

## Small-scale plants for decentralised thermal utilisation of sewage sludge for upcoming phosphorous recovery

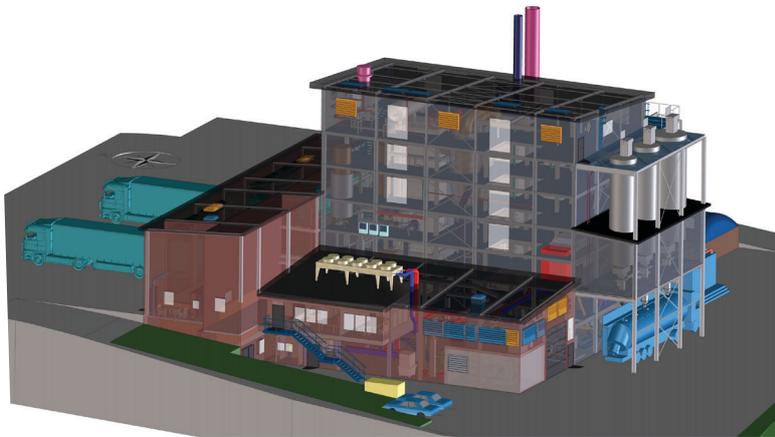
Phosphorous is a life-essential but finite element. New regulations require Phosphorous to be recovered from sewage sludge.

Accordingly, sewage sludge with at least 20 g phosphorus per kg and sewage sludge incineration ashes are subject to phosphorus recovery. Many European countries are implementing their regulations on phosphorus recovery.

WEHRLE's FLUIDFIRE® K<sup>3</sup>sludge sewage sludge mono-incineration plants increase the quality of the phosphorus ash produced through proper ash fractionation, facilitating the sustainable recovery of phosphorus.

Compared to large, decentralized incineration plants, FLUIDFIRE® K<sup>3</sup>sludge offers the following significant advantages:

1. Due to the high site flexibility, short transport routes without supraregional delivery of sewage sludge can be ensured, which leads to increasing acceptance among the population.
2. The wide range of fuels allows high flexibility in the acceptance of sewage sludge mixtures and alternative fuels in batch operation, ensuring future profitability beyond the sole sewage sludge market.
3. The sophisticated, highly standardized plant technology reduces the construction time and lowers the processing costs to a level competitive with large-scale plants.



Model of a FLUIDFIRE® K<sup>3</sup>sludge-fluidised bed plant 3.5 MW<sub>th</sub> for decentralised utilisation of sewage sludge

### FLUIDFIRE® K<sup>3</sup> sludge 3.5



**Shortest "time-to-market" period:** standardized plant components reduce construction time



**Site flexibility:** compact, energy self-sufficient design without production of technical wastewater enables greenfield installation or integration into existing building structures

