



# Methane to Markets

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## *Partnership in Action*

### **U.S. and Ecuador Landfill Biogas Technical Cooperation, Current status**

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# *Current situation of landfill sites in Ecuador*

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- Excluding the acceptable managing of solid waste in three major cities in Ecuador (Guayaquil, Quito and Cuenca), no more than 10 Municipalities has an acceptable final disposal that could be considered sanitary landfills.
- The potential of new projects depends on the availability of converted sanitary landfill projects in the country.
- There are 6 cities or Municipalities, besides Guayaquil, Quito and Cuenca, with more than 15.000 inhabitants that dispose of in a sanitary landfill, in with there is a potential for a LFG projects.

# Current situation of Ecuadorian Landfills, Opportunities for LFG Projects

Provincia	Ciudad	Tasa Anual de Crecimiento Demográfico (1990-2001)	Población 2001	Población al 2010	Cobertura recolección (%)	PPC (kg/hab* día)	Cantidad de RS recolectados y dispuestas en relleno sanitario (ton / año)
Azuay	Cuenca	2,1	277.374	341.781	90	0,7	67.181
Guayas	Guayaquil	2,4	1.985.379	2.511.856	90	0,7	493.730
Píchincha	Quito	2,7	1.399.378	1.824.805	90	0,7	358.684
Total			3.662.131	4.678.443			919.595

**Source:** Neira, David. Van Den Berg, y De la Torre, Francisco. *El Mecanismo de Desarrollo Limpio en Ecuador: Un diagnóstico rápido de los retos y oportunidades en el Mercado de Carbono.*

IDB and Ministry for the Environment of Ecuador, Quito, 2006.

# Current situation of Ecuadorian Landfills, Opportunities that should be explored for LFG Projects

Ciudad	Tasa Anual de Crecimiento Demográfico (1990-2001)	Población 2001	Población al 2010	Cobertura recolección (%)	PPC (kg/hab*dia)	Cantidad de RS recolectados y dispuestas en relleno sanitario (ton / año)
Tulcán	1,9	47.359	57.167	85	0,6	9.096
Loja	1,8	118.532	140.987	90	0,6	23.754
Tena	2,9	16.669	22.250	90	0,55	3.436
Cayambe	3,6	30.473	43.433	75	0,6	6.098
Azogues	0,5	27.866	29.233	90	0,6	4.925
Ambato	2,1	154.025	189.790	90	0,6	31.976
		394.924	482.860			79.285

**Source:** Neira, David. Van Den Berg, y De la Torre, Francisco. *El Mecanismo de Desarrollo Limpio en Ecuador: Un diagnóstico rápido de los retos y oportunidades en el Mercado de Carbono.*

IDB and Ministry for the Environment of Ecuador, Quito, 2006.

# *LFG projects potential in Ecuador*

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- Preliminary assessments in an IDB and Ministry for the Environment report in August 2006, about various CDM opportunities in various sectors.
- Assessments use LandGEM - Landfill Gas Emissions Model, Version 3.02 of US EPA.
- The preliminary results should be confirmed with specific data from the sites and pump trials to measure quantity and quality of the biogas.

# LFG Projects potential in Ecuador

Ciudad / Municipio	Generación promedio anual	
	Metano (ton / año)	CO <sub>2</sub> eq (ton / año)
Cuenca	2.752	57.792
Guayaquil	20.227	424.767
Quito	15.642	328.482
Total	38.621	811.041

**Source:** Neira, David. Van Den Berg, y De la Torre, Francisco. *El Mecanismo de Desarrollo Limpio en Ecuador: Un diagnóstico rápido de los retos y oportunidades en el Mercado de Carbono.*

IDB and Ministry for the Environment, Quito, 2006.

