

Tratamiento y Gestión de los Desechos Sólidos

F o r o I n t e r n a c i o n a l

Bogotá - Berlin - Beijing

Desafíos y Soluciones para las Megaciudades
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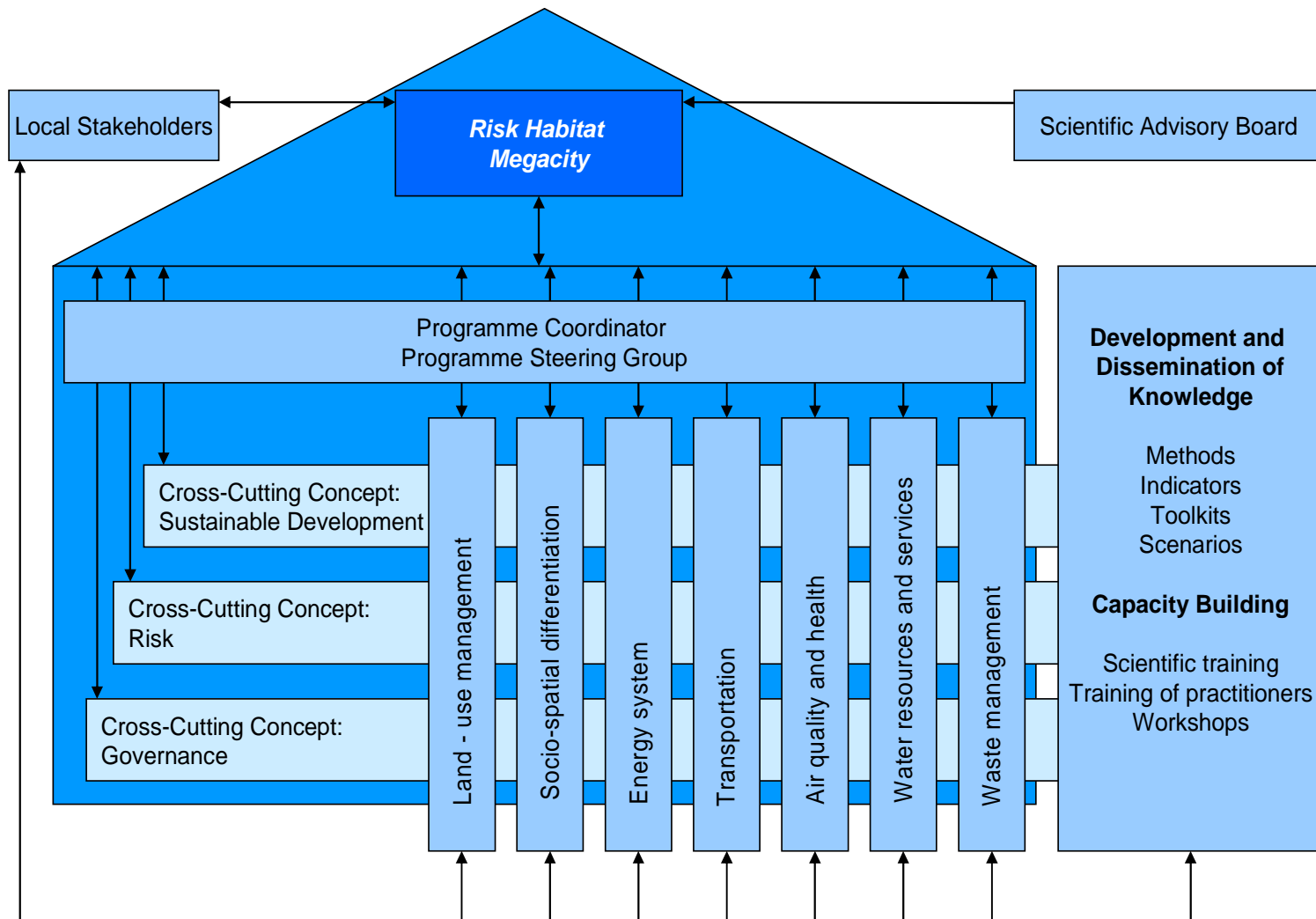
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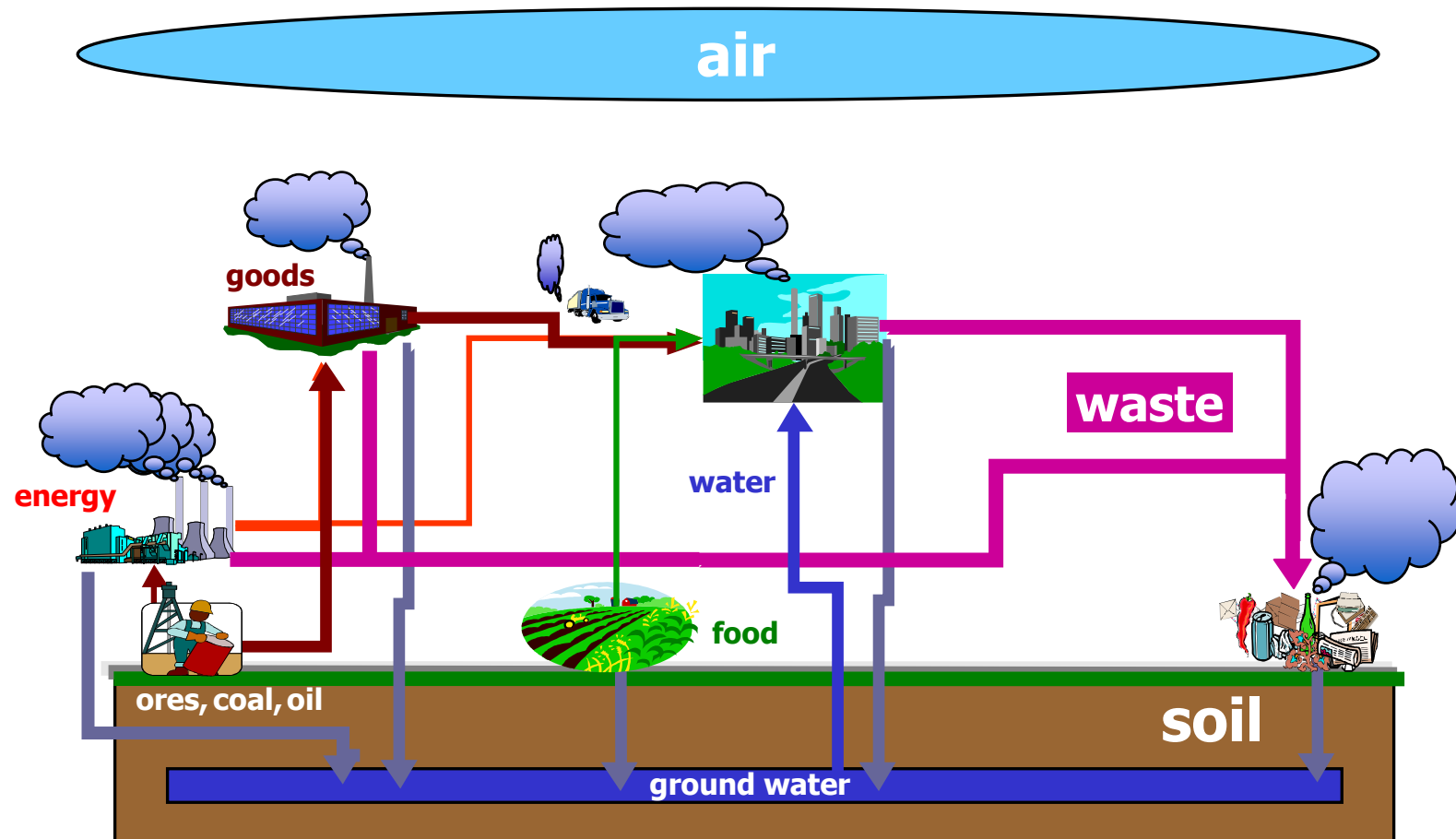
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The „Risk Habitat Megacity“ Project



