



Urban Heat Islands Strategy Vienna

Greening Facades and Roofs

City of Vienna –
Environmental Protection
DI Jürgen Preiss



Tasks of the City of Vienna – Environmental Protection

Spatial Development section – Team City Climatology:

DI Jürgen Preiss (head)

DI Max Wittkowski (climatology)

Mag.^a Eva Unger (advice)

Ing. Franz Fillafer (funding)

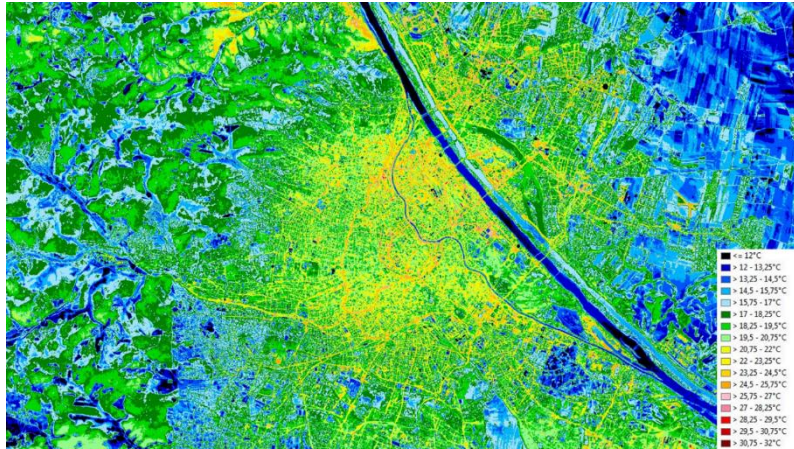
Main tasks & projects:

- Urban climatology & sustainable development – support of planning processes
- Funding for green buildings, up to EUR 30,000 from 2024
- Information work
- Research collaborations with external partners from university, NGO's, companies, associations...

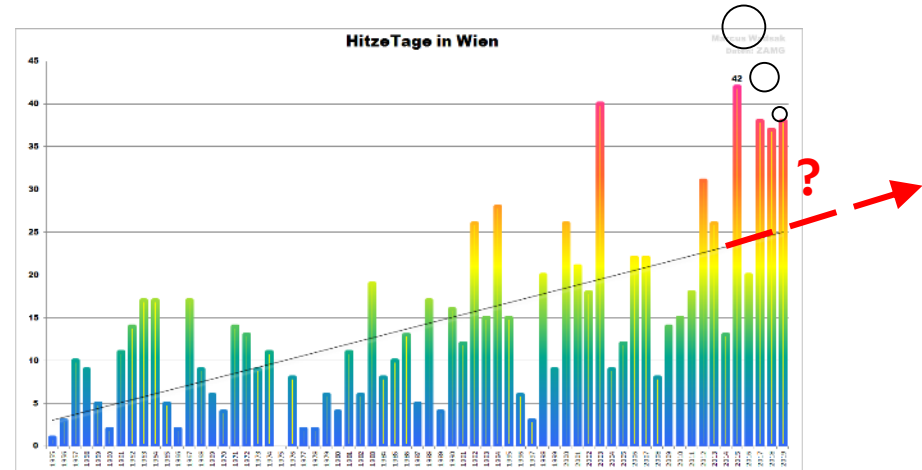


Urban Heat Islands & Climate Change

2023:
37 heat wave days in Vienna



Thermal Mapping Vienna 5am morning
(© Stadt Wien – Umweltschutz, 2001)



