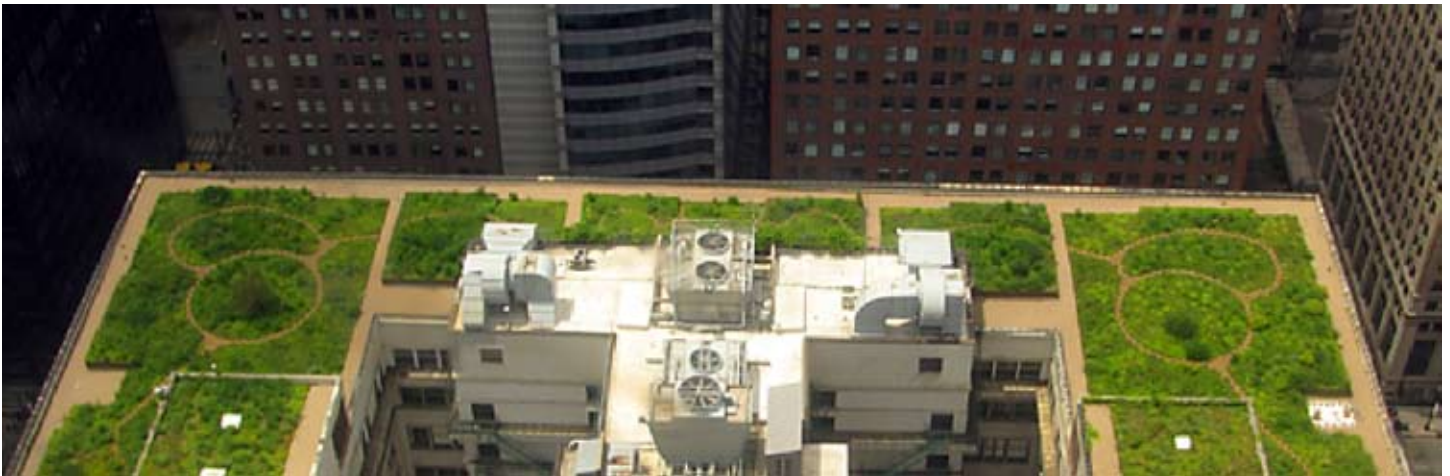


Chicago

Chicago, Illinois, USA, leads the way with green roofs cooling the city. In 2000, Mayor Richard M. Daley initiated a green roof at City Hall. By 2008, more than 450 green roofs were either in place or under development in the city, making Chicago the number one city on green roofs in the United States. Learn how green roofs can diminish urban heat islands, and lower heating and cooling bills.

Chicago, like many other American cities, is battling the urban heat island effect, which is common in cities where many building surfaces are dark colored. A heat island is an urban area, significantly hotter than its surroundings. The urban heat island effect causes overheating of cities during summer, leading to pollution and increased energy consumption on cooling and air conditioning. The condition occurs due to the use of concrete and asphalt in the city. Green roofs are one way of beating the problem.

In Chicago, the municipality realized the effectiveness of green roofs, when a team of scientists flew over Chicago in a police helicopter in 2007. Thermal cameras pointed at a county building with a regular black rooftop (connected to City Hall) measured more than 40 degrees Celsius, whilst City Hall itself with its green roof only measured 21 degrees Celsius.



Since then, green roofs have taken off in Chicago. In 2008, more than 450 green roofs were either in place or under development on other buildings – schools, fire stations, museums. Mayor Richard M. Daley has promoted green roofs vigorously and developed a series of policy programs to get the private sector and civilians to acquire green roofs. One initiative is a tax offer increment financing green building projects.

Green strategy requirements for building projects depend on the type of building in question. From an energy savings point of view green roofs are, however the way to go, when it comes to big box buildings, according to Sadhu Johnston, Chief environmental officer at Chicago Mayors office. Not only do green roofs cut down energy bills on cooling, they also cut down energy bills on heating, due to plants ability to reflect heat and provide insulation conserving both heating and cooling energy.

