

Efficient Biogas Treatment

Easy – Safe – Future-oriented



BIOMETHANE



PlanET Biogastechnik – Everything from a Single Source

PlanET Biogastechnik GmbH is one of the world's leading biogas plant suppliers. Founded in 1998, the company's service portfolio covers all fields of biogas technology and component distribution: from planning, plant construction, refinement of biogas to natural gas quality and all the way to service and biological support from our in-house laboratory. PlanET's RePowering division enables customers to increase the efficiency of their existing plants in a targeted fashion. At the same time, the modularly developed SYSTEMBIOGAS functional principle allows biogas plant operators and investors to react to new developments on the biogas market at any time. Over 200 employees currently work at the company headquarters in Münsterland alone. Other employees work in the international subsidiaries in the Netherlands, France and Canada. We are also represented in the United Kingdom, Italy, Spain and Japan. PlanET already has successfully realised more than 300 biogas plants worldwide on a scale from 40 kW to several megawatts.

The Most-Flexible Energy Source of all Time



No Matter When and Where it Takes Place



Organic and stock sources of wastes in addition to energy crops are readily available throughout the year. Biogas and biomethane technologies are the most efficient form of transforming these types of feedstocks into energy. This form of energy is reliable and constant due to feedstocks being available throughout the year. In this way, biogas and biomethane can provide a safe and secure form of energy from a renewable source, and will ensure a country more energy independent.

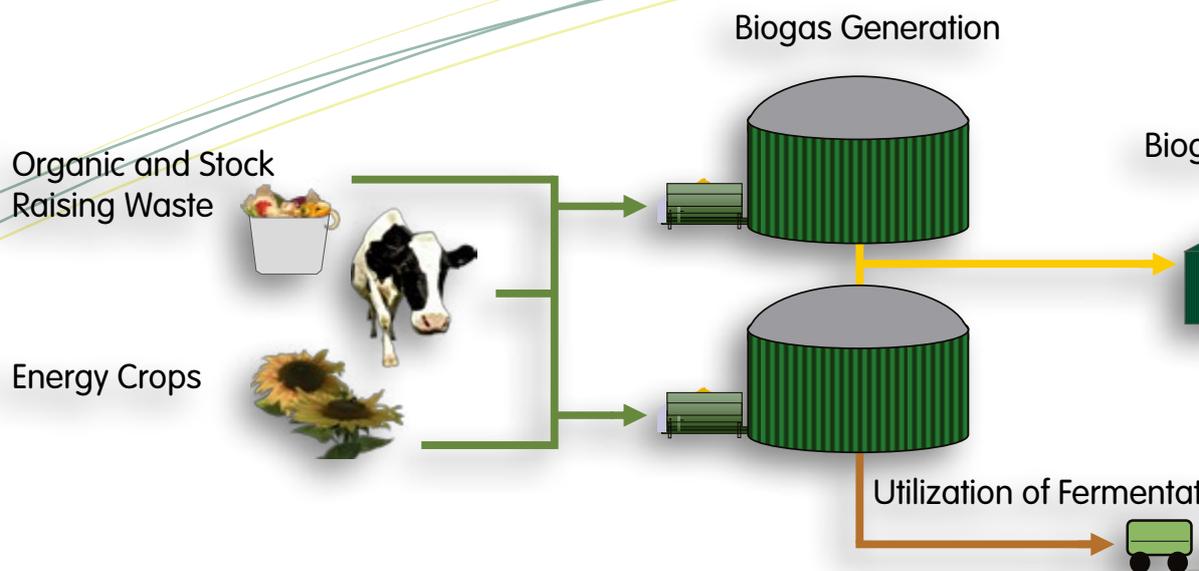
Biomethane has similar properties to natural gas and once treated it can be injected into the gas network. One of the greatest advantages of biomethane is it can be utilized independently from location and time, e.g. as a transport fuel, to heat homes and in a CHP via using the natural gas grid.

