

What is a green roof?

A Green roof refers to an architectural roofing system that is partially or completely covered with vegetation. The revival of green roofing dates back to the 1960s, but only in recent years has it become a popular alternative to traditional roofing, due to its substantial environmental benefits and savings for heating and cooling.

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Green roofs are a traditional method that originated in northern countries like Iceland and Scandinavia and were used for their insulating capabilities. Green roofs hold the potential to mitigate impacts on storm water quality and quantity, improve a building's energy efficiency, reduce the urban heat island effect, improve air quality and additionally, beautify the city, provide natural green spaces in built up areas,

hold grounds for gardening, food production and horticultural therapy, and increase passive recreational space in densely-populated neighbourhoods.

TYPES OF GREEN ROOFS:

	EXTENSIVE GREEN ROOF	SEMI-INTENSIVE GREEN ROOF	INTENSIVE GREEN ROOF
Maintenance	Low	Periodically	High
Irrigation	Periodically	Periodically	Regularly
Plant communities	Succulent-Herbs and Grasses	Grass-Herbs and Shrubs	Lawn or Perennials, Shrubs and Trees
System build-up height	60 - 100 mm	100 - 250 mm	150 - 400 mm on underground garages >1000 mm
Weight	60 - 150 kg/m ² 13 - 30 lb/sqft	120 - 200 kg/m ² 25 - 40 lb/sqft	180 - 500 kg/m ² 35 - 100 lb/sqft
Cost	Low	Middle	High
Use	Ecological protection layer	Designed green roof	Park like garden





According to plant selection and growing medium depth, there are three main green roof types called intensive, semi-intensive and extensive.

Intensive green roofs refer to rooftops that accommodate large plants including trees, full lawn, etc. This type of green roofing requires a significant depth of soil (>150mm), as well intensive maintenance, similar to maintaining a park or large garden.

Semi-intensive green roofs involve roof covering with plants of moderate size, a medium layer of growing medium (100-150mm) and require less maintenance.

An extensive green roof is the most convenient of all types of green roof systems and involves roof covering with a thin layer of growing medium (< 100mm), and vegetation that requires minimal care and maintenance, such as succulent groundcovers. These are suited to applications where economical, lightweight ecological coverings such as metal roofs are required.

GREEN ROOF BENEFITS:

No other building concept creates such a range of positive effects for buildings, for people and for the environment.

GREEN ROOFS IMPROVE AIR QUALITY

Green roofing has become increasingly popular in cities, because it creates additional green spaces that absorb carbon dioxide, chemicals and dust particles that pollute the air. Green roofs have the potential to bring the carbon cycle in urban areas back into equilibrium because of their ability to absorb carbon dioxide and release oxygen into the atmosphere.

GREEN ROOFS HAVE URBAN AGRICULTURE POTENTIAL

Many people take advantage of the possibility to grow their own fruits and vegetables on rooftops, adding to urban food security. Rooftops as urban agriculture spaces also have many social, economic and health benefits. Community-run urban agriculture programs have far-reaching benefits, as they empower groups to be self-sustaining and less vulnerable to hunger, thereby potentially addressing many social and health problems encountered in urban areas as a result of food insecurity. In most South African cities, these types of

communities are, for now, virtually non-existent, but many cities around the world have realised the value and need for such initiatives and encourage them as a means of sustainable food security for urban populations.

GREEN ROOFS CREATE JOBS

The green roof industry worldwide has created tens of thousands of jobs, being the next frontier for landscapers, landscape architects and designers. The same potential exists to provide employment to currently unemployed urban populations in South Africa. This has far-reaching economic implications for the city's economy and the families of green roof workers by enabling them to provide for their families and raising their living standards and conditions. Well-designed green roof policies and initiatives will create long-term employment for unemployed citizens. The green roof industry worldwide is worth billions of dollars and is growing rapidly, bringing with it great economic benefits.

GREEN ROOFS IMPROVE BUILDING ENERGY EFFICIENCY

Vegetated rooftops improve a building's thermal performance by regulating the building's internal temperature through reducing heat absorption by 10 to 22°C. They also act as insulation, which keeps the building warmer during cold winter months by preventing heat loss and cooler during hot summer months by absorbing heat, lessening the need for powerful HVAC systems. This can also contribute to significant savings in the integrated design phase of the building through the savings on HVAC systems offsetting the cost of the green roof installation. Green roofs have been shown to reduce cooling and heating costs by as much as 50%, offering major financial benefits to building owners in daily running costs. Green roofs have also shown to improve solar panel operating efficiency and also cool the immediate ambient temperature by evaporative transpiration.



On a typical day, the Chicago City hall green roof measures 80°F (40°C) cooler than the neighboring conventional roof.



GREEN ROOFING





GREEN ROOFS IMPROVE BUILDING ACOUSTIC PROTECTION

Green roofs have excellent sound proofing properties and can be used to effectively block sound entering or exiting a building in applications such as educational and healthcare institutions or recording studios where it is important to minimise excess noise. Noise protection can be as much as 25% for the extensive roofs and more for the intensive alternative. The exact amount of noise reduction is hard to quantify and depends mostly on the thickness of the soil substrate and additional factors, i.e., leakage from skylights, but overall, up to a 50 decibel noise reduction can be realized.

GREEN ROOFS AS A STORM WATER MANAGEMENT TOOL

Urban rooftops constitute roughly 60% of urban rainwater catchment areas. These rooftops are hard, impervious surfaces that drain into the city's storm water system. Hard elevated surfaces increase the volume and speed of storm water runoff, contributing to water contamination and flooding that leads to deteriorating the conditions of rivers and bathing areas, including beaches. Uncontrolled flash flooding can also contribute to damaging the storm water infrastructure, leading to high maintenance costs and repairs, as well as reducing infrastructure upgrading costs associated with higher densities. Green roofs reduce and slow storm water runoff and act as natural filters, improving the quality of runoff that can also be harvested and reused as irrigation for the green roof or other landscaping.

GREEN ROOFS HAVE CONSERVATION VALUE

Green roofs can also act as valuable conservation spaces where selected endemic plant species, like peninsula shale renosterveld species in Cape Town and Egoli grassland species in Johannesburg, which were formally displaced by urban development and population growth, can be reintroduced, thereby creating and establishing previously lost habitats for birds and insects. Bio-diverse green roof design can include nest boxes and other habitat structures like logs and perches, as well as bee hives. They act as 'stepping stone biotopes' and give plants and animals a replacement for their natural habitat. Birds, wild bees and butterflies can all find nourishment and shelter here and create a lively ecosystem. Even endangered species can relocate to a green roof. Initiatives such as beekeeping have proved to be very successful in cities such as New York and hold the same potential for South African cities.

For more information, visit www.mrc-group.co.za or www.greenbuildingsystems.co.za.

