Municipal Solid Waste

Municipal solid waste (MSW) management and treatment activities are sources of methane emissions worldwide. Opportunities exist for reducing methane emissions by collecting the methane-containing landfill gas (LFG) from landfills and using it for fuel. Methane emissions from MSW can also be reduced by modifying how the collected waste is treated. Organic fractions of the MSW stream can be diverted from landfills and instead disposed of at anaerobic digesters, composting facilities, or waste-to-energy facilities. Using these climate-friendly MSW solutions can yield substantial energy, economic, environmental, and public health benefits.

GMI brings together collective Partner resources and experience to facilitate technology transfer and demonstration, policy support, capacity-building, and market development necessary to implement LFG energy projects and increase LFG emission reductions. Specifically, the MSW sector has been working to reduce the barriers to LFG energy project development in Partner Countries. These barriers include the following: lack of in-country technical expertise; inadequate identification or evaluation of suitable candidate landfills; lack of demonstrated technical and economic feasibility of proven technologies and practices in local contexts; and other financial, informational, and institutional obstacles.

Engaging and Training Local Government Officials

Argentina

EPA provided a series of informational presentations to the Bahia Blanca City Council on the basics of LFG energy and the climatic and economic benefits and opportunities of LFG recovery projects. The presentations included an overview of LFG energy recovery technologies and the fundamentals of LFG formation, collection, and control. EPA also made presentations to the municipal sustainability coordinator and the Argentina Solid Waste Association.

China

EPA was invited by JUCCCE, a nonprofit organization dedicated to accelerating the greening of China, to participate in a 10-day training event in Beijing sponsored by the National Academy for Mayors of China. The GMI training session was attended by 36 mayors, focused on LFG capture and utilization, and included a site visit to the Gaoantun Landfill, which has received significant EPA technical assistance on the design and operation of its LFG collection and monitoring system.

LFG-fired boiler in operation at Gaoantun Landfill in China

Continued Partnership with the International Solid Waste Association

EPA and the International Solid Waste Association (ISWA) have been collaborating on environmental protection and integrated solid waste management by co-hosting workshops and trainings and working together informally on other technical assistance activities. In 2011, EPA and ISWA continued this partnership and took a major step toward formalizing this highly successful relationship.

GMI participated in an ISWA- and SIBICO International Ltd.-organized solid waste conference held in Moscow, Russia. EPA contributed by sponsoring a session on its experience in landfill biogas extraction and utilization technology application, and by conducting a LFG energy workshop. ISWA formally joined GMI by signing a memorandum of understanding (MOU) with EPA—a major conference highlight. Under this MOU, EPA and ISWA pledged to collaborate on a number of activities, including: coordinate training activities and workshops; promote GHG reduction and mitigation and energy recovery from the waste sector; build LFG capture and utilization capacity in ISWA-GMI countries; and provide critical support, feedback, and review for tools, reports, and guidance.

Following up on the MOU commitment, EPA participated in ISWA's 2011 Beacon Conference in Novi Sad, Serbia, which focused on waste-to-energy technologies and opportunities and packaging waste in developing countries. EPA presented a paper delineating market conditions in central and eastern Europe and identifying ways GMI might support growing LFG energy opportunities in those regions.

Educating Stakeholders on the Benefits of Direct Thermal LFG Energy Projects

Electricity-generating projects are the most prominent LFG energy projects worldwide. To encourage the development of international projects that directly utilize LFG, EPA sponsored a variety of initiatives—including study tours and feasibility studies—to educate corporations on how LFG can be a reliable and low-cost fuel source for their operations.

In September 2011, LFG energy professionals from Mexico and Serbia traveled to several LFG energy projects located in Georgia, North Carolina, and South Carolina to participate in a study tour. The tour included visits to a wide variety of industrial and commercial sectors, including auto manufacturers, chemical plants, greenhouses, and artisan kilns. The study tours gave the potential international end users confidence that the technology is demonstrated, reliable, and cost-competitive with other alternative fuel sources.

