

# LMOP National Landfill Gas Energy Workshop – Welcome Presentation

LMOP Team:

Kirsten Cappel, Tom Frankiewicz,  
Swarupa Ganguli, Chris Godlove

U.S. Environmental Protection Agency  
Landfill Methane Outreach Program



National Landfill Gas Energy Workshop  
New Orleans, Louisiana • March 19, 2015

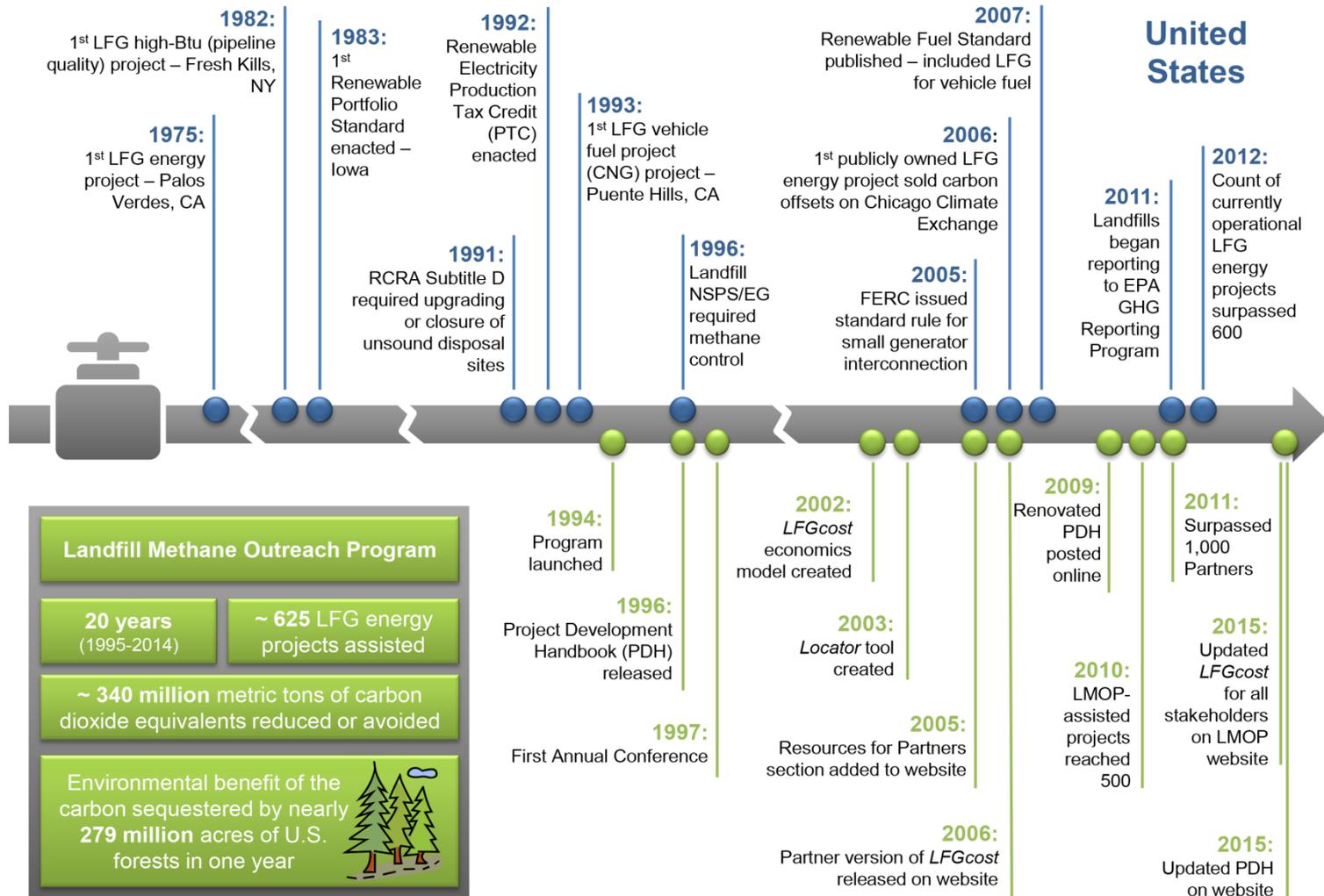
# Welcome and Agenda

- National Workshop in conjunction with SWANA
- Over 300 registered attendees
- Attendees include: landfill owners/operators; state/local government; project developers; equipment/service providers
- Agenda
  - Technical Sessions
  - 2014 Awards Recognition and Case Studies

