

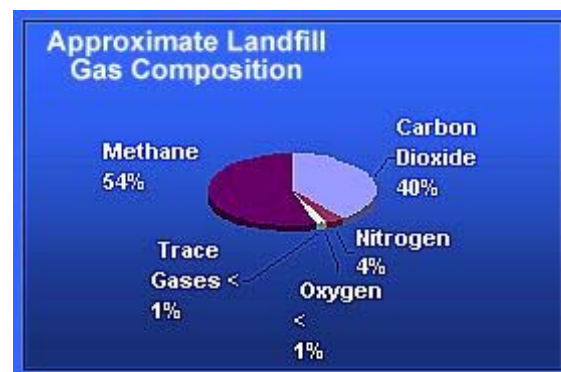


Developing Landfill Gas to Energy Capacity in North Carolina

Landfill gas (LFG) is created as solid waste decomposes in a landfill. This gas consists of about 50% methane (CH₄), the primary component of natural gas, about 50% carbon dioxide (CO₂), and a small amount of non-methane organic compounds. Municipal solid waste landfills are the largest source of human-related methane emissions in the United States, accounting for about 34% of these emissions. Reducing methane emissions by capturing the gas from landfills has many important energy, safety, economic, and environmental benefits. In fact, LFG is the only renewable energy source that, when used, *directly* prevents atmospheric pollution.

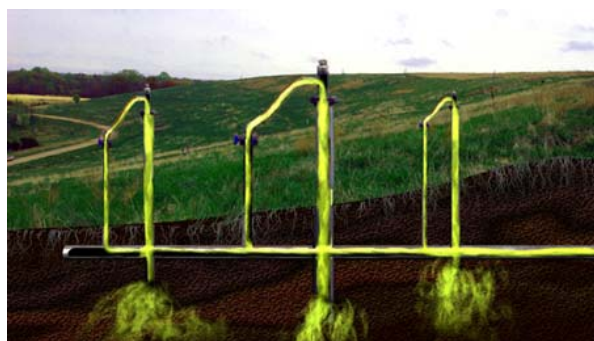
Benefits of Landfill Gas to Energy Development

Methane is the primary constituent of natural gas. Thus, the utilization of methane collected from LFG provides a valuable, clean-burning energy source that improves quality of life in local communities and can generate revenue and improve living standards. LFG prices are more consistent, unlike the volatile prices of natural gas. Producing energy from LFG can also avoid the use of higher-emitting energy resources such as wood, coal or oil. This can reduce end user and power plant emissions of CO₂ and air pollutants such as sulfur dioxide (a major contributor to acid rain), particulate matter (a respiratory health concern), and trace hazardous air pollutants. And because methane is both a potent greenhouse gas and has a short atmospheric lifetime, methane reductions can produce significant near-term results. Since the EPA developed the Landfill Methane Outreach Program (LMOP) in 1994, landfill methane emissions have been reduced by over 18 million metric tons of carbon equivalent (MMTCE). The greenhouse gas reduction benefits are equivalent to having planted 19.6 million acres of forest or removed the annual emissions from 14.5 million cars.



Incentives

The Renewable Energy Production Incentive (REPI) provides financial incentive payments for electricity produced and sold by new qualifying renewable energy generation facilities, which includes LFG. Qualifying facilities are eligible for annual incentive payments of 1.5 cents per kilowatt-hour (1993 dollars and indexed for inflation) for the first ten year period of their operation, subject to the availability of annual appropriations in each Federal fiscal year of operation. LFG projects that generate electricity will also benefit from Qualifying Facilities (QF) certification, which is granted through the Federal Energy Regulatory Commission (FERC). Under PURPA, utilities are required to purchase electricity from QFs at each utility's avoided cost of generating power.



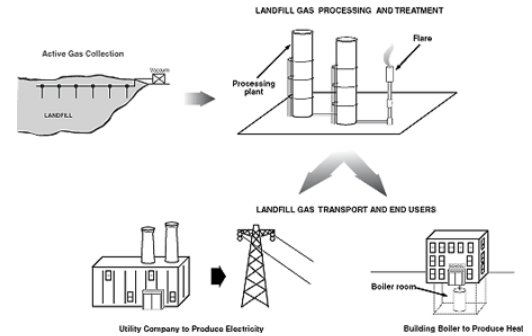
Types of LFG Technologies

Landfill gas is extracted from landfills using a series of wells and a blower/flare (or vacuum) system. This system directs the collected gas to a central point where it can be processed and treated depending upon the ultimate use for the gas. From this point, the gas can be simply flared or used to generate electricity, heat, steam, or a combination of electricity and thermal energy (cogeneration) for niche applications in the surrounding area. For example, gas from North Carolina's Yancey/Mitchell County Landfill supplies a

boiler that warms a greenhouse for ornamental plants. It also supplies landfill gas-fired glass blowing equipment and ceramic kilns at an incubator gallery for the region's fine potters and glass blowers. However, landfill gas can also be upgraded to pipeline quality and sold as a commodity in line with natural gas or used as an alternate vehicle fuel to help power North Carolina's transportation fleet.

To view photographs of the various components of a LFG collection system click on the following link:

www.epa.gov/lmop/over-photos.htm#1



Programs that Support LFG Development

EPA's Landfill Methane Outreach Program (LMOP) www.epa.gov/lmop/ (888) 782-7937

NCDENR-Division of Waste Management www.wastenotnc.org

Sold Waste Association of North America (SWANA) www.swana.org

How to get Started

Read the EPA's "Turning a Liability into an Asset: A Landfill Gas-to-Energy Project Development Handbook" at www.epa.gov/lmop/res/pdf/handbook.pdf and contact LMOP and the North Carolina Solar Center for assistance. Then follow these basic steps recorded from the EPA's LMOP website:

- 1) Estimate LFG Recovery Potential and Perform Initial Assessment or Feasibility Study
- 2) Evaluate Project Economics*
- 3) Establish Project Structure
- 4) Draft Development Contract
- 5) Access Financing Options
- 6) Negotiate Energy Sales Contract
- 7) Secure Permits and Approvals*
- 8) Contract for Engineering, Procurement & Construction (EPC) and Operation & Maintenance (O&M)
- 9) Install Project and Start Up Commercial Operation

For more information:

Visit the EPA's Landfill Methane Outreach Program at www.epa.gov/lmop/. To find resources in North Carolina, email Lyra_rakusin@ncsu.edu or visit the Solar Center's website at: www.ncsc.ncsu.edu.