Rio de Janeiro_Brazil

With 12.3 million residents, Rio de Janeiro is the second most populous metropolitan area in Brazil. Just over half of its residents live within the Rio city limits, about 6.4 million, making it the sixth most populous city in the Latin American Green City Index. All of the figures included in the Index are based on the city proper of Rio de Janeiro. Together with the wider metropolitan region, Rio generates just over 5% of Brazil's GDP; it is the second largest economy in the country, behind São Paulo. The city's commercial activities are largely dominated by tourism and services. Brazil's oil industry is based in Rio, as are the country's biggest mining company and one of the most important television networks. Recently the city has received a great influx of investments ahead of a series of high-profile events, including the UN Conference on Sustainable Development in 2012, the World Cup in 2014 and the 2016 Olympic Games. Rio is therefore in a unique position in the Index to greatly improve its urban development and environmental performance over the coming years. Investments are predominantly being made in infrastructure to accommodate an expected heavy inflow of visitors.

Rio ranks above average overall in the Latin American Green City Index. The city's best placement is in the area of environmental governance, where, with Mexico City, it ranks well above average. Its impressive performance in this category is thanks to a robust record on environmental monitoring and environmental management. Rio also performs well in the energy and CO_2, and land use and buildings categories, emerging above average. The city boasts a strong clean energy policy and strictly regulates environmental standards for the construction of new buildings. Rio de Janeiro receives average ranks in the areas of transport, waste, sanitation and air quality. Its overall score is constrained, however, by a below average placement in the water category, which is due partly to having the highest rate of water system leakages in the Index. Rio's performance compares favourably when measured against the seven cities of similar incomes (those with a GDP per capita between US$8,000 and US$16,000). It is one of three mid-income cities that ranks above average overall, and has the second lowest stock of cars and motorcycles among the same peer group.

Energy and CO_2: Rio de Janeiro ranks above average in energy and CO_2. The city's performance in this category is largely due to its clean energy policies and its clear goals for the reduction of CO_2 emissions outlined in the city's climate change action plan (see "green initiatives" below). In 1988 Rio became the first city in Latin America to publish an inventory of CO_2 emissions. The city emits an estimated 73 kg of CO_2 per person from electricity usage, below the 17-city average of 202 kg. This relatively low level of CO_2 emissions is a result of a very high contribution of renewable energy to the city's electricity production. Eighty-eight percent of Rio's electricity comes from renewable sources, primarily hydropower. The city consumes 678 megajoules of electricity per US$1,000 of GDP, which is below the Index average of 761 megajoules.

Green initiatives: In 2009 the city unveiled its comprehensive climate change programme, "Rio Sustainable". The plan foresees an 8% reduction — from 2005 levels — in the emission of CO_2 and other greenhouse gases in the city by 2012, a 16% reduction by 2016 and a 20% reduction by 2020. As part of the programme, the city conducted a full review of CO_2 emissions in collaboration with the federal university of Rio de Janeiro. The plan outlines a number of ways the city will meet its reduction targets, including the mitigation of emissions from transport and waste, the installation of energy-efficient LED lights in municipal buildings and street lights, and public awareness initiatives, among other programmes.
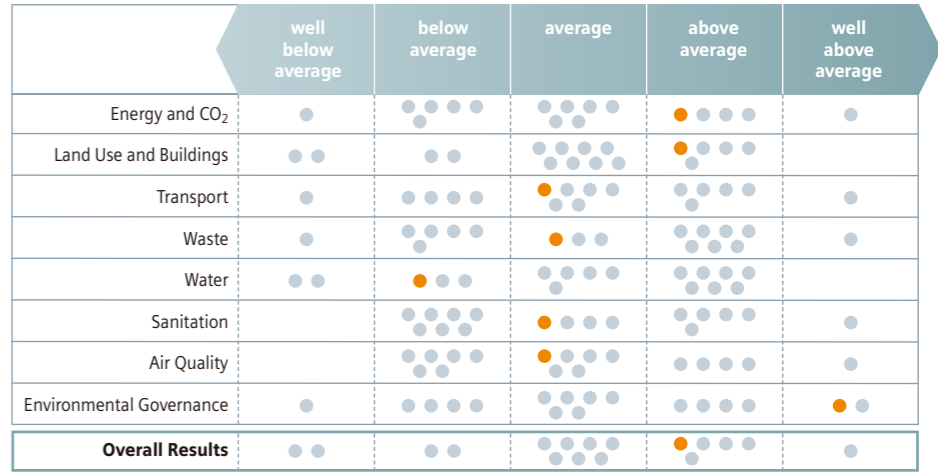
Land use and buildings: Rio ranks above average in the land use and buildings category. The city scores particularly well thanks to its very ambitious land use and eco-buildings policies, which are among the best in the Index. Moreover, the city, which has two of the world's largest urban forests, the Pedra Branca Natural Park and the Tijuca Forest, boasts 58 square metres of green space per person. Although the latest available data for Rio dates back to 2001, while the data for other cities is more current, this is relatively high by Index standards. The city strives to maintain its green spaces, and boasts a strict set of laws aimed at protecting these areas from development.

