



Vancouver

US and Canada Green City Index

A coastal city in western Canada, the Vancouver metropolitan area is home to some 2.1 million people, making it the third most populous in the country. However, with just 580,000 people living within the city limits, Vancouver is the smallest Canadian city in the US and Canada Green City Index, and a combination of metropolitan and city-level data are used in the Index. Vancouver houses Canada's largest port, and its economy is dominated by shipping, forest products and mining. Despite recent surges in the tourism, film and high-tech industries, Vancouver's per capita GDP is estimated at just \$37,500 per person – the fourth lowest in the Index. Like San Francisco and New York, Vancouver is made up of islands and peninsulas, restricting the city's lateral growth. Vancouver ranks second overall in the Index, and tops the rankings in the CO₂ and air categories. The city has the lowest CO₂ emissions in terms of both population and GDP, while it

ranks in the top three for emissions of all air pollutants measured in the Index. Perhaps more impressively though, Vancouver ranks in the top seven for all categories, with the exception of environmental governance, where it ranks tenth. Already one of the best cities overall, Vancouver fares even better when compared with its peers; compared to other low-income cities, for example, Vancouver places first overall, and in the top two in all categories.

CO₂: First, 91.4 points

This is one of Vancouver's strongest categories in the Index. The city emits just 4.2 metric tons of CO₂ per person, well below the Index average of 14.5 metric tons. Measured against economic output, Vancouver emits just an estimated 111 metric tons of CO₂ per \$1 million of GDP, compared with the Index average of 296 metric tons. The city's low emissions are a result of policies geared at green energy promotion and the

dominance of hydropower in Vancouver's energy grid. Furthermore, officials are in the process of adopting a target to reduce CO₂ emissions by 33% by 2020, compared to 2007 levels. Vancouver is likely, therefore, to remain among the lowest emitters of CO₂ of major cities in North America.

Green initiatives: Vancouver's Community Climate Change Action Plan in 2005 aimed to reduce the city's greenhouse gas emissions by 6% from 1990 levels by 2012. The plan included initiatives for integrated land use; more sustainable energy; green building standards; road space allocation and pricing programs that promote walking, cycling and mass transit; and waste reduction. A greenhouse gas inventory in 2008 indicated that emissions had already been reduced to 1990 levels and the city was expected to reach its goal of a 6% reduction by the end of 2011. These reductions are all the more impres-

sive because they have occurred while the population has grown by more than 27% and the number of jobs has increased by over 18%. In 2010 Vancouver unveiled a new plan – the Greenest City Action Plan, currently awaiting approval – which aims to accelerate the current momentum by reducing greenhouse gas emissions by 33% by 2020 from 2007 levels and reach its stated aim of becoming the “greenest city in the world”. In addition, the city runs the voluntary Corporate Climate Leader program for local businesses. Participating companies complete a GHG inventory, set targets for reductions, and then commit to having the inventory updated to see if they met the targets. The long-term goal of Vancouver's climate change strategy is to totally eliminate the city's dependence on fossil fuels.

Energy: Fourth, 80.1 points

Vancouver's per capita electricity consumption is better than average at 33 gigajoules per person, versus the Index average of 52 gigajoules. Likewise, the city consumes 237 gigajoules of electricity per \$1 million of GDP, compared with the overall mean of 332 gigajoules. Where Vancouver shines, though, is in its sustainable energy strategy, which seeks to provide high-density neighborhoods with financing for community renewable-energy systems, helping cover high up-front costs, while recouping the benefits through long-term lower operating expenses. Vancouver is one of just six Index cities actively increasing the amount of locally produced and consumed energy.

Green initiatives: Vancouver's Neighborhood Energy Utility (NEU) is a local government-owned utility that provides locally generated heat and hot water to the neighborhood surrounding the city's Olympic village. NEU is the first utility in North America to use waste heat recovery from untreated urban wastewater, an innovative green technology that eliminates over 60% of the carbon emissions associated with the heating of buildings. Furthermore, Vancouver is financing up to 50%, or about \$3,500, of the cost of installing residential solar hot water systems. As a pilot, the incentive is available to 50 new houses on a first-come, first-served basis.

Land use: Fifth, 74.1 points

Like other cities with geographical constraints, Vancouver has a high population density, at 13,100 people per square mile (5,000 people per square kilometer), far above the average of 8,100 people per square mile (3,130 people per square kilometer), and the fourth highest in the Index. Twelve percent of Vancouver's territory is considered green space, which is on par with the



Index average. However, the city is likely to improve in this area thanks to policies aimed at encouraging tree planting and park creation (see “green initiatives” below).

Green initiatives: In 2010 Vancouver set a target for all residents to live within a five-minute walk of a park, greenway, or other green space – while also planting 150,000 new trees – by 2020. Specific strategies include acquiring new parkland, adding trees and planted areas to existing bikeways, and preparing a citywide urban forest management plan. Additionally, in the run-up to the Winter Olympics in 2010, Vancouver sought to regenerate brownfields for new Olympic sites, including the Olympic village, which now serves as apartments. The projects have increased downtown Vancouver's residential population by nearly 13,000 people and provided them with extensive waterfront parkland.

