

LMOP Workshop: Introduction & Program Overview

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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 (LFG) energy projects.





LMOP Partners

- Currently over 1,050 Partners:
 - 737 Industry Partners
 - 114 Energy Partners
 - 39 State Partners
 - 135 Community Partners
 - 37 Endorsers
- 54 new Partners joined in 2012
 - 37 Industry Partners
 - 2 Energy Partners
 - 13 Community Partners
 - 2 Endorsers





Why EPA is Concerned about Landfill Gas

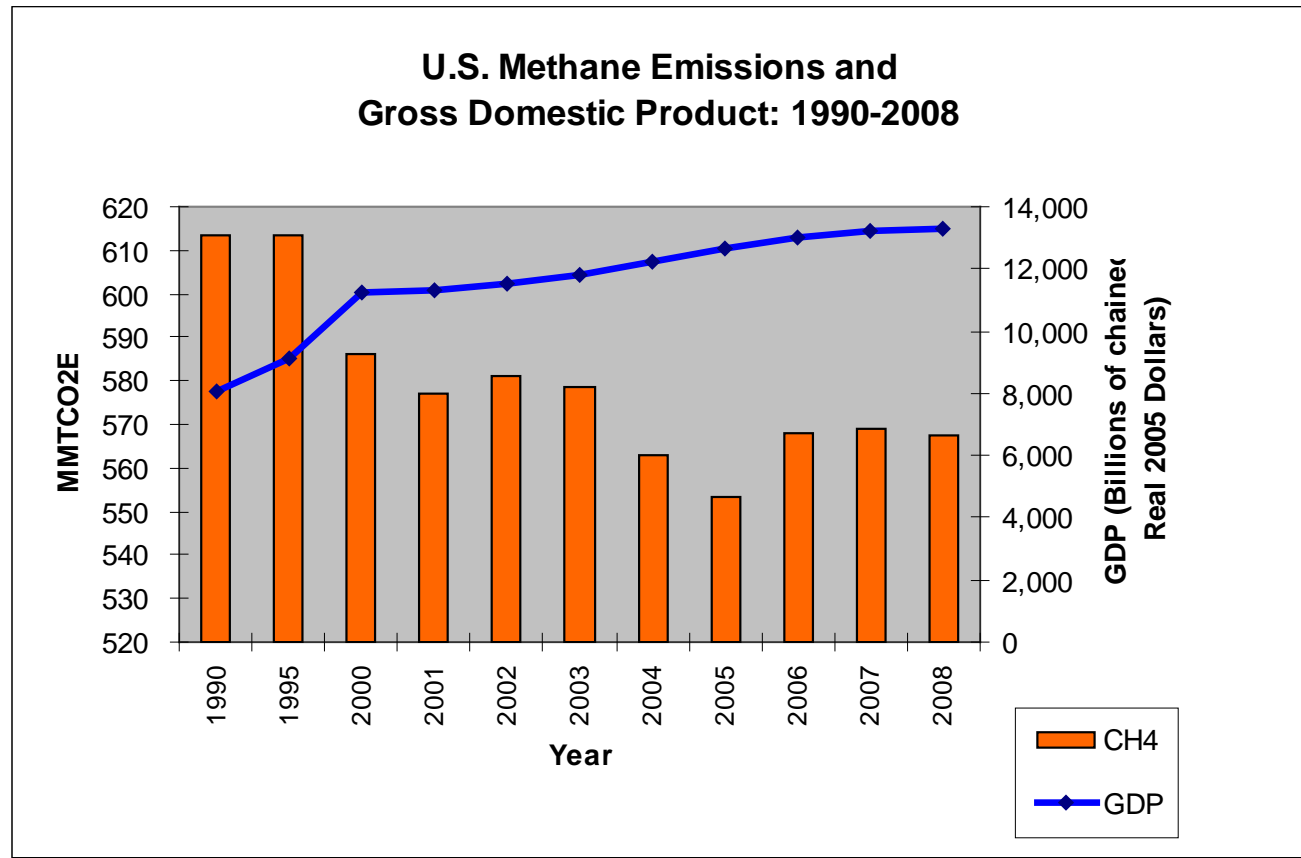
- Why is methane a greenhouse gas?
 - Methane absorbs terrestrial infrared radiation (heat) that would otherwise escape to space (GHG characteristic)
- Methane as a GHG is over 20x more potent by weight than CO₂
- Landfills are the *third* largest human-made source of methane in the United States
- Methane is more abundant in the atmosphere now than anytime in the past 400,000 years and 150% higher than in the year 1750





Targeting Methane... Producing Measurable Results

Since 1990, U.S. methane emissions have decreased by 7% while GDP increased by 65%



Sources: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008, U.S. EPA, April 2010; DOC/Bureau of Economic Analysis. Interactive National Income and Product Accounts Table. Last revised on March 26, 2010.