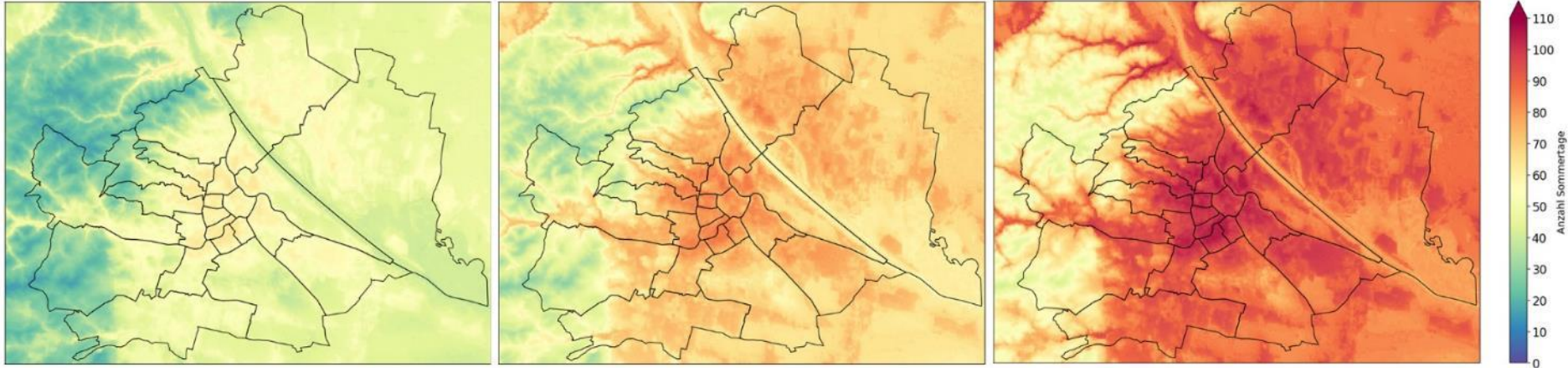
Heat wave days (© GeoSphere Austria)

Urban Heat Islands & Climate Change

1971–2000

present

2071-2100



MUKLIMO Scenario, number of summerdays
Reference simulation 1971–2000
A1B-Szenario 2071–2100
(© ZAMG)

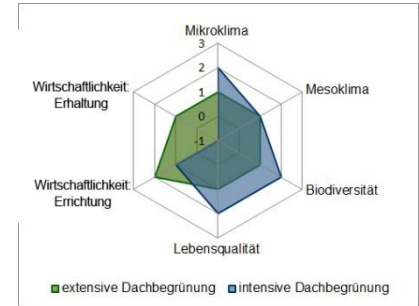
Urban Heat Islands Strategy Vienna

37 strategic & technical measures

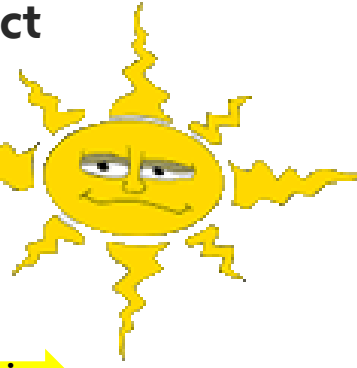


<https://www.wien.gv.at/umweltschutz/raum/uhi-strategieplan.html>

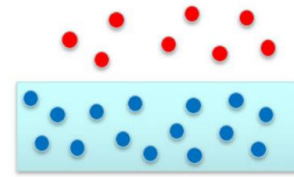
- **Ventilation**, linking of **Green Spaces**
- Adjustment of **Town Structure** and shapes of city areas
- **Brightening the Surfaces** of e.g. pavements and streets, buildings
- Increasing the **Proportion of Green** in streets and open spaces
- **Greening and cooling of buildings**
- Increase of **Water** content in the city
- **Shading** of open spaces and paths



Green infrastructure: cooling effect



Transpiration of 1 Liter Water you need: 2.25kJ



Enormous cooling capacity

Vaporization of 1 m³ of water: 680 kWh

Drive 1,000 km (60 liters diesel) approx. 600 kWh

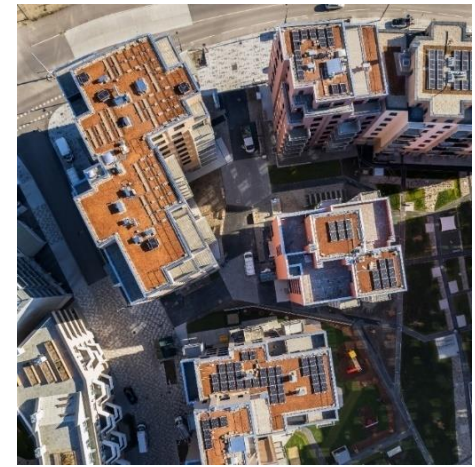
Regulation of Green Infrastructure

Vienna Building Regulation §5.(1) k):

