



Latest LFG Energy Developments

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Landfill Methane Outreach Program

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Presentation Overview

- Status of the LFG Energy Industry in the U.S.
- Market Overview and Industry Trends
- LMOP Assistance Opportunities





EPA's Landfill Methane Outreach Program

- Established in 1994
- Voluntary program that creates alliances among states, energy users/providers, the landfill gas industry, and communities

Mission: To reduce methane emissions by lowering barriers and promoting the development of cost-effective and environmentally beneficial landfill gas energy (LFG Energy) projects.





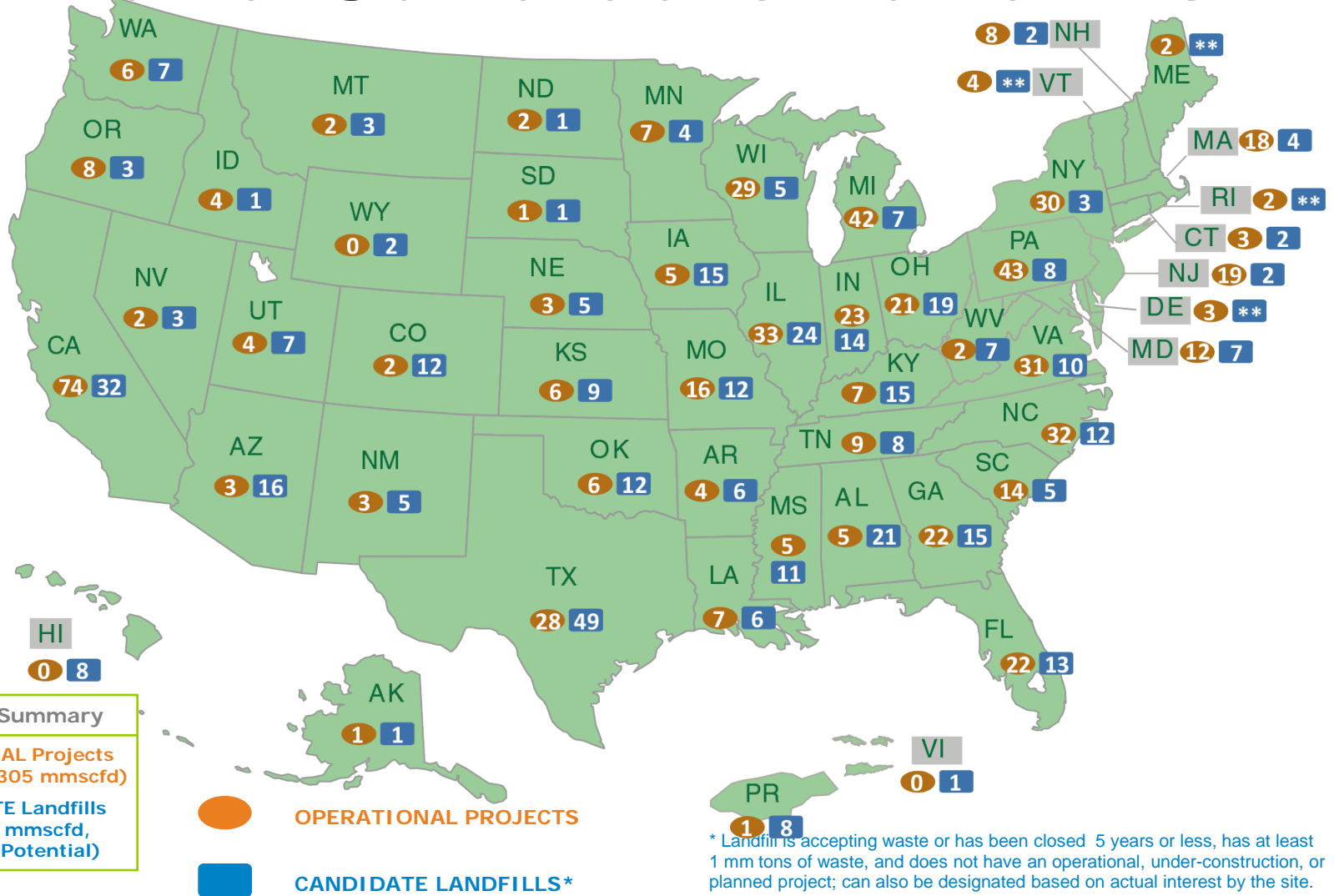
Benefits of LFG Energy Projects

- Dual benefit → destroys methane and other organic compounds in LFG
- Offsets use of nonrenewable resources (coal, oil, gas) reducing emissions of:
 - SO_2 , NO_x , PM, CO_2
- LFG is generated 24/7 and projects have online reliability over 90%
- Methane is a viable source of energy and we don't want to waste it
- LFG energy projects create jobs during construction and continued operation
- Creates collaboration from private and public entities