# 20 Years of LMOP

- Officially formed in December 1994, spurred by the president's 1993 Climate Change Action Plan
- Developed numerous tools and resources (e.g., Project Development Handbook, *LFGcost*, project database)
- Launched partnership and awards programs
- Hosted 17 annual conferences
- Made forays into international landfill assistance and formally solidified this work with the Global Methane Initiative in 2004
- From 1995-2014: provided assistance to ~625 of 680 LFG energy projects (92%) which have resulted in cumulative emission reductions of ~340 MMTCO<sub>2</sub>e

# Timeline of the U.S. LFG Energy Industry



# Current State of LFG in United States: Trends and Factors

- Economic factors continue to challenge project financial feasibility
  - Increased fossil fuel production (e.g., shale gas) and low NG prices
  - Uncertain future for tax credits and market conditions → low REC prices
- Maturing industry – consolidation of private companies and movement toward large, regional sites
- Increasing interest in avoiding methane generation → many cities & states are moving toward mandating organic waste recycling
- Renewable Fuel Standard and Biogas Opportunities Roadmap → increased interest in alternative fuel
- Advancing LFG energy projects is part of White House's 2014 Climate Action Plan – Strategy to Reduce Methane Emissions
- Increased regulation – revised Landfills NSPS proposed in July 2014

# Project Snapshot (March 2015)

**645** projects  
in **49**  
states/territories

provided in 2014

**98**  
billion

cf LFG delivered

**16.8**  
billion  
kWh  
produced

AND

**120 MMTCO<sub>2</sub>e**  
direct CH<sub>4</sub>  
reductions

- ~20 projects under construction for 2015/2016 and more in the planning stages

**~ 440**  
candidate  
landfills

could annually supply

**170**  
billion

cf LFG for direct use

**7.0**  
billion kWh  
produced

AND

**40 MMTCO<sub>2</sub>e**  
potential  
direct CH<sub>4</sub>  
reductions  
per year

OR

# Estimated 2014 Environmental and Energy Benefits

- Environmental

- Carbon sequestered by nearly 107 million acres of U.S. forests in one year, or
- CO<sub>2</sub> emissions from nearly 303 million barrels of oil consumed, or
- CO<sub>2</sub> emissions from more than 14.6 billion gallons of gasoline consumed



- Energy

- Powering more than 1.2 million homes and heating nearly 715,000 homes



# LMOP Partner Update

- 1,101 Partners at end of 2014
  - 773 Industry Partners
  - 140 Community Partners
  - 110 Energy Partners
  - 39 State Partners
  - 39 Endorsers
- 30 new Partners joined in 2014
  - 23 Industry Partners
  - 6 Community Partners
  - 1 Endorser

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

# New Partners Who Joined in 2014

- Advanced Technology Industries Inc
- Analytical Technologies, Inc.
- Blue Sphere Corporation
- Carbon Control Technologies, LLC
- Carbon Cycle Energy, LLC
- Dresser-Rand
- Duran Marks, LLC
- Eastbrook Asset Management LLC
- Energy Equipment Co.
- Environmental Attribute Advisors
- Environmental Information Logistics, LLC
- Genscape
- Green Way Energy LLC
- Hydros Inc.
- Industrial Power Cooling Ltd
- INFICON, Inc.
- Loci Controls, Inc.
- MTU America Inc.
- Peaker Services Inc.
- Regatta Solutions, Inc.
- Speed of Air Technologies
- Urban Renewable H2
- Weaver & Tidwell, LLP
- Cape May County Municipal Utilities Authority, NJ
- Hancock County, OH
- Manatee County, FL
- Municipality of Vega Baja, PR
- Sarpy County, NE
- Will County, IL
- Grid Grants Inc.

