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Office: E-10 Commercial Block PHA Flats Near (UET) Zero Gate, Opposite Sultan Pura Orange Line Metro Station G.T Road Lahore, Pakistan.

Phone: 0092- 42-3682-7799, 3682-7789
UAN: 0092-03-111-222-LEO (536)
Support: 0092-3033-9999-11

E-mail: INFO @ ENERGY.LEO.COM.PK
Website: WWW. ENERGY.LEO.COM.PK

BIO GAS IS FUTURE OF PAKISTAN

Article By: Aamir Anjum
Director Engineering & Technology

What Is Bio Gas

By properties, biogas is very similar to natural gas and is composed of methane, Carbon dioxide and other gases. The energy value of the biogas is 600-950 Kilo-cal/m3.

How it can be used

It Can be burned in boilers as natural gas It can burned with the purpose of electric and heat power production After treatment biogas can be used as fuel for vehicles.

Benefits of Biogas Plant

1. Free Organic Manure
2. Saving on Energy Cost
3. Pollution Free Clean Environment

Electricity

Biogas can be used run gas converted generator to produce electricity on any scale. 1 m3 of biogas can produce 1.3 kWh of electricity.

Bio-Manure

Biogas technology allows quick production of bio manure which is rich in organic substances.

The main advantages of bio manure compared with conventional are:

It's form of availability, nutrients balance and high level of organic matter which is a powerful energy material for soil microorganisms. After using bio manure nitrogen-fixing and other microbiological processes are greatly improved and as a result crop yields can increased up to 30-50% without incurring any additional costs.

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The main advantages of organic manure produced by biogas plants:

1. **Maximum Ammonia preservation and accumulation:** Within continuous process of manure storage (composting) 50% of ammonia is lost. Thanks to anaerobic digestion in biogas plant total ammonia N completely preserved in bio-fertilizer, besides dissolved ammonia NH4-N content increased by 10-15%.
2. **Absence of weed seed:** 1 ton of fresh cattle manure contains up to 10 thousand weed seeds that are capable for germination even after they passed through animal's stomach. After biogas plant weed seeds lost 99% of their germinating ability.
3. **Absence of pathogens:** Animal manure can contain human and animal health hazard diseases: salmonellosis, ascariasis, intestinal diseases. Due to special treatment in biogas plant bio-fertilizer is almost free of pathogenic micro flora.
4. **No need for preliminary storage:** Organic manure produced by biogas plant can be effectively applied without any preliminary storage and has affective result after injection into the soil.

Pollution free clean environment

Biogas plant is the most efficient cleaning system. Compared to conventional cleaning systems that consume energy; biogas plant produces energy.
As all processes take place in oxygen free conditions (digesters completely sealed) it is odor free. Biogas plant allows removing most part of contaminating organic substances that is why digested biomass has no bad smell

Bio Gas Plants

Biogas plant is name often given to an anaerobic digester that treats farm or organic wastes. The history of biogas plants goes back to ancient Persia and China. It was observed that rotting vegetables produce flammable gas. In 13th century the Chinese were using covered sewage tanks to generate power. In 1859 first biogas plant was built to process sewage at a Bombay in Indian Sub Continent.
The biogas plants can be fed with energy crops such as maize silage or biodegradable wastes including sewage sludge and food waste. During the process the biomass is converted into methane producing renewable energy that is used for heating, electricity and

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many other operations that use any variation of an internal combustion engines.

Typical composition of biogas

Compound	Chemical Formula	%age
Methane	CH4	50–75
Carbon dioxide	CO2	25–50
Nitrogen	N2	0–10
Hydrogen	H2	0–1
Hydrogen sulphide	H2S	0–3
Oxygen	O2	0–0

Biogas gas is also being used in power generators for electricity production around the world as renewable fuel source. Leo Corporation Pakistan has successfully installed biogas plants to produce electricity using different bio degradable materials in Punjab In China 30 million rural households that have biogas digesters enjoy the following benefits:

