Landfill gas capture – Minimum viability and key issues

FACTSHEET

Landfill gas (LFG) capture projects are critical for reducing methane emissions and generating renewable energy from waste.

The feasibility of these projects depends on several physical and economic factors, including landfill size, gas production, and revenue streams. Each landfill's viability for LFG capture is unique. Financial incentives such as ACCUs (Australian Carbon Credit Units) and LGCs (Large-scale Generation Certificates) are often crucial for making flaring and smaller generation projects feasible. This fact sheet provides an overview of the minimum viability for LFG capture systems and key issues affecting feasibility.

Physical viability: Key factors

Key factors to consider include:

Methane concentration

Methane content in LFG should be ideally 50-60% to support energy generation projects. Projects may be feasible at lower concentrations, but methane levels below 30-35% may compromise combustion processes, requiring supplemental fuel to maintain operation.

Gas flow rates

- For flaring-only systems, a minimum flow rate of 10-50 cubic feet per minute (cfm) per well may be required for efficient combustion. For flaring, very low flow rates can sometimes be used, but combustion efficiency and sustained operation depend on flow stability.
- Energy generation projects usually require a minimum flow rate of 200 cubic meters per hour (m^3/h) for economic viability.

Factors affecting these thresholds include:

Waste composition

Organic-rich waste (e.g., food, paper) produces more methane, while nonorganic waste does not contribute to LFG production.

Landfill depth and age

Deeper landfills tend to produce more gas, but extraction is more challenging. Additionally, older landfills continue to produce methane for decades after closure.

Local climate

Warmer temperatures and higher moisture levels promote faster waste decomposition and greater methane production, though excessive moisture can reduce gas collection efficiency by saturating landfill layers.

Economic viability: Project size and revenue streams

The economic feasibility of LFG capture systems is determined by balancing the costs of infrastructure, operations, and maintenance with potential revenue streams. Important considerations include:

Revenue streams:	Project size and economies of scale:	Equipment sizing:
Carbon Credits (ACCUs): Projects that capture and combust methane can generate ACCUs under the Emissions Reduction Fund (ERF). Flaring-only projects: These projects often rely heavily on ACCUs, as they do not generate revenue from electricity sales. Electricity Generation: Large-scale projects can sell electricity and earn revenue through Largescale Generation Certificates (LGCs).	Larger projects (>5000 tonnes CO_2-e annually) benefit from economies of scale, reducing per unit costs and improving financial viability. Smaller landfills may struggle to achieve economic feasibility due to higher per-unit costs and limited revenue opportunities. For generation projects, the landfill needs to be connected to the electricity distribution network, which can involve substantial infrastructure costs that can be a barrier for smaller projects.	Proper sizing of combustion engines and flares is critical. Oversized systems operate inefficiently, while undersized systems may be unable to handle peak gas flows, compromising safety and performance.

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Australian and U.S. data on LFG capture

Data on landfill gas (LFG) capture suggests that projects can be viable even at very small sizes.

In Australia, landfill gas (LFG) capture projects range from as low as 667,100 cubic meters per annum to just under 50 million cubic meters per annum. While larger projects account for a significant share of total LFG capture, the presence of smaller projects demonstrates that even low-volume landfills can contribute meaningfully, particularly through flaring.

This pattern is similar in the U.S., where projects range from as little as 372,083 cubic meters per annum to nearly 50 million cubic meters per annum. Very low-volume projects are in operation, showing that small landfills can be viable for gas flaring or even small-scale energy generation. These smaller projects meet the minimum requirements for LFG capture and demonstrate that project viability is not limited to large-scale sites.

Hunter region landfills: Feasibility within the range

The Hunter Region's landfills fall within the demonstrated feasibility range for LFG capture systems based on benchmarking against Australian and U.S. projects. Most Hunter landfills without current gas capture infrastructure appear to exceed the minimum gas volumes observed globally, suggesting that LFG capture is technically viable.

However, two of the smaller landfills in the region appear closer to the lower bound of feasibility. These sites may require careful economic and technical assessment before committing to LFG capture systems. Policy support, including financial incentives like ACCUs, will be likely crucial for ensuring the economic viability of such smaller projects.

Landfill gas capture projects in the Hunter Region and elsewhere fall within a demonstrated range of technical viability, as confirmed by benchmarking against Australian and U.S. projects. Smaller landfills can still implement LFG capture systems, provided they receive adequate financial support. Councils should carefully evaluate gas flow rates, equipment costs, and potential revenue streams to ensure the economic feasibility of their projects.