EPA conducted searches for landfills in close proximity to manufacturing facilities. In 2011, EPA worked closely with ALFA, CEMEX, Kimberly-Clark Corporation, and Proctor and Gamble to map coordinates of various plants in GMI Partner Countries—such as Brazil, China, the Dominican Republic, Germany, Mexico, Poland, and the United States—with landfills from the GMI International Landfill Database. EPA worked with landfill operators to confirm technical data and then applied country-specific LFG modeling tools to assess the site-specific potential for a LFG energy recovery project.

Site tour participants visit the flare station at EnergyXchange in North Carolina

Expanding Work in New GMI Partner Countries

Ethiopia and Nigeria

EPA participated in a GMI-sponsored side event at the African Carbon Forum, which is a knowledge-exchanging platform for all carbon markets. The workshop featured speakers from EPA, Ethiopia, and Nigeria who discussed advancing landfill methane projects and the associated public health benefits achieved through the advancement of improved solid waste practices. EPA presented an overview on GMI and its work in Africa to date. Other presentations focused on opportunities for reducing landfill methane emissions and improving solid waste management in Ethiopia, as well as incorporating LFG recovery as a component of integrated solid waste management in the Lagos State of Nigeria.

EPA awarded a grant to Nigeria's Lagos Waste Management Authority (LAWMA) to evaluate capturing and utilizing LFG from the Abule Egba and Solous Landfills. Based on the findings, LAWMA commenced the first phase of its LFG energy project, which will ensure steady electricity supply to residents in 2012. EPA also sponsored a grant with Ethiopia's Community Development Research to host a Landfill and Solid Waste Management Workshop in Addis Ababa. Session topics included assessment of Ethiopia's landfill operations, current solid waste management practices, LFG collection processes, and market conditions and technologies available for LFG energy.

Turkey

EPA representatives traveled to Turkey for a six-day scoping visit to observe landfill operations and site conditions and discuss LFG energy market conditions with local stakeholders. The tour included visits to the Kemerburgaz Odayeri, Komucouda, and Kocaeli Landfills—two of which included LFG energy projects. Visits were also made to composting and recycling facilities and a gasification plant in Kermerburgaz, as well as a hazardous waste incinerator in Kocaeli.

Bringing New LFG Projects Online

In 2011, EPA provided technical assistance to several new LFG collection and beneficial energy-use projects. In Brazil, the Solid Waste Treatment Center BR-040 in Belo Horizonte added a fourth GE Jenbacher engine and installed 5.6 MW of electric-generating capacity, and is sending this renewable energy to the local grid. In Colombia, a LFG flare with a rated capacity of 3,000 m^3 per hour was installed at the El Guacal Sanitary Landfill in Heliconia. Together, these new projects accounted for total GHG reductions of 256,848 $MMTCO_2E$ in 2011. Both projects have been registered and have submitted monitoring reports to the United Nations Framework Convention on Climate Change's (UNFCCC's) Clean Development Mechanism.

Completing LFG Assessment Reports

EPA completed assessment reports at eight landfills in multiple GMI Partner Countries during 2011 (see Table 4). The objective of these assessment reports was to evaluate the methane emission reduction potential and explore various energy recovery technology options available at the study sites. Collectively, these landfills represent an estimated 454,500 $MMTCO_2E$ in potential emission reductions for 2012 if projects were developed at these sites.

Table 4. 2011 LFG Assessment Reports

Country	Name of Landfill/Location
Brazil	Maracanau Landfill (State of Ceara) Uberaba Landfill and Vale de Aco Landfill (State of Minas Gerais)
China	Hongshantou Landfill (Xiangfan) Lingshan Landfill (Jimo) Taoshugang Landfill (Changde) Zhanjing City MSW Landfill (Zhanjing)
Nicaragua	La Chureca Landfill (Managua)