Efficiency of Landfill Gas (LFG) collection systems in Australia

FACTSHEET

LFG collection (and subsequent flaring, electricity generation, or combustion) can play a major role in reducing methane emissions from landfills.

The efficiency of these systems varies substantially depending on factors such as landfill characteristics, infrastructure provision (eg piping and pumping), and operational practices.

Drawing from local case studies, this Fact Sheet provides an overview of the real-world range of efficiency, as well as the factors influencing LFG collection efficiencies in Australia. Additionally, it addresses the caveats to consider when using modelled LFG data (for example from the NGER Solid Waste Calculator) for calculating gas capture efficiency.

Overview of LFG capture systems

Landfill gas capture systems are designed to contain methane emissions using engineered barriers and gas collection networks, including wells, drainage layers, and extraction systems. These systems can be either passive or active, with active systems – using pumps, blowers and other powered equipment, providing the greatest capture potential. Efficiency is also heavily influenced by the topography, system layout. and spatial density of collector pipes. Modern active systems in wellmanaged landfills can achieve much higher efficiencies (up to 90%) than can older or less optimised systems.

Regulatory and policy context

National and State policies drive the adoption of LFG capture systems across Australia, with targets aimed at increasing resource recovery and reducing greenhouse gas emissions.

NSW Net Zero Plan (Stage 1: 2020-2030)

Focuses on reducing emissions across sectors, including waste, with targets for methane reduction through improved LFG capture.

Waste Less, Recycle More Initiative

Provides funding for LFG capture and improving waste diversion from landfills.

The NSW Waste and Sustainable Materials Strategy 2041

Is a NSW Government initiative, administered primarily through the NSW Environment Protection Authority (EPA), with a target of achieving net zero emissions from licensed landfills, supported by a $7.5 million investment.

Environmental Protection Licences (EPL)

Mandates LFG capture for certain landfill facilities, with compliance monitoring.

The National Waste Policy Action Plan

Aims for an 80% recovery rate across all waste streams.

The Emissions Reduction Fund (ERF)

Incentivises projects to improve methane capture beyond the 30% baseline, offering Australian Carbon Credit Units (ACCUs) for projects that demonstrate emissions reductions exceeding this threshold.

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Typical LFG collection efficiencies in Australia

In Australia, methane capture efficiencies typically range from around 30% to 85%. Local case studies and industry reports demonstrate a range of methane gas collection efficiencies in Australian landfills, from moderate to high levels depending on system design and operation.

The following are real-world examples of Australian landfills with systems achieving above-average collection efficiencies:

Awaba Bioenergy Facility (Lake Macquarie)

Achieved an LFG capture efficiency of around 58%.

Mount Vincent Road Landfill (Maitland)

With a capture efficiency of around 61%, this landfill significantly reduced emissions, highlighting the potential for moderate-efficiency systems in regional councils.

Mugga Lane Landfill (ACT)

This facility upgraded over time to reach capture rates of 65-70%, contributing to the production of renewable energy.

Lambton Landfill (NSW)

Achieves capture efficiencies between 70% and 85%, indicating the effectiveness of active gas collection systems paired with energy recovery.

Summerhill Waste Management Centre (City of Newcastle)

Demonstrated a theoretical capture efficiency of 80% or more.

Eastern Creek Renewable Energy Facility

Achieved an 85% capture efficiency through extensive infrastructure investments, demonstrating the potential of high-efficiency systems.

Buttonderry LFG Management Facility (Central Coast Council)

Reported a capture efficiency of 85+%, one of the highest in the region, showing the benefits of comprehensive gas management systems.

Cessnock Waste Management Centre (Cessnock City Council)

Showed a theoretical capture efficiency of 85+%, reinforcing the role of advanced systems in maximising methane capture.

These figures align with best practices for LFG capture systems globally, where well-managed landfills in the United States and European Union report similar performance.

Caveats: Modelled vs. Actual gas capture efficiencies

When calculating LFG capture efficiency based on modelled LFG volumes (e.g., using the NGER waste calculator or another "1st order decay" model), there is potential for discrepancies between modelled and actual gas production due to several factors:

Over or underprediction

Modelling tools often rely on simplified assumptions regarding waste composition, landfill volume, and climate conditions, which may not reflect the actual circumstances of gas generation at a specific site. This can lead to over- or underestimation of LFG volumes.

Climate zone variations

Regional and micro-climatic differences may not be fully captured by modelling tools such as the NGER Solid Waste Calculator that rely on broad climate zone selections. For example, landfills modelled as being in a **wet temperate climate** may produce estimates of LFG volumes that are substantially higher compared with being modelled in a **dry temperate climate.** For the Hunter region, which is technically in the NGER scheme's dry temperate climate zone but includes coastal locations with notably wetter conditions, the actual amount of LFG volume in those wetter locations may, in reality, fall somewhere between the outputs of these 2 fixed climate zone settings.

Operational practices

The timing of cell closures, operation of gas capture infrastructure, and day-to-day management practices can all influence actual gas production, further complicating the alignment between modelled and real-world LFG volumes.

As a result, **estimates of gas capture efficiency using modelling tools** including the NGER Solid Waste Calculator **may not be exact.**