

Biogas Upgrading with Membrane Technology and CO₂ Liquefaction

GAS UPGRADING



Organic energy worldwide



All-rounder biomethane

In addition to conventional use for generating electricity and heat, biogas can be upgraded to natural gas quality and fed directly into the existing local natural gas grid or used at filling stations as biomethane without additives. A forward-looking, lucrative step towards a sustainable and environmentally friendly energy supply.

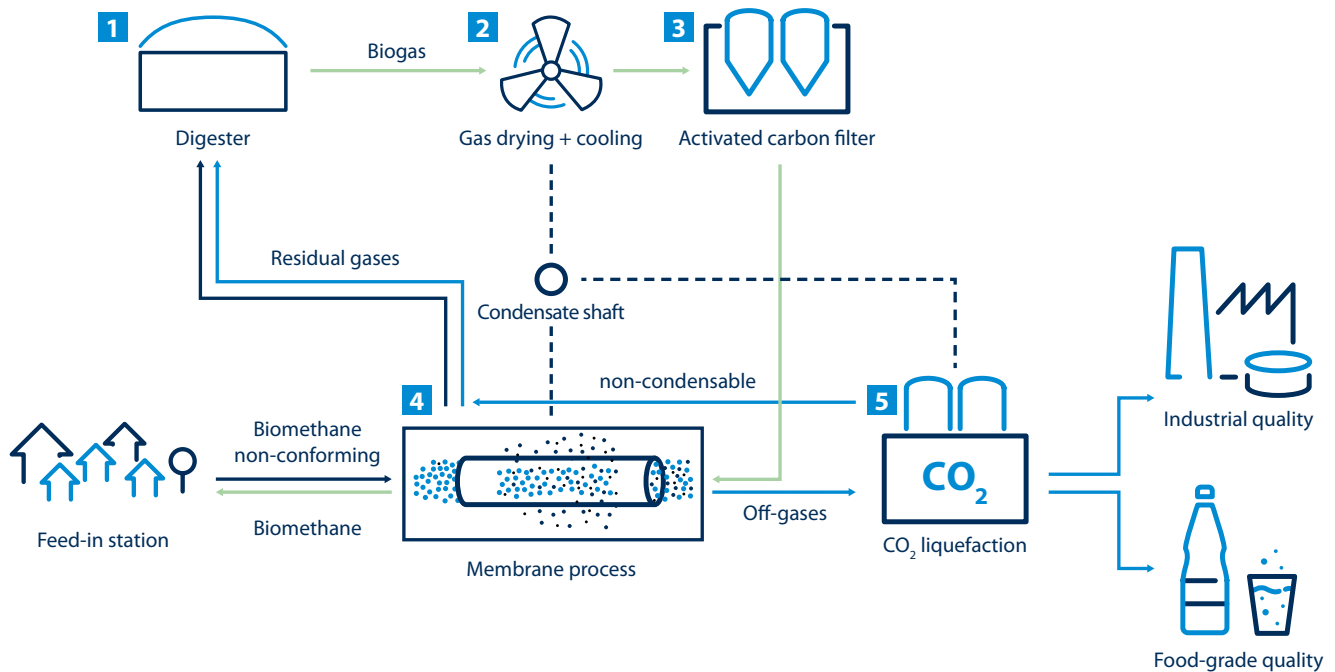
The production of biomethane produces CO_2 , which can be liquefied and used in the industry or the food sector. In addition, the residual methane is recovered and can be fed back into the biogas upgrading process. This ensures 100% utilization of the methane.

WELTEC BIOPOWER creates customized solutions and integrates precisely coordinated components into the process. This results in seamless complete systems that cover everything from the biogas plant to the entire processing technology through to technical and biological customer service.

BENEFITS

- Methane yield of up to 99.8% thanks to multi-stage process
- Time-saving installation through compact container design (plug and play)
- Extensions thanks to modular design
- Guaranteed power consumption
- Local, quickly available service team
- Separation of molecules without additional aids (heat, chemicals, water)
- No additional downstream drying required
- Very high system availability
- No additional compressor required for feeding into the natural gas network
- Functional guarantee from raw gas production to feeding into the gas grid
- Complete utilization of the methane with the addition of CO_2 liquefaction
- Low opex costs due to low maintenance requirements

Functionality of gas treatment with integrated membrane technology and CO₂ liquefaction



1 Biogas Production

Biogas is produced during the fermentation process in the digester. This gas mixture consists mainly of methane (CH₄) and carbon dioxide (CO₂). However, water vapor (H₂O), hydrogen sulphide (H₂S), nitrogen (N₂), oxygen (O₂) and hydrogen (H₂) are also present in small quantities in the biogas.

2 Gas Cooling

To avoid condensation forming later, the raw gas is first cooled and dried. This lowers the dew point and the water produced here is separated via the condensate shaft.

3 Fine Desulphurization

With the help of an activated carbon filter, the raw gas is 100% desulphurized. In addition, a fine filter separates unwanted suspended particles and vapors from the biogas.

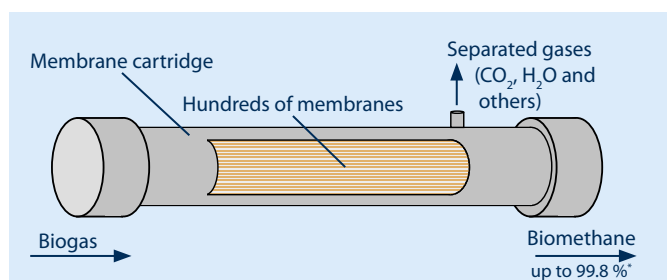
4 Compressor + Separation

The desulphurized and purified gas is compacted by a compressor. It is then treated in a multi-stage process. The gas is passed through the membranes to achieve a methane content of up to 99.8%. The multi-stage process can reduce the methane slip to less than 0.2%.

5 CO₂ Liquefaction

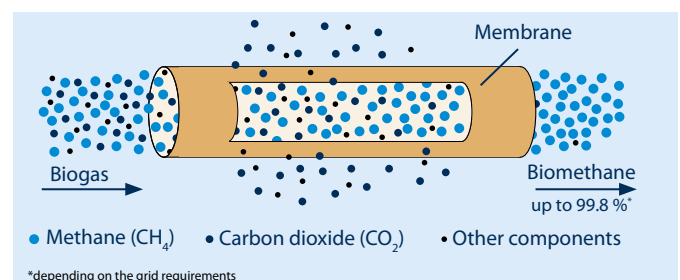
In this process, the biomethane is cooled down until it turns into a liquid state. Non-condensable gases (O₂, N₂, remaining CH₄) are separated and added back to the biogas upgrading process. With this recovery efficiency, the current emission regulations are met without residual gas combustion (RTO).

Structure of the Membrane Cartridge



The polymer membranes work without the addition of chemicals or water and also have a long service life.

Function Diagram of the Membrane



The methane is separated from the other components of the biogas due to different sizes and dissolution behavior.

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