

## BIOGAS FROM ORGANIC WASTE -CASE STUDIES

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**ABSTRACT:** DeponiGasTeknik DGT AB is a consulting firm working in the Environment and Energy sector. A special field is to design and develop plants for extraction and utilization of landfill gas. Among the plants that DeponiGasTeknik has designed through the years are a new compressor station in Västerås. Other interesting projects are the fixed link across Öresund where DeponiGasTeknik has design and now testing a system on the old landfill to prevent gas to penetrate the railway and highway area. An other project is the testing of digester cells in Växjö which are a development of the common bio cells. Finally is an example presented on the closed digesters that DeponiGasTeknik has designed in Helsingborg for around 300 000-400 000m<sup>3</sup> waste per year.

### **DeponiGasTeknik**

DeponiGasTeknik DGT AB is a consulting firm which is working in the Environment and Energy sector. In the Environment and Energy sector DeponiGasTeknik mostly works with municipal and government agencies. A special field, where DeponiGas Teknik is the leading firm in Sweden, is to design and develop plants for extraction and utilization of gas from landfill.

Other special competence areas are design of landfill and bio cells, treatment of leachate from landfills and anaerobic digestion of solid waste in closed digesters.

DeponiDasTeknik is working in the Nordic states and some other countries in Europe.

In the following presentation will four different projects, that DeponiGasTeknik has been involved in, be described.

### **COMPRESSORSTATIONN-VAFAB, VÄSTERÅS**

In late 1985 a plant for extraction and utilization of th landfill gas was built in Gryta landfill, Västerås, Sweden. After thirteen years is was time to construct and build a new compressor station so that all gas produced in the landfill could be used.

The station has a capacity for 6 MW and the gas is delivered to a gas engine and a gas boiler. The cooling water from the engine and from the boiler is transferred to the district heating system of Västerås.

In the new station the flow and the content of methane are measured continuously in 12 different incoming pipes from 10 gas wells and from 2 collection pipes. From the control room the extraction of gas from each pipe can be controlled and adjusted by the PC.

### **THE FIXED LINK ACROSS ÖRESUND**

In the year 2000 the link between Copenhagen and Malmö will be ready. It will be a 16 km long bridge/channel that connects the to cities.

The starting point on the Swedish side is on a place called Lernacken. Lernacken is an old landfill for Malmö that was used in the 50's - 80's. Since the 70's only some industrial wastes and garden waste were landfilled in Lernacken.

For the preparation of the place for the railway and highway a big cutting in the old landfill has to be done. Investigations in the landfill showed that there still was a generation of landfill gas in the landfill. In consequence whit this a system are built to insure that gas from the landfill not will occur in the railway and highway area.

The system of extraction of the gas is divided in to parts. The first part consist of a permeable layer in the cutting that is in forced by perforated PE-pipes. Over this layer a close layer of clay are laid and hereby a under pressure can be established in the permeable layer to collect the landfill gas. To enforce the gas extraction system, a second part, consisting of drilled gas wells in the border between the slope and the highway, are installed. By this part no gas can travel into and under the highway and the railway area. For the present the installations are tested and in some months a decision will be taken about the final design of the central for the extraction system.

### **DIGESTIONS-CELLS**

In Sweden the treatment of household waste in bio cells has been a new method that have been developed in the 90's. The method means that the waste is dumped in cells which are surrounded with walls of ear materials. In the cells water can be added and the degradation of the organic material roes relatively fast (7-10 years) and the collection of landfill gas can be done effectively. Under 1995-1996 DeponiGasTeknik has developed a new kind of bio cells called digestions-cells.

In Växjö a pilot plant has been built to test the system. In June 1997 the first waste was filled in the digestions-cells.

The plant is constructed of concrete with three walls and floor of concrete. When the cell was filled up with waste it was sealed with a rubber sheet to prevent the biogas from leaving the cell. In the cell there are installations so that air and water can be added to insure a fast and complete degradation of the organic waste.

### **ANAEROBIC FERMENTATION IN CLOSED DIGESTERS-NSR, HELSINGBORG**

a closed digester for anaerobic fermentation of organic wastes was built in Helsingborg at the landfill Filborna in 1995/96.

The waste which is delivered to the plant is pumped into a reception tank of concrete. From this the waste is then transported to a heat exchanger where the waste get a temperature of 70 °C to grantee a good hygienic result. Before the waste is pumped into the two digesters the temperature is lowered to round 37 °C. The digesters has a volume of each 3 000 m<sup>3</sup>.

In total the capacity in the plant is around 30 000 - 40 000 m<sup>3</sup> fluid waste per year. This will give a amount of biogas corresponding to an effect around 5 MW.

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