

Economic evaluation of biogas cleaning methods of DGE GmbH company



Method BCM-0

With the use of this basic method, biogas may be easily modified and divided into natural gas and CO₂. Here, there is no substance-utilization of CO₂. The thus produced natural gas is effectively used to produce electrical power. This method is cost-effective for devices/equipment at 100 Nm³/h or smaller amounts of biogas.

Method BCM-1

Biogas cleaning is carried out with good reliability, even up to the quality of natural gas. The method of production of brine from concentrated waste gas CO₂ is one of commonly tried, verified, and used methods, and an example of a company using this method is Bayer Co.

This method is cost-effective starting at an amount of 300 Nm³/h of biogas. The cost-effectiveness is highly dependent on the selling price of soda.

There are many ways of utilization of the produced soda, e.g. in glass industry. Due to the fact that this method calls for additional personnel, two new employees have been hired per shift, i.e. a total of 6 employees per day. Wage expenses must be adjusted to the current situation. Shall there be a long-lasting demand for the produced soda to be sold at good prices; this would surely be an interesting alternative. For the purpose of utilization in the production of electrical power, the evaluation included a bonus or premium of 0.02 €/KWh of natural gas.

Method BCM-2

There is a need to consider restrictions concerning the relatively high amount of CO₂ after condensation, when looking at the biogas cleaning process and the quality of natural gas. In case a bonus or premium of 0,02 €/KWh is also obtained for biogas cleaning, then this method could also be very interesting.

Shall the acquired high-caloric gas be used for the production of methanol instead of electricity, this method will yield a quick return on investment for even small devices and appliances.

With the use of compressive condensation, it is possible for the purpose of further substance-utilization in Fischer Tropsch Synthese to produce fractions of desired configuration.

Method BCM-3

Biogas cleaning with the use of compressive washing and retrogressive acquisition of carbon dioxide is cost-effective for appliances or facilities starting at amounts of 200 Nm³/h of biogas.

Shall the produced natural gas be used for the production of methanol instead of electricity; the cost-effectiveness is given for amounts starting at 200 Nm³/h of biogas. If we take into account expenses incurred to purchase the desired equipment/facility for methanol, the re-

turn on investment shall be more than five years from now. Since there is a big market for methanol, the long-term sales are secured.

Method BCM-4

The biogas cleaning process that employs absorption and change in pressure is economically feasible even for small devices with the amount of biogas equal to 100 m³/h.

Natural gas and carbon dioxide are of high quality. The advantage of this process is that it is not necessary to use any chemical additives as opposed to compressive washing machines.

Summary

The four different biogas-cleaning methods described above may be implemented, depending on the given utilization. Nowadays, it is without a doubt that the technically easiest option is method BCM 0. The highest possible effectiveness can be achieved only together with some equipment for retrogressive acquisition of carbon dioxide or equipment for the production of soda according to methods BCM-1 and BCM-3. The BCM-4 process is advantageous especially when there is a need for the direct distribution of natural gas, since the natural gas is of sufficient overpressure to be fed into the distribution system. The production of methanol should be worthy of consideration in a few years, after the rise of prices of natural gas.