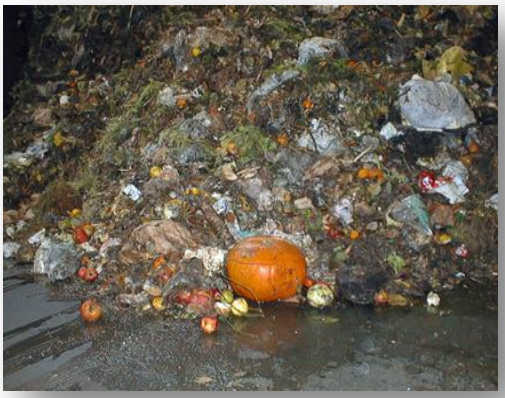
First Biogas International AG

The References

Biogas plants, object #203; MBT-AD plant; Erkheim, Germany

The "Bio-Energie Schwaben" plant, Erkheim, State of Bavaria, Germany

The "Bio-Energie Schwaben" plant is a Mechanical Biological Treatment system with Anaerobic Digestion (MBT-AD). The plant was commissioned and set into operation 1998 and has since then been further developed and enlarged. MBT-AD is a waste treatment technology that processes waste mechanically in order to separate recyclable elements from the organic component of the waste. The organic component is then treated biologically converted into biogas, a renewable fuel, and a solid digestate to use as fertilizer. MBT-AD plants are designed to process mixed household waste as well as commercial and industrial wastes.



Green urban waste

Green urban waste contains a high fraction of non-digestable organics like wood but also contraries like plastics, stones and metals. This type of feedstock is vary inhomogeneous and seasonally different.

Food leftovers and kitchen waste

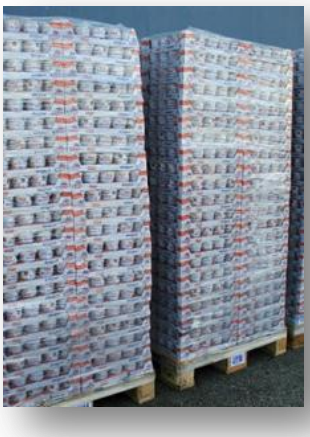
The "Bio-Energie Schwaben" plant is capable to treat and process 20’000 tons of urban and kitchen waste per year. Organic waste from households and the municipal waste collection is the biggest challenge on a biogas plant. Depending on the collecting area, the part of contraries can be very high. It could be noted that the larger the urbanity is, the bigger is the part of contraries. If the collecting area comprises more of villages, in summer the biggest part of the organic fraction are grass, wood, tree and bushes clippings. Most of organic waste from households is packed in closed plastic bags. The waste contains stones, glass and porcelain. This part causes abrasive wear on pumps and cutters. The waste

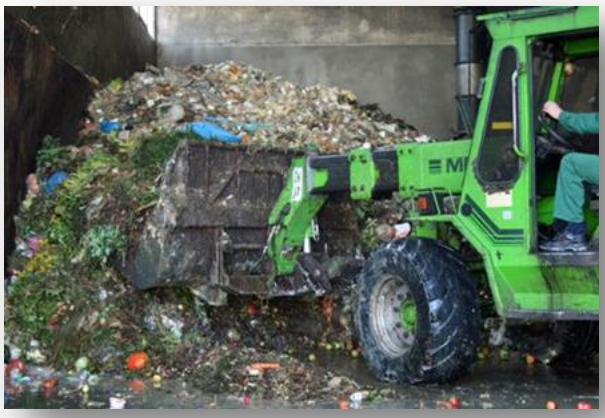
contains batteries and metals in different kind and sizes. The part of contraries can be up to 15 % by weight. Catering waste includes more or less bones that are not digestible.

All these materials arrive in the acceptance hall which is closed by automatically operated gates. The air is ventilated out through a bio-filter to avoid bad smells to the environment.

