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## **ANAEROBIC DIGESTION OF CORN STOVER AS SUSTAINABLE SOIL MANAGEMENT CONCEPT FOR METAL CONTAMINATED AGRICULTURAL LAND**

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### **Abstract**

In some regions agricultural soils are diffusely contaminated with heavy metals. Grain maize cultivated on heavy metal polluted land accumulates metals. Talking in terms of soil remediation, the metal extraction capacity is limited and therefore this concept has to be considered as a sustainable soil management strategy. Organic Waste Systems has developed a concept that combines the “biomass to energy” objective with the gradual rehabilitation of the agricultural land.

Grain maize is the input of the process chain. The maize kernel is harvested separately from the rest of the plant. As the degree of absorption of heavy metals in the kernel is rather poor to negligible, it is suitable for cattle feed production. The heavy metals are mainly accumulated in the rest of the plant. The entire maize plant is harvested, but only the corn stover is used as main substrate for a dry digestion process. By means of the DRANCO process corn stover is anaerobically converted into biogas, what subsequently can be converted into heat and electricity.

The residual digestate does not return to the fields. This way, part of the contamination will be extracted from the soil. The more heavily contaminated digestate has to get a controlled application. Digestate can also be dewatered and dried, making use of the residual heat of the CHP plant. A classical incineration process including strict exhaust gas treatment can provide the final energy recuperation step from the dried cake, resulting in a very limited amount of ashes (containing the heavy metals) that can be stored or stabilized, e.g. in glazed clinkers.

The feasibility of this new concept for sustainable land management is being studied for the Flemish Campine region where agricultural soil is contaminated with Cadmium, Lead and Zinc. By collecting 40 000 tons of corn stover each year up to 35 kg Cadmium, 160 kg Lead and 9 000 kg Zinc can be extracted from the agricultural soil in that region. Additionally 13 000 MWh of renewable electricity can be produced yearly (1.5 MW electrical power). Although there is no full-scale realization yet, the potential for application in Europe is huge. Due to the use of corn maize the accessibility for farmers is high and widely applicable. Moreover, due to the use of the very robust and flexible DRANCO technology maize can be substituted by other crops, e.g. crops with a higher metal accumulation capacity.

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