

Urban Heat Islands Strategyplan Vienna



**A key role for the implementation of
nature based solutions**

Background 1: Climate change

CLIMATE PROTECTION

Interrelation



ADAPTATION TO CLIMATE CHANGE

Interrelation



CLIMATE CHANGE

Two °

KLIP III (2021-)

Thematic work fields:

Five °

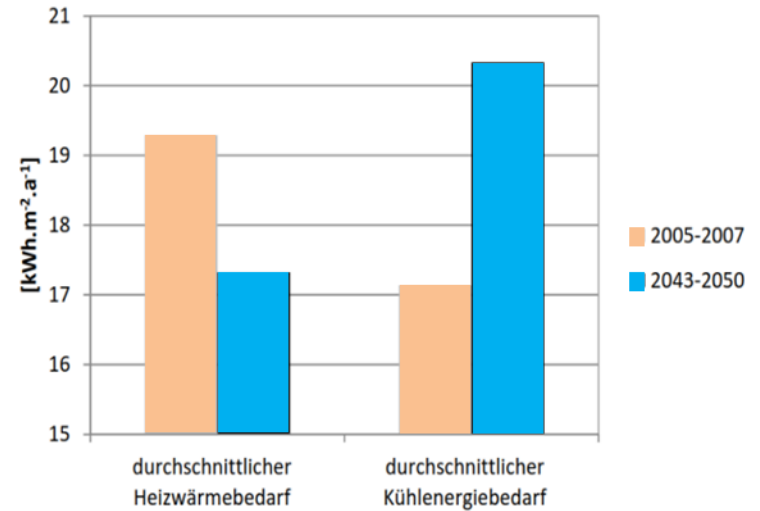
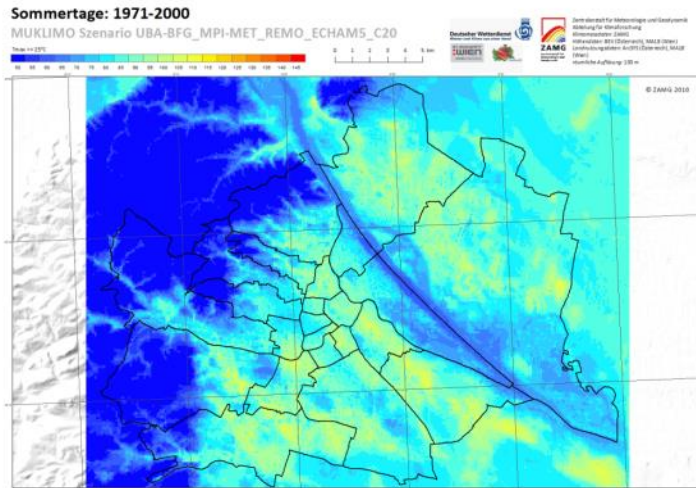
- **Town Planning & infrastructure**
- **Energy**
- **Health**
- **Water Resources & Water Management**
- **Green (Agriculture, Forestry, ...)**

Important approach:

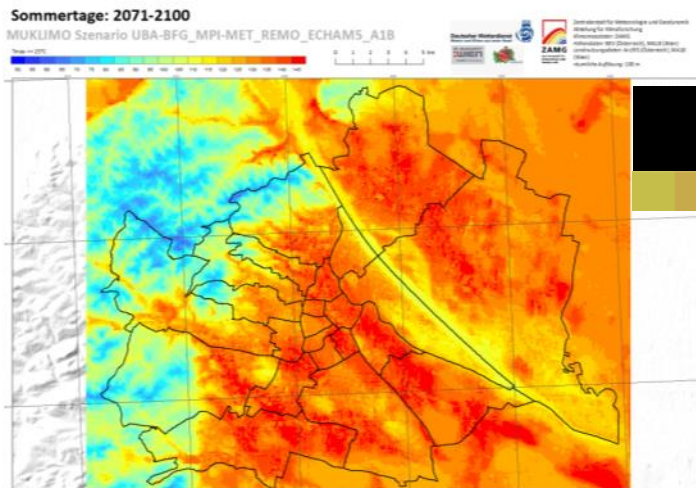
- **Nature based solutions,**
- **Urban Green Infrastructure**



Changing framework conditions



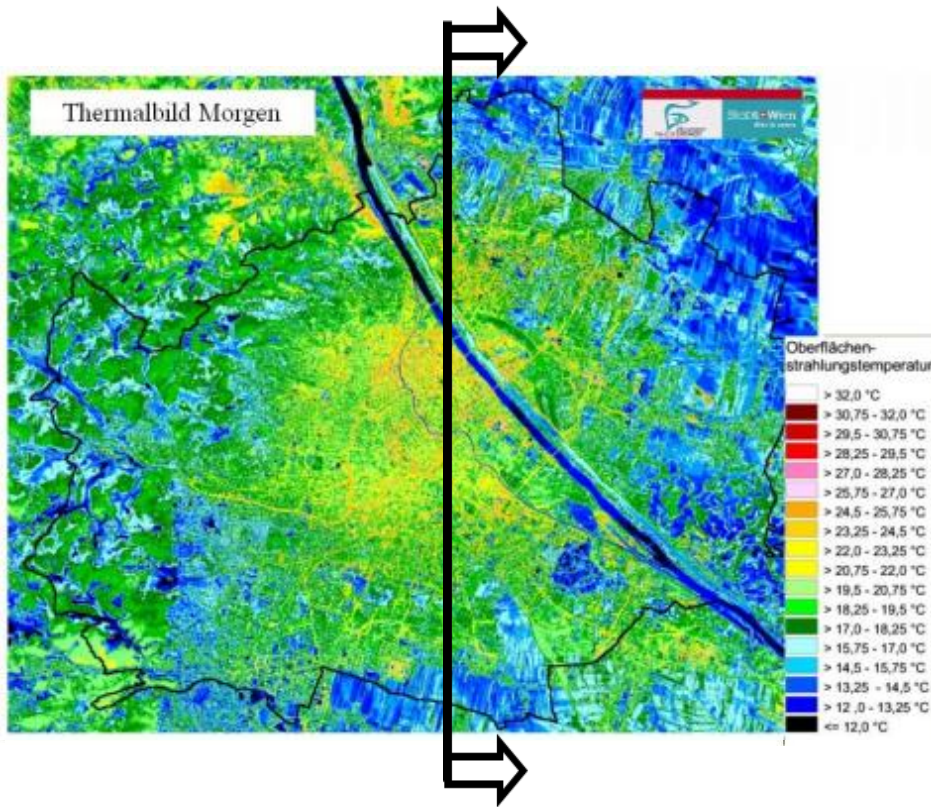
Energy supply for heating and cooling during cooler and hotter years - today and in the future (Source: AIT)