PlanET Biogastechnik utilizes a carefully selected membrane technology to upgrade the biogas to meet the gas networks statutory requirements, which is delivered as a turn-key installation. Customer specific requirements are always considered and the plant is designed to operate at optional efficiency.

PlanET Biogastechnik are at the forefront in biomethane and have already built several treatment plants in Germany and Canada which incorporate different technologies.

The Benefits at a Glance:

- Biomethane replaces fossil natural gas and utilizes the existing infrastructure
- Biomethane stabilises the energy supply system
- Biomethane can be used in conjunction with demand
- Biomethane cannot only be obtained from energy crop but also from residues and waste materials
- Biomethane can be used flexibly



Membrane-Based Biogas Treatment

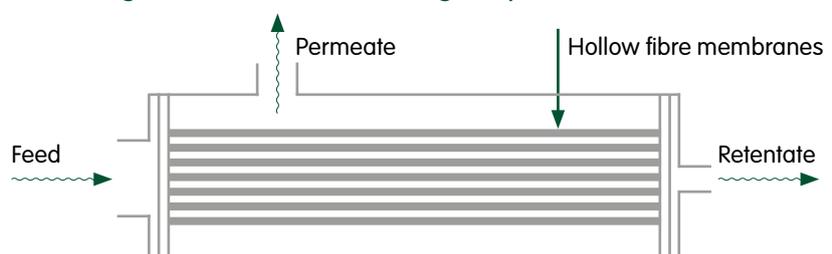


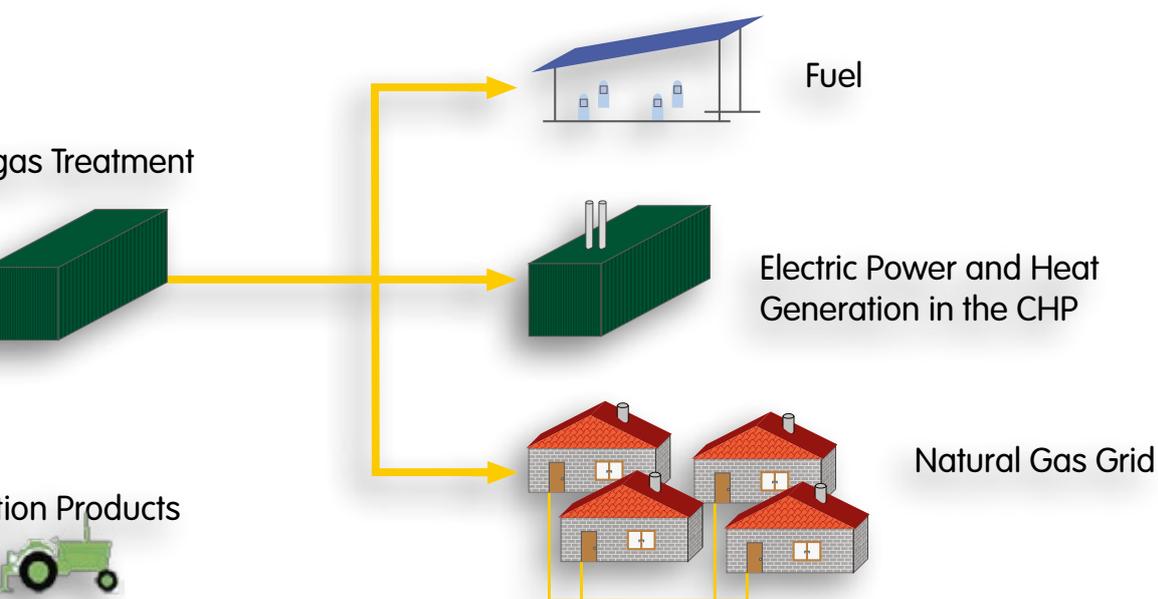
At first, raw biogas includes 48 to 65 % methane (CH_4) as well as 35 to 52 % carbon dioxide (CO_2) and low percentages of other trace gases which are seen as pollutants. Before the gas is fed into the natural gas supply network, the methane has to be separated.

