

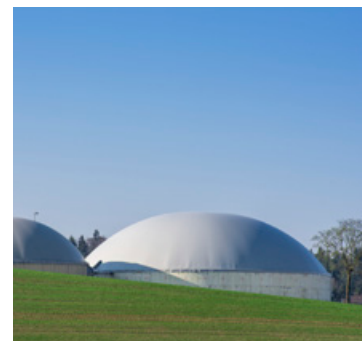


aerospace  
climate control  
electromechanical  
**filtration**  
fluid & gas handling  
hydraulics  
pneumatics  
process control  
sealing & shielding



# Biogas-Solutions

Gas Treatment



ENGINEERING YOUR SUCCESS.

# Raw Biogas Treatment



Parker Biogas Solutions, your 'single source' for advanced technologies and systems that deliver first class quality with global support and availability – all backed by the guarantees of the industry leader.

## Raw Biogas Treatment

Biogas, originating from biomass, sewage plants and landfill sites is gaining increasing worldwide importance as a recognised renewable energy source. Biogas production can and will contribute in a significant way to future energy supplies replacing more and more existing fossil-fuel sources such as coal, oil and natural gas.

Generally, biogas is saturated with water vapor and contains other impurities which, when used as fuel, must be removed to prevent corrosion and damage to equipment and systems and improve cogeneration unit efficiency.

The selection of effective biogas treatment equipment is therefore particularly important, both in optimising the cogeneration of electrical and thermal energy, making the most of the available renewable energy, and reducing energy consumption and operating costs to a minimum.

## Biogas Filtration

Biogas produced in anaerobic digesters and landfills contains foams, small solid particles in suspension, greases, particulates and other contaminants which must be removed from the gas by filtration prior to any downstream equipment or pipework. Failure to remove these impurities may lead to a malfunction of devices and processes downstream.

The stainless steel **Hyperfilter BioEnergy FFB** has been specifically designed to prevent these undesired effects, available in a range of sizes matched to the needs of biogas applications:

### Filter range:



#### FFB filter series Hyperfilter BioEnergy

- Particle removal size 5 µm or 20 µm
- Filtration Efficiency 99,999%
- Differential pressure 2 mbar (dry)



The secret of Hyperfilter BioEnergy is its highly advanced filter element. This combines ultra-high particle retention efficiency with extremely low pressure drop which results in clean, ready to use biogas with service costs kept to a minimum.

# Raw Biogas Treatment

## Biogas Dehumidification – Key Components

Biogas is usually saturated with water vapour and contains contaminants that need to be removed or reduced including hydrogen sulphide, carbon dioxide, chlorides, fluorides, siloxanes and aromatic compounds. Most of these elements are water-soluble; so by achieving efficient dehumidification it is possible to significantly reduce the water vapour content in the biogas and partially or completely remove some of these impurities.

Parker's solution is to dry the gas, firstly by cooling to around 5°C using a water-cooled heat exchanger working with a water chiller and secondly, by removing the condensed water with a cyclonic water separator.

The water-chiller **Hyperchill BioEnergy**, stainless Steel heat exchanger **Hypercool BioEnergy** and centrifugal separator **Hypersep BioEnergy** are the key components of the biogas treatment system: they have been specifically designed for biogas applications and provide safe and reliable operation in the harsh environments typically found at Anaerobic Digester and Landfill biogas production sites.



### Hyperchill BioEnergy

- Chiller Output 5 – 360 kW
- Special coating for corrosive environment
- Pump and tank installed inside casing
- Microprocessor controlled
- Ambient range -20 °C to +50 °C
- Compliant scroll refrigerant compressor
- IP54 protection as standard

### WFB aftercooler series Hypercool BioEnergy

- Flow rates and performances aligned with CHP power range
- Suitable for horizontal & vertical installations
- Max. working pressure: 0,5 bar<sub>g</sub>



### CSB separator series Hypersep BioEnergy

- Material: Parts in contact with biogas in AISI304 or AISI316L, parts not in contact with biogas in AISI304
- Suitable for installations with horizontal & vertical WFB
- Max. working pressure: 0,5 bar<sub>g</sub>

## Biogas Dehumidification – Skid-Mounted Packages

Compact, robust and easy to handle, the Parker skid solution is a plug & play biogas dehumidification package specifically designed for outdoor installations and reliable performance in harsh operating conditions.

