

Hydrothermal Carbonisation - HTC

AVA GmbH

DESCRIPTION:

Hydrothermal carbonisation transforms biomass into CO₂-neutral biocoal in an anaerobic thermo-chemical process that splits hydroxide anions (HO⁻) and hydrogen cations (H⁺) off the organic molecules, releasing them as water (H₂O). The dehydrated organic molecules combine to a multitude of different carbon compounds. This process is very similar to that of natural carbonisation. As water is a highly stable molecule, the removal of each water molecule from the organic molecules releases energy. This makes HTC exothermic and the most efficient process to treat and de-water wet biomass.

APPLICABILITY AND PRE-REQUISITES:

organic matter in an aqueous suspension is transformed into a lignite-like product at temperatures of 180 – 220° C and under increased pressure. The resulting CO₂-neutral biocoal can be burnt to replace fossil coal or used as a raw material for so called performance carbons (activated carbon, carbon black, etc.). The process transforms virtually all carbon to biocoal (95% carbon efficiency). Only small amounts of CO₂ but no methane are released in the process.

Reaction time is between 4-5 hours, depending on the biomass.

ADVANTAGES AND DISADVANTAGES:

- + CO₂-neutral process
- + Highest CE value of all technology options (HTC = 95% / Biogas = 50%)
- + Wet process – Biomass can be used without expensive pre-drying
- + Accepts numerous biomass types
- + HTC can also process problem wastes that currently require expensive disposal (e.g. sewage sludge)
- + Not in competition with foodstuff production, as biogenic waste can be used
- + Simple, Proven and robust, multi-batch technology
- + Low impact technology with very low odor or noise emissions
- + Low maintenance costs due to the proven, robust

technical implementation

- + Simple mechanical dewatering with filter presses to reach above 70% dry matter content due to hydrophobic nature of the biocoal
 - + Superior energy balance compared to thermal drying with energy savings of up to 60%
 - + Several studies have shown excellent results for Environmental Impact Assessments
 - + HTC allows for the currently most efficient phosphorous recovery.
 - + HTC is the only technology which allows for continuous co-incineration of sewage sludge to replace fossil coal and a highly phosphorous recovery at the same time.
- New technology. No commercially available HTC plants in operation yet



HTC-0 Industrial Scale Demonstration Plan

OPERATION AND MAINTENANCE:

Co-location has a big impact on operation and maintenance cost. Therefore a case by case project analysis is required.



COSTS:

HTC is a solution business. AVA GmbH offers tailor made plants in different sizes, treating biomass from 10'000 to more than 30'000 t/a (on dry matter basis). There is no general price list. The project has to be developed individually, based on biomass availability and potential co-location synergies (heat, power, and logistics).

REFERENCES: Within R3Water, the pilot plant K3-335 and the industrial scale plant HTC-0 located at the premises of AVA GmbH at „Innovationpark Ostvorpommern“ in Relzow.

CONTACT

Project contact: Stepan Kusche, General Manager
AVA GmbH, Libnower Landstrasse 1-3, 17390
Murchin-Relzow, Germany (s.kusche@ipi.ag)