# LMOP Accomplishments

- New and improved *LFGcost-Web* available to all stakeholders – updated cost data & new CNG module
- Published 2 articles and presented at 2 conferences
- Posted enhanced data Excel files on website
- Sent 12 listserv emails for LFG-related topics such as federal funding, RFPs from landfills and utilities, webinars
- Responded to 60 data requests and 60 technical inquiries
- Supported 5 LFG energy ribbon cuttings (AL, CA, NC, TX, VA) and visited 3 landfills (MD, IL, VA)

# LMOP International MSW Accomplishments

- Continued to support Climate and Clean Air Coalition
  - Working with 7 cities
- Partnered with municipalities to assess opportunities for reducing methane from MSW (e.g., organics diversion, anaerobic digesters, composting)
- Developed new training presentation: Anaerobic Digestion for Municipal Solid Waste
- Conducted 3 LFG training workshops (Brazil, Indonesia, Mexico) and 4 assessments (Mexico, Turkey)

# Updated Tools and Resources

Available at [www.epa.gov/lmop](http://www.epa.gov/lmop)

## LFGcost-Web, Version 3.0

### Evaluate the initial economic feasibility of an LFG energy project

- Now available online to all stakeholders
- Updated costs for collection & flaring system and direct-use & standard engine projects
- Expanded to include a project type for onsite CNG and fueling station
- Fully transparent model that allows users to edit all optional inputs

**LFGcost-Web Model (Version 3.0)**



LFGcost-Web is a spreadsheet tool developed for EPA's Landfill Methane Outreach Program (LMOP) project in the United States. **The tool is designed for parties interested in obtaining an initial economic project.** These project types include electricity generation, direct-use, boiler retrofit, combined production, and high Btu production. **Analyses performed using LFGcost-Web are considered preliminary.**

This tool consists of 12 required inputs to characterize the age and size of the landfill, the type of LFG the project. Several additional optional inputs are set to suggested default parameters but can be adjusted for landfill and LFG energy project. The model provides the economic analysis and environmental benefits and optional user inputs are in Table 1, and descriptions of the model outputs are listed in Table 2.

**The default input parameters and estimated costs are based on typical project designs and for when selecting the type of LFG energy project appropriate for the size of your project. Within these size accuracy of ± 30-50%. Using LFGcost-Web to evaluate projects outside of these recommended range: uncertainty.**

[Go to Inputs/Outputs](#)  
[Go to Important Notes](#)

[Go to Table 1. Glossary of Input Parameters](#)      [Go to Table 2. Glossary of Output Parameters](#)      [Go to Table 3. LFG Energy Project Types and Recommended Sizes](#)      [Go to Table 4. Workbook Design](#)

