

# **US and Canada Green City Index**

Assessing the environmental performance of major cities in the US and Canada

A research project conducted by the Economist Intelligence Unit, sponsored by Siemens

## **City Report – St. Louis**

**10 May 2011**

## Introduction

The US and Canada Green City Index measures the environmental performance of 27 major cities in the US and Canada and their commitment to reducing their negative environmental impacts in the future.

The methodology behind the Index was developed by the Economist Intelligence Unit in cooperation with Siemens. The methodology builds on the work of the Green City Index Series (Europe, Latin America, Asia and Germany) and aims to closely follow the structure of previous indices. However, to be applicable to the US and Canada, the Index has been adapted to accommodate variations in data quality and availability, and environmental challenges specific to the region. An independent panel of experts in the field of urban sustainability provided important insights and feedback in the construction of the Index.

The data used to compile the US and Canada Green City Index was collected and assembled by the Economist Intelligence Unit.

The publication of the US and Canada Green City Index is planned for June 2011. This document includes all the data as it will be published in the report.

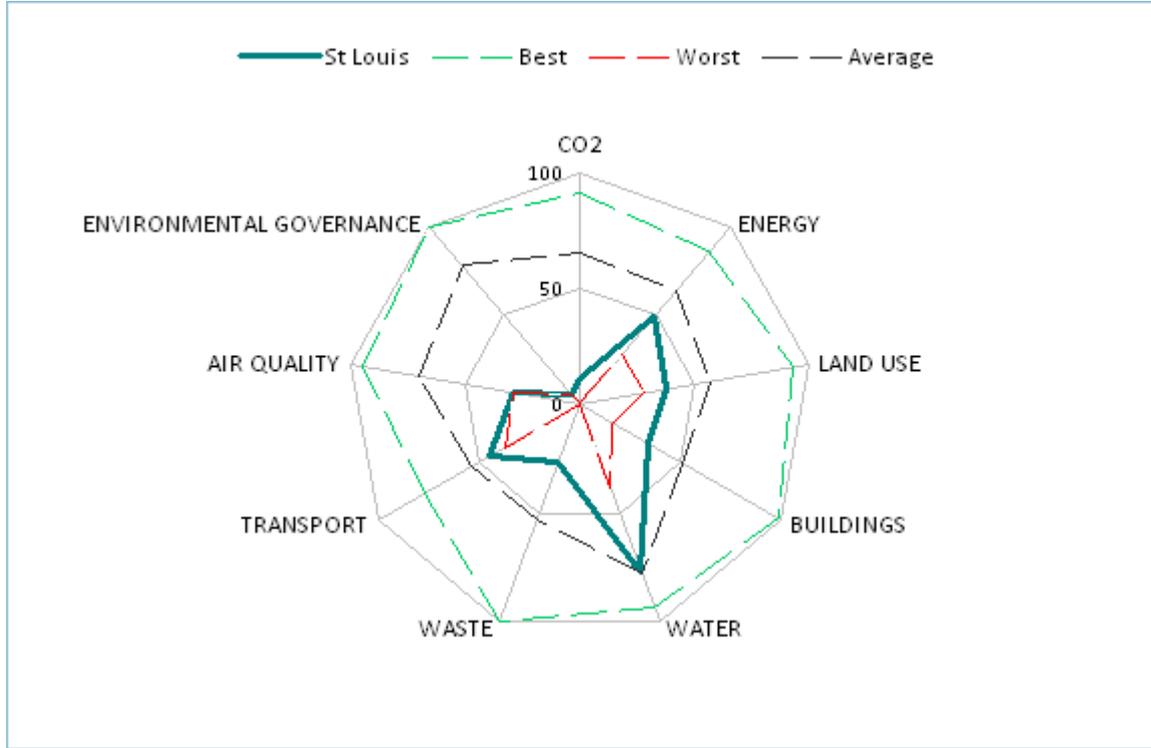
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## About the Economist Intelligence Unit

The Economist Intelligence Unit is the business-to-business arm of The Economist Group, which publishes The Economist Newspaper. Like The Economist, we are known for our global perspective, accurate analysis, objective thinking, business acumen and influential opinions. We pride ourselves as the world's foremost provider of country, industry and management analysis. For nearly 65 years, the Economist Intelligence Unit has delivered vital business intelligence to influential decision-makers around the world. Our extensive international reach and unfettered independence make us the most trusted and valuable resource for international companies, financial institutions, universities and government agencies. Today we have over 150 full-time country specialists and economists supported by an unparalleled global network of 650+ contributing analysts and editors. Our annual publications include the Business Environment Rankings, the Global Peace Index, Worldwide Cost of Living and the Digital Economy Rankings (formerly E-readiness rankings).

