

LMOP National Landfill Gas Energy Workshop – Welcome Presentation

U.S. Environmental Protection Agency
Landfill Methane Outreach Program



National Landfill Gas Energy Workshop
Charleston, South Carolina • April 7, 2016

Welcome and Agenda

- 2nd National Workshop in conjunction with SWANA
- Technical sessions with topics such as
 - Impact of organics diversion
 - LFG energy case studies
 - Wellfield remote monitoring

- Attendees include



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

- LFG energy project development has slowed (5 new projects & 5 project expansions in 2015), and is mostly self-sustaining
- Economic factors continue to challenge project financial feasibility
 - Increased discovery/production of natural gas → low NG prices
 - Uncertain future for tax credits and market conditions → low voluntary REC prices
- Market incentives and trends
 - Upward trend: Renewable Fuel Standard; Low Carbon Fuel Standard (CA); Section 45 tax credit extension
 - Downward trend: Carbon market (\$3.8/tonne national voluntary OTC price)
- Organic waste management
 - States and municipalities showing increasing interest in organic waste diversion and treatment
- Proposed MSW landfill regulations
 - Opportunity: 106 EG sites controlling

Renewable NG Projects			
Operational		Construction/ Planned	
LFG	Food Waste AD	LFG	Food Waste AD
70%	7%	27%	36%

+ Case Study 1: Small Landfill

St. Landry Parish, Louisiana Landfill

On-site fueling of public and private CNG vehicles

- 100 scfm landfill gas collected, refined and compressed on-site; then dispensed to municipal CNG cars/trucks and private refuse trucks.



Louisiana RNG Video: energy-vision.org/st-landry-parish-landfill-rng/

Project Snapshot (March 2016)



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



Estimated 2015 Environmental and Energy Benefits

- Environmental

- Carbon sequestered by more than 108 million acres of U.S. forests in one year, or
- CO₂ emissions from nearly 308 million barrels of oil consumed, or
- CO₂ emissions from nearly 14.9 billion gallons of gasoline consumed

