

Biological desulfurization and methanation of biogas and CO₂



Plant: Nature Energy
Maanson
Denmark

Capacity: 600 m³/h
(353 scfm) CO₂
7,500 ppm H₂S

▲
Plants: Nature Energy
Holsted
Denmark
Bio E-Fuel
Pilot Plant

▼
Nature Energy
Glansager
Denmark
Bio E-Fuel Plant

Biogasclean's Power-To-X solution:

Bio E-Fuel

Biogasclean has developed a ground-breaking technology which converts CO₂ from a harmful greenhouse gas to a sustainable green fuel. In the Bio E-Fuel reactor a biological process converts carbon dioxide (CO₂) and hydrogen (H₂) to methane (CH₄). Hydrogen is made from electrolysis of water powered by wind and solar. The conversion of power to gas or liquid is called Power-To-X (P2X). The most important advantage is that methane – unlike electrical power – can be stored. Methane can replace natural gas and be used for power and heat production or supplied on the natural gas grid. Methane can also be pressurized to compressed gas for heavy trucks or cooled to liquefied gas for ships. In addition, methane can be processed into green fuel for aircrafts and green plastic for the industry.

The Bio E-Fuel technology can be applied everywhere where you have a CO₂ source. However, biogas plants represent the lowest hanging fruit because the CO₂ flow and the infrastructure for methane production are already available. Biogas typically consists of 55-60% CH₄ and 40-45% CO₂. With Bio E-Fuel biogas plants can increase the methane content in biogas to +97-98%, i.e. the biogas production increases by up to 78%! The biological methanation process is very robust and handles untreated biogas and CO₂ without prior removal of sulfur and other impurities. Furthermore, the biological process takes place at low pressure (<200 mbar or 2.9 psi) and low temperature (<65°C or 149°F). Therefore, a Bio E-Fuel system has low operating costs.

Biogasclean is a leading supplier of biological desulfurization and methanation systems with more than 340 plants in operation or under construction in +40 countries.

Our mission is to contribute to the transformation from fossil fuels to renewable energy by development and supply of innovative solutions for efficient production of biogas and e-fuels in industrial scale.

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Innovative solutions for efficient production of biogas and e-fuels

Biogasclean supplies a full range of biological H₂S removal systems

Biogasclean has developed two different technologies, Bio Trickling Reactor (BTR) and Moving Bed Reactor (MBR). We offer three different types of gas cleaners, which can be designed to handle any flow and H₂S content in the raw biogas or carbon dioxide. Typically the H₂S is reduced to 50-100 ppm, but Biogasclean can reduce to other values if required.

Why it is necessary to reduce the H₂S

In upgrading projects the biogas is converted to biomethane or Renewable Natural Gas (RNG) by separating the CO₂ from CH₄. Before using the CO₂ in industrial applications or releasing the CO₂ into the atmosphere the H₂S has to be reduced typically to below 5 ppm.

In combined heat and power projects (CHP) the biogas is used in gas engines or in boilers for power and steam production. During combustion the H₂S will convert to H₂SO₄ (sulfuric acid). This acid is extremely corrosive and will destroy the engines or boilers in a very short time. This is why gas engine manufacturers require that H₂S in the clean gas must not exceed 50-250 ppm. Otherwise, the operating costs for change of engine oil, spark plugs and other maintenance will increase significantly. Furthermore, there will be high costs for repairs and income lost during overhauls and break downs.

Air quality standards are another driver for H₂S removal. Combustion of un-cleaned biogas will result in sulfur dioxide (SO₂) emissions which causes serious odor problems as well as acid rain. Also health and safety standards require H₂S removal as H₂S is toxic even in small concentrations.

Low operating costs coupled with high availability

Biogasclean's H₂S removal process is 100% biological and operating costs 80-90% lower than chemical gas cleaning systems as Biogasclean's systems neither consume caustic soda nor require frequent media replacement such as iron sponge, activated carbon, etc. The availability is above 98%. The only residue from the process is a valuable liquid fertilizer. Therefore, a gas cleaner from Biogasclean is not only economically but also an environmentally sound investment.

Plant: Seaboard Energy
Sunray, Texas
USA

Capacity: 1.190 m³/h
(700 scfm) CO₂
5,000 ppm H₂S

Plant: Nature Energy
Køng
Denmark

Capacity: 2,500 m³/h
(1,470 scfm) CO₂
7,500 ppm H₂S



Biogasclean's H₂S removal solutions:



Biogasclean QSR

This type is for smaller and larger H₂S loads and used all over the World in many different applications. We manufacture fiberglass tanks in several countries to reduce transportation costs. The packing media can be cleaned inside the tank with the QSR® - Quick Sludge Removal - system.



Biogasclean BASIC

This type is typically used at palm oil mills and cassava starch factories in tropical countries. It is the cheapest model as the tank is without grating and not designed for being filled with water and the control unit skid mounted. The packing media shall be moved outside the tank for cleaning.



Biogasclean MBR

The MBR technology is especially developed for larger biogas flows produced on wastewater from molasses or cane juice at ethanol distilleries where the biogas has high H₂S loads (15,000-30,000 ppm) in combination with low calorific values (50-55% CH₄). Depending on the volume of H₂S we use either prefabricated tanks or field erected tanks. The packing media is floating in the scrubber liquid and no special cleaning is required.