### Summary of results

Cities' performances in the US and Canada Green City Index in comparison to the best and worst city and the 27-cities-average; shows overall ranking position and sub-ranking position for all nine environmental categories.



	St Louis		Average	Best	Worst
	Score / 100	Rank / 27	Score / 100		
<b>OVERALL SCORE</b>	<b>35.1</b>	<b>26</b>	<b>63.4</b>	<b>83.8</b>	<b>28.4</b>
CO2	10.9	26	65.4	91.4	1.2
ENERGY	50.2	23	65.0	86.0	27.3
LAND USE	38.0	24	57.2	93.0	28.1
BUILDINGS	33.8	20	51.1	98.2	16.7
WATER	77.0	19	77.5	94.1	38.8
WASTE	26.6	24	53.2	100.0	0.0
TRANSPORT	44.4	23	53.8	76.6	37.5
AIR QUALITY	29.5	27	69.8	95.1	29.5
ENVIRONMENTAL GOVERNANCE	5.6	27	78.1	100.0	5.6

## Quantitative indicators

The table below shows the underlying data points used in scoring the quantitative indicators in the US and Canada Green City Index, including the source and year of the data. This overview will be included in the US and Canada Green City Index report.

Category/indicator	Average	St Louis	Year	Source	Geographical basis for data and further comments
<b>CO<sub>2</sub></b>					
CO <sub>2</sub> emissions per unit of GDP (tons/US\$m)	296.4	689.0	2002	Purdue University - The Vulcan Project; US Bureau of Economic Analysis	MSA; Using MSA GDP
CO <sub>2</sub> emissions per person (tons)	14.5	27.1	2002	Purdue University - The Vulcan Project; US Census Bureau	MSA; Using MSA population
<b>ENERGY</b>					
Electricity consumption per unit of US\$ GDP (TJ/US\$m)	0.33	0.17	2008	Energy Information Administration; US Bureau of Economic Analysis	State retail electricity sales scaled down to city level using population data; Indicator constructed using MSA GDP
Electricity consumption per person (GJ)	52.2	50.8	2008	Energy Information Administration; US Census Bureau	State retail electricity sales scaled down to city level using population data
<b>LAND USE</b>					
Green spaces as % of total area (%)	11.9	8.7	2008	Trust for Public Land	City; Using area of city in 2000
Population density (persons/miles <sup>2</sup> )	8,106.8	5,845.7	2009	US Census Bureau	City
<b>BUILDINGS</b>					
Number of LEED certified buildings (silver, gold or platinum) (buildings/100,000 persons)	6.4	9.3	2010	US Green Building Council; US Census Bureau	City; Using city population
<b>TRANSPORT</b>					
Share of workers traveling by public transport, bicycle, or foot (%)	13.0	4.4	2009	US Census Bureau American Community Survey	MSA
Length of public transport (miles/miles <sup>2</sup> )	1.1	0.2	2009	National Transit Database	Metro-area; Using service area square miles
Annual vehicle revenue miles (miles/person)	24.4	23.3	2009	National Transit Database	Metro-area; Using service area population
Maximum public transport vehicles available per square mile (vehicles/miles <sup>2</sup> )	9.0	1.0	2009	National Transit Database	Metro-area; Using service area square miles
Average commute time from residence to work (minutes)	28.9	24.8	2009	US Census Bureau American Community Survey	MSA
<b>WASTE</b>					
Recycled municipal waste (%)	25.8	2.5	2008-2009	City of St. Louis, Department of Streets, Refuse Division	City

**WATER**

Total water consumption per person per day (gallons)	155.1	185.9	2005	USGS	MSA; Using USGS publicly supplied population
Water leakages in water distribution system (%)	13.0	3.0	2009	City of St. Louis	City

**AIR QUALITY**

Nitrogen oxides emissions per annum (tons/person)	0.033	0.062	2005	EPA; US Census Bureau	County; Using county population
Particulate matter (PM10) emissions per annum (tons/person)	0.013	0.018	2005	EPA; US Census Bureau	County; Using county population
Sulfur dioxide emissions per annum (tons/person)	0.011	0.032	2005	EPA; US Census Bureau	County; Using county population