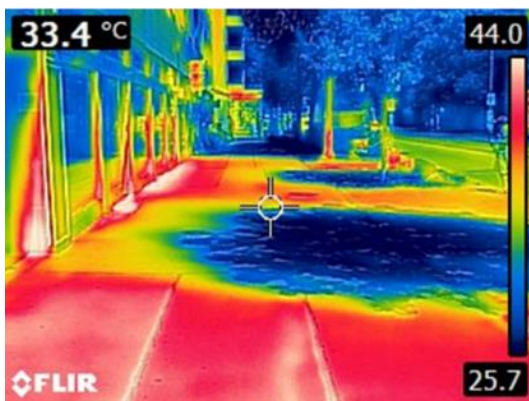
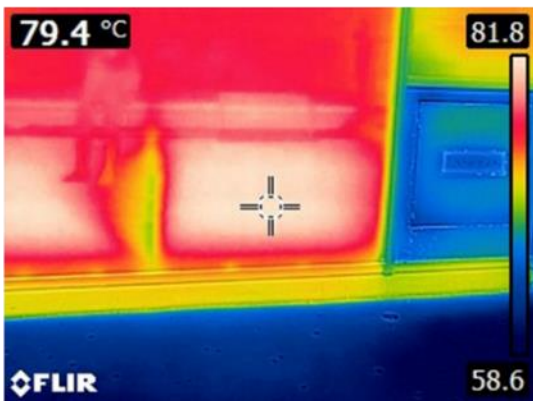
*Provisions for **green roofs and facades:***

*“ The **roofs** of buildings of more than 12 m² are to be designed as flat roofs and **intensive green** according to the standard”.*

*„For new buildings with a fixed building height [7.5 m up to 21 m].... **Facades** at least to the extent of 20% of the relevant front **have to be designed as green facades** according to the standard”*