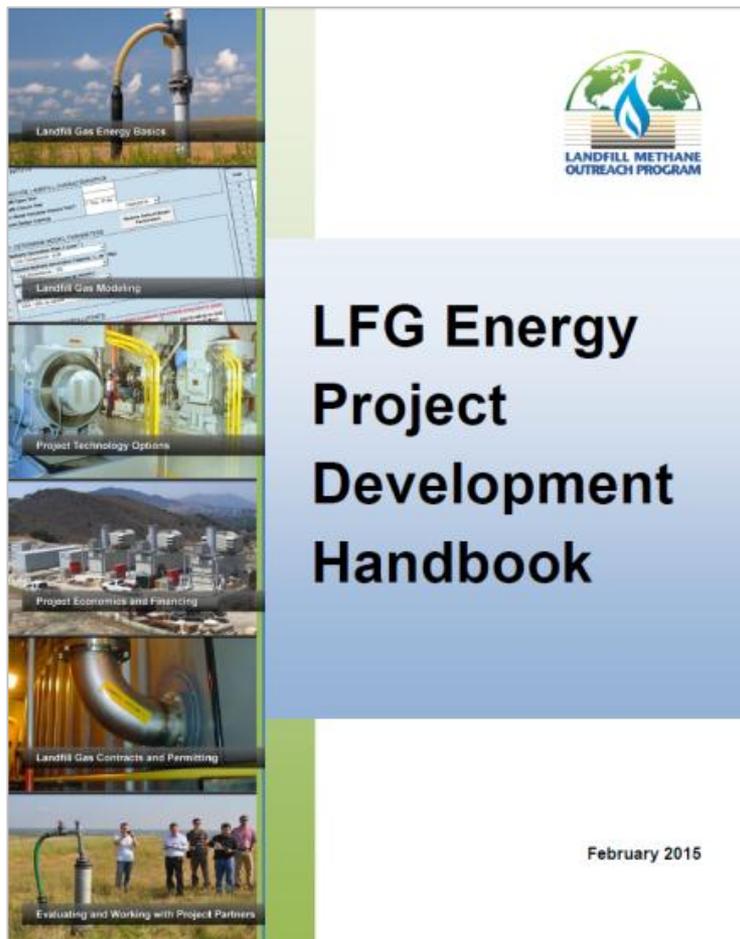
**Table 1. Glossary of Input Parameters**

Required Input	Definition
<a href="#">Year landfill opened</a>	Four-digit year that the landfill opened or is planning to open.
<a href="#">Year of landfill closure</a>	Four-digit year that the landfill closed or is expected to close.
<a href="#">Area of LFG wellfield to supply project</a>	Acreage of the landfill that contains waste and generates LFG to be collected and utilized by the LFG energy project. The model assumes one well per acre to determine vertical gas well, wellhead, pipe gathering system, and other costs for the collection and flaring system. Acreage should represent area of landfill for gas collection to feed project, not total landfill area. Gas collection and flaring cost estimates represent a complete new system (costs for expansion of an existing system will be higher); inaccurate cost estimates may result for smaller landfill areas (<10 acres) due to economic infeasibility of designing and installing an entire new collection and flaring system.
<a href="#">Average annual waste acceptance rate</a>	Average annual tons of municipal solid waste (MSW) accepted each year the landfill is open.
<a href="#">Waste acceptance rate calculator</a>	If you do not know the average annual waste acceptance rate, then you can use the calculator to estimate this rate.
<a href="#">Waste-in-place</a>	Total tons of MSW accepted and placed in the landfill.
<a href="#">Year representing waste-in-place</a>	Four-digit year that corresponds to the waste-in-place tonnage.
<a href="#">Annual waste disposal history</a>	The waste disposal history should be used <b>only</b> when year-to-year waste acceptance is known for each year that the landfill operates. The annual waste acceptance rate, in tons per year, <b>MUST</b> be entered for all years beginning with the landfill open year and ending with the landfill closure year.
<a href="#">LFG energy project type</a>	Pick list to choose one of the 12 LFG energy project types you want to analyze. Table 3 (below) contains a list of project types to use for selecting the project type appropriate

INST | **INP-OUT** | WASTE | REPORT | RPT-CASHFLOW | CURVE | ENV | FLOW | C&F | DIR | BLR | HBTU | CNG | LCH | TUR | ENG | MTUR | SENG | CHPE | CHPT | CHPM | ECN

# Updated Tools and Resources (cont)

Available at [www.epa.gov/lmop](http://www.epa.gov/lmop)



## Project Development Handbook

*Improve understanding to develop successful projects*

- Expands on project-specific considerations
- Helps stakeholders who are new to LFG energy projects
- Highlights useful online resources and successful LFG energy projects

# Updated Tools and Resources (cont)

Available at [www.epa.gov/lmop](http://www.epa.gov/lmop)

## Landfill and LFG Energy Project Data

Download details about projects and landfills

- Enhanced to include more detailed data
- Now cross references EPA's greenhouse gas reporting program (GHGRP)

