# U.S. Cities

Large, densely populated, and bustling with activity, cities are cultural and economic centers, providing employment, leisure, and educational opportunities. Energy and resources flow in and out of cities to support their population and infrastructure. However, there is increasing attention on the environmental impacts of cities, and the significant opportunity for reducing the impact of the built environment and improving the livelihoods of urban residents.

Urban Land Use Patterns

- Approximately 81% of the U.S. population lives in urban areas, up from 75% in 1990. By 2050, 87% of the U.S. population and 66% of the world population is projected to live in urban areas.[1]
- More than 270 urban areas in the U.S. have populations above 100,000; New York City, with 8.2 million inhabitants, is the largest.[2]
- The rate of urbanization, i.e., the changing of land from forest or agricultural uses to suburban and urban uses, is increasing.[3] Between 2000 and 2010, urban land area in the U.S. increased by 15%. Urban land area is 106,386 square miles, or 3% of total land area in the U.S., and is projected to triple from 2000 to 2050.[4,5]
- The average population density of the U.S. is 87 people per square mile. The average population density of metropolitan areas (MSA) is 283 people per square mile; in New York City, the population density is 27,012 people per square mile. Guttenberg, New Jersey has the greatest density of housing units (24,195) per square mile of land area.[4]
- One study found that low-density development has 2.5 times the greenhouse gas (GHG) emissions and twice the energy use of high-density development on an annual per capita basis; on a per unit living area basis, low-density development has 1.5 times the annual GHG emissions and the same energy use as the high-density development.[6]
- Sprawl, the spreading of a city and suburbs into surrounding rural land, reduces green space and increases traffic, air pollution, school crowding, and taxes.[7]
- According to Smart Growth America's Sprawl Index (based on development density, land use mix, activity centering and street accessibility), the most sprawling metropolitan regions of the 221 surveyed are Hickory-Lenoir-Morganton, NC, Atlanta-Sandy Springs-Marietta, GA, Clarksville, TN-KY, and Prescott, AZ. The least sprawling metropolitan areas include New York/White Plains/Wayne, NY-NJ, San Francisco/San Mateo/Redwood City, CA, Atlantic City/Hammonton, NJ, and Santa Barbara/Santa Maria/Goleta, CA.[8]

Population Trends of the Largest U.S. Cities, 2000-2010[2]
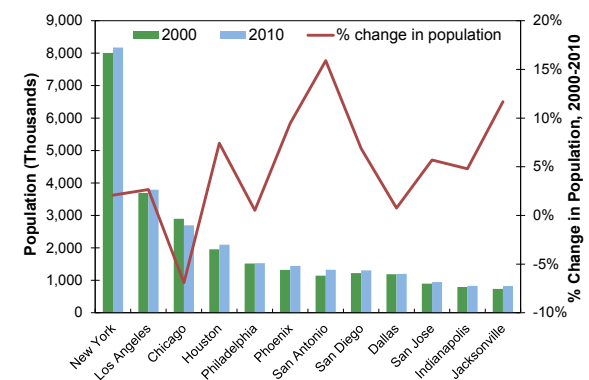
Built and Natural Environment

- Residential (20.9 Quadrillion Btu; "quads") and commercial (18.0 quads) sectors accounted for 40% of total energy consumption and 37% (1,965 million metric tons of CO_2) of energy-related emissions in 2015.[10]
- The "urban heat island effect," in which average annual temperatures are 1.8-5.4°F higher in cities than surrounding suburban and rural areas, results in increased energy demand, air pollution, GHG emissions, and heat-related illness, as well as decreased water quality.[11]
- Urban tree canopies decrease the urban heat island effect. The recommended average canopy cover is 40% for metropolitan areas east of the Mississippi and in the Pacific Northwest and 25% for metropolitan areas in the Southwest and West.[12] According to one study's photo-interpretation, canopy cover in urban areas in the continental U.S. is 35.1%.[13]
- In 2010, the number of days with Air Quality Index values greater than 100 ranged from 0 days in five cities to 116 days in the Riverside, CA area (on a 0-500 scale where 0 is best and 100 generally corresponds to U.S. air quality standards).[14]
- Out of 315 contaminants detected in a national tap water quality study, 86 were sprawl- and urban-related pollutants resulting from road runoff, lawn pesticides, and human waste, of which 56 are unregulated.[15]
- Vegetation and topsoil loss and the constructed drainage networks associated with urbanization alter natural hydrology.[16]
- Stormwater runoff from the built environment is a principal contributor to water quality impairment of water bodies nationwide.[16]
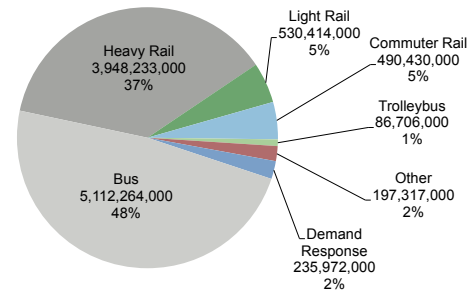
Urban Density and Transportation-Related Energy Consumption[9]
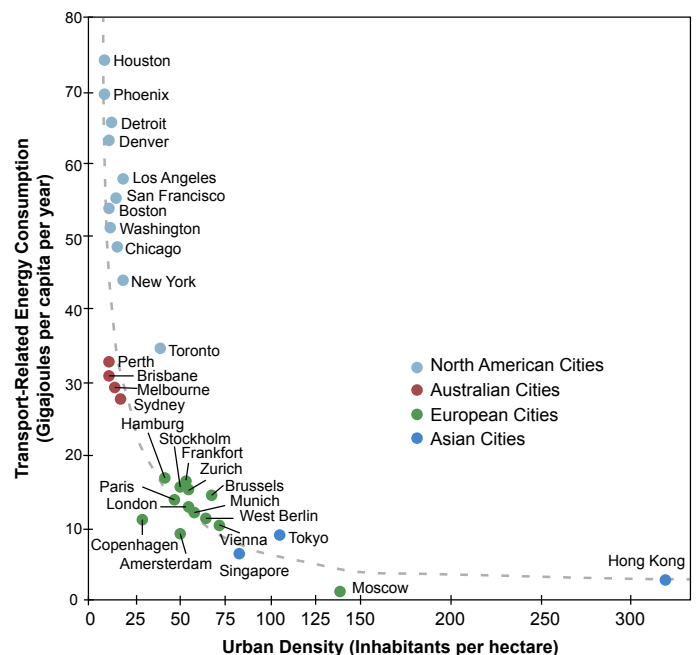
Transportation and Mobility

