GREENING THE FACADE

HAZARD

HEAT

RAINFALL AND FLOODS

IMPLEMENTATION STEP

CONSTRUCTION

RENOVATION

AREA OF ACTION

ENVELOPE

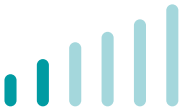
OUTDOORS

COST

€ € €

low medium high

LEVEL OF SKILL



low

The practice of greening facades has developed considerably over the past few years. This strategy counts as a nature-based solution for adaptation (NbSA), and is of real interest for buildings. It involves installing climbing plants on a facade, or integrating plants directly to make a "green wall".

IMPACTS

Planting vegetation on walls **improves thermal comfort** for the building's occupants, particularly in summer, by intercepting solar radiation (which can exceed 60°C in summer), creating shaded areas and additional layers of insulation. This insulating layer can reduce **energy consumption** for air conditioning by between 5% and 68%, depending on the geographical location of the building (Malys et al., 2013). It also helps to combat urban heat islands and heat waves by converting around 60% of absorbed solar radiation into latent heat, thus avoiding a rise in temperature.

By **protecting the wall from variations in temperature, strong winds, rainfall**, etc., vegetation (depending on the type) improves the resilience of the building (reduced cracking, protection against infiltration, etc.) on certain materials. By absorbing, diffracting and reflecting sound, green walls provide a means of sound insulation, which improves acoustic comfort for users. They **also improve air quality and the aesthetics** of the building. Numerous studies have shown links between the **well-being of occupants** and the presence of plants on buildings.

Green walls, particularly when planted in the open ground, **support local biodiversity**; they help to integrate the building into the urban ecological continuum, and also reduce the risk of birds colliding with reflective surfaces.

Another advantage is that, when it rains, the plants capture the falling water and discharge it at a regular rate, provided the rain is not too intense. Green walls planted in the open-ground therefore help to reduce run-off by returning the water to the permeable soil.

INSTALLATION GUIDE

There are two strategies for greening walls. A **green facade** consists of specialised plants installed to climb the facade (1), while **green walls**, which integrate plants directly into the wall, require a more complex installation and irrigation system (2). The second approach, which is more costly and requires more water, is less in line with the principles of adaptation, particularly in terms of sobriety, and is not covered in this fact sheet.

To green the facade, a **cladding system featuring beams or cables** can be installed, depending on the load-bearing capacity of the structure. This system duplicates the original facade and allows the vegetation to take hold without compromising the solidity of the building, like a trombe wall (3).

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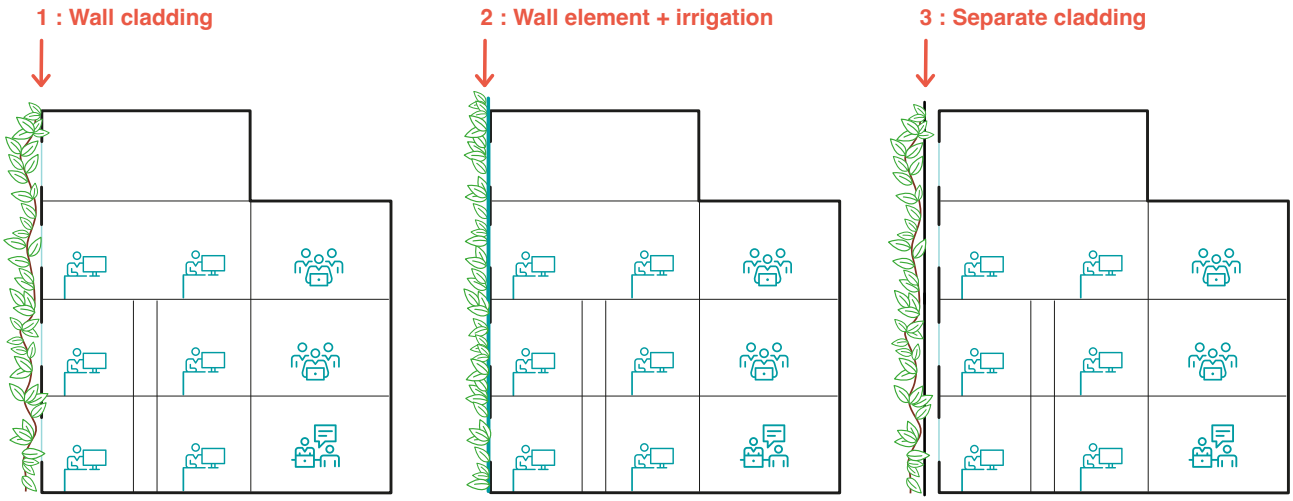
TYPES OF FACADE GREENING



It is preferable to cover the facade with **climbing plants native to the region**, adapted to the climatic conditions and the local ecosystem, and requiring little water. The plants can be planted directly in the **open ground**, to encourage soil permeability, or in pots, planting boxes or window boxes on the building. One of the benefits of planting in the ground is that it considerably reduces watering and fertilisation requirements. The exposure of the wall, its height and the local climate must also be taken into account, as must the expected height (more details here).

