Clarke Energy®
A KOHLER COMPANY

Engineer - Install - Maintain

Sewage Gas

Sewage Gases

Clarke Energy, a Kohler company, 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

Sewage Gas to Renewable Power

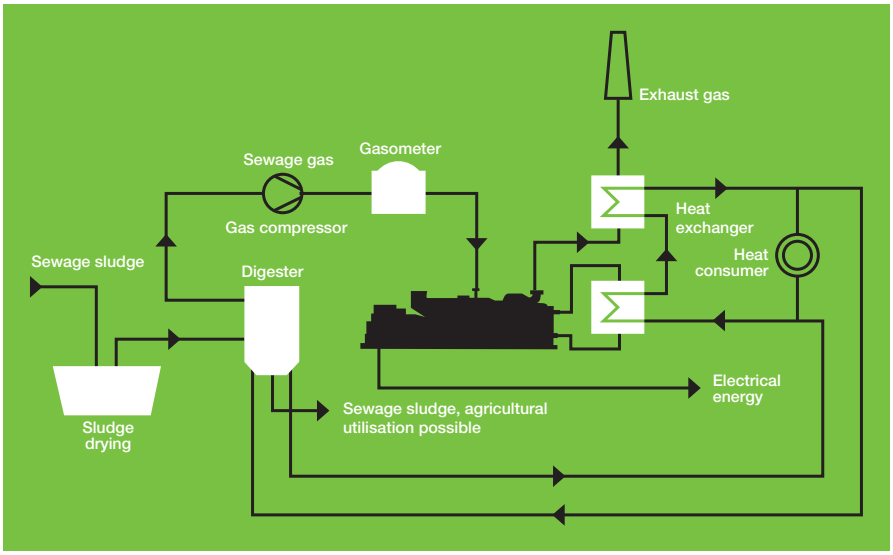
Wastewater professionals once accepted the high costs of operating wastewater treatment facilities as a consequence of meeting their discharge permit requirements. As the cost of energy rises and emphasis on renewable energy increases, local authorities and municipalities are seeking solutions that save money and meet renewable requirements. Jenbacher gas engines provide a renewable energy solution that results in long-term savings for wastewater treatment plants (WWTPs).

Benefits of Sewage Digestion

— Generation of renewable energy from a waste material
— Reduction in carbon emissions especially compared to aerobic sewage treatment
— Economical onsite electrical power production & reduced transmission losses
— Production of soil improver
— Cost effective, proven technology

Reading, UK, sewage treatment works

Sewage Gas Schematic



Energy Costs

Waste treatment processes include energy-intensive operations such as aeration and pumping. As a result, WWTPs require significant energy consumption. As electrical prices increase, plant operators are facing higher energy costs in order to meet discharge permit requirements. The second leading expense to WWTP owners is the cost of energy, behind only personnel. For plants that employ anaerobic digestion for biosolids treatment, the process of combusting digester gas to produce electricity and heat may provide a solution to rising operational costs.

A large proportion of the world's sewage systems do not recover value from the sewage in the form of electricity and heat. But, the renewable energy fuel source derived from sewage gas can be converted using reciprocating gas engines, to electricity and heat, offsetting as much as two-thirds of a plant's electricity demand and eliminating the need to purchase fossil fuels for plant heating processes.

Conversion Steps from Sewage to Power

The process of biogas generation is divided into for steps:

1. Preparation of the input material including removal of physical contaminants
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

Sewage is collected in municipal sewage systems and sent to the waste water treatment plant. From here it is prepared and sent to the sewage digesters.

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 typically located separately to the main digester. The gas storage tank acts as a buffer in order to balance fluctuations in the production of gas in the digesters.

Where gas production levels are low or highly variable, dual fuel mixing can be used to supplement the sewage gas with natural gas from the mains distribution network.

Advantages

Seamless dual fuel mixing maximises renewable energy output and smoothens gas production fluctuations by supplementing with natural gas as required.

High electrical efficiencies help generate more electricity per unit of sewage gas used. Electrical efficiencies of up to 43% based upon the lower heating value of the gas are achieved with Jenbacher gas engines.

LEANOX controls with turbocharger bypass ensures the correct air-to-gas ratio under all operating conditions to minimise exhaust gas emissions while maintaining stable operation.

Longer overhaul schedule minimise maintenance costs with 60,000 operating hour overhaul intervals.

Our competence

Clarke Energy has extensive multi-national experience in the engineering, installation and maintenance of generation facilities operating on sewage gas and other gases 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 our customers that they will achieve the highest levels availability and hence consistent returns from their biogas plant.

Beddington, UK, 1 x JGMC312

Mapocho, Chile, 3 x JMS620