Green initiatives: Ahead of the 2016 Olympic Games, Rio is redeveloping the residential and commercial areas around its port. The US$200 million project involves refurbishing historical buildings, improving transport access and sanitation services, and creating cycling lanes and green spaces, including a green corridor lined by 11,000 trees. Around 30,000 people currently live in the run-down port area, and the city estimates that the neighbourhood will be home to more than 100,000 residents when the project is finished in 2016. Additionally, Rio's climate change action plan calls for the reforestation of protected areas. To achieve this, the city is investing US$15 million to plant 1,500 hectares of trees through 2012.

Transport: Rio de Janeiro ranks average in the transport category. Rio's public transport system consists of both buses and a metro, and is the longest in the Index, measuring an estimated 8.7 km per square kilometre of city territory — considerably longer than the 17-city average of 5 km per square kilometre. Its superior transport networks (defined in the Index as transport that moves large numbers of passengers quickly in dedicated lanes, such as a metro, bus rapid transit or trams) measure 0.12 km per square kilometre of city territory, just slightly longer than the Index average of 0.10 km. Rio's metro runs along two lines, extending a total of 47 km, which leaves large portions of the city served only by buses. The city's third metro line is currently under construction, scheduled for completion by 2016 (see "green initiatives" below). Rio's climate change action plan delineates goals for expansion of mass transport services, and further plans are laid out by the state transportation secretariat. According to official sources the city has 0.26 vehicles per inhabitant, which is just less than the Index average of 0.30 vehicles. This is the lowest ratio among the

Background indicators

Total population (million)	6.2
Administrative area (km²)	1,182.0
GDP per person (current prices) (US$) [e]	11,580.8
Population density (persons/km²)	5,234.1
Temperature (24-hour average, annual) (°C)	25.0

Based on City of Rio de Janeiro, e) EIU estimate

Performance

● Rio de Janeiro   ● Other cities

	well below average	below average	average	above average	well above average
Energy and CO_2	●	●●●●	●●●●	**●** ●●●	●
Land Use and Buildings	●●	●●	●●●●●	**●** ●	
Transport	●	●●●●	**●** ●●	●●●●	●
Waste	●	●●●●	**●** ●●	●●●●	●
Water	●●	**●** ●	●●●●	●●●●	
Sanitation		●●●●	**●** ●	●●●●	●
Air Quality		●●●●	**●** ●	●●●●	●
Environmental Governance	●	●●●●	●●●●	●●●●	**●** ●
Overall Results	●●	●●	●●●●	**●** ●	●

The order of the dots within the performance bands has no bearing on the cities' results.

Brazilian cities in the Index. Nonetheless Rio continues to suffer from endemic traffic problems, and the city has been slow to implement congestion reduction policies. Officials say they are creating limited vehicle zones, but other measures such as "no-car days" or carpooling lanes are missing so far.

Green initiatives: The city and state transportation departments are implementing an ambitious range of projects to improve public transport ahead of the World Cup and Olympic games. The state is investing US$678 million to double the capacity of the two existing metro lines to 1.1 million passengers a day. In addition to purchasing new trains, two new metro stations are being built and existing lines extended. In 2010, the city was scheduled to start building its US$2.9 billion third metro line ("Line 4") to serve Rio's western region. The state transportation secretariat says the line will have the capacity for 230,000 passengers per day. Furthermore, by 2016 the city will have four major bus corridors, modelled after Curitiba's "bus rapid transit" (BRT) system. Rio also plans to extend cycling lanes from 140 km in 2009 to 340 km in 2012.

