

# Greening Lower Manhattan: A Green Roof Project at Pace University



## Abstract

In partnership with the U.S. EPA Region 2, the New York City Department of Environmental Protection, and the Earth Pledge Green Roofs Initiative, Pace University is developing a 30,000 square foot "green roof" at its Lower Manhattan campus. The Pace green roof will be the largest green roof in New York City, and the first publicly accessible, municipally supported green roof project in the United States.

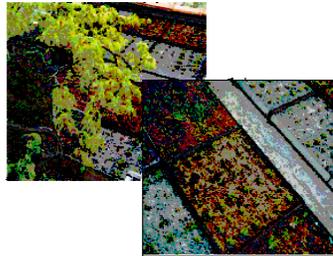
The Pace green roof will:

- Serve as open space and educational opportunity for Pace students and faculty;
- Provide research opportunities for studying green roof function; and
- Demonstrate green roof stormwater-capture benefits.



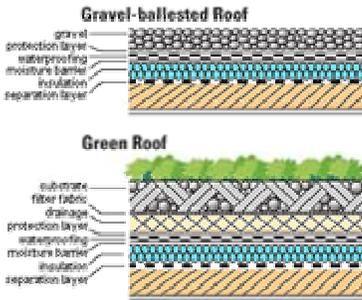
## What is a Green Roof

Green roofs are highly engineered, lightweight roofing systems that allows for the propagation of rooftop vegetation while protecting the integrity of the underlying roof. While conventional roof gardens rely on heavy pots and planters, green roof systems allow for much more extensive cultivation of plant life across wide expanses of a given rooftop. Municipalities worldwide have used green roofs as an innovative solution to urban environmental problems such as pollution from stormwater runoff, high summer temperatures and air pollution.



## Why aren't there more green roofs in NYC?

- Lack of information on green roofs
- Cost: benefit figures unavailable
- Lack of local expertise in green roof installation
- Lack of definition of green roofs in the NYC building codes



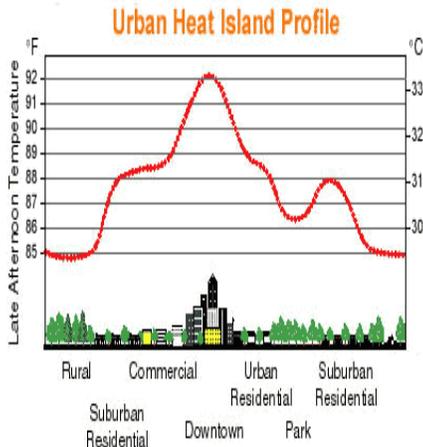
Green roofs: An Ecological Balance. (Courtesy of Albrecht Duerr)

## Why green roofs for NYC?

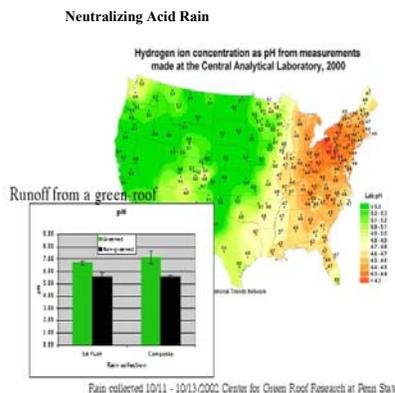
- Mitigate urban heat island effect (a serious concern in NYC which is 3.6°F to 5.4°F warmer than surrounding suburbs on summer afternoons). A climate model developed through the US Department of Energy revealed that increased reflective roof surfaces and urban re-vegetation could result in temperature reductions in New York City of 3.6°F.
- Reduce energy use. Higher temperatures lead to increased use of air-conditioning, requiring greater energy use. A study by the Los Angeles-based Heat Island Group has found that rooftop-cooling efforts could lead to annual energy savings of \$16 million.
- Stormwater-capture benefits. NYC relies on combined sewage overflow (CSO). During heavy rains, sewage treatment plants often cannot handle the increased volume of combined sewage and rain water, causing an overflow of untreated wastewater into the city's waterways. Green roofs act as a sponge, absorbing much of the water that would otherwise run off. Researchers estimate that three to five inches of soil or growing medium absorbs 75% of rain events that are one-half inch or less. Green roofs also filter pollution from rainwater.
- Reduction in solid waste generation. Green Roofs lengthen roof life 2-3X by protecting it from intense UV degradation and continued expansion and contraction due to fluctuating temperatures.
- Improved air quality. Green roofs filter air by absorbing and converting carbon dioxide and producing oxygen. On a green rooftop, a 1.0 m<sup>2</sup> plot of grass can remove 0.2 kg of airborne particulates from the air ([www.earthpledge.org](http://www.earthpledge.org)).
- Provide green space and rooftop gardens. This is an essential quality of life improvement for New Yorkers. The green space also provides critical habitat for birds and insects.

## Critical factors for a successful green roof:

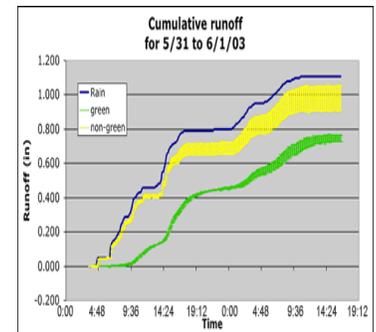
- Right drainage
- Right medium
- Right plants
- Structural capacity
- Appropriates of underlying roof
- Maintenance



Courtesy of EPA's Heat Island Reduction Initiative (HIRI)



Source Penn State Center for Green Roof Research, <http://hortweb.cas.psu.edu/research/greenroofcenter/research.html>



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