- Saving fossil fuels
- Saving time collecting firewood
- Protecting forests
- Using crop residues for animal fodder instead of fuel
- Saving money
- Saving cooking time
- Improving hygienic conditions
- Producing high-quality fertilizer
- Enabling local mechanization and electricity production
- Improving the rural standard of living Reducing air and water pollution In Pakistan biogas produced from the small-scale digestion plants is called Gobar Gas and it is estimated that such facilities exist in hundreds of thousands in Pakistan, particularly North Punjab, due to the thriving population of livestock. Leo Corporation Pakistan understood the benefits biogas plants started working to develop biogas plants to produce electricity. Now Government of Punjab is also taking initiative to install biogas plants to produce electricity and help people to get rid of the Load shedding. Depending on size and location, a typical brick made biogas plant can be installed at

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the yard of a rural household with the investment between 50,000 to 65,000 rupees.

Biogas Plants for Cattle Farms

Pakistan is gifted with a large livestock population well-adapted to the local environmental conditions. It includes the best dairy breeds of buffalo and good dairy breeds of tropical cattle. Many breeds of cattle, buffaloes, sheep and goats have good meat production potential. Poultry sector has shown excellent growth in the last 4 decades.

Pakistan is also the fifth largest milk and producer in the world.

Most of the farmers who own the land also own small or large herds of cattle. An average sized animal produces

10-15 KG of dung on daily basis. This is either being sold on very cheap rates as raw manure to the local markets or the farmer uses this as manure for their own lands. Biogas plants for animal farms are the simplest and most common in the world.

This dung can easily be used as raw material to produce biogas and thus generate power to run tube wells, electricity and gas for cooking

Biogas Plants for Poultry Farms

Chicken dung (dry or liquid) is not a very good fertilizer itself. 6-9 months are required for chicken dung to become bio-manure. Chicken dung treated in biogas plants allows production of natural biologically active substances and microelements in a much shorter period of time.

Chicken dung is perfect raw material for biogas plant as it gives high biogas yield.

To use chicken dung in biogas plant the dung is treated in 2 stages of anaerobic digestion; hydrolysis and methenization. This method helps biogas to be very efficient but addition of another one reactor also increases biogas plant price.

Biogas yield from fresh manure is higher as compared with manure containing bedding material. Egg laying chicken and broiler fresh manure has biogas yield 170-200 M3 from one ton. Dung containing bedding is produce about 100 M3 of biogas from one ton.

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Biogas Plants for Community

More than 70% of Pakistan's population lives in villages and small towns. The economy is majorly based on agriculture. As energy crisis is continuously growing in Pakistan Villages and farmers are the most effected ones and it has started to take its toll. The crops cultivated are dependent on irrigation as no new water reservoirs and canals are built the farmers have to pump water using electric or Diesel pumps.

Major Issues that this community is facing are

- Long hours of electricity load shading
- Diesel prices are very high cumbersome to get
- Prices of fertilizer are gone too high and it has become impossible to earn profits
- No gas to cook food
- No light for nights
- No sanitation Infrastructure and this is causing health issues

Biogas Plant can answer all these issues but also can help to generate alternate source of income. A community level biogas plant can be constructed in a common place, the feed material will be collected from a group of households and the produced biogas can be distributed to all the beneficiaries. The size and cost of the plant may vary based on the availability of feed material, requirement of biogas and initial investment.

Advantages of Community Biogas Plant

Low Cost Energy: Biogas produced is a very low cost renewable energy source. Organic waste is converted into biogas and this biogas can be used to cook food, lit gas lamps and use biogas in diesel powered Peter Engines to pump water. This is the energy that will never go out

Sanitation: With proper management of animal and other agriculture/organic wastes/ village will be clean leading to better health and hygiene in rural areas.

Pollution control: normally aerobic decay of organic waste leads to emission of green house gases like carbon dioxide or carbon monoxide. The process reduces green house

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gas emission and helps in arresting depletion of the ozone layer.

Employment generation: Such plants can be easily set up and operated at village level and can be managed by women self help groups or local entrepreneurs with lower per capita investment. Since the product has a captive market the plant is bound to be economically viable and generate employment opportunity for a large number of people.