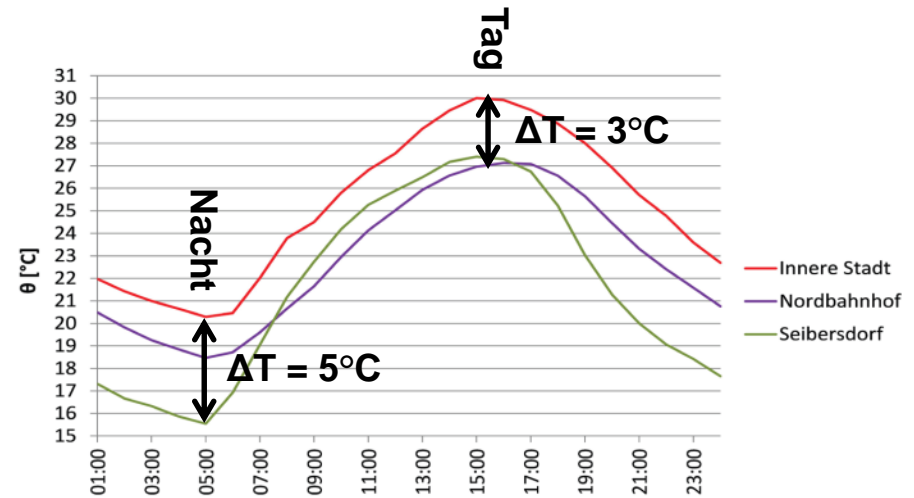
Five°

MUKLIMO Szenario
Reference Simulation 1971–2000 (top left)
and A1B-Szenario 2071–2100 (bottom left)
(© ZAMG)

Background 2: Urban Heat Islands



Thermal image of Vienna and surroundings day / night. There is a noticeable difference between the urban agglomeration and the cooler rural areas



Average hourly temperature distribution on a given day in the summer of 2012 – pictured here are two selected areas in Vienna (see chapter 4) compared to a rural area at Seibersdorf

Source: Vienna University of Technology

Five + Five °

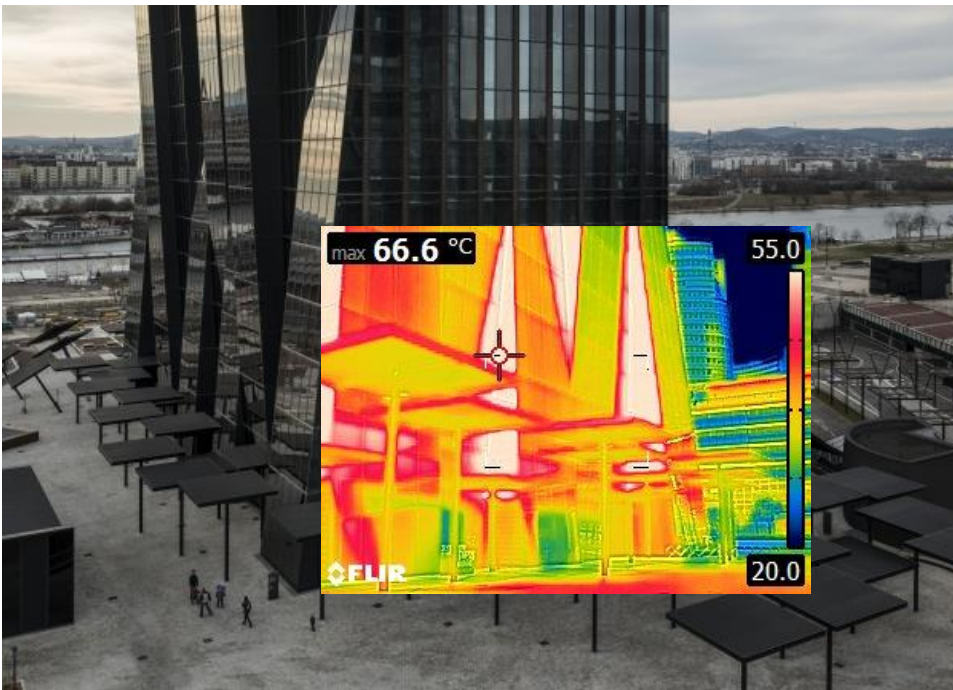
Different climate- relevant approaches

Technical



“Nature Based”

DC Tower 1



© www.energy.at

- ! water
- ! radiation
- !! wind

Five + Five °

Danube Flats



Green concept

Etwa 500 Wohneinheiten
samt Terrassen

STRATEGIE

- 🌿 Eigens geplante
Bepflanzungsart
- 🌿 Punktuelle Bepflanzung
Sonderform der
Fassadenbegrünung
- 🌿 Grüne Sockelzone - und
Freiraume

© soravia

Government Resolution 2015 (Vienna city council)

A political order to implement NBS- Measures

*“Creation of **air-conditioning systems** in densely built urban areas through **vertical green areas and roof greening.**”*

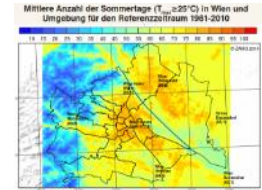
*“Promising measures from the **UHI strategy plan** are being implemented to prevent heat islands in the city.”*

UHI-adaptation & mitigation: Strategy

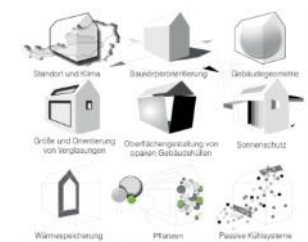
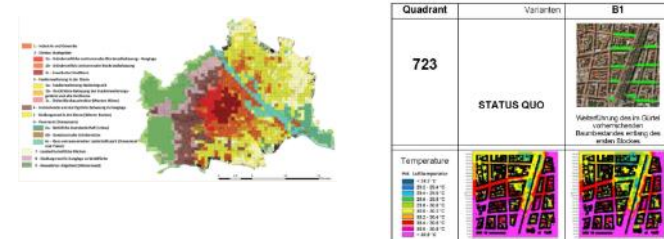
PRODUCT OF COOPERATIVE WORK!