Human Activities Endanger the Environment



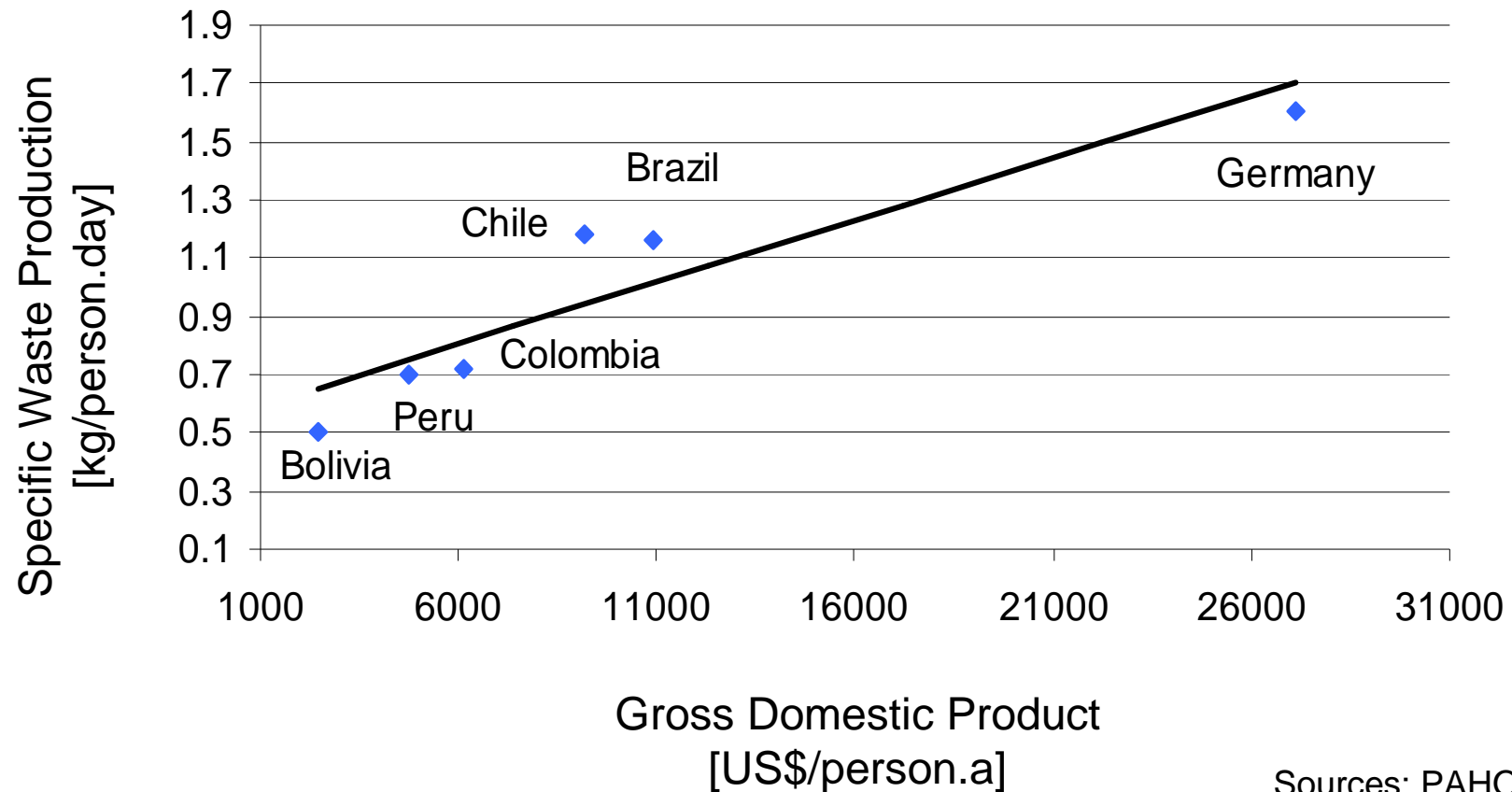
Environmental Health Problems Related to Inadequate Management of Waste