## *LFG projects that should be confirmed with an assessment report*

Ciudad / Municipio	Generación promedio anual	
	Metano (ton / año)	CO <sub>2</sub> eq (ton / año)
Tulcán	373	7.833
Loja	973	20.433
Tena	141	2.961
Cayambe	250	5.250
Ambato	1.310	27.510
Total	3.047	63.987

**Source:** Neira, David. Van Den Berg, y De la Torre, Francisco. *El Mecanismo de Desarrollo Limpio en Ecuador: Un diagnóstico rápido de los retos y oportunidades en el Mercado de Carbono.*

*IDB and Ministry for the Environment, Quito, 2006.*

# Partnership with Ecuador

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- Ecuador joined Methane to Markets November 2005
- Ministerio de Ambiente, Ecuador (MAE) formed a partnership with U.S. EPA's Landfill Methane Outreach Program (LMOP) June 2006
- LMOP and MAE launched activities under the partnership August 2006



# ***U.S. - Ecuador Partnership Objectives***

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- **Opportunity**
  - Technical assessments & pre-feasibility studies of selected disposal sites
  - Financial impacts and opportunities for landfill biogas projects
  - Disseminate understanding of the potential for landfill biogas projects
  - Local and practical training (capacity building)
- **Tools and Resources**
  - Development of an Ecuador specific Landfill Biogas Model
  - Development of landfill biogas assessment reports and pre-feasibility studies
- **Benefits**
  - Local and global environmental and economic benefits through development of a landfill biogas projects
  - Social through skills transfer

# *Launching Activities*

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- MAE conducted survey of Ecuador landfills using the Methane to Markets template for profiling landfills. *July 2006*
- MAE used the resulting data to identify 5 landfill candidates for evaluation. *August 2006*
- LMOP visited the sites to confirm profile data and gather additional data. *October 2006*
- Two landfills were selected as good candidates for further technical and economical evaluation, including physical field trials. *November 2006*

# Measuring methane concentrations at Loja LF, Loja. October 2006



# *Measuring methane concentrations and leachate levels at Pichacay LF, Cuenca. October 2006*



# *Measuring methane concentrations at El Valle LF, Cuenca. October 2006*



# Outcomes

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- Pumping trial completed in Cuenca and Guayaquil, *April 2007*.
- Site assessment reports prepared and submitted for other three sites, *June 2007*.
- Five landfills featured at the Partnership Expo, *October 2007*
- Development of two Prefeasibility Studies of landfill biogas projects submitted to Municipalities of Guayaquil and Cuenca, *October 2007*.
- Training Workshops to Municipalities, *October 2007*
- Landfill Biogas Model for Ecuador, First version presented, *October 2007*

# *Drilling gas wells for pump test at Pichacay LF, Cuenca. March 2007*



# *Pipes connecting gas wells to flow measurement and flare station. Las Iguanas LF, Guayaquil. April 2007*

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# *Portable flow measurement and flare station. Pichacay LF, Cuenca. March 2007*



# Flow metering and recording instruments on portable measurement and flare station. Las Iguanas LF, Guayaquil. April 2007



# *Flaring landfill gas at the flow measurement and flare station. Las Iguanas LF, Guayaquil. April 2007*



# ***Preliminary Lessons Learned***

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- Many Ecuador landfills contain significant leachate, requiring closer well spacing
- Both test sites (Guayaquil and Cuenca) had good gas flows and methane concentrations
- Local drilling companies have limited experience drilling in waste
  - Increases effort required to install a collection system
  - Suggests benefits for alternatives to conventional wells
- Chimney gas vents can be converted to productive gas wells using simple modifications

# ***Converting gas vent to gas collection well at Pichacay LF, Cuenca. March 2007***



# ***Completed gas collection well from a converted gas vent. Pichacay LF, Cuenca. March 2007***



# *Preparing for next phase of Technical Cooperation*

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Once a consulting firm has been hired by EPA, US – Ecuador cooperation will be enhanced by the following activities:

- Feasibility study for Las Iguanas Landfill in Guayaquil.
- With the cooperation of MIDUVI, select three landfills to do assessments report.
- If the assessment show potential for a LFG project and has political support, perform pump test.
- User's Manual for Ecuador's Landfill Gas Model.
- Assist the Municipalities of Guayaquil and Cuenca to get closer for the development of their LFG projects.
- The partnership needs projects developed.

# Thank you for your time....

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