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Methane to Markets Ministerial Meeting

“WORLD BANK LFG ACTIVITIES IN THE LAC REGION”

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Why are LFG projects interesting for the World Bank's LAC region ?

- They deal with two fundamental problems for the environment and our health: (i) Municipal Solid Waste management (local) and (ii) Methane as greenhouse gas (global)
- Win-Win situation: alternative source of energy – improve landfill practices/reduce risks
- Carbon finance and energy sales revenues: economic incentive promoting project financial stability and local investment
- Promote Energy-Environment intersectoral work in client countries



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World Scenario: Number of existing plants (2002)

Location	Number of plants	Installed Capacity (MW)
USA	350	2600
EUROPE	720	1400
CANADA	25	106
SOUTH AFRICA	4	4
AUSTRALIA	18	75
LATIN AMERICA	3	28

Source: Hans Willumsen (2002)



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Generation Potential in Latin America

- There are 117 towns with > 500,000-inhabitants
- Waste generation: estimated at 74 million tons/year
- Half of these towns have the necessary technical characteristics
- Estimated Potential: 810 MW
- 1 million-inhabitant towns generating 740 tpd: estimated Potential 5.9 MW



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LFG Capture - Regional Project Portfolio

Global Environmental Facility

Finances, through grants, investment projects for energy generation:
Mexico, Monterrey (LFGTE existing)

Uruguay, Maldonado (LFGTE existing)

Carbon Finance

Finances LFG capture and LFGTE projects through ERs purchase agreements through CDM: Brazil (Nova Gerar); Argentina (Olavarría); Mexico Umbrella Project (Leon, Guadalajara, Monterrey); Uruguay (Montevideo); and Peru (Lima)

Energy Sector Management Assistance Programme (ESMAP) - LFGTE initiative

Finances LFGTE pre-feasibility studies in 10 landfill sites in LAC through technical assistance grants (Colombia, Peru, Uruguay, Brazil, Mexico)



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GEF Mexico, Monterrey LFGTE

Status: in operation

Installed capacity: 7 MW

Landfill Characteristics:

- Operation started: September 5th, 1990
- Lifetime of the site: 25-30 years
- Landfill area: 212 ha.
- Filling area: 44 ha. (biogas improvement area)
- Waste depth: 22m.
- Average daily disposal: 2300 ton
- Solid waste accumulated to 1999: 7.5 Mtons
- Waste characterization: 80% Biodegradables (43% Rapidly, 17% Moderately and 20% Slowly), 20% are non-degradable





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GEF Mexico, Monterrey LFGTE

- LFGTE plant inaugurated September 2003
- 66,210 MWh have been generated until August, 2004
- 263,000 tCO₂e abated since 2003
- Total investment: US\$11.5 M
- Expected total ERs: 3.6 MtCO₂e
- Abatement cost US\$3.2/tCO₂e
- Engineering design and equipment supplier: British





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GEF Uruguay, Maldonado LFGTE

Status: start up phase

Installed capacity: 1 MW

Landfill Characteristics:

- Operation started: October 1997
- Expected closing year: 2007
- Landfill area: 19 ha.
- Organic fraction: 60%
- filling area: 9 ha
- depth: 12 mts (average)
- Average daily disposal: 145 ton
- Waste in place (actual): 560,000 ton
- Expected waste disposal (2007): 800,000 ton

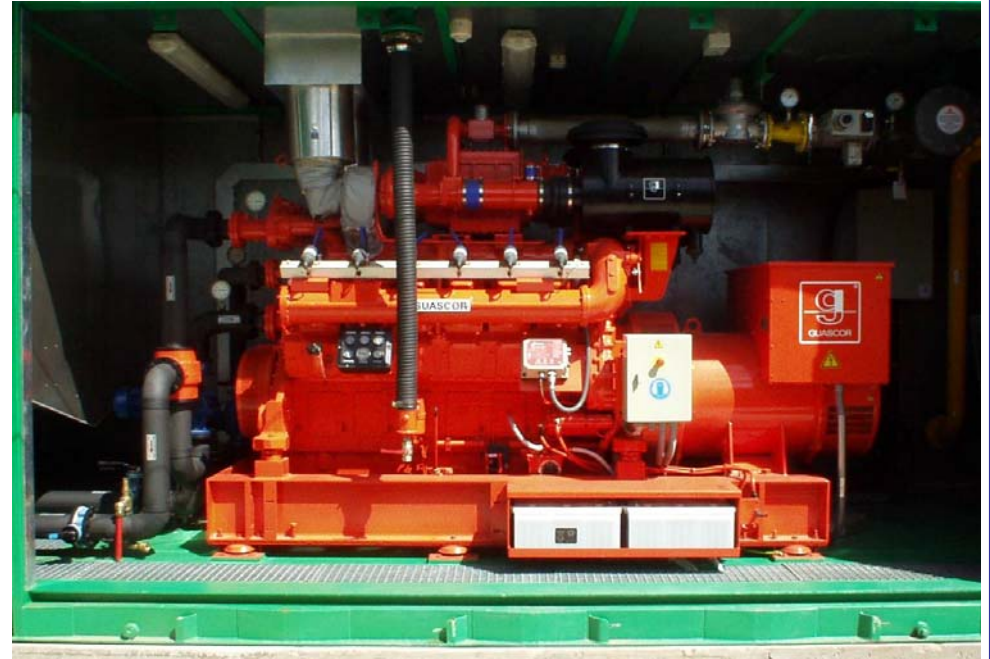




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GEF Uruguay, Maldonado LFGTE