**BACKGROUND INDICATORS**

Total population (millions)	1.35	0.36	2009	US Census Bureau	City
Administrative area (miles <sup>2</sup> )	210.7	61.0	2000	US Census Bureau	City
GDP per person (real) (US\$)	45,975.5	37,579.8	2008	US Census Bureau	MSA; Using MSA population
Temperature (24-hour average, annual) (°F)	56.0	56.3	1971-2000	NOAA	City
Goods employment (%)	13.8	14.3	2009	US Bureau of Labor Statistics	MSA
Services employment (%)	86.2	85.7	2009	US Bureau of Labor Statistics	MSA

## US and Canada Green City Index - Methodology

Cities included in the US and Canada Green City Index were selected with a view to representing a number of the most populous Metropolitan Statistical Areas (MSAs) in the United States, as defined by the U.S. Office of Management and Budget, and the most populous Census Metropolitan Areas (CMAs) in Canada, as defined by Statistics Canada. The core city within each of the 22 US MSAs was chosen for inclusion in the Index.

The methodology behind the US and Canada Green City Index was developed by the Economist Intelligence Unit in cooperation with Siemens. An independent panel of urban sustainability experts provided insights and feedback on the methodology. The Index scores cities across nine categories—CO<sub>2</sub>, energy, land use, buildings, transport, water, waste, air quality and environmental governance—and is composed of 31 indicators.

Sixteen of the Index's 31 indicators are derived from quantitative measurements—e.g., a city's CO<sub>2</sub> emissions, electricity consumption, prevalence of public transport, and levels of air pollutants. The remaining 15 indicators are qualitative assessments of cities' environmental aspirations and ambitions—e.g., a city's commitment to consuming energy produced from green and local sources, the extent to which it promotes usage of public transport and makes efforts to reduce road traffic, the ambitiousness of its waste reduction and water management policies, and the stringency of its environmental strategy.

The goal of the Index is to allow key stakeholder groups, such as city authorities, policymakers, infrastructure providers, environmental NGOs, urban sustainability experts, and citizens, to compare how their city performs against other cities, both overall and within each of the nine categories. The Index also allows cities to be filtered by six measures: population size, administrative size, GDP per capita, temperature, proportion of population employed in the goods sector, and proportion of population employed in the services sector.

### Data sources

A team of in-house and external contributors from the Economist Intelligence Unit collected data for the Index in late 2010. Wherever possible, publicly-available data from official sources was used. Data sources for US cities included the US Census Bureau, the US Environmental Protection Agency, the US Geological Survey, the National Oceanic and Atmospheric Administration, the Trust for Public Land, Purdue University's Vulcan Project, the National Transport Database, and the "State of Garbage in America" report conducted by BioCycle and the Earth Engineering Center of Columbia University. For Canadian cities, sources included Statistics Canada, Environment Canada, and the Conference Board of Canada. When data was not available from national sources, it was collected from city agencies and authorities. National sources were favoured over city sources given that data obtained from national sources is measured in a consistent manner across the cities included in the Index.

Particular attention was given to the geographical level at which the data was collected, and efforts were made to collect data at a consistent geographical level across the 27 cities in the Index for each of the 31 indicators. In practice, this sometimes involved choosing city-level data or metropolitan-area data depending on the geographical area at which the data was more commonly available for the range of cities covered in the Index.

Every effort was made by the Economist Intelligence Unit to integrate the most recent data. When uncertainties arose regarding the accuracy of individual data points, the agency or city official from which the data was sourced was contacted to confirm. The main exception to the rule of using the most recent data is for CO<sub>2</sub> emissions for US cities. Here, the Vulcan Project data (from 2002) was chosen over data available from city agencies because it ensures that CO<sub>2</sub> emissions are measured in a consistent manner for all US cities in the Index.

In the several instances in which gaps in the data existed, the Economist Intelligence Unit produced estimates by scaling down data from larger geographical areas.

For the purposes of constructing indicators comparable across US and Canadian cities, all data obtained from Canadian sources in metric units was converted to units typically used in the United States. The exception to this is for CO<sub>2</sub> emissions, which were measured in metric tons in their original source, Purdue University's Vulcan Project.

Despite all of these steps, the Economist Intelligence Unit cannot rule out having occasionally missed an alternative reliable public source or more recent figures.

### Indicators

For the 16 quantitative indicators in the Index, the Economist Intelligence Unit first "normalised" the data points representing each quantitative indicator on a scale of 0 to 10, where the high benchmark was set by the best-performing city for each indicator and the low benchmark was set by the worst-performing city for a given indicator. The best-performing city for each indicator was assigned a score of 10, while the worst-performing city for each indicator was assigned a score of 0. Remaining cities were assigned a score between 0 and 10 according to their distance from the high benchmark.