- ← ZAMG: MUKLIMO_3
- ← TU: Urban fabric types
- ← TU, BOKU: ENVI-MET
- ← DonauUni: smartKB*

.....



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



UHI-adaptation & mitigation: Strategy



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

37 MEASURES

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FIELDS OF ACTION

- Strategic urban Development
- Master Plans, Mission statements
- Green & open space planning
- Building planning and construction

ACTIVE INFORMATION WORK

UHI-adaptation & mitigation measures: implementation

Planning levels in the city relevant for > UHI



Strategic urban development

Master Plans and urban design concepts

Land use and development plans

Green and open space planning

Building planning and design

City wide



Urban District /Quarter



Urban Quarter /
Neighbourhood



Neighborhood / plot

source: from top to bottom: Stadtentwicklung Wien, Magistratsabteilung 18 – Stadtentwicklung und Stadtplanung, 2014, STUDIOVLAY; Stadtentwicklung Wien; Büro tilia; Jürgen Preiss, MA 22

STEP 2025

Urban Development Plan



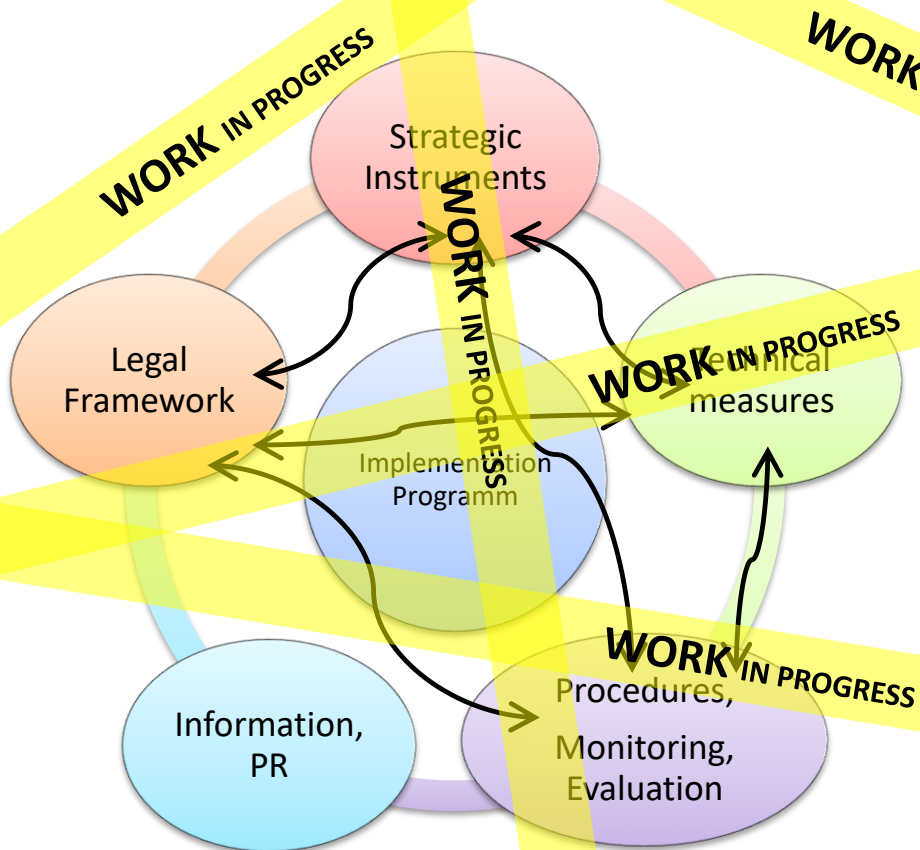
UHI – a key objective:

“city green instead of air conditioning”,

*"Improving the comfort of public spaces by protecting them against summer overheating (for example by **adequate greening**, shading and ventilation, adequate choice of materials) and **greening measures for buildings (facades, roofing, roof gardens).**"*

(See: STEP 2025 chapter 3.2 Vienna coming alive –open spaces: green & urban, pp 79 and 82)