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 SO₂, NO_x, PM, CO₂
- Produces energy 24/7 and projects have online reliability of over 90%
- Local, renewable source of energy
- Creates jobs during construction and continued operation
- Fosters collaboration among private and public entities





Jobs and Revenue Creation

- A typical 3 MW LFG electricity project is estimated to have the following economic & job creation benefits during the construction year:
 - Add more than \$1.5 million in new project expenditures for the purchase of generators, and gas compression, treatment skid, and auxiliary equipment
 - Directly create at least 5 jobs for the construction and installation of the equipment
 - Ripple effect: increase the state-wide economic output by \$4.3 million & employ 20-26 people throughout the state & local economies





Jobs and Revenue Creation (cont.)

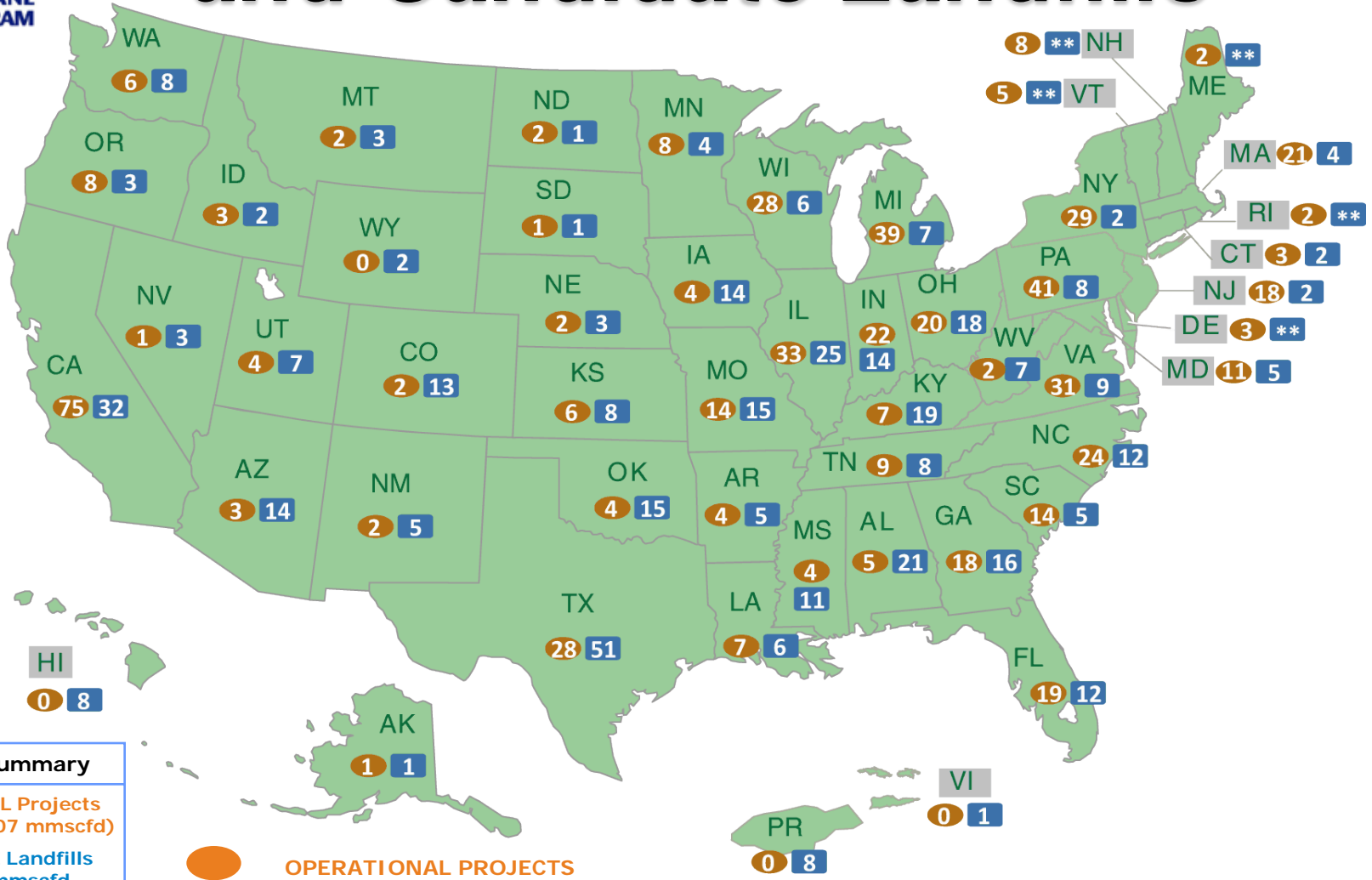
- A typical 1,040 scfm LFG direct-use project is estimated to have the following economic & job creation benefits during the construction year:

