



# Modular Roof Systems

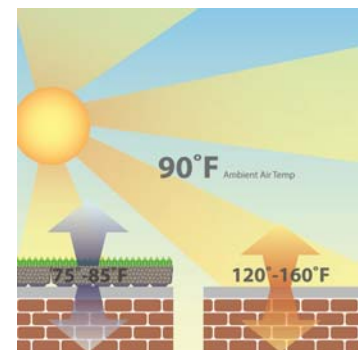
## What is a Green Roof?

Green roofs are roofs covered by vegetation. These roofs are designed with engineered soil to be lightweight and can incorporate layers for drainage, water retention and root barrier. All these layers are installed over a waterproofing layer to keep water from penetrating the building. Modules can also be used in non-roof applications to create planting space on patios, decks, balconies or other spaces where conventional gardening is not possible.

## Green roofs provide many environmental and economical benefits:

### Reduce Energy Costs

Conventional roofing absorbs solar energy and passes it through the building in the form of heat. The vegetation of a green roof uses that solar energy to create oxygen and transpire, and shades the roof too. The layers of a green roof also act as an extra insulation layer. All of this combined prevents heat energy from passing through to the building and makes cooling the building more efficient.



### Reduce Storm Water Run-off

During large storm events, the run-off from roofs, roads, and other impermeable surfaces can over burden a city's storm water system. This leads to contaminated water entering oceans, rivers, lakes, and other water resources. Green roofs can help mitigate this problem by retaining storm water — keeping an average 56% of annual rainfall from running off roofs and detaining the rest — slowing it's progression into the storm water system. More green roofs = less run-off.



### Reduce Air Pollution

A green roof will filter the air moving across it. A study has shown that 10.76 ft<sup>2</sup> of a vegetated roof can remove .44 pounds of airborne particulates from the air every year. The typical size of one Green Roof Outfitters' module is 4 ft<sup>2</sup>, so it would just take 2.5 modules to accomplish this task.

### Produce Oxygen

Another study found that 16.15 ft<sup>2</sup> of vegetated roof can produce enough oxygen to supply one human with their yearly oxygen intake requirement. This is the equivalent of 4 Green Roof Outfitters' modules.

### **Create Habitat**

Green roofs promote biodiversity, by providing a habitat for critical species of insects & birds that wouldn't normally be present in an urban setting.

### **Reduce Noise Pollution**

The Green Roof Outfitters' modular green roof system acts as an insulator and buffer to reduce outside noise pollution that enters through the roof. Studies have shown that green roofs can reduce the indoor noise pollution from outdoor contributors by as much as 10 decibels. Noise-level reductions can provide significant benefits to buildings in noise-impacted areas, such as sites close to airports, highways, construction or industry. This reduction in unwanted noise pollution creates a more productive and peaceful work environment.

### **Create Pleasing Spaces**

Green roofs provide a win-win scenario for adding beautiful and functional spaces for gathering, and for providing pleasant scenes to higher buildings within view. Green roofs can assist commercial and industrial properties to better blend into their surrounding suburban and rural areas, and can possibly qualify to meet green space requirements needed on a project.

### **Mitigate Urban Heat Island**

The Urban Heat Island (UHI) effect occurs when solar radiation is absorbed by roofs, buildings structures, roads, sidewalks, parking lots & other surfaces, which then re-radiate that energy back into the atmosphere as heat, causing further warming. These factors can result in a 6° - 10°F temperature increase in cities. Using green roofing is one way to help mitigate these effects. A green roof insulates the roof membrane and actually cools the atmosphere around it by a process called evapotranspiration (when the plants transpire). The more green roofs that are installed throughout the city, the greater the impact on UHI effect. For each 1°F the city gets cooler, every building owner's HVAC energy costs will decrease, making the city's total energy consumption decrease.

### **Produce Food**

Roof space in an urban environment can be prime space for producing vegetables and herbs. Cultivating vegetables and herbs in a green roof environment is much the same as gardening on the ground. The main concerns are the structural capacity of the roof; protecting the waterproofing layer from the use of hand tools; and creating a low weight soil medium ideal for growing crops.



These green roofs were generously donated by Green Roof Outfitters  
<http://www.greenroofoutfitters.com/>