



IRISH ENERGY CENTRE
RENEWABLE ENERGY INFORMATION OFFICE

Landfill Gas In Ireland - The Facts

Almost two million tonnes of municipal solid waste (MSW) were generated in Ireland in 1998, over 90% of which was consigned to landfill. At landfill, bacteria cause the organic fraction of deposited waste to decompose, under partially anaerobic conditions, producing a biogas. This biogas consists primarily of methane and carbon dioxide in the ratio of 2:1, with small quantities of some other gases also present.

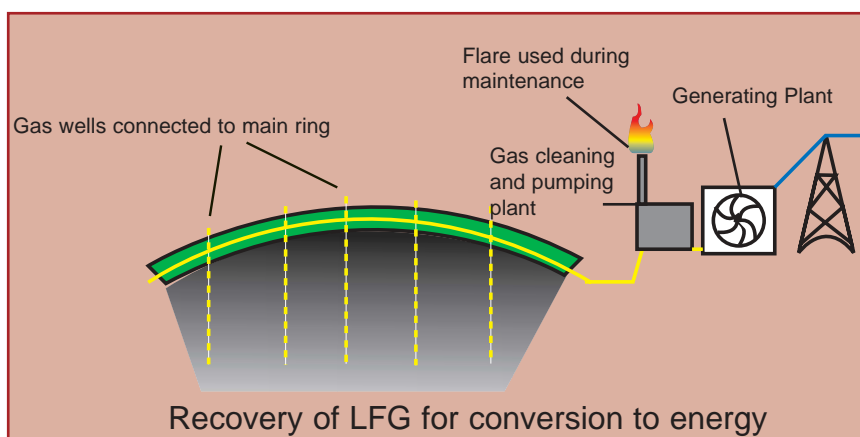
Methane is highly flammable and is one of the major greenhouse gases responsible for climatic change as it has 21 times the global warming capacity of carbon dioxide. However, landfill gas (LFG) emissions can be minimised through effective recovery systems, which harness the gas and use it as a renewable and valuable fuel. In addition to electrical power generation, LFG can also be used for combined heat and power (CHP), kiln firing and as a heating or vehicle fuel. LFG is similar to 'natural' or fossil gas and can be fed into the 'natural' gas network.

Because LFG has different characteristics (calorific value and specific gravity) to 'natural' gas, burners designed for use with 'natural' gas will require some modifications prior to using LFG.

The technology used for landfill gas is mature and well established. In order to avoid any shortfalls in LFG production careful resource assessment is essential prior to establishing a recovery plant. The landfill site must be evaluated in relation to size, location, composition of waste, age and estimated tonnage. The rate of LFG production can then be calculated using computer models.

How is LFG collected from landfill sites?

Piping, similar to that used for natural gas, runs in a circular collection system around the landfill site. Several vertical wells are drilled into the landfill, each containing a perforated pipe that collects the gas. The pipes feed the gas back to the circular piping and from there the gas is collected under vacuum and transferred to a pumping house to be filtered (to remove particulates, water vapour and other gases). The collected gas is then burned in ignition engines. The most suitable level of methane for LFG recovery is approx. 50%, mainly due to the fact that at levels greater than this there are too many particulates and contaminants.



Optimum recovery of LFG can be obtained at purpose-built modern sites, where excavated areas are lined with an impervious material prior to being filled with waste. In addition to this lining, the waste is capped to prevent gas escaping.

In Ireland, almost two million tonnes of municipal solid waste were generated in 1998, over 90% of which was consigned to landfill



Where are these LFG sites?

There are over 40 licensed landfills in Ireland (2001). So far, only five landfill sites have been developed to recover landfill gas and convert it to energy in the form of electricity. Heat is also produced during the recovery process, but at present this heat is not put to any use at the existing landfill gas stations.



The five existing landfill sites in Ireland have been developed by Irish Power Systems Ltd. (www.irishpowersystems.ie) to generate a total of 15MW of electricity that is fed into the National Grid. Development of these sites has been supported under the Alternative Energy Requirement (AER) scheme run by the Department of Public Enterprise (www.irlgov.ie/tec/energy). Under this competition a fixed price is offered to successful bidders for the production of electricity from renewable resources. To date, there have been five such competitions with a total of 15 MW of electricity being generated under the heading of biomass, in competitions I-IV. All of this electricity is produced from landfill gas. AER V is inviting proposals for renewable energy projects in 2001.

Max. Output Support

Cork

Tramore Valley Landfill Site, South City Link Road, Cork. 2MW AER I

Dublin

Balleally Landfill Site, Lusk, Co. Dublin. 5MW AER I & III

Dunsink Landfill Site, Finglas, Co. Dublin. 4.8MW AER I

Ballylogan Landfill Site, Co. Dublin. 2MW AER I

Friarstown Landfill Site, Co. Dublin. 1MW AER I



Landfill Gas Utilisation Project, Dunsink Co. Dublin

The five operational landfill gas plants in Ireland have:

- * a combined electrical capacity of 15 MWe
- * enough LFG to meet the needs of 29,000 households
- * resulted in major reductions in harmful greenhouse gas emissions in excess of 500,000 tonnes of CO₂ equivalent/year