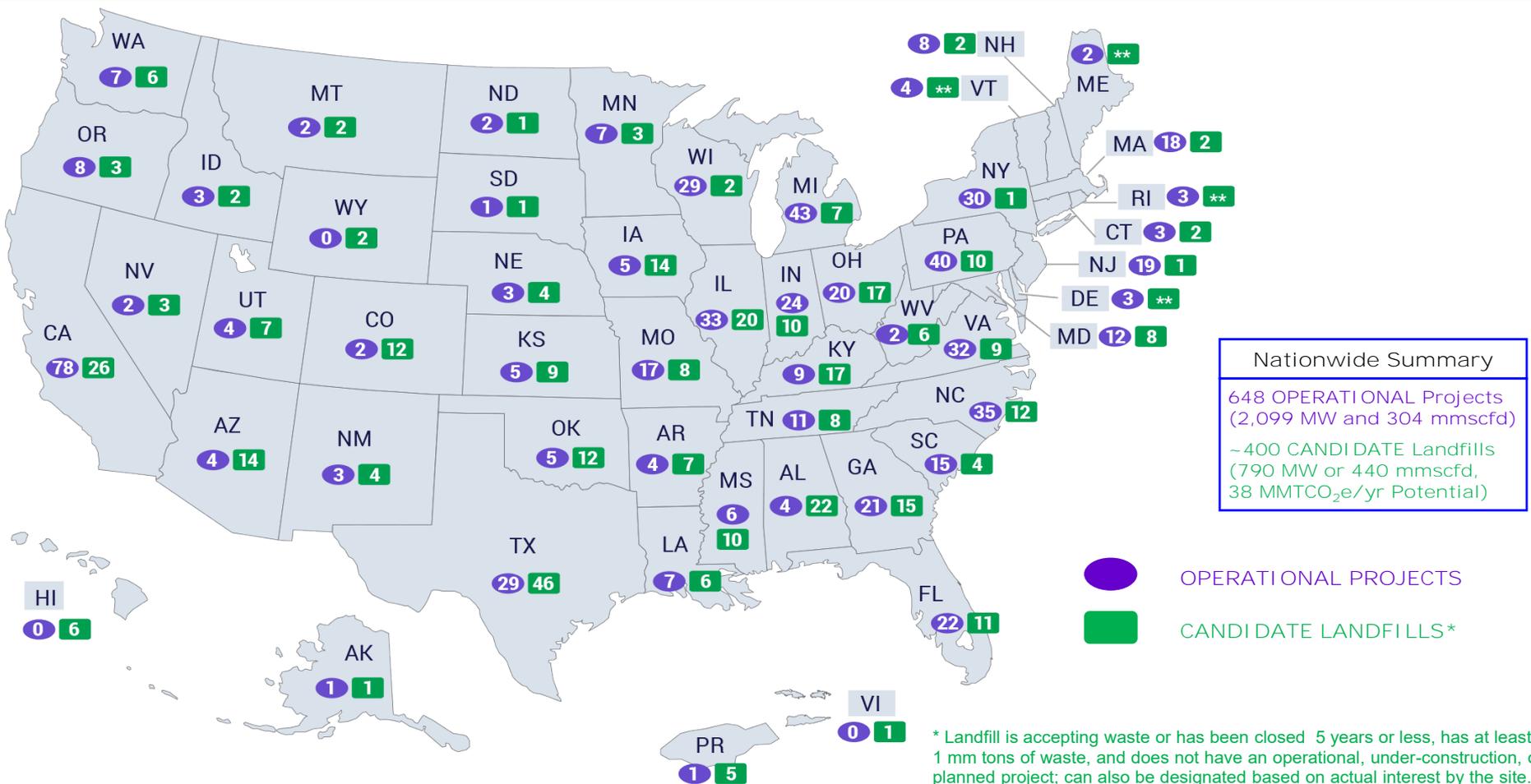


- Energy

- Powering more than 1.2 million homes and heating more than 729,000 homes



LMOP National Database and Map



+ Case Study 5: Large Landfill

Seneca Meadows Landfill (NY)

Aria Energy & Clean Energy Fuels



- 3,000 scfm of landfill gas refined and injected into natural gas pipeline at Seneca Meadows (Progressive Waste landfill)
- Capacity to produce ~25,000 GGE's/day of RNG (9M GGEs/yr)
- 60% delivered to SMUD in Sacramento; 40% is delivered to the transportation market in California through a partnership with Clean Energy

