The Global Methane Initiative

Landfill Biogas to Energy in China

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Agenda

- GMI Overview
- Landfill Biogas
- Uses of Landfill Biogas
- Landfill Biogas work in China

Overview the Global Methane Initiative (GMI)

- GMI was the Methane to Markets Partnership, which has proven to be one of the most effective international efforts to reduce greenhouse gas emissions.
- Since 2004, has grown from 14 to 39 country partners, representing nearly 70 percent of global methane emissions today.
- Reduction efforts cover four sectors: agriculture waste, coal mines, landfills and oil & gas systems.

Farms and Landfills— Providing Renewable Energy

Animal Waste to Cooking Fuel in Vietnam

Landfill Gas to an Infrared Heater in Ukraine

Partner Countries and Project Network

Partner Country

- Countries with large sources of methane and/or special expertise and interest in developing methane projects.
- Founding partner countries account for nearly ~70 percent of global methane emissions from the targeted sources.
- More than 300 methane emission reduction projects around the world
  - When fully implemented projects will reduce 60 MMTCO2E/year

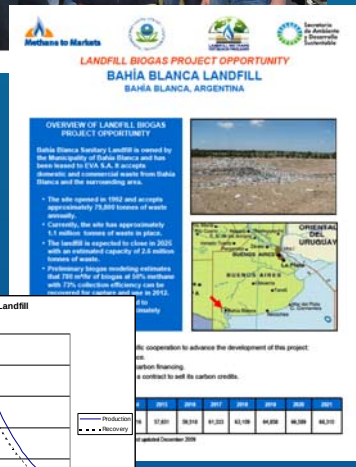
Project Network Member

- Private-sector entities, financial institutions, and other governmental and non-governmental organizations with an interest in methane capture and use projects.
  - More than 1,000 public and private sector organizations have contributed recourses and expertise
- Work with Partner Countries to galvanize action, setting the stage for concrete methane projects

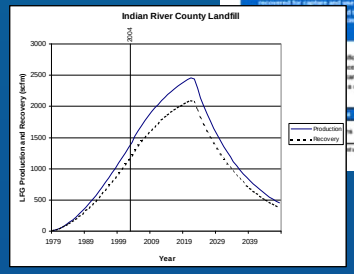
Sector Work

- Approach to Sector Work
  - Capacity Building
  - Resource Assessment
  - Performing initial gas generation and feasibility studies
  - Technology transfer through demonstration, training, and workshops
  - Creating an environment for sound investment

Sector Work Continued



- Elements of Sector Work
  - Technical Assistance
    - Pre-feasibility assessments
    - Landfill gas collection engineering assistance
  - Capacity Building and Training
    - Landfill Gas Energy Basics
    - Landfill Operations and Management Training
  - Outreach, Publications and Resources
    - International Best Practices Guide
    - Multiple country/region-specific models



Global Landfill Biogas Emissions Trends

- Industrialized Nations Declining
  - Increased LFG regulation
  - Increased recycling of organics/paper
  - Increased LFG utilization (>1100 worldwide)
- Developing Nations Sharply Increasing
  - Shift from open dumps to sanitary/engineered landfills
  - Increased MSW generation and disposal
  - Lack of LFG regulation and recycling

Significant Co-benefits of Methane Recovery and Use Projects

BENEFITS OF METHANE PROJECTS

- Reduced waste of a valuable fuel and important local energy source and
- Improved industrial safety and productivity
- Improved air quality, water quality and reduced odors
- Reduced greenhouse gas emissions
- Progress toward sustainable development goals
- Economic growth and energy security

BUT BARRIERS EXIST…

- Lack of awareness of emission levels and value of lost fuel
- Lack of information on and training in available technologies and management practices
- Traditional industry practices
- Regulatory and legal issues
- Limited methane markets and infrastructure
- Uncertain investment climate

