



About: Andrew Mourant is a freelance journalist whose areas of expertise include renewable energy, education and the rail industry.

Ready to explode

In Part I of this “mini-series,” Andrew Mourant looks at global developments in the nascent field of landfill gas site management and engineering.

IT MAY not be a gold rush, an oil boom, or rank in the same league as the craze for fracking. However, exploiting landfill gas is a big business and, say analysts, likely to put on a mid-decade spurt of growth, despite the obstacles in its way.

As *Renewable Energy Focus* magazine reported in November, revenue from the waste to energy (WTE) plant market globally is predicted to rise from \$19 billion in 2012 to \$29 billion by 2016. Landfill gas operations, once found principally in mature advanced economies such as those of North America and the European Union (EU), are thought to account for more than 60% of all biogas power generation.

New hot spots include Mexico and China (I will examine Chinese developments in a future issue). A layman might wonder: what’s taken landfill, as an energy source, so long to take a hold? Surely rubbish heaps, forever releasing methane into the atmosphere, are every neighbourhood’s potential power source and a polluter to be clamped down on?

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For every million tonnes of municipal solid waste, there are thought to be 1.7–2.5 million cubic metres of collectable gas. That's enough to produce 6,500 to 10,000 MWh of electricity annually. Photo credit: Egor Tetiushev/Shutterstock.com

For every million tonnes of municipal solid waste, there are thought to be 1.7–2.5 million cubic metres of collectable gas. This can be used to produce 6,500 to 10,000 MWh of electricity annually — roughly the average power demand of 1,500–2,200 EU households. But however straightforward the technology involved, the politics and economics of landfill gas exploitation are much more complex.

Like other renewable initiatives, landfill needs to be kick-started by governments and legislation. There's been no shortage of carrot and stick in the EU, for instance, but less in some other parts of the world. Many elements need to fuse if landfill gas power initiatives are to take off.

The landfill site itself is a singular beast — a living, organic thing. Consultants who have worked on them around the world agree on one thing: that no two are identical; each is a distinctive as a fingerprint.

Gas formation is influenced by waste composition, landfill storage

height and density, air temperature, atmospheric pressure and precipitation levels. Organic carbon is converted to gas by micro-organisms via anaerobic processes. Production starts one to two years after the waste is dumped, and lasts 15–25 years.

Site management

How sites are supervised matters a great deal, yet some are barely managed at all, as Grant Pearson, principal at UK consultants **SLR**, well knows. “The greater operational control, the better,” he explains. “The western European model makes for generally well-managed sites. But in many developing countries, there's little control (waste disposal can spread over a large area). It's important to have on-going site management and reliable information as to what's gone on in the past — local knowledge of local conditions.”

Poor control presents almost intractable problems. “Fires can be a recipe for disaster,” Pearson warns. “Burning

or hot loads may simply get buried and forgotten and burn for years, inhibiting effective site management and removing the potential LFG source.”

One crucial element in doing things properly is controlling leachate, which on some sites is successfully recirculated. “The right amount of moisture enhances gas production,” Pearson explains.

SLR has learnt from Africa the value of using horizontal gas wells for early gas collection. “With the higher bio content of waste and warmer climate, producing viable LFG tends to happen more quickly than in the UK,” Pearson stated.

Pearson continues: “It has proven beneficial to construct horizontal wells early in the tipping process... rather than rely only on ‘traditional’ vertical wells to capture gas. The benefits are twofold: income is generated sooner, and landfill gas that might otherwise have been lost can be captured more swiftly.”

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