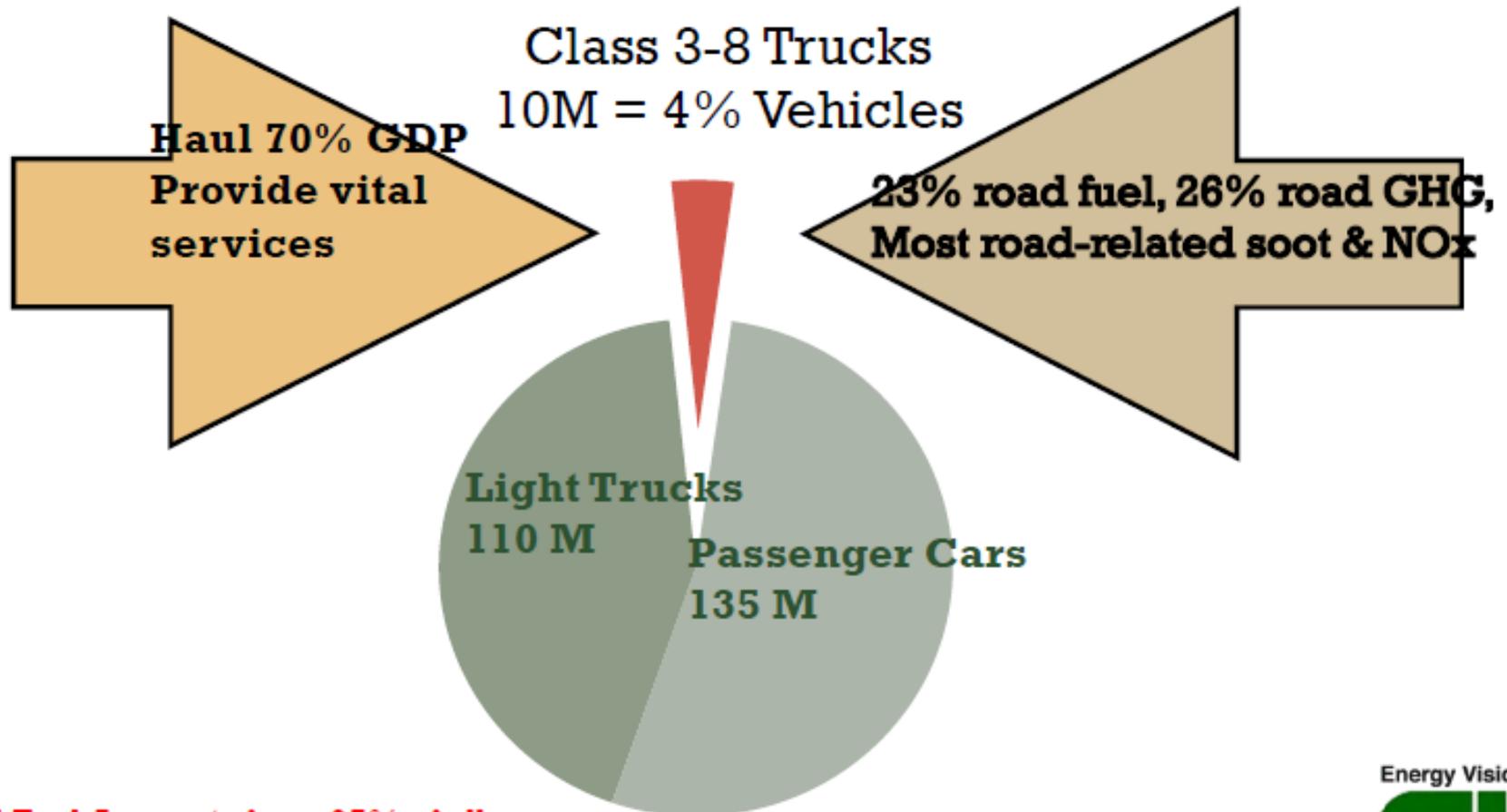




Why a Focus on Trucks & Buses?

Small Numbers, Big Impact

(U.S. Example)



