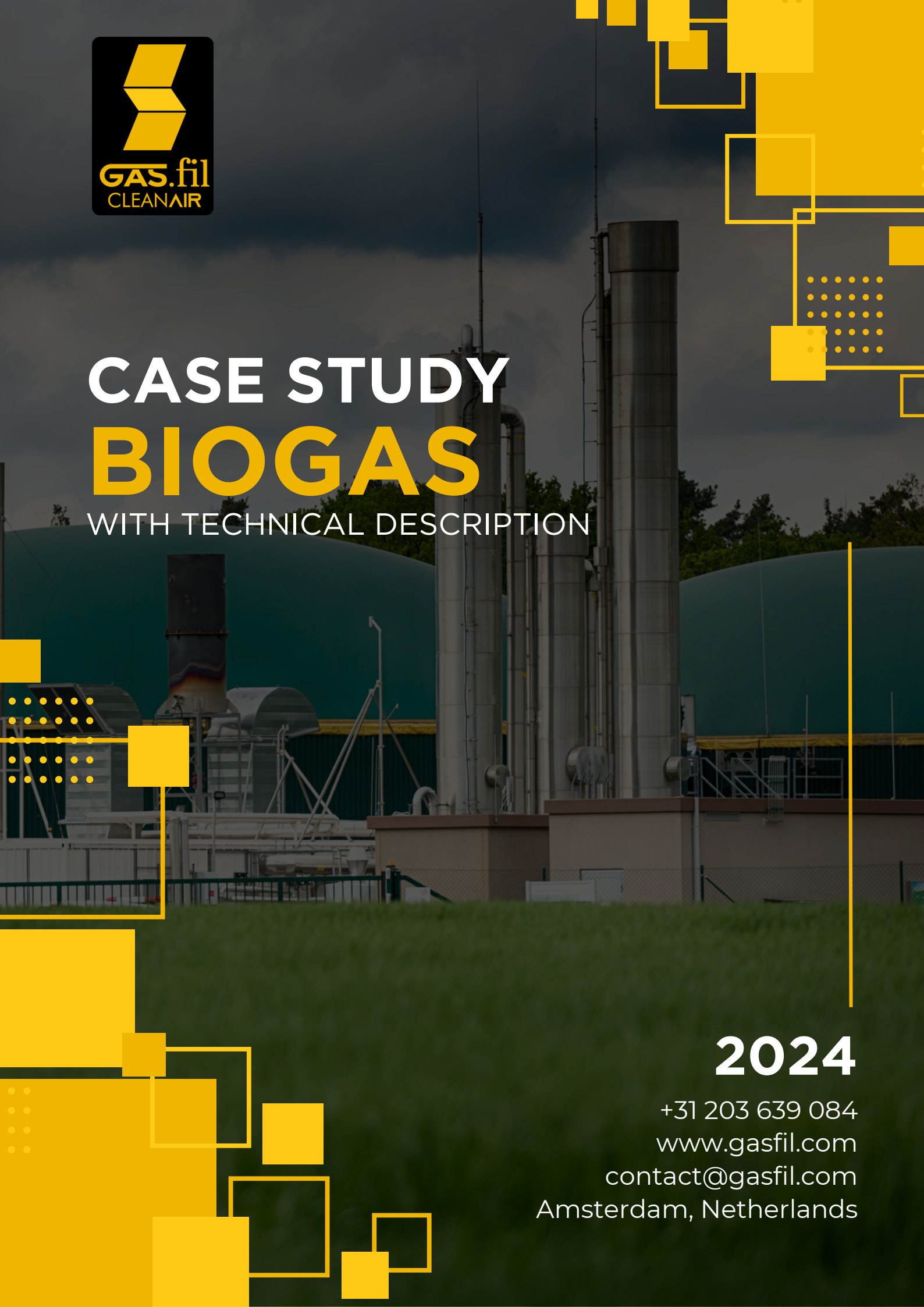


CASE STUDY
BIOGAS
WITH TECHNICAL DESCRIPTION

2024

+31 203 639 084
www.gasfil.com
contact@gasfil.com
Amsterdam, Netherlands

TECHNICAL DESCRIPTION

Principal Application

The G2G biogas desulphurisation system is designed principally for low oxygen content applications making it ideal for gas to grid applications. Unlike our traditional BIOC system it can operate at oxygen levels of just 0.4%.

The problem

Many substrates used for anaerobic digestion contain sulphur, including sulphates and some amino acids. Microbial degradation of these products produce Methane (CH_4), Carbon Dioxide (CO_2) and Hydrogen Sulphide (H_2S). In order to inject biomethane into the grid both the CO_2 and H_2S need to be removed. The CO_2 is normally removed by the Biogas upgrading plant. The H_2S even in low concentrations can pose problems for upgrading equipment or CHP engines because of its corrosive nature. It will form sulphur dioxide (SO_2) during combustion and leads to acidification of the engine oil in CHP plants which in turn damages the engine and raises operational costs and increased breakdown frequency. It is therefore advantageous to remove the H_2S using a biogas desulphurisation plant that does not require more than 0.5% O_2 in order to ensure that the 1% O_2 concentration limit in the Biomethane is not exceeded.

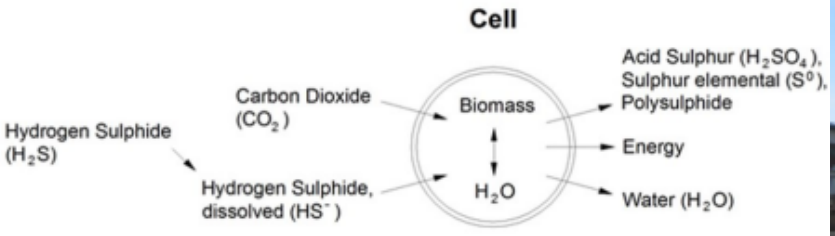
G2G Operational description and principal Equipment

The G2G system is normally located between the digestor and the gas upgrading or CHP plant. The biogas from the digestor is fed into the base of the G2G reactor vessel, the vessel is constructed of HDPE and consists of a vertical cylinder with a special strip media suspended from a stainless-steel grid at the top of the reactor vessel (the system does not utilise a packed bed) . The strip media is designed to support the sulphur oxidising bacteria. The biogas travels up through the strip media being oxidised as it moves up through the column which can be up to 15m high. The strip media is fed periodically with liquid digestate that is trickled from the top of the reactor onto the strip media which runs down the media strip providing the microorganisms with nutrients to maintain a healthy and active biomass. As the biogas travels up through the active media strip the hydrogen sulphide is oxidised to elemental sulphur, which is then returned to the digester and enhances the digestate value as a fertilizer.
In order to maximise removal performance which is typically 90% the system key parameters are carefully controlled within the technical centre mounted directly adjacent to the reactor vessel and the heat scrubber that is utilised to ensure optimal temperature conditions for maximum microbial activity. Oxygen

TECHNICAL DESCRIPTION

The microbial mechanism is as follows:-

$2H_2S + O_2$ <-> $2\ S + 2\ H_2O$



$2\ S + 2\ H_2O + 3\ O_2$ <-> $2\ H_2SO_4$

Additional Benefits of the G2G system

- The system does not use any process water although a small amount is used to flush the digestate line.
- There is no waste effluent as such other than the small mount of flushing water and condensate
- OPEX is minimal irrespective of the level of H2S
- Very low energy consumption
- No chemicals required
- The system complies with all relevant UK standards
- Maximum availability with just two service visits (1 minor requiring no shut down) per annum
- UK based service engineers and annual service contracts available
- Full turn key installation if required