

With the development and progress of society, anaerobic biological treatment technology has been widely used in sludge treatment, sewage treatment, brewery, etc., but also to achieve the recovery of biomass energy (biogas).

As a renewable clean energy, biogas can not only replace straw, fuelwood and other traditional biomass energy, but also replace coal, natural gas and other commercial energy, and its energy efficiency is significantly higher than straw, fuelwood and coal. On the other hand, biogas has become an important part of energy strategy because of its simple structure, easy operation, local materials and pollution-free characteristics. It is of great significance to solve the problem of rural energy, promote the development of agricultural production, promote the development of animal husbandry, improve health conditions, cope with climate change, and protect the ecological environment.

With the price of coal, natural gas and inorganic fertilizer rising, biogas projects are becoming more important again. Today I would like to share a zero-emission (zero pollution) biogas project.

1, Site selection of biogas digester:

- (a). Solid soil; (b). Low groundwater level; (c). There are no hidden dangers such as cellar, seepage well and empty soil at the bottom of the soil layer; (d). Stay away from railways, roads and trees. Avoid damage caused by vibration or tree roots to the biogas digester; (e). The temperature in the sunny position is higher, which is conducive to increasing gas production; (f). Close to livestock and poultry sheds and toilets. In order to facilitate the biogas digester feed in winter;

2, Construction of biogas digester:

- a. Household biogas digesters, At present, Red Mud is the best material for the construction of household biogas digesters and small biogas projects, with a service life of more than 15 years. Cheap, durable, short construction time (half a day), greatly saving labor and material costs. Because the material is heat-absorbing and absorbs sunlight better, it produces 15% more biogas than other digesters. It should be noted that the part of digester should be placed below the ground to achieve thermal insulation.

(More details: www.ocatt.com)



- b. Large and medium-sized biogas project, enamel assembled tank with service life of up to 30 years. It is made of special steel plate, special sealing material, self-locking bolt and other materials assembled into the tank, can be used for sewage treatment, biogas engineering, food storage, petrochemical and other industries in the gas, liquid and solid sealed storage. The assembled tank is the best storage and fermentation container for organic matter (such as animal feces, sewage, straw and other fermentation materials) in large and medium-sized biogas projects.





3, Inoculum and raw materials:

- a. Before build a new digester or after feeding to collect old renewal in the biogas, biogas slurry, manure pit at the bottom of the foot black sediment, mud pond, urban sewage sludge, slaughterhouse wastewater sludge and so on, which are rich in methane bacteria, on the proportion to achieve 10-30% of fermentation materials, the inoculum and raw material mixing, join together in the pool.
- b. Choose cow dung, pig dung, sheep dung, straw (Straw, carbon content is higher, unit raw material gas production is higher. However, its decomposition rate is slow and the gas generation cycle is long. It must be chopped before use) as starting fermentation materials. These contain more compounds, C/N is less than 25:1, and they start quickly and produce good gas after entering the digester. It is not recommended to start with chicken manure and human manure alone. In the case of less biogas bacteria, the feed liquid is easy to acidify, leading to normal fermentation and no biogas.

4, Water seal tower:

It is an indispensable safety device in entire system. To prevent flames from entering devices, containers and pipes, or prevent flames from spreading within equipment and pipes. The principle of working is to set up the fire resistance between the gas inlet and outlet.

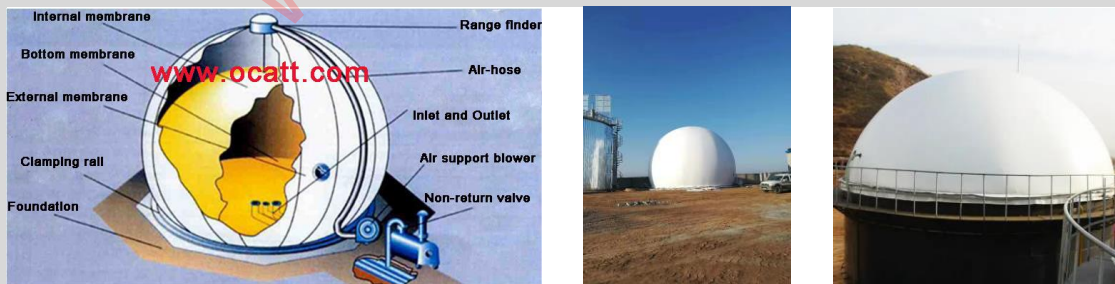


5, Biogas storage bag/biogas holder

- a. Biogas storage: The material is Red Mud PVC, the most suitable material for storing biogas. It is mainly used in household and small biogas projects. Easy to carry, easy to transport, size and shape can be customized according to actual needs.