	Environmental Problems	Health Risks	Exposed Population
Inadequate Generation and Storage	Environmental hazard due to hazardous materials, pathogen organisms, food contamination, bad odors	Gastrointestinal diseases, poisoning of infants and pets, Dengue	Population lacking adequate storage and/or collection systems
Inadequate Disposal in Public Areas	Pathogen organisms, air contamination due to open air burning, surface water contamination, food contamination, bad odors, landscape deterioration	Gastrointestinal and respiratory diseases	Population lacking adequate collection services
Collection, Transportation, Transferstations	Landscape deterioration, bad odors, noises	Respiratory, gastro-intestinal dermatology diseases, occupational diseases and accidents	General population, formal and informal urban sanitation workers
Segregation and Recycling	Reuse bottles and containers, feeding of beef cattle and pigs with unhealthy organic waste	Respiratory, gastro-intestinal, dermatological diseases, occupational diseases and accidents;	Segregators, population that acquires products in reused containers
Treatment and Final Disposal	Soil contamination, air contamination from open air burning, surface and underground water contamination, landscape deterioration, fires	Allergic diseases, respiratory tract, skin and mucous, occupational diseases and accidents, mental health	Population adjacent to final disposal sites, peri-urban population where waste is accumulated or burnt

Waste Arising in Santiago de Chile

Type of Waste	Total Amount Mg/a	Percentage %
Municipal Solid Waste residuos solidos urbanos (RSU)	2,645,966	46
Industrial Waste residuos solidos industriales (RSI)	920,336	16
Construction Waste residuos de construccion (ResCon)	2,128,277	37
Hospital Waste residuos hospitalarios (ResHos)	57,521	1
Total	5,752,100	100

Specific Waste Production – Correlation with GDP



Sources: PAHO, Global University

Waste Management in Latin America – Overview

Materials recovery occurs at all phases of the management chain (at the source, during transportation, and at the disposal sites).

There is a trend towards source separation due to

- **an improvement in the management of dumps, which has forced waste pickers to find work elsewhere;**
- **factories that pay more for cleaner materials;**
- **households getting paid a small amount of money for their recyclable materials.**

In some large Argentine, Brazilian, Colombian, and Mexican cities, recycling bins have been set up, where glass and paper products can be deposited.

Waste pickers are not allowed in managed landfills in the region.

Waste Management in Latin America – Overview



Waste Management in Latin America – Overview



Waste Management in Latin America – Transfer-Stations

Throughout Latin America transfer-stations have been installed or are in the process of being installed.

The need for the transfer-stations has grown significantly as the distance between the city and the disposal sites grows.

In cities such as Rio de Janeiro, Mexico City, Caracas, and Buenos Aires, more than 50% of the wastes go through a transfer-station.

Waste Management in Latin America – Transfer-Stations



Waste Management in Latin America – Composting

Centralized composting has not been successful in Latin America.

In the last 20 years, at least 30 plants were purchased, some of which were never installed.

Approximately 15 composting plants were closed only a few years after installation.

One plant in São Paulo, Brazil is owned and subsidized by the municipal government of São Paulo, which is interested in its continued operation due to the lack of landfill space in the metropolitan area.

Four large composting plants operated in Mexico, but none of these is still working. Two others were purchased there, but were never installed.

Waste Management in Latin America – Composting

Reasons for composting plants not being successful are

- **High operating costs**
- **No feasibility studies**
- **No existing market for the product**
- **Availability of cheaper (though less environmentally friendly) options.**
- **Deficient management of the plants resulting in problems for public health.**

Waste Management in Latin America – Incineration

Up to now no incinerators operate in Latin America although there have been a number of feasibility studies.

The costs of this technology are far too high to be considered by local governments as an appropriate waste management technology.

One municipal incinerator did operate in Mexico City; however, it was closed in 1992 because it could not meet emission standards.

MSW incinerators were also tried in São Paulo and Buenos Aires, but they are not operative at the present time. In these cases operation and maintenance costs were too high.

