REFINED BIO-GAS PLANT

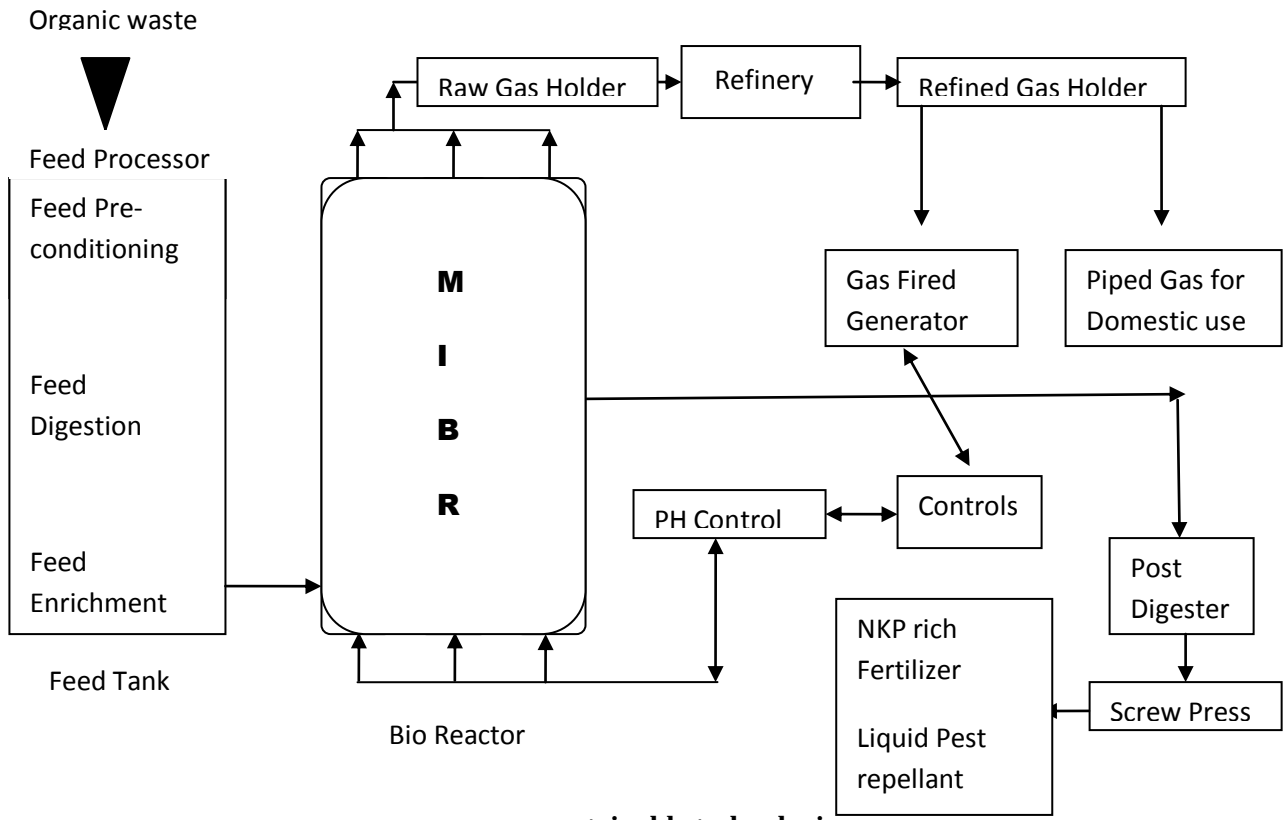
Technology

The Refined Bio-Gas plant uses Bio-Methanisation process to break down organic material and to produce high purity methane gas. The success of the Bio-Methanisation technology used in the Refined Bio-Gas plant lies in the fact that the process in itself is simplistic in nature (actually mimics an animals digestive system), a controlled and closed biological process using specific microbes for breaking down organic matter (protein, fat, cellulose, lignin, etc) completely and fast, thereby ensuring less space requirement and much higher output of refined Biogas. Also there is no odour or fowl smell from the plant. Being a biological process using food processing microbes and very similar to the conventional biogas no certification of any kind from the Health Department is required. As the refined biogas will be stored and piped at atmospheric pressure there are no safety concerns and hence approval from Petroleum and Explosives Safety Organisation (PESO) or any such organization will not be required.

Various capacity models using the technology are available to enable organic waste processing at different levels. The current models available can handle 500 kg, 1000 kg, 1500 kg and specifically built units for handling any higher capacities upto few thousand tones per day of organic wastes.

Technical Details

Process Diagram



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Feed processor

Feed processor is used to grind the feed stock to a paste /slurry condition with water, in order to enhance the digestion and make it suitable to pump. Our technology partner will supply suitable feed processor for each project based on the feed stock requirement and type of feed. All wetted parts of this machine is made of suitable material to withstand the feed characteristics.

Bio reactor

The bio reactor is a high efficiency single reactor MIBR based technology especially designed to take household food waste. Normally the material of construction of the digester will be M.S with epoxy coating inside. However in certain cases it may differ based on the environmental and site conditions. It is provided with inlet and outlet connection and internal piping for the enhancement of better digestion process.