LFG Energy Projects and Candidate Landfills

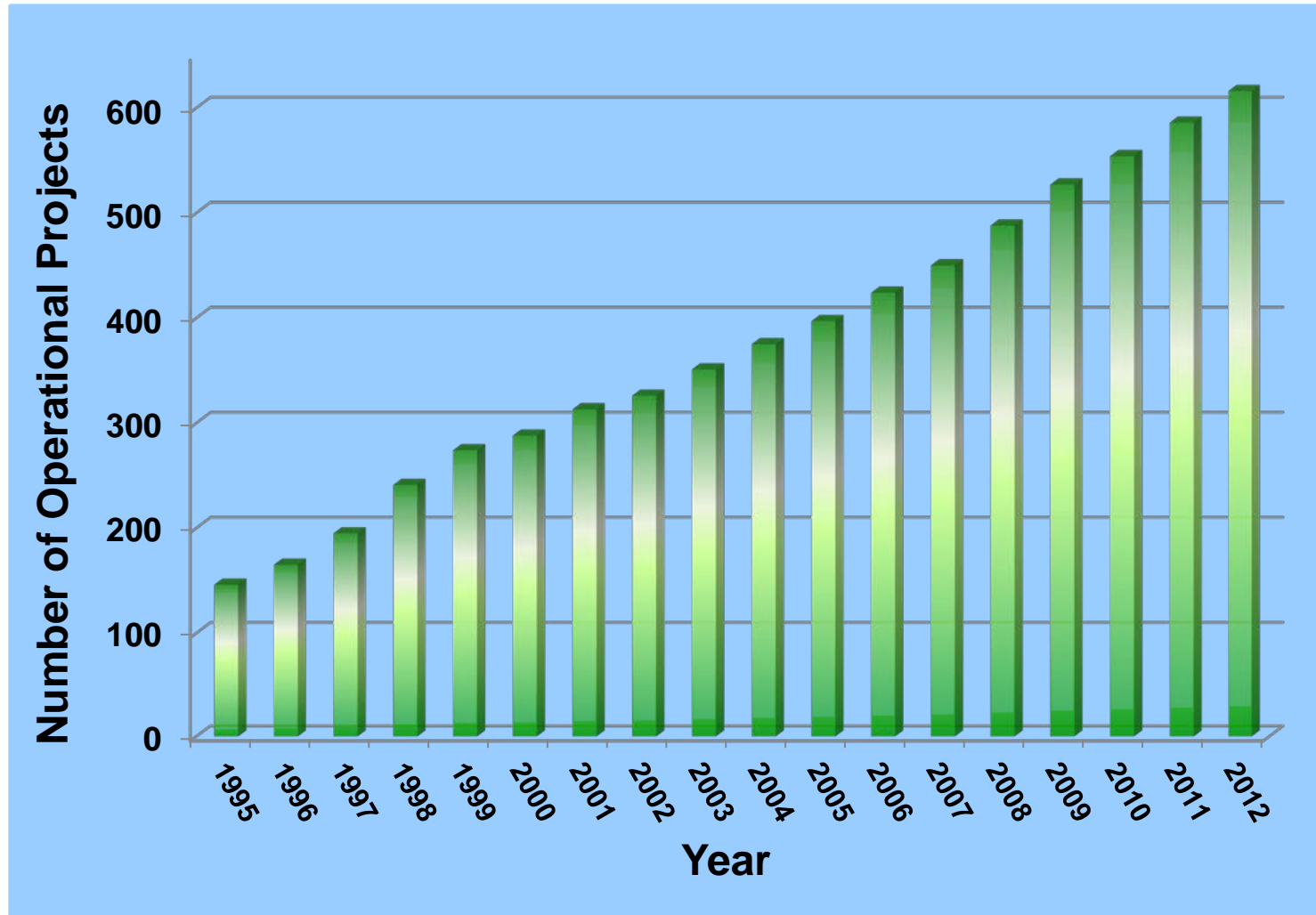


These data are from LMOP's database as of July 22, 2014.

* Landfills accepting waste or has been closed 5 years or less, has at least 1 mm tons of waste, and does not have an operational, under-construction, or planned project; can also be designated based on actual interest by the site.

** LMOP does not have any information on candidate landfills in this state.

LFG Energy Project Growth Over Time





Electricity Projects: 2003 vs. 2013

Project Technology	Number of Projects in 2003	Number of Projects in 2013
Internal Combustion Engines	184	344
Gas Turbine	26	44
Cogeneration	12	31
Steam Turbine	16	14
Microturbine	10	14
Combined Cycle	6	8
Stirling Cycle Engine	1	2
TOTAL	255	457





Direct-Use Projects: 2003 vs. 2013

Project Technology	Number of Projects in 2003	Number of Projects in 2013
Boiler	39	61
Direct Thermal	22	49
High Btu	8	29
Leachate Evaporation	20	12
Greenhouse	5	6
Alternative Fuel	1	5
Medium Btu	1	1
TOTAL	96	163





Average LFG Energy Project Size: 2003 vs. 2013

Project Technology	Average Size 2003	Average Size 2013
Electricity	4.14 MW	4.33 MW
Direct Use	1.00 mmscfd	1.01 mmscfd
High Btu	7.05 mmscfd	5.08 mmscfd





Market Overview & Industry Trends

- Over 300% increase in # of LFG energy projects (1995-2013)
- Electricity projects continue to dominate – 75% now