Beneficial Use of Landfill Biogas

- Electricity
  - Engines, turbines, microturbines
- Direct Use
  - Boilers
  - Process heaters
  - Greenhouses
  - Infrared heaters
  - Ceramics and glass
  - Biodiesel production
  - Autoclave/medical waste incineration
- LNG/CNG/ Natural Gas Pipeline

Landfill Biogas

U.S. Involvement: China-Landfill Sector

China

- Hosted the first Methane to Markets Partnership Expo
- Over 15 landfill opportunities highlighted at the 2nd Expo in India, March 2010
- Gaountun Landfill highlighted at first expo- has second engine running.
- Launch of China LandGEM model and workshop
- Landfill Gas to Energy workshops- Beijing, Shenzhen- April 2008; Wuhan, Jinan, Changsha- April 2010; China LandGem Workshop -2009, Beijing

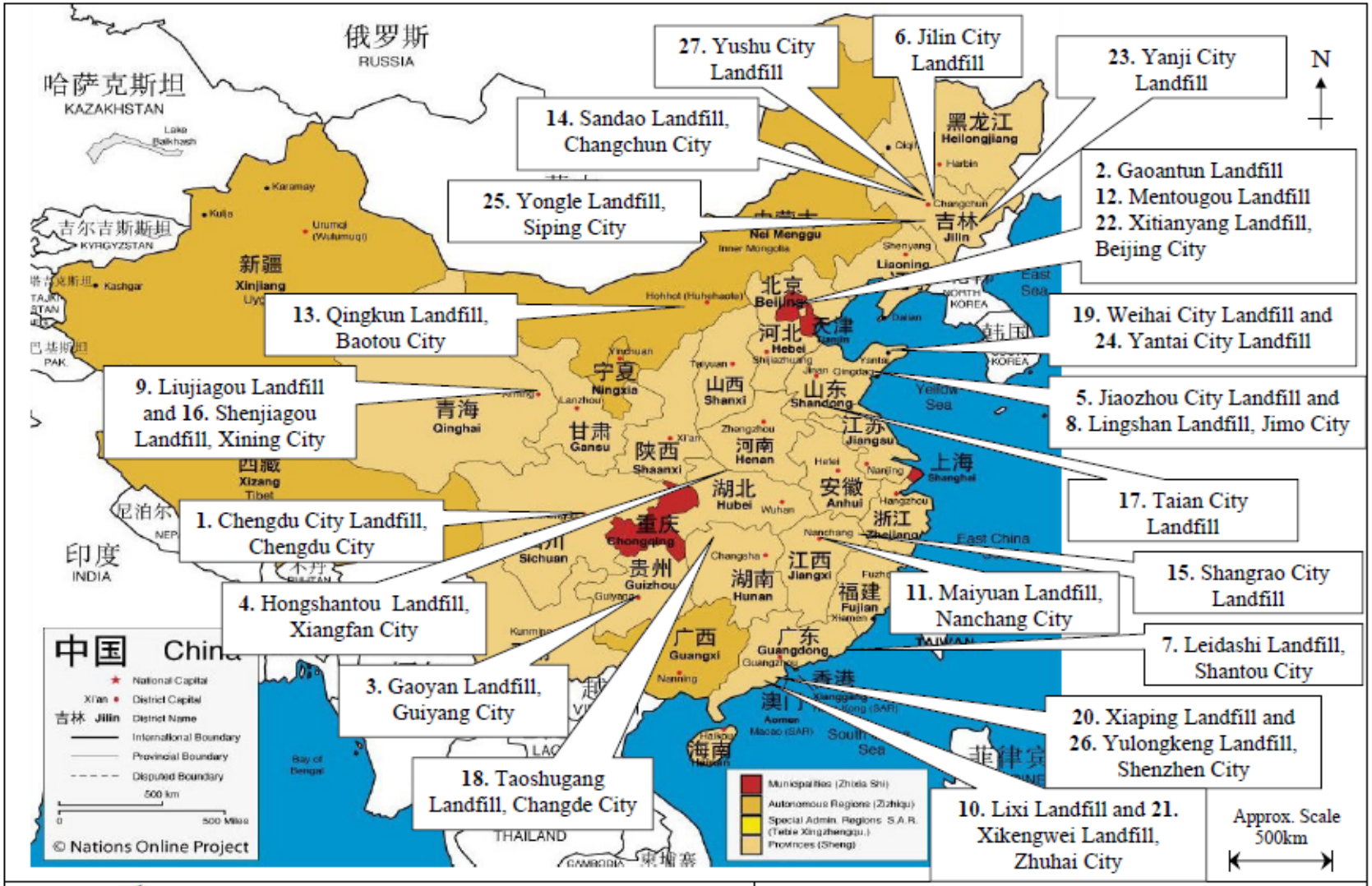
Solid Waste/Landfill Biogas Sector in China