Diesel Fuel Accounts for > 95% of all on-road heavy-duty buses and trucks



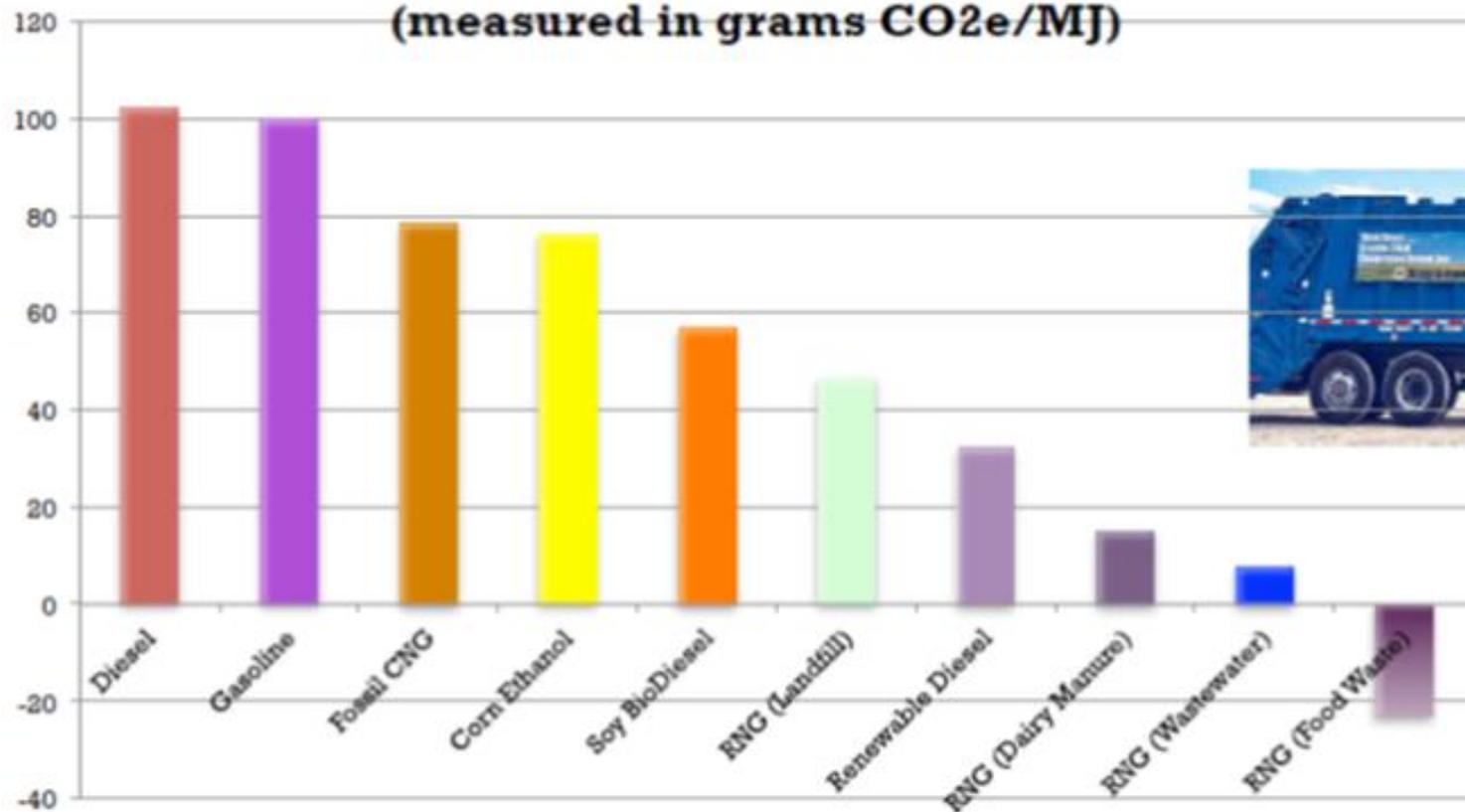


RNG Fuel: Optimal Transportation/ Climate Strategy



Lifecycle Carbon Intensity: Petroleum & Alternative Fuels – CARB GREET 2.0 2015

(measured in grams CO₂e/MJ)



Source: www.arb.ca.gov/regact/2015/lcfs2015/lcfsfinalregorder.pdf



+ REDEEM™ by Clean Energy Fuels

- Utilize Existing Natural Gas Infrastructure to Offer RNG at 40+ Retail Stations in California + stations in Texas and Tennessee (UPS is the largest customer)
- ~50 Million GGE's of REDEEM (sourced from a number of landfills across the country) hit the market in 2015
- >135,000 GGE's of REDEEM dispensed daily in California, largely because of the state's Low Carbon Fuel Standard (carbon program)



