science summary

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Control of landfill gas containing low concentrations of methane

Science Summary SC030305/SS

A recent study involving European manufacturers of specialised combustion equipment has shown that the technology now exists to destroy landfill gas with a low methane content and thus avoid significant emissions of this potent greenhouse gas to the atmosphere.

Landfill gas with a high methane content is relatively easy to burn and, on modern landfill sites, is often used to generate electricity. This avoids local pollution problems and significantly reduces the site's contribution to global warming. But when the methane content of the landfill gas falls below a certain level, the gas cannot be used to generate electricity and will need to be flared instead. When the methane content falls again, there is simply not enough methane present to keep a flare alight. At this point the gas is known as 'low calorific landfill gas'. Such gas is currently vented untreated into the atmosphere where it acts as a greenhouse gas over 20 times more potent than carbon dioxide. The most common sources of low calorific landfill gas are:

- older, closed landfills;
- perimeter gas collections;
- landfill gas collection systems that are leaky, over-pumped and/or poorly balanced;
- shallow waste deposits subject to atmospheric conditions.

The timescale of the decline in the methane content of the gas produced by a landfill site depends on a number of site-specific factors such as moisture content and the types of waste in the landfill. However, low-level gas production can continue for decades and, cumulatively, could represent a significant source of greenhouse gas. The Department for Environment, Food and Rural Affairs (Defra) has estimated that at least a quarter of the methane released from UK landfills in 2006 came from old, closed landfills sites likely to be emitting low calorific landfill gas.

There is not enough methane in low calorific landfill gas to sustain a flame using a standard flare. However, specialised low calorific flares have now been developed to overcome this problem. The report describes an investigation of the performance of the low calorific flares available from two European companies (HAASE Energietechnik AG and Hofstetter Umwelttechnik AG) with UK distributors. Similar flares are produced by a small number of UK and other European manufacturers.

The results show that the technology exists to flare low calorific landfill gas in a safe manner that complies with Environment Agency guidance on the minimum temperature and residence time for the destruction of landfill gas. The outputs from the two low calorific flares tested both met Environment Agency emission limits.

However, the extraction of low calorific gas will require a different approach to that used for standard landfill gas due to the much lower rates of gas production. Care will therefore be needed in the design and operation of the gas field within the landfill site.

Low calorific gas could be flared for a significant period of time, resulting in lower methane emissions and consequent local safety and global warming benefits. The technology shows significant promise as a way of reducing emissions of methane from landfill sites – both in the UK and worldwide.

This summary relates to information from Science Project SC030305, reported in detail in the following output:

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