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Rubbish tip or gasfield? How the fumes from landfill are powering homes

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From the edge of Eastern Creek Landfill in western Sydney, you can see tiny trucks far below as they spiral around a vast quarry ready to dump waste. At the end of each day, workers compact the rubbish and cover it with dirt, creating layers of what some call a "garbage lasagne".

To most observers it looks like a modern landfill site. Jarryd Doran, the chief executive of renewable energy company LGI, sees something different: a gasfield.

"Even if every landfill was to stop receiving rubbish today, and no new material went into landfills across Australia, there is still decades of gas that these sites will continue to produce, just based on the waste material already there," Doran said.

The pit is zigzagged with black gas pipes, and in one corner there is a drill rig. Behind you, on high ground, is LGI's newest 4MW power plant, which generates enough electricity to power 7000 homes.

Landfill gas extraction is not to be confused with waste-to-energy plants, in which the rubbish is directly burnt to generate power. Instead, it's about mining the landfill site for the methane it naturally produces as organic material such as food scraps, timber and textiles rots.

Methane is a potent greenhouse gas. The Intergovernmental Panel on Climate Change says one tonne of methane is equivalent to 84 to 87 tonnes of carbon dioxide over a 20-year time frame and 28 to 36 tonnes over a century. The Albanese government has signed Australia up to the global methane pledge to cut emissions of the gas by at least 30 per cent below 2020 levels by 2030.

The waste sector produces about 11 per cent of Australia's methane pollution, the Climate Council says. The most basic abatement for landfill operators is to capture the methane and then burn it in a flare to convert it into carbon dioxide. Doran says it is a one-for-one conversion from methane to carbon dioxide with a byproduct of water, so this drastically reduces the greenhouse emissions.

An LGI gas drill and pipes ready to be laid at Eastern Creek Landfill. JANIE BARRETT

The value-add comes in harnessing the methane to use it for renewable energy. There are 87 sites in Australia using landfill gas to produce electricity, based on registrations with the Clean Energy Regulator, including 23 in NSW, 17 in Victoria, 22 in Queensland and 10 in Western Australia.

The industry, dominated by LMS, LGI and EDL, collectively produces enough power for 200,000 homes, a modestly significant contribution to the national grid.

Landfill gas extraction technology has been around for decades, but it is coming to the forefront now because of improved technology and an increased focus on decarbonisation as Australia tries to meet net zero by 2050 and its new interim goal of 62 to 70 per cent by 2035.

The federal government is reworking the method for landfill sites to generate carbon credits for methane capture and energy generation, though a prominent critic says the government's proposal will award carbon credits that are not needed and keep the price artificially low to benefit the oil and gas industry.

LGI chief executive Jarryd Doran at the new 4MW electricity generator powered by landfill gas at Eastern Creek. JANIE BARRETT

Although the electricity is not emissions-free, the alternative is letting the methane escape into the atmosphere or flaring it without generating power. Leaving landfill to its own devices would also stink.

A few years ago, Eastern Creek Landfill made headlines for a persistent rotten egg odour afflicting nearby residents. After receiving 750 complaints, the NSW Environmental Protection Authority prosecuted the operator – Dial-A-Dump, which was acquired by Bingo Industries in 2018 – and the Land and Environment Court ultimately imposed a fine of $280,000.

Installing landfill gas capture is part of the clean-up.

“The reduction of methane absolutely addresses odour,” said Gayle Sloan, chief executive of industry body Waste Management & Resource Recovery Association.

Doran said landfill gas extraction traditionally involved allowing landfill to fill up to a certain depth, then drilling vertical pipes into the landfill.

“It means that some years could go by before you’re recovering gas from an area of the landfill,” Doran said. “We’re putting horizontal pipework in as the landfill fills, and as we get to that higher depth, we come back and drill, so we always stay on top of and recover the highest quantity of gas that we can possibly get out of these sites.”

He said the power generator could be ramped up and down, allowing it to respond to peaks and troughs in demand, especially when coupled with batteries.

LMS co-chief executive James McLeay said his company pioneered the technology in Australia 30 years ago at a site in Adelaide, and now had about 60 projects producing enough electricity

for 100,000 homes, including Wollert in Victoria, Lucas Heights in Sydney, and Caloundra and Nambour on the Sunshine Coast.

Bingo Industries has partnered with LGI to extract gas from Eastern Creek Landfill. Here, the pipes are laid horizontally as the pit fills up. JANIE BARRETT

The industry had started out with just flaring, McLeay said, but energy generation took off after 2001 when the Howard government introduced the renewable energy target.
"Australia has reduced its emissions from waste by 50 per cent over the last 30 years [despite significant population growth]," McLeay said. "It's a bit of an unsung hero in emissions reduction."

McLeay said he was excited about the potential for the captured landfill gas to be cleaned up and piped into the gas network rather than burnt for electricity, which he said was already happening overseas.

"Manufacturers that require really high heat, like glassmaking, can't electrify," McLeay said. "There are industries that still need a hydrocarbon, so instead of using a fossil-fuel hydrocarbon, landfills and the organics industry are a great place to be able to produce a renewable one."

Carbon credits

Landfill gas operators can earn carbon credits under the federal government program, and the method is being revised in line with recommendations from the Chubb review.

A spokesperson for the Department of Climate Change, Energy, the Environment said the department was progressing reforms to the Australian Carbon Credit Unit (ACCU) scheme to

“strengthen the integrity of projects under the method and capture more methane from landfills to help meet the government’s emissions reduction targets”.

The current level at which landfill sites can earn credits for landfill gas extraction is grandfathered to zero or 24 per cent of the gas captured at most of the bigger sites. The proposed new method raises the baseline to 39 per cent for large landfill sites, but proposes a 0 per cent baseline for small and regional landfills, meaning any methane they capture and destroy could be eligible for credits.

Professor Andrew Macintosh, of the Australian National University, said 39 per cent was still far too low, and it should be 70 to 75 per cent at the largest sites. The difference represented between 1.5 million and 2 million credits in the market, he said.

Macintosh, formerly chair of the Emissions Reduction Assurance Committee (ERAC), said carbon credits were meant to represent additional abatement, but large landfill sites would abate emissions anyway because of regulation, the ability to earn large-scale generation certificates and the ability to sell back to the grid, including at peak times. He said had no problem with the additional incentive for the smaller and regional sites.
“The baselines are grossly too low for the sites that matter – the 20 to 30 sites that account for 80 per cent of the credits going to these projects,” Macintosh said. “They’re just trying to manipulate the baseline number, to make sure that they keep generating credits for projects that basically don’t need them, or need a tiny fraction.”

Macintosh said he was “hugely supportive” of the impressive technology and engineering at the landfill sites, and the government should provide industry incentives, whether through regulation or direct payments. However, he said, the current ACCU policies simply kept the price of carbon credits artificially low so the oil and gas industry could cheaply offset its activities.

In 2022, Macintosh and LMS co-wrote a letter to Climate Change and Energy Minister Chris Bowen saying the baselines were too low and undermined the integrity of the method. The proposed baselines have been revised since then, and while Macintosh remains unimpressed, LMS co-chief executive McLeay said it was a “pragmatic outcome”.

Doran said small regional landfills would not invest in gas abatement without carbon credits, but he agreed that large sites could commercially operate successful landfill gas recovery with baselines greater than 39 per cent. LGI’s Mugga Lane site in Canberra had a baseline of 66 per cent, he said, while its new Eastern Creek facility did not earn carbon credits at all.

ERAC will advise the assistant climate change minister whether the method meets the offset integrity standards.

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