
PRESS RELEASE

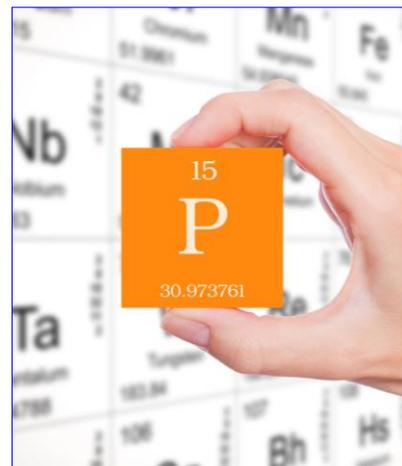
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Valuable phosphorus from sewage sludge: AVA cleanphos pilot plant comes online

The race is on: the AVA cleanphos pilot plant in Karlsruhe, sponsored by the German Federal Environment Foundation (DBU), came online at the beginning of July 2016. Leading biotechnology company AVA-CO2 has developed the AVA cleanphos process which enables efficient and cost-effective recovery of phosphorus from sewage sludge. The process also allows for co-incineration in the future and therefore the direct substitution of fossil fuels such as lignite.



The AVA cleanphos pilot plant began operating at the beginning of July 2016
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Phosphorus can be recovered more easily and economically from sewage sludge with the AVA cleanphos technology
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In the coming weeks and months, the innovative AVA cleanphos process will be tested at a pilot scale at AVA Green Chemistry Development GmbH in Karlsruhe. AVA-CO2 is cooperating with two project partners: the University of Hohenheim and the Project Group for Material Cycles and Resource Strategy at the Fraunhofer Institute for Silicate Research (ISC).

For the industry, AVA cleanphos represents a breakthrough in phosphorus recovery as required by the German amendment to the Sewage Sludge Ordinance. The process has the potential to be more efficient and cost-effective than existing phosphorus recovery methods, as municipal sewage sludge is converted first into HTC-coal before the phosphate is isolated. This creates two commercially interesting products - a valuable fertiliser and phosphorus-free HTC-coal. In the future, CO₂-neutral HTC-coal could be used as a direct substitute for lignite, which would lead to substantial CO₂ emission reductions.

The first results of the AVA cleanphos plant will be made public later this year. In combination with the AVA cleanphos process, HTC provides a solution which paves the way for effective and durable sewage sludge recovery.

AVA-CO2

Biotechnology company AVA-CO2 provides global solutions for the sustainable use of sewage sludge and other biomass. As a pioneer of hydrothermal carbonisation (HTC), AVA-CO2 designs, builds and operates HTC installations on behalf of its customers, processing sewage sludge and plant residues efficiently and profitably to CO₂-neutral HTC-coal, high-performance carbons or platform chemicals. AVA cleanphos is another AVA-CO2 technology based on HTC which offers an innovative and cost-effective process for phosphorus recovery. The company is headquartered in Zug, Switzerland with subsidiaries in Karlsruhe, Germany and Muttenz, Switzerland. AVA-CO2 is operating the world's first HTC plant at industrial scale since October 2010. Subsidiary AVA Biochem applies the HTC technology to commercially produce the platform chemical 5-HMF.

Hydrothermal Carbonisation

AVA-CO2's HTC process is an 'aqueous carbonisation'. During hydrothermal carbonisation, a chemical dehydration of the biomass takes place. The reaction removes hydroxyl groups from the biomass, which leads to a decrease of hydrophilic functional groups. The chemical dehydration is promoted by the low viscosity of water at HTC process conditions and leads to the decomposition of colloids. The process results in significantly improved mechanical dewatering properties of HTC coal compared to sewage sludge or other biomass. The HTC process runs in a closed system, and emits only minor amounts of odour and noise. HTC is a 'wet process', meaning sewage sludge or other wet biomass can be used without prior, costly drying. This leads to an excellent energy balance of the HTC process. Our HTC plants are highly compatible with a wide range of supplied sewage sludge. As it is possible to recover phosphorus within AVA-CO2's HTC process, it is 'tomorrow's process today' for sewage sludge and other wet biomass treatment. The HTC process is based on a multi-batch process and customers benefit from a modular installation which makes it possible to flexibly expand capacities. It is also a robust and reliable process that integrates seamlessly into the continuous processes employed by the users.

Find out more about **AVA-CO2** at www.ava-co2.com or on [Twitter](#)

Find out more about **AVA Biochem** at www.ava-biochem.com or on [Twitter](#)

Contact AVA-CO2

Thomas M. Kläusli
Chief Marketing Officer
AVA-CO2 Schweiz AG
Baarerstrasse 20
CH-6302 Zug

T +41 41 727 09 81
M +41 78 936 74 81
E tk@ava-co2.com
W www.ava-co2.com