- In 2013, 59 billion passenger-miles (PM) were traveled on public transit, and 3 trillion vehicle-miles are traveled (VMT) on public roads each year.[17,18]
- There are 24 light rail systems in the U.S. From 2012 to 2013, light rail ridership increased 2% (458 million trips) after declining for several years; the value is still below the 2009 high.[17] Without public transportation, the annual impacts in the U.S. would include an additional 102.2 billion VMT, 5.3 billion gallons of gas, and 37 million metric tons of CO_2 emissions.[19]
- Congestion is a serious problem in urban areas, causing an additional 6.9 billion hours of travel time and an extra 3.1 billion gallons of fuel use by urban Americans in 2014.[20]
- In 2013, transit buses used 90.8 trillion Btu and traveled 22.3 billion PM, and rail used 95.9 trillion Btu and traveled 39.1 billion PM. In comparison, passenger cars and trucks used 13,702 trillion Btu and traveled 4,140 billion PM.[21]
- New York City has the most utilized heavy rail, commuter rail, and bus systems in the U.S., Boston has the most utilized light rail system, and San Francisco has the most utilized trolley bus system.[22]

Public Transportation Ridership, 2014[22]
(number of passenger trips)

Light Rail 530,414,000 5%
Commuter Rail 490,430,000 5%
Heavy Rail 3,948,233,000 37%
Trolleybus 86,706,000 1%
Other 197,317,000 2%
Bus 5,112,264,000 48%
Demand Response 235,972,000 2%

Socioeconomic Patterns

- The 381 U.S. metro economies account for 90.7% of GDP, 91.1% of wage income, and 94% of jobs. Only 11 countries (including the U.S.) have a higher GDP than the New York City area.[23]
- The median household income inside MSAs is $55,855; outside MSAs it is $45,482.[24] The average unemployment rate of metropolitan areas in March 2016 was 5.1%, ranging from a low of 2.4% in Ames, IA MSA to a high of 18.6% in El Centro, CA MSA.[25]
- Poverty rates in urban areas are higher than in suburbs - 18.9% compared to 11.8% in suburbs in 2014.[24]

Solutions and Sustainable Alternatives

A sustainable urban area is characterized by the preservation of a quality environment, use of renewable and efficient energy resources, the maintenance of a healthy population with access to health services, and the presence of economic vitality, social equity, and engaged citizenry.[26] An integrated approach to environmental management, measures to counter sprawl, the establishment of linkages among community, ecology, and economy, and coordinated stakeholder interaction are necessary for achieving sustainability in cities.[26,27]

- Portland, Oregon placed first on SustainLane's 2008 city ranking based on 16 criteria.[28]
- As of May 2016, 1,060 mayors have signed on to the 2005 U.S. Mayors Climate Protection Agreement, committing to reduce global warming pollution levels to at least 7% below 1990 levels, to reduce dependence on fossil fuels, and to accelerate the development of clean, economical energy resources and fuel-efficient technologies.[29,30]
- A Living Cities Report found that over 75% of the 40 largest U.S. cities surveyed have plans for reducing greenhouse gasses and most call for emissions reductions of 10-20% in the next 5-10 years.[31] Many cities, including New York, Los Angeles, and Chicago, have created Climate Action Plans, demonstrating environmental leadership and commitment to reducing climate change.[32]
- The EPA offers many clean energy programs, information, training opportunities, grants, resources, and tools to assist local governments.[33]
- In 2009, the U.S. Department of Housing and Urban Development, Department of Transportation, and Environmental Protection Agency created the Partnership for Sustainable Communities to promote sustainable communities through better access to affordable housing, more transportation options, and lower transportation costs.[34]
- ICLEI (International Council for Local Environmental Initiatives), an international association of local governments and national and regional local government organizations, develops locally designed initiatives to achieve sustainability objectives.[35]
- Smart Growth America is a coalition working to improve the planning and building of towns, cities, and metro areas.[36]
- The Solar Outreach Partnership is a component of the U.S. Department of Energy's SunShot Initiative to make solar energy cost-competitive with other energy technologies. The Solar Outreach Partnership provides local governments with guidance on community-wide deployment of solar power.[37]

SustainLane Rankings, 2008[28]

Top 10 U.S. Cities, 2008
Portland
San Francisco
Seattle
Chicago
New York
Boston
Minneapolis
Philadelphia
Oakland
Baltimore

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32. U.S. EPA (2014) "Climate Change Action Plans."
33. U.S. EPA (2014) "Local Climate and Energy Program."
34. Partnership for Sustainable Communities (2013) "About Us."
35. ICLEI Global (2014) "Who is ICLEI."
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