Green infrastructure: cooling effect



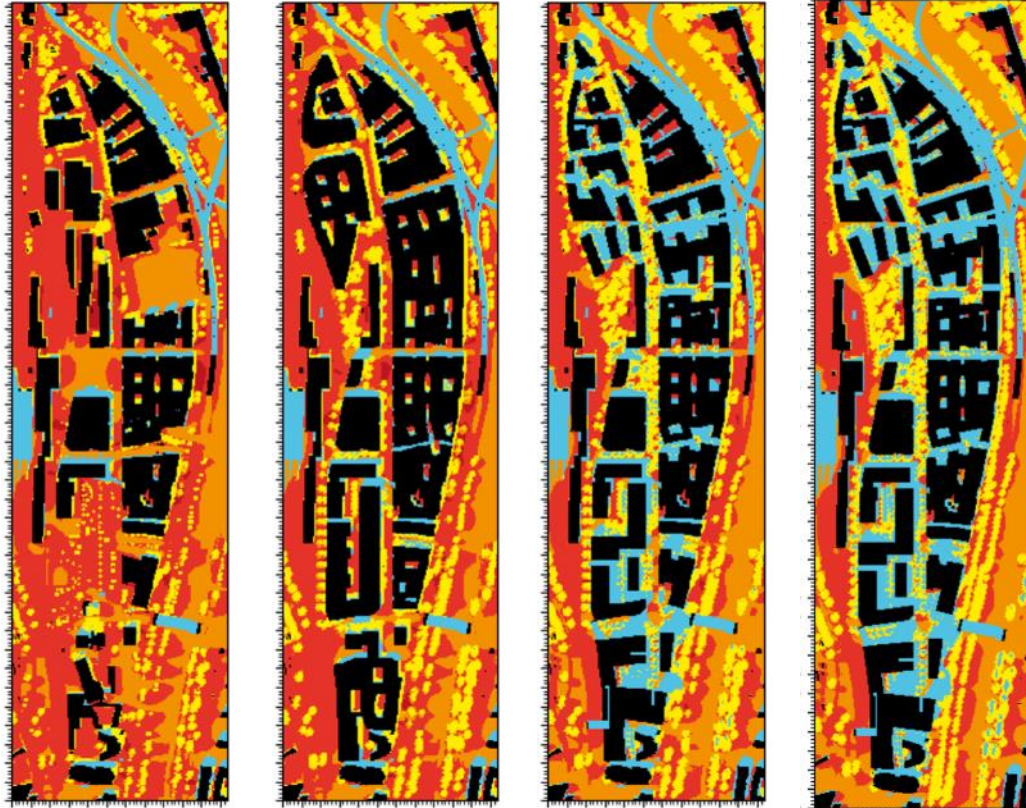
Planning instruments : Modelling

City development area
19., Muthgasse:
Simulation of 4 scenarios

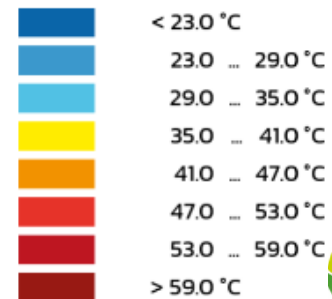
vltr:

1. **Existing situation**
2. **Reference** (business as usual)
3. **Basis** (more trees, green roofs, facades...)
4. **Best Case** (intensive greening measures)

PET Physiological equivalent temperature, mean at 3 pm



WNW-Wind



City of
Vienna

Environmental
Protection

(source: ENVI-MET 2022).

Urban Heat Islands Strategy Vienna - Implementation

21 Feb.

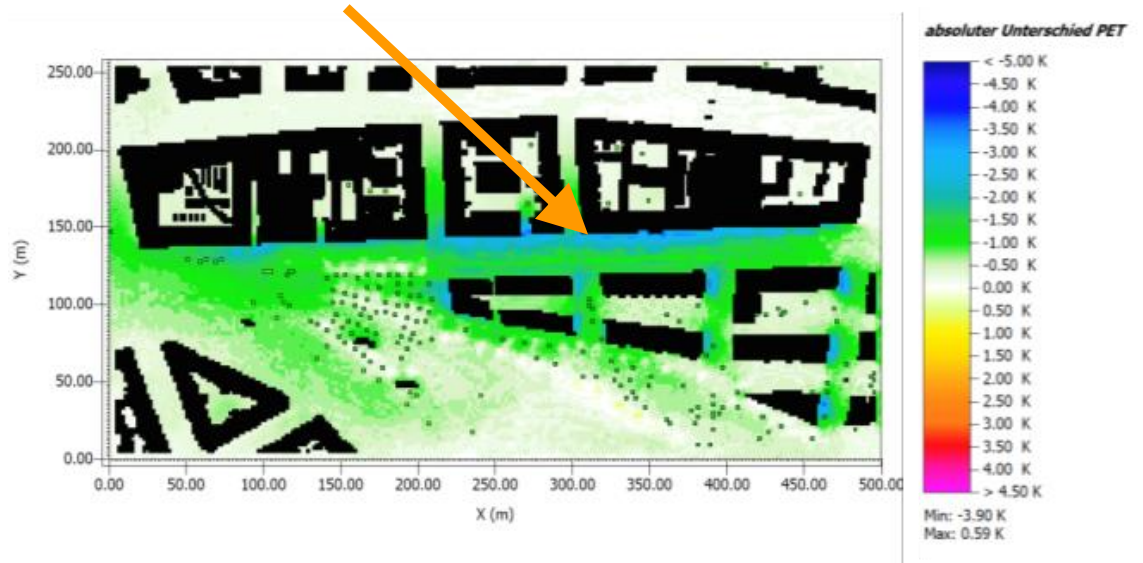


Planning instruments : Modelling

Case Study „Greening Aspang“ 3., Apangstraße:



Difference -3 °C at 10 pm



(source: ENVI-MET 2017).

