
## This presentation will focus on:

1. Current Situation of MSWM service provision in LAC and identification of key issues
2. Actual and Future prediction for CH4 Emissions and Reduction
3. How can the Bank help

# Current Situation in LAC Region

- Highly urbanized Region with 78% of its 518 million population living in cities
- Urban population and waste is concentrated mainly in large cities
  - 114 cities of more than 500,000 population
    - » housing 225 million inhabitants
    - » generating 98 million tons of waste per year
  - Yet LAC has thousands of small and medium size cities
    - » with 209 million population
    - » generating 56 million tons of waste per year

# Estimated MSW generation in LAC (2005)

| City Size (million) | Total Population (millions) [# of cities] | MSW Generation Rates (kg/cap/day) | | Total MSW Generated (million tons/year) [% of total] | |
|---|---|---|---|---|---|
| | | Domestic | Municipal | Domestic | Municipal |
| >1 | 183 [55] | 1.04 | 1.25 | 69 [55%] | 83 [54%] |
| .5 to 1 | 42 [59] | 0.69 | 0.98 | 11 [9%] | 15 [10%] |
| .2 to .5 | 58 | 0.68 | 0.88 | 14 [11%] | 19 [12%] |
| <0.2 | 151 | 0.56 | 0.68 | 31 [25%] | 37 [24%] |
| Totals | 434 | 0.79 | 0.97 | 125 | 154 |

# LAC MSWM Practice and Problems

- SWM is a municipal responsibility throughout the Region
- Waste collection is generally acceptable in the large cities
  - Typically 85% of waste is collected in capital cities and large metropolitan areas
  - However, the poor peri-urban areas of large cities often remain with deficient collection services
  - And small to medium cities have lower collection levels and efficiencies (average 69%)

# LAC MSWM Practice and Problems

- Waste disposal is generally deficient
  - Only 23% of MSW collected is disposed in sanitary landfills*, 24% goes to controlled landfills, and the rest to open dumps or courses of water
    - » In capital cities and metropolitan areas about 60% of MSW collected is disposed in sanitary landfills
    - » In small and medium cities open dumping predominates
    - » Overall 60% of all MSW generated in LAC ends up in unknown disposal sites

* However, surveys in Colombia, Chile and Mexico show that many "so-called" sanitary landfills do not meet basic standards for sanitary operations, and many do not have the necessary EIA approval or environmental operating license.

# LAC MSWM Practice and Problems

- Service financing is very poor
  - Average cost recovery is less than half of actual recurrent costs of service provision
    - » Average rate collected is US$2.49 per household
  - Most cities have little knowledge of the true costs of service provision
  - Efficiency of service provision is often poor, especially in small and medium cities
    - » Excessive employment
    - » Low labor and vehicle productivity
    - » Leading to high cost for poor quality service

# Typical MSWM Expenditures in LAC

| Service | Cost |
|---|---|
| Collection | US$ 15-40 per ton |
| Street sweeping | US$ 10-20 per km |
| Transfer | US$ 8-15 per ton |
| Disposal | US$ 4-15 per ton |

LAC Average = US$ 29 per ton collected, transported and 'adequately' disposed

# Estimated Costs of Adequate MSWM

| | Low-income Countries | Middle-income Countries | High-income Countries |
|---|---|---|---|
| Average Waste Generation | 200 kg/cap/yr | 300 kg/cap/yr | 600 kg/cap/yr |
| Average Per-Capita Income | 370 US$/cap/yr | 2,400 US$/cap/yr | 22,000 US$/cap/yr |
| Collection | 10-30 US$/t | 30-70 US$/t | 70-120 US$/t |
| Transfer | 3-8 US$/t | 5-15 US$/t | 15-20 US$/t |
| Final Disposal | 3-10 US$/t | 8-15 US$/t | 15-50 US$/t |
| Total Cost | 16-48 US$/t | 43-100 US$/t | 105-190 US$/t |
| Total Cost Per-Capita | 3-10 US$/cap/yr | 12-30 US$/cap/yr | 60-114 US$/cap/yr |

# LAC MSWM Practice and Problems

- There is good experience with private sector participation
  - Big cities started contracting out in 1970s
  - Today spreading to intermediate cities
  - Half of LAC urban population now served by private operators
  - In Brazil in 1998, 40 firms collect 65% of urban waste nationwide (up from 40% in 1982)
  - Still need to ensure competition, transparency and accountability at municipal level
  - Role for micro-enterprises established

## LAC MSWM Practice and Problems

- Institutional failures
  - Legal and regulatory framework often dispersed, overlapping and inconsistent
  - Existing legislation generally disconnected from the economic reality of municipalities, thus guaranteeing non-compliance
  - Lack of inter-municipal coordination (both metropolitan and rural) leading to inefficiencies and loss of economies of scale
  - Failure to plan strategically
  - Politicians and planners fail to recognize the importance of NIMBY and the need for pro-active public involvement to deal with it