The dehumidification skid has energy efficiency at the forefront of its design. The in-built flexibility to use a wide range of cooler/chiller combinations ensures the closest match to customer requirements thus delivering constant dewpoint performance regardless of fluctuations in operating conditions.



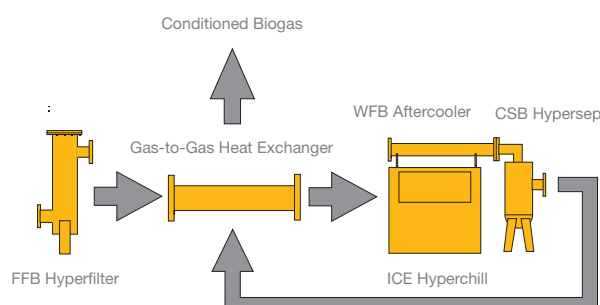
### Skid-Mounted Packages

Available in a range of sizes from 50 Nm<sup>3</sup>/h to 1800 Nm<sup>3</sup>/h:

- Hyperfilter BioEnergy;
- Hypercooler and Hypersep BioEnergy;
- Hyperchill BioEnergy;
- Water connections;
- Expansion tank;
- Counterflanges kit;
- Galvanized steel frame.

## Energy Saving Feature

For applications where the dehumidification system is located downstream of the blower a specially designed Gas-to-Gas Heat Exchanger can be supplied to reduce the inlet gas temperature and re-heat the gas after the cooling process thus reducing the final relative humidity of the biogas and avoiding the possibility of any further condensation in the pipework. Energy savings are achieved by reducing the cooling load of the chiller and by eliminating the requirement for an additional energy source to reheat the biogas.





# Siloxane and VOC Removal

PpTek, and its unique regenerative media solution, are now part of the Parker – Hiross Filtration Division, having been purchased in 2014.

PpTek is the world leader in regenerative Siloxane removal technology, with over 100 installations world wide. Solutions are fitted to protect CHP engines in Gas to Electricity, Gas to Grid and Gas to Vehicle applications.

This acquisition forms a powerful combination of products to cover almost all aspects of Gas Conditioning necessary in the BioEnergy markets.

Recent years have seen a marked increase in the use of siloxane-containing products, a substantial amount passing through to waste products both in sewage and landfill sites.

As the gas produced from these sites is used to power biogas-to-energy units, without treatment we see a substantial increase in the effects of the siloxane contamination, in the form of crystalline Silicon Dioxide (quartz/sand) building up on the combustion surfaces inside generating engines.



Silica deposits on a head & valves causing a collision between valves and piston crown



A piston coated in silica deposits

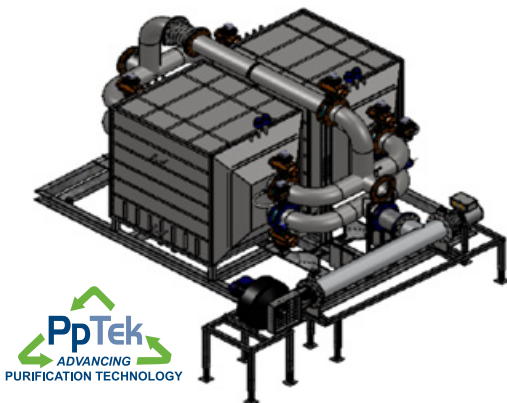
In addition to damage to engine components, affected engines run inefficiently producing excessive emissions particularly of carbon monoxide and  $\text{NO}_x$ . The result is increased operating costs,

decreased electricity production and increased pollutants. PpTek has developed solutions to these challenges that have a short payback time.

# Siloxane and VOC Removal

The PpTek Siloxane Removal System tackles the cause at source using a man made regenerative polymer medium to capture siloxane molecules allowing a free flow of clean gas to the engine and has a life of up to 5 years.

