Go to:

The Center of Electrotechnical Materials and Environmental Technologies studies and designs a new equipment for energetical recovery of whey as biogas, during an anaerobic fermentation process.

The project was developed in order to apply some new concepts and metanogenic fermentation systems, suitable for projecting new equipments, exhibiting optimal energetical yields and investment costs, capable of generating unconventional, renewable energy.

Whey is mainly generated during cheese production. This stream not surprisingly is referred to a cheese whey or sweet whey. The other source of whey is acid or casein whey produced during the industrial production of casein and caseinates from skimmed milk.

Whey is a residual product of the milk industry and represents an optimal raw material for biogas generation, during metanogenic anaerobic fermentation. All the necessary analyses were performed and it was concluded that whey fulfills all the necessary conditions for developing the bacterial environment, mandatory for carrying on the anaerobic digestion.

Anaerobic digestion

The anaerobic digestion is a complex biological process developed in the absence of oxygen, that transforms the organic substance into biogas (or biological gas), composed especially from methane and carbonic anhydride. The methane percentage varies from 50% to 80%, depending on the type of digested organic substance and on the conditions of the process.

The advantages of the anaerobic treatment can be indicated by comparing this process with the aerobic one. In the aerobic treatment , the waste is mixed with large quantities of microorganisms and air. Microorganisms use the organic waste for food and use the oxygen to burn a part of the food to carbon dioxide and water for energy. Since these organisms obtain much energy from this oxidation, their growth is rapid and a large portion of the organic waste is converted into new cells.

In the anaerobic treatment, the waste is also mixed with large quantities of microorganisms. Bacteria growth are capable of converting the organic waste to carbon dioxide and methane.

Advantages of the anaerobic process

- A high degree of waste stabilization is possible
- Low production of waste biological sludge
- Low nutrient requirements
- No oxygen requirements
- Methane is useful

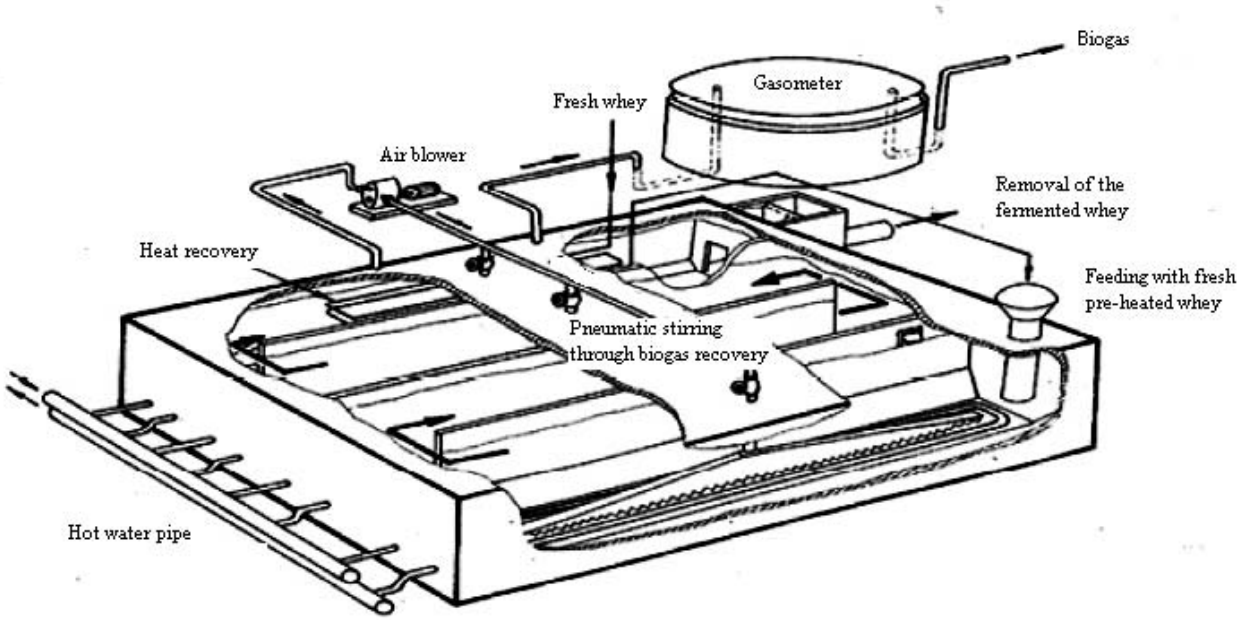
Features of the new "HORIZONTAL FLUX" system

- The biogas removal is performed simultaneously on the entire substrate due to the existence of the horizontal path having a thickness that doesn't overpass 3.5 meters;
- The age of the digested material is equal to the retention hydraulic time being at least double that in the case of the traditional systems, thus ensuring a complete exploitation of the raw material;
- The hydraulic piston effect ensures the advancement of the material inside the digester;
- Ensures a periodical homogenous behavior ,on the vertical axis, of the substrate through pneumatically stirring process developed through a fixed quantity of re-circulated biogas and its pressing with an air-blower;
- The separation of the acidogenesis and metanogenesis phases, allowing an improved pH value for each microbial population that is involved in the biogas production, ensuring in this way a maximum biological yield;
- The total destruction of the pathogenic microorganisms existent in the raw material, thus leading to the removal of the o digested material's sterilization , prior to its usage as an agricultural fertilizer;
- The construction of the digester at smaller volumes, reduced to the necessary ones for performing the release of the generated biogas having decisive benefits on the investment costs;

- The possibility of the partial recovery of the thermal energy from the evacuated digested material, for pre-heating the new introduced material during a process that doesn't imply a supplementary energetical consumption;
- The possibility of reducing the hydrogen sulfide content by sequential disruptions, ensured by the substrate's stirring through bubbling.

The research activities developed during this project allow the implementation of newer concepts and metanogenic fermentation systems suitable for creating equipments, exhibiting optimal energetical yields and costs of investment, for generating unconventional, renewable energy.

Short description of the "HORIZONTAL FLUX" equipment



View also:

Microwave treatment for milk and cream pasteurization