- A mix of dump sites and sanitary landfills
- Recommendation of gas collection for sites meeting certain size and depth
- China also has developed policies that encourage the use of LFG, and has promulgated the Policies on Technologies for the Treatment of Urban Garbage and Pollution Prevention, and Technical Standards on Sanitary Landfilling of Garbage
- CDM landfill gas projects must have an energy component
- Interest in incineration for the future
- Beijing is now looking to phase out untreated waste into landfills by 2012 and go more towards incineration
- Renewable tariff for energy from landfill biogas, but utilities have no requirement to purchase it (RMB 0.25/kWh credit according to the Law on Renewable Energy (2005))

Landfill Biogas Potential

- At least 168 MW of potential generating capacity
  - Based on 53 sites; 11 GMI evaluated sites, 42 CDM sites
  - 17 projects registered with the CDM board have a potential generating capacity of 50MW
  - Another 25 awaiting validation have 92 MW of generating capacity
  - GMI reports have an estimated mmtCO2e from offsetting a total of 26MW

Assessment Studies

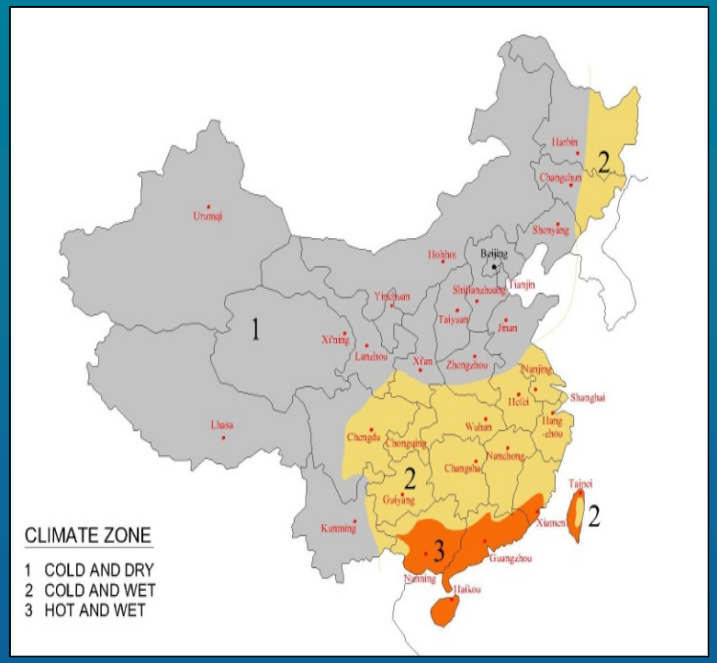


Organic Waste Technologies (H.K.) Ltd.
浩宏环保（香港）有限公司

Location of Potential LMOP Candidate Landfills in People's Republic of China

China LandGEM

- Improves the capacity international landfill assessments
- First-order decay equation to estimate the rate of waste decomposition and gas generation
- Incorporates region or country-specific climate data
- Locations in China are categorized according to various temperatures-consistent with IPCC criteria
- Coal ash questions



International Landfill Database

- Provides key landfill data to help project developers assess and pursue landfill biogas projects

