

# Landfill Technology

In recent years, the design of landfill sites has changed dramatically. No longer simply just a hole in the ground where unwanted material is 'tipped' or 'dumped', many modern landfill sites are extensively engineered and utilise the latest chemical and structural technological advances to ensure the site meets rigorous state guidelines and legislation. As the design and management of landfills has become more sophisticated, choosing a site for a new landfill has more restrictions and protocols than ever before.

Landfills produce gases over time due to the break down of organic (food and garden) materials. Many modern landfill sites in Australia have some form of gas capture system in place to reduce the amount of gas entering the atmosphere. The most commonly generated landfill gas is methane, which comprises approximately 40 to 60% of the total mix of gases, with carbon dioxide contributing to the remainder. Preventing methane from being expelled into the atmosphere is a significant priority for modern landfills, as methane is 21 times more potent than carbon dioxide in contributing to global warming.



A network of gravel and pipes are constructed at the bottom of the landfill cell to capture and remove the polluting leachate and store the liquid in ponds for treatment.



Once garbage is placed inside the landfill cell, a layer of soil is added on top to help reduce the smell, litter and interaction with pests.

## Designing a landfill



The site is cleared; removing all vegetation and a large amount of soil.



A waterproof membrane is then placed over the exposed soil to prevent leachate from soaking into the surrounding soil and groundwater. Material such as clay is spread across the membrane to form another protective layer.

There are two major options for capturing methane in a landfill. The first is the use of mechanical energy whereby the gas is captured in a series of pipes. The extracted methane gas can then be used to run a turbine or generator that can be used to power other sites within the landfill, or it can be diverted back into the electricity grid. Another method of reducing methane at landfill sites is to initiate combustion of the captured methane, which converts it to carbon dioxide, a less potent greenhouse gas. This process is known as 'flaring'. Landfills are continually monitored for gas emissions even after they are decommissioned (closed) as the material inside continues to break down for thousands of years to come.

The process of opening a landfill site is lengthy and requires considerable investment from both local and state governments. Many landfills in NSW are now required by the State Government to pay a Solid Waste Levy for every tonne of waste received at the facility. The purpose of this levy is to reduce the amount of waste being land filled and promote recycling and resource recovery activities. Such outcomes can significantly increase the 'lifespan' of a landfill, preventing the need for further landfill investment and development.