© Betül Bretschneider

Examples Green facades 5., Einsiedlergasse MA 48 – Wastemanagement



April 2010



Oct 2014

Examples Green facades 5., Einsiedlergasse MA 48 – Wastemanagement



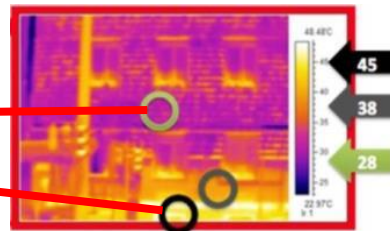
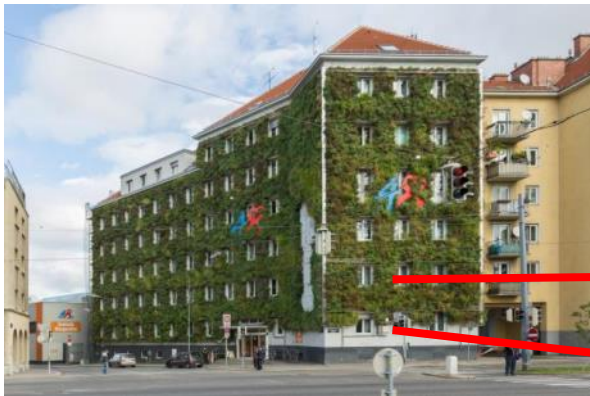
© VfB



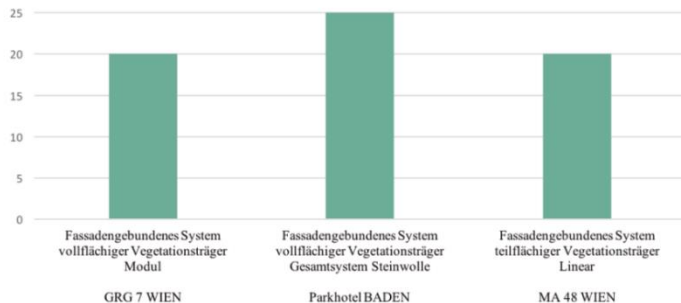
© Preiss

- **Dimension:** 850 m²
- **Vegetation:** 17.000 Herbs & Grasses
- **System:** 2.800 m linear aluminium planters with 40 m³ greenroof substrate (recycling clay granules), filter fleece; provider: Tech Metall, Dachgrün GmbH
- **Irrigation:** automatically, 3 km Drip hose irrigation, 12 circuits
- **Research support:** by University of Natural Resources (Bernhard Scharf) and Vienna technical University (Azra Korjenic)

Examples Green facades 5., Einsiedlergasse MA 48 – Wastemanagement



© Bernhard Scharf



Above: infrared image

Below:
Improvement of Heat transfer coefficients (U-values) compared with conventional facades (%) (c Korjenic, MA 22)

- **50 % less heatflow (W/m^2) in summer.**
Evapotranspiration: 3.600 L of water daily. 4 L/ m^2 responds to a cooling capacity of 75 air conditioning units 3.000 w / 8 hours.
- **20 % less heatflux in winter**
- **Protection** from the weather.
- **Biodiversity**



Examples Green facades 5., Einsiedlergasse MA 48 – Wastemanagement



Habitat for wild bees and other insects:

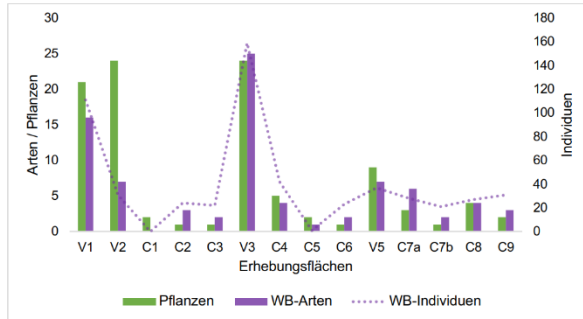
16 species of wild bees

19 plant species

Geranium spp.; Dianthus spp.; Sedum telephium; Iberis sempervirens; Sesleria caerulea; Sesleria heuffleriana; Nepeta faassenii; Dianthus plumarius; Achillea millefolium; Thymus vulgaris; Diplotaxis tenuifolia; Echium vulgare; Melilotus albus; Epilobium sp.; Dianthus carthusianorum; Lysimachia sp.; Cardus sp.; Stellaria media; Urtica dioica



© Dr Julia Lanner



Left: Correlation of the number of individuals and plant species.

