

EPA Voluntary Programs and Renewable Natural Gas

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U.S. EPA



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Introduction to LMOP

U.S. EPA's Landfill Methane Outreach Program (LMOP):

- Established in 1994
- Voluntary program that creates partnerships among landfill owners and operators, states, municipalities, energy users and providers, and the landfill gas (LFG) industry and communities

Mission: To work cooperatively with industry and stakeholders to reduce or avoid methane emissions from landfills by encouraging the recovery and beneficial use of biogas generated from organic municipal solid waste.

LMOP Partners (as of September 2018)

**Over
1,000 Partners**

Industry Partners **769**

Community Partners **145**

Energy Partners **108**

Endorsers **38**

State Partners **38**

Benefits of LMOP Partnership:

- Opportunities to participate in LMOP events, webinars, etc.
- Recognition for commitment to renewable energy
- Use of LMOP logo on Partner website (within guidelines)
- LMOP support for groundbreaking or ribbon cuttings
- Information about new developments, events, and other LFG related information

To join the Partnership, visit our website at:
epa.gov/lmop/join-landfill-methane-outreach-program

EPA Voluntary Programs Involved in RNG



Encourages the recovery and beneficial use of biogas generated from organic municipal solid waste.



Encourages oil and natural gas companies to adopt cost-effective technologies and processes that improve operational efficiencies and reduce methane emissions.