The following plants are frequently used in France: ivy, clematis, Virginia creeper, star jasmine, honeysuckle, climbing roses, etc.

Lastly, **pruning should be carried out once or twice a year** to ensure that access and windows are kept clear (preferably outside nesting and cold winter periods to protect any wildlife that uses the wall as refuge).

WEAK POINTS AND STRONG POINTS

- Green facades can be unpopular with occupants, particularly when they have **fears of high levels of insects and a risk of allergies**. Choosing appropriate species and communicating clearly should make the solution more acceptable.
- Green walls require a large-scale irrigation and fertilisation system.
- Opt for green facades rather than walls, which are more energy sufficient.
- Communicate all the benefits detailed below. These are all arguments in favour of these practices that are easily affordable. The variety of urban issues addressed by green facades increases the proportion of the population that will be receptive.

MALADAPTATION

Maladaptation can result from the following:

Fragility of the building

Greening using climbing plants is relatively simple, requires little maintenance and is fairly inexpensive. However, some species require a support on which to grow. If the support is too small, not strong enough, poorly fixed or too far from the wall, planting on the facade might weaken the structure of the building.

Larger ecological footprint

When climbing plants are grown from pots placed on the ground, the reduced substrate volume requires incorporating an irrigation or fertilisation system. However, the aim is to avoid irrigation, particularly during periods of drought when there is considerable pressure on water resources. A rainwater collection tank can be installed throughout the year to remain self-sufficient through summer drought periods. Inputs of nutrients from chemical fertilisers involve the extraction of minerals and chemical processes that transfer vulnerability to other systems where these resources are exploited. Organic fertilisers have a smaller environmental footprint but may contain peat extracted from peat bogs.

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MONITORING INDICATORS

ESSENTIAL RECOMMENDATIONS WORTH THINKING ABOUT

- FAVOUR CLIMBING PLANTS PLANTED IN THE OPEN GROUND
- DO EVERYTHING POSSIBLE TO AVOID THE NEED FOR AN IRRIGATION AND FERTILISATION SYSTEM (HERE ARE A FEW RECOMMENDATIONS: OPEN GROUND, PLANT PALETTE ADAPTED TO THE CLIMATE, GREEN FAÇADE RATHER THAN GREEN WALL, ETC.).
- USE LOCAL SPECIES AS MUCH AS POSSIBLE
- ADAPT THE PLANT PALETTE TO CURRENT AND FUTURE CLIMATES
- INSTALL A RAINWATER HARVESTING SYSTEM TO IRRIGATE THE FACADE IF NECESSARY DURING DRY SPELLS
- INSTALL BIRD NESTING BOXES
- CALL ON THE SERVICES OF AN ECOLOGIST DURING THE DESIGN PHASE

MONITOR MY ACTIONS FOR CLIMATE CHANGE ADAPTATION

+/− : Quantitative indicator ★ : Qualitative indicator

INDICATORS OF MEANS	INTERPRETATION
+/− Surface temperature of green facades (°C)	To be minimised
+/− Annual irrigation excluding rainfall (m^3)	To be minimised
+/− Ratio of green facade area to building envelope (excluding roof) (%)	To be maximised
+/− Thickness of substrate for planting in boxes (minimum 50 cm recommended) (cm)	To be maximised
+/− Percentage of essential recommendations followed (%)	To be maximised

INDICATORS OF RESULTS	INTERPRETATION
+/− Comparison between the surface temperature of green facades and a control situation* (e.g. another non-green facade with the same exposure and the same cladding before planting) (°C)	Surface temperature of green facades < temperature of control situation*.
+/− Comparison between energy consumption for heating and cooling after the facade has been planted and a control situation (kWh)	Energy consumption after greening < energy consumption of the control area
+/− Leakage rate onto public roads (l/s.ha) (see definition in "Creating a green roof")	To be minimised
+/− Rainfall abatement of facade (%) (see definition in "Creating a green roof")	To be maximised
+/− Comparison of noise levels near the facade and in a control situation* (dB)	Noise near the facade < noise in control situation* (dB)

** The control situation is defined by the parameters established to isolate the influence of the adaptation action (similar conditions: weather, time of measurement, space, etc.).*

FIND OUT MORE

Paris City (2021), *Créer un mur végétalisé de plantes grimpantes*

Malys et al (2013), A hydrothermal model to assess the impact of green walls on urban microclimate and building energy consumption

Nature4Cities (2020), Climber green wall

REDON, E. (2017), *Modélisation de la végétation urbaine comme régulateur thermique*

Strasbourg Eurométropole (2017), *Guide de végétalisation - Façades*

Vandersmissen (2021), *Les façades végétalisées : analyse comparative et mise au point d'un outil d'aide à la décision*

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