

We are consultants providing one stop solution to all your "Green" endeavors, from Design to execution under a single roof. We make sure that our client's vision is always delivered.

We provide greening systems to cater to a sustainable built environment.

# **BENEFITS OF** GREEN ROOFS, WALLS AND FACADES



### **IMPROVED THERMAL PERFORMANCE**

A significant benefit of green roofs, walls and facades is the potential for reducing building heating and cooling requirements. Green walls and facades can reduce heat gain in summer by directly shading the building surface. Green roofs reduce heat transfer through the roof and ambient temperatures on the roof surface, improving the performance of heating, ventilation and air conditioning (HVAC) systems. While there is great potential to cool buildings, research data and the results of modelling studies vary greatly in relation to the extent of the difference in temperature and the energy savings that are predicted for buildings with green roofs versus conventional roofs



## **URBAN HEAT ISLAND EFFECT**

Temperatures can be reduced by covering a roof or wall with a layer of vegetation that shades building materials which would otherwise absorb heat. Evapotranspiration provides cooling effects, as water is evaporated from the soil and plants and plants transpire by taking water in through roots and releasing it through leaves. Energy from the sun that would otherwise heat the roof or wall surface and increase ambient air temperatures is instead used in the evapotranspiration process, resulting in latent heat loss that lowers surrounding air temperatures. When green wall and facade plants are grown on a support system that leaves a gap between the wall and the planting, hot air moves up by convection through the space between the wall and the vegetation, providing passive cooling.

## **ECOLOGICAL PRESERVATION**

Green roofs can contribute to and enhance biodiversity by providing new urban habitats and specific habitats for rare or important species of plants or animals. Green roofs can also provide a link or corridor across urban 'ecological deserts' and assist in migration of invertebrates and birds.Designing for biodiversity requires consideration early in concept development with regard to plant species, food sources, habitat values, access points and building heights.





## **STORMWATER MANAGEMENT**

Green roofs absorb and retain rainwater and can be used to manage stormwater run-off in urban environments. They can also filter particulates and pollutants. Stormwater run-off can be reduced or slowed because it is stored in the substrate, used by or stored in the foliage, stems and roots of plants, and also evaporates directly from the substrate. Additional water storage capacity in green roof systems can be provided through incorporation of a water retentive layer or drainage layer at the base of the green roof.

## **INCREASED PROPERTY VALUE**

Building owners and developers are increasingly installing green roofs, walls or facades to add a point of difference, increase commercial returns, provide visual appeal and turn a building into a local landmark.

## **AESTHETIC, URBAN FOOD PRODUCTION**

The livability of cities is increasingly dependent on the availability of and access to green open space. Green roofs, walls and facades can increase amenity and provide opportunities for food production, recreation, relaxation or commercial ventures.

In dense, rapidly growing urban areas, the contribution of green roofs, walls and facades to overall green space should not be underestimated. In inner-city areas especially, most space is occupied by buildings and related infrastructure and the opportunities for new parks and gardens is extremely limited. Green roofs, walls and facades can be used for multilevel greenery designs that connect with ground level green spaces.

## **CLEANING THE AIR**

Green roofs, walls and facades can contribute to the removal of gaseous pollutants from the air, although their effectiveness varies with plant species and area of cover. Plants with a high foliage density or with textured leaf surfaces that trap small particles also assist in removing particulate pollution, through dry deposition on the foliage or through rain wash. On a larger scale, green roofs, walls and facades can help to reduce overall environmental heat gain (re-radiation of heat from building materials with high thermal mass), in turn improving air quality as less photochemical pollutants are produced at lower air temperatures





# EXTERIOR GREENING

### GREEN WALLS/VERTICAL GARDENS



# **ABOUT GREEN WALL**

A green wall is comprised of plants grown in supported vertical systems that are generally attached to an internal or external wall, although in some cases can be freestanding.

Green walls differ from green facades in that they incorporate multiple 'containerised' plantings to create the vegetation cover rather than being reliant on fewer numbers of plants that climb and spread to provide cover.



Aesthetics Vertical gardens are strikingly beautiful, unique and original works of living art designed to complement their surroundings.