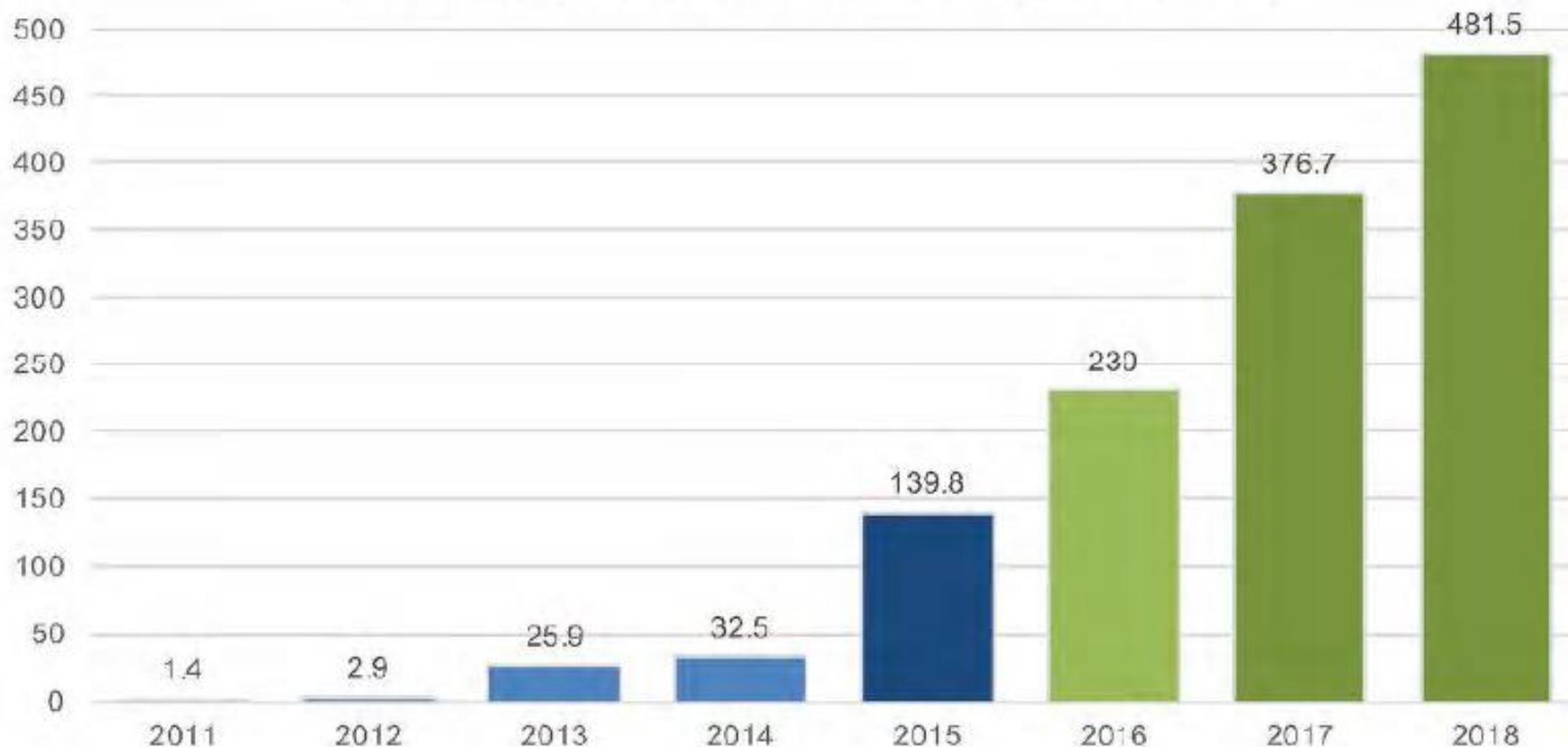
For more on REDEEM, visit:

