

# Biogasclean **Bio E-Fuel** - biological methanation of CO<sub>2</sub>



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

Bio E-Fuel is a biological process converting (CO<sub>2</sub>) and hydrogen (H<sub>2</sub>) to methane (CH<sub>4</sub>). Hydrogen is made from electrolysis of water powered by wind and solar. The most important advantage is that methane – unlike electrical power – can be stored.

Bio E-Fuel can be applied everywhere where you have a CO<sub>2</sub> source. The lowest hanging fruit is biogas which typically consists of 55-60% CH<sub>4</sub> and 40-45% CO<sub>2</sub>. With Bio E-Fuel biogas plants can increase the methane content in biogas to +95%, i.e. the efficiency of biogas production increases by more than 60%!

The biological methanation process is +10 times more efficient than anaerobic digestion. The process is very robust and handles untreated biogas and CO<sub>2</sub> without prior removal of sulfur and other impurities.

- **The PTU** – the Process Technique Unit - is the engine room and contains liquid supply and drain system, heating and cooling system and PLC based control system as well as gas analyzers, gas detectors and fire alarm system. For larger flows the technical equipment is mounted on skids and installed in a technical house built on site. For smaller flows the PTU can be a custom-made fiber glass container or a modified shipping container.





- **Bio E-Fuel reactors** comprise one or more insulated tanks manufactured in high quality fiberglass or stainless steel. Each tank is made with a grating, so it is possible to inspect the tank underneath the packing media. The tank is supplied with ladder and handrail. The tank is so robust that it can be filled with water and designed with the QSR® - Quick Sludge Removal - system.
- **The packing media** is manufactured of PP (Poly Propylene). The QSR system makes it possible to decompress the packing media to prevent clogging and channeling of the filter.
- **Gas blowers** and air cooler are located outside.
- **Safety;** there are no gas pipes inside the PTU and the potential risk is limited to small unintended gas leakages from liquid pipes. If the gas detectors in the PTU should measure above 25% of the Lower Explosive Level (LEL) for CH<sub>4</sub> or 20% for H<sub>2</sub> the ignition source is removed by cutting the power supply.
- **Efficient and reliable operation;** the system is automatically controlled by the PLC controller board which reduces the risk for manual errors and operation problems. The main function is to provide stable conditions for the biological process and to ensure safe and reliable production. The signals are available in the control room and can be accessed for remote process control.
- **Low operating costs;** as Bio E-Fuel system operates at low pressure and temperature the power consumption is very low.

#### **Biogasclean A/S**

*Biogasclean is specialized in biological desulfurization and methanation of biogas. We develop, manufacture and supply fully automated gas conditioning systems combining low operating costs with high availability. Our track record comprises more than 300 plants in operation or under construction in 40 countries. Biogasclean supplies clean gas to more than 650 MW gas engines and boilers and removes sulfur from more than 30 biogas upgrading plants for RNG production.*

**BIO** | The key to innovative and  
**GASCLEAN** | efficient production of biogas

**Biogasclean A/S**  
Ørbækvej 268  
DK-5220 Odense SØ  
Denmark  
T (+45) 6617 2177  
[www.biogasclean.com](http://www.biogasclean.com)

**Biogasclean (Thailand) Ltd.**  
331 Moo 2, Unit S1/2  
Soi Thetsaban Bangpoo 54  
Sukhumvit Rd., T. Taiban, A. Muang  
Samutprakarn 10270, Thailand  
T (+66) (0)2 395-1157