Waste Management in Latin America – Incineration



Waste Management in Latin America – Landfills

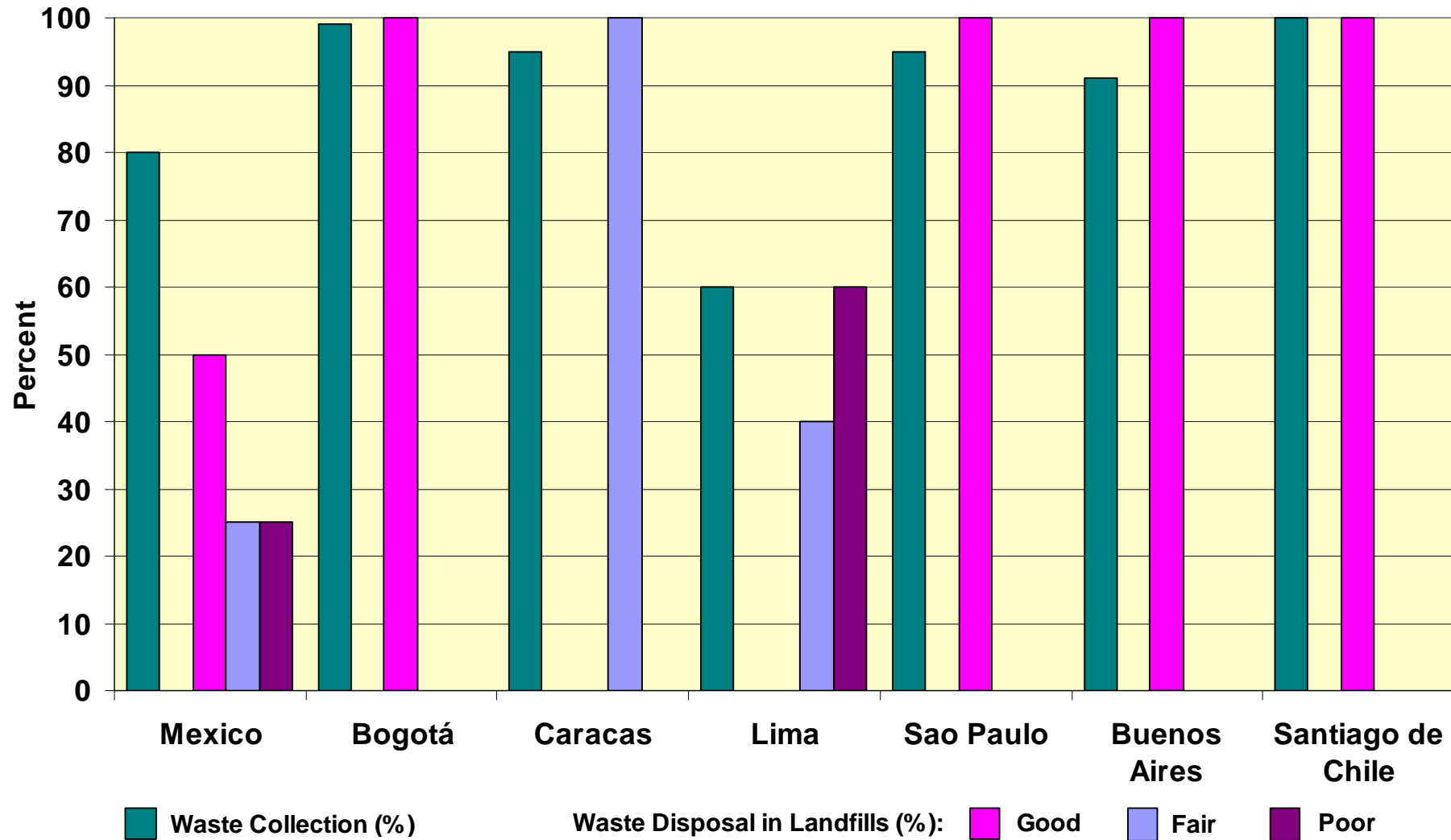
Some large cities in the region do have state-of-the art landfills.

Landfill design in these cities typically consists of an initial clay layer, followed by a sand or ground stone layer. Synthetic liners are not usually used except for some new landfills in Argentina, Brazil, and Chile.

Leachate collection systems are used, the landfills are subdivided into cells, and they have chimneys for gas ventilation.

Wastes are covered daily with topsoil. When full, landfills are closed by covering with a clay layer and topsoil, then re-vegetated.

Waste Collection and Waste Disposal in Latin American Cities



Waste Management in Latin America – Landfills



Waste Management in Latin America – Landfill gas collection

Because of the high organic content of the region's wastes, landfilled wastes tend to produce methane relatively quickly.

Nevertheless, this gas is only used in Chile (Santiago and Valparaiso), where three landfills have gas collection systems.

Waste Management in Beijing - Overview

The amount of MSW increased from 2.2 Mio tons in 1990 to 3.6 Mio tons in 2003 (13 Mio inhabitants).

In 2004 there were 5 transfer stations, 13 sanitary landfills, 2 compost plants and 2 incineration plants.

Some treatment facilities have to operate at a load > 100%, e.g. the Gaoantum sanitary landfill at a load of 197%.

