# Methane Oxidation in Optimised Landfill Cover Layers under Different Seasonal Conditions

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Uncontrolled emitted landfill gas contributes to the greenhouse effect due to its high content of methane. Worldwide about 40 million tons of methane result from waste landfills. Methane emissions from waste landfills are situated at third rank of anthropogene methane sources. These emissions are mainly caused by inadequate gas collection systems and uncontrolled emissions from old dumps and unauthorised open dumping. With traditional gas collection systems only 40 to 60 % of the produced gas can be collected and reused or safely disposed of.

A low-cost alternative or an additional measure to the conventional methods is the use of suitable landfill cover layers, e.g. made of compost, which provide appropriate conditions for microbial methane oxidation. We received promising results from laboratory tests with soil columns filled with municipal solid waste compost and sewage sludge compost. Different test series were carried out in an air-conditioned chamber to examine the methane oxidation potential at various temperatures, with various water content and methane supply. These results are now reviewed in a large-scale outdoor experiment, which began last year. On a landfill for household waste in Lower Austria several test cells with compost materials of different thickness and composition has been installed. The various landfill covers are designed like vast biofilters.

The previous results from our experiments show that mature, well decomposed compost substrates support appropriate conditions for microbial methane oxidation particularly under outdoor conditions. Methane-oxidation rates in compost materials are clearly much higher than those in natural soils and traditional landfill cover soils. Also under winter conditions high methane-oxidation rates were achieved in compost substrates. The data from the differently designed test cells show that it is very important to install a gas distribution layer below the compost cover and to dimension the thickness of the compost cover conveniently, in order to reach homogenious and efficient methane oxidation.

The data from these investigations and particularly the results from the field experiment on the landfill as well as the technical design of a landfill cover layer, which is capable of reducing methane emissions, will be presented.