



## Landfills

**M**ethane from landfills often offers a local source of reliable energy with significant environmental and economic benefits. Unfortunately, many nations lack the technical expertise, policies, financing, and information needed to effectively tap landfills to meet energy needs. Through Methane to Markets, the United States is working with Partner Countries to break down these barriers that prevent landfill gas (LFG) from entering energy markets.

### *Training and Capacity-Building Workshops*

In 2006, the United States organized capacity-building workshops in India, Russia, and Turkey. In India, USAID, the U.S. Department of State, and EPA partnered with the Federation of Indian Chambers of Commerce and Industry, the Ministry of Urban Development, and the Municipal Corporations of Mumbai, Hyderabad, and Ahmedabad to host a cross-sector workshop. The landfill technical session focused on LFG collection systems and gas modeling and also included presentations by several Indian municipal representatives on LFG energy prospects at their landfills.

In Russia, EPA organized a landfill methane capture and use workshop in Moscow in association with WasteTech 2007, Russia's largest waste management conference. In Turkey, EPA and the International Solid Waste Association delivered a landfill project development training event in Istanbul and sponsored participation by a group of Russian and Ukrainian delegates representing local governments, federal agencies, private industry, and academia. This enabled them to see an operating project, something that does not yet exist in either country.

### *Developing Tools to Advance LFG Projects*

The United States has taken the lead in developing a suite of tools that help landfill owners and operators collect the data they need to determine the feasibility of potential





project sites and market them more efficiently to project developers. These tools include:

- **Country-specific LFG recovery models.** EPA has finalized the Mexico LFG generation model, which provides realistic estimates of projects' LFG energy potential. The model is available in both English and Spanish on the EPA Web site ([www.epa.gov/lmop](http://www.epa.gov/lmop)). EPA plans to calibrate this model to specific meteorological and landfill site conditions in Argentina and Ecuador. These modeling tools, along with ongoing and planned workshops on how to use and interpret modeling results, are providing Partners with better estimates of their LFG energy potential.
- **Gathering data to evaluate landfills.** Together with Australia and Project Network members, EPA compiled and distributed a template for Partner Countries to use in evaluating their landfills. The template facilitated data gathering on landfills in Argentina, Brazil, China, Colombia, Ecuador, India, and Ukraine.
- **International landfill database.** A Web-based, voluntary data repository to promote the development of LFG energy projects is being launched in September 2007 for data entry. The database

can store information including general location and contacts, landfill physical characteristics, gas collection system characteristics, waste characteristics, and landfill operations. Members of the Landfill Database Task Force for the Methane to Markets Partnership Landfill Technical Subcommittee provided valuable input to the development of the database. The Partner Countries and Project Network members Carbon Trade, D'appolonia S.p.A, Deutz Corporation, Eastern Research Group, Inc., International Solid Waste Association's working group on sanitary landfills, SCS Engineers, Stratus Consulting, the Secretariat of Environment for Argentina, and the Ministry of Environment for Ecuador contributed to the database's development.

### USAID Gorai Landfill Project

USAID supported the development of a LFG project at the Gorai landfill in Mumbai, India, upon completion of a landfill feasibility study. A pre-feasibility study assessed the technical and economic viability of the project. Later, site visits and interviews were conducted to assess the conditions of local populations, including landfill scavengers, and design a community development program. The municipality recently issued a request for Expressions of Interest for projects that utilize the LFG and could be candidates for the Clean Development Mechanism (CDM). The CDM is an arrangement under the Kyoto Protocol through which industrialized countries invest in emissions-reduction projects in developing countries as an alternative to more costly projects in their own countries.

**Table 2. LFG Energy Potential Projects Analyzed by EPA**

Assessment Reports	
Country	Location
Argentina	Bahia Blanca
	Neuquen
	San Nicholas
China	Jilin City
	Yongle
	Gaoyan
Colombia	Dona Juana
	La Pradera
	Navarro
	Los Cocos
Ecuador	El Valle Landfill, Cuenca
	Loja Landfill
	Chabay Landfill
India	Okhla
	Hyderabad
Russia	Dnitrovsky
Ukraine	Lviv
	Lutsk
	Poltava

### Identifying LFG Energy Project Opportunities

EPA is collecting and analyzing LFG energy potential projects in numerous countries (see Table 2). Reports and studies from these analyses will be presented at the 2007 Partnership Expo (see page 19). Conducting data analysis, site screening, and feasibility studies are essential steps that ultimately lead to project development. As seen in Table 2, the United States has engaged in

Pre-Feasibility Studies	
Country	Location
China	Gaoantun
Ecuador	Las Iguanas Landfill, Guayaquil
	Pichacay Landfill, Cuenca
India	Ahmedabad
	Deonar-Mumbai
Mexico	Ensenada
	Nuevo Laredo
Ukraine	Cherivtsi

multiple Partner Countries to accelerate LFG project development. Some highlights of this work follow.

- In early 2007, EPA and USAID, with the help of Mexico's SEMARNAT, completed the first official LFG pre-feasibility studies and pump tests to be conducted under the auspices of the Methane to Markets Partnership. The studies were undertaken at landfills owned by the cities of Ensenada and Nuevo Laredo in northern Mexico and indicate that the sites are good candidates for an energy project.
- EPA summarized data on more than 400 municipal solid waste facilities in Brazil and identified a minimum of 50 sites that could support at least a 500-kilowatt LFG energy project. Currently, EPA is working with the state environmental agency in San Paulo to select 12 top sites for further evaluation.
- USAID funded a pre-feasibility study for methane recovery in Buzios, Brazil, which has led to a local company, Marquise, securing the rights from the municipality to capture and use the landfill methane.

### *Promoting LFG Energy Project Opportunities*

Promoting LFG energy project opportunities to municipal officials and local stakeholders has also been a priority. The United States has focused on sponsoring events at major international forums to achieve this goal:

- EPA sponsored and coordinated travel for representatives from the China Ministry of Construction and the Ecuador Ministry of Environment to attend the Carbon Expo Methane to Markets event. Delegates from China and Ecuador presented their in-country landfill opportunities and the advantages of participating in the Methane to Markets Partnership.
- As part of the Landfill Methane Outreach Program's Annual Conference and Project Expo, EPA sponsored a workshop on how to enter the Mexican LFG energy market and explained the services and assistance



offered by the U.S. Department of Commerce and other agencies. The workshop included speakers from the U.S. Trade Development Agency (USTDA), EPA, U.S. Department of Commerce, the Export-Import Bank, Overseas Private Investment Corporation, and representatives from the first LFG electricity project in Mexico.