Waste Management in Beijing - Overview

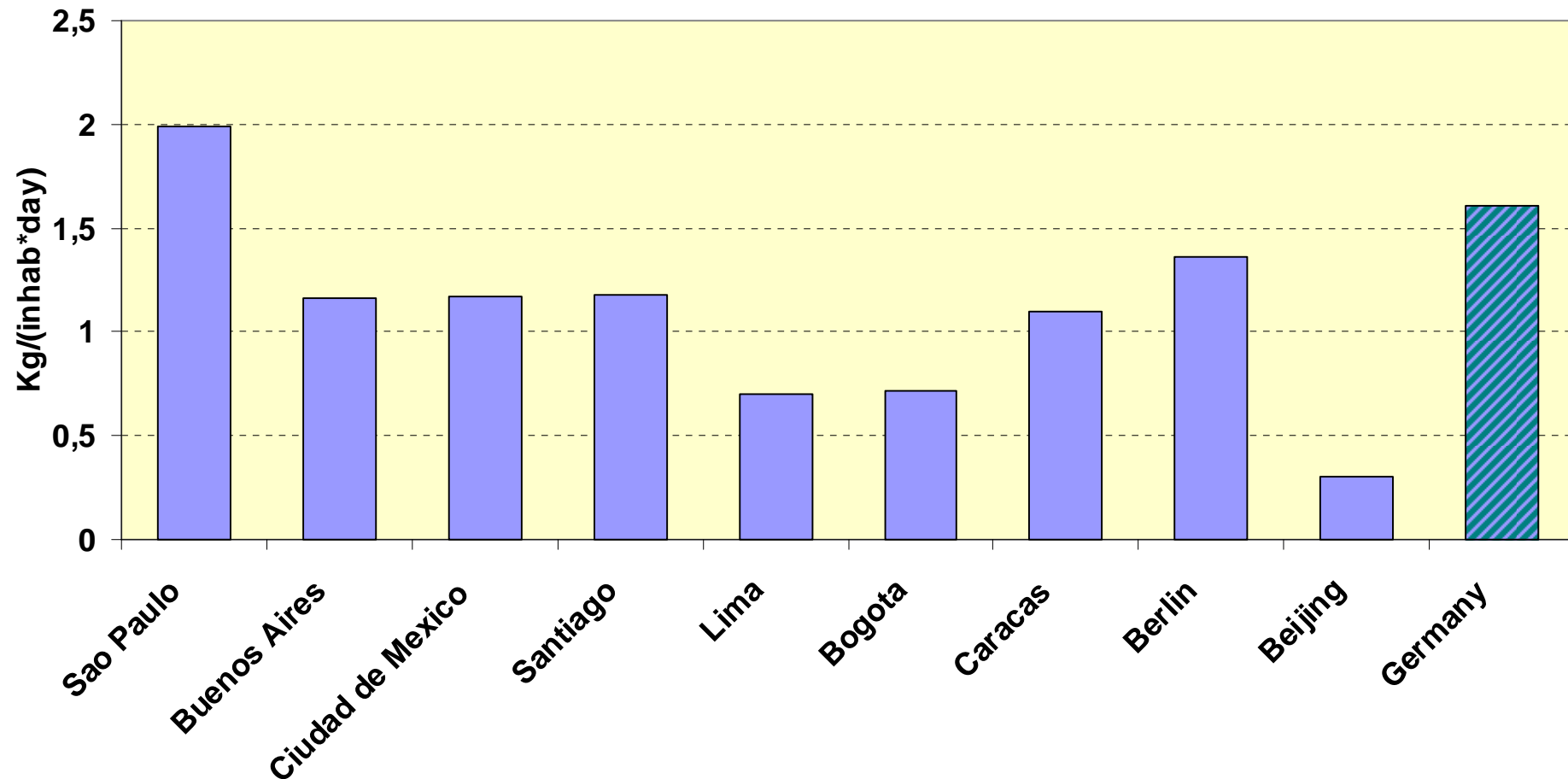
The share of treatment of MSW is

- **94% for sanitary landfills**
- **4% for composting**
- **2% for incineration**

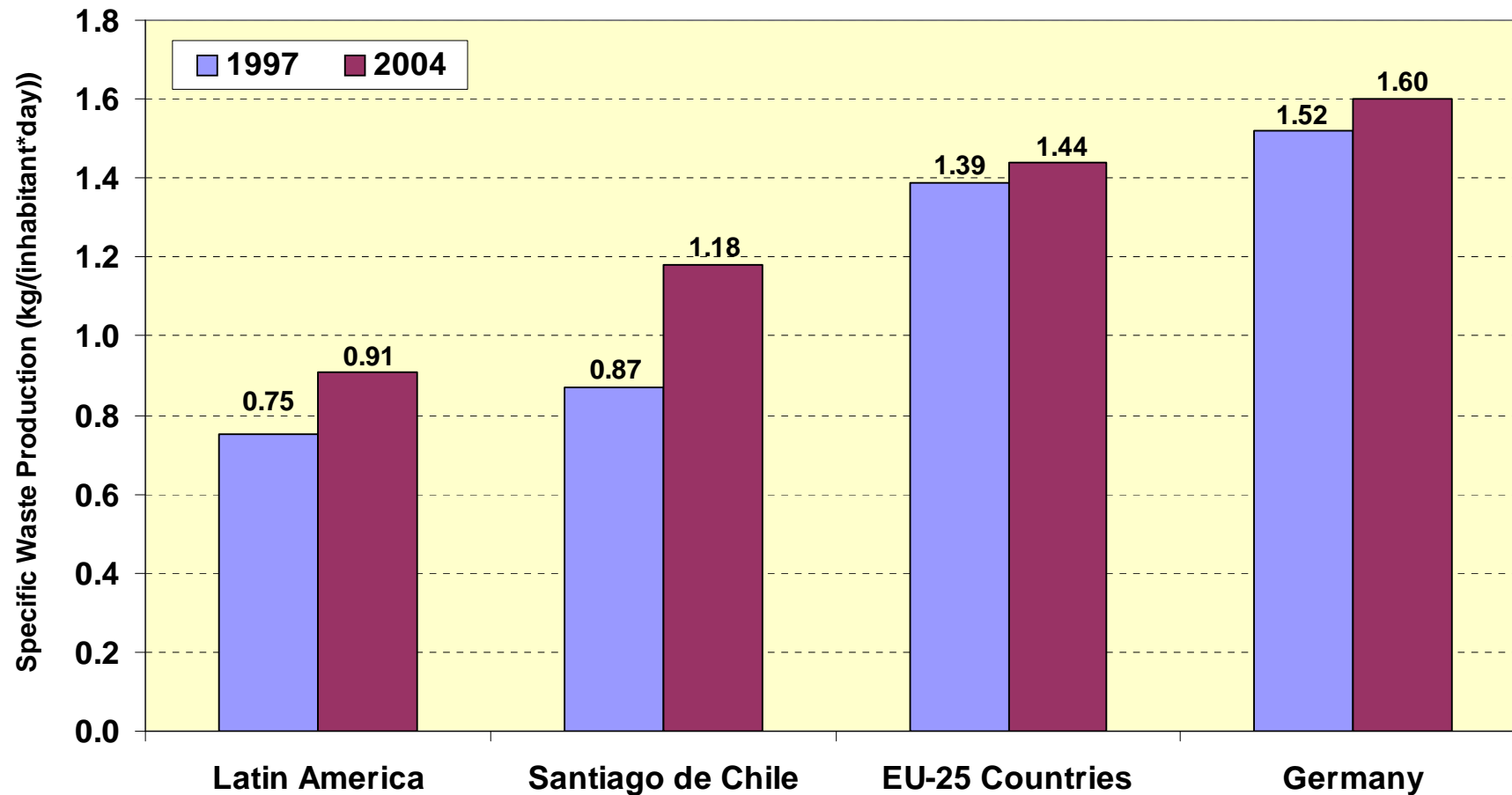
Only two landfills were designed to collect methane.

