

# *LMOP Workshop: Tools & Resources*

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# ***LMOP Tools and Services***

- Website – [www.epa.gov/lmop](http://www.epa.gov/lmop)
- Direct project assistance
- Technical and outreach publications
- Project and candidate landfill database
- Network of over 1,000 Partners
- Listserv
- Support for ribbon cuttings/other PR
- Presentations at conferences
- State training workshops
- ***LMOP 17<sup>th</sup> Annual Conference, Project Expo & Partner Awards – January 2014***





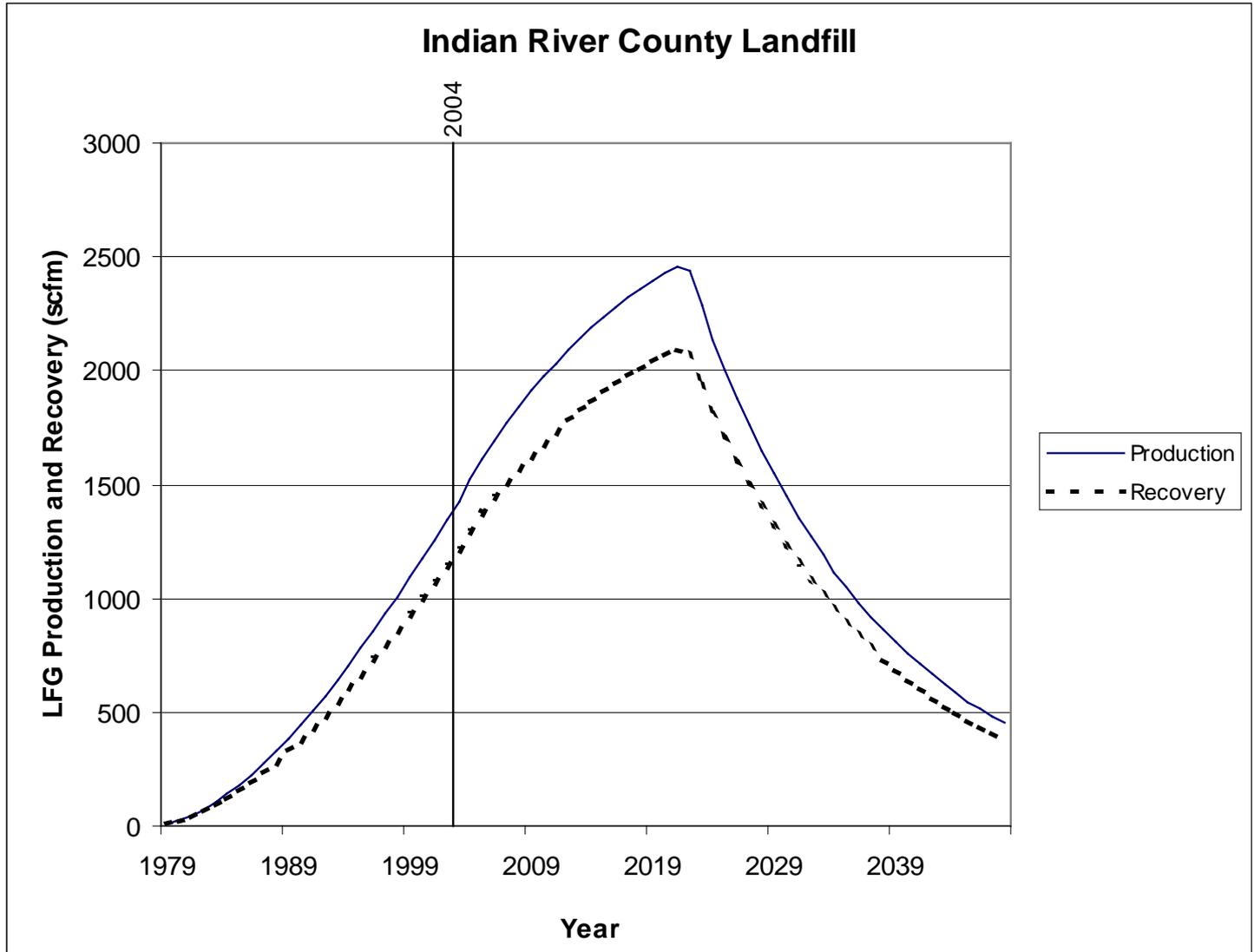
# ***How Can We Work Together? Direct Project Assistance***