Acoustics Plants absorb sound and help with diffraction. The amount of noise reduction is proportional to the number of plants that are present in a room. Vertical gardens contain such a large number of plants that the acoustics of a room can be substantially improved.



Save Floor Space Planting vertically allows for high plant density on less floor space.

### A D V A N T A G E S



Marketing Potential Green buildings, products, and services now possess a competitive edge in the marketplace.



Health and Wellness Vertical gardens improve the wellbeing and mood of people through a spiritual connection to nature which is missing in the modern concrete jungle



Indoor Air Quality Plants photosynthesize and release oxygen into the air, and act as bio filters for impurities.



Urban Heat Island Effect With strategic placement of green walls, plants can create enough turbulence to break vertical airflow, which slows and cools down the air and reduces the urban heat island effect.



Building Structure Protection Temperature fluctuations over a building's lifetime can be damaging to organic construction materials in building façades.



Improved Energy Efficiency Green walls can help lower the air temperature around intake valves, which means HVAC units will require less energy to cool air before being **Modular system** 

#### Hydroponic system



#### green wall plant selection



SHRUBS



EVERGREEN HERBACEOUS PERENNIALS



HERBACEOUS GROUND COVERS





LILIES AND IRISES

GRASS-LIKE FOLIAGE FORMS

### **GREEN FACADES**



# **ABOUT GREEN FACADE**

A green facade is created by growing climbing plants up and across the facade of a building, either from plants grown in garden beds at its base, or by container planting installed at different levels across the building.

Climbing plants can attach directly to the surface of a building, or they can be supported on a structure independent of the building. As the height of multi-level facades increase, wind can create significant problems for plant attachment, hence in these settings, twining climbers are preferred.

### design guide

Green facade plant selection Self-clinging – attachment through adhesive suckers, disks or adventitious roots. These climbers then form a self supporting vegetation layer on a solid wall or surface. Twining and tendrils – attachment by twining stems or by hooking and clasping tendrils (modified leaf/stem organs). These climbers require a specialized support system and can produce both upward and cascading (or trailing) stems



Self clinging plants attached to facade directly..



Containers installed at different levels, creeper dropped down

3D layer of grid provide

support for extra volume



Twining and tendril creeper supported by trellis



2D-layer system



Two-dimensional solutions consist of vertical cables, horizontal cables, rods, grids, or nets. Cables are used to mount green on desired custom shape.

Single 2D layer of grid,

cables provide support.



3D systems consist of panels that have length, width and depth, and are created specifically to enhance the growth and maintenance of green facade plants.

#### 3 D-layer system



# **GREEN ROOFS**

### GREEN ROOFING SYSTEMS AND TERRACE GARDENS



# ABOUT GREEN ROOFS

Green roofs are constructed for multiple reasons - as spaces for people to use, as architectural features, to add value to property or to achieve particular environmental benefits such as stormwater capture and retention, improved species diversity, insulation of a building against heat gain or loss).

Vegetation on green roofs is planted in a growing substrate (a specially designed soil substitution medium) that may range in depth from 50 mm to more than a metre, depending on the weight capacity of the building's roof and the aims of the design.



### A D V A N T A G E S

### FIGURE SHOWING SENSIBLE HEAT FLUX UNDER DIFFERENT ROOF TREATMENTS AND ALBEDO (ABILITY TO REFLECT SOLAR RADIATION)

A green roof provides significant cooling benefits compared to an uninsulated bare roof, although the most effective cooling comes from inclusion of insulation under the roof. Modelling comparisons suggest that green roofs could be useful on poorly insulated buildings to reduce the thermal conductance across the roof deck. Thermal conductance (U-value) is the inverse of the resistance to transfer of heat (R-value).

### **DIFFERENT TYPES OF ROOF DRAINAGE SYSTEMS**

Primary roof drainage systems may use:

- Box gutters (for near-flat roofs) or eaves gutters (for pitched roofs)
- Simple waterspouts (also known as scuppers)
- Outlets or box drains built into the roof These are collector drains that are designed to flow when only partly full.