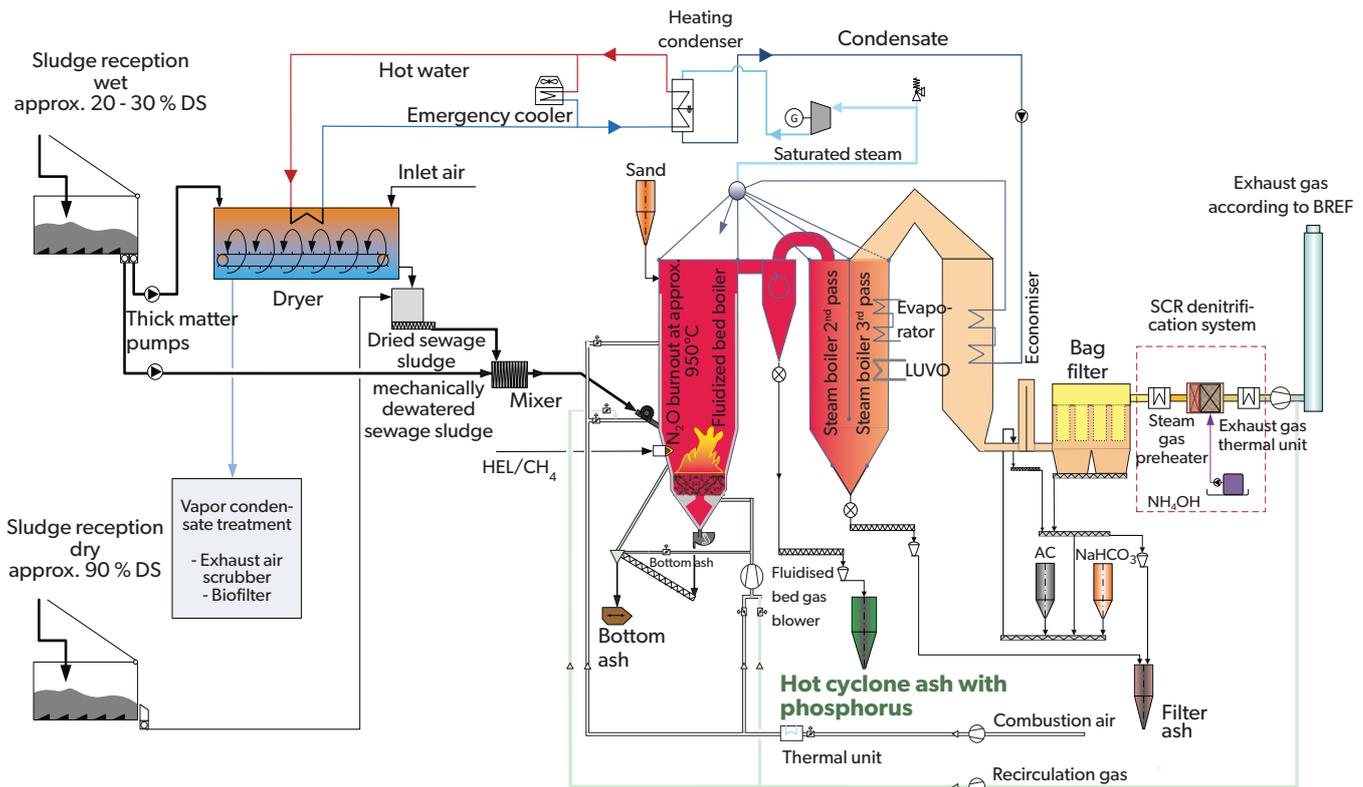


**Highest market security:** maximum flexibility in the acceptance of dewatered and dried sludges as well as alternative fuels (Multi-Fuel)

## Mono-Incineration of Sewage Sludge by FLUIDFIRE® K<sup>3</sup>-Sludge3.5

WEHRLE's fluidized bed technology for sewage sludge mono-incineration:

- ▶ Decentralized small plants for the thermal utilization of 30,000 – 47,000 tOS/a (= approx. 350,000 – 750,000 PE or 3.5 MW<sub>th</sub>), other sizes on demand
- ▶ Optimized system for maximum disposal capacity of original substance (filter cake) due to complete heat utilization for sewage sludge drying
- ▶ Independence and site flexibility due to energy self-sufficiency and avoidance of continuous production of technical wastewater



Flow diagram of utilisation of sewage sludge

### Product phosphorus ash:

A decisive factor for the future potential of sewage sludge disposal is the recovery of phosphorus from sewage sludge ash. With FLUIDFIRE® K<sup>3</sup>sludge, ash fractions with particularly high content of phosphorus are separated from the flue gas in a temperature range of 700 ... 750°C by using a hot gas cyclone. At this temperature, most heavy metals are still gaseous and do not pass into the phosphorus ash.

The result is a particularly low-pollutant ash, which can be processed into fertilizer with significantly fewer chemicals than conventional phosphorus ash. It is therefore preferred by fertilizer manufacturers.



## Reference example ZVG (DE)

### Sewage sludge mono-incineration 3.5 MW<sub>th</sub>

Direct utilization of approx. 36.000 t/a sewage sludge in a self-sufficient FLUIDFIRE® K<sup>3</sup>sludge fluidized bed unit. The excess heat is used to dry the sewage sludge.

In terms of emissions, the system has already been adapted to the latest BREF\*) and the German Immission Law (17. BImSchV) which is expected for 2022.

Commissioning is planned for summer 2022.



Manufacturing of the boiler at WEHRLE

<b>Firing capacity tot.</b>	3.73 MW <sub>th</sub>
<b>Sewage sludge mass in incineration system</b>	3,000 kg/h
<b>Flue gas mass flow approx.</b>	8,800 Nm <sup>3</sup> /h
<b>Saturated steam from boiler approx.</b>	5.5 t/h
<b>Saturated steam pressure</b>	30 bar(a)
<b>Feed water temperature min.</b>	130 °C
<b>Flue gas temperature max.</b>	Outlet ECO approx. 180 °C

\*) BREF: EU reference document (EU 2019/2010) for Best Available Techniques (BAT)

## Service: Partnership and support beyond Take Over

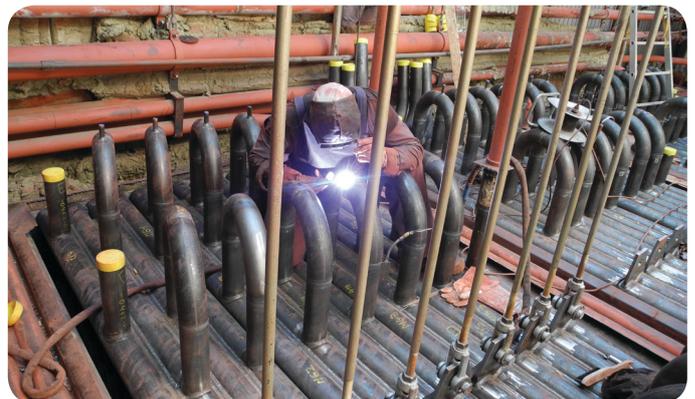
### Highest availability, long plant lifetime and safe operation

From technical consulting to installation based on your requirements and operation of the plant, the service team of WEHRLE supports you with experience and reliability.