- Analyze landfill resource – gas modeling
- Identify potential matches – *LMOP Locator*
- Assess landfill and end user facilities
- Look at project possibilities
  - Direct-use (boiler, heating, cooling, direct thermal)
  - Combined Heat & Power (engine, turbine, microturbine)
  - Electric (engine, turbine, microturbine)
  - Alternative Fuels (medium- or high-Btu, LNG, CNG)
- Initial feasibility analyses – *LFGcost*





# Analyze Energy Potential from Landfills





# LFGcost – Example Inputs and Outputs

INPUTS / OUTPUTS

Enter Landfill Name or Identifier: Example Landfill

Print Summary Report

## Required User Inputs:

Type of Input Required		Input Data
Year landfill opened		1960
Year of landfill closure		2020
Area of landfill waste for LFG to be collected (acres)		100
Method for entering waste acceptance data [CHOOSE ONLY ONE METHOD]:	Average annual waste acceptance rate (tons/yr)	200,000
	Waste acceptance rate calculator (in WASTE worksheet)	<a href="#">Go to WASTE</a>
Annual waste disposal history (in WASTE worksheet)		<a href="#">Go to WASTE</a>
LFG energy project type: (D)irect use, (T)urbine, (E)ngine, (L)NG, microtu(R)bine, small en(G)ine, or lea(C)hate evaporator?		E
Will LFG energy project cost include collection and flaring costs? (Y)es or (N)o		N
For leachate evaporator projects only: Amount of leachate collected (gal/yr)		
Year LFG energy project begins operation		2005
Expected LFG energy project lifetime (years)		15

## Outputs:

Type of Output	Output Data
<b>Economic Analysis:</b>	
Average project size for projects NOT generating electricity: (million ft <sup>3</sup> /yr)	0.000
[based on actual LFG use] (ft <sup>3</sup> /min)	0.000
Average project size for projects generating electricity (kWh/yr)	34,992,195
Total installed capital cost for year of construction (\$)	\$5,493,824
Annual costs for initial year of operation (\$)	\$696,312
Internal rate of return (%)	14%
Net present value at year of construction (\$)	\$569,101
Net present value payback* (years after operation begins)	13



# LMOP Locator – Example End User Search Report

Landfill Name: Pine Ridge Recycling  
 Landfill Address: 105 Bailey Jester Road, Griffin, GA 30224  
 Latitude: 33.24  
 Longitude: -84.12  
 County Searched: Butts  
 Distance Searched (miles): 10

Potential End User Facility Name	Distance (miles)	Facility Physical Address Line 1	Facility Physical City	Facility Physical State	Facility Physical Zip Code	Facility SIC	Facility Site ID	Emission Process Description	MACT Description	Facility Contact Name	Facility Contact Phone	Facility County	Facility Latitude	Facility Longitude
Tanimura & Antle Southeast	4.45	148 Riverview Park Rd	Jackson	GA	30233-6132	209903	1303553402				770-504-7100	Butts County	33.2130	-84.0510
Mercer University	6.34	390 Wilson Rd	Griffin	GA	30224-4546	822101	1325535235			Mr. G Hollums	678-547-6311	Spalding County	33.2293	-84.2323
STANDARD PRODS. CO.	6.45		GRIFFIN	GA	30223	3069	13255E5071340101		Printing, Coating & Dyeing Of Fabrics			Spalding County	33.2353	-84.2344
STANDARD PRODS. CO.	6.45	200 WILSON RD.	GRIFFIN	GA	30223	3069	13255T\$3715	Industrial Processes, Miscellaneous Manufacturing Industries, Miscellaneous Industrial Processes, See Comment**	Printing, Coating & Dyeing Of Fabrics			Spalding County	33.2353	-84.2344
Coca-Cola Bottling Co	7.87	410 E Taylor St	Griffin	GA	30223-3428	208601	1325510926			Mr. K Bobbitt	770-228-8636	Spalding County	33.2470	-84.2583
Griffin Light & Water Account	8.07	217 E Solomon St	Griffin	GA	30223-3313	912104	1325522318			Ms. B Harker	770-229-6403	Spalding County	33.2486	-84.2616
Griffin Lights Out Svc	8.10	120 N 6th St	Griffin	GA	30223-3334	491101	1325522319			Mr. J Jones	770-229-6406	Spalding County	33.2502	-84.2619
Robert Brooker Paving Co	8.23	114 1/2 W Solomon St	Griffin	GA	30223-3046	161101	1325546800			Mr. R Brooker	770-227-3938	Spalding County	33.2486	-84.2646



City of Lawton Landfill  
Lawton, Oklahoma

LMOP PROJECT EXPO

## City of Lawton Landfill Overview

Open Year  
1980

Estimated Closure Year  
2051

Estimated Waste in Place  
3.7 million tons

Design Capacity  
11.6 million tons (permitted)