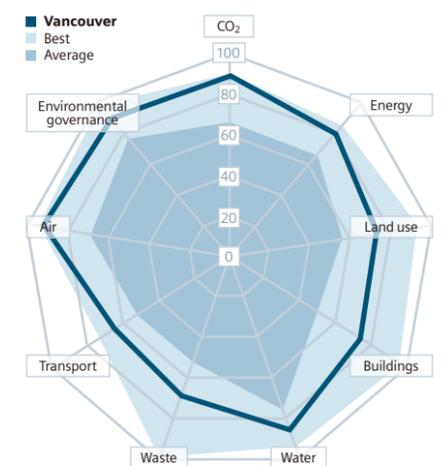
Buildings: Fifth, 77.2 points

Vancouver's score in this category is bolstered by the abundance of Leadership in Energy and Environmental Design (LEED)-certified buildings. It has among the most in the Index with

Background indicators

Total population ¹⁾	580,000
Administrative area (miles ²) ¹⁾	44
GDP per person (real) (US\$) ²⁾	37,500
Temperature (24-hour average, annual) (°F) ¹⁾	50
Goods employment (%) ²⁾	17
Services employment (%) ²⁾	83

Geographical basis: 1) City, 2) CMA





10.2 per 100,000 people, compared with the average of 6.4. The city also scores well in the area of policies aimed at promoting energy efficiency in buildings. While Vancouver does not fully require energy efficiency audits, the city's One Day program offers a number of building efficiency incentives such as free energy assessments, mortgage rebates for energy efficient home improvements, and preferential loans for efficiency upgrades.

Green initiatives: In 2008 Vancouver set a goal of making all new construction carbon neutral by 2030. As part of this goal, the Green Homes program requires that all new building permit applications for single-family homes meet a specific set of requirements, which will reduce energy consumption by 33% from current levels. The program also includes requirements that will improve the air quality in all new houses, such as requiring a heat-recovery ventilator, as well as the installation of a vertical service shaft to allow future roof-mounted solar PV panels. Furthermore, in 2010 Vancouver required all newly rezoned buildings to meet the LEED gold standard, the highest green building standard for rezoned buildings in North America. This includes strict minimum requirements for energy savings, water efficiency, CO₂ emissions reduction, and improved indoor environmental quality, and is expected to result in 20 to 30 new green buildings being constructed annually.

Transport: Third, 66.6 points

Vancouver boasts the longest public transit system in the Index, at 5.4 miles per square mile (3.3 kilometers per square kilometer), nearly five times the overall average of 1.1 miles (0.7 kilometers). Its performance is further helped by a high percentage of workers commuting by public transit, bicycle, or foot, at 25%, compared with the average of 13%. With efforts to implement a new streetcar underway (see "green initiatives"), the city is poised to improve even further upon its already strong public transport system. Meanwhile, the city has been expanding

bicycle and pedestrian lanes, and is looking to implement a bike share program.

Green initiatives: Vancouver's Downtown Streetcar is expected to be a key element of the city's transition to more sustainable transportation. The trams link Vancouver's metropolitan core with other mass transit, including the Canada and Expo Lines. In 2008 the first line of the Downtown Streetcar was added as a showcase project for the 2010 Olympic Winter Games, and three future line extensions are planned, although there is not yet a concrete time frame.

Water: Sixth, 86.6 points

Vancouver consumes 137 gallons (519 liters) of water per person per day, better than the Index average of 155 gallons (587 liters). Its score is further bolstered by its water leakage rate of 11%, slightly better than the average of 13%. Vancouver officials have demonstrated eagerness to further improve the city's water performance. The city has set a goal to reduce per capita water consumption by 33% over 2006 levels by 2020. To achieve this ambitious aim officials plan to develop incentive programs to accelerate the installation of water-efficient infrastructure, and to unveil full service retrofit programs in partnership with other utilities.

Green initiatives: Vancouver has several programs to encourage efficient water use. All commercial properties are metered, and the city sells subsidized indoor and outdoor water-saving kits, and rain barrels for watering plants. Vancouver also runs public awareness campaigns in elementary schools.

Waste: Seventh, 69 points

Although Vancouver recycles 55% of municipal waste – the third best rate in the Index and more than double the average of 26% – the city's waste performance is hindered by a comparative lack of incentives in place to reduce overall waste. The city instead relies on advocacy measures, including efforts to create a "zero waste" culture, by

working with schools, developing educational campaigns, establishing a network of zero-waste businesses, and challenging other cities to reuse or recycle all waste.

Green initiatives: Vancouver aims to reduce total solid waste going to landfills or incinerators by 50% by 2020 from 2008 levels. To this end the city is creating mandatory "take-back" programs – by 2015 all businesses will have to pay for materials they do not recycle, and the program will include packaging, printed paper and hazardous waste. Construction and demolition waste, carpet, furniture and textiles will follow by 2017. Together, these product categories will account for more than 60% of garbage going to a landfill or incinerator.

