (Pb), dis.	<0,0005	0,0016	0,74
Cadmium (Cd), dis.	<0,00005	<0,000034	0,011
Chloride, filtered	3000	360	240
Chromium (Cr), dis.	0,019	0,013	0,13
Fluoride, filtered	4,2	1,0	5,2
Coppar (Cu), dis.	<0,0001	0,00068	0,23
Mercury (Hg), dis.	0,00035	0,000063	0,0058
Molybdenum (Mo), dis.	0,11	0,11	0,23
Nickel (Ni), dis.	0,0001	<0,00068	0,0063
Selen (Se), dis.	0,016	0,011	0,016
Sulphate, filtered	1100	890	3100
Zinc (Zn), dis.	0,005	<0,0034	2,0

THANK YOU FOR YOUR ATTENTION

CUSTOMER CONTACT INFORMATION:

HaloSep AB

➤ Staffan Svensson [Phone +46 104452188]

Stena Recycling DK

➤ Erik Rasmussen [Phone +45 21488211]

Vestforbrænding

➤ Kim Crillesen, [Phone +45 29171347]

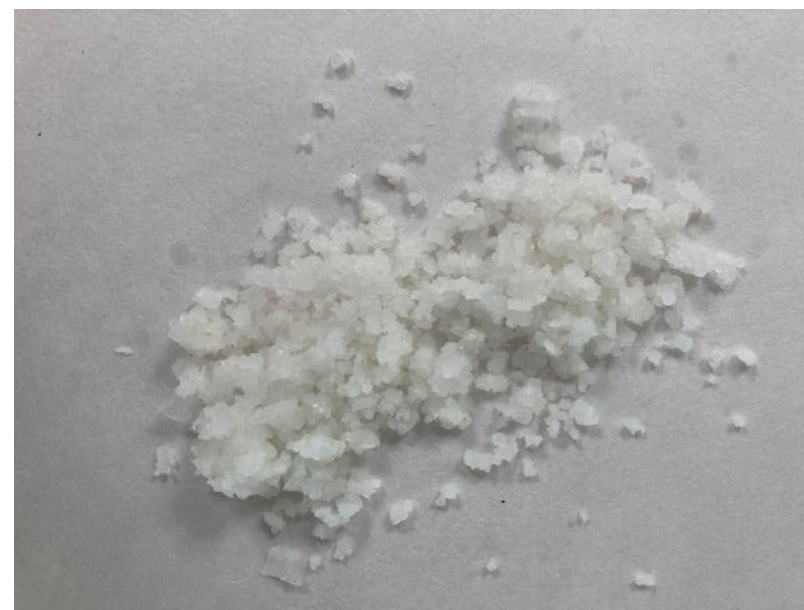
This publication has been produced with the contribution of the LIFE financial instrument of the European Union, under the grant agreement LIFE15 ENV/SE/000265-HALOSEP.

Any communication or publication related to the project, made by the beneficiaries jointly or individually in any form and using any means, shall indicate that it reflects only the author's view and that the Agency/Commission is not responsible for any use that may be made of the information it contains.

TREATED FLY ASH



SALT FRACTON



HEAVY METAL PRODUCT



OVERSIZED PARTICLES (> 1 mm)