Annual Acceptance  
160,000 tons (2011)

Designed Landfill Area  
130 acres

LFG Collection System  
To be installed in 2013

2013

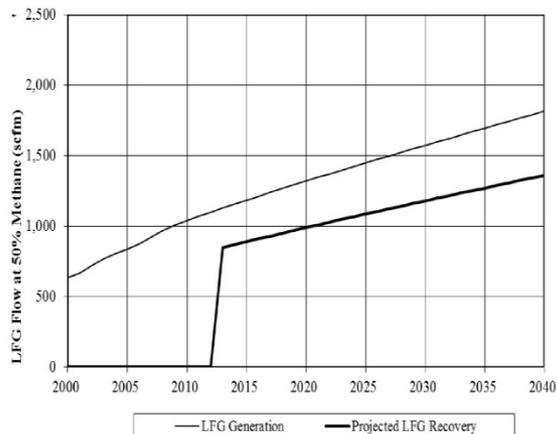
The City of Lawton Landfill is a municipally owned and operated landfill located ~8 miles south of Lawton in southwest/south-central Oklahoma. Landfill gas (LFG) estimated to be recoverable in 2013 for collection and utilization is ~850 scfm (50% methane). LFG collection efficiency is estimated at 75%. Utilization of this LFG would result in direct destruction of methane gas and avoided emissions from conventional electricity sources, equivalent to preventing emissions of nearly **96,000 metric tons of CO<sub>2</sub>e per year**.

These emission reductions are equivalent to any one of the following annual environmental benefits for 2014:

- ◆ Annual greenhouse gas emissions from more than **18,700 passenger vehicles**
- ◆ Carbon sequestered annually by approximately **20,400 acres of pine or fir forests**
- ◆ CO<sub>2</sub> emissions from **10,722,000 gallons of gasoline** consumed

The City of Lawton Landfill reports that it is not currently required to collect and combust LFG under the Landfill NSPS/EG. Electricity is provided to the landfill by Cotton Electric and PSO.

### Landfill Gas Generation and Collection Rates



J.C. Elliott Landfill  
Corpus Christi, Texas

LMOP PROJECT EXPO

2013

## J.C. Elliott Landfill Overview

Open Year  
1972

Closure Year  
2007

Waste in Place  
9.9 million tons

Landfill Area  
207 acres

Average Waste Depth  
70 feet

LFG Collection System  
Yes

Wells in Place  
137 wells

Flare in Place  
Yes

LFG Collected  
1,800 scfm

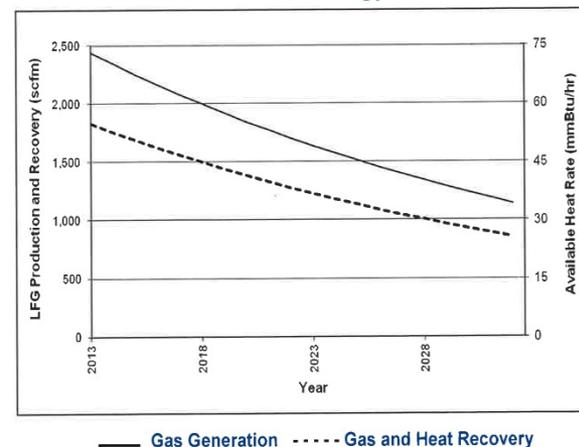
J.C. Elliott Landfill reports that it is not currently required to collect and combust landfill gas (LFG) under the Landfill NSPS/EG.

Collection and utilization of the LFG in 2013 at an extraction rate of **1,800 scfm** would result in direct destruction of methane gas and avoided emissions from conventional electricity sources, equivalent to preventing emissions of nearly **200,000 metric tons of CO<sub>2</sub>e per year**.

These emission reductions are equivalent to any one of the following annual environmental benefits for 2013:

- ◆ Annual greenhouse gas emissions from **38,600 passenger vehicles**
- ◆ Carbon sequestered annually by nearly **42,000 acres of pine or fir forests**
- ◆ CO<sub>2</sub> emissions from **22 million gallons of gasoline** consumed
- ◆ CO<sub>2</sub> emissions from nearly **458,000 barrels of oil** consumed

### Landfill Gas and Energy Potential



— Gas Generation - - - Gas and Heat Recovery



**NEW**

# LMOP's LFG Energy Project Development Handbook!



Looking for an easy-to-use, one-stop source for all your questions about developing a landfill gas (LFG) energy project? The U.S. Environmental Protection Agency's Landfill Methane Outreach Program (LMOP) has released a new, online *Project Development Handbook!*

LMOP developed the Web-based handbook to meet the needs of its Partners and others interested in LFG energy development, including landfill owners, project developers, energy service providers, corporate energy end users, and state and local governments.