Waste: Rio de Janeiro ranks average in the waste category. The city generates 525 kg of waste per person per year, which is above the 17-city average of 465 kg per person per year, although it collects and disposes of nearly all of it. The city's waste is disposed in the Gramacho landfill, which is being replaced in 2011 (see "green initiatives" below).

The city earns middling scores for its policies on waste collection and disposal, and recycling and re-use. While Rio does enforce environmental standards for its landfills, its failure to dispose of household hazardous waste and chemical and pharmaceutical waste separately from regular municipal waste holds it back. Its performance in this area will likely improve, however,

following the adoption of a state initiative to improve waste collection and disposal, and improve landfill standards across the entire state of Rio de Janeiro. The programme will provide municipalities a total of US$88 million each year to eradicate all of the state's open air dumps and ensure that waste is properly disposed. It also places emphasis on recycling and composting.

Green initiatives: Rio's Gramacho landfill will be closed in 2011 and replaced by a new one currently under construction at Seropédica. The US$47 million state-of-the-art facility will cut CO2 emissions by 1.4 million tonnes each year by capturing methane gasses, and will also have the capacity to generate biogas.

Water: Rio de Janeiro ranks below average in the water category, largely due to high water system leakages and an above-average water consumption rate. Rio loses 58% of its water to leakages, the highest percentage in the Index and well above the already high 17-city average of 35%. The state waterworks company, Nova Cedae, estimates that 15% of the city's total water supply is lost to illegal connections in both informal settlements and large apartment blocks, and is investing heavily to expand water services in order to tackle this problem (see "green initiatives" below). Rio consumes 301 litres of water per person per day, compared to the Index average of 264 litres. Although the city does promote public awareness about efficient water consumption and encourage rational use with water tariffs, Rio earns only partial points in the area of water efficiency policy, because it lacks separate pipes for non-drinking water and does not recycle graywater. According to official data, nearly all of Rio's residents have access to potable water, and nearly 80% of this is supplied by the world's biggest water treatment plant, Guandu, a facility that produces 43,000 litres of potable water per second.

Green initiatives: Nova Cedae, the state waterworks company, is investing US$58 million per year to stop illegal connections to the city's water supply. The company also now supplies potable water to 111 of the city's informal settlements to reduce the need to connect illegally. Additionally, schools in Rio teach water conservation as part of the curriculum.

Sanitation: Rio de Janeiro ranks average in the sanitation category. An estimated 83% of Rio's residents have access to sanitation, which is one of the lowest rates in the Index and well below the average of 94%. In contrast, Rio treats an estimated 85% of its collected wastewater, considerably more than the Index average of 52%. New treatment facilities currently under construction will further improve Rio's performance. Rio's sanitation performance is also weighed down by a poor score for sanitation policies, primarily because it lacks a plan to promote environmentally sustainable sanitation services. The city fares better, however, in terms of wastewater treatment standards.

Green initiatives: Rio's largest initiative to improve sanitation, ongoing since 1994, is the Guanabara Bay Depollution Programme. At a cost of US$793 million, the programme involves the construction of 1,248 km of effluent collectors, 28 km of drains, eight wastewater treatment facilities and the expansion of sanitation services to 139,000 households. The programme is designed to address all aspects of the bay's environmental performance. It also includes works to improve flood control and the supply of potable water and waste collection for residents who live near the bay, though 90% of the budget has been allocated to sanitation.

Air quality: Rio de Janeiro ranks average in the air quality category. The city's traffic-choked streets are the main source of pollution, followed by pollution derived from municipal

waste. Rio's rugged topography prevents the dispersion of pollutants and high temperatures exacerbate the problem. Rio city has the highest incidence of nitrogen dioxide in the Index, with average daily levels at 58 micrograms per cubic metre, versus the 17-city average of 38 micrograms. However, thanks to Brazil's extensive ethanol programme, levels of sulphur dioxide are much lower at 4 micrograms per cubic metre, well below the Index average of 11 micrograms. Levels of particulate matter are also low, at 24 micrograms per cubic metre versus the Index average of 48 micrograms.

