Quantification of methane emissions from 15 Danish landfills using the mobile tracer dispersion method - DTU Orbit (06/12/2018)

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Whole-site methane emissions from 15 Danish landfills were assessed using a mobile tracer dispersion method with either Fourier transform infrared spectroscopy (FTIR), using nitrous oxide as a tracer gas, or cavity ring-down spectrometry (CRDS), using acetylene as a tracer gas. The landfills were chosen to represent the different stages of the lifetime of a landfill, including open, active, and closed covered landfills, as well as those with and without gas extraction for utilisation or flaring. Measurements also included landfills with biocover for oxidizing any fugitive methane. Methane emission rates ranged from 2.6 to 60.8 kg h\(^{-1}\), corresponding to 0.7-13.2 g m\(^{-2}\) d\(^{-1}\), with the largest emission rates per area coming from landfills with malfunctioning gas extraction systems installed, and the smallest emission rates from landfills closed decades ago and landfills with an engineered biocover installed. Landfills with gas collection and recovery systems had a recovery efficiency of 41-81%. Landfills where shredder waste was deposited showed significant methane emissions, with the largest emission from newly deposited shredder waste. The average methane emission from the landfills was 154 tons y\(^{-1}\). This average was obtained from a few measurement campaigns conducted at each of the 15 landfills and extrapolating to annual emissions requires more measurements. Assuming that these landfills are representative of the average Danish landfill, the total emission from Danish landfills were calculated at 20,600 tons y\(^{-1}\), which is significantly lower than the 33,300 tons y\(^{-1}\) estimated for the national greenhouse gas inventory for 2011. (C) 2014 Published by Elsevier Ltd.

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