The plants making up the green roof naturally provide heat and cooling. Plants reflect heat, provide shade and help cool the surrounding air through evapotranspiration.

Rooftop gardens absorb rainfall and reduce runoff that otherwise would collect pollutants and empty sewers. A roof top garden filters and moderates the temperature of any water that is lead to the sewer. In addition, plants actually filter the air. Plants improve air quality by using excess carbon dioxide to produce oxygen. On a neighbourhood or regional level, temperatures are lowered and air pollution is reduced when the overall area of dark surfaces is reduced and the area of reflective and shaded surfaces is increased.

The green roof may also add usable leisure space to a property that is attractive not just to people, but to wild-life such as birds and butterflies.

City officials in Chicago now estimate that their green roof saves the city about \$3,600 a year in cooling and heating costs. If all of Chicago's roofs were greened, they add, the city's peak energy demand could be cut by 720 megawatts -- enough electricity for 750,000 people. The load on the city's storm-sewer system, meanwhile, would be slashed by about 70%.

Mayor Daley says that Chicago offers grants of as much as \$5,000 toward the cost of installing a green roof, and that buildings with plans to install green roofs are pushed through the permit process quicker.

"We decided that the city had to lead by example," by installing green roofs on government buildings and then "offering economic assistance to get the private sector involved," the mayor says. "Now everything from libraries, schools and apartment buildings have green roofs," he says. Mr. Daley estimates that Chicago now has about 400 green roofs in the downtown area.

Chicago Wal-Mart to Sprout Green Roof

The first Wal-Mart inside Chicago's city limits will also be the first Wal-Mart to host a grassy meadow on its roof, according to the Chicago Sun Times. The initiative is part of a deal the mega-chain made with Chicago Mayor Richard M. Daley. Covering 67,000 square feet, the roof will feature three inches of soil and a flowering oasis of cactus-like plants, hardy enough to survive a Chicago winter. Designed to reduce rainfall runoff, the roof will not need an irrigation system. Expected to be completed with the new store this summer, Wal-Mart's green roof could be the first of many in Chicago. Last Fall, Daley launched the city's environmentally-driven Green Roof program, which divvies out \$5,000 grants to residential and small commercial business owners. Reportedly, the green roof program could, in conjunction with other green roofs, lower the city's air temperature.

Landscaped Roofs Have Chicago Mayor Seeing Green

Another benefit: Green roofs last longer than conventional ones. Where typical roofs might last 20 years, green roofs will survive 40 to 50 years. They protect the roofs waterproof layer from damaging ultraviolet rays and extreme day/night temperature fluctuations, which may cause cracks.

The rooftop green space also helps mitigate a phenomenon known as the urban heat island effect. The city microclimates occur when acres of densely-packed human-made building materials absorb heat energy from the sun. "In Atlanta on a hot summer day, it might be 10 degrees [Fahrenheit/5.6 degrees Celsius] warmer in the city than out in the countryside," Rowe said. Green roofs can help mitigate the unnatural temperature rise, Rowe said.

Cultivating Converts

The green roof concept is winning more converts in the United States. Ford Motor Company created a 10.4-acre (4.2-hectare) living roof, the world's largest, atop its Dearborn, Michigan, truck plant final-assembly building. In Chicago, Mayor Daley is leading by example. City Hall sports a green roof that was the city's first. Over a hundred building projects, incorporating a million square feet (93,000 square meters) of green roof, are now underway. Officials are even experimenting with green roofs at O'Hare International Airport as a means to reduce noise.

At the Chicago Center for Green Technology, demos showcase green-roof technology to everyone from developers and builders to schoolchildren. The center also serves as a research center, where leading suppliers are invited to install different green-roof plots that are monitored and compared.

And the city government is providing at least a nudge to those involved in new building ventures. Projects that receive tax-increment financing support from the city are required to include some level of green roof.

