CARBONIZATION OF BIOWASTE AND BIOMASS TO BIOCHAR

Biochar is a name for charcoal when it is used for particular purposes, especially as a soil amendment. Like all charcoal, biochar is created by pyrolysis of biomass. Biochar is under investigation as an approach to carbon sequestration to produce negative carbon dioxide emissions. Biochar thus has the potential to help mitigate climate change, via carbon sequestration. Independently, biochar can increase soil fertility, increase agricultural productivity, and provide protection against some foliar and soil-borne diseases. Furthermore, biochar reduces pressure on forests. Biochar is a stable solid, rich in carbon and can endure in soil for thousands of years.

(http://en.wikipedia.org/wiki/Biochar)

Biochar contains mainly stable carbon (typically 60-90 %) in an amorphous form that remains unchanged for centuries at least. It has a high porosity and hence a specific surface (up to hundreds of square metres per gram). The basic characteristic of biochar is this large specific surface and therefore adsorption capacity.

PROBLEM

Treatment and utilization of biodegradable waste

Use of residual and waste heat from flue gas cogeneration

SOLUTION

CARBONIZATION > PRODUCTION OF BIOCHAR

The utilization and application of biochar results in

1. Reduction of greenhouse gas emissions
   - from biowaste oxidation
   - from agricultural production (from livestock operations and the soil)
   - from artificial fertilizer production (reduction of consumption)
2. Improvement of agricultural land quality and fertility – food security
3. Elimination of mineral fertilizer and pollutant elution into the water system
4. Retention of water in landscape – elimination of floods and erosion risks
5. Efficient remediation of contaminated soils and landscape revitalization
6. Removal of anthropogenic carbon dioxide from the atmosphere (CCS)

KARBOTECH Technology

The technological facility for biomass carbonization works on the principal of low-temperature pyrolysis, during which biomass is heated for a period of time without the access of air at a temperature of 400-500 °C. During the thermochemical reaction the process gas develops from the unstable fractions and the carbonization of the stable fraction. Process gases are burned in a combustion chamber and the flue gases are mixed with the flue gases from an external source (typically a cogeneration unit engine to biogas).

The carbonization reactor is designed as a retort with the internal movement of a material and a supply of hot flue gases to the space between jackets. The flue gases heat the internal reaction space which is closed by sealing device both at the input and the output.

The advantage of KARBOTECH technology is the utilization of flue gases from the external source. It is therefore possible to process biomass with a low content of combustible substances (such as biowaste) and a high water content (up to 70%). At the same time, the technology has a higher processing capacity. Thermal energy is consistently used in single technological elements – carbonization, biomass drying, and increasing biochar quality by activation.

Processing capacity	400 – 800 kg per hour (dry biomass)
Water content in biomass	< 70%
Biochar production	200 – 400 kg per hour
Electric power	30 kW