A moderate garbage collection fee is applied, but the willingness to pay for solid waste collection and treatment is still low.

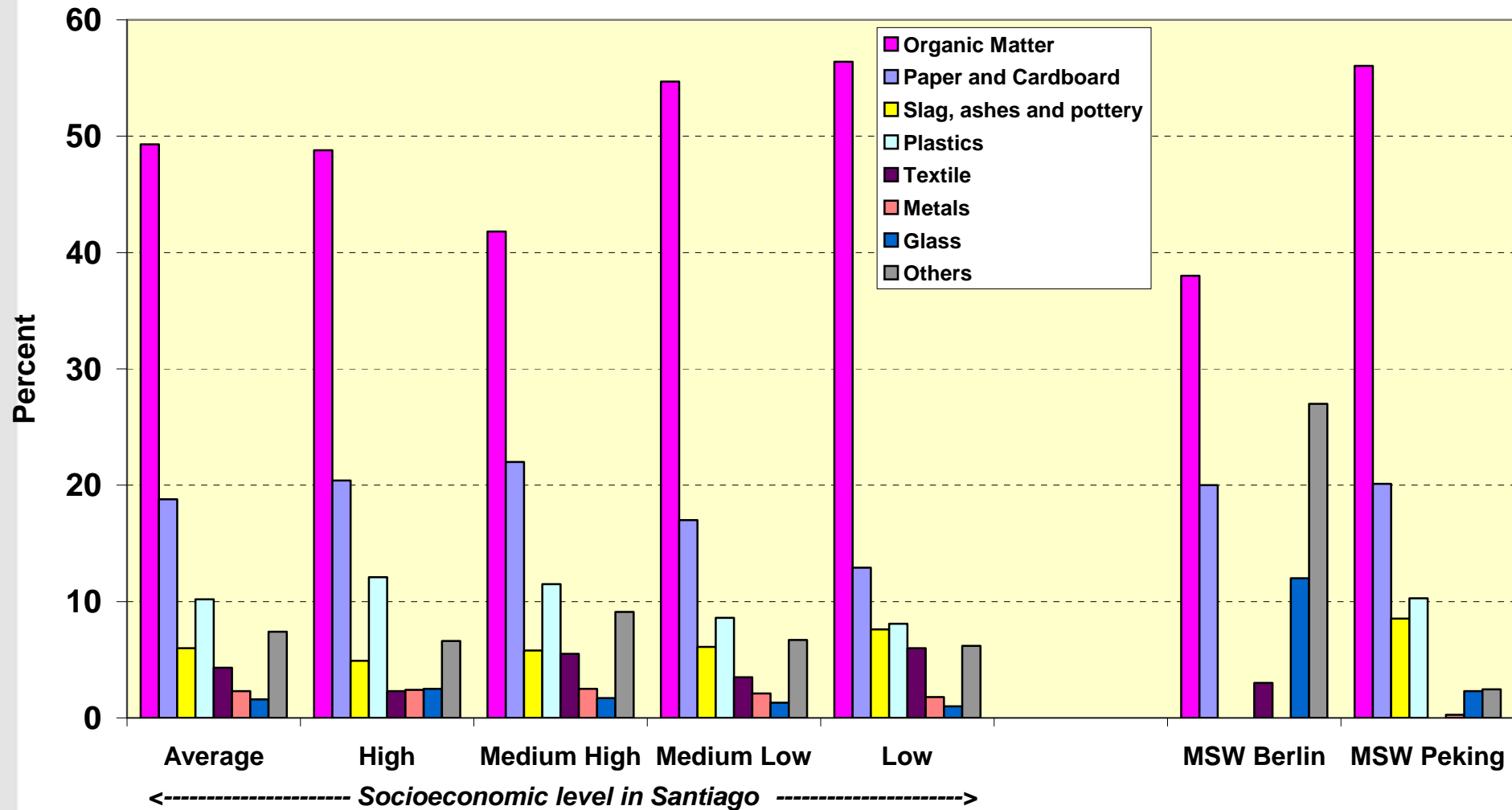
Specific Arising of MSW in Selected Cities (kg/(inhab*day))