Based on the principles of anaerobic digestion, stage wise process in which biodegradable organic sources are broken down in a series of steps to produce methane and carbon dioxide which will be refined and used for cooking or other thermal application or power production.

Refining

Proprietary methodology is used in this process for refining the gas, to improve the quality of the gas. The refined gas can used as pipe line grade natural gas (PNG) prescribed by the government for supply to thermal applications. In this process the gas will be cleaned of all in-organic chemical substances, like sulfur, carbon dioxide, phosphates, nitrates, ammonia and water.

The features of this technology are.

- Totally compact and minimum site work to install the plant
- Minimal civil work is required
- Heat content of the Refined BIOGAS is equivalent to that of LPG
- Refined BIOGAS line can be connected to the existing LPG stove and the same LPG line
- Any bio-degradable material can be used as the feed stock.
- Pipe line grade natural gas, for cooking or other thermal applications.
- Electricity production is available as an option
- The carbon dioxide produced is reused in the process itself
- Carbon foot print neutral, hence eligible for maximum carbon credit.
- Hydrogen sulfide content in the gas is extremely low
- Modular system can be added at any time to increase the capacity.

Recommended feed

Hotel Kitchen food waste, Slaughterhouse waste, Chicken waste, Water Lilly, Water Hyacinth, Food Processing Industry waste, Other Organic waste, etc.

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Process details

In the pre-feed tank pre-conditioning, digestion and feed enrichment occurs. The slurry is then pumped to MIBR (Bio-reactor) through proper connections, as shown in the flow diagram. Suitable environmental conditions are created inside the bio reactor by microbes for the healthy process and maximum extraction of the gas from the feed materials. Bio methanisation takes place in the bio reactor and the gas produced will be collected in the gas holder (crude gas).

The gas holder is made of a special combination of materials, poly amide coated with nylon fabric neoprene rubber and hyplon rubber. This to make sure that the product can withstand environmental condition including UV, attacks from pest and resistance to fire. The storage pressure of gas is less than atmospheric pressure, hence there are no safety problems and also does not require statutory approvals.

This (crude) gas will be further pumped through a de-moisturizer, de-sulphanator and refinery. The refinery removes the carbon dioxide content in the gas. The refined and purified gas has a purity, in the range of 85-98% methane depending on the type of refinery installed & purity desired. The refined gas will be stored in a refined gas holder. In this process the gas will be clean of all organic chemical substances like sulphur, carbon dioxide, phosphates, nitrates, ammonia and water. This (refined) gas can be used as pipe line grade natural gas (PNG) prescribed by the government for thermal applications also if required this gas can be filled in CNG cylinders and can be used for commercial thermal applications as well as automotive fuel.

The carbon dioxide separated in the refining process will not be let out to the atmosphere in this Plant. The carbon dioxide is re-used after converting to carbon monoxide and hydrogen in the carbon dioxide re-breather using a proprietary technology. This carbon monoxide will be taken back to the bio reactor which further enhances the anaerobic process and increases the gas production and methane content in the crude gas. In addition to this, the process makes sure that the sulphur content in the crude gas is less than 100 PPM by another proprietary in built technology.

However to reduce the sulphur content further a de-sulphonator is incorporated. This purified gas can be directly connected to any LPG stove and can be used just like the conventional LPG gas through a gas manifold.

Depending upon the requirement of pressure at the user point, additional facility to maintain the line pressure with separate booster pumps can be provided. The gas received at the user point will be free from moisture content with required pressure.

The bio reactor slurry is enriched in nitrogen, phosphorous and potassium. This value can be further improved and fixed if required. The elemental analysis of bio reactor slurry reveals that silicon,

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phosphorous, sulphur; potassium, calcium and iron are present. The presence of silicon is an important factor in the plant growth as well as yield. It can be applied to all crops. The liquid slurry can be directly mixed with running water of irrigation canal.

This is also used for coating the seeds before sowing. This will act as insecticide and prevent seeds or plants from insect attack. This will also help better germination and healthy growth of seeding.

A typical layout plan of a 500 kg plan is shown below.

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500KG PLANT LAYOUT

LEGEND:

F.Pr : FEED PROCESSOR
FHT : FEED HOLDING TANK
FP : FEED PUMP
MIBR : MICROBE INCUBATED BIO REACTOR
DM : DE-MOISTURIZER
DS : DE-SULPHONATOR
PP : PURGE PUMP
CGH : CRUDE GAS HOLDER
RGH : REFINED GAS HOLDER
RP : REFINERY PUMP
MP : MANIFOLD PUMP
GM : GAS MANIFOLD
Pr.P : PERCULATION PUMP
C.P : CONTROL PANEL

*NOTE: ROOF HEIGHT MINIMUM 12 FEET

REV NO.	DESCRIPTION	REF NO.	SIGN	DATE
00				

DRWG. No.

DRAWN: ARUN
CHKD: AJAYKUMAR
APPRVD: Dr.R V KUMAR
DATE: 09-01-2013

CLIENT :
PROJECT :
DRAWING TITLE : 500KG PLANT LAYOUT DRAWING
SCALE : NTS
SHEET 1 OF 1
ALL DIMENSIONS ARE IN MM

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