# Anaerobic treatment of wastewater is a step towards sustainable energy

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Until recently, most of the world's energy supplies have come from coal, oil and gas. Scarcity of natural resources, surging energy prices and global warming had focused attention on renewable energy, and consequently, alternative approaches to producing bio-energy. Over the last five years, one particular technology for the production of biocoal - Hydrothermal Carbonization (HTC) - has undergone significant development and has become a subject of major scientific interest.

Hydrothermal carbonization entails a conversion process of biomass. In natural conditions production of coal from biomass is slow and can take up to millions of years, whereas biocoal can be produced in just a few hours. During the process, heat is released and water molecules are split off from carbohydrate and what remains is a carbon-rich material - the biocoal.

However, the ongoing discussion on biomass utilization largely neglects one remarkable aspect of the process, namely, the huge CO2 and methane emissions produced by biomass residue. No wonder, that researchers continue their quest for novel solutions for the utilization and recycling of by-products of hydrothermal carbonization.

In a paper: "Anaerobic Digestion of Waste Water from Hydrothermal Carbonization of Corn Silage" published in *Applied Bioenergy* by open access publisher De Gruyter Open, Doctors Benjamin Wirth and Jan Mumme from the Leibniz Institute for Agricultural Engineering in Potsdam-Bornim and the Technische Universität Berlin respectively,

argue that the residual HTC process liquor can be treated by anaerobic digestion to reduce its organic contaminants and to yield methane.

Anaerobic digestion is a biological process that produces a gas principally composed of methane and carbon dioxide otherwise known as biogas. As a result, anaerobic digestion could be established as a crucial part of an industrial implementation of HTC. If organic waste is used for the production of bio-coal instead of being composted, it can then produce heat and power as a substitute for fossil coal. HTC liquor is a high-strength organic waste water that has to be treated before it can be released to the environment. Treating it by anaerobic digestion yields methane that can be used for raising steam for the HTC process itself.

The authors carried out continuous anaerobic digestion tests with HTC liquor as a substrate. They compared a CSTR and a fixed-bed reactor. HTC liquor proved a suitable substitute for anaerobic digestion, and despite the broad range of organic compounds, turned out not to be toxic.

"This research is one of many from the group led by Prof. Jan Mumme at Leibnitz Institute for Agricultural Engineering, demonstrating the viability and practicality of conversion of corn stover to biocarbon" says Prof. Charles Coronella, from the University of Nevada, Reno, and expert in hydrothermal carbonization of biomass.

In industrial settings, and especially by rising composting costs, the economic business case for the valorization (or recycling) of by-products of hydrothermal carbonization seems a valuable contribution to resource conservation and sustainable energy.

**More information:** Benjamin Wirth, Jan Mumme, "Anaerobic Digestion of Waste Water from Hydrothermal Carbonization of Corn Silage," *Applied Bioenergy*, ISSN: 2300-3553, OPEN ACCESS, DOI:

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