



SMALL LANDFILLS = UNTAPPED ENERGY POTENTIAL

There are hundreds of municipal solid waste landfills with less than three million tons of waste-in-place across the nation. These smaller landfills are often overlooked as candidates for landfill gas-to-energy (LFGTE), yet in many cases they offer tremendous energy potential. More than half of the nation's approximately 300 operating LFGTE projects are small landfills that have captured this untapped energy potential through innovative project design, reaping financial and environmental benefits for the communities they serve. Many more small landfills may also be good candidates for LFG use.

Small Challenges = Big Opportunities

While project financing and finding suitable end users are challenges common to LFG use projects of all sizes, they may be particularly difficult barriers for small landfills to overcome. Operators can address these challenges by selecting

from a variety of innovative options for end uses and energy recovery. Since minimizing the cost of transporting LFG energy to users is critical to a project's economic feasibility, local use of LFG may be the most attractive option for landfills with less than three million tons of waste-in-place. On-site or nearby use of LFG in facility buildings, greenhouses, leachate evaporators, and other niche applications are often the most financially beneficial.

Nearby municipal and private buildings, such as recreational facilities, wastewater treatment plants, schools, and corrections facilities are typically good candidates for LFG use, again because of the low cost of transporting the LFG energy to the end user. The ideal situation is to find a single end user that will use the LFG year-round.

Creative opportunities for landfill gas use can be identified through partnerships between landfill operators and communities, state agencies, project developers, and end users. These partnerships can also open the door to sources of funding and support for project development and assist in maximizing the benefits of LFG use to the community.

Benefits of LFG Use to the Community

Turns a landfill into a good neighbor:

- Reduces unpleasant odors
- Eliminates explosion threats

Helps the environment:

- Reduces greenhouse gas emissions and improves local air quality
- Produces a renewable energy resource

Offers economic advantages:

- Uses a local energy source that would otherwise be wasted
- Saves fuel costs
- Creates new jobs through project development

Small Projects, Big Successes

All regions of the United States have successful LFG use projects. The following four examples illustrate innovative approaches that have proven effective for LFG collection and end use at landfills with less than three million tons of waste-in-place.

Pennsylvania Landfill's Problem Evaporates

The Southern Alleghenies Landfill in Davidsville, Pennsylvania (2.6 million tons of waste-in-place) had a problem: The

leachate produced at the landfill required costly treatment and disposal. As a solution, the landfill operators employed a technology that uses the heat generated by burning LFG to evaporate leachate on-site. By using LFG as a fuel, the landfill treats leachate economically, with no further treatment required. A study comparing the cost of the project to the potential benefits confirmed that an LFG-fueled leachate evaporation project offered the greatest benefits to the landfill and community.

Within 24 months of identifying the technology, the landfill had installed a leachate evaporation system. In addition to eliminating the leachate, the project turns a profit. If facility expansion occurs in the future, adding an evaporator to the system would allow more capacity without modification of the treatment permit.

New York Landfill Gets Cool Results

The city of Saratoga Springs, New York, took an innovative approach by combining an environmental benefit with a

favorite winter pastime. The city's Department of Public Works has been operating a cogeneration LFG use project at its Weible Avenue Landfill (2.1 million tons of waste-in-place) since 1997. Owned and operated by the city, the cogeneration system uses LFG generated by the landfill to produce electricity and heat for the city-owned skating rink, which is located across the street from the landfill.

A feasibility study indicated that the landfill would generate enough LFG over a 15-year period to supply at least 85 percent of the electricity needs of the rink and 100 percent of its thermal requirements. During this period, the city anticipates saving approximately \$50,000 per year on the ice skating rink's utility bills.

Greenery and Crafts Benefit from a North Carolina Landfill

The Blue Ridge Resource Conservation and Development Council, which represents seven North Carolina counties, assembled an 80-member task force to identify end users for the LFG at the Yancy/Mitchell Landfill, which has just over 360,000 tons of waste-in-place. The task force decided to use the LFG in an innovative manner to heat and power on-site greenhouses and a craft studio. The three facilities provide a unique economic development opportunity for the community.

A variety of organizations funded the project. A local community foundation provided an initial grant, and the rest of the funding, totaling \$800,000, came from several other sources, including the state's Department of Environmental and Natural Resources, a community foundation, the North Carolina Technological Development Authority, U.S. EPA, the U.S. Forest Service, and several private foundations.

New Mexico Landfill Uses Innovative Microturbine Technology

Albuquerque, New Mexico, was facing a challenge not unlike those tackled by many cities—LFG was detected escaping from the city's closed Los Angeles Landfill (2.8 million tons of waste-in-place). The city looked to the U.S. Environmental Protection Agency's Landfill Methane Outreach Program (LMOP) for assistance in finding a solution that would not only prevent the migration of LFG, but also would use the LFG as an energy source.

LMOP arranged for the city and a local company, Honeywell Power Systems, Inc., to collaborate on a pilot test of Honeywell's new LFG-fueled 75 kilowatt microturbine. The microturbine is a compact power source that allows businesses and organizations to generate electrical power at the point of use. The city's successful test demonstrated that strategic partnerships enable government and industry to work together to implement sustainable environmental solutions. The city, Honeywell Power Systems, and the LMOP unveiled the unit at the Albuquerque International Hot Air Balloon Festival, an annual event that attracts more than two million visitors. The partners used the event to profile the city's commitment to the environment and its citizens.

For More Information

The LMOP is a voluntary program that helps landfill owners, project developers, and communities develop landfill gas use projects. The LMOP can offer technical assistance, resource documents, and other tools to help landfill owners and operators realize their facility's LFG use potential. For more information, call 888-782-7937 or visit the LMOP website at www.epa.gov/lmop.

Steps for Developing an LFG Use Project

- 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 Assess Financing Options
- 6 Negotiate Energy Sales Contract
- 7 Secure Permits and Approvals
- 8 Contract for Engineering, Procurement and Construction, and Operation and Maintenance Services
- 9 Install Project and Start-Up Operation

1 million tons Waste-in-Place (WIP)
= **1.1 MW** or **60,000 mmBtu/yr**¹

*and is equivalent to*²

9,600 cars taken off the road; or
13,000 acres of forests planted; or
210 railcars of coal not used; or
100,000 barrels of oil not used

3 million tons Waste-in-Place (WIP)
= **3.8 MW** or **200,000 mmBtu/yr**

and is equivalent to

32,000 cars taken off the road; or
44,000 acres of forests planted; or
720 railcars of coal not used; or
340,000 barrels of oil not used

1. Million British Thermal Units

2. Because the benefits differ slightly between electricity and direct use, the above estimates represent an average of the two.