- Direct use of LFG has slowed, mainly due to low NG prices
 - \$5.00/MMBtu in '13 vs. peak of \$13.06/MMBtu in '08
- Increasing interest in conversion to alternative fuel
 - CNG \$2.10/GGE vs. diesel \$3.99/gal in Spring 2013
 - RINs under Renewable Fuel Standard 2
- Corporate sector interest challenged with low gas prices and financial constraints
- Low carbon and REC prices in most of country
- Maturing industry – consolidations within the waste companies and project developers





LMOP Partners

- Currently over 1,090 Partners*:
 - 765 Industry Partners
 - 116 Energy Partners
 - 39 State Partners
 - 135 Community Partners
 - 38 Endorsers

- 45 new Partners joined in 2013
 - 41 Industry Partners
 - 2 Energy Partners
 - 1 Community Partner
 - 1 Endorser



*Current as of February 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
- Initial feasibility analyses – *LFGcost*
- Look at project possibilities
 - Direct-use
 - Combined Heat & Power
 - Electric
 - Alternative Fuels
- Initial feasibility analyses – *LFGcost*





LMOP Tools and Services

- Website: www.epa.gov/lmop
- Direct project assistance
- Technical and outreach publications
- Project and candidate landfill database
- Listserv
- Support for ribbon cuttings/other PR
- Presentations at conferences
- State training workshops





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