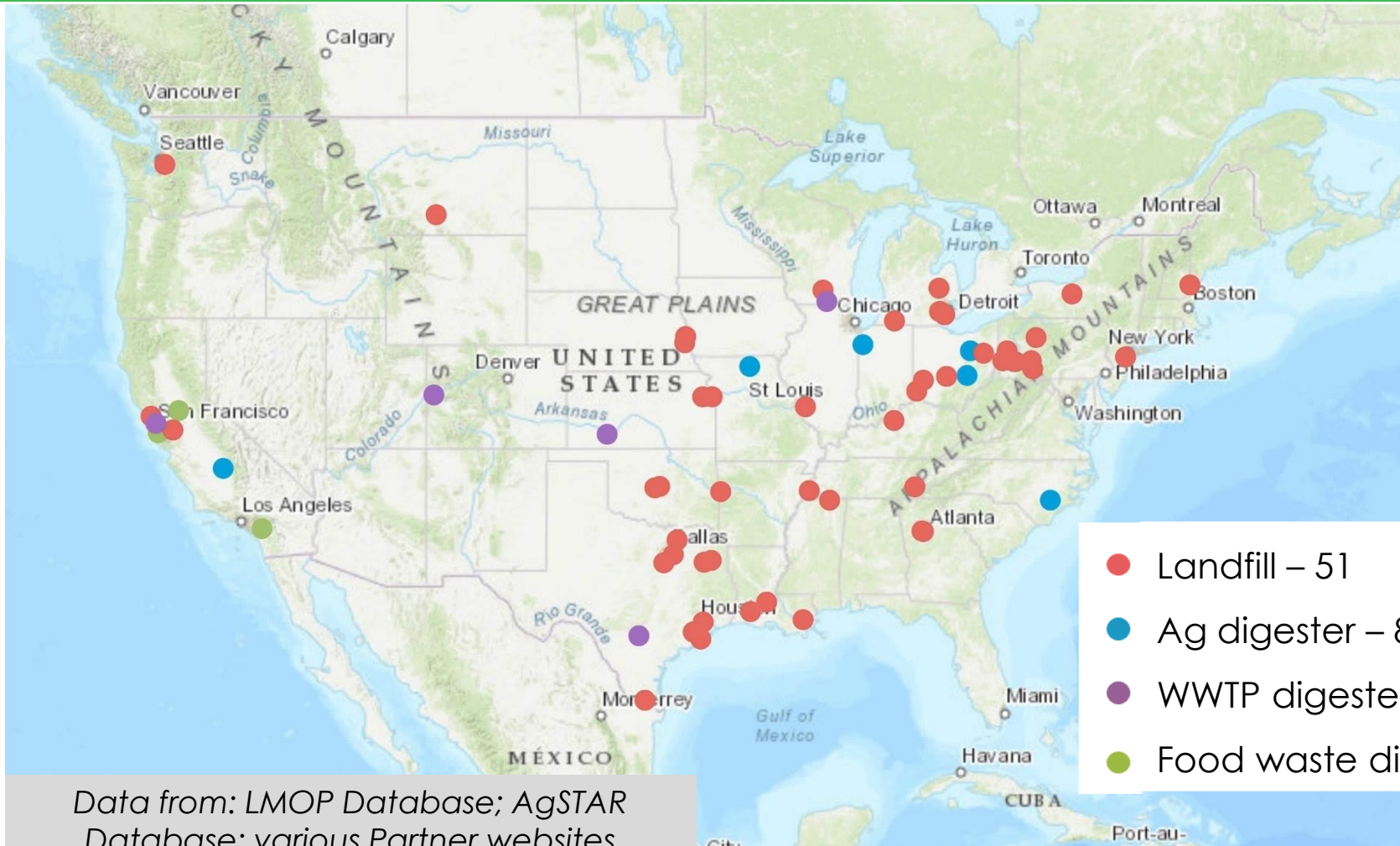


Promotes the use of biogas recovery systems to reduce methane emissions from livestock waste.

Background: What is RNG?

- Renewable natural gas (RNG) is term used to describe a product derived from the upgrading of biogas
- RNG can be used in place of traditional fossil natural gas
- Biogas for RNG production can come from landfills and digesters at water recovery facilities, livestock farms, food production facilities, or organic waste management operations
- RNG can be injected into the natural gas grid or used on-site for vehicle fuel, electricity generation, thermal applications (e.g., heating, drying, steam, hot water), or as a bio-product feedstock

Where Does RNG Come From?



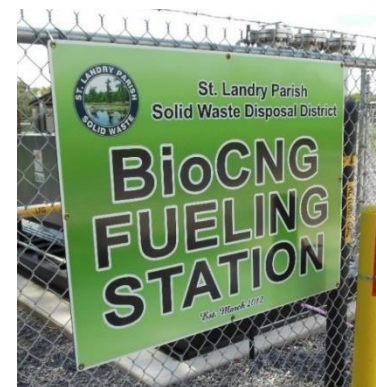
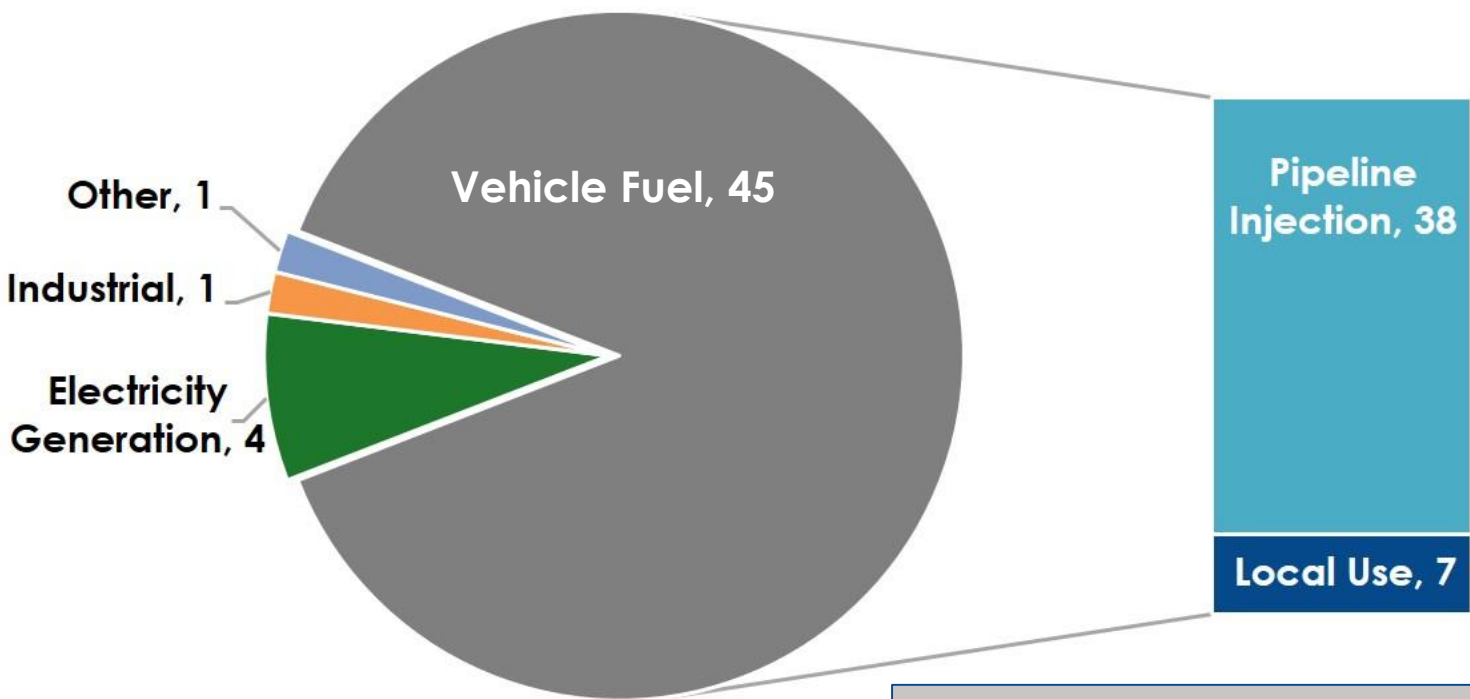
Data from: LMOP Database; AgSTAR Database; various Partner websites