Air: First, 95.1 points

Vancouver's impressive performance in the air category is a result of low emission levels of all pollutants measured in this Index. The city has one of the lowest rates of particulate matter emissions in the Index, at just 7 lb (3 kg) per person versus an overall average of 25 lb (11 kg). Vancouver has similarly low emission levels of sulfur dioxide, at 5 lb (2 kg) per person, less than a quarter of the Index average of 22 lb (10 kg); and nitrogen oxides, at 37 lb (17 kg) per person, compared with the average of 66 lb (30 kg). Vancouver has a relatively higher population density than other Index cities – which contributes to air quality through increased use of public transport, for example. In addition, over the last half-decade the city has actively promoted a suite of air quality improvement policies while ensuring that air pollution does not disproportionately affect the poor (see "green initiatives" below).

Green initiatives: In 2005 officials approved the Air Quality Management Plan for Greater Vancouver. The plan includes 33 specific actions, including increasing emissions standards, providing incentives for vehicle retrofits, strengthening regulations on fuels that may be sold in Vancouver, and increasing dialogue with busi-

nesses about appropriate mutually beneficial air quality measures. Additionally, Vancouver is looking to alter its building regulations to assist vulnerable populations through policies specifically designed to enhance the air quality in low-income housing, by reducing the degree to which high-polluting facilities can be located in low-income neighborhoods.

Environmental governance: Tenth, 91.1 points

Vancouver is among ten cities in the Index that score more than 90 points. The city has a ro-

bust environmental strategy in place, demonstrated by its strong performance across the board. And while Vancouver has also launched multiple environmental campaigns such as the Greenest City and One Day programs that enjoy strong political support, the city's somewhat lower placement in this category is the result of a comparative lack of transparency. Not all of the city's targets have been reported, and while information is accessible and the sustainability campaign is widely known, data is not collected and provided in a unified location. The city has partnered with a private company to moni-

tor energy-use plans to make strides to that end.

Green initiatives: Since 2005 Vancouver has provided links to programs and resources for teachers who would like to bring climate protection into the classroom. School projects include workshops, games and contests, field trips, and a school play about climate change. Additionally, Vancouver's Green Streets program offers residents an opportunity to become volunteer street gardeners in their neighborhoods by sponsoring a traffic circle or street-corner garden.

Quantitative indicators

Category	Indicator	Average	Vancouver	Year	Basis	Source	Comments
CO ₂	CO ₂ emissions per unit of GDP (metric tons/US\$m)	296.4	111.0	2008	City	City of Vancouver	Using estimated city GDP
	CO ₂ emissions per person (metric tons)	14.5	4.2	2008	City	City of Vancouver	Using city population
Energy	Electricity consumption per unit of US\$ GDP (TJ/US\$m)	0.33	0.24	2009	City	BC Hydro	Using CMA GDP
	Electricity consumption per person (GJ)	52.2	32.5	2009	City	BC Hydro	Using city population
Land use	Green spaces as % of total area (%)	11.9	11.7	2010	City	City of Vancouver, communication with city official	Using area of city in 2006
	Population density (persons/miles ²)	8,106.8	13,051.3	2006	City	Statistics Canada	Equivalent in metric units: 5,039 persons/km ²
Buildings	Number of LEED certified buildings (silver, gold or platinum) (buildings/100,000 persons)	6.4	10.2	2010	City	CaGBC LEED Database	Using city population
Transport	Share of workers traveling by public transport, bicycle, or foot (%)	13.0	24.5	2006	CMA	Statistics Canada	
	Length of public transport (miles/miles ²)	1.1	5.4	2006	Metro-area	TransLink	Using city area; Equivalent in metric units: 3.3 km/km ²
	Annual vehicle revenue miles (miles/person)	24.4	40.5	2009	Metro-area	Translink	Using CMA population; Equivalent in metric units: 65.1 km/person
	Maximum public transport vehicles available per square mile (vehicles/miles ²)	9.0	42.0	2009	Metro-area	Translink	Using city area; Equivalent in metric units: 16.2 vehicles/km ²
	Average commute time from residence to work (minutes)	28.9	33.5	2005	CMA	Statistics Canada	
Waste	Recycled municipal waste (%)	25.8	55.0	2007	City	Metro Vancouver	
Water	Total water consumption per person per day (gallons)	155.1	137.0	2009	City	City of Vancouver, Water Design Branch	Using city population; Equivalent in metric units: 518.6 liters
	Water leakages in water distribution system (%)	12.8	11.0	2009	City	City of Vancouver, Water Design Branch	
Air	Nitrogen oxides emissions per annum (pounds/person)	66	37	2007	Metro-area	Metro Vancouver	Using metro-area population; Equivalent in metric units: 17 kg
	Particulate matter (PM10) emissions per annum (pounds/person)	25	7	2007	Metro-area	Metro Vancouver	Using metro-area population; Equivalent in metric units: 3 kg
	Sulfur dioxide emissions per annum (pounds/person)	22	5	2007	Metro-area	Metro Vancouver	SO _x ; Using metro-area population; Equivalent in metric units: 2 kg