Green initiatives: The state of Rio de Janeiro

requires yearly emissions tests for all licensed cars, and vehicles that exceed emissions limits are not allowed on state roads. Furthermore, the city is testing 15 so-called B20 buses that run on diesel with a blend of 20% biodiesel. The city aims to have 8,500 B20 buses in operation by 2016. Authorities say the full fleet of B20 buses will reduce CO2 emissions by 148,000 tonnes and particulate matter by 3,300 tonnes per year.

Environmental governance: Rio ranks well above average for environmental governance, its best placement in the Index. This is mainly because of the efficient network of municipal and state-level institutions dedicated

to environmental monitoring, management and enforcement. The city has a strong record for monitoring air, water, waste, sanitation, transport, land use, human settlements, energy and green spaces, including urban forests. Rio also engages residents and NGOs on environmental projects. Non-governmental stakeholders have, for example, played a significant role in drafting plans for infrastructure development ahead of the 2016 Olympics. Rio has a designated environmental authority that oversees and implements all aspects of environmental policy. The authority collaborates closely with other city departments, including housing, transportation, science and technology, and urban planning.

Quantitative indicators: Rio de Janeiro

		Average	Rio de Janeiro	Year*	Source
Energy and CO₂	CO$_2$ emissions from electricity consumption per person (kg/person)	202.2	73.0 [1, e]	2009	EIU estimate; Light; International Energy Agency; Instituto Brasileiro de Geografia e Estatística; Intergovernmental Panel on Climate Change
	Electricity consumption per US$ GDP (megajoules per thousand US$ GDP)	760.7	677.8 [1]	2007	Light; Instituto Brasileiro de Geografia e Estatística; Economist Intelligence Unit
Land use and Buildings	Population density (persons/km²)	4,503.0	5,234.1 [1]	2009	Instituto Brasileiro de Geografia e Estatística
	Green spaces per person (m²/person)	254.6	58.0 [1]	2001	Secretaría Municipal de Meio Ambiente
Transport	Length of mass transport network (km/km²)	5.0	8.6 [1]	2009	Secretaría de Transportes; MetroRio; Confederação Nacional do Transporte; Instituto Brasileiro de Geografia e Estatística
	Superior public transport networks (km/km²)	0.13	0.12 [1]	2010	Secretaria dos Transportes Metropolitanos
	Stock of cars and motorcycles (vehicles/person)	0.30	0.26 [1]	2010	Denatran
Waste	Share of waste collected and adequately disposed (%)	96.2	98.6 [1, e]	2008	Secretaría Municipal de Meio Ambiente; Companhia Municipal de Limpeza Urbana
	Waste generated per person (kg/person/year)	465.0	525.2 [1]	2008	Secretaría Municipal de Meio Ambiente; Instituto Brasileiro de Geografia e Estatística
Water	Water consumption per person (litres per person per day)	264.3	301.3 [1]	2008	Sistema Nacional de Informações sobre Saneamento;Instituto Brasileiro de Geografia e Estatística
	Water system leakages (%)	34.6	57.7 [1]	2008	Sistema Nacional de Informações sobre Saneamento
	Share of population with access to potable water (%)	97.5	98.4 [1]	2007	Instituto Brasileiro de Geografia e Estatística
Sanitation	Population with access to sanitation (%)	93.7	83.4 [2, e]	2007	Instituto Brasileiro de Geografia e Estatística
	Share of wastewater treated (%)	51.5	85.3 [1, e]	2008	Sistema Nacional de Informações sobre Saneamento
Air Quality	Daily nitrogen dioxide levels (ug/m³)	37.8	57.7 [1]	2009	Instituto Estadual do Ambiente
	Daily sulphur dioxide levels (ug/m³)	11.4	3.5 [1]	2009	Instituto Estadual do Ambiente
	Daily suspended particulate matter levels (ug/m³)	48.0	24.0 [1]	2009	Instituto Estadual do Ambiente

* Where data from different years were used only the year of the main indicator is listed, e) EIU Estimate, 1) Based on City of Rio de Janeiro, 2) Based on City of Rio de Janeiro. Total population with access to sewage.