Examples Green facades 5., Einsiedlergasse MA 48 – Wastemanagement

Construction: ca 440 € / m²

Maintenance: 10 € / m²a

Maintenance usually takes place **once a year** in spring. During this maintenance, dead plant parts are removed, a **long-term fertilizer** is applied, the **irrigation pipes are checked** and any failed plants are replaced.

Due to the height of the building, maintenance is carried out with an **elevator**. If the plants are growing vigorously, they get pruned back and cleared as necessary in the fall.

Compare:
Cleaning Costs of facades:
10 € / m²a



© Preiss

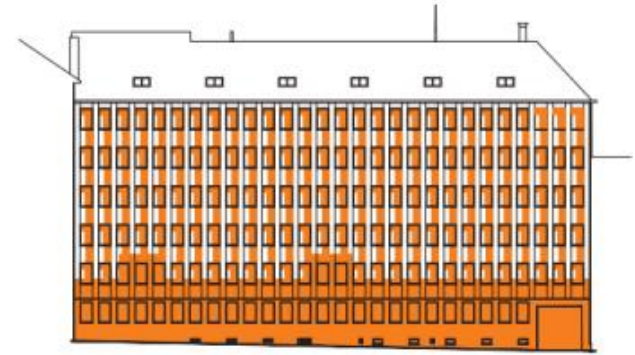
© MA 48



Examples Green facades 6., Grabnergasse 4-6 Vienna Water



© MA 22 Preiss

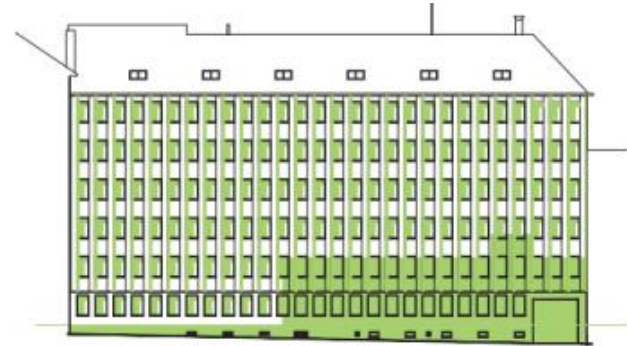


Schattenbilder

01. März 12:00 Uhr



© MA 22 Preiss



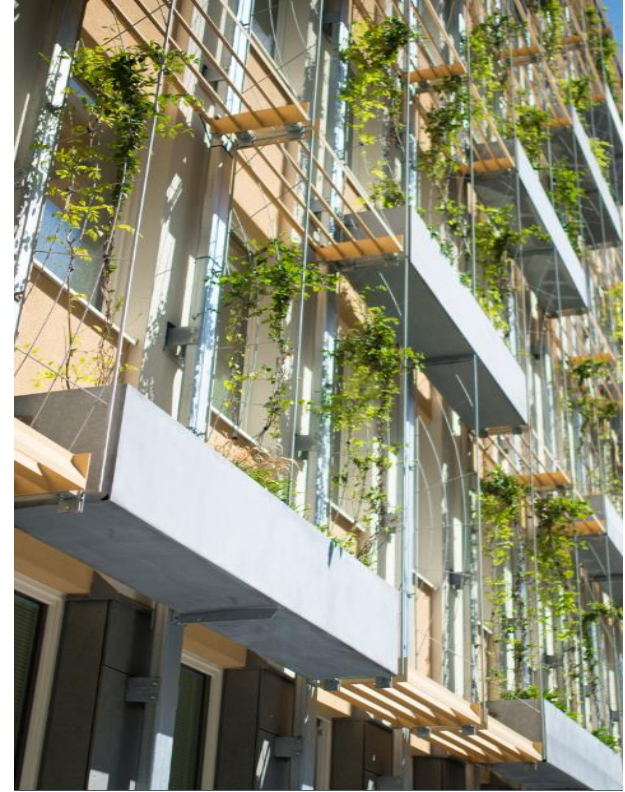
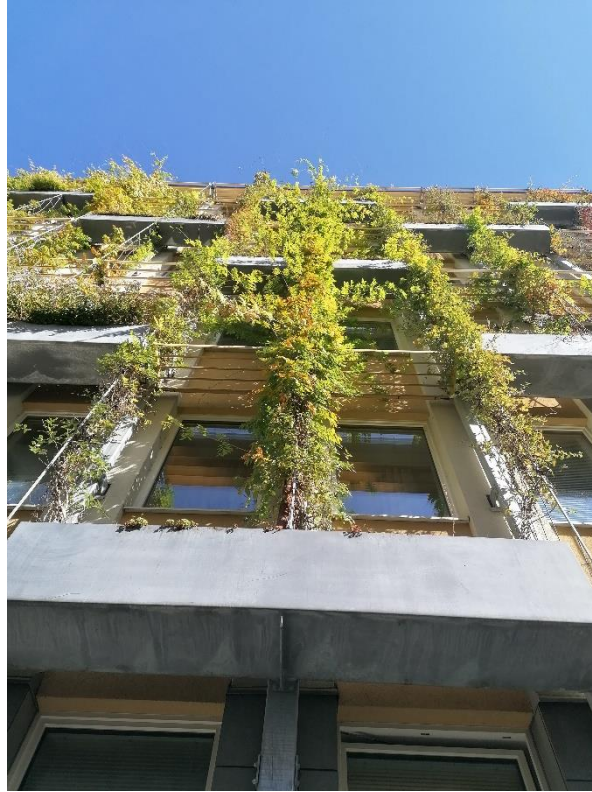
