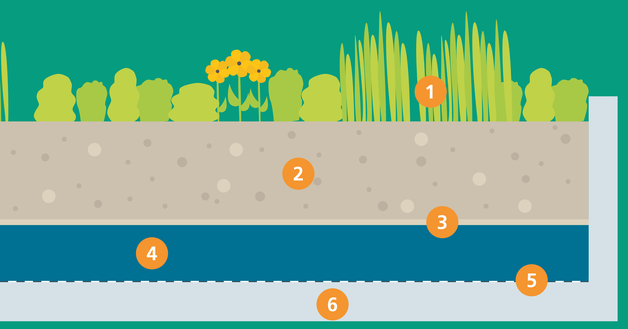
# Greening buildings – sustainably adapting cities to the climate change

## Types of greening

Greening the surfaces of buildings has several advantages, especially in densely populated cities, e.g. cooling, noise reduction, water retention or a better quality of life for people and the ecosystem. Depending on local conditions and requirements, there are different types of greening.




1. Vegetation layer
2. Substrate
3. Filter fleece
4. Water storage and drainage layer
5. Roof insulation (root-proof according to FLL)
6. Roof construction

## Urban climate

Greening buildings not only improves appearances but also significantly helps cities to adapt to the consequences of climate change in the long term. A whole range of properties have a positive impact on the environment as well as on the quality of the air and of life in densely populated areas.

**1 Protection from summer heat**

Greened roofs and façades improve the indoor climate due to evapotranspiration, their heat-insulating properties and by creating shade. Cooling energy requirements can thus be reduced.

**2 Improved urban climate**

Greening lowers the surface temperature of buildings and thus their heat radiation. This effect coupled with evaporative cooling counteracts urban heat islands. Furthermore, the plants absorb $CO_2$ and fine particulates, thereby improving the quality of air in cities.

**3 Rainwater storage**

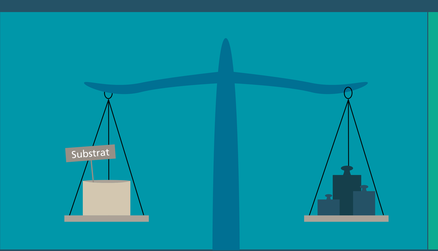
Greening increases the percentage of unsealed areas in urban areas. Water can seep away and be stored instead of running off surfaces. Particularly in the event of heavy rain, these additional storage areas help to prevent sewer systems from being overloaded.

**4 Noise reduction**

Traffic noise increases the risk of cardiovascular disease, causes chronic insomnia and is disturbing to residents. Greened walls can significantly lower noise levels in built-up areas. Study results show a sound reduction index (Rw) of up to 15 dB with a sound absorption coefficient (α) of 0.40.

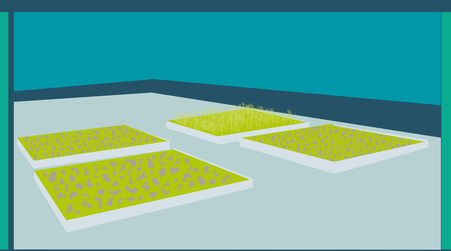
## Services offered by the Fraunhofer Institute for Building Physics IBP

Our experts provide interdisciplinary advice to suppliers, planners, contracting companies and municipalities on greening issues and give them the support they need to build and maintain sustainable solutions that have a positive impact on the climate.




**Laboratory**

In our hygrothermal laboratories, our experts examine greening systems – e.g. to ascertain their durability in different climate zones or the capacity of greened roofs to retain water. Additonally, they determine material and cumulative parameters.



**Field studies**

Among other things, the focus of our field studies is on the release of substances, water retention capacity or measurements with sensors. Individual aspects can be taken into account at any time in the experimental set-up and study parameters. The collected data are used to build a digital twin of the system and to validate it through simulations.

**Simulation**

Depending on the aim and the chosen software, through simulations we can quickly and easily assess the durabiltiy of a roof construction, the effect of greening on the indoor climate and on energy consumption, as well as the impact on the urban climate.