UHI-adaptation & mitigation: Program

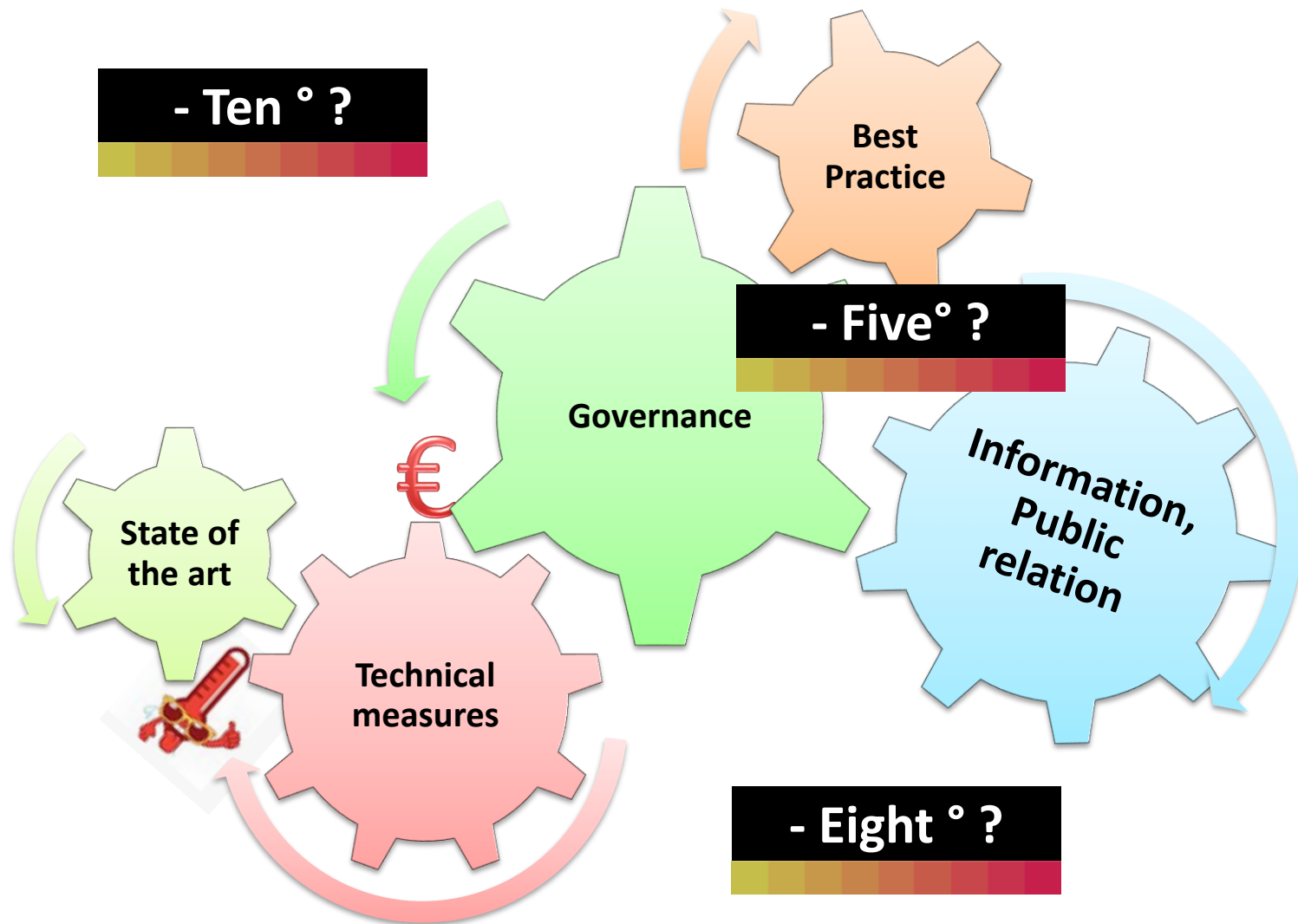


Program implementation-
Process =

- Cross-oriented
- Interdisciplinary,
- Integrative,
- interactive

- Three °

Process of implementation



NBS to counteract UHI's potentials

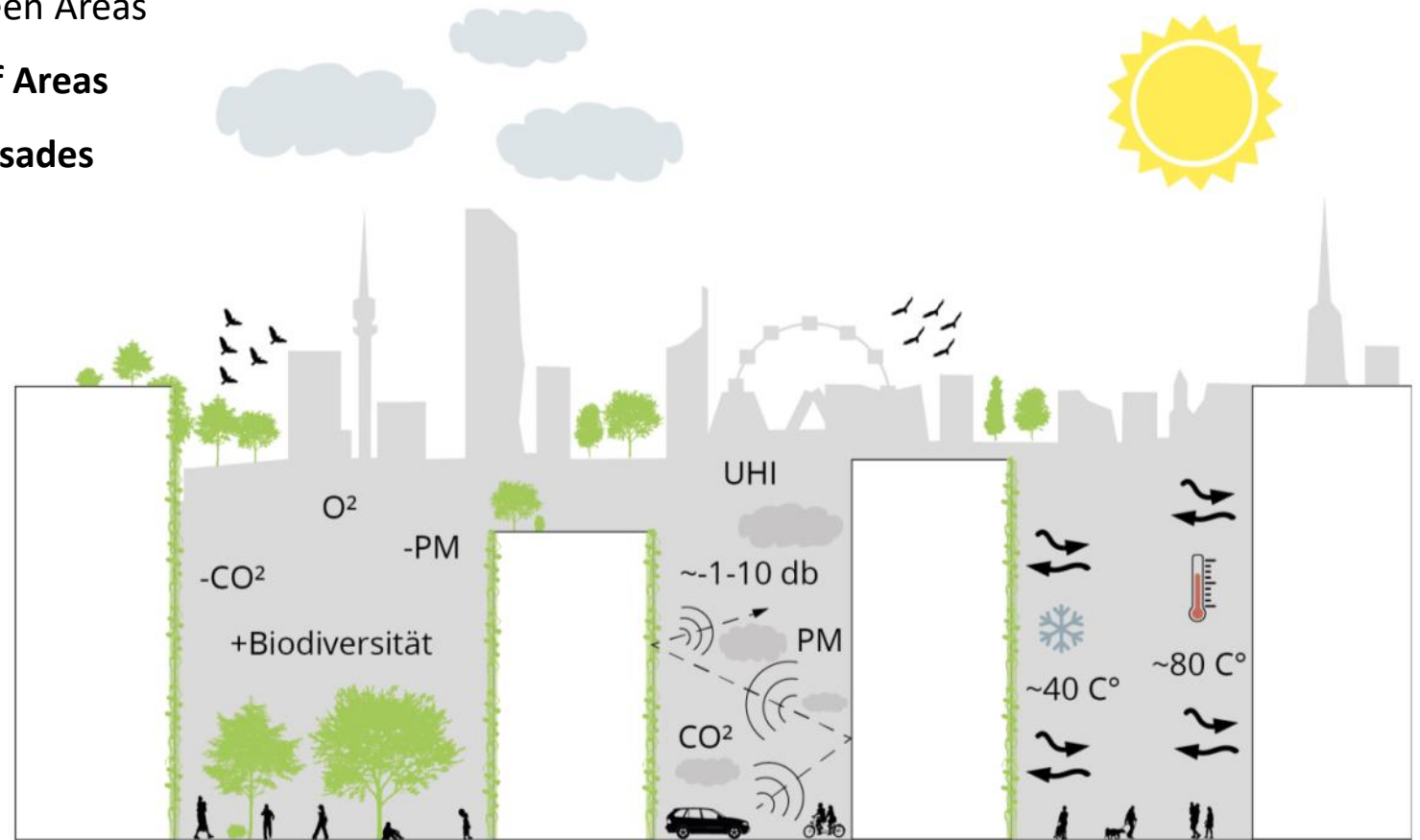
Vienna:

41.000 ha Total Area

19.000 ha Green Areas

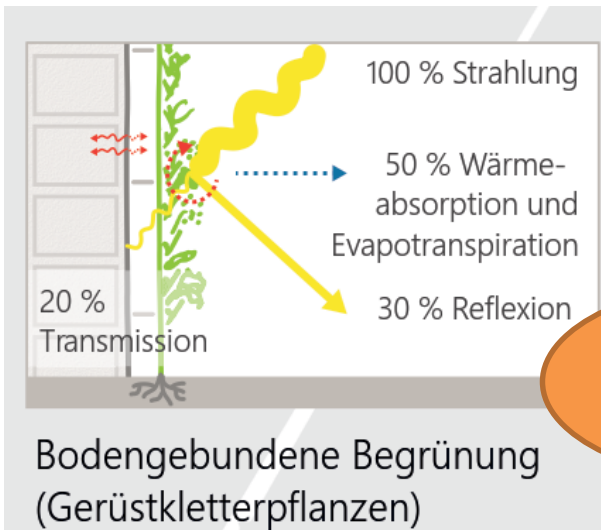
5.700 ha Roof Areas

12.000 ha Fassades



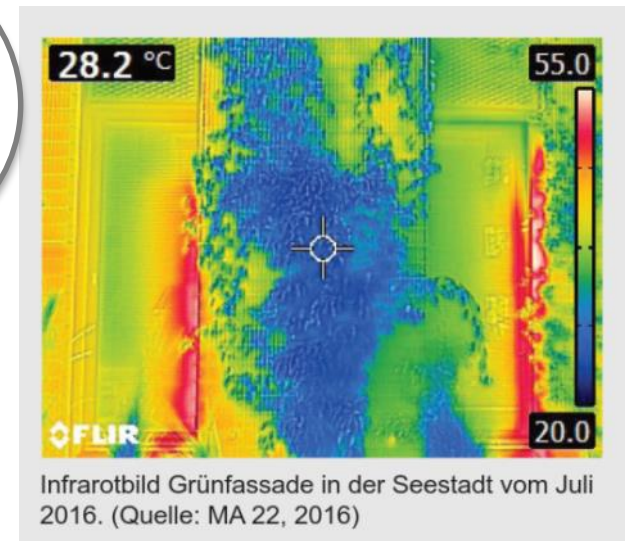
© Pfoser 2012, Änderungen: MA 22

Climatic effect of Green Infrastructure

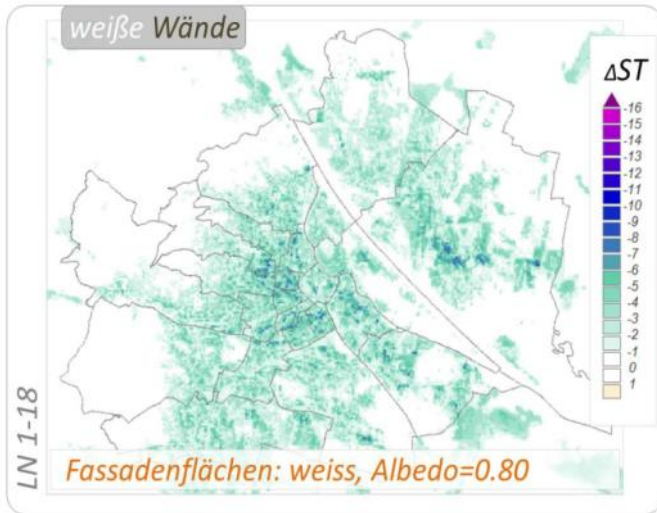



Saving Energy

Protecting the climate



Climatic effect of Green Infrastructure



 -7 summerdays

White Walls: Albedo 0,8 effects

→ moderate effect

→ **Reflection!** (Source: ZAMG, 2015)



Climatic effect of Green Infrastructure

6., Einsiedlergasse

MA 48 – Wastemanagement Department

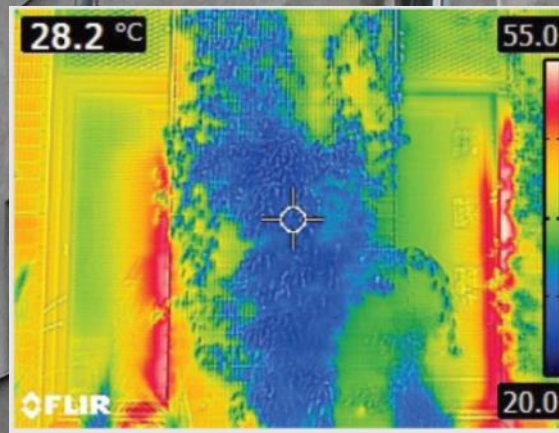
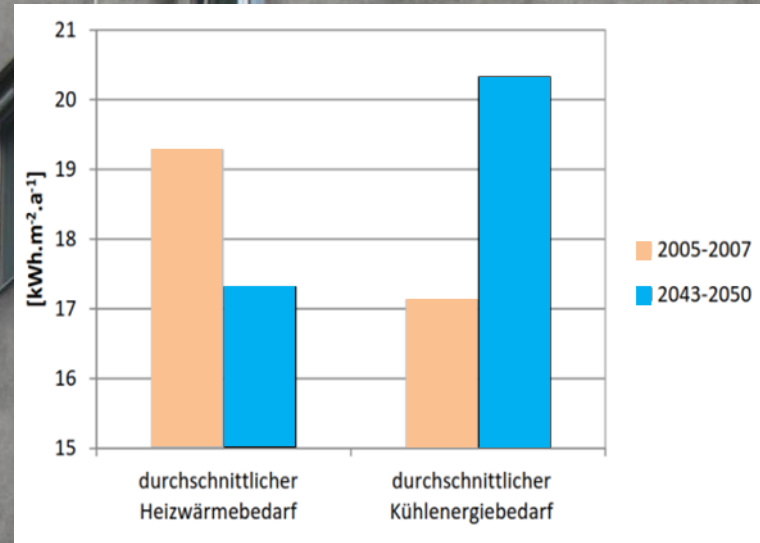
Building Renovation 2010



ausgenommen
Zustelldienste

Anfang

“City green instead of Airconditioning”



ausgenommen
Zustelldienste
Anfang

6., Einsiedlergasse
MA 48 Müll- und Abfallbeseitigung

Climatic effect of Green Infrastructure

6., Einsiedlergasse

850 m² Living Wall (2010)

