

MACAO (CHINA)

General information

Area:	25.4km ²
Population:	0.44 million
City GDP per capita:	USD 14,055
Total income:	USD 1.1 billion

Solid waste generation

Total generation:	229,444 ton/year (629 ton/day)
Waste generation per capita:	1.43kg/person · day
Waste source:	72% household, 8% commercial, 15% industrial

Solid waste management

Collection:	Private sector carries out collection and transport of waste
Recycling:	Paper, plastic bottles, aluminium cans (300 recycling points)
Incineration:	Capacity of 778 ton/day, volume reduced to 20% after incineration
Final treatment:	Sanitary landfill (incineration residue, construction waste, animal carcasses, used tires)
Expenditure:	USD 17 million/year (Collection/transportation: USD 12.7 million, MSW incineration: USD 3.9 million, Landfill: USD 625,000), with a rate of 1.5% in the total budget.

Major challenges and strategies

Management of municipal solid waste is carried out by the Civic and Municipal Affairs Bureau (Department of Environment, Hygiene and Licensing), the Office for Infrastructure Development, and the Port Authority. Due to Macao's geographic area, high cost of land, and long-term waste treatment facility, incineration was the most appropriate technology to address environmental concerns.

Because of issues associated with insufficient land resources for waste disposal, solid waste management in Macao must also focus on decreasing waste generation through reuse, reduction, and recycling. There are a number of constraints limiting the extent of waste recovery and recycling activities, i.e., low public awareness; lack of financial incentives to reduce waste because costs for collection and disposal services are not linked directly with the quantity of wastes; restrictions on source separation and storage practices; and low value of recovered materials (plastic bottles, tires). Other barriers to the waste recycling campaign include high land and labour costs and the lack of market demand, which discourages the recovery of marginal materials and investments in waste recovery technology. Macao is conducting studies on the improvement of recycling through education and public relations, and allocating land for recycling.

Since 1992, the collection and transportation of municipal solid waste (MSW) and incineration have been contracted out to two private companies

- (1) Companhia de Sistemas de Resíduos, Limitada (CSR): Carried out collection, cleaning and maintenance of public garbage containers (380 staff, with 25 refuse compacted collection truck, 4 high pressure water jet vehicles, 6 sweeping vehicles).
- (2) Additional company: Incineration of 36 tons/per hour, 283,800tons/per year and generated 12MW of power for its own consumption. Remaining work is contracted out to a concessionary electric company that is operating the local public power supply network.

The private sector's motivation for profit will lead to the efficient conduct of activities to consistently improve returns, development of innovative methods to enhance services, more investment in the quality of assets to reduce long term maintenance and operating costs, and management of risks associated with completing investment projects in time and on budget. This type of service contract helped avoid "government failure" to improve efficiency, improved the capacity of local and central governments, and improved environmental technology and management skills, as well as contributed to the promotion of environmental business.