Landfill Methane Outreach Program and Landfill Gas Energy:

The Power of Partnership

EPA
United States
Environmental Protection
Agency

THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S Landfill Methane Outreach Program (LMOP) is a voluntary assistance program that reduces greenhouse gas (GHG) emissions from landfills by encouraging the recovery and beneficial use of landfill gas (LFG) as an energy resource. LFG contains methane, a potent GHG that can be captured and used to generate electricity or replace fossil fuels used in manufacturing facilities, vehicles, and more.

Partners and Endorsers join LMOP to gain a greater understanding of LFG recovery efforts and to build connections with other interested parties. By joining LMOP, companies, state agencies, organizations, landfills, and communities gain access to a vast network of industry experts and practitioners, as well as to various technical and marketing resources that can help with LFG energy project development.

LMOP Offers Solutions

LMOP facilitates the development of LFG energy projects by providing hands-on assistance to Partners and other stakeholders. Offering many tools and extensive information and experience, LMOP can tailor its assistance to individual landfills and potential LFG end users to provide customized solutions to project challenges.

LFG emitted from decomposing garbage is a reliable, local, and renewable source of energy that can provide a variety of environmental and economic benefits. One of the largest components of LFG is methane, the same energy-producing ingredient found in natural gas. Methane is also a potent GHG (more than 20 times stronger than carbon dioxide) with a short atmospheric lifetime, making efforts to reduce methane emissions an effective way to combat climate change in the near term.

Municipal solid waste landfills are the second largest human-generated source of methane emissions in the United States. LFG energy projects capture methane emitted by landfills and destroy it by converting it into energy. The captured methane can be used in combination with internal combustion engines, turbines, microturbines, or other technologies to produce electricity. It is also possible to use LFG directly as an alternative to fossil fuels in equipment such as boilers, heaters, and kilns, or to refine it for use in vehicles or injection into natural gas pipelines.

By finding cost-effective ways to utilize landfill methane as energy, LMOP is helping to prevent climate change and air pollution, encourage development of a renewable energy resource, promote local economic development, and reduce dependence on fossil fuels.

Success Stories

Located in Dillsboro, North Carolina, the **Jackson County Green Energy Park** uses LFG captured from the town's closed landfill as fuel for greenhouses, blacksmithing, glass blowing studios, and a metal art foundry. Future phases for the energy park include pottery studios, waste heat recovery, and anaerobic digesters. The project encourages the success of new artisans and upon full completion, will have created 15 to 20 new jobs. With continued turnover of artisans and increased eco- and heritage crafts tourism, the project will have a positive impact on the local economy for years to come. LMOP helped support development of the energy park by answering questions about LFG migration and other technical issues during early stages of project conceptualization and by facilitating peer exchange with similar projects. Jackson County Green Energy Park earned LMOP's 2006 Project of the Year Award for its creative use of LFG. The annual GHG reduction attributable to this project is approximately the same as the carbon sequestered by 1,000 acres of pine or fir forests.

In 2005, the city of **Sioux Falls, South Dakota** sought LMOP's help in assessing LFG generation at its regional landfill and, in turn, identifying a customer for the LFG. **POET Biorefining-Chancellor** expressed interest in using the LFG to help power daily operations at its 105-million-gallon-per-year ethanol plant. LMOP helped clarify questions POET had about treatment options for LFG. The project moved forward, and POET and the city of Sioux Falls worked together to complete an 11-mile, low-pressure pipeline to transport LFG from the landfill to a wood waste-fuel boiler at the plant. Combined, these two alternative energy sources will initially offset up to 90 percent of the plant's process steam needs previously met by natural gas. The reduction of methane and offset of natural gas emissions provide an environmental benefit equivalent to the annual GHG emissions from more than 28,000 passenger vehicles. The city of Sioux Falls will also benefit from revenue generated through the sale of LFG and carbon credits that are associated with destruction of the methane. Annual net revenues of $1.5 million are expected; once the capital investment is paid back, the income will ensure stable tipping fees and also allow for improvements. This self-developed project won a 2009 LMOP Project of the Year Award.