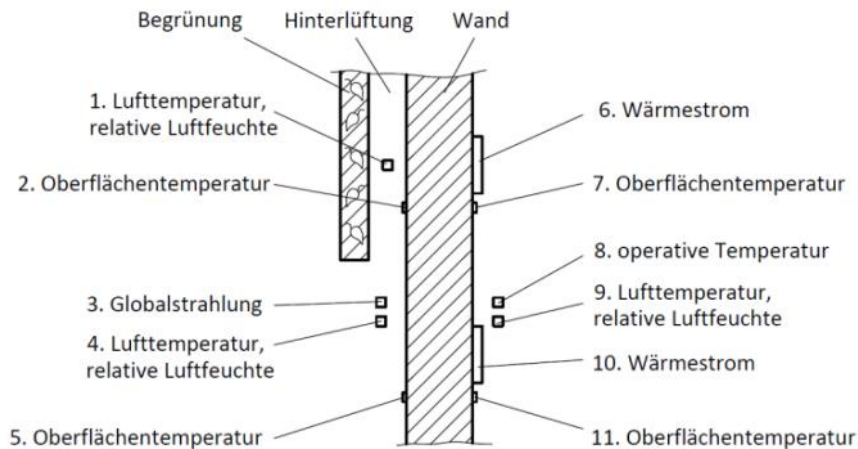
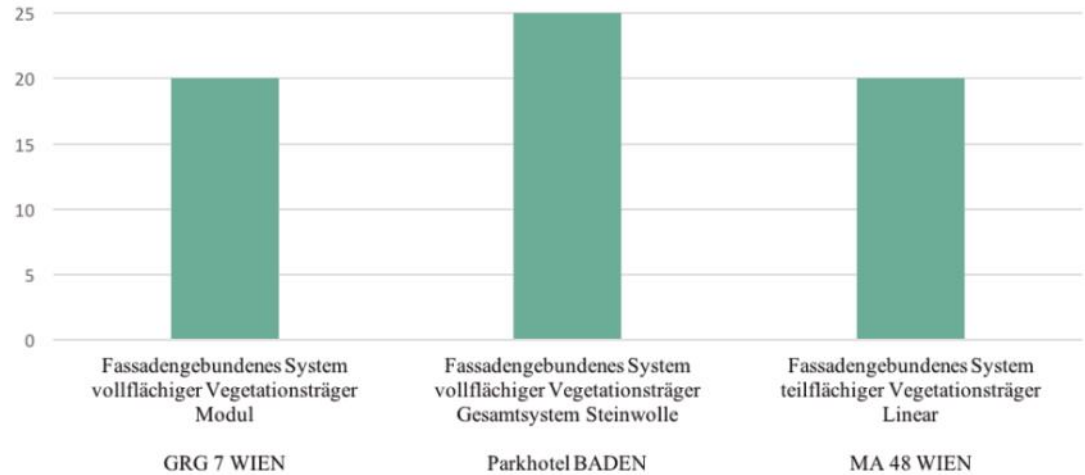
- 50 % less heatflux (W/m²) during summer.
- 20 % less heatflux in winter
- Protection of the building against overheating in summer.
 - Evaporation of 3.600 liters water daily corresponds to 75 cooling units with 3.000 W cooling capacity / 8 hours.
- Natural conditioning System

© MA 22

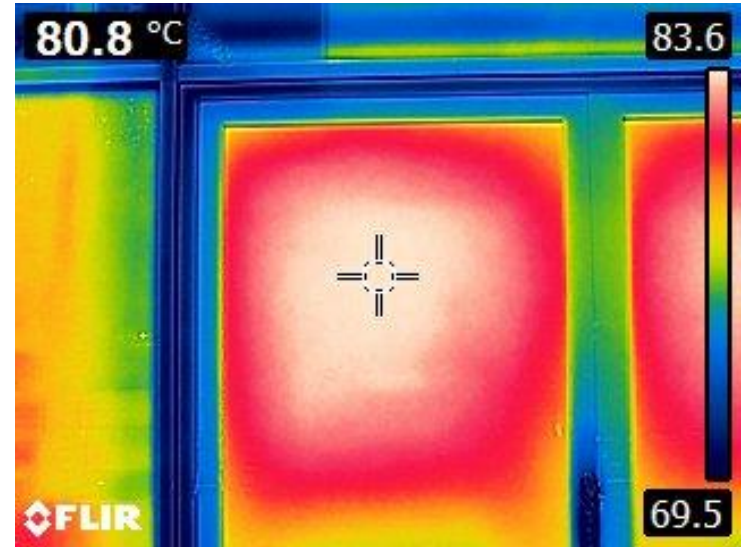
Climatic effect of Green Infrastructure



Verbesserung Wärmedurchgangskoeffizient (U-Wert) im Vergleich zu unbegrünter Fassade - WIEN (%)



Improvement U-Value (%) in comparison with a common facade | © KORJENIC et al., on behalf of MA 22, 2015



Climatic effect of Green Infrastructure

6., Grabnergasse (2016)



© MA 22

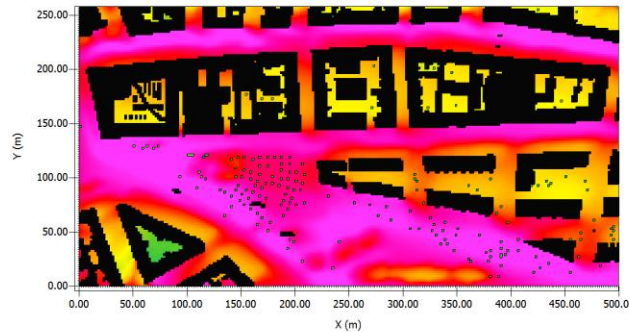
Climatic effect of Green Infrastructure

6., Grabnergasse (2016)