- LFGTE plant expected inauguration December 2004.
- Expected generation 89,000 MW (15 years)
- Expected ERs 475,000 tCO₂e
- Total investment USD\$1,500,000
- Abatement cost US\$3.15 / tCO₂e
- Engineering design and equipment supplier: Spanish
- High replication potential





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Carbon Finance (NCDF) Brazil, Nova Gerar

- Type: 1st stage flaring; 2nd stage LFGTE
- Status: under construction
- Installed Capacity > 12 MW
- Overall ERs > 11.6 MtCO₂e (21 years)
- Estimated Project Costs: US\$ 20.9 M
- Purchase Agreement: 2.5 MtCO₂e @ US\$3.35CO₂e
- Abatement Cost US\$ 1.8tCO₂e

Landfill Characteristics : existing sector and new cells under development

- | | |
|--|--------------------------------------|
| • Operation started: 1987/ 2003 | • daily disposal: 450 ton/2,000 tons |
| • closing year: 2002 / 2023 | • Waste in place: 2,000,000 ton |
| • Landfill area: 20 ha (old) +120 ha (new) . | • LFGC plant operational: 2005 |



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Carbon Finance (CDCF) Argentina, Olavarría

Type: Methane capture and flaring

Status: Design phase

Total investment: USD\$276,100

Expected ERs 363,331 tCO₂e (21 years)

Abatement cost: US\$0.76/tCO₂e

PA: 131,234 tCO₂e @ \$4.5/tCO₂e*

Operational: May, 2005.

Landfill Characteristics:

- Operation started: October 1999
- Expected closing year: 2029
- Landfill area: 33 ha.
- filling area: 17 ha
- daily disposal: 80 -100 ton
- Waste in place: 120,000 ton



* \$0.50/tCO₂e premium for social component



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LFGTE Initiative in LAC

Objectives:

- Contribute to a regional approach aimed at a maximum reduction of methane emissions and the development of carbon trading opportunities.
- Develop outreach activities to promote this non-conventional energy source in medium and large city landfills by means of LFG recovery and utilization.
- Use it as a tool/incentive to improve SWM practices.
- Documentation and dissemination of existing experiences
- Implementation of a Knowledge and Cooperation Network (Env. Canada, USEPA, ISWA, SWANA, AIDIS, etc.)
- Finance LFGTE prefeasibility studies



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Current Status :

- Documentation of worldwide case studies completed
- Handbook for the Preparation of LFGTE Projects completed and distributed in English, Spanish and Portuguese (http://www.bancomundial.org.ar/lfg/gas_access_008.htm)
- Implementation of a knowledge sharing network and website (<http://www.bancomundial.org.ar/lfg/default.htm>)
- Workshop held in Monterrey on October, 2003
- [Screening of 26 candidate landfill sites for potential development of new LFGTE projects](#)
- [Selection of 10 landfill sites to carry out pre-feasibility studies](#)
- Pre-feasibility studies under preparation



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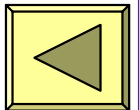
Submission of proposals :

Brazil	→	10
Colombia	→	7
Guatemala	→	1
Mexico	→	6
Peru	→	1
Uruguay	→	1
Total		26

Selection Criteria :

The submitted landfill proposals were evaluated and scored based on the following criteria categories:

- **Technical aspects:** type of landfill, capacity, waste in place, covers, ave. Temp, precipitation, leachate collection, etc.
- **Regulatory framework** aspects: legal framework for LFG utilization, access to distribution and transmission lines, energy market, etc.
- **Social aspects:** surrounding fence, waste pickers, resettlement needed, etc.
- **Political commitment:** municipality, private operator, etc.

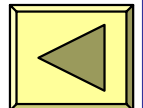




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Selected Landfills

Landfill name	Country	Total Cap Mton	Estimated daily disposal in tons	Potential Energy Gen. MW
Gramacho (Rio de Janeiro)	Brazil	35	3,800	12
Muribeca (Pernambuco)	Brazil	20	2,800	8
Porto Alegre (Rio Grande do Sul)	Brazil	1.1	1,050	3
Combeima (Ibagué, Tolima)	Colombia	1.2	275	1
El Carrasco (Bucaramanga)	Colombia	3	593	1.7
La Esmeralda (Manizales)	Colombia	2.8	400	1.3
Queretaro	Mexico	6.1	465	1.5
Chihuahua	Mexico	8	1,070	3
Huaycoloro (Lima)	Peru	40	2,500	7
Montevideo	Uruguay	10	1,250	4
			TOTAL	42.5





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Next steps :

- Completion of prefeasibility studies for the 10 selected landfills (expected January 2005)
- Completion of pump tests for 5 out of the 10 selected landfills (expected March, 2005)
- Main findings and results dissemination workshop (expected May, 2005)



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THANK YOU !