

# Green walls for a green city!

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## 1. Is there an effect on the temperature?

I found an article on the internet about the positive effects of green walls on the cities. More and more architects started giving their buildings 'green skins'. It's becoming a worldwide trend thanks to the Italian architect Stefano Boeri. He became known for his so called 'Bosco verticale' or vertical forest. The two residential buildings had a huge amount of plants and trees planted on them. These plants are most definitely not useless as they help the climate bit by bit. In the article there is one example given: "these plants are a solution for a lot of urban problems such as the collecting of rainfall." Loads of cities have trouble dealing with the extreme climate which in this case, results in to more rainfall. The plants hold on to the water which is a great way to fight the overheating of the cities. It also offers a new living environment for birds and insects who normally don't live in the cities.



Metz, T, Het gebouw wordt een verticale tuin, internet, 7/09/2017.

(<https://www.nrc.nl/nieuws/2017/09/07/het-gebouw-wordt-een-verticale-tuin-12831100-a1572477>)

3. Is there an effect on the humidity?

Relative humidity levels affect when and how plants open the stomata on the undersides of their leaves. Plants use stomata to transpire, or “breathe.” When the weather is warm, a plant may close its stomata to reduce water losses. The stomata also act as a cooling mechanism. When ambient conditions are too warm for a plant and it closes its stomata for too long in an effort to conserve water, it has no way to move carbon dioxide and oxygen molecules, slowly causing the plant to suffocate on water vapor and its own transpired gases.

As plants transpire, the humidity around saturates leaves with water vapor. When relative humidity levels are too high or there is a lack of air circulation, a plant cannot make water evaporate (part of the transpiration process) or draw nutrients from the soil. When this occurs for a prolonged period, a plant eventually rots. When surrounded by warm temperatures in low relative humidity levels, transpiration rates in a plant increase, reducing the need for a grower to fertilize it.

In addition to water and air, plants use light energy for the transpiration process, as it causes liquid water to turn to vapor (evaporation). Greenhouses often maintain relative humidity levels below threshold values during the day and night by controlling the water content in air to maintain a minimum transpiration rate in plants.

Managing the growth and development of plants involves manipulating a growing environment so light, temperature and relative humidity levels to promote photosynthesis, high yields and generative growth. Optimal transpiration rates vary by plant type, age and season, making climate control for plant growth necessary throughout the year.

( [link: https://www.polygongroup.com/en-US/blog/how-humidity-affects-the-growth-of-plants/](https://www.polygongroup.com/en-US/blog/how-humidity-affects-the-growth-of-plants/) )

The interior and exterior living green walls function to cool the air in the warmer summer months by a process known as “evapotranspiration.” The winter months see the added advantage of building insulation thus reducing energy costs for heating the building. Exterior living green walls can reduce wall surface temperatures by as much as 50 degrees ° F, resulting in significant energy savings and air conditioning costs.

( link: <https://www.ambius.com/green-walls/> )

### 3. How to sustain these plants?

Green walls are constructed much the same way actual walls are. They are built with a skeletal structure that is hung with sections containing the plants and flowers that will make up the Green Wall. As for the way the green wall functions itself, a lot depends on the type of Green wall system installed. Some green walls have hidden pipes which will provide a self-watering mechanism to keep the plants healthy, while others require hand-watering. I found an article that gives you tips about how to ensure the maintenance of the plants. The first tip is to optimize the access to natural light. Walls can be pointed in certain directions and installed on specific walls, ensuring that the plants have access to as much light as they need. The amount of light required will, of course, depend on the plants chosen, which is why working with the Planters team is so important. The second tip is Using Appropriate Nutrient Solutions. Different plants require different nutrition. Living walls do not use soil – this would be inefficient and require extensive maintenance throughout the year. Instead, Planters uses a clever hydroponics and irrigation system that feeds plants through intermittent watering. The water used is infused with nutrients, ensuring that the plants installed on the panel get all the nutrition they need through the water. The fourth tip is to Remove Dead Plants. If plants die, it's important that they are quickly removed from a living wall. If some plants begin to die because of disease, it's essential that they are removed. This means that other plants won't need to be removed or trimmed in the future, protecting. The fifth tip is to ensure easy access. By ensuring easy access at all heights, maintenance is simpler and quicker. This is a preventative measure that means your experience with a living wall is hassle-free. The last tip is to Confirm Access to Proper Drainage. Ensuring that you have access to proper drainage, and ensuring that this drainage system remains unblocked throughout the year, makes maintenance easier.

PLANTERS, [7 ways to minimise living green wall maintenance](https://www.planters.ae/blog/minimise-living-green-wall-maintenance), internet, 16 Juli 2017.  
(<https://www.planters.ae/blog/minimise-living-green-wall-maintenance>)

### 4. Which plants do we use in which climate?

BELGIUM

For years we have had a climate with mild winters and cool summers. But the past few years were hotter than ever. We even had a few heatwaves, which means we have hotter summers

instead of a few years ago. The average temperature in Belgium is higher than before. A hundred years ago the average temperature in Belgium was around  $8,6^{\circ}\text{C}$ , today this is around  $11,8^{\circ}\text{C}$ . So there is a notable revolution.

In Belgium the average rainfall in a year is around 800mm, so we are also looking for plants who survive rainfall.

In winter we have an average temperature of  $3,6^{\circ}\text{C}$ . If we look at the summer, we have an average temperature of  $20^{\circ}\text{C}$ .

So if we talk about plants for our city, we need plants that could survive the cold winters, hot summers and rain.

## ZURICH

In general there is a similarity in the climate of Antwerp and Zurich. In 1990, the average temperature in Belgium is around  $9,6^{\circ}\text{C}$ , in Switzerland it is around  $8,5^{\circ}\text{C}$ . Today it will be a little higher, around  $11^{\circ}\text{C}$  and  $10^{\circ}\text{C}$ .

A difference between these two is the amount of rain. In Zurich they have an average rainfall of 1100mm a year, Belgium around 800mm a year (again info of 1990, they might have changed a little).

Conclusion: we can use the same sorts of plants in both countries, since our climates are kinda similar.

### Examples of plants who can survive wintertemperatures:

- **Jasmine:** survive temperatures of  $-15^{\circ}\text{C}$ . This plant grows the best against a wall (good for cities). They don't demand much, they can survive in the sun and shadow.
- **Violets:** bloom from November until spring. They survive frost, so perfect for our winters.
- **Ivy**

### Examples of plants who can survive summertemperatures:

- **Lavender**
- **Succulents:** don't need a lot of water, because they save water in their leaves, roots, ... They survive hot temperatures.

### Examples of plants who can survive rainfall:

- **Different sorts of grasses:** survive rainfall and winters. Ex: gazongras.
- **Ivy**

SOURCES:

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