Free Organic Manure for farmers: Biogas technology allows quick production of bio manure which is rich in organic substances

Raw Bio Gas Holders

A biogas holder is generally an inverted floating tank cover with that is submerged into the water level. These covers are designed with a guided system to ensure that the cover is rightly balanced during the lift position and is not tilted unduly under the conditions of wind load. The gas holder tanks can be designed up to any diameter. Floating gas holders on the digester form a low-pressure storage option for biogas systems. These systems typically operate at pressures up to 2 psi. Floating gas holders can be made of steel, fiberglass, or a flexible fabric. A separate tank can be used with a floating gas holder for the storage of raw biogas.

Design:- The design of a gas holder resembles a large container where biogas is stored near the atmospheric pressure at ambient temperatures. The volume of the container is designed keeping in mind the quantity of stored gas, with pressure coming from the weight of a movable cap. Usually the volumes of a large gas holder are about 500 M3, with 60 m diameter structures. Gas holders are generally used for balancing purposes rather than for actually storing gas for later usage.

Advantages:- Gas holders offer several advantages over other methods of storage. These present the single storage technique that keeps the gas at district pressure. Gas is stored in these gas holders throughout the day when small gas is being used.

Biogas Compression

Due to the continuous energy crisis Biogas is the only cheep alternate to Natural (Sui gas) which can easily be produced with locally available technologies.

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Till recent past biogas is only been used for cooking and lighting in Pakistan. The gas produced in small home based biogas plants is usually used in kitchen via pipe line; the pressure developed in the Biogas Holder is around 1-2 PSI and it is not sufficient to transport gas to farther distances. This is why the use of biogas plants is very limited until now and plants are not installed at lager scale. A large scale biogas plant producing a large amount of biogas is often rendered worthless due to the lack of knowledge and expertise available in Pakistan.

Purified Biogas Storage

Once purified the biogas is similar to natural gas (CH4 Methane) and can now be used for running generators and stationary engines.
A common gas compressor poses fire hazards, since the auto-ignition temperature of biogas is 537 °C. Leakage and excessive temperature rise can be fatal. Due care during operation must be done so as not to allow the temperature to rise above safe limits. Leo Corporation Pakistan has successfully developed techniques to compress and store biogas at medium pressure between 2 and 200 psi. To prevent corrosion of the tank components and to ensure safe operation, the biogas it is first cleaned by removing H2S and then the cleaned biogas is compressed prior to storage in tanks.
Leo Corporation Pakistan fabricates pressurized biogas storage tanks of all sizes

Bio Gas scrubbing

By removing CO2 the biogas is upgraded to natural gas (Sui Gas). After this up gradation the can be used to run and gas fired engine/Generator. There are many ways that can remove CO2 from the biogas but the most cost effective way is passing gas at high pressures to shower of water. Leo Corporation Pakistan has after lots of learning from international research studies adopted and developed a technique that easily removes CO2 and H2S.
Leo Corporation Pakistan has developed water based Biogas scrubbers that are easy to operate and which don't use any chemicals or complex machinery.

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Bio Gas Dehumidification

Raw biogas produced by anaerobic digestion is water saturated. As the biogas enters the pipe work utilization system cooling takes place and water drops out of the biogas. This water needs to be removed from the system to protect mechanical equipment and it is important that design consideration of the pipe work layout includes correctly located condensate removal pots.

Leo Corporation Pakistan design and manufacture all sizes of stainless steel condensate pots for low and high pressure applications.

Filters

Raw biogas produced by anaerobic digestion can contain particulate which is damaging to mechanical plant. A lot of the particulate will settle out with the water in the condensate pots and be discharged to drain. Heavier particulates remain in the pots as sediment to be periodically flushed out.

Leo Corporation Pakistan design and manufacture biogas fine particle filters using polypropylene micro-fiber media cartridges which are water resistant and simply 'twist-to-lock' installed in stainless steel housings making replacement an easy operation. Filtration down to 70micron can be achieved and the modular design caters for any design flow.

For Farther Details About Biogas Plant Constriction

Contact: Aamir Anjum, Engineering Consultant, LEO Eco Energy

Cell No: **+92-322-222-7799** Skype : **aamir.anjum** E.mail : **aamir@leo.com.pk**