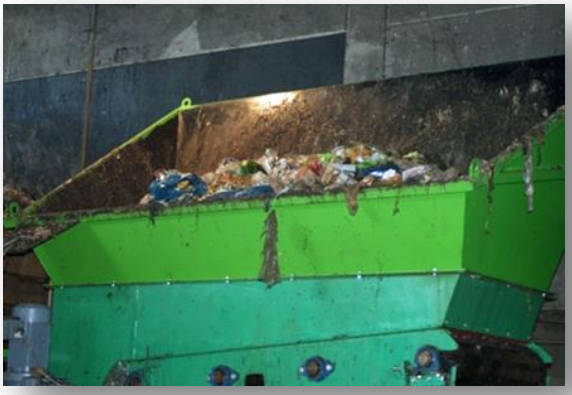
Acceptance hall

The waste is delivered loose or packed.

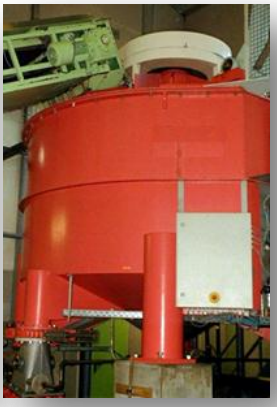




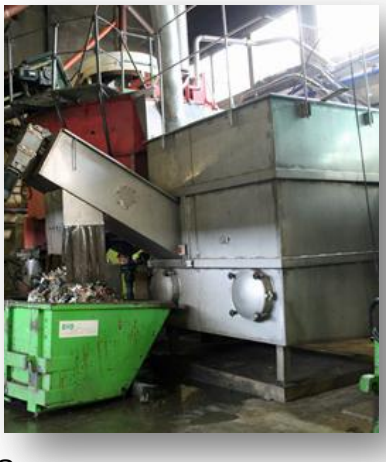
Overstored food packings and the loose waste are put into a screw-mill that works as bag opener and makes the pre-cutting. This machine is also the dosing unit for the pulper. The second machine is a pulper in which the organic is dissolved. With a separate screening and contraries separation unit all plastics stones and metals would be removed from the suspension.



Screw-mill



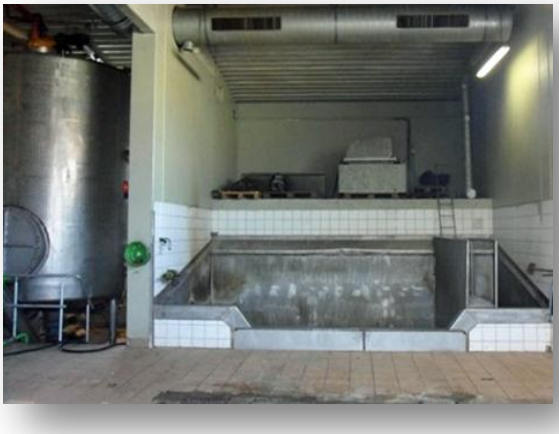
Pulper



Screen

According to hygienic regulations, food leftovers and catering waste must be milled before **pasteurization.** In Erkheim, a hammer-mill with a screen size of 12 mm is used.

The receiving area of catering waste is designated as “black (contaminated)” area. Only after passing the pasteurization station it’s hygienically safe and could be handled in the “white (clean)” area.



Pasteurization unit

The center of the plant is an two-step biogas system, which means that the hydrolysis and pre-acidification processes are strictly separated from the mechanization process.

Hydrolysis units

Digesters

Thanks to the two-step fermentation, highest efficiency is achieved. There are four digesters installed, working in parallel. All tanks are made from reinforced concrete and are fully insulated. With digester volumes of 2 x 1,200 m³, 1,000 m³ and 800 m³ there is a retention time of about 14 days.

The CHP rates at 1′131 kW_{el}. And has an excellent efficiency with η_{el} 42,1 % and η_{therm} 42,3 %. The CHP module is installed in a noise-protected 40” container.

The **management of the digested residuals** is one of the key issues to have a profitable plant. There are three main parts of residuals:

- The contraries which are separated before the biogas process
- Surplus liquid
- Solids which are separated from the digested substrate

The separated contraries are mainly plastics, wood parts but also textiles and light metal foils. This material is delivered as RDF to a power plant. The heavy fraction, containing the stones, glass, porcelain, bones and metals, must be disposed to a dump side.

With a separator, 80% of the solids can be removed. The separated solids contains about 50 % not digested organic (fibers) and more than 60 % of the nutrients. It's an excellent material for compost but could be also used as fuel after drying.