Clarke Energy

Engineer - Install - Maintain

Distributor & Service Provider
Gas Engines

Biogas from Waste

Biogas from Waste

Clarke Energy is the authorised distributor and service partner for GE Energy's gas engine division in a growing number of countries across the world. In addition to providing high-efficiency, reliable gas engines we combine this with the expertise and resources to deliver unbeatable product support.

Whether your requirement is for the supply of a single gas engine generator or a complete turnkey power generation facility, we can meet that need. Our ability to add value by offering an end-to-end service, from initial proposal to reliable long-term maintenance, has led to us becoming a multi-national company with operations in ten countries across the globe. Our company prides itself on integrity, delivering only the highest quality products whilst providing a reliable accountable localised service.

Benefits of working with Clarke Energy
Clarke Energy provides flexible solutions for your gas generation projects. Our services range from the supply of a gas engine generator, through to the complete turnkey installation of a gas powered generation facility. Clarke Energy has a dedicated, top-quality team of sales, engineering, project management, commissioning and maintenance staff to meet your needs. We also offer long-term maintenance contracts backed up by a strong balance sheet, giving peace of mind with respect to the long-term performance of your GE gas generation equipment.

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

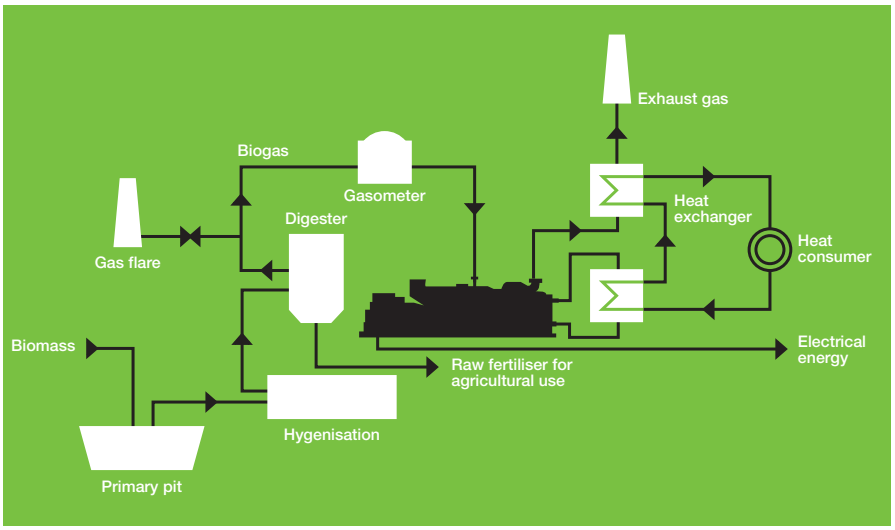
- Production of renewable power
- Treatment of a waste material
- Reduced carbon emissions
- Economical embedded power production and reduced transmission losses
- Production of soil improver
- Cost effective proven technology

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 facilties (MRFs) to refine the waste materials prior to digestion.

Biogas from Waste Schematic



Conversion Steps from Waste to Power

The process of biogas generation is divided into four steps:

1. 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 GE Energy's 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.

GE Jenbacher and Biogas

The broad range of GE 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 experience in the engineering, installation and maintenance of generation facilities operating on gas derived from biological sources.

The GE Jenbacher gas engine is 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.

Biogengreenfinch, Westwood, UK, 2 x JGMC320

PDM Group (Refood) Doncaster, 2 x JGMC420 + waste heat boiler

If you would like to find out more about how Clarke Energy can help you develop your waste sector biogas project, please contact your local office for more details.

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