Biogas production from manure

Several technologies in biogas production from manure have been developed and widely used.

Most biogas productions are categorized by sources of waste that include farm/manure waste, industrial waste, municipal solid waste, MSW/Household. Biogas is currently produced by anaerobic process within biogas digester that can be divided into low and high anaerobic reactors.

1. Low rate anaerobic reactor consists of three types including Fixed dome digester, Floating drum digester, and Plug flow digester, comprising cover lagoon and channel digester. The low rate anaerobic digester needs large space for equipment installation and require long time to stock water.

1.1 Fixed dome digester is built with concrete and buried underground with pipe to feed manure and another pipe for manure outflow. Gas container is built with concrete right next to the digester. Gas pressure usually varies with gas volume in the plant.

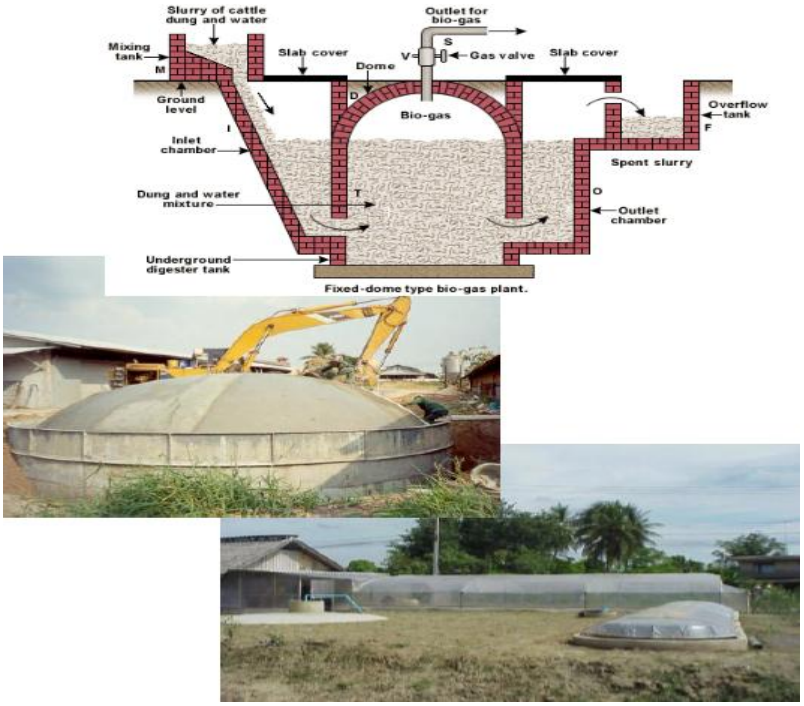

Figure 1 Fixed dome digester

1.2 Floating drum digester is used in managing manure of domestic animals piled on the residential ground. It help improving hygiene and eliminated germs breeding source while biogas is considered to be just by-product.

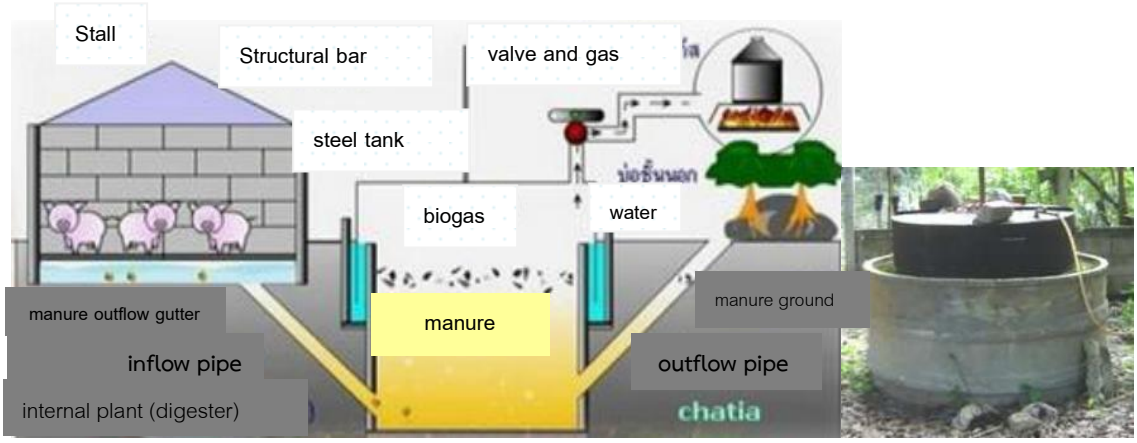

Figure 2 Floating drum digester

1.3 Plug flow digester comprises of cover lagoon and channel digester. The cover lagoon type will use rubber bag to cover on manure lagoon, which could be built from concrete or ground digging. In the latter case, rubber sheet can be used to lay at the bottom of the pond in order to prevent leakage of waste into the ground.

Figure 3 Cover lagoon type

The Channel digester is the long-shaped concrete pond, like a gutter or canal, covered by plastic to contain biogas. The digester will be buried underground, with pipe to feed manure and another pipe for manure outflow at the head and tail ends. With the gas being contained by plastic, gas pressure is rather low and additional pressure driving equipments are needed in order to use the biogas.

Figure 4 Channel digester type

2.High rate anaerobic reactor has high diction rate because the process includes mixing and keeping quality bacteria sludge for a long period of time. The system is designed to fix sludge with intermediary or crystallizing them. This type of digester does not need much space and can cope with huge amount of waste.

It suits for application with industrial waste with high density of organic substances. The biogas produced under this method can be used to substitute fuel in production process, cutting treatment costs and trimming fuel input while helping treated water meet standard.

High rate anaerobic reactor can be divided into:

2.1 Up-Flow Anaerobic Sludge Blanket (UASB)

Under this system, waste water will be pumped into the bottom of two-storey tank, comprising sludge bed, consisting 2-5mm granular bacteria, and the sludge blanket. The upper-end of the UASB digester will install Gas Solid Separator to separate gas and prevent bacteria sludge from flowing along with waste water.

2.2 High suspension solid Up-Flow Anaerobic Sludge Blanket (H-UASB)

This system is based on the UASB system, but designed to specifically fix problem of clogged water injection system from manure sludge. It has a buffer tank to separate sludge from wasted water and manure.

Figure 5 UASB and H-UASB system