Focus on CSIR

Anaerobic sludge digestion

Anaerobic digestion is a multi-stage biological process that is commonly used to stabilise sludge, i.e. reduce the number of disease-forming bacteria in sludge and reduce the potential of odours.

This is an automated two-stage continuous flow anaerobic digester facilitated by three hopper tanks.

1st stage – Control of the loading rate, temperature, mixing and pH.

2nd stage – Stratification/settling of the stabilised sludge.

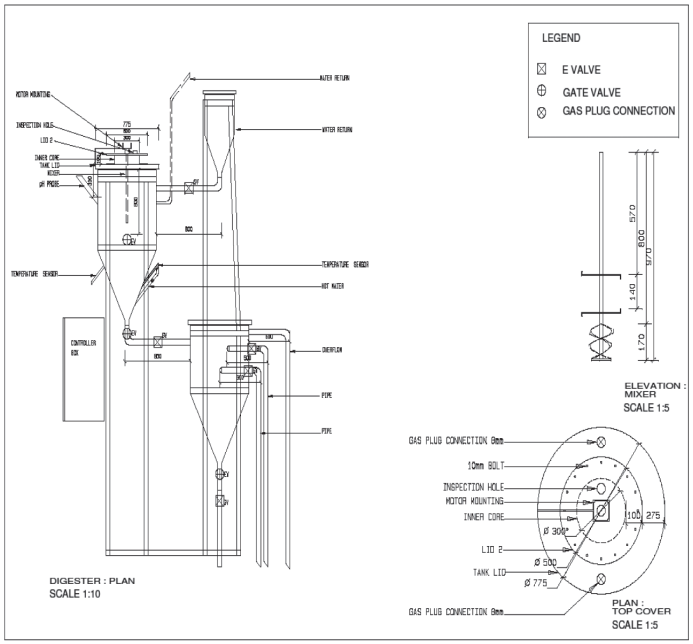

Fig 1: Layout of anaerobic digester

Process

- Municipal raw sludge is sampled and fed into AD on a continuous basis
- The process is fully automated and the continuous feed, mixing, temperature and pH levels are maintained
- A retention period of approximately 16 days is achieved
- Supernatant and stabilised sludges are disposed of at the end of the cycle.

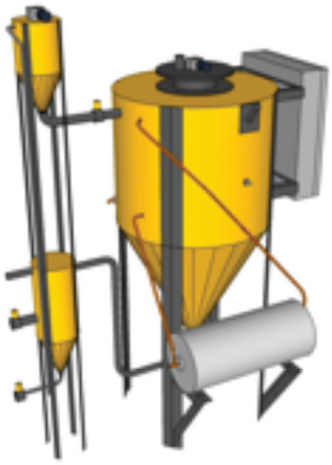

Fig 2: Anaerobic digester

Performance measurement

- Temperature and pH levels are monitored and controlled
- Analyses on sludge are conducted and compared with municipal system
- Parameters measured includes:
  - pH
  - Pathogenic content
  - Methane volumes produced
  - Total gas produced.

Biogas-to-electricity project at ERWAT

Assisted through funding of the Green Fund, the CSIR is currently upgrading one 2 Ml anaerobic digester at the Hartebeestfontein treatment plant of ERWAT to the patented two stage CSIR process.

The gas produced will be used in a Combined Heat and Power (CHP) unit. It will generate electricity for use on-site and produce heat to keep the digestion process at mesophylic temperature.

Improving biogas potential WWTP sludge

For a major municipal wastewater treatment plant the CSIR is currently testing a number of additives and pre-treatment options to the wastewater sludge to investigate methods to increase the biogas yield of the anaerobic digestion process. In a dedicated laboratory site-specific sludge is tested in lab scale digesters with and without the pre-treatment / additive to test its effect on volumes of gas produced.

Biogas as alternative energy source

Due to the increased global interest in biogas as a renewable fuel source the CSIR has been concentrating on optimising the methane percentage potential from the anaerobic digestion process. Ongoing research is investigating the economical benefits of utilising biogas produced at municipal waste water treatment plants (MWWTP) for the generation of electrical and thermal energy to be used on the plant. This will reduce the demand of MWWTP of resources from the national grid.

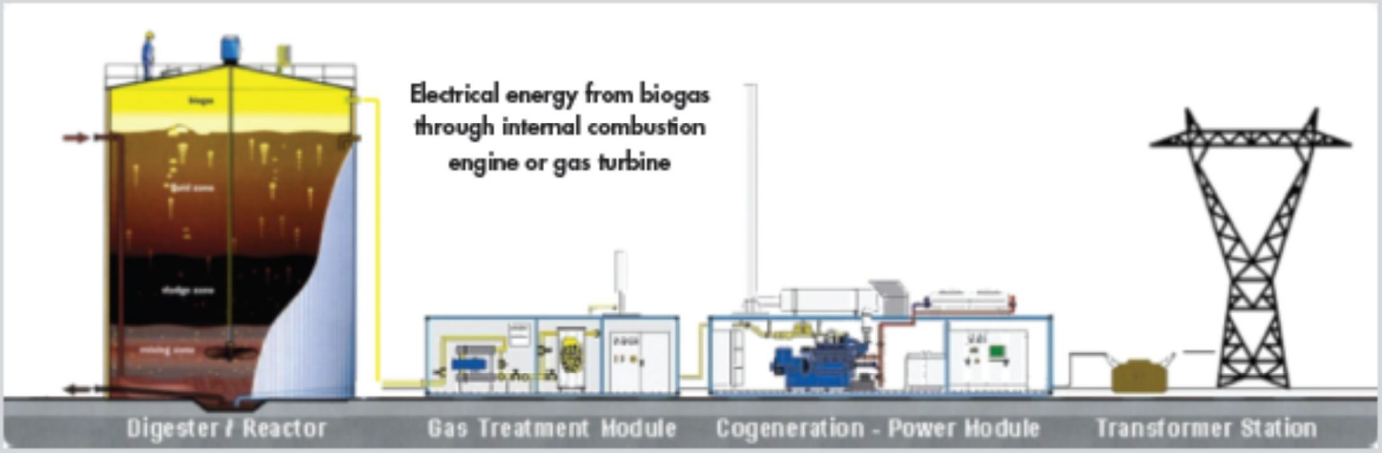

Fig 7: Biogas as energy source

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