Feasible LFG resource in Ireland 2020

County	Feasible Electric Power MWe
1. Dublin	81.6
2. Cork	46.3
3. Galway	24.7
4. Limerick	18.0
5. Longford	18.0
6. Kildare	11.0
7. Waterford	9.1
8. Wicklow	8.8
9. Clare	8.8
10. Donegal	8.5
11. Monaghan	8.1
12. Westmeath	7.5
13. Meath	7.4
14. Kerry	7.2
15. Mayo	6.5
16. Kilkenny	6.2
17. Offaly	3.7
18. Roscommon	3.6
19. Laois	3.5
20. Wexford	3.4
21. Tipperary	2.8
22. Carlow	2.8
23. Cavan	2.6
24. Louth	1.8
25. Sligo	1.6
26. Leitrim	1.0
Total	304.7

New opportunities for LFG projects follow the Electricity Regulation Act (1999) Since February 2000 suppliers of electricity generated from renewable resources are entitled to sell their product directly to final consumers. A potential application of this new ruling would be for local authorities to purchase their own electricity directly from a landfill gas power supplier or green electricity company (for example, <http://www.eirtricity.ie>). This would help to overcome one of the main barriers to implementation of renewable energy projects, the power purchase agreement, previously only available from the ESB through the AER process. It should also result in a lower energy bill for the purchaser.



Landfill gas – boost for Irish jobs!

Landfill gas is a local resource creating significant local employment. There are currently seventeen people employed directly in LFG utilisation for power generation in the Republic of Ireland. There are also a number of technicians employed by local authorities to monitor LFG for environmental control purposes.

Landfill Gas Companies

There are a number of companies that undertake all aspects of developing a landfill site for recovery of LFG. Contact details for Irish Power Systems (the only existing Irish company) and several UK companies are listed at the end of this brochure.



Gas Engine

Recommended LFG literature:

Landfilling of Waste: Biogas

Edited by T.H.Christensen *et al.* 1995. This publication outlines landfill gas production, extraction, transport and utilisation, as well as safety aspects and emissions.

Available from <http://www.efnspon.com/environment/default.asp>.

Landfill Gas Development Guidelines

Written by respected experts, these UK produced guidelines provide an excellent review of technology for gas recovery and options for its use and also address the key issues of site assessment, economics, financing and liabilities. Produced by ETSU for the DTI, November, 1996. (Available from The Renewable Energy Information Office).

An Introduction to Household Waste Management

A UK produced guide to integrated waste management. Includes a useful analysis of relative costs and environmental impacts of different waste management scenarios. Produced by ETSU for the DTI, March 1998. (Available from The Renewable Energy Information Office).

Websites:

Using landfill gas for energy

http://www.eren.doe.gov/cities_counties/landfill.html

UK Biogas Association

<http://www.biogas.org.uk>

Irish Power Systems

<http://www.irishpowersystems.ie>

Environment Canada

<http://www.ec.gc.ca/nopp/lfg/bulletin/indexe.htm>

Careful landfill site design, as shown here, will help to maximise landfill gas recovery.



List of companies dealing with Landfill Gas:

Irish companies

Irish Power Systems Ltd.

Phone

01-8221050

Fax

01-8221049

UK Companies:

BIFFA Waste Services

Phone

01246-570071

Fax

01246-819505

Capitol Waste Management

0191-3844000

0191-3845869

Cleanaway

01277-234567

01277-230067

Combined Landfill Projects Ltd

0207-4930297

0207-4081216

CPL Energy Ltd

01246-277001

01246-212233

Ener-G PLC

01223-411039

01223-411034

Energy Developments (UK)Ltd.

0208-8612777

0208-8612888

Hampshire Waste Services Ltd.

01962-764000

01962-715693

Hyder Industrial Ltd.

02920-585679

02920-585808

Lafarge Redland Aggregates Ltd.

01509-882183

01509-882010

Renewable Power Systems

01234-271700

01-234271709

Shanks Waste Solutions

01908-650609

01908-650697

SITA

01675-434728

Summerleaze RE-Generation

01628-762350

01628-773160

Viridor Waste Disposal Ltd.

01732-220044

01732-220055

Waste Recycling Group Ltd.

01244-301887

01244-301970

The National Renewable Energy Information Office

The National Renewable Energy Information Office is a service of the Irish Energy Centre. Its objective is to support the development of renewable energy in Ireland by providing independent and expert advice as well as information on related financial, environmental and technical issues.

Five ways to contact us:

WRITE: Renewable Energy Information Office

Irish Energy Centre

Shinagh House

Bandon, Co. Cork

Ireland

TELEPHONE: our hotline – 023 42193

FAX: 023 41304

EMAIL: renewables@reio.ie

VISIT OUR WEBSITE: www.irish-energy.ie/reio.htm



The Irish Energy Centre is a joint initiative of the Department of Public Enterprise and Enterprise Ireland. It is supported by the EU through the community Support Framework.

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Hotline: 023 42193 Website: <http://www.irish-energy.ie/reio.htm> Email: renewables@reio.ie

I want to know more about Renewable Energy

Further Reading

Free Factsheets available Directly from Us or Our Web Site:

- Wind Energy

- Bioenergy

 - Biomass

 - Landfill Gas

- Hydropower

- Green Electricity

- Renewable Energy for Buildings & Industry:

 - Passive Solar Design

 - Heat Pumps for Your Home

 - Heat Pumps for Commercial Buildings

 - Heat Pumps for the Health Sector

 - Solar Water Heaters

 - How to Heat with Wood



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