Here, the particular process steps are desulphurisation with activated carbon filters, condensate separation and compression. After that, the most important process step, the separation of CO_2 and water vapour, takes place using the membrane.

The membrane method, called PlanET eco[®] gas, obtained from Gasaufbereitung Himmel GmbH, uses the principle of selective permeation through the membrane surface. For this purpose, the highly-efficient gas separation modules SEPURAN[®] Green, developed by Evonik Industries, are used. Gases with higher solubility as well as smaller molecular volumes (CO_2) penetrate the membrane very quickly. Large, less soluble gases (CH_4) go through the membrane more slowly. Furthermore, different membrane materials separate differently. The driving power necessary for the separation of the gases is achieved by a partial pressure gradient.

Functioning of a membrane module for gas separation



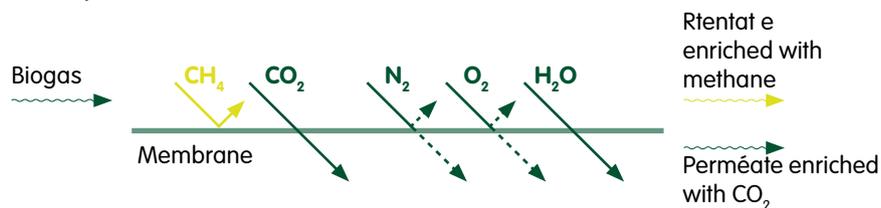


The Membrane Technology - Easy and Safe

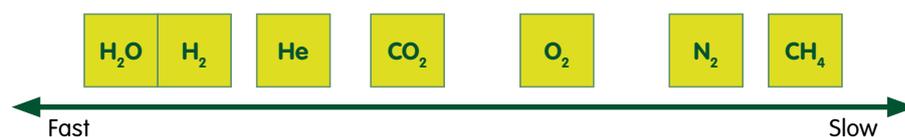


This membrane technology uses hollow fibre membrane modules. For this purpose, several thousand hollow fibres are bundled up in a stainless steel tube. The tube ends are embedded in resin. The hollow fibres made of polymer plastics separate CO_2 and CH_4 contained in the biogas and in this way, they ensure an excellent biogas treatment. Gas separation is done at room temperature, thus no external heat sources will be required. The outstanding advantages of the membrane method in comparison with other biogas treatment technologies are mainly low energy consumption, small space requirements, high flexibility, and simple modular plant design.

Gas separation with membranes



Passing velocity of different gases



Advantages of PlanET eco® gas



Flexible, Environmentally-Friendly and Highly Efficient



+ Reduced operating costs

The membrane technology is extremely durable and requires minimum maintenance. This reduces your operating costs.

+ Low investment

PlanET eco® gas is an investment that is worthwhile. With low investment costs and high efficiency outputs this option is therefore very profitable.

+ Easy to control

The equipment can be easily controlled, in case of fluctuating flow rates and different mixtures; PlanET eco® gas adjusts to meet every situation. Within a few minutes, the plant can run up to full load.

+ Requires small space, less time for installation

PlanET eco® gas is also part of the modular design of the SYSTEMBIOGAS. In this way, everything can be installed quickly and requires only small space.

+ Flexibility

Whether a small plant with a production of 10 Nm³/h or a large-scale plant with several hundred Nm³/h, using the membrane technology PlanET eco® gas, you will be well equipped and can produce the biomethane quantity that matches to your biogas plant.