Due to the close connection with the WEHRLE manufacturing division, the delivery periods of spare parts and consequently the downtimes are particularly short. We provide the whole planning, the project management, the transport, the assembly and commissioning – everything from one source and from the experts of WEHRLE!

#### Range of services:

- ▶ Plant revision & maintenance
- ▶ Restructuring
- ▶ Optimisation
- ▶ Repair / Replacement of components
- ▶ Installation & commissioning
- ▶ Plant operation



## Deammonification of Sludge Water from Anaerobic Digestion & Condensate

### WEHRLE Solutions for the Treatment of Wastewater

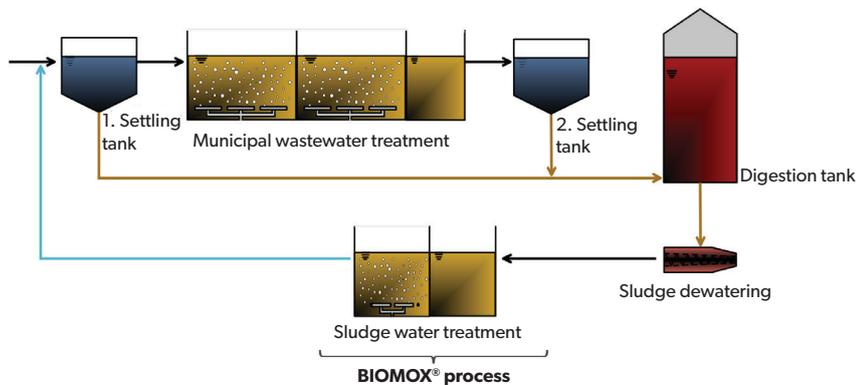
The return liquor produced when dewatering anaerobic digestion sludge contains high ammonium concentrations, which increases the N load by up to 25 % when recirculating the water into the sewage treatment plant increasing the operating costs.

The sludge water can be treated directly using a BIOMOX®-CFR step technology and 90 % of ammonium can be eliminated. This deammonification process requires 60 % less energy than conventional ammonia treatment processes. The bacteria operate without adding a C source.

Vapor condensate from sewage sludge drying can also either be stripped and/or the nitrogen load can be reduced in a denitrification/nitrification process.



Example: Sewage treatment plant Badajoz / ES with BIOMOX® CFR



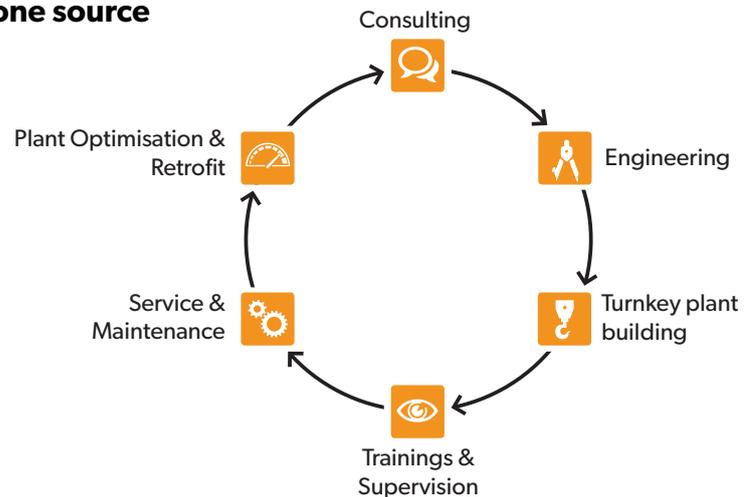
Flow rate	495 m <sup>3</sup> /d
Component	NH <sub>4</sub> -N
Inlet	820 mg/l
Outlet	< 80 mg/l
Performance	> 90 %

## WEHRLE-WERK AG

### Plant engineering and services from one source

With over 150 years of experience in the field of plant and boiler construction, WEHRLE is a synonym for quality and longevity for energy technology. The high-performance boilers from WEHRLE set benchmarks in difficult applications like incineration of waste or hazardous waste.

Particularly for sewage sludge mono-incineration the technology of WEHRLE brings unique advantages which offers economic solutions for the disposal of sewage sludge especially for operators of smaller sewage treatment plants.



## Contact

Germany  
**WEHRLE-WERK AG**  
 Bismarckstrasse 1-11  
 79312 Emmendingen  
 Tel.: +49 7641 585-0  
 info@wehrle-werk.de  
 www.wehrle-werk.de

Switzerland  
**ECOTHERM AG**  
 Im Ifang 12  
 8307 Effretikon  
 Tel.: +41 52 355 35 88  
 info@ecothermag.ch  
 www.ecothermag.ch



Company video