Qualitative indicators were scored by Economist Intelligence Unit analysts with expertise in the city in question, based on objective scoring criteria that considered concrete actions being taken and strategies and targets set by cities. The qualitative indicators were scored on a scale of 1 to 3, with 3 points assigned to cities that met or exceeded the criteria established in each of the 15 indicators, 2 points assigned to cities that partially met the criteria, and 1 point assigned to cities that showed no progress toward meeting the criteria. The independent expert panel provided inputs into the criteria assigned to each indicator.

### Index construction

The Index is a composite of all 31 quantitative and qualitative underlying indicators. To arrive at the overall score for each city, the Economist Intelligence Unit first assigned each of the 31 indicators to a relevant category (CO<sub>2</sub>, energy, land use, etc.).

To create the category scores, each underlying indicator was aggregated according to an assigned weighting (as shown in the table below). In several cases, when indicators represented similar measures of environmental performance, they were bundled together and assigned the weight of a single indicator before the category score was calculated. The category scores were then rebased on a scale of 0 to 100.

Finally, to build the overall score for each of the 27 cities, each of the nine category scores were assigned an equal weighting (that is, multiplied by 11.1%) and summed to arrive at a final score on a scale of 0 to 100. The decision to assign equal weighting to the category scores reflects feedback from the expert panel and broader research on measuring environmental sustainability.

## List of categories, indicators and their weighting in the US and Canada Green City Index

Category	Indicator	Type	Weighting	Description	Normalisation technique
CO <sub>2</sub>	CO <sub>2</sub> emissions per unit of GDP	Quantitative	33%	Total CO <sub>2</sub> emissions, in tons per US\$m of GDP	Scored on a scale of 0 to 10 based on min/max of data for all cities
	CO <sub>2</sub> emissions per person	Quantitative	33%	Total CO <sub>2</sub> emissions, in tons per person	Scored on a scale of 0 to 10 based on min/max of data for all cities
	CO <sub>2</sub> reduction strategy	Qualitative	33%	Assessment of the ambitiousness of GHG emissions reduction strategy and of the rigour of the city's CO <sub>2</sub> reduction target and emissions measurements.	Scored by EIU analysts on a scale of 1 to 3 (composed of 3 sub-indicators)
ENERGY	Electricity consumption per unit of GDP	Quantitative	33%	Total electricity consumption, in TJ per US\$m of GDP	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Electricity consumption per person	Quantitative	33%	Total electricity consumption, in GJ per person	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Clean and efficient energy policies	Qualitative	33%	Measure of a city's commitment to promoting green energies, developing green energy projects, and increasing the amount of locally produced energy.	Scored by EIU analysts on a scale of 1 to 3 (composed of 3 sub-indicators)
LAND USE	Green spaces	Quantitative	25%	Sum of all public parks, recreation areas, greenways, waterways, and other protected areas accessible to the public, as percent of total area.	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Population density	Quantitative	25%	Number of persons per square mile.	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Green land use policies	Qualitative	25%	Assessment of a city's efforts to sustain and improve the quantity and quality (i.e., proximity and usability) of green spaces and its tree planting policy.	Scored by EIU analysts on a scale of 1 to 3 (composed of 2 sub-indicators)
	Urban sprawl	Qualitative	25%	Assessment of how rigorously a city promotes containment of urban sprawl and re-use of brownfield areas.	Scored by EIU analysts on a scale of 1 to 3 (composed of 2 sub-indicators)
BUILDINGS	Number of LEED certified buildings	Quantitative	33%	Number of LEED certified buildings, (silver, gold or platinum) per capita (buildings/100,000 persons)	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Energy-efficient building standards	Qualitative	33%	Assessment of whether a city requires energy audits and whether energy consumption regulations require that new buildings satisfy energy efficiency standards.	Scored by EIU analysts on a scale of 1 to 3 (composed of 2 sub-indicators)
	Energy-efficient building incentives	Qualitative	33%	Assessment of a city's incentives for retrofitting buildings to improve energy efficiency and how widely it promotes energy efficiency in homes and offices.	Scored by EIU analysts on a scale of 1 to 3 (composed of 2 sub-indicators)
WATER	Water consumption per capita	Quantitative	25%	Total water consumption, in gallons per person per day	Scored on a scale of 0 to 10 based on min/max of data for all cities