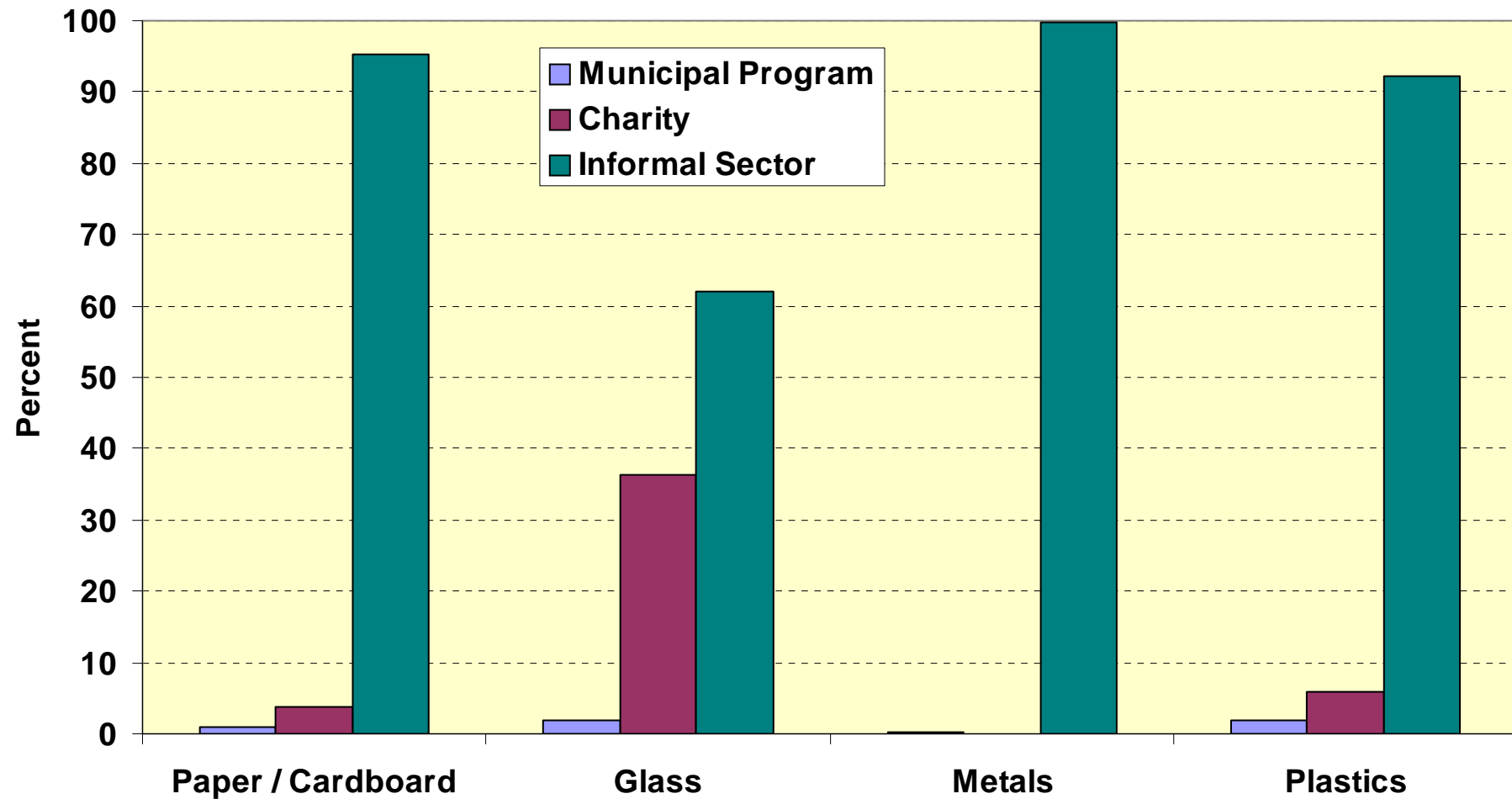
Specific Production of MSW for Different Regions