### THE SUBSTRATE DEPTH ON A GREEN ROOF INFLUENCES THE PLANT TYPES THAT CAN BE USED



Low growing

succulents

Substrate can be as



Annual to biennial plants, herbaceous perennials shallow as 50–150 mm. Substrate deeper than

150 mm



Small shrubs & turf Substrate deeper than 250 mm



Shrubs up to 2 m Substrate deeper than 500 mm

Small trees Best results in substrate deeper than 1 m

DESIGN GOALS	DESIGN CONSIDERATIONS
Reduced stormwater run-off	Increase depth and water-holding capacity of substrate, use plants with high water uptake.
Recreation and amenity use	Increase weight loading, ensure ready roof access, planning and safety requirements.
Lightweight, long-life and no irrigation	Choose stable, lightweight substrates and components, and high stress tolerant plants, e.g. succulents.
Maximise thermal insulation	Increase substrate depth, provide irrigation, select species for leafy plant cover in summer (passive heat gain in winter may be increased if the roof is bare in winter but this strategy increases maintenance and reduces aesthetic benefit).

### green wall plant selection.



LOW-GROWING **SUCCULENTS** 



**HERBACEOUS** PERENNIALS



**ANNUAL AND BIENNIAL PLANTS** 







**SHRUBS** 

**TREES** 

# INTERIOR GREENING

# **ABOUT INTERIOR GREENING**

Wellness can be fostered through the 'living' decor plants provide – they absorb harmful chemicals and regulate humidity – and they're an inexpensive way to add instant colour and glamour to home interiors. Introducing plants into our homes is one of the ways we can easily and practically counteract the negative effects of city living.

Indoor plants can improve air quality by creating oxygen and absorbing carbon dioxide, regulating humidity, and absorbing harmful chemicals such as formaldehyde and volatile organic compounds, she continues.



INCREASED PRODUCTIVITY

### A D V A N T A G E S



REMOVE TOXINS AND PURIFY THE AIR



FOSTER HAPPY VIBES



CREATE A RELAXED ENVIRONMENT



ENRICH HEALTH AND WELL BEING

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**PRODUCE OXYGEN** 



As part of our green line, we manufacture customisable designes of FRC Planters and landscaping elements which could be used to enhance not only interiors but greening requirement at any level.

Our comprehensive range of FRC Planters , which are used as an excellent decorative item in the residential, commercial and other areas. Use of high quality FRC makes our planters one of the most coveted architectural items in the market. Our valuable clients can avail this product from us at very affordable price.



# **FREQUENTLY ASKED QUESTIONS**

### Do green roofs work on new and old buildings?

Yes. Green roofs can be fitted to a range of roof types. A new building can be constructed to accommodate the weight loading necessary for a green roof. Some existing buildings will have the capacity to support a green roof, or additional structural support can be retrofitted to support the required increase in loading. A structural engineer must be engaged to clarify details of building structure and weight loading capacity.

### Can I green any building?

Most building surfaces have the potential for greening. Challenging sites such as those in deep shade or with low weightloading capacity, and tall buildings or sites with limited access, require specialist engineering, design and technical input.

### Can a tile roof be greened?

Yes, but it requires design expertise and specialised systems that are not yet widely available in India

## Is irrigation necessary for a green roof, wall or facade?

All green walls and most green facades and roofs, require irrigation. It is possible to install a green roof with no irrigation, but this will limit the range of plants that can be used successfully and the potential benefits of the roof (such as summer cooling or aesthetically pleasing views of leafy plants). Some green facades grown in garden bed settings may not need irrigation.

# Can I have a green roof on a slope?

Yes, but steeper slopes present a challenge, and require specialised design solutions, including drainage boards and systems to help hold substrates and plants in place.

### How much water do you need?

There is no one answer, as calculating the water needed to sustain a green roof, wall or facade depends on climate and environmental influences, the design and type of system used, and on the substrate and vegetation characteristics. Explore alternative sources of water for use in irrigation, such as harvested and recycled water, to minimise reliance on potable water. Many green walls rely heavily on irrigation and it is essential to establish that supply can meet demand.

