



HAASE BiogasUpgrader at Ronnenberg (Hanover) commenced operation on 13 March 2008:

2.4 million cubic meters of biomethane are fed in the natural gas net per year

The future of biogas utilisation started with the first beginning of net supply in Ronnenberg in March 2008. Now the combination of biogas plant and HAASE BiogasUpgrader enables to use biogas under optimal conditions and independently of location. About 1,400 households are supplied with energy ecologically and climate neutral by feeding in approx. 2.4 million cubic meters of biomethane per year.

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Until now this project is unique in Germany: Five farmers built a biogas plant for about two million Euro and sell the produced biogas to the local energy provider energcity (Stadtwerke Hannover). Energcity upgrades the biogas to biomethane with natural gas quality by means of the HAASE BiogasUpgrader and feeds it into the local medium pressure natural gas net.

3711 biogas plants have been built in Germany by the end of 2007. Usually the biogas is utilised directly by a CHP on site. However, this is not really profitable, if it is impossible to use the exhaust heat of the engines – e.g. for heating buildings nearby. In these cases the exhaust heat needs to be cooled away. This is a waste of cash money and an unnecessary contribution to the global warming. A BiogasUpgrader can solve this problem and make biogas plants profitable even if no heat utilisation on site is possible.

The Ronnenberg facility is designed for upgrading 650 cubic meters raw biogas per hour. HAASE Energietechnik was entrusted with this project in the frame of a EU tender at the beginning of 2007.

The first HAASE BiogasUpgrader has been successfully in operation in Jameln (Wendland) since June 2006. The operation experiences show that the HAASE BiogasUpgrader holds what is promised – upgrading biogas sustainably and safely to biomethane with natural gas quality. Within this process the biogas is treated by the so-called organic physical washing by absorption.

The advantages of the BiogasUpgrader compared to other commercially available procedures are high availability, low emissions and optimal energy balance. Two aspects are relevant for the energy balance: The organic cleaning dilution is regenerated and returned to the circuit. And the

produced exhaust heat is sufficient for satisfying the heat-base load needs of a biogas plant nearby. (This heat concept was not realised in Ronnenberg.)

The methane emissions of the BiogasUpgrader fall below 2 Vol%. Furthermore it is possible to reach a “zero-methane-concept” by retrofitting a HAASE VocsiBox[®]. Methane is 21 times more harmful to climate than carbon dioxide.

Latest publications of Fraunhofer Umsicht assume, that the feed-in of biomethane becomes economically for plant dimensions from 200-500m³/h. With its 650m³/h, the Ronnenberg facility easily exceeds this assumed min. dimension.

The realisation of the planned innovation in the German gas access ordinance (combustion value and pressure conditioning by the gas net operator) as well as the new German EEG will contribute to an economically more attractive biomethane feed-in. These innovations will show their advantages soon. Furthermore the German KfW bank announces additional federal funds for the promotion of innovation in the field of biogas upgrading.

Why has biogas to be processed before it can be fed in a natural gas net?

Biogas produced from renewables is an environment-friendly, inexhaustible energy source. However, unprocessed biogas is humid, warm, and it contains a pollutant concentration of hydrosulphide (approx. 100-300ppm). The percentage of methane in unprocessed biogas comes up to 50-54%. Compared to natural gas, this is only half of the power capacity! Therefore biogas has to be “upgraded” before it is suitable for net supply or for vehicles fuelled with natural gas.

How does the HAASE BiogasUpgrader work?

The HAASE BiogasUpgrader upgrades the methane percentage from 50Vol% to 93-98Vol%. At the same time it reduces the hydrosulphide concentration below 5ppm and separates the water. The result is biomethane with the quality of natural gas. Biomethane can be fed in the local natural gas net, or it can be supplied as high-quality fuel for natural gas car engines. -> ***scheme page 3***

The BiogasUpgrader starts processing the biogas by compressing it to 7bar overpressure and cooling it down. Subsequently the biogas flows through an absorption column with a purifying agent which dissolves carbon dioxide, hydrosulphide and water. The upgraded biomethane escapes at the head of the column. The purifying agent is regenerated in a second column. This environmentfriendly process identifies the BiogasUpgrader as a power solution.

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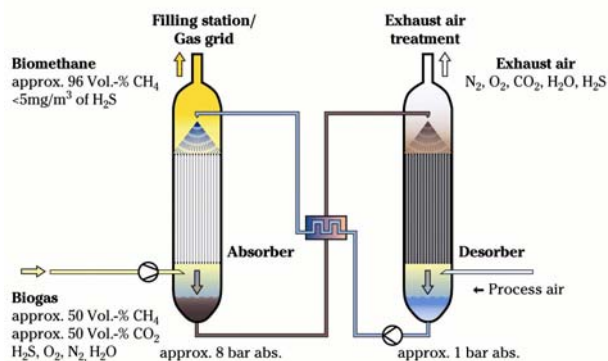
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The HAASE BiogasUpgrader at Ronnenberg (Hanover, Germany) upgrades 650m³/h of raw biogas to biomethane with the quality of natural gas. The biomethane is fed in the local natural gas net since March 2008.



Scheme: How the HAASE BiogasUpgrader works