

EMBIO LIMITED

Energy Recovery from Pharmaceutical Waste:

Embio Ltd. is leading manufacturer of bulk drugs using molasses as a main raw material. Fermentation is the core process used to convert molasses into drugs intermediate. This process generates significant amount of waste, which has



immense biogas potential. The generated biogas can be used as fuel for both thermal and electrical applications.

Anaerobic digestion process is used to convert this high strength wastewater into biogas. The digester, based on fixed film process, provides higher treatment efficiency & is

considered best amongst the anaerobic digestion processes. The fixed film system gives consistent and higher biogas production.

Wastewater treatment consists of series of unit operations, in which biomethanation process plays vital role. There are several advantages of biomethanation process which are as follows;

- 1) To convert organic matter into clean eco-friendly biogas
- 2) This process further reduces pollution strength of wastewater, which is very important to streamline further treatment processes
- 3) Embio Ltd. plant is generating 14,500-15,000 m³ biogas per day & 85-90 tonnes of steam per day which substantially reduces conventional fuel consumption. (i.e. furnace oil, coal, diesel etc.)

Process Description:-

Fixed film type bio-digester is installed by MM Enviro, Nagpur which is one of the type of attached growth process. The process carried out is high rate anaerobic digestion under thermophilic temperature range of 50-55 °C. The pH inside the reactor is maintained around 7.2, while proper ratio of volatile acid and alkalinity is also maintained.

The following three stages are involved in the process of anaerobic digestion.

- a. **Hydrolysis:** In the process of hydrolysis, the complex molecular compounds i.e. polymers are converted into the simple molecular form i.e. monomers.
- b. **Acidogenesis:** The monomers so formed at the end of hydrolysis process are converted into volatile fatty acids. Acetic acid forms the major portion of volatile fatty acids. The process of conversion of monomers into acids is carried out by a group of anaerobic bacteria known acid formers.
- c. **Methanogenesis:** Acids produced at the end of acidogenesis process are converted into carbon dioxide and methane gases. The process of conversion of acid into gases is carried out by group of anaerobic bacteria known as methane formers.

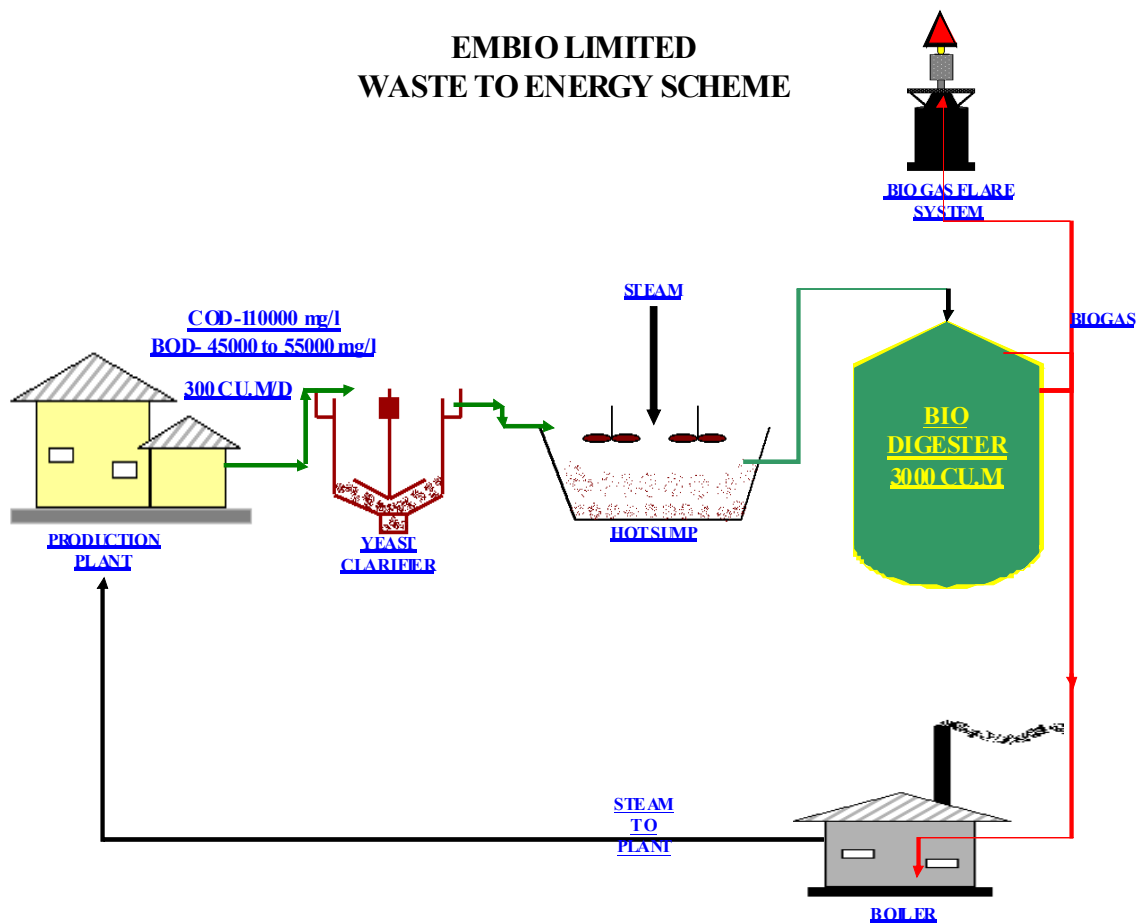


Fig. :- Basic process flow diagram of waste to energy

Here, the digester is designed to take 300 m³/day of wastewater with 100000 - 110000 mg/l COD and 31500 kg/day organic load with 2523 m³ media

volume. The organic loading for media is around 12.82 Kg COD/m³/day; the surface area provided by media is around 95 - 105 m²/m³; 70% COD reduction is observed which approximately generates 14500 - 15000 nm³ biogas per day. Around 200 m³ gas space is provided, which is transferred to boiler through gas blowers. The steam generated from boiler is utilized in plant for process. This amounts to saving 7000 - 7500 Kg furnace oil per day.