



# Bioenergy Insight

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**Backing a winner**  
Biomass attracts investors

**Capturing carbon**  
Commercialising the HTC process

**Regional focus: Bioenergy in Africa**

The number one source of information internationally for **biomass**, **biopower**, **bioheat**, **biopellets** and **biogas**!

A UK-based company has developed a technology solution to commercialise the process of HTC

# Capturing carbon

**T**he fundamental problem remains for all existing conversion technologies in that they struggle with the issue of mass-energy balance. It takes energy to make energy, and all processes, with the exception of hydrothermal carbonisation (HTC), still require significant amounts of energy, no matter how they have been modified and advanced over the years. HTC is different. It captures more carbon and uses less energy compared to other thermal processes and the temperature and pressure required for the chemical reaction to take place are much lower. In addition, the energy required to sustain the conversion process is significantly lower than other processes.

In light of this, Antaco has won a contract to manage a water utility's sludge – the first of its kind for HTC in Europe. With the water sector typically risk-averse to technological innovation, by removing the

risk, Antaco has been able to penetrate the market.

HTC is a thermal reduction process able to convert all types of organic material into a stable sterile carbon material. In doing so, it offers a cost-effective waste solution. It is a relatively new technology that offers advantages over conventional conversion processes, not least to the water sector. Independent research shows that HTC can cut wastewater treatment plant's (WWTP) operational costs by 50%, energy use by 73% and carbon emissions by 95%.

## Waste-to-energy conversion process

Antaco has developed a technology solution to commercialise the process of HTC. Their patented process creates a bespoke biofuel maximising carbon, and therefore calorific value, whilst removing undesirable properties in resultant biofuel. Where alternative conversion



Antaco's HTC plant

technologies typically only convert a low proportion of the available carbon in feedstock into a useable form, Antaco's technology is able to capture 95% of the carbon and transform this into a solid, transportable, storable biofuel. HTC has the highest carbon efficiency of any waste-to-energy conversion process. In comparison to anaerobic digestion (AD), Antaco's HTC solution is 4-5 times more efficient in capturing the valuable carbon out of organic matter and converting this

into solid fuel. This leap in innovation is rarely seen.

The resultant solid biofuel produced has similar properties to fossil coal and so termed, biocoal. Biocoal has a comparable heat value to fossil coal but burns 'cleaner' and has a high-density, low-moisture content. Biocoal is only one of many products that can be produced from the HTC process. For example, the carbon product can be treated to produce high-grade activated carbon (AC). This can be used in water treatment to purify both drinking water and contaminated water, adsorbing contaminants due to its extremely large surface area. Due to its porous nature, AC can also be adapted to provide a high phosphorus content fertiliser with the ability to retain vast amounts of water. Biocoal has also attracted attention as a component for fuel cells replacing the platinum electro catalyst.

The recent discovery and advanced applied research of HTC during the last few years is reflected in around a dozen companies worldwide that are exploring HTC, albeit with different focuses and approaches. A viable solution



Engineer at Antaco's plant

that can meet industrial requirements in size and continuous operation has not yet been demonstrated. This is because of the three key problem areas: high costs; inability to maintain a continuous process; and lack of means for an efficient heat recovery system. Antaco's solution successfully addresses these barriers by offering an innovative engineering process different to other HTC providers.

**Sewage sludge recovery**

Due to changes in legislation, there is growing interest from the European water sector in turning sludge into renewable energy through modifications to thermal reduction processes. For decades WWTPs have employed AD to convert sludge into biogas. Thermal processes using sludge have generally not been used

due to its aqueous nature, with utilities deferring to incineration when sludge cannot be applied to land as fertiliser. This has increasingly become the case as legislation tightens around the use of sewage sludge recovery, most recently in Germany with the enforcement of Ordinance 2016/514/D.

Aside from the high costs associated with incineration, flue gas emissions are a serious problem and have led some operators of incineration to consider switching to HTC technology. AD has a similar problem in that digestate is produced as a by-product and must also be disposed of at cost. Pyrolysis only deals with dry matter. Fortunately, HTC does not suffer from the same deficiencies. HTC is a hydrothermal processing technology specifically designed for wet wastes that converts the carbon



Inside of Antaco's HTC plant

in the organic matter into products with calorific value with the only natural by-product being H<sub>2</sub>O.

With decision-makers the world over having now pushed sustainability to the top of the agenda the race for commercialising thermal

reduction technologies is on – and Antaco are about to prove that the economic benefits of turning waste into renewable energy really do add up! ●

**For more information:**

This article was written by Liz Gyekye, editor of *Bioenergy Insight*.

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