- b. Biogas holder: This is the most widely used gas storage method in large and medium-sized biogas projects. The main components of the material are red mud soft software composite film and red mud soft software mesh cloth. It has high safety factor and 100% utilization rate. It is shaped like a three-quarter sphere, fixed by steel rails to a cement base or to the top of an anaerobic tank. The sphere is composed of outer membrane, inner membrane, bottom membrane (upper cabinet) and auxiliary equipment.
- c. Operation principle of holder: bottom membrane, inner membrane, outer membrane together to form two Spaces. The inner membrane space is used as the gas storage space to store various gases, and the space between the outer membrane and the inner membrane is used as the pressure regulating space. When the stored gas increases, the control device exhausts the pressurized air of the outer membrane to release a certain capacity. When there is less gas stored in the inner membrane, the device is controlled to inject air into the pressure regulating layer to balance the pressure in the cabinet and stabilize the stiffness of the outer membrane



6, Gas-water separator:

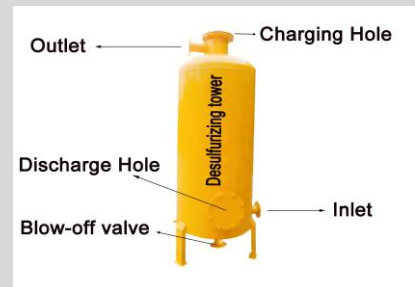
- a. When biogas is produced, it will be accompanied by a large amount of water and H₂S, which will form hydrosulphuric acid and have corrosiveness to gas pipelines, valves, stoves and other components.
- b. When the external temperature is below zero, the moisture in the methane will freeze, which is easy to cause the blockage and rupture of the pipeline. There will also be very low biogas production.
- c. The gas-water separator can effectively remove the water entrained in biogas, and the water removal rate is as high as 99.5%. It has the characteristics of high efficiency, small size, easy installation and long service life.



7, Desulfurization tower: Stainless steel.

Advantages :(1) strong and durable, the life of the tower body is about 15 years; (2) facilitate later transformation to adapt to new environmental standards; (3) weight of tower, the whole system is stable after installation; (4) Excellent corrosion resistance.

As mentioned in the introduction of the gas-water separator, the newly produced biogas contains a large amount of water and corrosive hydrogen sulfide. Therefore, biogas must be dehydrated, desulfurized and deoxidized before it is used or sent the generator set, in order to prevent corrosion damage to mechanical components, pipes, valves and so on, and become a serious hidden danger of biogas use.



8, Constant pressure system:

To provide users with a continuous and stable pressure output and ensure sufficient and large fire power of biogas combustion a pressure system may be needed. It includes biogas regulator tank, biogas pressure gauge, control box, booster fan, sensor, etc. After setting the upper and lower limits of pressure, the booster fan will automatically start or stop according to the biogas pressure in the buffer tank. When the pressure of the biogas pipe network is lower than the set value, the booster fan will automatically start; when the pressure of



the marsh gas pipe network is higher than the set value, the booster fan will automatically stop running, to ensure the stability of the pressure in the tank. Suitable for all kinds of biogas digesters and long-distance transportation of biogas. Weight on a floating drum or flexible bag storage will also provide a constant pressure.



9, Flame retardant device:

It is suitable to be installed on the biogas pipeline and storage tank to prevent the reverse propagation of flame in the pipeline under abnormal conditions, avoiding the occurrence of catastrophic accidents.



10, Gas flare:

Some equipment failure, system maintenance or excess production/reduced use means biogas cannot be properly burned, so the surplus biogas which cannot be completely stored by the gas container, must be burned in a flare, so that the biogas output and emission balance to avoid accidents and atmospheric discharge. Escaping biogas will not only pollute the environment, but also cause serious security and fire risks, so proper treatment of anaerobic biogas is needed. For factories or places with small gas production, biogas torch is generally set to burn any excess biogas. A biogas flare can improve site safety, increase social identity, reduce



odor pollution, reduce greenhouse effect and so on.

It is mainly used in biogas engineering, landfill, brewery, breeding farm, sewage treatment plant, chemical industry, energy and environmental protection.



11, Cogenerator/Generator(Biogas):

Biogas generator refers to a power generation system using biogas to generate electricity. According to different uses, it can be divided into household biogas generator and biogas project generator. A range of sizes from around 2.5 KW to 500 KW are available



Its main equipment includes an engine, generator and heat recovery device. The working principle is that the biogas is supplied to the gas generator set by the storage tank through the desulfurizer, which drives the biogas internal combustion engine to generate electricity. The heat in the cooling water and exhaust gas discharged by the biogas generator unit can be recovered by the heat recovery device, and can be used as the heat source of the biogas generator.

Due to the large amount of energy loss (friction, heating, cooling) during the entire generation process, the power generation efficiency is only between 20% and 40%.



Notes:

- ◆ All contents are for reference only. The pictures are taken in kind
- ◆ Relevant parts can be selected according to the actual situation, not everything is necessary for every project
- ◆ Any dung can be used, or food wastes if available (give more biogas).

1, Household biogas system → www.ocatt.com

2, Biogas residue and biogas slurry organic fertilizer system (Coming soon...)

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