LMOP Data Trends



LFG to RNG End Uses

As of Sept. 2018, there are **51 operational LFG to RNG** projects

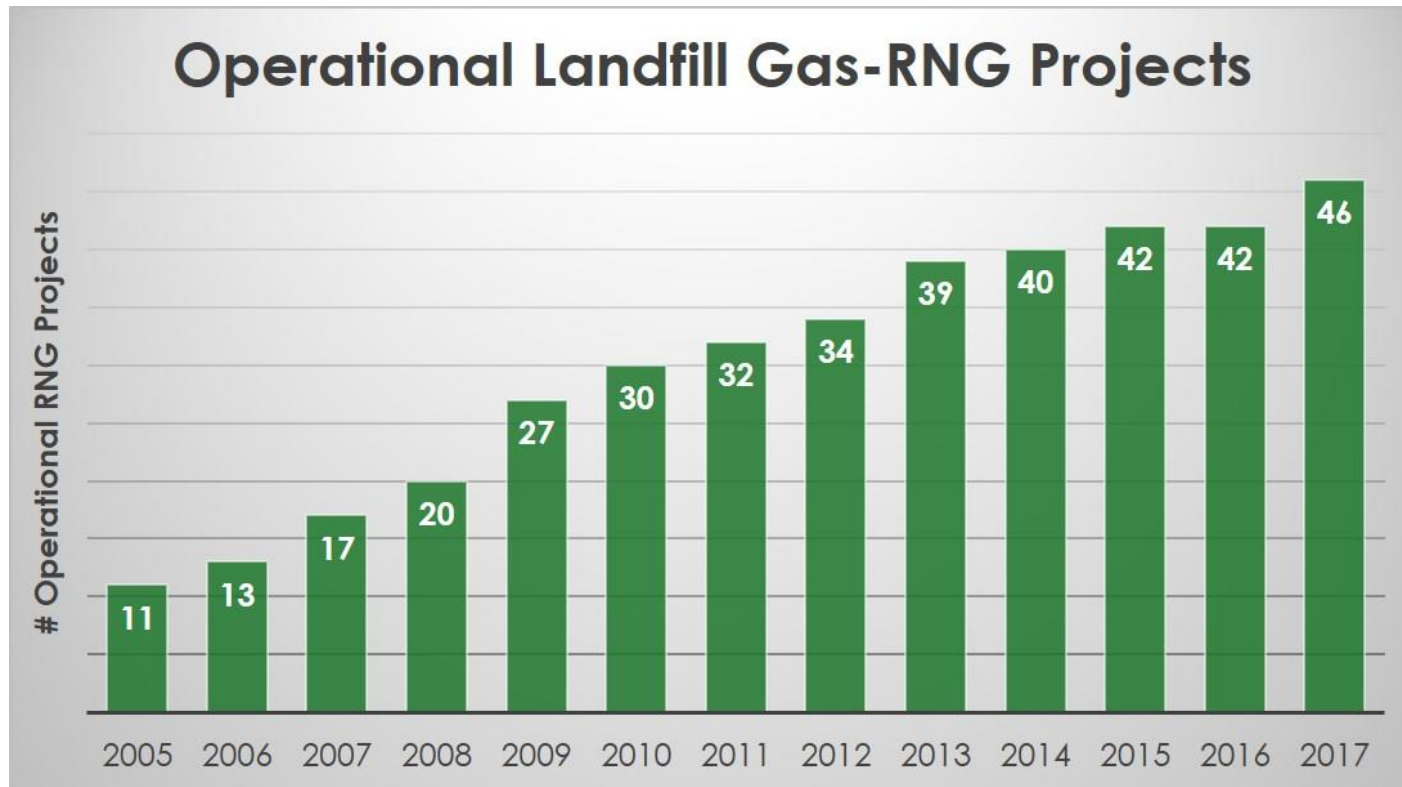


Example uses of RNG as vehicle fuel:

- Waste hauling and collection trucks
- County vehicles
- City buses

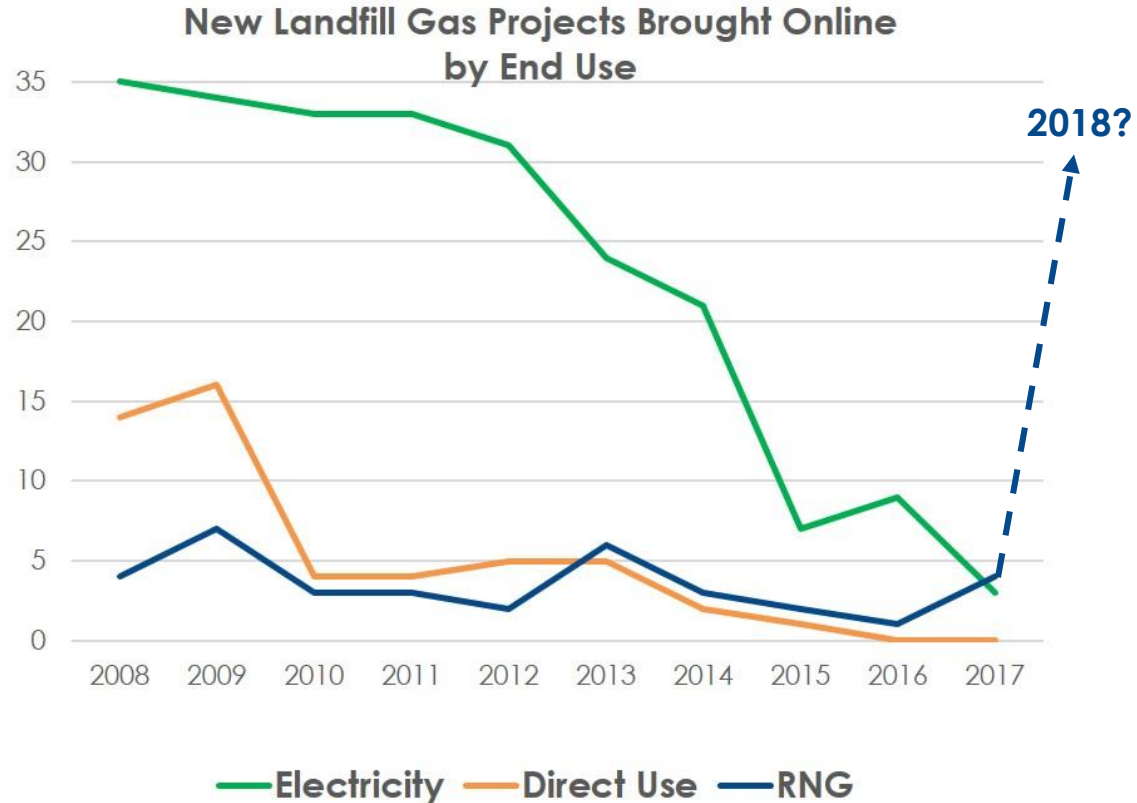
LFG RNG Projects Over Time

The first recorded Landfill Gas – RNG project came online in 1975 at the Palos Verdes landfill in CA