The skid mounted, ECU controlled unit uses one of two parallel housings to clean the gas, capturing the contaminants in the media. As the on-line housing becomes saturated with siloxanes and other contaminants, the gas flow is automatically redirected to the other housing. The first is then regenerated automatically whilst the flow of gas continues through the second housing uninterrupted to the engine. Depending on the levels of contamination, the change over and regeneration cycle is programmed to take place every 12 – 24 hours, with regeneration times of 4 – 5 hours.



## Features

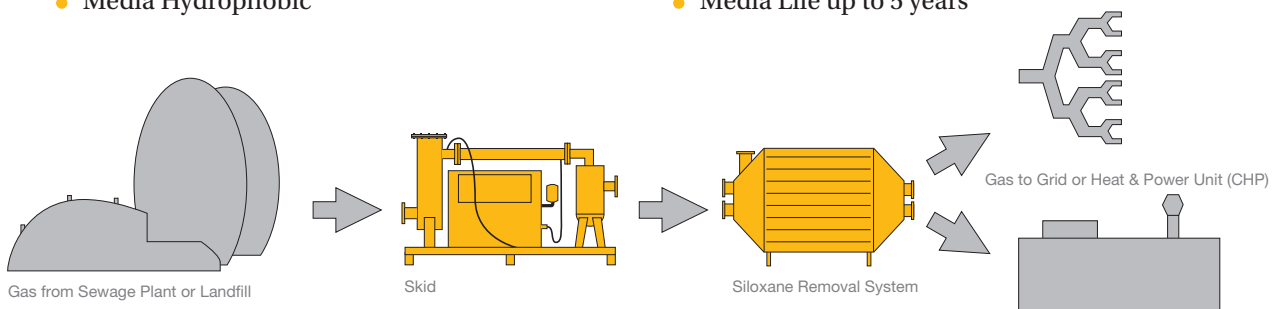
- Low on-going maintenance costs
- ATEX approved CE compliant
- Skid mounted
- ECU controlled
- Small outline and footprint
- Filter media automatically regenerated
- Stainless steel construction
- Media Hydrophobic
- Environmentally safe
- No filter medium disposal cost
- Multiple fail safe detection features
- Optional Modbus TCP/IP connection
- Optional Remote GSM monitoring
- Optional Vent Air Burner (VAB – Mini Flare)
- Installation under pressure or suction
- Media Life up to 5 years



Simple, compact, robust, self contained & regenerative, the system enables extended full-power operation, increased service intervals and payback within an operating period as short as 12 months.

On a site with average levels of contamination the PpTek media will last five years, requiring a minimum of servicing, significantly reducing downtime and the constant removal and disposal of contaminated media.

See [www.pptek.co.uk](http://www.pptek.co.uk) for additional informations and local contacts.



# Biomethane Treatment

Raw biogas can be 'upgraded' to biomethane which essentially means it is refined to Natural Gas quality and can be injected into a gas-grid or used as vehicle fuel. To reach pipeline quality the gas must be upgraded to the correct composition for the gas distribution network to accept.

## Pre-Conditioning of Raw Biogas

Prior to upgrading, the gas should be conditioned (see Raw Biogas Treatment) and in the case of Landfill and Sewage Gas applications, Siloxanes and VOC's should be removed (see Siloxane and VOC Removal) - The efficient removal of VOC's such as Limonene and other Terpenes is particularly important as they can mask the odorants added to the upgraded gas as a safety requirement.

## Water & Chemical Scrubbing Biogas Upgrade Plants

As well as pre-conditioning of the raw biogas, Parker has additional solutions for two critical applications in the upgrade process:

### Process Water Cooling

Hyperchill BioEnergy the provision of chilled water at accurately controlled temperature is a key component in the scrubbing process.

Extremely compact and easy to use, Hyperchill Bio-energy chillers are specifically designed for Biogas applications and provide safe and reliable operation in the harsh environments typically found at Anaerobic Digestion and Landfill Gas Biogas production sites.