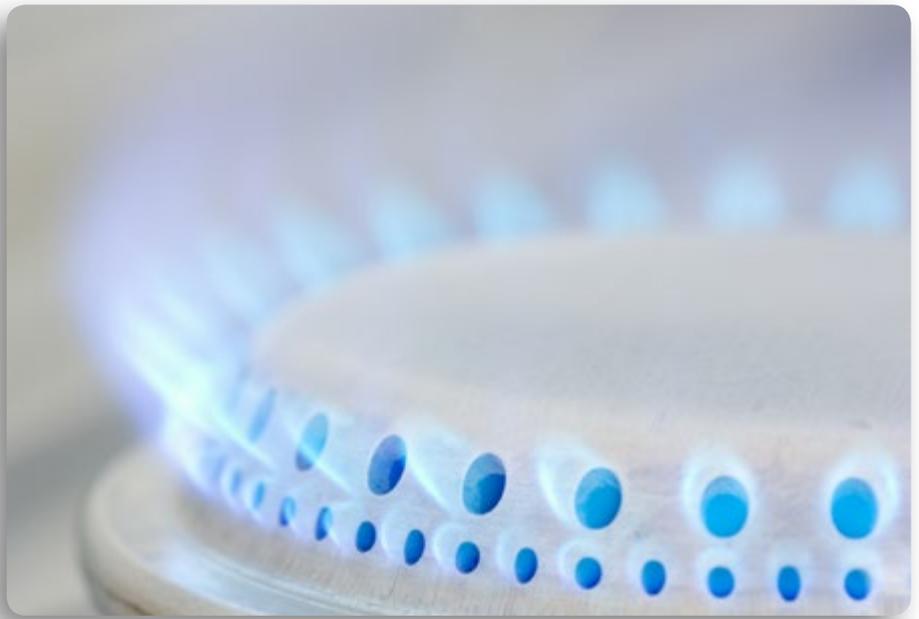
+ No heat consumption or chemicals

The aim is: environmentally-friendly generation of electrical power, heat or fuel. PlanET eco® gas goes this way, no chemicals or heat are required for the generation of biomethane.

+ No additional drying process

Other methods partially require several drying steps, until the biogas has reached its required dew point for the public gas network. This does not apply to PlanET eco® gas. Due to the separation process, the gas is dried in only one step.

The Utilization Paths of Biomethane



Unlimited Variety of Fields of Application



There are various possibilities of utilization: Whether it is used in private households or in industry, as fuel for vehicles or for the generation of electrical power or heat in non-central combined heat power plants; Biomethane as a regenerative energy source replaces fossil natural gas completely.

As fuel, bio natural gas is a real all-rounder; it does not only help fight climate change due to 98% less emission, it also saves on costs in comparison to fossil fuel.

Biomethane is converted into electricity in non-central CHP plants, completely independent from the place of origin. The actually generated by-product, heat, can be used to heat residential or public buildings, for example swimming pools or schools, or it can be utilized in heat-intensive industrial processes.

In future, the importance of biomethane as operating agent in the chemical industry and plastics processing will be increasing and in this way, it will replace more fossil natural oil and gas.

The Benefits at a Glance:

- Regenerative natural gas" used in private households and industry
- Environmentally-friendly and economic fuel for vehicles with gas engine
- Non-stationary generation of electrical power and heat in CHP plants.



If there are any questions about the PlanET Biogastechnik's biomethane offer, or you need more information, please give us a call or send an e-mail to the competent expert adviser for PlanET eco® gas:

Andreas Lenger

a.lenger@planet-biogas.com



Biogaz France

Etude, Construction & Service



Biogas Italia

progettazione, costruzione & assistenza



Biogas Solutions

design, construction & service



Biogas UK Ltd.

design, construction & service



Biogas Projects

develop, invest & operate



Biogastechnik

planen, bauen & service

PlanET Biogastechnik GmbH

Up de Hacke 26

48691 Vreden

Fon: +49 (0) 2564-3950-0

Fax: +49 (0) 2564-3950-50

www.planet-biogas.com

info@planet-biogas.com

June 2013

Subject to alterations and errors excepted.