01. Juli 16:30 Uhr

Examples Green facades 6., Grabnergasse 4-6 Vienna Water



- **Dimension:** 1.000 m²
- **Vegetation:** 7 climbers, herbs, grasses
- **System:** 30 steel planters 1.000 kg each
- **Shading slats**
- **Irrigation:** automatically, 5 circuits, controlled via smartphone app.
- **Provider:** Tech Metall, Dachgrün GmbH
- **Research (Monitoring)** by University of Natural Resources (BOKU).

Examples Green facades 6., Grabnergasse 4-6 Vienna Water



BeRTA Green facade module



50 GRÜNE HÄUSER

<https://50gh.at/>

Begrünung (greening), Rankhilfe (trellies), Trog (trough): All-in-one

Why greening the city with planter – tubs?

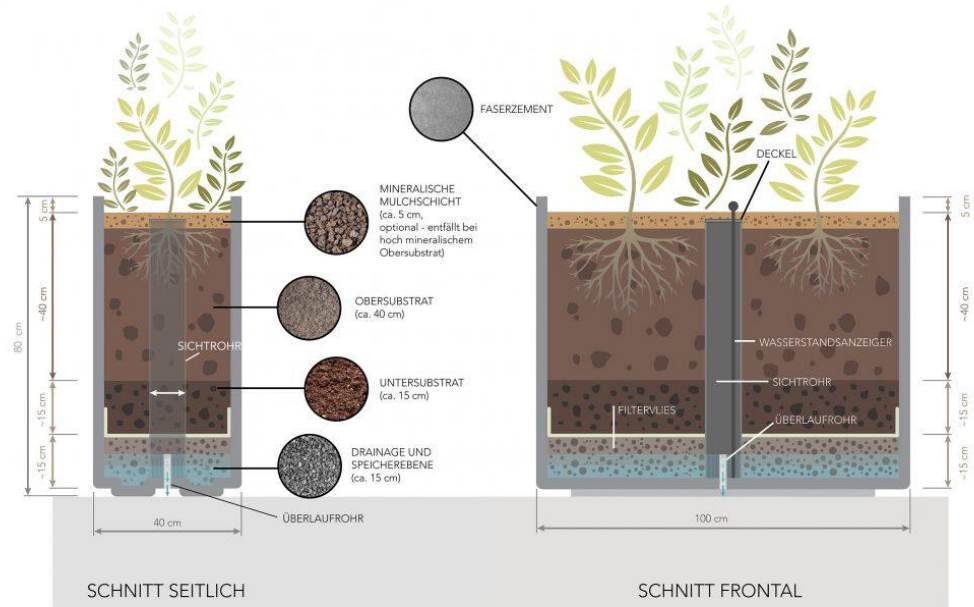
- Quick installation
- Removeable in case of construction work
- Do-it-yourself construction (DIY)
- No permission by the street owner
- Trafficplanning permission only (Ma 46)
- All-in-one solution