"I hate to say that we're mandating, but we're really talking to big box [stores], architects, contractors, developers, and others about how important [green roofs] are to the environment and to business," Daley said.

The mayor believes that the city's cleaner, greener roofs are an important part of long-term environmental planning close to home. "The environmental movement often seems like it's happening somewhere else and people forget about our own community," he said. "We need to be sure that we're planning well."

Green Roofs Enroll in Chicago Schools

by Michael Fickes

Right now, green roofs are rare in the U.S., but a Chicago Public School program may help bring green roofs into wider use.

Stuart Brodsky likes to stare out of his office window in downtown Chicago. He enjoys his view of the City Hall roof, a 20,000-sq.-ft. green roof with 300 species of drought resistant plants, all native to Illinois. Mayor Richard Daley commissioned the roof after a tour of Germany, where green roofs have been in use for years. "The Chicago City Hall is a fine example of a green roof," Brodsky says. "It is much more attractive than other roofs where all you see are membrane, drains and HVAC units."

Mayor Daley envisioned City Hall's green roof as a demonstration project that might inspire owners, architects and builders to consider more sustainable building designs in general. The Chicago Public School system picked up on the message and has made a commitment to sustainable design for renovations of all its existing school buildings and the construction of any new buildings. Properly designed green roofs create stable, living ecosystems. Their insulating properties conserve energy and reduce sound reflection and transmission. A collection of green roofs will reduce the warming effect of urban heat islands by as much as four degrees — a feature that attracted Mayor Daley to the concept.

One of the most significant benefits of a green roof is control of storm water runoff, an increasingly important environmental goal of sustainable design. According to Roofscapes, Inc., a Philadelphia-based firm that specializes in green roof design, green roofs control runoff by mimicking natural processes. They capture and hold precipitation in plant foliage, absorb water through roots, and slow the velocity of direct runoff. Roofscapes research suggests that a green roof can cut total annual runoff volumes by as much as 50 percent to 60 percent, compared to conventional roofing systems. While green roofs offer many functional benefits to buildings, they can also provide schools with educational tools.

By Kevin Tibbles

NBC News

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CHICAGO - It's like a scene from a peaceful meadow: Where wildflowers bloom and the bees are busy. But to reach this slice of Eden, one doesn't travel out of town, one travels up, 12 stories up. "I talked about building a green roof," says Chicago Mayor Richard Daley, "and everybody kind of looked at me whether or not I kind of lost it, ha ha ha." But the crazy idea is paying off. **Since Chicago installed a 20,000 square foot "green roof" atop City Hall five years ago, the city has saved about \$25,000 in energy costs.**

"Because there are plants on it, it's cooler than a regular flat, black roof," says Robert Berghage, an associate professor of horticulture at Penn State University. Berghage's research has shown there are many benefits to going green. "The water from the flat roof was about here," Berghage says as he demonstrates at a water measuring tank. "The water from the green roof is down here." The plants can drink 60 percent of dirty rain water before it can overflow local sewer systems, soaking up some of the costs businesses pay to control storm water runoff.

"Anything you can do to get more plant material in the city is going to make a big difference in helping to make our cities more livable," says Berghage. Ruth and Scott McElroy of Norfolk, Va., liked the idea so much, they took it home. They paid \$4,000 to install a green roof. "In the first month we had the roof installed, we saw our air conditioning bill drop by about \$25," says Ruth. It's not very often a simple idea comes along that's not only good for the environment but also the bottom line - and that's exactly what green roofers are hoping big business picks up on. In Dearborn, Mich., 10 acres of vegetation tops a Ford assembly plant. Green roofs are sprouting up on stores, schools, even a few dog houses. Back in the Windy City, more than 250 buildings are going green on top.

"As everybody talks about the environmental movement, they're always pushing their finger someplace else," says Mayor Daley. "They should just turn their finger right into their own backyard, their own city."