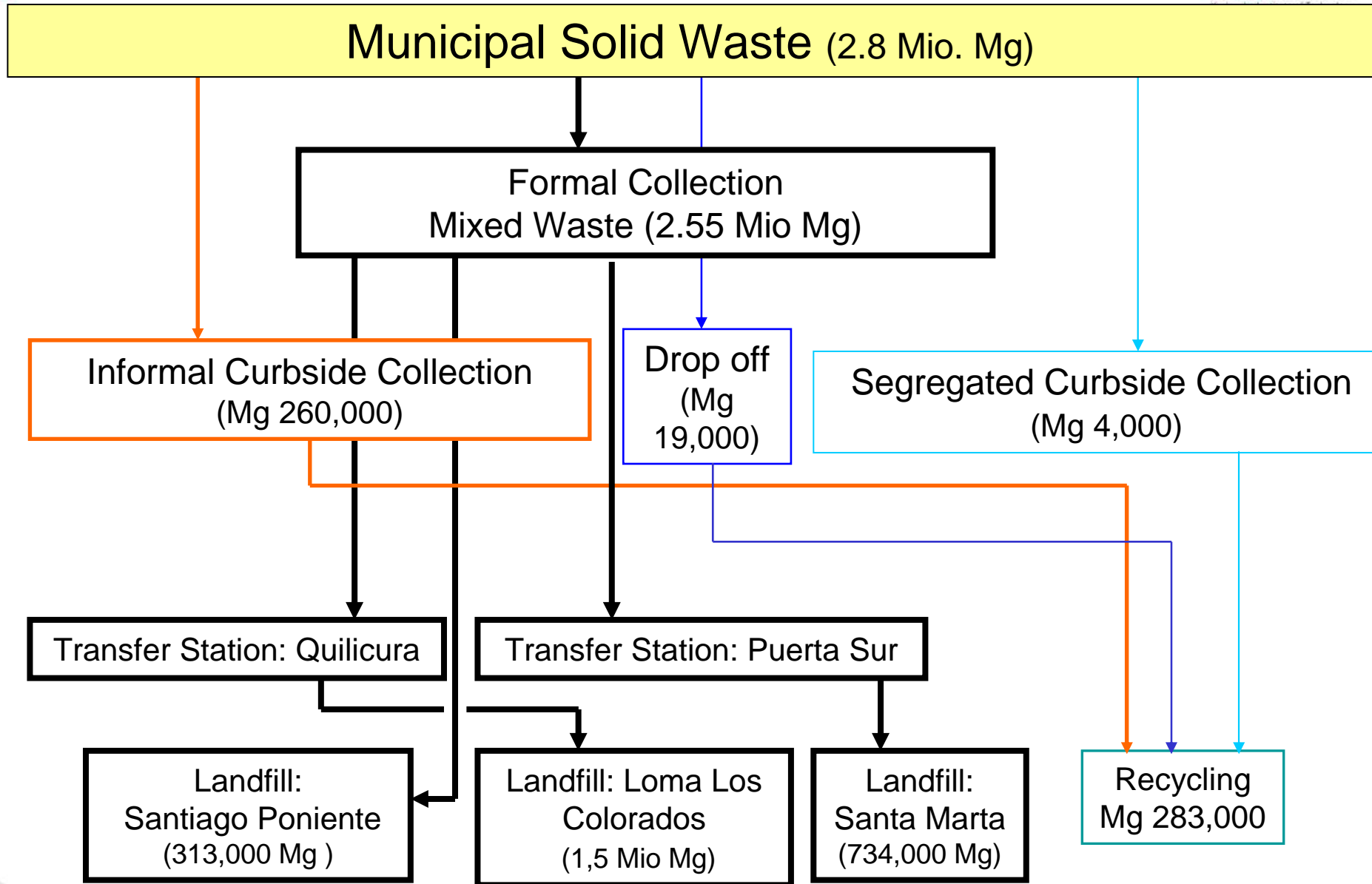


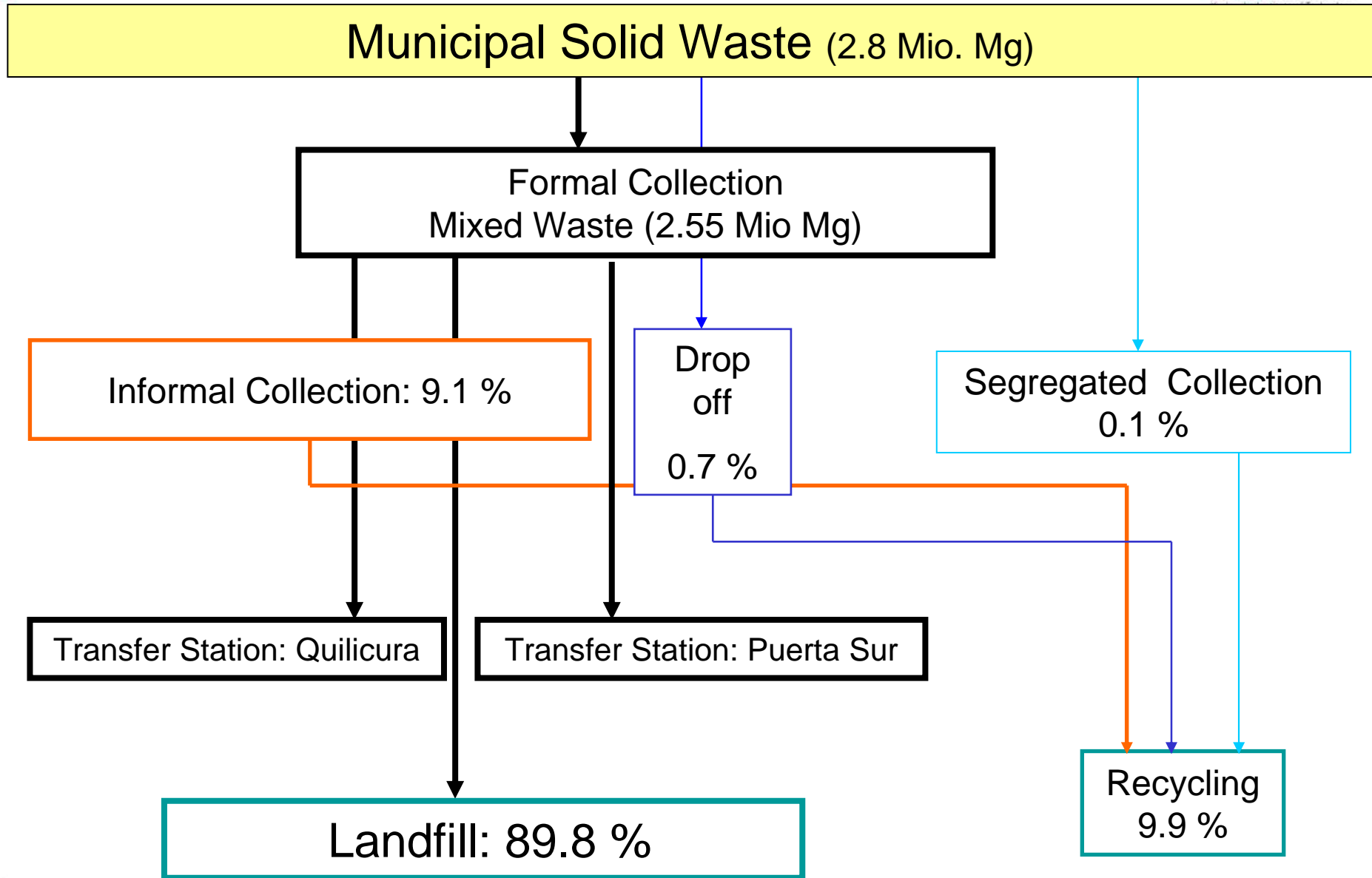
Mean Composition of MSW in Santiago According to the Socioeconomic Level



Materials Recycled in Santiago de Chile







Conclusions and Outlook

A brief overview about waste management in large cities was given.

This overview has shown that there are many deficits.

What can be done to achieve a more sustainable system of waste management?

Conclusions and Outlook

**Analyse the actual system of waste management in detail
(waste arising, waste composition, waste treatment)**

Work out main deficits

**Set up different options for future waste management systems,
e.g. on the basis of scenarios on the development of waste arising
and waste composition**

**Analyse and evaluate these options/scenarios and discuss the
results with scientists and stakeholders from the resp. city**

**Work out recommendations for a better (more sustainable) waste
management system**

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Thanks for your Attention