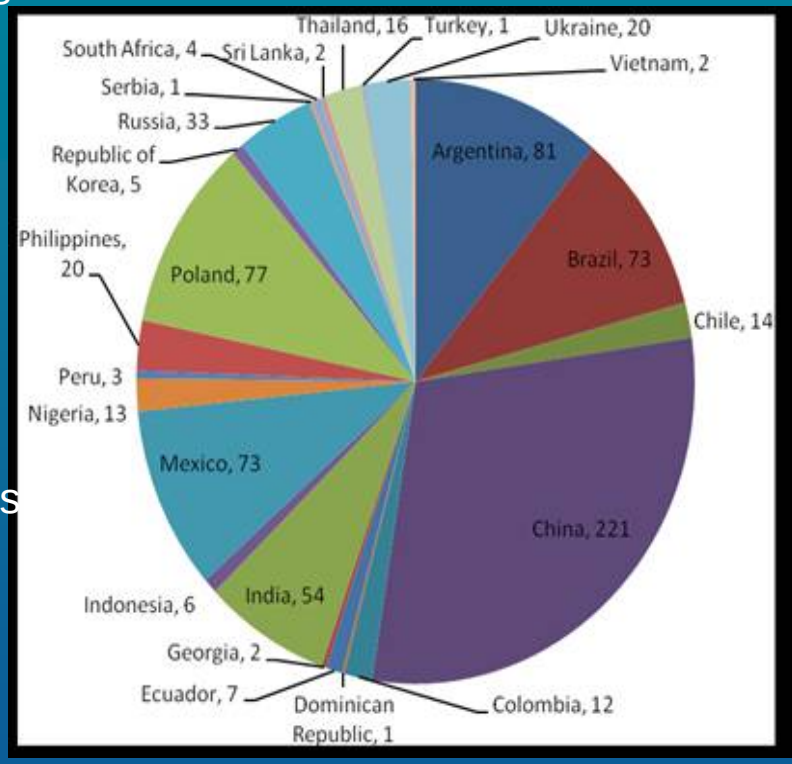
- Tracks biogas recovery projects currently in operation, under construction or planned.

- The application is web-based and relies solely on Partner Countries, its network partners and affiliates to provide landfill technical data.

- Through grants from GMI, landfill inventories have been developed in Russia and Nigeria.

- U.S. EPA has provided funding for entering landfills in the database that have the best potential for LFG recovery in Methane to Markets countries

- Total number of registered users: 1,078; over 700 landfills listed



Estimated Emission Reduction Potential of Landfill Study Sites

Country	Number of Landfills with Potential Emission Reductions	Estimated Average Annual Emission Reductions (mtCO2e)
Argentina	5	130,414
Brazil	16	1,875,474
China	9	297,070
Colombia	9	838,994
Ecuador	6	793,032
India	11	509,310
Korea	3	135,368
Mexico	6	430,073
Nigeria	4	69,568
Poland	1	3,052
Russia	2	331,671
Thailand	1	12,539
Ukraine	7	169,768
Vietnam	1	287,082
Total	83	5,883,414

Estimated Emission Reductions from Assisted Operational Projects

Country	Number of Landfill Project Sites	Project Type	Start Year	Actual Emissions Reductions for FY10 (mtCO2e)	US Agency Sponsoring Activity
Argentina	2	Infrared Heater, Pyrolisis Furnace	2009, 2010	3,100	EPA Grant
Brazil	2	Enclosed Flare, Electricity	2003, 2007	859,500	Early EPA support
China	2	Electricity	2009	4,700	EPA LMOP
Colombia	1	Enclosed Flare	2009	304,100	EPA LMOP
India	1	Enclosed Flare	2009	42,000	U.S. DOE
Peru	1	Enclosed Flare	2007	83,400	U.S. DOE
Philippines	1	Electricity/ Flare	2008	110,300	Early EPA support
Ukraine	2	Enclosed Flare, Infrared Heating	2009, 2010	118,700	EPA Grant/ EPA-LMOP
TOTAL	**12**			**1,525,800**	

For More Information

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