Category	Indicator	Type	Weighting	Description	Normalisation technique
	Water system leakages	Quantitative	25%	Share of non-revenue public water leakages; includes flushing, fire hydrants, all lost water.	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Water quality policy	Qualitative	25%	Assessment of the level and quality of a city's main water sources: whether the city uses recycled water; whether a city treats all its wastewater before discharging it into the surface water again; and whether the city promotes lower water usage through water meters, incentives to install modern technologies (e.g. low-flow shower, low-flush toilets), or awareness campaigns.	Scored by EIU analysts on a scale of 1 to 3 (composed of 4 sub-indicators)
	Stormwater management policy	Qualitative	25%	Indication of whether a city has a stormwater management plan.	Scored by EIU analysts on a scale of 1 to 3
WASTE	Percent of municipal wasted recycled	Quantitative	50%	Percent of municipal solid wasted recycled.	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Waste reduction policies	Qualitative	50%	Assessment of whether a city has "selective disposal mechanisms" in place for all types of waste, whether the city has implemented measures to reduce the creation of waste, and whether the city taken steps toward more sustainable local waste management practices (e.g., composting or converting local waste by-products to energy by methods such as methane capture).	Scored by EIU analysts on a scale of 1 to 3 (composed of 3 sub-indicators)
TRANSPORT	Share of workers traveling by public transit, bicycle, or foot	Quantitative	20%	Percent of workers traveling by public transit, bicycle, or foot.	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Public transport supply	Quantitative	20%	Length of public transport network (miles/sq. mile of geographical area), annual vehicle revenue miles of public transport system (miles/person), and maximum public transport vehicles available (vehicles/sq .mile)	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Average commute time from residence to work	Quantitative	20%	Average commute time from residence to work (minutes).	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Green transport policies	Qualitative	20%	Assessment of whether at least part of the city's public transport system operates on "green" fleets, such as biofuel or electric powered buses or trams; whether the city actively promotes public awareness around "green" transport (walking, cycling or public transport); whether the city encourages public transport take-up by offering integrated pricing; and whether the city offers either of fast-lanes for car-pooling or a free/low-cost public bicycle network.	Scored by EIU analysts on a scale of 1 to 3 composed of 4 sub-indicators)
	Congestion reduction policies	Qualitative	20%	Assessment of a city's efforts to reduce congestion. Criteria include: whether the city has any large central pedestrian zones or areas with limited traffic and whether the city's	Scored by EIU analysts on a scale of 1 to 3 (composed of 2 sub-indicators)

Category	Indicator	Type	Weighting	Description	Normalisation technique
				traffic management policies actively aim at improving traffic flow.	
AIR QUALITY	Nitrogen oxides emissions	Quantitative	25%	NOx emissions per annum (per person).	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Sulphur dioxide emissions	Quantitative	25%	SO <sub>2</sub> emissions per annum (per person).	Scored on a scale of 0 to 10 based on min/max of data for all cities
	PM10 emissions	Quantitative	25%	PM10 emissions per annum (per person).	Scored on a scale of 0 to 10 based on min/max of data for all cities
	Clean air policy	Qualitative	25%	Measure of a city's efforts to reduce air pollution. Criteria include: whether the city has adopted air quality targets and whether the city has adopted policies to sustain/improve air quality.	Scored by EIU analysts on a scale of 1 to 3 (composed of 2 sub-indicators)
ENVIRONMENTAL GOVERNANCE	Green action plan	Qualitative	33%	Measure of the rigour of a city's green action plan. Criteria include: whether the city has an integrated environment plan/strategy that addresses main environmental issues; whether the city's environment plan/strategy contain a baseline review, whether the city's environment plan/strategy contain explicit targets for each environmental issue; whether the city's environmental plan/strategy been endorsed by the mayor, the city administration or similar authority; and whether the city produces regular environmental reports to monitor and evaluate implementation of the plan.	Scored by EIU analysts on a scale of 1 to 3 (composed of 5 sub-indicators)
	Green management	Qualitative	33%	Measure of the extensiveness of environmental management undertaken by the city. Criteria include: existence of a dedicated environmental department, whether the city is involved in any form of international environmental commitment, and whether the public has access to information on the city's environmental performance and policies.	Scored by EIU analysts on a scale of 1 to 3 (composed of 3 sub-indicators)
	Public participation in green policy	Qualitative	33%	Measure of the city's efforts to involve the public in monitoring its environmental performance. Criteria include: citizen and stakeholder involvement, access to information, and use of information campaigns on the necessity of behavioural change to tackle critical environmental issues.	Scored by EIU analysts on a scale of 1 to 3 (composed of 3 sub-indicators)