<http://redeem.cleanenergyfuels.com/images/redeem-clean-energy-factsheet.pdf>



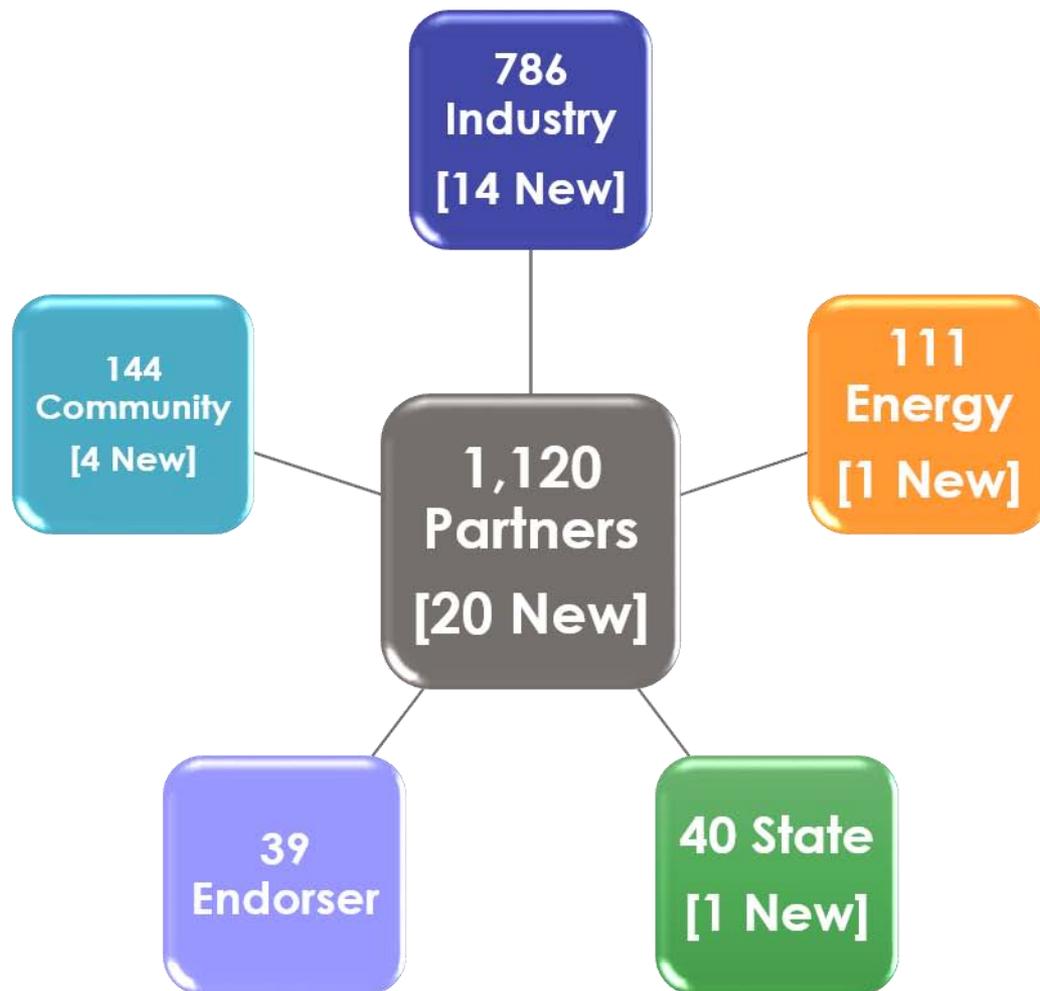
+US RNG Industry Growth: 2011-2018

RNG Transportation Fuel Volume (Million EGE)



LMOP Partners in 2015

epa.gov/lmop/partners/



New Partners Who Joined in 2015

- * Alaska Power & Telephone Company
- * BioHy-Energy
- * Clean Waste Technologies, LLC
- * CMA Environmental, LLC
- * CMD Corp
- * Diamond Scientific
- * Directional Technologies, Inc.
- * EcoEngineers
- * Glacial Lakes Energy
- * Industrial Motor Power Corp.
- * Kraft Power Corporation
- * Sphere 3 Environmental, Inc.
- * Sulzer
- * T2C-Energy

* Hawker Pacific Aerospace

* University of Texas at Arlington

- * Autonomous Municipality of Toa Alta (PR)
- * Biogas Researchers, Inc. (DC)
- * Solid Waste Authority of Central Ohio (OH)
- * The Green City Development Group (GA)

LMOP Accomplishments

- Hosted and/or presented at 3 webinars
 - “LFGcost-Web, Version 3.0”
 - “Technical Support for LFG Energy Project Development in Hawaii”
 - Biomass Magazine’s “Landfill Methane: Capture for Cash, Compliance & Clean Air”
- Updated LFG Energy Project Development Handbook
- Published key milestones timeline on website and “LMOP 20th Anniversary” article in trade magazine
- Responded to ~80 data / technical requests
- 1995-2015: provided assistance to ~637 LFG energy projects
- Working on launch of new website – later in 2016

LMOP International MSW Accomplishments

- Continued to support Climate and Clean Air Coalition
 - Finalized assessments in 3 pilot cities
- Hosted 2-day AD/food waste workshop in Ningbo, China focused on best practices and technology assessment
- Implemented 2 workshops on biogas recovery from organic waste and LFG recovery (China and Brazil)
- Presented at C40 Latin American Mayor's Forum and led development of CCAC panel at ISWA World Congress
- Assessed composting practices and opportunities in Mexico