#### Hyperchill BioEnergy

- Chiller Output 5 – 360 kW
- Special coating for corrosive environment
- Pump and tank installed inside casing
- Microprocessor controlled
- Ambient range -20 to +50 °C
- Compliant scroll refrigerant compressor
- IP54 protection as standard

### Drying to low dewpoint (pipeline quality)

After the scrubbing process the gas is usually saturated which means it must be dried with an adsorption dryer prior to grid injection

Heat-regenerated adsorption dryers in the WKL 65-920 series dry biomethane reliably and efficiently down to a pressure dew point (PDP) of -50 °C without the loss of gas.



#### W-KL Biomethane Dryer

- Flow rates from 25 to 1000Nm<sup>3</sup>/h
- ATEX Zone 1 or 2 options
- Pre & Post Filtration included
- Pressure range 150 to 500 mbar<sub>g</sub>
- Dewpoint control included
- IP54 protection as standard





# Biomethane Treatment

## Membrane and PSA Biogas Upgrade Plants

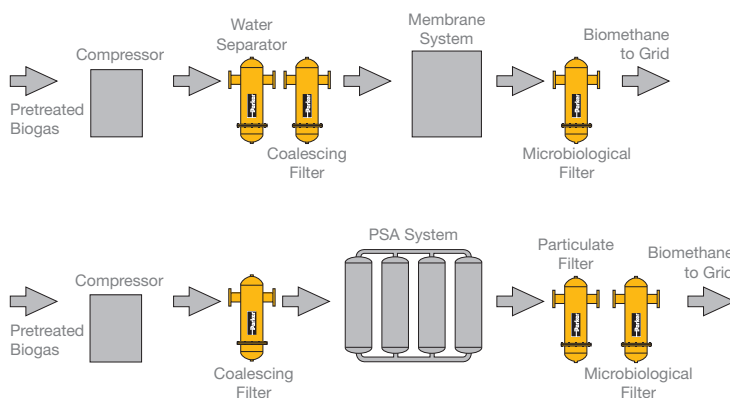
In these systems, the biogas should be conditioned prior to compression and filtered after compression to protect the membranes or adsorption media.

### Coalescing Filters

After compression there is a risk of oil aerosols contaminating the upgrading media. This problem can be solved by the installation of Parker Purgas Coalescing Filters.

### Particulate Removal Filters

Fine particulate from the pipe-work or upgrade media can be entrained in the gas stream. As final protection prior to grid-injection a particle removal filter should be installed.



#### TGS filter series (flanged filter)

- For temperatures up to 120 °C
- Corrosion protection on the inside
- DN 50 to DN 200,
- PN 16



#### TGE filter series (stainless steel filter housing)

- For temperatures up to 120 °C
- G 3/4 to DN 100,
- PN 16



#### TGA filter series (aluminium filter housing)

- For temperatures up to 120 °C.
- From PN 16 to PN 50



#### HDK-CNG dryer series

- Pressures up to 250 bar,
- Flow rates from 250 to 2,000 sm<sup>3</sup>/h
- Approved for PED 97/23/EC
- Compliant with ATEX EX II 2G IIB T1



#### STV dryer series

- Efficient operation, thanks to maximum loading time.
- Also suitable for low pressure applications.
- PN16



#### TGH filter series

- For temperatures up to 120 °C.
- From PN 100 to PN 350



## CNG or Compressed Biomethane

CNG (Compressed Natural Gas) is an alternative to other traditional vehicle fuels. The use of CNG as a fuel contributes to the reduction of CO<sub>2</sub>, nitrous-oxide and particulate emissions. This fuel can be produced from natural gas or alternatively from biogas, treated to meet the standards and quality of natural gas.

Effective gas drying and filtration prevents the build-up of liquid deposits in gas tanks, compressor fouling, unscheduled replacement of the gas-dispenser and repairs to vehicle fuel systems.

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### US Product Information Centre

Toll-free number: 1-800-27 27 537

[www.parker.com/hzd](http://www.parker.com/hzd)