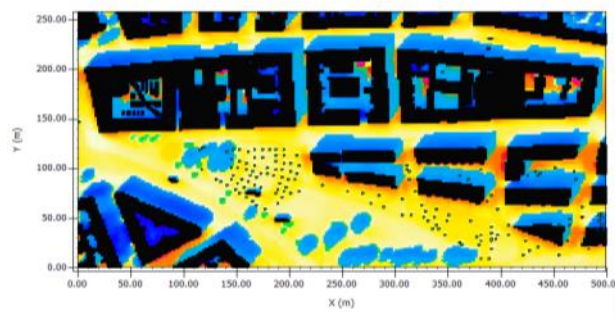


© MA 22

Simulation tools



Δ 3 ° Airtemp!

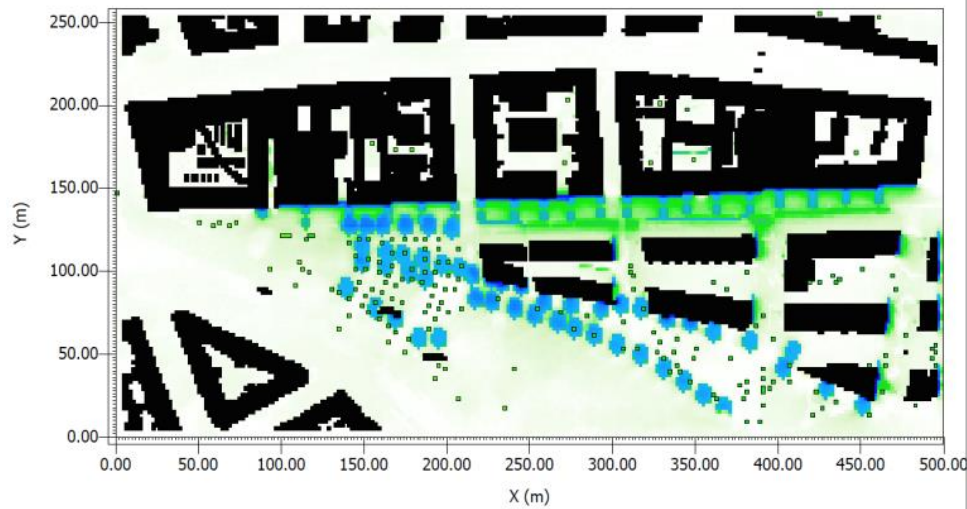


Δ 20 ° PET!

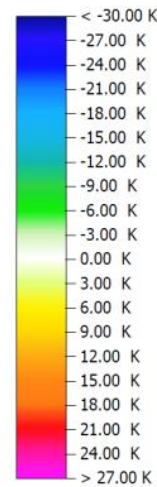
GI retrofit at Aspangstraße:
Simulated air temperature / PET
at 2 m height, 3:00 pm
(source: ENVI-MET 2017).



Simulation tools



absoluter Unterschied PET

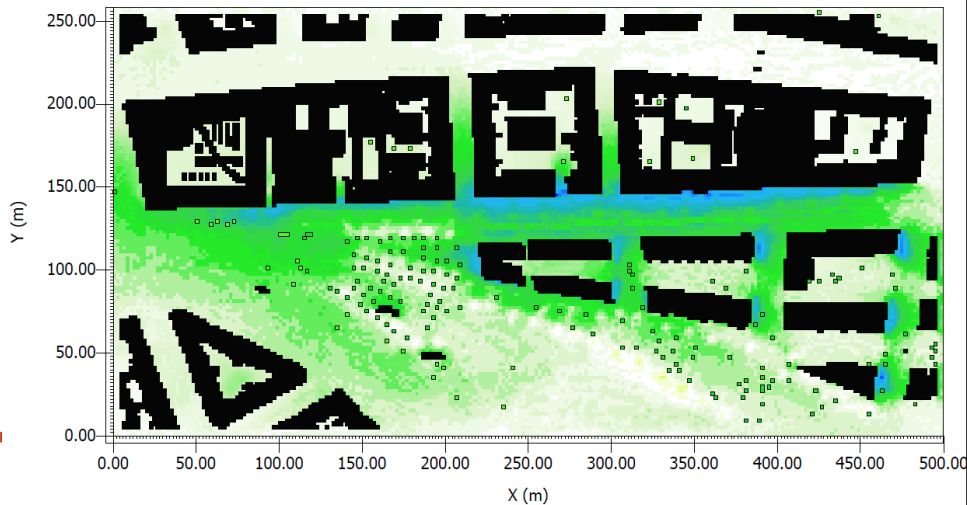


Min: -32.06 K
Max: 2.40 K

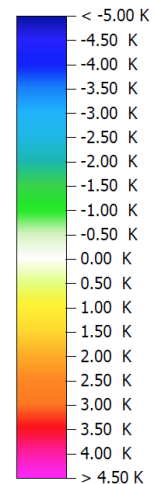
Differences
variant 1 – status quo
(source: ENVI-MET 2017).