LMOP joined forces with Salt Lake City-area partners to launch the **Salt Lake Valley LFG Energy Project.** DTE Biomass Energy and Landfill Energy Systems worked cooperatively with Murray City, Utah, and Murray City Power (MCP) to develop a project that captures LFG from the Salt Lake Valley Landfill. The LFG powers three reciprocating engines to produce 3 megawatts of electricity—enough to power more than 2,000 homes in Murray City and offset fossil fuel emissions equivalent to the carbon dioxide emissions from 34,000 barrels of oil consumed. In developing the project, MCP overcame a disappointing initial cost-benefit analysis and other setbacks by developing a creative time-of-use pricing mechanism that proved to be a winner for all parties. The project's power costs parallel daily and seasonal market pricing, providing pricing and cash flow advantages to MCP, while achieving financial thresholds for the facility owners over a 10-year contract. LMOP presented MCP with its 2006 Energy Provider Partner of the Year Award.

Kimberly-Clark began utilizing LFG at its Beech Island Facility in May 2008 to produce process steam. The gas is captured from the **Three Rivers Regional Landfill** in Jackson, South Carolina, and sent to the facility via a nearly 16-mile pipeline. Kimberly-Clark uses approximately 1,150 cubic feet of LFG per minute, which replaces 80 percent of the baseline fuel use in one boiler and saves the company more than $800,000 annually. The Three Rivers Landfill also benefitted from the project by voluntarily installing a gas collection system, thereby generating additional revenue from carbon credits. In all, the project is generating more than $1.6 million annually for Three Rivers. LMOP contributed significantly to this project by visiting the landfill early on to discuss the benefits of having an LFG energy project, searching for potential landfills near many of Kimberly-Clark's facilities, and performing an initial economic feasibility assessment for a direct-use project. LMOP also developed posters for a press event recognizing the contributions of project partners and highlighting the environmental benefits of the project. The annual GHG reduction attributable to this project is approximately the same as the carbon sequestered annually by 3,000 acres of pine or fir forests.

LMOP Assistance and Resources

Project Development Process: To guide project stakeholders through the development process, LMOP offers products and services such as:

- Feasibility studies
- Identification of potential end users
- A comprehensive project development handbook
- A national database of operational, under construction, and planned LFG energy projects and candidate landfills for potential development
- LFGcost-Web, a model that provides reasonable economic evaluations of potential LFG energy projects
- An environmental benefits calculator

Financing LFG Energy Projects: Securing funding for LFG energy projects is often the biggest hurdle to project development. LMOP helps Partners think creatively about funding options and find answers to tough financing questions. LMOP's online, regularly updated guide to LFG energy project funding resources provides communities and landfill owners with easy access to information on relevant funding sources at the state and federal levels.

Project Marketing: LMOP works with communities, landfills, government officials, utilities, power marketers, and developers to increase awareness and build support for a project. LMOP's outreach tools for Partners have helped many new projects articulate the economic and environmental benefits of LFG energy projects. LMOP can also provide the necessary tools to plan a ribbon cutting and site tour or conduct outreach to the media and community.

Regulatory and Market Issues: LMOP tracks and reports on regulatory and permitting developments, legislative initiatives, and renewable energy market developments. LMOP can also help landfills demonstrate the environmental benefits of LFG use to the community and regulatory agencies.

Networking and Information: LMOP provides its Partners with opportunities to network with peers and LFG energy experts throughout the country. In addition, LMOP provides:

- Broadcast e-mails to bring Partners the latest news and information
- An annual conference and awards program
- State workshops

Network of Peers

Through its partnerships, LMOP creates a vital network of landfills, states, communities, and companies interested in LFG use:

- *State Partners* include state air and solid waste departments, energy and economic development offices, and state universities.
- *Energy Partners* include power providers, marketers, and energy end users.
- *Industry Partners* include engineering firms, project developers, consultants, equipment suppliers, and private landfill owners and operators.
- *Community Partners* include municipal landfill owners and operators and nonprofit organizations.
- *Endorsers* include key industry trade associations and nonprofit organizations.

EPA invites organizations to partner with LMOP to protect the environment and build a sustainable energy future. Joining is easy! Visit www.epa.gov/lmop/join/index.html to find out how.

For more information, visit LMOP's website at www.epa.gov/lmop.

LANDFILL METHANE OUTREACH PROGRAM

EPA 430-F-10-012
Office of Air and Radiation (6207J)
www.epa.gov/lmop
June 2010