



W O I M A

CORPORATION

BROCHURE

WOIMA HTC
HYDRO-THERMAL
CARBONIZATION

WOIMA HTC

HYDRO-THERMAL CARBONIZATION PROCESS

Today, societies generate billions of tons of different sludge materials, such as municipal sewage sludge, agricultural sludges and industrial sludges. This potentially valuable material is currently mostly discarded in landfills and dumpsites, or even worse, in the nature. Hydro-thermal carbonization (HTC) represents a nouvelle method in utilizing the sludge streams to produce hydro-char, a charred matter similar in composition to coal. This can be further refined to produce a range of valuable commodities.

Hydro-thermal carbonization (HTC) is an emerging waste-to-value technology specifically designed for the conversion of wet biomass with 75 to 90% moisture content, such as most sludge feedstocks, into valuable commodities. It is a much less energy-dependent solution than other waste drying techniques. Pre-treatment for the drying of biomass is not needed in HTC, which also saves costs.

The HTC process fits perfectly in the current climate change action plan and the Paris Accord pledge to significantly reduce the CO₂ emissions. The different biomasses suitable for feedstock are renewable and abundantly available. The carbon-neutral hydro-char can replace traditional fossil fuels in power generation. And its low sulphur and nitrogen content offers another advantage in the reduction of air pollution.

HTC transforms wet waste streams into hydro-char bearing a high calorific content and complemented with elevated levels of carbon content. HTC involves the use of wet carbohydrate-rich feedstock, a relatively low temperature environment (180 to 250°C) and high pressure (up to 40 bar) in a closed system.

The hydro-char, rich in carbon and with a calorific value (HHV) between 13 and 25 MJ/kg depending on the feedstock, can be utilized as a solid fuel similar to lignite coal. It also works as a soil additive for nutrient enrichment, or as an adsorbent or precursor for activated carbon. The resulting by-product ash works as a plant nutrient enhancer because of its phosphorus content, and also the liquid by-product produced by the HTC plant can be used for watering plants as it is loaded with potassium.

A typical WOIMA HTC solution using waste water sludge as feedstock and combining with the *wasteWOIMA*® waste-to-energy power plant has the following characteristics

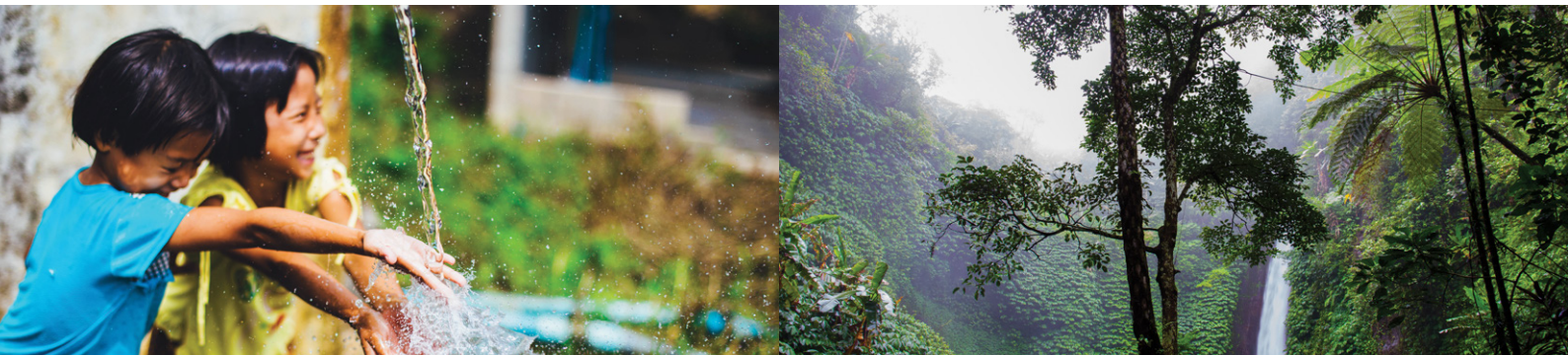
- annual treatment capacity 80,000 tons of sludge (20% dry matter concentration)
- annual production capacity 25,000 tons of hydro-char (LHV 9 MJ/kg, moisture 40%)
- heating power demand 1,000 kW
- cooling power demand 900 kW
- annual operating hours 8,000h

The simple closed loop between the HTC and the *wasteWOIMA*® power plant uses the hydro-char as partial feedstock for the plant and utilizes the plant's energy commodities in the HTC process. The profitability of this combination consists of the excess commodities for sale and reduction of waste fractions for landfilling.

Similar to all other WOIMA solutions, the WOIMA HTC is a pre-designed and pre-fabricated solution based on sea-container-sized modules. Thus, it offers exactly the same benefits, such as scalability, transportability, constructability and movability, as do the other WOIMA Ecosystem solutions.

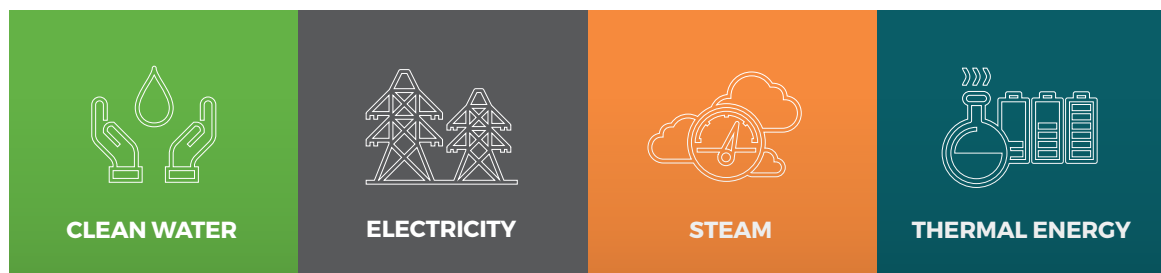
The WOIMA Ecosystem integrates several waste treatment technologies to save virgin raw materials and to generate a range of different valuable commodities. These include e.g.

- waste pre-sorting solutions
- biogas production plants
- biofuel refineries
- plastics and rubber pyrolysis systems
- wastewater treatment plants
- nitrogen capture solutions
- CO₂ capture solutions



KEY FACTS

- Easy to build; established on a concrete slab of 1,000 m²
- Erection and commissioning within 4 months of delivery
- Simple operation; robust and proven technology
- Safe operation under any conditions
- Easy exchange of broken or worn-out plant components
- Remote monitoring of plant performance
- Transforms the sludge feedstocks into valuable or harmless commodities
- Complies with the EU Standards and Directives





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