# Will plants 'overtake' the roof or wall?

Vegetation maintenance on a green roof is important and should be factored in during the design phase of the project. Selection of less vigorous plants (species with low biomass) or those that do not seed freely will help reduce maintenance requirements. Green walls can be designed to have an air gap between the back of the system and the wall, to provide air pruning of roots. Green facades will require pruning to manage size and maintain effective cover

## How much do green roofs, walls and facades cost?

Costs will vary significantly between sites and projects. The case studies in this uide indicate costs for a range of projects of varying complexity for comparative purposes. The key factors that influence costs are the size of the roof, wall or facade; the design and type of materials used in the roof (for example, structural reinforcement, volume of growing substrate and components used in the mix, plants, system components, hard surfaces and furniture, etc.); requirements for access; and the requirements for ongoing maintenance (including inputs for irrigation, weeding, pruning, fertiliser). Green wall technologies offer notable variation in costs, with relatively cheap domestic green wall products suited to smallscale DIY (do-it-yourself) applications, through to large and small-scale customdesigned commercial systems. Each presents a different level of refinement and security for longterm success.

# Will the green roof leak and cause problems?

Any roof has the potential to leak. Well-constructed green roofs, walls and facades will not leak or cause other structural damage to the building. Correct installation of waterproofing is essential on roofs and some walls, and leak detection systems can minimise risks on green roofs. Waterproofing membranes can actually last much longer under green roofs because they are protected from damage by the elements by overlying layers.

# **FREQUENTLY ASKED QUESTIONS**

### What is the typical lifespan of a green roof, wall or facade?

The lifespan is directly related to the quality of the design, construction and maintenance. and in particular, the longevity of the system components. Some green roofs in Europe have been in place for more than 75 years and are still performing strongly. There are many examples of direct façade greening in Melbourne that have lasted for decades. The projected lifespan of green wall and facade technologies that are more recent entries into the market are less well understood.

### Will construction of a green roof, wall or facade cause delays in the construction of my building?

Although a green roof, wall or facade should be considered an integral component of a building, its construction can usually be done independently from the rest of the build, so it poses little risk in causing delays. It is very important to include the installation specialists in early design discussions and associated construction project timelines to establish the most efficient construction timetable and ensure that drainage, irrigation and lighting are designed to include the green roof, wall or facade.

### Can I have solar panels on a green roof?

Yes. There are examples of green roofs in India and other parts of the world where green roofs have solar panels installed above them.

### Are green roofs, walls and facades environmentally sustainable?

Design of the system is paramount to how well it contributes to broad sustainability goals, such as pollutant filtration, thermal insulation, providing habitat or localised cooling. By considering how you design, operate and maintain your system you can also ensure that the materials and practices used are environmentally sustainable now, and in the long term. This process is called 'life-cycle analysis'. Recycled waste products could be used (from the building materials to substrate materials) or local products sourced rather than imported materials to reduce the energy used in these components. Some systems may require more water than others, but if that water is sourced from harvested stormwater or recycled water, it may be more sustainable than a low waterusing system that uses potable water. Considered application of fertiliser is required to ensure there is no negative effect from polluted run-off from the site. Management of weeds and pests in the vegetation through a maintenance regime will also contribute to overall sustainability outcomes.

### How much pruning will be needed if I grow a green facade?

Pruning is usually required once or twice a year, although this will depend on the vigour of the plant species and the growing conditions. Annual pruning is important to control growth and keep vegetation away from building fixtures (lighting, heating or cooling equipment, drains).

### Could I just paint my roof white to achieve summer cooling?

Increasing roof reflectance through a 'white roof' is one way of reducing heat gain through the roof. However, a white roof will not capture and retain stormwater, provide aesthetic benefits or increase biodiversity values. Paint

eventually degrades and requires maintenance. Most white roofs cannot help insulate the building in the winter months and will therefore only improve the building's energy efficiency in the heat but not the cold. A green roof can help a building's energy efficiency year round.

### How do I know if my building has the capacity for a green roof?

An architect, engineer and green roof provider are needed to ascertain that a green roof can be installed on a new building. To retrofit a green roof on an older building, consultation with an architect and/or structural engineer is necessary to determine the load-bearing capacity of the structure. Consult with green roof, wall or facade providers to discuss design ideas and solutions for the site.

### WHAT WE DO

We help create some of the most iconic spaces in both global and local scene.

As artists, tacticians, architects, designers, and planners, our group accepts the responsibility of designing high-performing buildings that provide positive space for the people and the community.

### **CONTACT US**

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