



Biogas from Waste

Renewable Power From Waste



Biogas from Waste

Clarke Energy is a multinational specialist in distributed power generation technology. Our scope ranges from the supply of a gas or diesel fuelled power generation engine, through to the turnkey installation of a multi-engine power plant. Clarke Energy is an authorised distributor and service provider for INNIO's Jenbacher gas engines. The business has a strong focus on aftersales support; developing in-country resources to service and maintain our facilities, along with original equipment manufacturer approved spare parts. Our aim is to provide high quality products and installations supported by a reliable, accountable and localised

after-sales service. Integrity is a core company value and Clarke Energy operates to the highest international standards of compliance.

Benefits of working with Clarke Energy

- Quality products, balance of plant and installations products mean high technical and environmental performance hence maximum returns for our customers.
- Our installations are backed up by the highest levels of localised aftersales support, meaning maximum reliability of the power generation assets we supply.
- Extensive engineering experience across a range of gases and applications, meaning tailored, optimal power generation solutions for our customers

Biogas from Waste

Disposal and treatment of biological waste represent a major challenge for the waste industry. For a wide range of organic substances from agriculture, foodstuff of feed industries, anaerobic digestion is a superior alternative to composting. Biogas - a mixture of both methane and carbon dioxide - is created during anaerobic digestion and serves as a high-energy renewable fuel that can be used as a substitute for fossil fuels. Biogas-fuelled gas engines improve waste management while maximising the use of an economical energy supply.

Biogas Creation

Biogas results from anaerobic fermentation of organic materials. As a metabolic product of the participating methanogens and acidogenic bacteria, the prerequisites for its production are a lack of oxygen, a pH value from 6.5 to 7.5 and a constant temperature of 35-45°C (mesophilic) or 45-55°C (thermophilic). The digestion period or retention period is typically between 10 and 30 days depending upon the type of digestion employed. The anaerobic digestion systems of today operate largely within the mesophilic temperature range.

Benefits of Waste Biogas Plants

- Production of renewable power
- Treatment of a waste material
- Reduced carbon emissions
- Economical embedded power production and reduced transmission losses
- Production of soil improver
- Cost effective proven technology

Waste Feedstocks

A variety of biodegradable waste feedstocks can be used in digestion facilities. At the outset the developer should consider what contaminants might be in this waste and how could it affect the digestion process or the operation of the gas engines.

Waste-based facilities range from simple systems for the digestion of contaminant free by products, such as those in the food preparation industry, up to mixed waste digestion facilities such as mechanical biological treatment (MBT) facilities accepting household waste. MBT facilities include comprehensive pretreatment plants or materials recovery facilities (MRFs) to refine the waste materials prior to digestion.



Biogas from Waste Schematic

Biogengreenfinch, Westwood, UK, 2 x JGMC320



Conversion Steps from Waste to Power

The process of biogas generation is divided into four steps:

- Preparation of the input waste material – including removal of physical contaminants, particle size reduction & pasteurisation
- 2. Digestion (fermentation), consisting of hydrolysis, acetogenesis, acidogenesis and methanogenesis
- 3. Conversion of the biogas to renewable electricity and useful heat
- 4. Post-treatment of the digestate

Initially the feedstock to the digesters is received in a primary pit or liquid storage tank. From here it is loaded into the digester by various different means depending upon the constitution of waste materials.

In the digestion tanks a series of biological processes are harnessed in order to produce biogas. Hydrolysis is the process where the organic material is solubilised into the digestion liquid. It then undergoes the intermediate steps of acidogenesis and acetogenesis which create the precursor molecules for methanogenesis. Methanogens feed off these precursors and produce methane as a cellular waste product.

The biogas containing this biologically-derived methane is contained and captured in a gas storage tank which is located separately to the main digester, or alternatively can form its roof. The gas storage tank acts as a buffer in order to balance fluctuations in the production of gas in the digesters.

Gas Quality Considerations

The biogas may contain high levels of water (humidity) and sulphur, depending upon the feedstock of the digester. Developers of biogas plants should consider the potential for gas contamination when designing their facility.

Please contact your local Clarke Energy sales office to provide you with technical instruction for fuel gas quality to understand the required specific limits.

Clarke Energy is able to supply fuel gas treatment equipment either free issue, or as part of a turnkey scope of supply. These typically include carbon filters, gas dehumidifiers and gas boosters.

Jenbacher and Biogas

The broad range of Jenbacher biogas engines is specifically designed to run at full load with high efficiency and high availability, despite a low heating value and fluctuating gas quality and pressure. The high quality and specially designed engine parts resist the impurities that usually appear in biogas and similar types of fuel.

Before the biogas can be fed into the gas engines, it needs to be dried and compressed. Severe contaminants such as sulphur should be removed if exceeding a certain level. Not only will these measures considerably increase the availability of the generator, but they will also reduce the costs associated with operation.

Please request a fuel gas quality specification to understand operational limits for gas contaminants in the generator's fuel.

Waste based biogas systems typically gain revenue in the form of gate fees and from the sale of renewable electricity and heat. This means that the gas engine is of particular importance for the success of the plant. Waste facilities are typically required to operate at specific times of day and have limits on the levels of waste that is permissible to be stored on site. These factors make it essential for the operator to have an engine with the maximum levels of availability (running time per year) and the highest levels of electrical efficiency, in order to convert the gas to the maximum level of electrical output and to ensure consistent plant operation.

Our Competence

Clarke Energy has extensive multi-national experience in the engineering, installation and maintenance of generation facilities operating on gas derived from biological sources.

Jenbacher engines are known for having the highest levels of electrical efficiency on the market. When coupled with a contractual maintenance agreement with Clarke Energy, it will give peace of mind to the customer that they will achieve the highest levels availability and hence consistent returns from their biogas plant.





Clarke Energy, a Rehlko Company, is a multi-award-winning global business specializing in the engineering, installation and maintenance of distributed energy solutions.

Clarke Energy supplies a range of different energy efficient, resilient, low carbon and renewable power generation and storage technologies. For gas based projects we are able to produce or accept renewable and low carbon fuels including hydrogen, biogas and biomethane / renewable natural gas (RNG).



To contact Clarke Energy please visit our website: www.clarke-energy.com