BeRTA Green facade module

BeRTA specifics:

- 300-litre planter tub made from fibre cement
- Trellises optional
- 3 layers of substrate
- 15 cm water storage, level indicator
- 8 m² coverage of the facade
- Support by experts
- Eco balance: no toxics, low CO₂, energy balance



<https://50gh.at/>

Urban Heat Islands Strategy

BeRTA – Green facade module



supported
2021

Examples Green facades Rathausstraße 8 Office Building



© MA22 Preiss

Examples Green roofs for multiple use



BiotopeCity / Wienerberg



Environmental Department (MA 22)

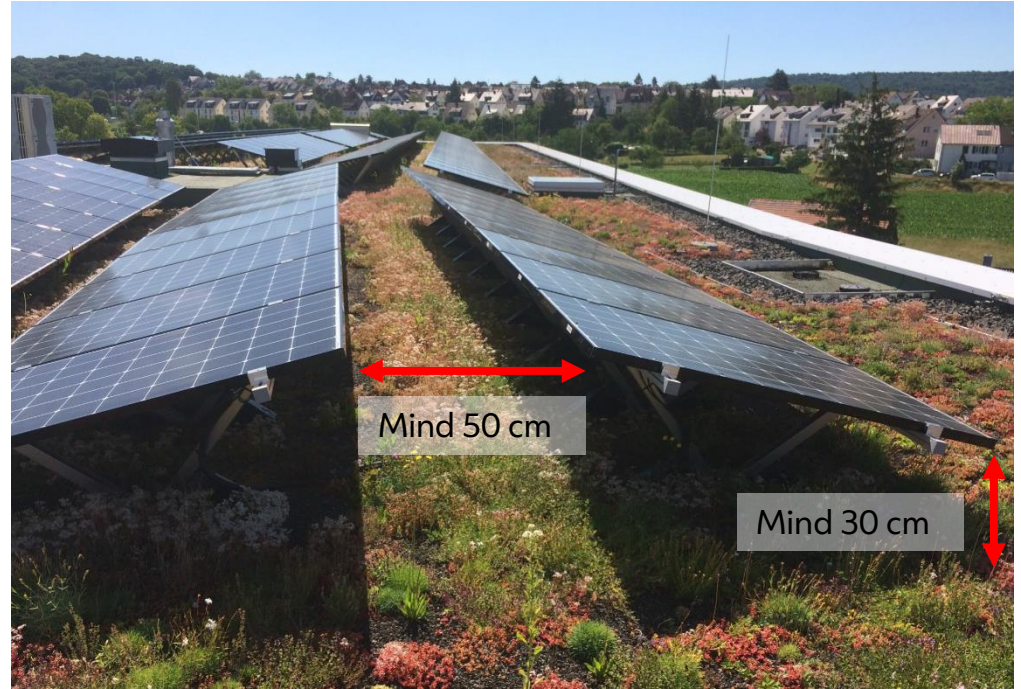


Latest discussions about Green Roofs & photovoltaics:

Massively increased maintenance effort, or not feasible!

Shading leads to loss of yield !!

Example Green Roofs & Solar Pannels



The solution: best synergy achieved, if module lower edge to substrate surface ≥ 30 cm, according to the ÖNORM L 1131 Standard (suggestion)