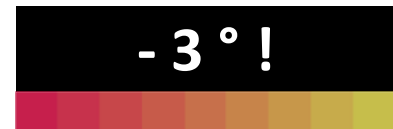
Δ PET 1:00 pm



absoluter Unterschied PET



Min: -3.90 K
Max: 0.59 K



Δ PET 10:00 pm

20., Dresdnerstraße Green Roof MA 22 (2008)



20., Dresdnerstraße Green Roof MA 22 (2008)

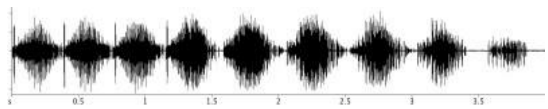


Halictus simplex
Halictus subauratus
Lasioglossum calceatum
Bombus terrestris

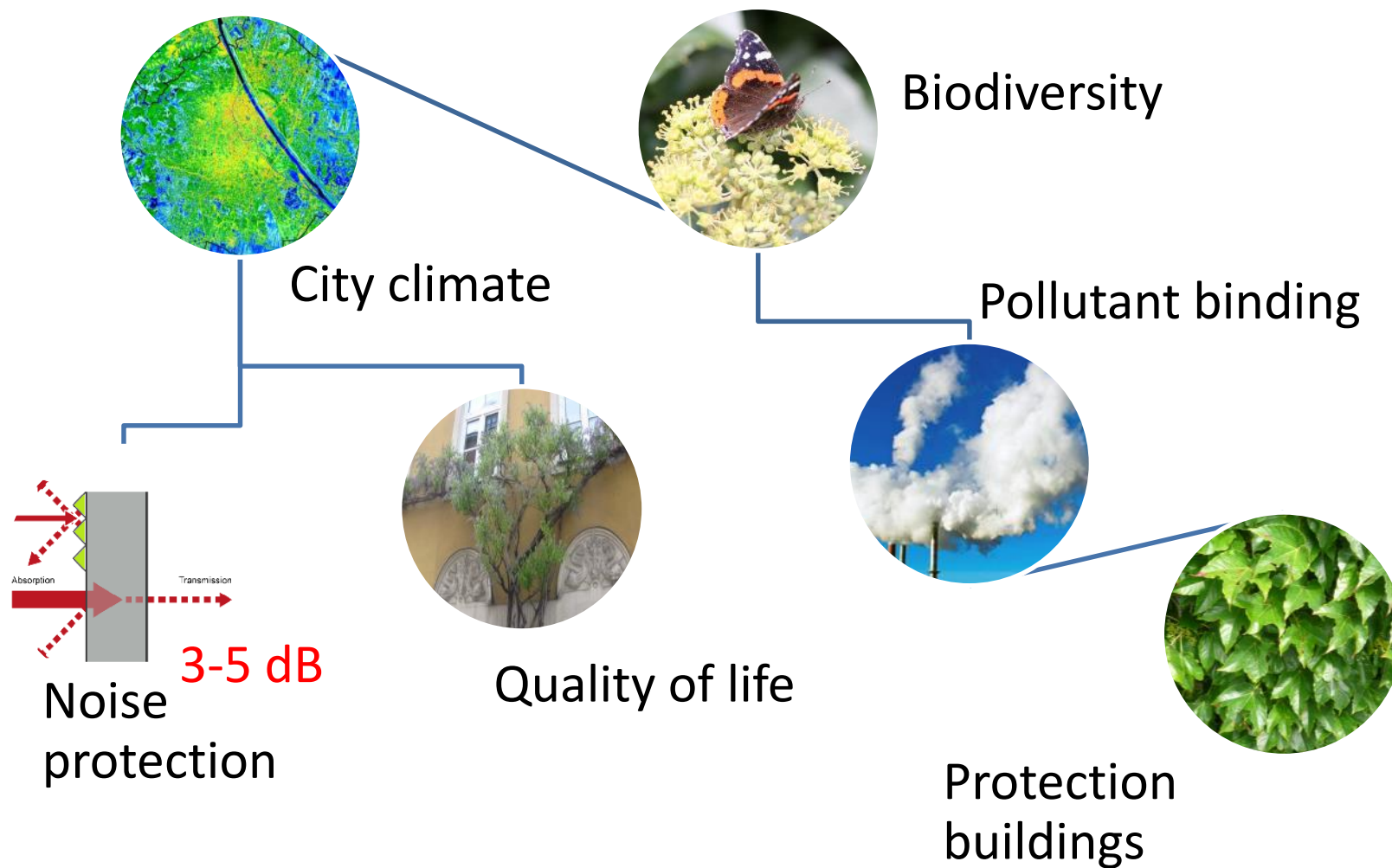


Sphex funerarius

Andrena minutula
Andrena tibinalis
Chorthippus mollis mollis



NBS: Holistic approach, synergies



NBS: Holistic approach



© MA 22

Perspectives



© Stefano Boeri Architetti: Liuzhou Forest City south of China



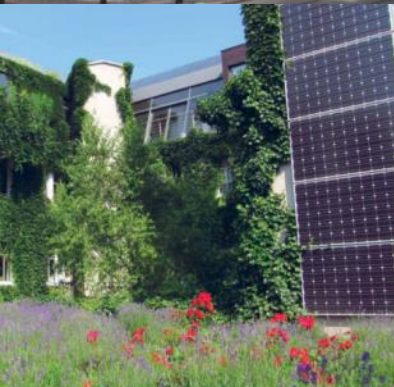
Hundertwasserhaus 1985



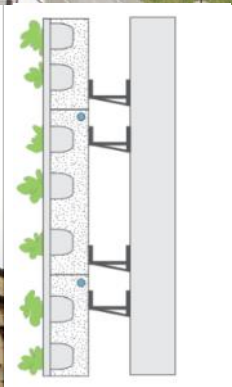
Al Erlaa 1978 - 1985



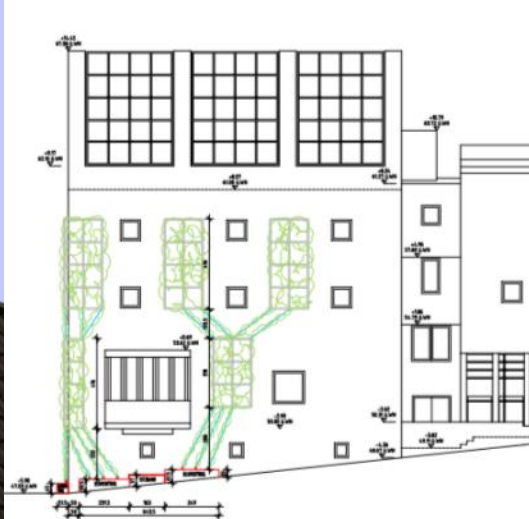
MA 48 Müll- und Abfallbeseitigung 2010



MA 31 Wiener Wasser 2015



Coca Cola © schreinerkastler.at



ANSICHT KÖHLERGASSE (OSTANSICHT)



Cool down now!

MA 22 Green Roof 2009