



Biogas Upgrading with Membrane Technology



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GAS UPGRADING



Organic energy worldwide

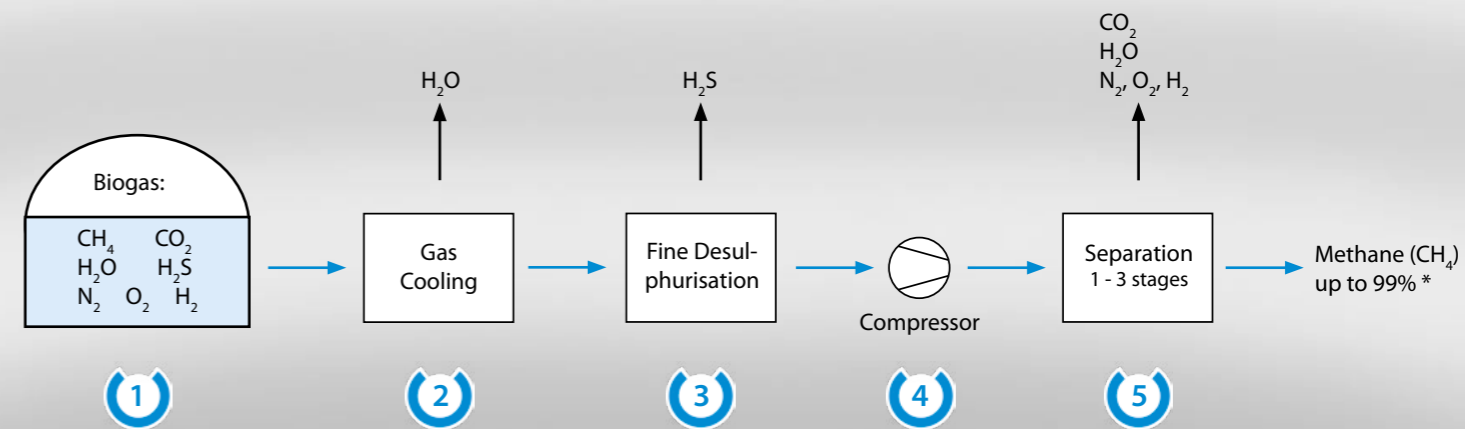
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* depends on grid requirements

Biogas the All-Rounder

Biogas is an all-rounder: In addition to the conventional use for the production of power and heat, biogas can be upgraded to natural gas quality and be fed into the local natural gas grid as biomethane without any additions. This is a future-oriented, lucrative step towards sustainable, eco-friendly energy supply.

Easy and Flexible Gas Upgrading

In the first stage of the biogas processing, the biogas is pre-dried, scrubbed and desulphurised with active carbon. Before the actual gas separation process takes place, the gas must be compressed to 8-15 bar. Subsequently, the CO₂ and water vapour are separated from the methane. Special polymer membranes through which the raw gas is forced have been developed for this process stage. The membranes are able to separate the CO₂, H₂O and CH₄ molecules due to their different sizes and solution behaviours. For instance, CO₂ molecules are smaller than methane and pass through the micro-pores of the membranes faster than methane. The three-stage separation of WELTEC BIOPOWER can reduce the methane slip to less than 0.5 percent.

Owing to the upstream compression, the separated methane has the optimum pressure for direct feed-in into the natural gas grid in the most cases. This advantage saves costs by eliminating the need for an additional compressor and enables economic use of WELTEC biogas processing even for smaller plants.

One-Stop Provider

Based on its comprehensive experience, WELTEC BIOPOWER delivers customer-specific solutions under consideration of the respective upgrading volume. The result: Interface-free systems that comprise everything from the AD plant to the entire upgrading technology to the technical and biological customer service.

BENEFITS

- Methane yield of up to 99 percent through multi-stage procedure
- Intelligent control ensures uninterrupted gas feed-in
- Extremely high plant availability and low maintenance overhead thanks to durable membranes
- Easy to operate
- Quick installation thanks to compact container setup (plug and play)
- Fast start-up of system (3-5 minutes)
- Modular structure enables extensions
- Separation of the molecules without any additional aids such as chemicals or water
- Separation without any further need for heat
- No downstream dryer required
- Feed-in into the natural gas grid possible without additional compressor
- Heat recovery via the compressor
- Seamless overall process

These benefits mean low plant and operating costs for you!

Function of Gas Upgrading with Integrated Membrane Technology

1. Biogas Production

The fermentation process in the digester generates biogas. This gas mixture mainly consists of methane (CH₄) and carbon dioxide (CO₂). However, the biogas also contains small amounts of water vapour (H₂O), hydrogen sulphide (H₂S), nitrogen (N₂), oxygen (O₂) and hydrogen (H₂).

2. Gas Cooling

To prevent the accumulation of condensate, the raw gas is first cooled and dried. In this way, the dew point is reduced, and the accumulating water is separated via the condensate trap.

3. Fine Desulphurisation

The raw gas is fully desulphurised with the help of an active carbon filter. Furthermore, a fine filter ensures separation

of unwanted suspended matter and vapours from the biogas.

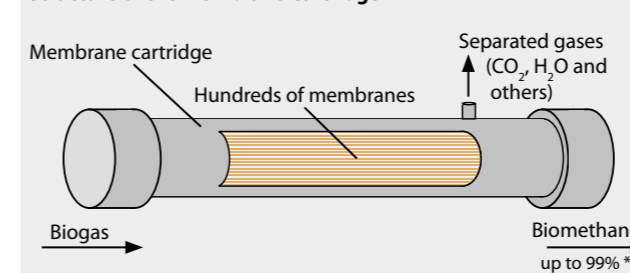
4. Compressor

A compressor compresses the desulphurised and scrubbed gas to 8-15 bar.

5. Separation

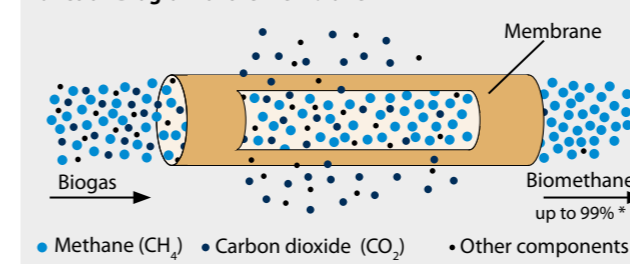
The biogas is processed by means of a three-stage procedure. The gas is forced through the membranes, thereby reaching a methane content of up to 99 percent. The separated CO₂ mixture with small amounts of hydrogen, nitrogen and oxygen can be released into the atmosphere without any harmful emissions.

Structure of the Membrane Cartridge



The polymer membranes operate without any addition of chemicals and water and have a long lifetime.

Function Diagram of the Membrane



Due to different sizes and solution behaviours, the methane is separated from the other components of the biogas.



The compact structure of the container is one of the advantages of the WELTEC biogas upgrading.



WELTEC biogas upgrading: Maximum efficiency through low costs and high methane yield.