Tools and Resources

Available at epa.gov/lmop

LFGcost-Web, Version 3.0

Evaluate the initial economic feasibility of an LFG energy project

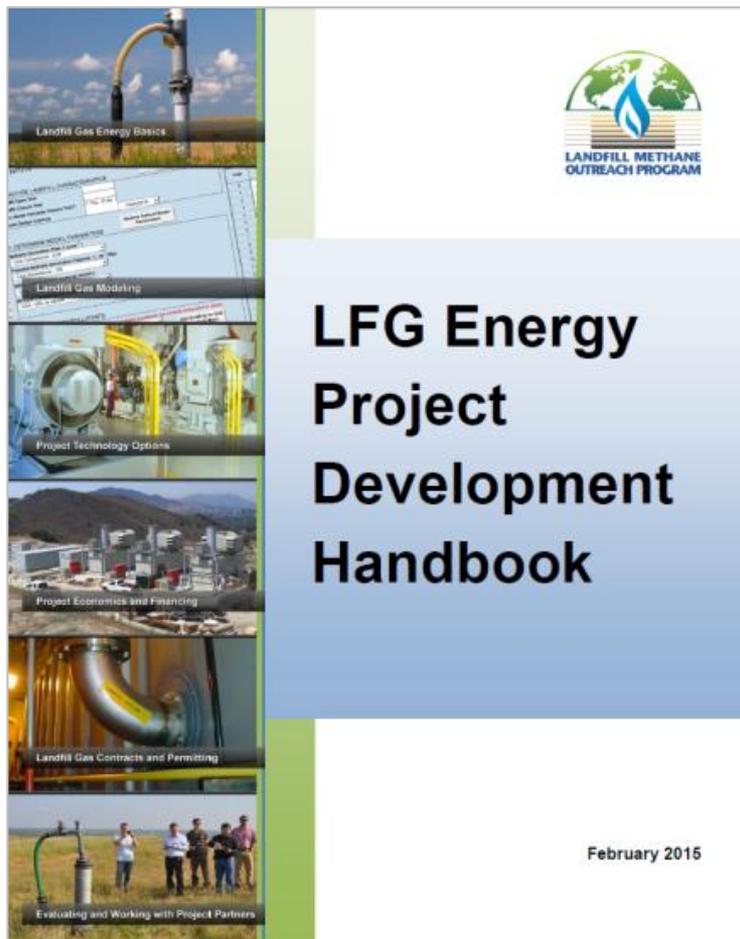
Posted online December 2014

- Available online to all stakeholders
- Updated costs for collection & flaring system and direct-use & standard engine projects
- Includes a project type for onsite CNG and fueling station
- Transparent model that allows users to edit optional inputs



Tools and Resources (cont.)

Available at epa.gov/lmop



Project Development Handbook

Improve understanding to develop successful projects

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

Tools and Resources (cont.)

Available at epa.gov/lmop

Landfill and LFG Energy Project Data

Download details about projects and landfills

- Excel files cut the LMOP data in various ways to help you find what you are looking for
- 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	99645	61.59	-149.21	Public
6	1005349	12216	Central Peninsula Landfill (CPL)	AK	46915 Sterling Highway	Soldotna	Kenai Peninsula	99669	60.44714	-151.10369	Public
7		10960	Kodiak Island Borough Landfill	AK	1203 Monashka 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 Sanduri 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						



+ Case Study 4: Food Waste Digester Sacramento Biodigester (CA)

CleanWorld/Atlas Disposal: First Closed-Loop Food Waste-to-Fuel (RNG) Initiative in U.S.; Public-Private Partnership



See Project Profile:
<http://bit.ly/1Kv1U07>



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



For More Information or Questions

epa.gov/lmop/contact.html

Select topics:

- LMOP partnership or listserv messages
- EPA policy related to LFG energy
- Technical issue regarding landfill or LFG energy project
- Technical analysis for a specific landfill/project
- Request for data from LMOP Landfill and LFG Energy Project Database
- Question about tools or publications on LMOP website
- LMOP support for a ribbon-cutting event