

Rio de Janeiro, the second-largest city in Brazil and the third-largest metropolitan area in South America, has over 6.3 million inhabitants, approximately 22% of whom live in slums. Although Rio provides full waste collection services in parts of the city, there are a number of high-density slum areas that do not receive waste collection services because of the difficulty with collecting waste with traditional collection vehicles in these areas. Rio has implemented a recycling program in parts of the city and composting in a centralized composting plant, but the recycling rate is still fairly low and the composting program faces challenges associated with converting low-quality organic waste into quality compost. Rio has a new sanitary landfill that receives the bulk of the city's waste and is nearly 70 kilometers from the city's Caju Transfer Station. This new landfill, the recently closed landfill it replaced, and a small public landfill all present important opportunities for landfill gas (LFG) recovery and use.

Rio Fast Facts

- Population: Approximately 6.3 million (12 million in Greater Rio region) (as of 2010)¹
- Population density: More than 5,000 people per square kilometer¹
- Annual growth rate: 0.5%¹
- Per capita income: 10,800 USD (as of 2010)²
- Percentage below poverty line (monthly earnings less than 30 USD): 8.5% (all of Brazil)³
- Percentage of city covered with slums: 2%⁴
- Percentage of population living in slums: 22%⁵



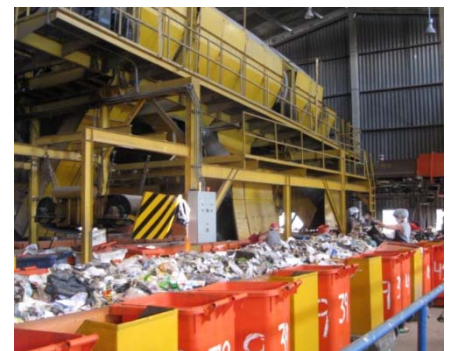
Solid Waste Management in Rio

Waste Generation

Rio generates approximately 3.5 million metric tons of solid waste annually.¹ The waste stream is approximately 27% organic matter by weight. Per capita waste generation is approximately 1.6 kilograms per person per day.¹

Waste Collection

Waste collection and disposal is coordinated by the Companhia Municipal de Limpeza Urbana (COMLURB). COMLURB provides full waste collection services in planned areas of the city, and collection fees are incorporated into Rio's property taxes. Collection in the city's low-income communities (or *favelas*) remains inadequate, in part because these areas are not easily accessed with traditional collection vehicles. The city is working to improve services in these areas. In addition, Rio is evaluating options for optimizing waste collection routes to reduce fuel consumption and associated particulate emissions (including black carbon).



Waste Disposal

Rio has four transfer stations (and plans for three more) and two material recovery facilities that receive and redirect collected waste. The facilities are operated by recyclables picker cooperatives that manually sort materials. The cooperatives employ about 160 people from neighboring low-income communities. Waste that is not diverted is landfilled. Rio recently closed its primary disposal site (i.e., the public Gramacho landfill) and began sending the bulk of its waste to a new state-of-the-art sanitary landfill (i.e., Seropedica) located nearly 70 kilometers outside the city (from Caju Transfer Station). The new sanitary landfill, which has an expected lifetime of 30 years, is operated and owned by a private consortium. Rio is a pioneer in the recovery and use of LFG. During the 1980s, the city initiated one of the first projects in the world to convert LFG into vehicle fuel. At the recently closed Gramacho landfill, a new biogas purification plant will deliver 10,000 cubic meters of high-grade gas per day to one of the country's main refinery complexes through a 5,500-meter pipeline. Another option that holds promise, for the new landfill and the public landfill, is the conversion of LFG into vehicle fuel for use in the city's waste transfer and collection vehicles.

Organic Diversion

Rio's waste stream contains a large quantity of organic material – approximately 50% of household waste. The city currently operates a 200 ton-per-day composting project that uses feedstock from large organic waste generators (e.g., wholesale food markets) combined with the organic waste that is separated at the material recovery facilities. The city is considering additional opportunities for diverting bulk quantities of clean, quality organic waste (e.g., from tree pruning in city parks and streets and by electric utilities performing power line maintenance) to be composted.



Recycling

The majority of Rio's recycling effort is dependent on recyclables pickers recovering valuable materials from waste bins in the streets and in the city's recycling facilities. Rio also has commercial paper and cardboard recycling programs, but about 15% of the household waste stream is still composed of paper and cardboard and the city is considering strategies for increasing recovery and recycling of these materials.

Climate and Clean Air Coalition Municipal Solid Waste Initiative

The Climate and Clean Air Coalition (CCAC) is a voluntary partnership uniting governments, intergovernmental and nongovernmental organizations, and representatives of civil society and the private sector in the first global effort to address emissions of short-lived climate pollutants, including methane and black carbon, as a collective challenge. The CCAC Municipal Solid Waste Initiative is working with government officials, sanitation engineers, private entrepreneurs, and other stakeholders in pilot cities to help build capacity to improve waste management.

¹ EPA CCAC MSW Initiative Assessment

² IBGE, 2010 (ftp://ftp.ibge.gov.br/Contas_Regionais/2010/contasregionais2010.pdf)

³ IBGE, 2010 (http://www.ibge.gov.br/home/estatistica/populacao/censo2010/indicadores_sociais_municipais/indicadores_sociais_municipais.pdf)

⁴ EPA CCAC MSW Initiative Assessment

⁵ EPA CCAC MSW Initiative Assessment