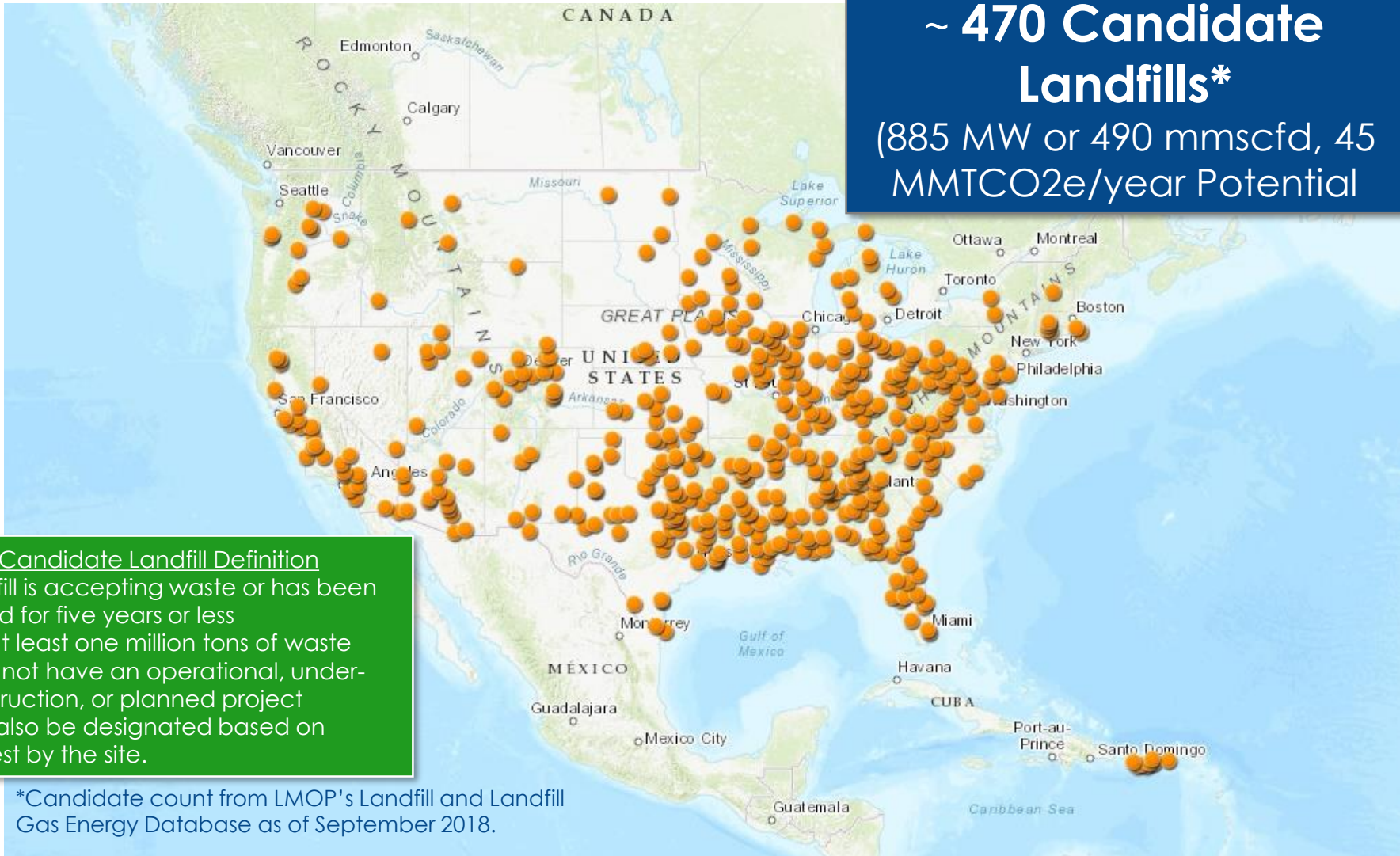
Growth of New LFG Projects

- LMOP Database identifies **39 planned or under construction RNG projects**
- The majority have a planned start date within the next year
- If all come online as planned, the number of operational landfill gas to RNG projects would nearly double



LMOP Candidate Landfills

~ 470 Candidate Landfills*
(885 MW or 490 mmscfd, 45 MMTCO₂e/year Potential)



*Candidate Landfill Definition

- Landfill is accepting waste or has been closed for five years or less
- Has at least one million tons of waste
- Does not have an operational, under-construction, or planned project
- Can also be designated based on interest by the site.

*Candidate count from LMOP's Landfill and Landfill Gas Energy Database as of September 2018.

