

APPENDIX D. COSTS OF SOLID WASTE MANAGEMENT TECHNOLOGIES

Before making an investment in an MSW treatment technology, decision-makers must know what costs are entailed. Predicting such costs is possible to some extent, but it is necessary to specify the exact technology under consideration and the circumstances in which it will be used.

Making general comparisons between technologies, to be used as guides across a wide variety of situations, is very difficult. When specifying costs for an MSWM technology, one has to take into account a large range of factors that may vary considerably from one country to another and even within one country.

Definitions can be problematic. For example, in estimating the cost of a municipally sponsored materials recovery program, the specification of what is to be collected, and the method of including (or not including) avoided landfill costs, can have large effects on the estimates of costs. For example, the cost of landfilling depends significantly on conditions at the site chosen and on the methods that will be employed for monitoring and controlling leachate and landfill gas production. As another example, there are many types of vehicles and methods that can be used for waste collection and, consequently, the costs of collection can vary substantially among the alternatives.

When making comparisons among countries, fluctuating (and sometimes overvalued) exchange rates complicate the process of estimating costs. High rates of inflation in many countries make it difficult to consistently translate dollar costs into local costs. Subsidisation or taxation of local or imported inputs into MSWM activities can lead to a significant difference between the simple financial cost of implementing a technology and the real economic cost of doing so.

With the above discussion in mind, it is possible to make some very broad generalisations about MSWM costs. Table D-1 presents estimated costs of some MSWM technologies as a function of income level, i.e., low, middle, and high. High-income levels are associated with highly industrialised regions or countries. Both waste generation rates and costs of solid waste management systems reflect the level of industrial development. The technologies listed in the table are collection, transfer, and sanitary landfill. Also shown in the table are estimates of the cost of solid waste management as a percentage of income. As indicated by the data in the table, the proportion of income spent on MSWM in high-income regions is generally lower than that in low-income regions.

Table D-2 compares the disposal costs of some alternative technologies for large cities, listed approximately in order of increasing cost of disposal.

Table D-1. Costs of solid waste management as a function of income

	Low Income	Middle Income	High Income
Avg. Waste Generation (Mg/cap/yr)	0.1	0.2	0.7
Income (US\$/cap/yr)	500	3,000	25,000
Collection cost (US\$/Mg)	15 to 40	25 to 75	75 to 150
Transfer cost (US\$/Mg)	4 to 10	6 to 20	20 to 25
Sanitary landfill (US\$/Mg) (US\$/Mg)	5 to 25	15 to 20	30 to 100
Total Cost without Transfer	20 to 65	40 to 95	105 to 250
Total Cost with Transfer	24 to 75	46 to 115	125 to 275
Cost as % of Income	0.4 to 1.6%	0.2 to 0.7%	0.3 to 0.8%

1. Average income values based on selected world development indicators from the World Development Report 2000/2001, published for The World Bank by Oxford University Press.
2. Costs are for owning, operation, maintenance, and debt service in 2002, and assuming no equipment provision through grants.

Table D-2. Disposal costs of alternative technologies for large cities

	Low Income	Middle Income	High Income
Open dumping (US\$/Mg)	0.5 to 2	1 to 3	Not applicable
Sanitary landfill (US\$/Mg)	5 to 25	15 to 30	30 to 100
Composting (US\$/Mg)	5 to 25	15 to 40	30 to 80
Incineration (US\$/Mg)	30 to 60 (Note 5)	30 to 80 (Note 4)	70 to 100 (Note 4)

1. The above sanitary landfill costs are for cities of over 500,000 people, or over 250 tonnes/day, in order to capture economies-of-scale. For smaller cities, costs could be higher.
2. The higher range of costs for sanitary landfill is for systems with plastic membrane bottom liners and leachate collection and treatment systems; while the lower range of costs is for natural attenuation landfills, where site conditions do not require leachate management.
3. The higher range of costs for composting is for systems with mechanised classification, pulverisation, and forced aeration, while the lower range of costs is for systems with hand sorting, trommel screening, and simple turned windrows.
4. The higher range of costs for incineration is for systems with modern air pollution control and ash handling systems, while the lower range of costs is for systems with limited air pollution control equipment and no specialised ash handling equipment.
5. Limited air pollution control equipment and no specialised ash handling.