

Nature-based Solutions in Action

Lessons from Central European Cities



Project partners



What actually works on the ground?



Technical solutions

1. Climate-adapted green roofs & façades



Lightweight green roofs for existing buildings

→ **Zagreb** (Wooden Skyscraper): polystyrene foam planters enabled greening despite strict load limits.



Highly replicable for post-war / heritage buildings.

The original design solution from BIRO studio, the Urban Gardens' horticulture was designed by Maja Subotić and the roof greening was carried out by  Tanja Herr, Green Box d.o.o (GreenScape CE HOST)



Bio-based and modular systems

→ **Milan** (Via Russoli): lightweight bio-based insulation + green roofs (rooftop farming) integrated with energy retrofit.



Prefabricated façade modules made from bio-based materials, including insulation derived from rice husks and straw.

The architectural design was developed by  RiceHouse Srl (GreenScape CE HOST, which also produces the bio-based insulation modules used in the project.



Vertical greening adapted to harsh climates



The green wall designed by Arch. Bartek Dankiewicz, iqgarden.pl (GreenScape CE HOST)

→ **Warsaw** (Rotunda PKO): 30 cm substrate, evergreen species, winter-resistant systems tested also with universities.

2. Smart water management (blue-green integration)



Rainwater harvesting + reuse



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→ **Warsaw** (Rotunda PKO): rainwater stored under the building, filtered and reused for irrigation.



Retention and flood control integrated into parks

→ **Ptuj** (Ljudski vrt): historic pond + new dry retention basin (≈5,000 m³) to reduce flood peaks.



Digital irrigation & monitoring

→ **Milan & Warsaw**: sensor-based systems ensuring plant survival and reducing water waste.

3. Nature-based cooling & microclimate regulation



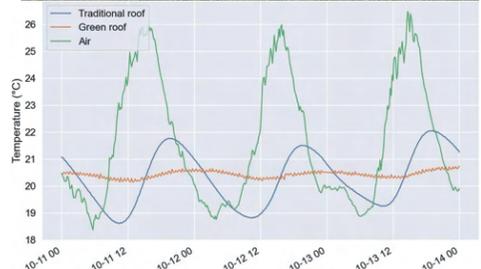
Measured thermal benefits



→ **Warsaw**: cooling demand -60% (Warsaw green walls)

→ **Milan**: indoor temperature -3 to -4°C in summer

Environmental monitoring conducted in the green terrace of Villaggio Barona, Alberto Tavazzi (GreenScape CE HOST) 

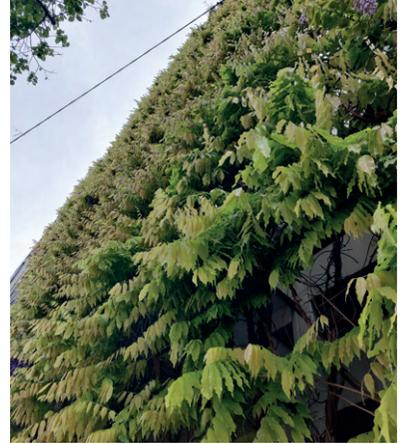


©D.4.3. Empirical results from Milan's monitoring campaign - Horizon 2020 CLEVER Cities project



Species selection matters

→ **Ptuj** & **Vienna**: drought-tolerant trees (honey locust, hackberry) outperform traditional species.



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4. Maintenance-aware design



Resilient low-tech solutions outperform fragile systems



→ **Vienna**: ground-based climbers more resilient than planter or wall-based systems.



Design failures as lessons learned

→ **Ptuj** (lack of irrigation system for tree) and **Vienna** (overflow issues) highlight the need to design for maintenance, not just installation.



5. Nature based Design Solutions



Water elements are powerful urban cooling tools

→ **Szeged** – Móra Ferenc Park fountain

Integrating fountains and drinking water infrastructure creates cooling zones that increase comfort during heat waves and encourage public use of green spaces.



Multi-functional urban infrastructure increases NbS impact

→ **Szeged** – Green tram lanes and permeable pavements

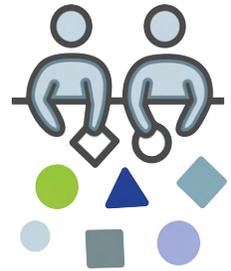
Transport infrastructure can be combined with vegetation (e.g., tram corridors) to regulate microclimate and reduce heat in dense urban areas without requiring additional land.



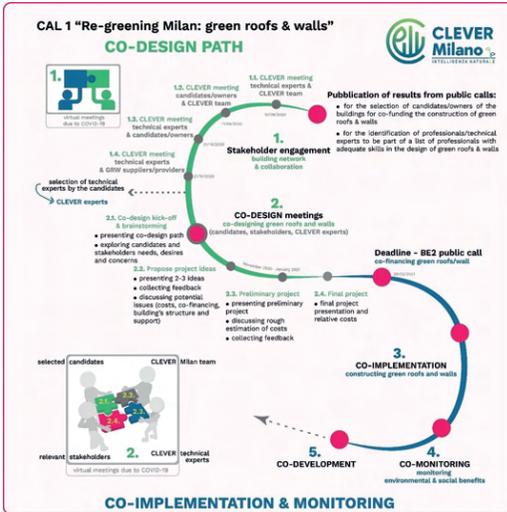
How people are involved – or not?

6. People make NbS last

Deep participatory processes



Engagement solutions



→ **Milan** (Via Russoli and Villaggio Barona): 5 months of co-design with residents, NGOs, universities.

→ Result: pride, stewardship, social cohesion.

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Target-group specific engagement

→ **Milan (Villaggio Barona)**: tailored methods for elderly, people with psychiatric illnesses, people with HIV/AIDS and caregivers.



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7. Grassroots initiatives can lead innovation



Bottom-up leadership

→ **Zagreb**: tenant-led initiative, volunteers + sponsors, no public funding.



Community as long term manager

→ **Milan**: Residents not only co-design but maintain the space.

8. Expert-led but publicly accessible models

High-tech, low participation spaces

→ **Warsaw**: expert-designed, privately managed, but fully public space



Communication reduces resistance to urban transformation

→ **Szeged**: Mora Ferenc Park redevelopment

Before reducing traffic and redesigning the park, the city conducted communication campaigns explaining the expected

How these projects were actually paid for?



9. Blended financing = scalability

Milan's layered public funding



Comune di
Milano

Incentive of the public call BE2 30% of subsidy for funding the overall intervention of a green roof or wall.

It did not finance the structural interventions if necessary.

Financial solutions



Comune di
Milano

Incentive of the public call BE2 increased to 35% of subsidy for funding the overall intervention of a green roof or wall & the interventions needed to make a green roof usable (staircase, rooftop fences etc.) if the project would participate in the CLEVER Cities co-creation pathway

It did not finance the structural interventions if necessary.

+



The technical support: the design fee for one of the CLEVER experts

It financed the structural interventions.

10. Fully private investment

Corporate-led NbS

→ **Warsaw (PKO Bank):** ~1 M euro private investment

Effective where branding, visibility and ESG goals align.

11. Low-budget, high impact citizen funding

In-kind + sponsorship models

→ **Zagreb:** materials + volunteer labor + private sponsors (IKEA, Green Box)

Ideal for pilot actions and replication

12. Embedded municipal funding

NbS without explicit NbS labels

→ **Ptuj and Vienna:** green elements embedded in standard urban renewal budgets

Shows NbS can be mainstreamed, not always “projectized”.