Waste Fermentation and Sand – no Problem?

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Anaerobic Digestion, Contraries Removal, NMT-Process, BioFluff, wet mechanical separation

Abstract

Anaerobic digestion of biowaste and organic fraction from municipal solid waste (OFMSW), containing certain amounts of contraries such as sand, gravel, glass and plastics is a rather young technology. The growing experience with industrial scale implementation shows the need for changes in the overall process. A possible solution is shown, using a much improved wet mechanical separation method for waste material, yielding separated inert and organic fractions that can be used f. ex. as building material, RDF or fertilizer. Only the contrary-free process water is used for biogas production.

Introduction

Separation of contraries, such as sand, gravel, glass and plastics, as a pre-treatment for anaerobic digestion of biowaste and the organic fraction of municipal solid waste (OFMSW) is chiefly implemented to protect the plant equipment. This applies mainly to wet anaerobic digestion but recently also to dry anaerobic digestion.

Wet AD (Anaerobic Digestion) processes usually separate contraries by grinding the material and mixing the material with water in a pulper. Part of the contraries is then separated from this suspension by gravity, but the separation is not complete, due to the high viscosity of the suspension. After feeding the suspension into the digester, its viscosity drops quickly because of the bacterial digestion of soluble degradable components. This is the reason for the often experienced sedimentation of sand in the digester as well as for the development of scum layers.

Mechanical separation is more effective in processes without grinding or crushing of the waste material prior to separation. However, due to the low selectivity of the mostly one-stage separation processes the results are also not ideal.

In dry AD plants contraries do usually not interfere with the digestion process itself but are rather impeding dewatering of the digestate and cause similar problems as in wet AD processes.

Development of AD in Germany

The historical overview presented in Figure 1 shows the development of the different AD processes. Until 2004 the total installed capacity of AD plants for the treatment of OFMSW was only 35.000 tons per year in Germany.

The young AD technology is currently booming without being prepared to full extent. Between 2005 and 2006 eleven AD plants for MSW with a total capacity of nearly 1 Million tons per year were commissioned, mostly with unsatisfactory performance.

Advancement of wet mechanical treatment

By developing a new process for the wet mechanical treatment of waste (NMT-process), EcoEnergy could demonstrate that composting as well as anaerobic digestion of suspensions, containing particulate matter, are not technically justifiable in the future.

EcoEnergy could further verify by experiment, that 65 % to 80 % of the biogas production, generated with AD from the total material, would also be yielded using the NMT-process. The process yields low polluted inert fractions that can be used for construction purposes as well as sand-free organic fractions, containing only unpolluted organic matter, separated in fossil and native organic matter.

Due to the very low pollution, the native organic fractions (BioFluff), even from municipal solid waste without separate collection, fulfils the requirements for the German compost application as a high

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quality fertilizer. The process also reduces the salt content of the BioFluff so that BioFluff meets the specifications for use in coal fired boilers for CO_2-free energy utilisation.

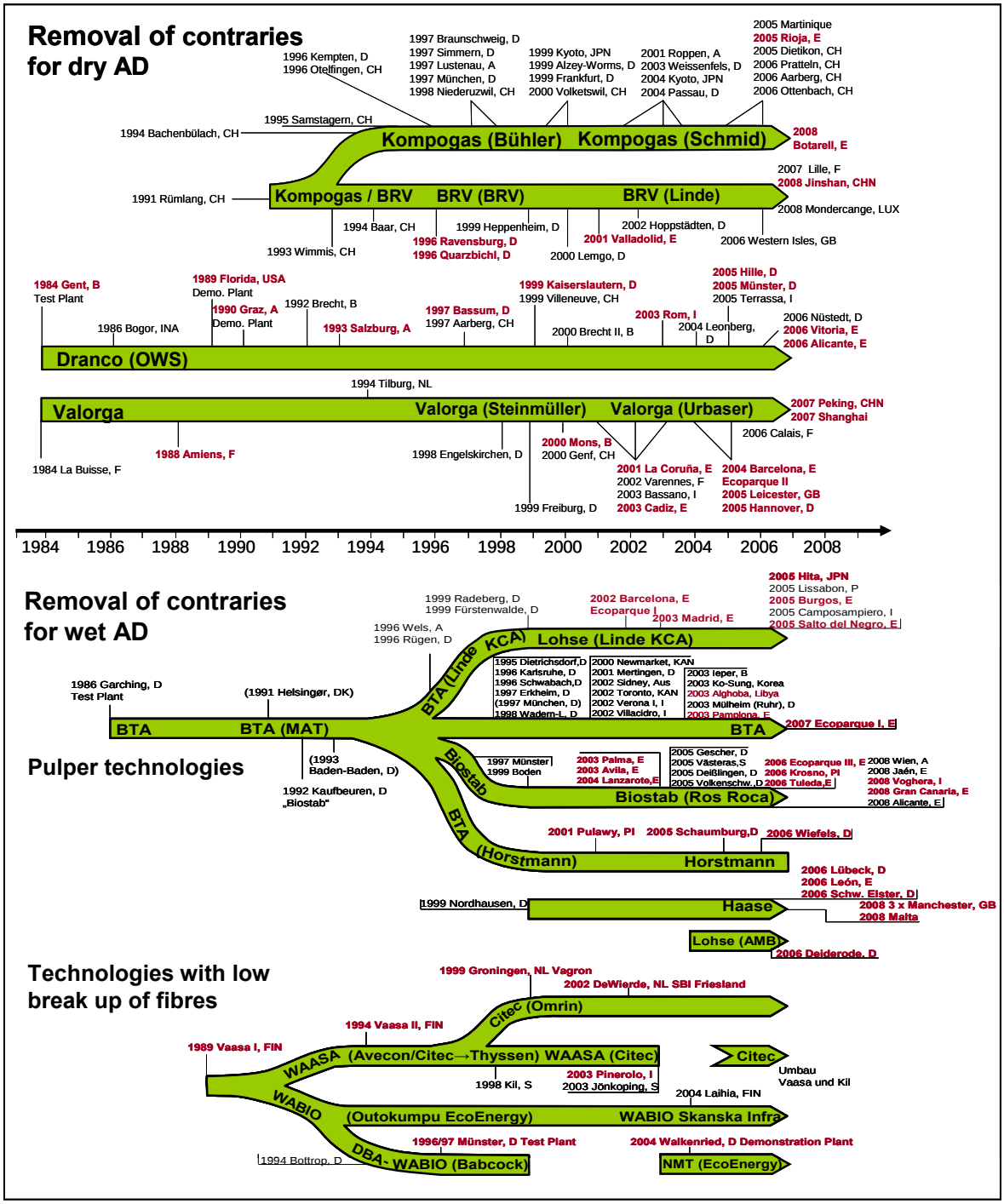

Figure 1: Development of anaerobic digestion (not exhaustive)

References

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