



The Arcadis Sustainable Cities Index 2022

# Methodology

The Arcadis Sustainable Cities Index (SCI) 2022 builds on a legacy index of **100 global cities** first published in 2015. The 2022 report incorporates a range of new indicators and cities, and measures activity across three “pillars”, ranking each city based on the results. The three pillars are Planet, People and Profit. The combined city-level sustainability scores for each pillar reveal the relative cumulative performance of the selected **100 global cities**.

## Cities list 2022

Europe	Americas	APAC	Africa
Vienna	Buenos Aires	Brisbane	Kinshasa
Brussels	Sao Paulo	Sydney	Cairo
Antwerp	Rio de Janeiro	Melbourne	Nairobi
Prague	Santiago	Wellington	Lagos
Copenhagen	Bogota	Shanghai	Johannesburg
Paris	Mexico City	Beijing	Cape Town
Lyon	Lima	Wuhan	
Marseille	Toronto	Guangzhou	
Berlin	Vancouver	Shenzhen	
Frankfurt	Montreal	Tianjin	
Munich	Ottawa	Macao	
Hamburg	New York	Chengdu	
Athens	Chicago	Hong Kong	
Budapest	Los Angeles	Mumbai	
Dublin	San Francisco	New Delhi	
Rome	Washington DC	Kolkata	
Milan	Boston	Chennai	
Amsterdam	Houston	Bengaluru	
Rotterdam	Dallas	Jakarta	
Oslo	Philadelphia	Tokyo	
Warsaw	Miami	Seoul	
Lisbon	Atlanta	Kuala Lumpur	
Riga	Detroit	Lahore	
Madrid	Denver	Karachi	
Barcelona	Seattle	Manila	
Stockholm	New Orleans	Singapore	
Zurich	Pittsburgh	Taipei	
Geneva	Baltimore	Bangkok	
Istanbul	Tampa	Hanoi	
London	Phoenix		
Manchester			
Birmingham			
Glasgow			
Leeds			
Edinburgh			





Our approach to the selection process of the indicators and pillars that underpin the SCI research is guided by the notion that cities are only truly sustainable when they have natural environments that are healthy and thriving; when local authorities support the quality of life of their communities; and when shared economic and social value is a priority.

#### Index structure

The index includes three pillars: Planet, People and Profit. Each pillar is made up of eight or nine indicators which provide data on specific themes. Some indicators comprise two or more individual metrics where they cumulatively provide the best perspective on the theme of that indicator, others feature one key metric that alone reflects the theme.

For example:

- The “Energy” indicator in the planet pillar is made up of two metrics: 1) Renewables as a share of primary energy consumption and 2) Energy use per capita.
- The “Ease of doing business” indicator is made up exclusively of the ease of doing business score compiled by the World Bank.

#### Index weighting

To ensure the index is as **objective as possible** as well as easily understood and explained, the basic structure aligns with previous approaches and is constructed from arithmetic averaging across all indicators within the three pillars and arithmetic averaging across the three pillars. Put simply, each metric within an indicator is weighted equally; each indicator within a pillar is weighted equally, and each pillar within the index is weighted equally.

## Metric detail

The Index comprises **51 individual metrics**:



- Population with access to open spaces (percentage of population)
- Number of shared bicycles (per 100k cyclists)
- City commitment to climate
- CO2 emissions (metric tons per capita)
- Energy use per capita (kWh)
- BEV, PHEV, other EV: share of new car registrations
- EV chargers (number per km2)
- Food waste per capita (kg), households
- Green spaces (percentage of city area)
- Hazard risk score (sum of probability-impact scores across hazards)
- Municipal waste treated (percentage)
- Annual mean exposure to PM 2.5 air pollution
- Renewables, share of primary energy consumption
- Sustainable transport modes (percentage of all modes)
- Proportion of safely treated domestic wastewater flows (percentage)
- Proportion of total wastewater flow safely treated
- Wastewater treatment (percentage of population).



- Monthly broadband cost (percentage of monthly per-capita GDP)
- Educational attainment (percentage of female population aged 25+ who at least completed upper secondary)
- Free Wi-Fi quality
- Gini coefficient
- Hospital beds (per thousand population)
- Homicides (per 100k population)
- Life expectancy at birth
- PISA mean score for maths, reading and science
- Physicians (per 1,000 population)
- Quality of transport infrastructure
- Total paid parental leave for mothers (weeks)
- Full-time rate equivalent parental leave for fathers (days)
- Thefts (per 100k population)
- Average annual working hours per worker.



- Access to electricity (percentage of population)
- City connectivity score
- Cost of living index
- Ease of Doing Business score
- Employment (percentage of population age 15+)
- Number of green bonds issued between 2016 and 2022
- GDP per capita, PPP dollars
- Number of LinkedIn job posts (per thousand population, aged 18-49, tertiary educated)
- Women using internet (percentage of female population, generally aged 10+)
- Labour force participation rate (percentage)
- Number of listed firms headquartered in city (per million population)
- Median mobile download speed (mb/s)
- Market capitalisation of firms headquartered in city (USD per capita)
- At least one online purchase in 2021 (percentage of population)
- Monthly cost of 1-bedroom apartment, city centre (percentage of monthly per-capita GDP)
- Rideshare fleet size, e.g. Uber, Lyft, etc. (per thousand population)
- Services share of GDP (percentage)
- Traffic congestion (hours lost per year)
- Universities in global top 1k (count)
- Real wage growth (year-on-year percentage, 3-year trailing average).

Some of the metrics within the index are available at the city level and some are only available at the country level. For example, the metric “Female labor force participation” is only available at the country level, therefore different US cities will score the same in this metric. Each pillar has been constructed to ensure that at least half of the metrics are available at the city level to ensure sufficient differentiation for cities within a given country. Some metrics are a combination of both city and country level data. In these instances, city-level data was prioritized subject to availability. If unavailable, country-level data was used.

### Standardization

Each metric is based on a score which varies according to how that data is collected. To allow for direct and fair comparison of those scores across the entire data set each metric has been standardized to a score of between 0 and 1. The positions of 0 and 1 in each case have been defined relevant to the best and worst cities in that particular metric with space added at the top and bottom to allow for future change or the addition of new cities. Each city is then assigned a performance score relative to their position between the best and worst cities in that particular metric.

For example, one of the simplest metrics in the index is “Availability of free wifi” which is a rank between 1 and 4 – 1 being the worst and 4 being the best. Those cities which rank 4 will have a standardized index score of 1 and those that rank 1 will have a standardised index score of 0.

### Imputation

As with almost any index of this size, it is necessary to impute additional data for cities within the SCI where the primary data sources cannot provide up-to-date information. In some cases, the index will infer city data from national data. For example, the number of “secondary-educated or above” population in a city might be inferred from the city population size and the national proportion of secondary-educated people.

### Partners

The strategy, concept and research design were developed in partnership by Arcadis and Man Bites Dog - a strategic communications consultancy specializing in global research-led campaigns. The data was collected and modelled by independent economic analysts Oxford Analytica.

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