The easy-to-use handbook gives step-by-step guidance about the LFG energy project development process, and includes the most up-to-date technical, regulatory, and practical information available. The handbook includes chapters (in PDF format) on the following topics that can be read online or downloaded and printed, if needed:

- LFG energy basics
- Landfill gas modeling
- Project technology options
- Project economics and financing
- Contracts, regulations, and permitting
- Selecting and working with project partners

Each chapter includes links to LMOP technical tools and resources as well as other EPA and third-party sites where users can find more detailed or specialized information, based on their own needs and interests.

To access the Project Development Handbook, visit:  
[www.epa.gov/lmop/res/handbook.htm](http://www.epa.gov/lmop/res/handbook.htm)



The U.S. EPA's Landfill Methane Outreach Program (LMOP) is a voluntary assistance and partnership program that promotes the use of landfill gas as a renewable, green energy resource. Landfill gas contains methane, a potent heat-trapping gas that can be captured and used to power businesses, greenhouses, vehicles, and homes. By finding ways to use this gas, LMOP helps businesses, states, energy providers, and communities protect the environment and build a sustainable future.

# Look Who's Energizing the Community

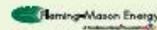


By developing a landfill gas energy project,  
East Kentucky Power Cooperative is:

- Reducing greenhouse gas emissions
- Improving local air quality
- Encouraging economic development and job creation
- Developing a local, renewable source of energy

The U.S. Environmental Protection Agency congratulates LMOP Partner East Kentucky Power Cooperative as well as Fleming-Mason Energy and Mason County Fiscal Court for their efforts to improve the community and the environment by utilizing landfill gas to create energy. The Mason County Fiscal Court worked cooperatively with Fleming-Mason Energy and East Kentucky Power Cooperative to develop a project that captures landfill gas from the Maysville-Mason County Landfill in Maysville, Kentucky to power one reciprocating engine, manufactured by LMOP Industry Partner Caterpillar, with a capacity of 1.6 megawatts of electricity. Fleming-Mason markets the green power to its members through the EnviroWatts program. Using landfill gas for energy helps the environment by reducing fossil fuel emissions, helps the economy by providing a stable source of alternative energy, and benefits the community by improving local air quality. The annual reduction of greenhouse gases that will be attributable to this project is approximately the same as the annual greenhouse gas emissions from 13,000 passenger vehicles, the carbon dioxide emissions from more than 158,000 barrels of oil consumed, or the carbon sequestered annually by 14,500 acres of pine or fir forests.

For more information on the benefits of landfill gas energy, contact the Landfill Methane Outreach Program at [www.epa.gov/lmop](http://www.epa.gov/lmop).





# For More Information

[www.epa.gov/lmop/contact.html](http://www.epa.gov/lmop/contact.html)

## Landfill Methane Outreach Program

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## Contact Us

Do you have a question for LMOP or would you like to request assistance? Are you interested in partnership with LMOP or receiving periodic listserv messages about landfill gas (LFG)-related topics? Select a topic below to submit a request or comment to LMOP. A form will open for any topic you select, and you will have the opportunity to select other topics as well after you submit your first question.

- [Report a broken link or other issue with website functionality](#)

Question or Request related to:

- [LMOP partnership or receiving listserv messages](#)
- [Annual LMOP Conference and Project Expo](#)
- [EPA policy related to LFG energy](#)
- [Greenhouse Gas Reporting Program as it relates to MSW landfills](#)
- [Other EPA regulations that affect landfills](#) (e.g., Landfills NSPS/EG, Boiler NESHAP), OR [Emissions from landfills, LFG energy projects, or other forms of electricity generation](#), OR [Emission control techniques](#)
- [Technical landfill/LFG energy project issue](#) (e.g., permitting, barrier to project development, gas collection system) OR [Technical analysis for a specific landfill/project](#) (e.g., LFG curve, LFGcost run, feasibility assessment, search for end users or landfills)
- [Functionality of LMOP's Locator search tool or LFGcost economic feasibility tool](#)
- [Data from the LMOP Landfill and LFG Energy Project database](#) OR [Tools/Publications on the LMOP website](#) (e.g., Excel files of data, map of candidate landfill and LFG energy project counts, Project Expo sites, LFG energy project profiles, LFG Energy Benefits Calculator, Interactive Conversion Tool, LFG Energy Project Development Handbook)

### Partners and Endorsers

If you are a Partner or Endorser and would like to update your contact information, please use this form.

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### LMOP Team

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