## LAC MSWM Practice and Problems

- Final disposal appropriately based on sanitary landfill
  - Increasing number of sanitary landfills and controlled landfills, but open dumping common
  - Successful experiences with Landfill Gas-to-Energy (LFGTE) in Argentina, Brazil, Chile, Mexico, and Uruguay – driven by Carbon Financing
  - Considerable experience with composting, but mostly disappointing
  - No large-scale incineration (waste-to-energy) due to economics (high moisture content and low calorific value)

## LAC MSWM Practice and Problems

- Waste minimization and recycling incipient
  - Estimated 3% of MSW recycled in LAC, however some countries doing better
    - » Mexico recycles 10% of waste stream
    - » Paper and cardboard recycled in Brazil (44%), Colombia (57%), Chile (50%), Ecuador (40%)
    - » Brazil recycles 87% of aluminum cans, 70% of steel cans, 35 percent of PET containers, and 45% of glass bottles
  - Source separation and separate collection on the increase
    - » 20% of municipalities in Colombia
    - » 5% of municipalities in Brazil

## LAC MSWM Practice and Problems

- Recycling is dominated by informal activities
  - PAHO estimates there are 500,000 wastepickers in LAC, 29% women and 42% children
    - » Wastepickers face elevated health and accident risks, and live in conditions of extreme poverty
    - » Many work at dumpsites, impeding attempts to operate as sanitary landfills
    - » Social programs needed to improve living and working conditions and move recycling activities from dumpsites to waste sources through organization into cooperatives and microenterprises
  - Successful organization of informal wastepickers into microenterprises and cooperatives in Brazil, Colombia, Mexico, and Peru

## Sector setting in client countries

- Some common elements of these strategies
  - Regional landfill construction, including LFGTE
  - Closure and/or remediation of open dumps
  - Strengthen national and local institutions, including the private sector
  - Development of local/regional integrated MSWM strategies
  - Promotion of waste minimization and recycling
  - Social inclusion of wastepickers
  - Public communication and outreach

# Bank Operations in LAC

- The Regional portfolio (1997-2007) consists of 40 projects with MSWM components worth $698 million
  - Only 5 lending projects deal exclusively with SWM
  - 20 lending projects are components of broader urban, water or environmental loans
  - 15 projects are supported by Carbon Finance
    - 14 Landfill Gas + 1 Composting
- The Regional Environmental Strategy (2001-2003) give high priority to MSWM and identifies potential synergies
- However, there is still no Regional Strategy for SWM

# LAC MSWM Portfolio 1997-2007+

| Project Status | Projects (No.) | | | Investments (US$ millions) | | |
|---|---|---|---|---|---|---|
| | Loans | Carbon Finance | Total | Loans | Carbon Finance | Total |
| Closed | 9 | 2 | 11 | 337.7 | 13.5 | 351.2 |
| Active | 4 | 7 | 11 | 58.9 | 31.4 | 90.3 |
| Pipeline | 12 | 6 | 18 | 198.4 | 58.3 | 256.7 |
| Totals | 25 | 15 | 40 | 595.0 | 103.2 | 698.2 |

## Dedicated Loans

- Closed
  - Mexico Second Solid Waste Management ($200M)
  - OECS Ship-generated Waste Management ($24M)
- Active
  - Argentina National Urban Solid Waste Management ($40M)
- Pipeline
  - Colombia Solid Waste Management ($20M)
  - Brazil Integrated Solid Waste Management and Carbon Finance ($50M)

## Toward a Regional Strategy

- Projects in LAC should give priority to:
  - expanding collection to poor neighborhoods;
  - improving final disposal; and
  - promoting waste minimization and recycling
- To do this, should focus on 6 key issues:

1. Strategic planning for integrated waste management
2. Better institutional arrangements
3. More efficient operations
4. More effective financial management
5. Improved environmental protection
6. Waste minimization and recycling strategies

# Sustainable Landfills?

- LFG contributes significantly to GHGs
  - Important opportunity to introduce LFGTE projects as mitigating measure, taking advantage of emerging markets for carbon emission reductions
  - Indirect benefit is that LFGTE projects require properly operated sanitary landfills and can help finance operations
- Social liability -- wastepickers currently working at open dumpsites will be displaced
  - Requiring comprehensive socio-economic integration strategies

# Actual and Future Emissions from LF

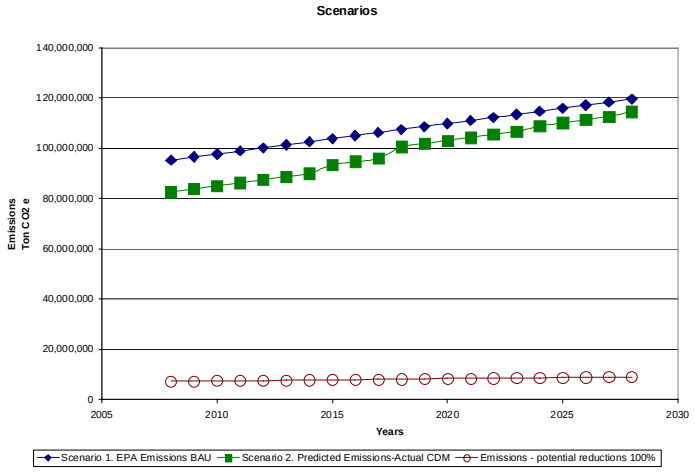
**Table 1. Methane Emissions from Landfilling of Solid Waste* Source EPA (2006)**