	A	B	C	D	E	F	G	H	I	J	K
1	GHGRP ID	Landfill ID	Landfill Name	State	Physical Address	City	County	Zip Code	Latitude	Longitude	Ownership Type
2	1007341	1994	Anchorage Regional Landfill	AK	15500 E. Eagle River Loop Road	Eagle River	Anchorage	99577	61.293281	-149.60214	Public
3	1007341	1994	Anchorage Regional Landfill	AK	15500 E. Eagle River Loop Road	Eagle River	Anchorage	99577	61.293281	-149.60214	Public
4	1010389	11941	Capitol Disposal Landfill	AK	5600 Tonsgard Court	Juneau	Juneau	99801	58.3528	-134.4947	Private
5		10980	Central Landfill - MatSu Borough	AK	1201 N. 49th State Street Just off the Palmer-Wasilla Highway	Palmer	Matanuska-Susitna Kenai	99645	61.59	-149.21	Public
6	1005349	12216	Central Peninsula Landfill (CPL)	AK	46915 Sterling Highway	Soldotna	Peninsula	99669	60.44714	-151.10369	Public
7		10960	Kodiak Island Borough Landfill	AK	1203 Monaska Bay Road	Kodiak	Kodiak Island	99615	57.80874	-152.40761	Public
8	1004380	11020	Merrill Field Landfill	AK	800 Merrill Field Drive	Anchorage	Anchorage	99501	61.21266	-149.84012	Public
9	1006806	10961	South Cushman Landfill	AK	455 Sandurli Street	Fairbanks	Fairbanks North Star	99701	64.80476	-147.70085	Public
10		11000	Unalaska Landfill	AK	1181 Summer Bay Road	Unalaska	Aleutians West	99685	53.88463	-166.50657	Public
11		27	Athens/Limestone County SLF MSWLF	AL	Strain Road off Highway 31						
12		16	Bishop Landfill Company	AL	379 Pleasant Grove Cutoff						
13	1004245	2005	Black Warrior Solid Waste Facility	AL	3301 Landfill Drive						
14		2006	Blount County/Nectar/Hayden LF & TS	AL	2390 Armstrong Loop						
15	1004415	2408	Brundidge Landfill	AL	515 Cleanwater Drive						
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flight  
Facility  
Level  
Information on  
GreenHouse gases  
Tool  
Refresh View

# Tools for Program Outreach to Stakeholders



LMOP is pleased to announce that registration is open for its National Landfill Gas Energy Workshop to be held on **Thursday, March 19, 2015**. Online registration for the LMOP workshop is being managed through the [Solid Waste Association of North America \(SWANA\) website](#). **There is no fee to attend the LMOP workshop, but registration is required**

LMOP is collaborating with SWANA to organize the workshop in conjunction with their upcoming 38th Annual Landfill Gas & Biogas Symposium in New Orleans, Louisiana. The half-day LMOP National Landfill Gas Energy Workshop will highlight recent successes in landfill gas (LFG) energy projects and include recognition of the 2014 LMOP Project and Partner of the Year awardees.

LMOP is not hosting a separate conference in 2015.

- [Visit the LMOP National Landfill Gas Energy Workshop website](#)
- [Learn more about SWANA's Landfill Gas & Biogas Symposium 2015](#)



**Webinar:**  
*LFGcost-Web, Version 3.0*

**February 3, 2015**

**Presenter:**  
Amy Alexander, ERG (contractor to LMOP)

## LMOP Listserv

- Distribute LMOP announcements, funding opportunities and RFPs, and promote Partner news

## Stakeholder Webinars

- *Using Landfill Gas as Vehicle Fuel*
- *LFGcost-Web V3.0*
- Presentations available at [www.epa.gov/lmop](http://www.epa.gov/lmop)

# LMOP Booth

- Visit LMOP's table to:
  - Learn more about LMOP tools and resources / pick up materials
  - View data or provide updates for projects and candidate landfills
  - Share project development successes and challenges