EPA Resources on RNG



Existing Resources on RNG

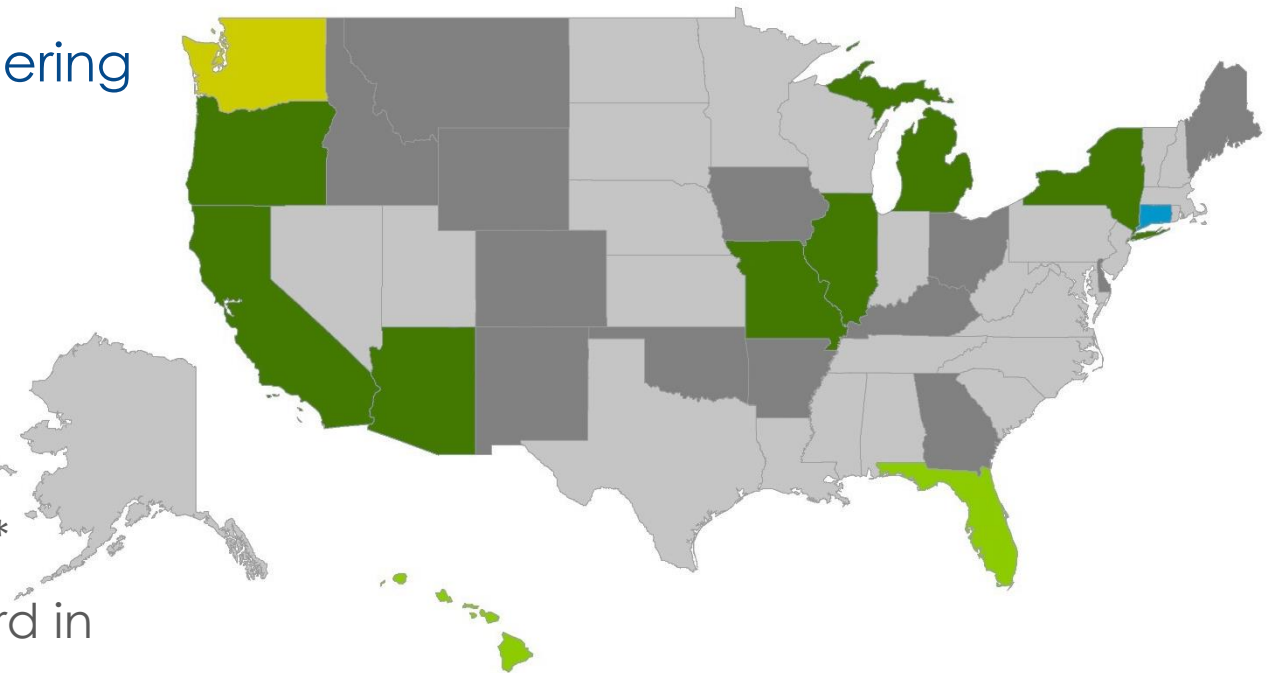
- LFGcost-Web: High Btu and onsite CNG module
 - A preliminary financial feasibility model for LFG energy projects
 - Available at <https://www.epa.gov/lmop/list-publications-tools-and-resources>
- RNG Flowrate Tool (NEW)
 - A tool to help landfills quickly estimate normalized gas flows for RNG projects
 - Available at <https://www.epa.gov/lmop/list-publications-tools-and-resources>
- Project Development Handbooks
 - Basic information about project development; available from AgSTAR and LMOP
- Listserv messages
 - Contact us via program websites to sign up
- Partner lists

Consolidated Webpage – Under Development

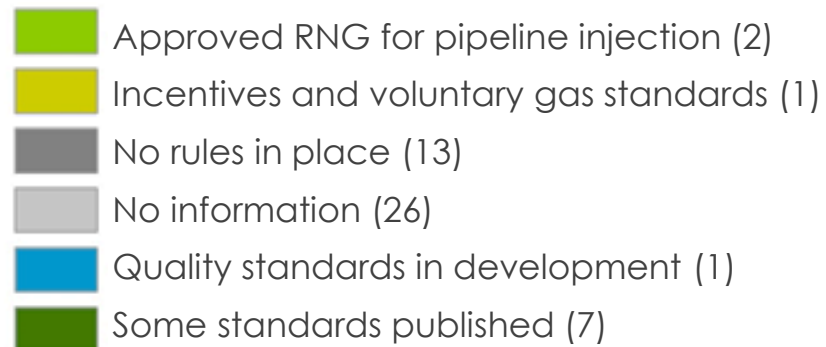
- Basic information about RNG
- Map and database of projects
- Webinar and event recordings
- Links to papers
- Links to EPA voluntary programs
 - AgSTAR, LMOP, Natural Gas STAR, Green Power Partnership

Preliminary Research on State RNG Quality Standards

- EPA has begun gathering information on state standards for RNG pipeline injection
- Our research so far shows:
 - 10 states have some standards published*
 - 1 state has a standard in development



*We welcome updates; please come see me with any new data



How Can we Work Together?

- Facilitating information sharing
 - Project databases; Partner lists
- Collaborate on webinar content
- Providing technical information about project development

We welcome your feedback!

Contact Us

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Program Websites

- www.epa.gov/lmop
- www.epa.gov/agstar
- www.epa.gov/natural-gas-star-program