

Landfill Gas Management and Greenhouse Gas Emissions

What is Landfill Gas?

Landfill gas is created when organic waste in a solid waste landfill decomposes. Landfill gas consists of about 50% methane, 50% carbon dioxide, and a very small amount of other organic compounds, some of which are hazardous.

Health, Safety and Environmental Aspects of Landfill Gas

There are several public health, safety and environmental concerns associated with landfill gas. Subsurface migration, the underground movement of landfill gas, can result in fires and explosions should the gas accumulate in enclosed areas. Odours are another issue as many of the compounds found in landfill gas have an unpleasant odour and can affect the quality of life in neighbouring communities if not appropriately managed.

Possibly the biggest concerns, however, are emissions to the atmosphere of carbon dioxide, methane, volatile organic compounds (including some which contribute to ozone formation), and hazardous air pollutants (such as benzene and toluene), all typically present in landfill gas. Both methane and carbon dioxide are greenhouse gases, and emissions of these from landfill gas are included in Australia's and the Northern Territory's greenhouse gas inventories. Greenhouse gas emissions from landfill in the Northern Territory in 2004 were estimated at 116,000 tonnes CO₂ equivalent. This is the equivalent emissions of over 23,000 vehicles annually, and represents about 1% of the Northern Territory's total emissions.

Managing landfill gas to reduce greenhouse gas emissions

There are two main ways to reduce greenhouse gas emissions from landfills. Instead of allowing landfill gas to escape into the atmosphere, it can be captured, converted and burnt, either as a flare or for power generation.

Flaring

Flaring of landfill gas can reduce its methane, volatile organic compound and hazardous air pollutant content before its release to the atmosphere. This significantly reduces greenhouse emissions to the atmosphere by reducing the potent greenhouse gas methane to less potent forms of gas, mainly carbon dioxide. Careful and expert management of the flaring process is required however as production of toxics is possible should the gas be inadequately treated or burnt incorrectly.

Power generation

Landfill gas can be used as an energy source to generate electricity or heat, and is generally considered to be a form of renewable energy. Using landfill gas to generate power directly reduces emissions of the powerful greenhouse gas methane and also creates an indirect displacement of energy generation that would likely otherwise have been undertaken using fossil fuels.

In many cases, flaring or power generation using landfill gas can yield a net profit through sale of energy into the power grid, and/or sale of Renewable Energy Certificates earned under the Commonwealth Government's Mandatory Renewable Energy Target scheme.

Existing projects in Australia

Power generation from landfill gas was first demonstrated in Australia at the Northcote tip in Melbourne in 1985. Since then the sector has grown quickly and landfill gas is now used to generate power throughout Australia.

Darwin City Council, in partnership with a private company, has established a landfill gas-powered 1MW power station at their Shoal Bay Waste Disposal Site.

Commercial viability of flaring and power generation at landfill sites depends largely on the amount of gas generated, which in turn depends on the amount of waste deposited at the site per year, age of existing waste, the type of waste (particularly proportion of green waste), the climate at the landfill site, amount of water available to the decomposition process, landfill design, and degree of waste compaction.

Technological advances mean that, increasingly, landfill gas recovery and use will be economically viable at smaller landfill sites

Landfill owners and operators:

Careful consideration should be given by landfill owners and operators to the management of landfill gas on site, including the potential for profitably flaring landfill gas or establishing a landfill gas-fired power station.

More information

More information on this subject is available from:

United States Environmental Protection Agency

<http://www.epa.gov/lmop/>

Australian Government Office of the Renewable Energy Regulator

www.orer.gov.au

Australian Greenhouse Office - Map of Operating Renewable Energy Generators in Australia

<http://www.agso.gov.au/renewable/>

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