| Country | Methane Emissions (MMTCO2) MMT (Million Metric Tons) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 1990 | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 |
| Argentina | 5.51 | 5.89 | 6.28 | 6.66 | 7.02 | 7.36 | 7.68 |
| Bolivia | 0.38 | 0.42 | 0.47 | 0.52 | 0.56 | 0.61 | 0.66 |
| Brazil | 12.98 | 14.54 | 15.56 | 16.56 | 17.47 | 18.29 | 19.00 |
| Chile | 1.43 | 1.55 | 1.66 | 1.76 | 1.86 | 1.96 | 2.06 |
| Colombia | 6.55 | 7.21 | 7.88 | 8.53 | 9.16 | 9.77 | 10.34 |
| Ecuador | 0.84 | 0.93 | 1.01 | 1.09 | 1.16 | 1.24 | 1.30 |
| Mexico | 26.04 | 28.51 | 30.95 | 33.28 | 35.45 | 37.42 | 39.16 |
| Peru | 1.84 | 2.01 | 2.19 | 2.36 | 2.53 | 2.70 | 2.86 |
| Uruguay | 0.60 | 0.62 | 0.64 | 0.67 | 0.69 | 0.71 | 0.73 |
| Venezuela | 5.60 | 6.29 | 6.97 | 7.65 | 8.32 | 8.96 | 9.56 |
| Rest of Latin America | 10.80 | 11.59 | 12.42 | 13.25 | 14.04 | 14.79 | 15.52 |
| **TOTAL** | **72.57** | **79.56** | **86.03** | **92.33** | **98.26** | **103.81** | **108.87** |

# Actual Reductions: CDM projects

| Country | Nr. Projects | Total CER claimed |
|---|---|---|
| Argentina | 7 | 23,498,313.00 |
| Bolivia | 1 | 1,776,561 |
| Brazil | 19 | 108,479,629.50 |
| Chile | 7 | 28112063 |
| Colombia | 1 | 539,454 |
| Costa Rica | 1 | 2,185,169 |
| Ecuador | 1 | 771,884 |
| El Salvador | 1 | 5,229,158 |
| Mexico | 7 | 7,880,138 |
| Peru | 2 | 8451331 |
| Uruguay | 1 | 1,412,530 |
| **TOTAL** | | **188,336,230.50** |

# Emission vs Potential Reductions



## Conclusions

- The potential avoided emissions from LFG projects in LAC with the actual registered CDM projects represents between the 4 – 15% of the total Waste related emissions.
- The potential future avoided emissions from LFG projects in LAC might represent the between 46% to 95% of the total waste related emissions.

## Conclusions

- The avoided emissions calculated in this note only represent possible LFG projects in landfills. It accounts only for municipalities with population larger than 500.000 inhabitants. This assumption suggest that only these municipalities meet the general criteria for feasible LFG projects. These criteria includes, large landfills over one million tons of waste place with depth of 12-20 meters.
- The potential future avoided emissions in this estimate do not take into account those related to better solid waste management practices, such as composting, proper recycling, etc

## Conclusions

- A significant driving force increasing MSW generation is not only urban population but also GDP growth. Richer societies generate more waste, contributing at the same time with a significant reduction of the food/organic waste in percentage terms of the MSW composition. However, in absolute terms total methane emission will continue to grow since the overall amount of organic content will tend to increase due to the increment of urban population.

## Conclusions

- In terms of policy, the region needs to start working on various fronts: i) in the medium term LFG treatment (burning) has to be mandatory for security and sanitary reasons, even if this means loosing the CDM potential, ii) Minimization practices (reduction, re-use, recycle) and compost need to be included in the clients agenda, for sanitary, environmental and economic reasons. This will trigger additional eligible CDM activities, that in the medium term will replace LFG revenues from CDM . The Bank is currently developing a recycling methodology which is expected to have a significant impact in the sector, mainly because of the social implications that may came with it (informal work of waste pickers).

## Bank's strategy

- Help Cities become good "environmental citizens" by managing their wastes better
  - decentralize collection services
  - centralize disposal operations where possible
  - focus on cost recovery and self financing
  - enlist support of private sector and the public
  - adopt landfill as backbone of integrated system
  - develop social programs for improving lives of wastepickers

## Bank's strategy

- Help Central governments and provincial/state authorities to enable cities
  - develop national policy and regulatory framework for integrated waste management
  - provide technical support and access to financing
  - consider matching grants to help deal with disposal externalities
  - help build markets for recycled materials

## Bank's strategy

- The Bank can help LAC cities by:
  - Assisting countries in establishing national MSWM policies and programs with the elements described above
  - Ensuring that projects are designed within an integrated MSWM strategic planning framework
  - Targeting immediate financing (IBRD, IFC, CFU) toward improved landfill disposal and the introduction of LFGTE components to help ensure operational viability
  - Support local and national efforts to expand waste minimization and recycling, and improve the lot of wastepickers