| | 5-mile pipeline | 10-mile pipeline |
|---|------------------------------|---------------------------------|
| New project expenditures | \$1.1 million + | \$2.2 million + |
| Direct installation jobs | At least 7 | At least 14 |
| Ripple effect – economic output & employed people | \$2.9 million & 17-22 people | \$5.3 million & 32 to 41 people |





LFG Energy Projects and Candidate Landfills



Nationwide Summary
 605 OPERATIONAL Projects
 (1,858 MW and 307 mmscfd)
 ~445 CANDIDATE Landfills
 (845 MW or 475 mmscfd,
 10 MMTCE Potential)

OPERATIONAL PROJECTS
 CANDIDATE LANDFILLS*

* Landfill is accepting waste or has been closed for 5 years or less, has at least 1 mmtons of waste, and does not have an operational/under construction LFG energy project; or is designated based on actual interest/planning.

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



Project Snapshot

(October 2012)

- 605 operational projects
- 15 billion kWh of electricity produced and 101 billion cubic feet of LFG delivered in '12
- At least 35 projects under construction for '13 and more in the advanced planning stages
- At least 445 candidate landfills with 840 MW of potential capacity or 155 billion cubic feet/yr of LFG for direct use – either way, ~10 MMTCE in potential emission reductions!





Estimated 2012 Environmental and Energy Benefits

- Environmental:

- Carbon sequestered annually by 22,000,000 acres of pine or fir forests, or
- CO₂ emissions from 241,000,000 barrels of oil consumed, or
- Annual greenhouse gas emissions from 20,000,000 passenger vehicles, or
- CO₂ emissions from burning 565,000 railcars' worth of coal

- Energy:

- Powering 1,097,000 homes and heating 724,000 homes



Market Overview

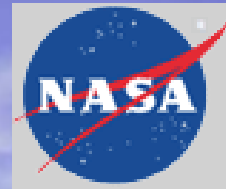
- 300% increase in LFG energy project counts from 1995 to 2012
- Electricity projects continue to dominate
 - 37 states, DC & 4 territories have an RPS or RPG
 - Production tax credit extension – now if construction begins prior to January 1, 2014
- Direct use of LFG has slowed since 2011, mainly due to LOW natural gas prices
 - \$3.90/MMBtu in Oct. 2012 down from \$13.06/MMBtu in July 2008
- Alternative Vehicle Fuel taking off
 - CNG: \$2.12/GGE v. diesel \$4.13/gal in mid-2012
- Carbon markets₂ not active for LFG



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LOOK WHO'S USING Landfill Gas!

AJINOMOTO

MARS snackfood

Johnson A FAMILY COMPANY

DU PONT The miracles of science™

AFP advanced food products llc

Cargill



POET Energy inspired.™

MALLINCKRODT



Interface FLOR™



Lucent Technologies Bell Labs Innovations

Jenkins Brick Company





LFG Energy and Opportunities in Texas

- 33 operational projects
 - 101 megawatts (MW) of electrical generation from 24 LFG energy projects in Texas
 - 35 million standard cubic feet per day of LFG is utilized in 9 direct-use projects (6 are highBTU)
- 2 projects under construction:
 - Ft. Bend Regional Landfill (highBTU)
 - Nelson Gardens LF (electricity)
- Over 50 Candidate Landfills in Texas



Conclusion

Let's work together to increase those numbers for Texas!

